

DOE/NV/10081--1

DE84 010540

SWEET LAKE
GEOPRESSEDURED-GEOTHERMAL PROJECT
MAGMA GULF-TECHNADRIL/DOE AMOCO FEE

VOLUME I

DRILLING AND COMPLETION
TEST WELL AND DISPOSAL WELL

ANNUAL REPORT
for the period
1 December 1979 - 27 February 1981

R.W. RODGERS
Editor

Magma Gulf-Technadril
430 Hwy. 6 South, Suite 208.
Houston, Texas 77079

Prepared for the
U.S. Department of Energy
Division of Energy Technology
Under Contract DE-AC08-80NV10081

MASTER

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

P R E F A C E

This report was compiled by Magma Gulf - Technadril, Houston, Texas, as a part of the program tasks under Contract No. 12E-AC08-80NV10081. Material compiled in the report is from work done by Magma Gulf Co., Magma Gulf - Technadril, subcontractors to Magma Gulf - Technadril under Contract No. DE-AC08-80NV10081, and subcontractors to Magma Gulf - Technadril under Gas Research Institute Contract No. 5014-321-0290.

This report is effectively an extended annual report summarizing the activity under the contract from its inception December 1, 1979 through the completion of drilling activities and production well rig release February 27, 1981. During this period, one additional report was submitted to DOE, the Geopressed-Geothermal Drilling and Testing Plan, MG-T/DOE Amoco Fee #1, Cameron Parish, Louisiana, submitted July, 1980.

TABLE OF CONTENTS

	<u>Page</u>
LIST OF FIGURES	v
LIST OF TABLES	vi
1.0 <u>SUMMARY</u>	1-1
2.0 <u>INTRODUCTION</u>	
2.1 Background	2-1
2.2 Program Objectives	2-2
2.3 Well Locations	2-2
3.0 <u>DRILLING OPERATIONS SUMMARY</u>	
3.1 MG-T/DOE AMOCO Fee No. 1 Test Well	3-1
3.2 MG-T/DOE AMOCO Fee No. 2 Salt Water Disposal Well	3-1
4.0 <u>GEOLOGY</u>	
4.1 Regional Geological Setting	4-1
4.2 Geology of the Sweet Lake Area	4-1
4.2.1 Subsurface Geology	4-1
4.2.2 Geothermal Gradient and Temperature	4-5
4.2.3 Geopressure Distribution	4-7
4.2.4 Sand Characteristics	4-12
4.2.5 Fluid Salinity	4-15
4.2.6 Petroleum Production	4-17
4.2.7 Basin Size	4-17
4.3 Seismic Evaluation	4-20
4.3.1 Procedure	4-23
4.3.2 Geology	4-23
4.3.3 Velocity Function	4-23
4.3.4 Migration	4-26
4.3.5 Geological-Geophysical Interpretation	4-26
4.4 Conclusions	4-26
5.0 <u>GENERAL SITE ACTIVITIES</u>	
5.1 Site Preparation	5-1
5.2 Trailers	5-3

	<u>Page</u>
5.3 Communications	5-3
5.4 Power	5-3
5.5 Water Supply	5-3
5.6 Sanitation	5-4
5.7 Site Clean Up and Restoration	5-4
 6.0 <u>OCCUPATIONAL SAFETY AND HEALTH</u>	
6.1 General	6-1
6.2 Site Access	6-1
6.3 Fire Protection	6-1
6.4 Industrial Hygiene	6-1
6.5 Safety Hazards	6-1
6.5.1 Hydrogen Sulfide	6-1
6.5.2 Blowouts	6-2
 7.0 <u>MG-T/DOE AMOCO FEE NO. 1 TEST WELL - DRILLING AND COMPLETION</u>	
7.1 Introduction	7-1
7.2 Interval to 20" Casing Point	7-1
7.3 Interval to 13 3/8" Casing Point	7-1
7.4 Interval to 9 5/8" Casing Point	7-2
7.5 Interval to 7 5/8" Casing Point	7-3
7.6 Sidetracked Interval to 7 5/8" Casing Point	7-6
7.7 Interval to 5 1/2" Liner Point (Total Depth)	7-8
 8.0 <u>MG-T/DOE AMOCO FEE SALT WATER DISPOSAL WELL</u>	
8.1 Introduction	8-1
8.2 Interval to 13 3/8" Casing Point	8-1
8.3 Interval to 9 5/8" Casing Point (Total Depth)	8-1
 <u>APPENDIX A - TEST WELL</u>	
A.1 Time Utilization Diagrams	A-1
A.2 Site and Rig Layout	A-9
A.3 Rig Specifications	A-12
A.4 Producing Well Diagram and Wellhead	A-15
A.5 Wire Line Operations	A-19
A.6 Directional Surveys	A-21
A.7 Bit Record	A-30

	<u>Page</u>
A.8 Mud Report	A-34
A.9 Casing and Cementing Reports	A-61
A.10 5 1/2" Tubing and Liner Specifications	A-70
A.11 Coring Procedure	A-73
A.12 Core Analysis Report	A-78
A.13 Temperature Surveys	A-103
A.14 Perforating Procedure	A-105
A.15 Daily Drilling Progress Report	A-109
 <u>APPENDIX B - SALT WATER DISPOSAL WELL</u>	
B.1 Time Utilization Diagram	B-1
B.2 Rig Specifications	B-5
B.3 SWD Well Diagram and Wellhead	B-8
B.4 Wire Line Operations	B-12
B.5 Directional Survey	B-14
B.6 Bit Record	B-17
B.7 Casing Record	B-19
B.8 Cementing Record	B-24
B.9 Side Wall Cores	B-31
B.10 Perforating Procedure	B-35
B.11 Daily Drilling Progress Report	B-38
B.12 Casing and Tubing Summary	B-44
 <u>APPENDIX C - PALEO DATA</u>	
C-1	
 <u>APPENDIX D - GEOCHEMICAL ANALYSIS (SUMMARY)</u>	
D-1	
 <u>APPENDIX E - LOG ANALYSIS REPORT</u>	
E-1	
 <u>APPENDIX F - SAND CONTROL REPORT</u>	
F-1	
 <u>APPENDIX G - TEST WELL COMPLETION RECOMMENDATIONS -</u>	
<u>PROPOSED PRODUCTION INTERVAL</u>	
G-1	
 <u>APPENDIX H - DISPOSAL WELL COMPLETION RECOMMENDATIONS -</u>	
<u>PROPOSED INJECTION INTERVAL</u>	
H-1	
 <u>APPENDIX I - TEST PROCEDURE EVALUATION - TEST WELL</u>	
I-1	

LIST OF FIGURES

<u>Figure No.</u>		<u>Page</u>
3-1	Location of Test Well in Cameron Parish, Louisiana	3-2
3-2	Location of Salt Water Disposal Well	3-3
4-1	Structure Map Contoured on Top of Miogyp Sand	4-3
4-2	Induction Log of Miogyp Sand	4-4
4-3	Isothermal Map of Miogyp Sand	4-6
4-4	Subsurface Temperatures from 18 Deep Wells in Southern Louisiana	4-8
4-5	Pressure Expressed as Mud Weight (PPG): Well #3	4-9
4-6	Pressure Expressed as Mud Weight (PPG): Well #4	4-10
4-7	Pressure Expressed as Mud Weight (PPG): Well #5	4-11
4-8	Induction Log Cross Sections of Miogyp Sands in Test Well and Three Control Wells	4-13
4-9	Computed Pressure Drawdown Curve for 15,385'-15,415' Sand at a Flow Rate of 20,000 BPD	4-19
4-10	Area of Graben Contoured and Planimetered	4-21
4-11	Velocity Function -- North Sweet Lake Field	4-25
5-1	Location of Test Well	5-2

LIST OF TABLES

<u>Table No.</u>		<u>Page</u>
1	Measured and Calculated Porosities and Permeabilities	4-14
2	Calculated Salinities, PPM	4-16
3	Barrels of Water in Place for Miogyp Sands Under Area Shown in Figure 4-10	4-22
4	Velocity Function -- North Sweet Lake	4-24

1.0 EXECUTIVE SUMMARY

This report is an extended annual report covering the period from the inception of the contract on December 1, 1979, through the completion of drilling activities in February, 1981.

The Sweet lake site is located approximately 15 miles southeast of Lake Charles in Cameron Parish, Louisiana. It was selected by the Department of Energy under the Design Well Program of the Geopressured-Geothermal Energy Program. The Sweet Lake production well and disposal well were drilled under DOE Contract No. DE-AC08-80NV10081 to the Magma Gulf-Technadril Joint Venture. Additional funding was provided by the Gas Research Institute, under GRI Contract No. 5014-321-0290. These funds were used for mud logging, micropaleontology, organic geochemistry, and rock mechanics.

The Sweet lake site was selected to test the Frio Formation in Louisiana. The area was picked to optimize various important parameters. It was known from well logs that the pressures and temperatures are as high here as elsewhere in Louisiana, and thick, porous sands are present at an appropriate depth of 15,000' to 15,700'. Permeability data were unavailable but it was expected that the permeability in a sand of this type would be high. Salinity as calculated from well logs was expected to be 100,000 ppm.

A geological study by Magma Gulf Company under Contract No. ET-78-08-1561 showed that the major structure in this area is a graben. The dip of the beds is northwesterly into the basin. A well drilled into the deep basin would find the target sand below 18,000', at high pressures and temperatures. However, since there is no well control in the basin, the specific site was chosen on the 15,000' contour of the target sand in the eastern, more narrow part of the graben. Those key control wells are present within one mile of the test well. The information acquired by drilling the test well confirmed the earlier geologic study. The target sand was reached at 15,065', had a porosity of over 20% and a permeability to water of over 300 md. The original reservoir pressure was 12,060 psi and the bottom hole temperature 299°F. There are approximately 250 net feet of sand available for perforation.

The test well was spudded August 22, 1980. The well was drilled without incident to 13,550' when the well took a kick. A random sidetrack was started at 10,554' and reached a total depth of 15,740'. Three strings of pipe were used in this well: 13 3/8-inch from 4,050' to surface; 9 5/8-inch from 10,230' to surface; and 7 5/8-inch from 15,065' to surface; 7 5/8-inch from 15,065' to surface. The production tubing is a 5 1/2-inch liner from the plugged back total depth of 15,660' to the surface. Drilling operations were completed on February 26, 1981.

The disposal well was spudded on September 19, 1980 and was drilled to a total depth of 7440'. Two strings of pipe were used in the well: 13 5/8-inch from 1,375' to surface; and 9 5/8-inch from 7,436' to surface. The production tubing is a 7-inch liner set from plugged back total depth of 7350 to the surface. Drilling operations on this well were completed on October 13, 1980.

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 geopressured resources underlying the Gulf Coast region of the United States. Several investigators had recognized the energy potential and suggested that studies be conducted to assess the energy resource.

As a part of the Department of Energy (DOE) program, the Magma Gulf Company under Contract No. ET-78-C-08-1561, undertook a comprehensive study of the geopressured resources in the Sweet Lake geopressured-geothermal prospect located in northern Cameron Parish, Louisiana, in T 12 S, R 7 W, and T 12 S, R 8 W, approximately 15 miles south of Lake Charles, Louisiana.

As part of that program, ERDA issued a request for proposals in the spring of 1976. Magma Gulf responded with a proposal to drill and test two prospects with production wells, one in Louisiana and one in Texas. These were among several prospects that the Gulf Geothermal-Magma Gulf joint venture had identified in 1973-74 and leased in 1975. Magma Gulf's proposal for the Louisiana project was selected competitively for funding by ERDA in June 1977.

The Louisiana prospect, namely the Sweet Lake prospect, is located in northern Cameron Parish, Louisiana in T12S, R7W and T12S, R8W approximately 15 miles south of Lake Charles, Louisiana. The initial contract for a comprehensive geological and geophysical investigation using well logs and existing seismic data occurred under Contract E7-78-C-08-1561, beginning in June 1978.

The primary objective of the investigation was to select the optimum resource site for extensive studies, i.e., exploratory drilling, production testing, reservoir analysis, and environmental impact evaluation. A final report entitled "Analysis of Cameron Parish Geopressured Aquifer" was submitted to DOE in September, 1978.

The region is characterized by Cenozoic sand and clay deposits of geosynclinal thickness and differentially uplifted salt structures. The primary geopressured-geothermal aquifer is the "Miogyp" sand of the Camerina zone (Upper Frio formation of Oligocene-Miocene age).

The main prospect is located in a basin on the north flank of the Hackberry-Big Lake-Sweet Lake salt ridge. Interpretation of 27 miles of seismic lines and 17 deep well logs localized the prospect in a basin with northwesterly dip in a graben between east-west faults which converge eastward.

Aquifer depth ranges from 14,000 to 18,000 feet. Net sand thickness exceeds 400 feet, with 22 percent porosity. Temperatures range from 280°F (corrected) at 14,000 feet to 350°F at 18,000 feet. Geopressures occur below 9,000 feet, with mud weight equivalents in the sand from 15.5 to 16.5 pounds per gallon. Net sand volume of one cubic mile was estimated in the area mapped.

In order to conduct these studies, DOE executed a contract with Magma Gulf-Technadril (MG-T), a joint venture between Magma Gulf Company and Technadril, Inc., of Houston, Texas, to conduct the drilling, completion, and testing of one geopressured-geothermal well, the MG-T/DOE AMOCO Fee No. 1 well, and one disposal well in Cameron Parish, Louisiana. The contract was based on a proposal entitled "Analysis of Cameron Parish Geopressured Aquifer" submitted to DOE by Magma Gulf in June 1979.

2.2 PROGRAM OBJECTIVES

The objectives of the well drilling and testing program are to determine the following parameters:

- 2.2.1 Reservoir permeability, porosity, thickness, rock material properties, depth, temperature, and pressures.
- 2.2.2 Reservoir fluid content, specific gravity, resistivity, viscosity, and hydrocarbons in solution.
- 2.2.3 Reservoir fluid production rates, pressure, temperature, production decline, and pressure decline.
- 2.2.4 Geopressured well and surface equipment design requirements for high-volume production and possible sand production.
- 2.2.5 Specific equipment design for surface operations, hydrocarbons distribution, and effluent disposal.
- 2.2.6 Possibilities of reservoir compaction and/or surface subsidence.

2.3 WELL LOCATIONS

The test well MG-T/DOE AMOCO Fee No. 1, and the disposal well, MG-T/DOE AMOCO Fee No. 2, are located on a 5 acre test site approximately 15 miles south of Lake Charles, Louisiana, in the S 1/2, Sec. 13, T 12 S, R 8 W, on AMOCO fee land under geothermal lease to Magma Gulf Company.

3.0 DRILLING OPERATIONS SUMMARY

3.1 MG-T/DOE AMOCO FEE NO. 1 TEST WELL

The subject test well was spudded on August 22, 1980 and drilling operations were completed on February 26, 1981. This well, which is depicted in Figure 3-1, was drilled to a total depth of 15,740 feet with a random sidetrack at 10,564 feet.

The 13 3/8-inch casing was set at 4,050 feet and cemented from that depth to the surface. The 9 5/8-inch casing was cemented in at 10,230 feet. A 7 5/8-inch string, run as a liner, was cemented in at 15,065 feet, and then tied back to surface and cemented in the 9 5/8-inch casing to 5,600 feet.

The production tubing consists of a 5 1/2-inch liner cemented in place [Plugged Back Total Depth (PBDT) of 15,660 feet to 14,558 feet Top of Liner]. A Polished Bore Receptacle (PBR) was set on top of the liner at 14,534 feet. A 4 1/8-inch I.D. seal assembly is inside the PBR. The 5 1/2-inch tubing is hung off in the tubing hanger.

The 5 1/2-inch tubing was filled with about 300 barrels of 10.0 ppg salt water. The annulus between the 5 1/2-inch tubing and the 7 5/8-inch casing was filled (ca 190 bbls.) with a calcium bromide packer fluid with a 13.4 ppg density at 70°F. As the well heats up to 310°F, the calcium bromide will expand; the density will be reduced to about 12.5 ppg., and it will be necessary to bleed off about seven barrels of the fluid from the annulus to avoid excessively high pressures.

3.2 MG-T/DOE AMOCO FEE NO. 2 SALT WATER DISPOSAL WELL

The salt water disposal well was spudded on September 19, 1980 and completed drilling operations on October 13, 1980. This well, shown in Figure 3-2, was drilled to a total depth of 7,440 feet with a 12 1/4-inch bit.

The 13 5/8-inch casing was set at 1,375 feet and cemented back to the surface. The 9 5/8-inch casing was set at 7,436 feet and cemented back to 1,970 feet. The PBDT inside the 9 5/8-inch casing is 7,350 feet.

This well was completed with a Baker Model F packer set at 6,254 feet. It should be noted that the first packer failed to set and was pushed to PBDT. The production tubing in this well is 7-inch 23# K-55. The well was filled with an inhibited brine solution with a density of 9.5 ppg.

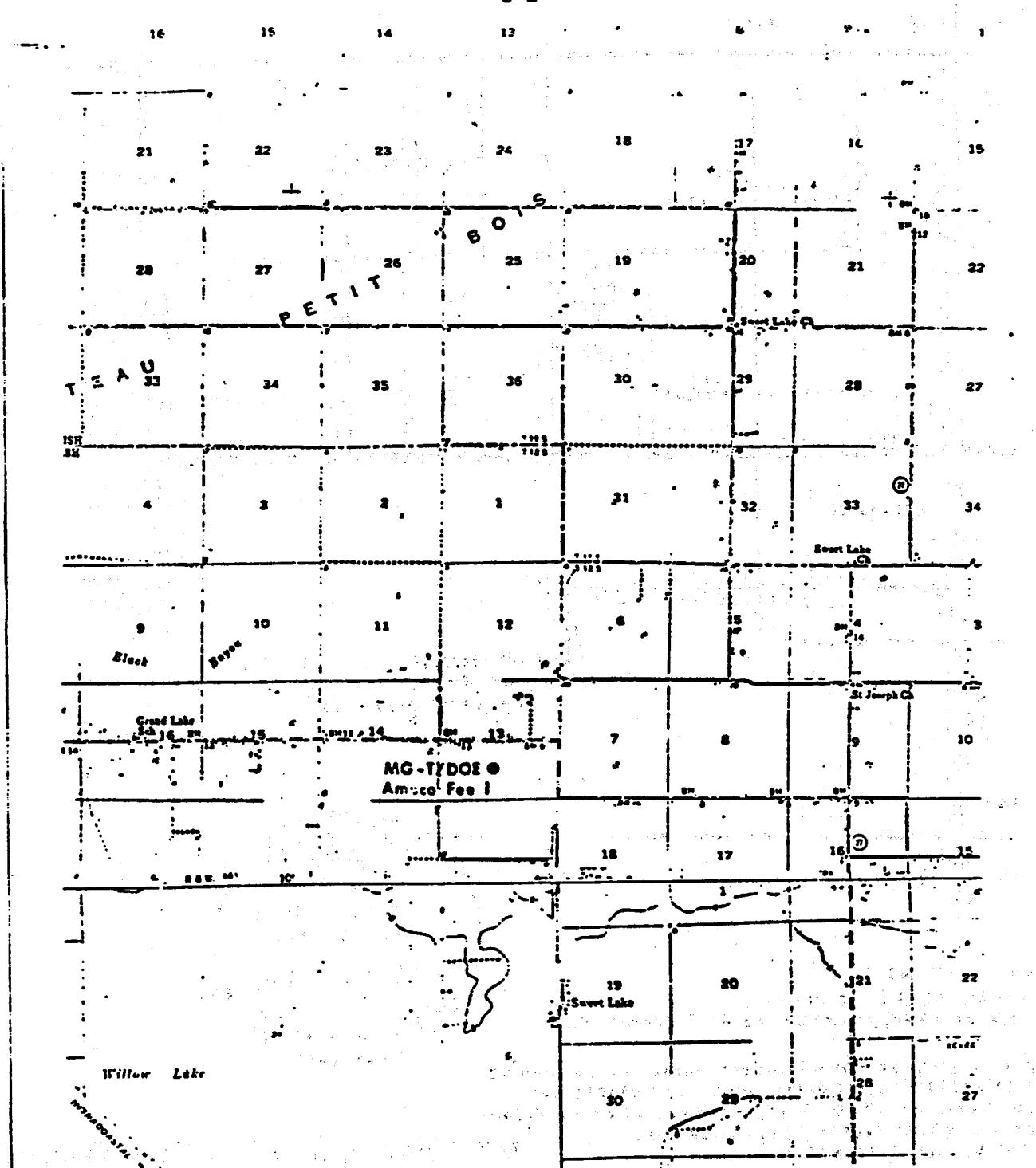
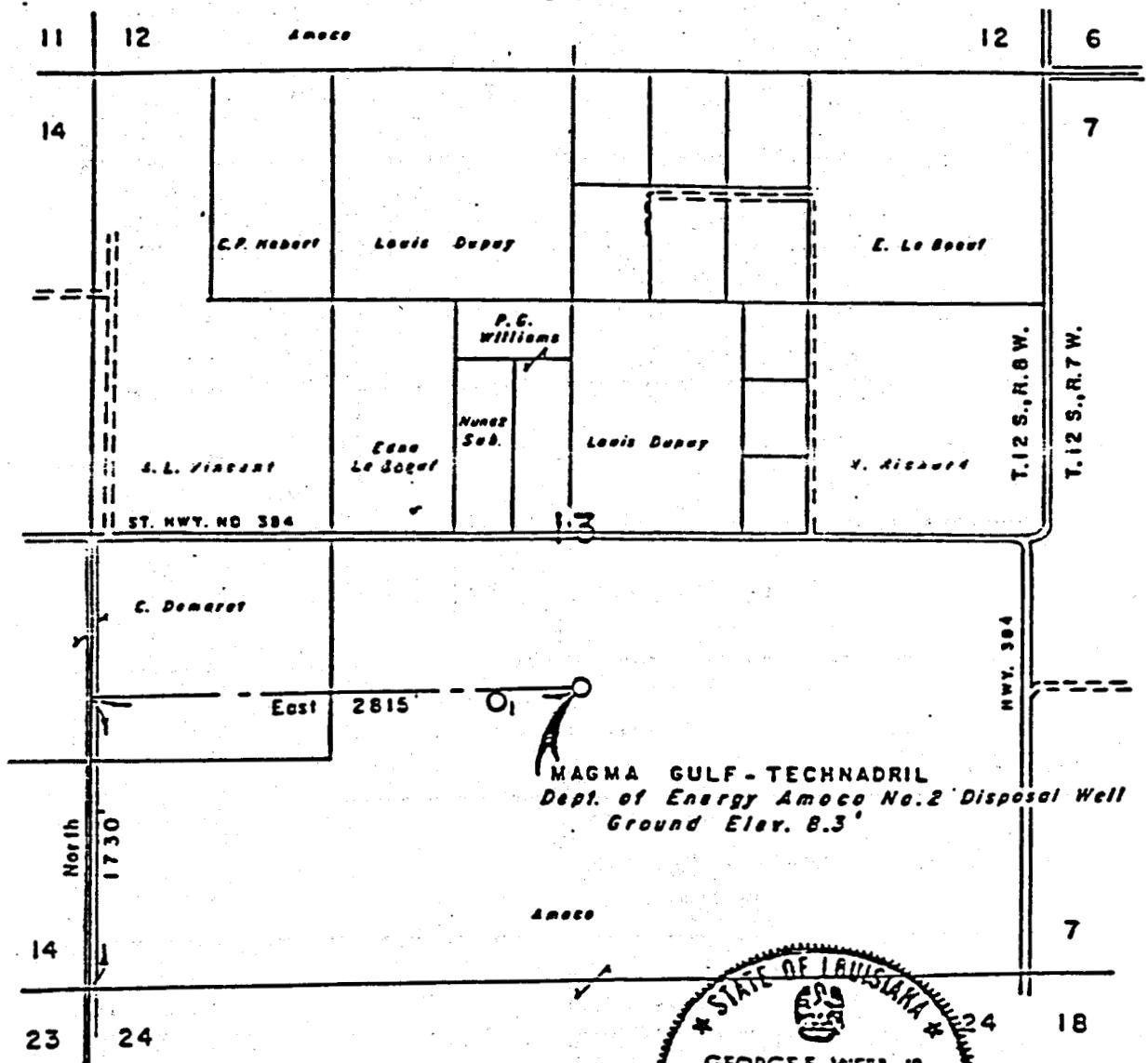


FIGURE 3-1
LOCATION OF TEST WELL IN CAMERON PARISH, LOUISIANA



WELL LOCATION:

MAGMA GULF - TECHNADRIL
Dept. of Energy Amoco No.2 Disposal Well

Commencing at the Southwest corner of Section 13,
T.12 S., R.8 W., go North along the West Line
of Section 1730 feet, thence East at Right
Angles 2815 feet to the Location.
Ground Elevation 8.3'

MAGMA GULF - TECHNADRIL

We hereby certify that we staked the above
Well Location as shown June 16, 1980.
Whitaker & Webb - Civil Engineers.

WELL LOCATION
SECTION 13, T.12 S., R.8 W.
CAMERON PARISH, LA.

George F. Webb Jr.
GEORGE F. WEBB, JR., LA. REG. NO. 3870

SCALE: 1" = 1000'

JUNE 17, 1980

WHITAKER & WEBB
CIVIL ENGINEERS
LAKE CHARLES, LA.

FIGURE 3-2
LOCATION OF SALT WATER DISPOSAL WELL

4.0 GEOLOGY

4.1 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 Parish, 50 miles north of the prospect, during deposition of the early Eocene Wilcox Formation. Today it is 160 miles to the south, some 145 miles off the present coastline. The prospect was occupied by unstable outer shelf and slope conditions with associated growth faults at an intermediate time during the deposition of the upper Frio Camerina zone of upper Oligocene or lower Miocene age. The target sand is a lower sand of that zone.

4.2 GEOLOGY OF THE SWEET LAKE AREA

4.2.1 Subsurface Geology

The Sweet Lake geopressured-geothermal prospect is a basin located on the north flank of an east-west salt ridge containing the Hackberry, Big Lake, and Sweet Lake structures. The south side of the basin is bounded by a fault downthrown to the north. This converges eastward with a major east-west fault downthrown to the south to form the eastern termination of the basin. Dip is northwesterly into the basin which opens toward the south flank of the South Lake Charles structure several miles distant to the north.

Surface terrain is formed by late Pleistocene deltaic deposits. Alternating massive sands and clays extend to an average depth of 9,000 feet and overlie the thick shales of the Anahuac Formation. The Anahuac Formation is underlain by the Frio Formation, the upper member of which is called the Camerina zone. Several sands occur within this sequence, the thickest being the basal "Miogyp" sand - for Miogypsina (Miogypsinoides), the key microfossil it contains. The Miogyp, the target sand, was deposited on the outer shelf in the upper Oligocene or lower Miocene time.

A seismic evaluation of the geology was performed by Brian E. Parsons, assisted by Lewis R. Brescoll. The geology depicted on Parsons' structural map of the top of the Miogyp sand resulted from the combined study of the 27 miles of seismic lines and the 17 well logs as interpreted by Parsons and Dr. C. O. Durham utilizing the Lafayette Geological Society study of the Big Lake Field prepared by Robert A. Anderson. The resultant structural map is presented as Figure 4-1.

Although the Miogyp sand is present in the entire area, it is structurally lower in the graben which widens westward from its termination at the juncture of the two bounding faults in Section 8, T 12 S, R 7 W. The three key control wells drilled by Union Oil of California (Sweet Lake #1, Pan Am Fee #1, Pan Am Fee #2) and used as a basis for the identification of the prospect are shown to be in the structurally high southeastern portion of the graben. The sand dips strongly northwestward from this area so that it occurs below 18,000' in depth in the northwestern portion of the map. Besides the 3 control wells and the MG-T/DOE AMOCO Fee #1, no other wells penetrate the Miogyp sand in the graben.

The drill site was intentionally located on the 15,000' contour of the Miogyp sand. The Miogypsinoides microfossil occurs only slightly higher stratigraphically than the sand itself, for example, in the Union Oil of California Pan Am Fee #1, the fossil occurs at a depth of 14,335' and the top of the sand is at 14,460'. In the test well, the fossil was picked at 14,970' and the first good sand appeared at 15,065'. (Figure 4-2) These actual figures are very close to the predicted depth of 15,000'.

Correlation of the test well log with the three control well logs shows significant thickening of the section below the first Camerina sand (12,900'). If the section had continued to thicken at this rate, the Miogyp sand would not have been reached until several hundred feet below the predicted

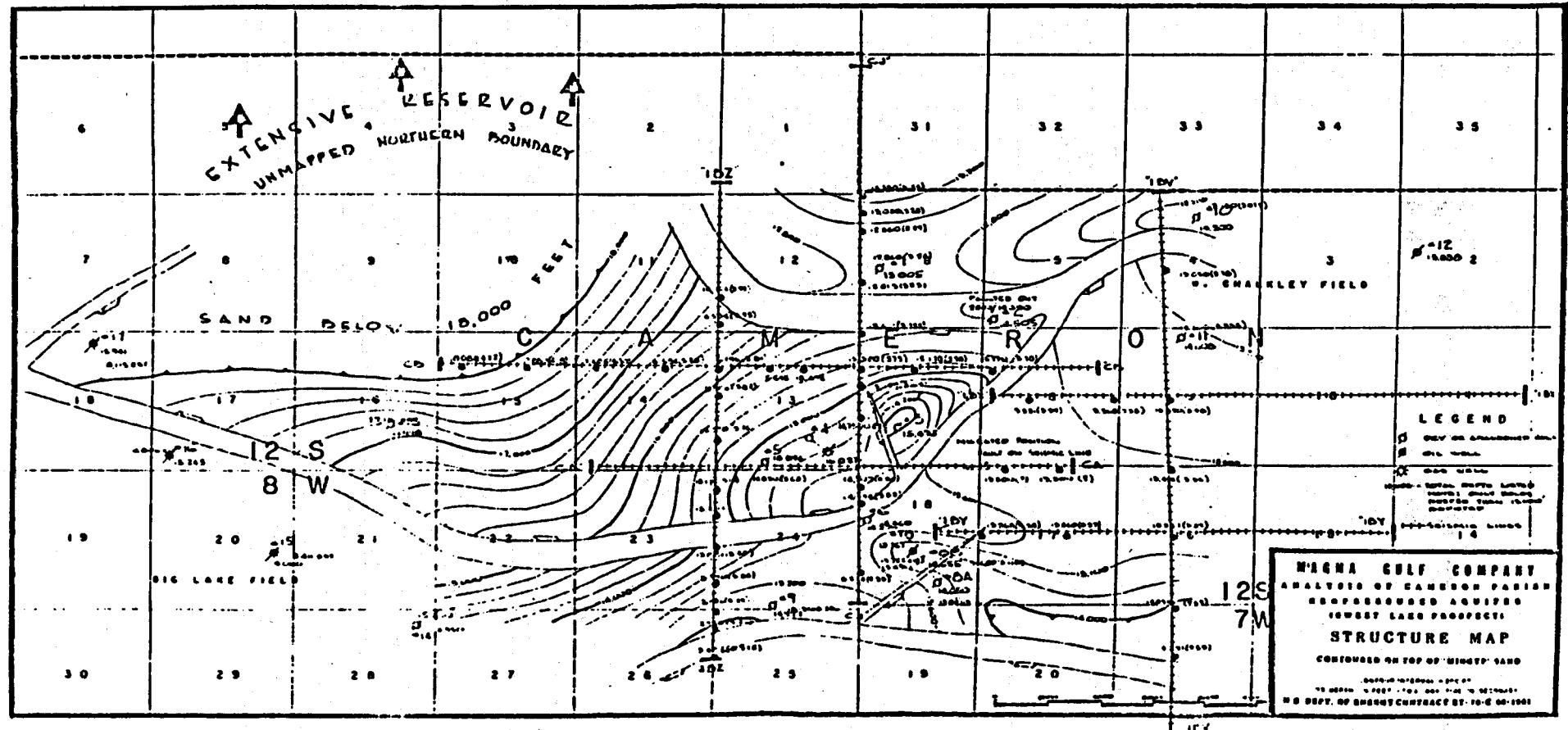
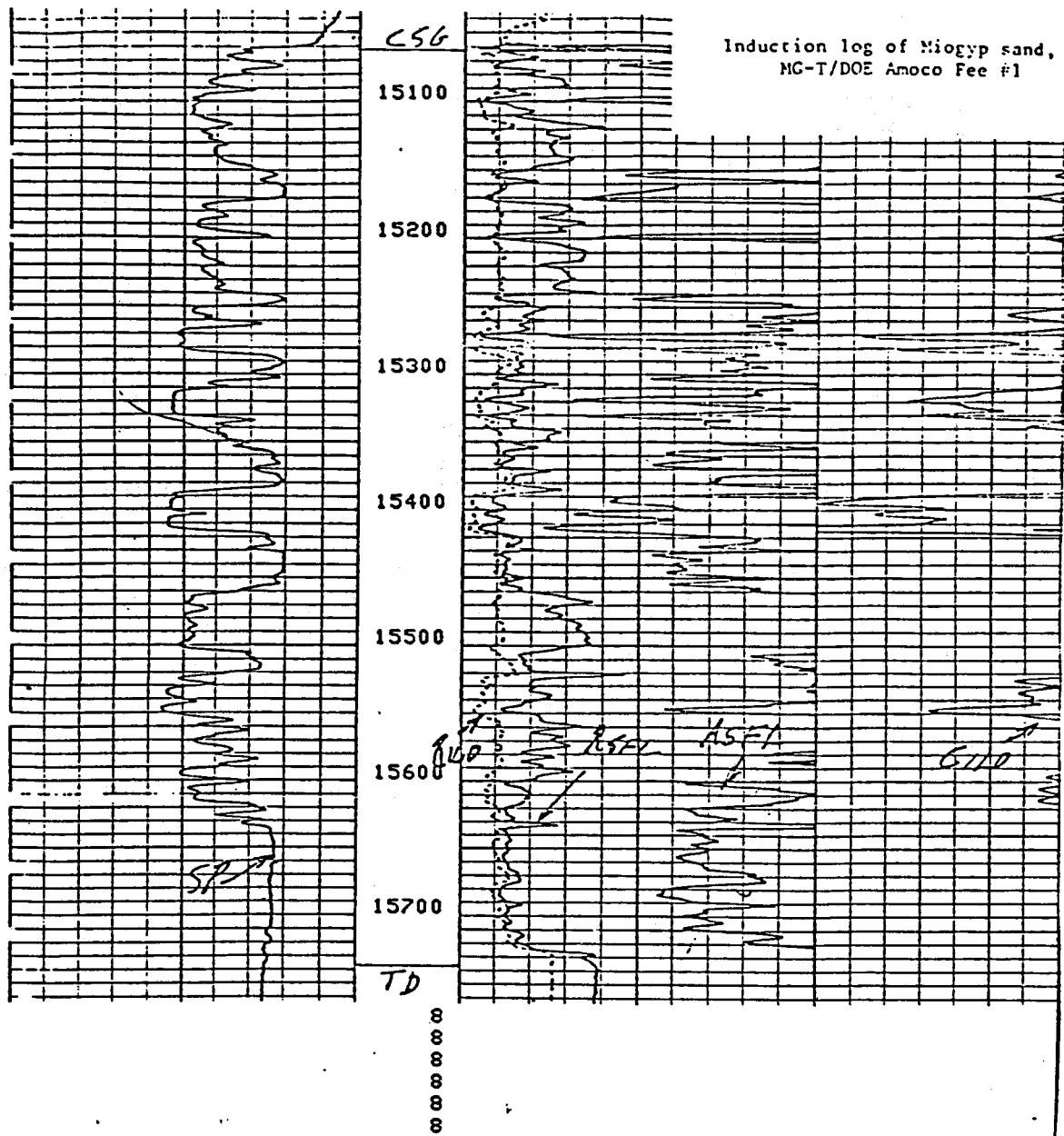


FIGURE 4-1
STRUCTURE MAP CONTOURED ON TOP OF MIOGYP SAND



SP (MV γ)		ILD (OHMM)	
-160.0	40.00	0.0 10.00	SFLA(OHMM)

PARAMETERS

NAME UNIT VALUE

NAME UNIT VALUE

NAME UNIT VALUE

FIGURE 4-2

depth. However, although the section continued to thicken, it did so at a lesser rate. In addition, immediately above the Miogyp sand the section thinned considerably and the sand was tagged very close to the predicted depth. In order to determine whether this thickening was caused by faulting or stratigraphic means, a thickening index diagram was prepared for the interval from the base of the massive sands (approximately 9,000') to the base of the Miogyp sand. Correlation of the four logs was done on as detailed a scale as possible, and it was found that the small resistivity peaks in the shales below the first Camerina sand could be correlated. The thickness of each correlation interval was compared to the thickness of the same interval in each of the three control wells, and it was found that, in general, the thinning of the section immediately above the Miogyp sand in the test well might be explained by a fault, but the dipmeter log shows no indication of one.

The thickening index diagram shows a considerable amount of thickening and thinning between the four wells over the entire 6,000' + interval. If faults exist, they must be small and present throughout the section; there is no evidence for a major fault cutting the test well.

4.2.2 Geothermal Gradient and Temperature

Bottom-hole temperatures in the Sweet Lake area have been corrected according to the AAPG correction factor table. The average Gulf Coast temperature gradient is 1.5°F per 100 feet of depth. At the top of the geopressured zone, most temperatures are 25°F cooler than the average, indicating a lower geothermal gradient in the hydrostatic zone. However, within the geopressured zone the gradient is higher than the average, and temperatures are mostly 10°F above average below a depth of 14,000'. It is pertinent that the target sand occurs at these depths.

The map in Figure 4-3 depicts the average corrected temperature for each of the 17 wells used in the 1978 study as determined from geothermal gradients prepared on each individual well at the midpoint of the sand. Temperatures slightly above 300°F were expected at a depth of 15,000'. The maximum temperature recorded on the third logging run, which reached a depth of 15,065', was 267°F uncorrected and 297°F corrected. The final logging run, to 15,740', recorded an uncorrected temperature of 300°F (329°F corrected). Since circulation in the well was stopped 8 hours or more before the logging tool reached the bottom of the hole, it may not be necessary to add the entire AAPG correction factor to the uncorrected temperature. A repeat

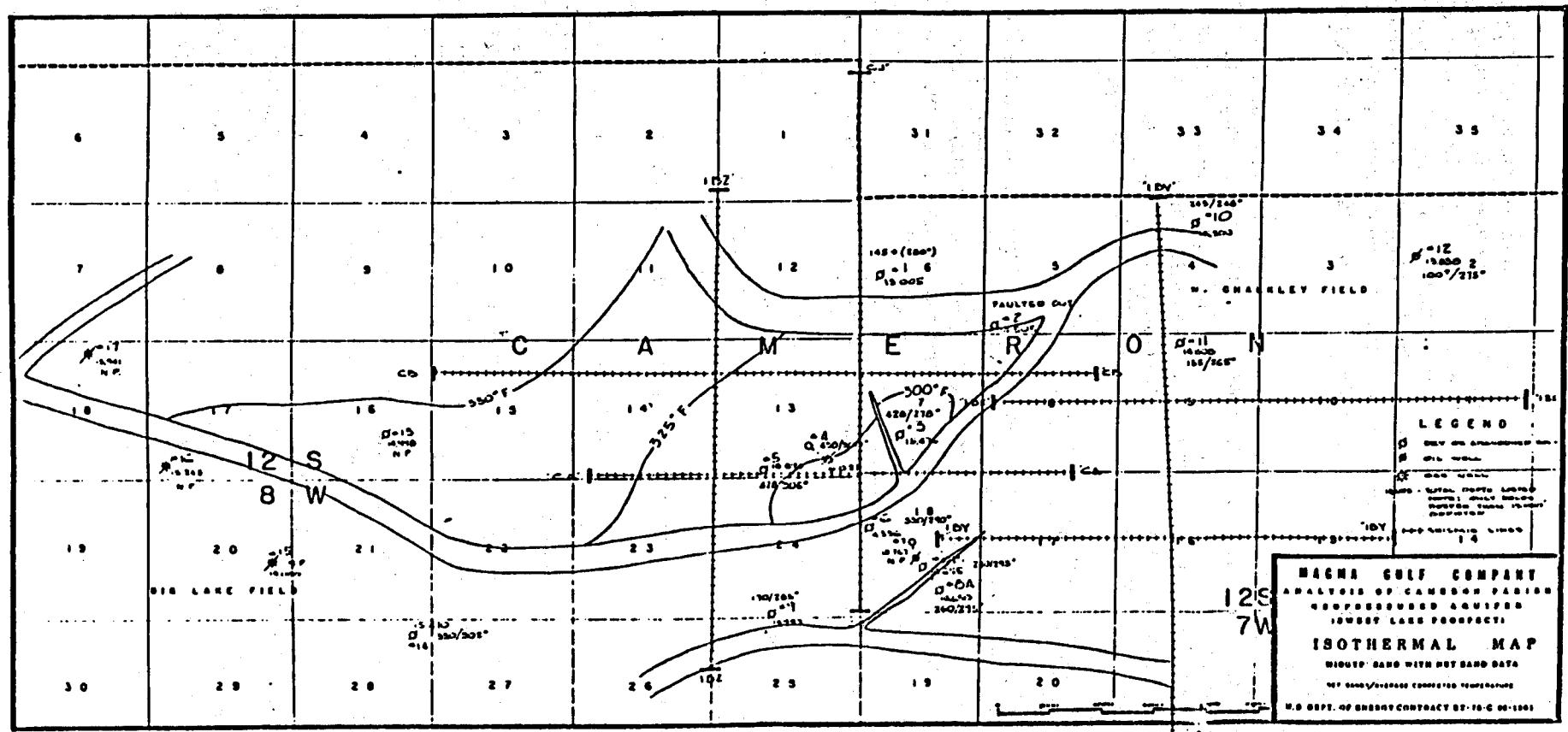


FIGURE 4-3
ISOTHERMAL MAP OF MIOGYP SAND

formation test at 15,144' yielded a temperature of 298°F uncorrected. It is not certain whether this temperature approaches equilibrium or whether it should be corrected. If it is corrected, the temperature at 15,144' would be 328°F, and there would be a significant increase in temperature between the Miogyp sand and the overlying shale. While there may be such an increase, a magnitude of 31°F seems unlikely.

The relationship between the corrected temperatures from the test well and the 17 study wells, and the average Gulf Coast geothermal gradient can be seen in Figure 4-4. The increase in the geothermal gradient between the hydrostatic and geopressured zones is pronounced, and the corrected bottom-hole temperature is higher than the average.

4.2.3 Distribution of Geopressure

The subsurface in the Sweet Lake area is characterized by hydrostatic pressures to the base of the massive sand sequence at depths varying from 8,740' to 9,400'. The underlying thick Anahuac shale formation is geopressured at a mud weight equivalent averaging between 15 and 16 pounds per gallon. Based on mud weights utilized in drilling the three adjacent earlier wells which were used as control wells on this project (Figures 4-5, 4-6, and 4-7), geopressures reduced to 12 to 13 pounds per gallon were expected in the Miogyp sand. This would be characteristic of many thick extensive sand bodies whose volumes accommodate the loss of pressurized fluid from the confining shales.

The minimum expected pressures at the top of the Miogyp sand were estimated to be 8,700 to 10,800 psi. The three control wells in the target reservoir vary from 8,950 to 9,850 psi with equivalent mud weights of 12.0 to 13.1 pounds per gallon. The repeat formation test at a depth of 15,144' in the test well showed that the pressure at the base of the top sand in the Miogyp sequence is 11,900 psi, almost 2,000 psi greater than the 10,000 psi expected. The equivalent mud weight is 15.2 pounds per gallon and the bottom-hole pressure at this gradient (15,790') should be approximately 12,400 psi. The sand to be tested (15,385'-15,415') is expected to have a pressure of 12,200 psi.

More pertinent is the geopressure factor - excess pressure above hydrostatic pressure. The geopressure factor for the three control wells ranged from 2,350 to 3,050 psi, with the expected wellhead pressure in the test well of 2,000 psi. Since the bottom-hole pressure was greater than expected,

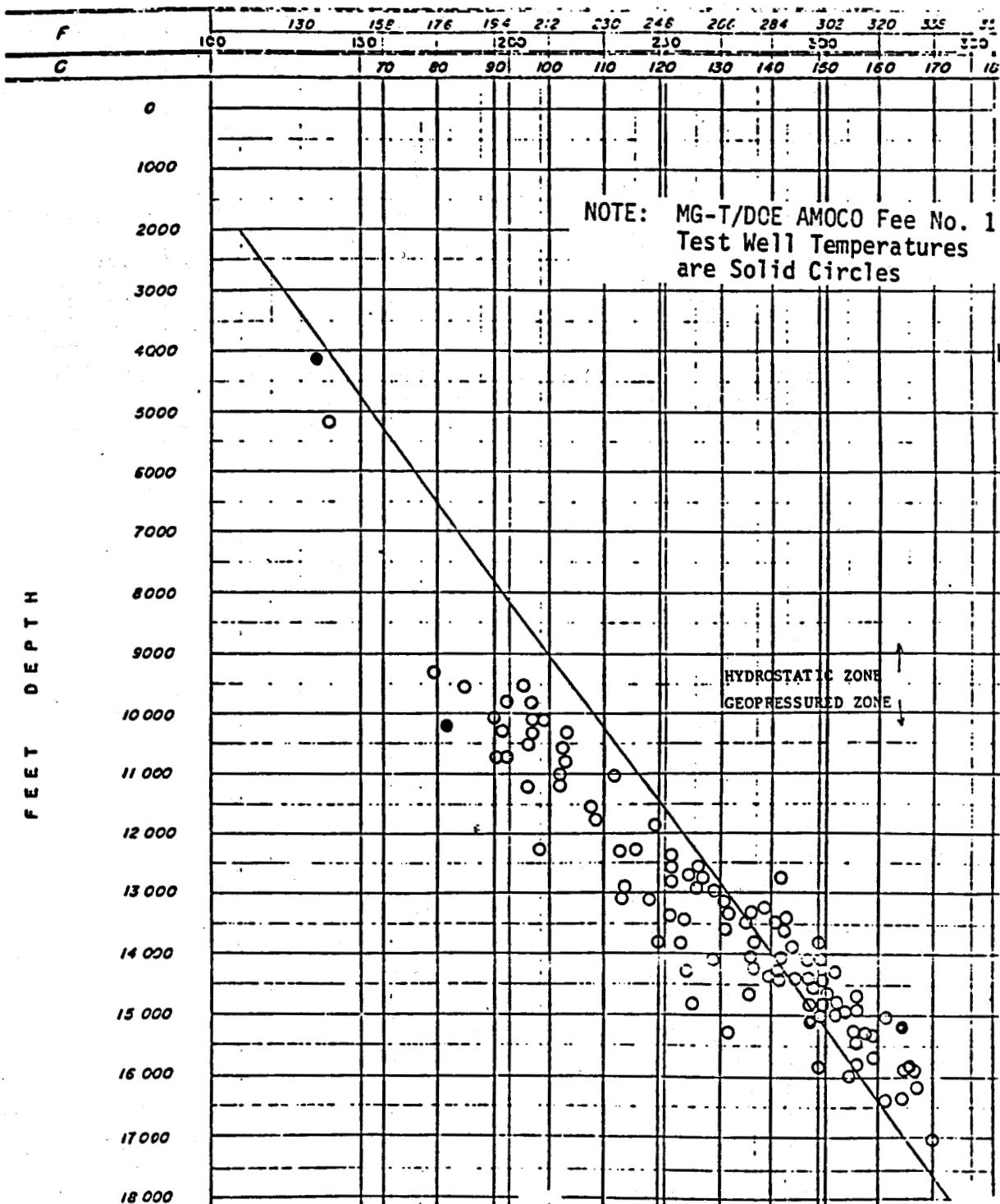


FIGURE 4-4
SUBSURFACE TEMPERATURES FROM 18 DEEP WELLS IN SOUTHERN LOUISIANA

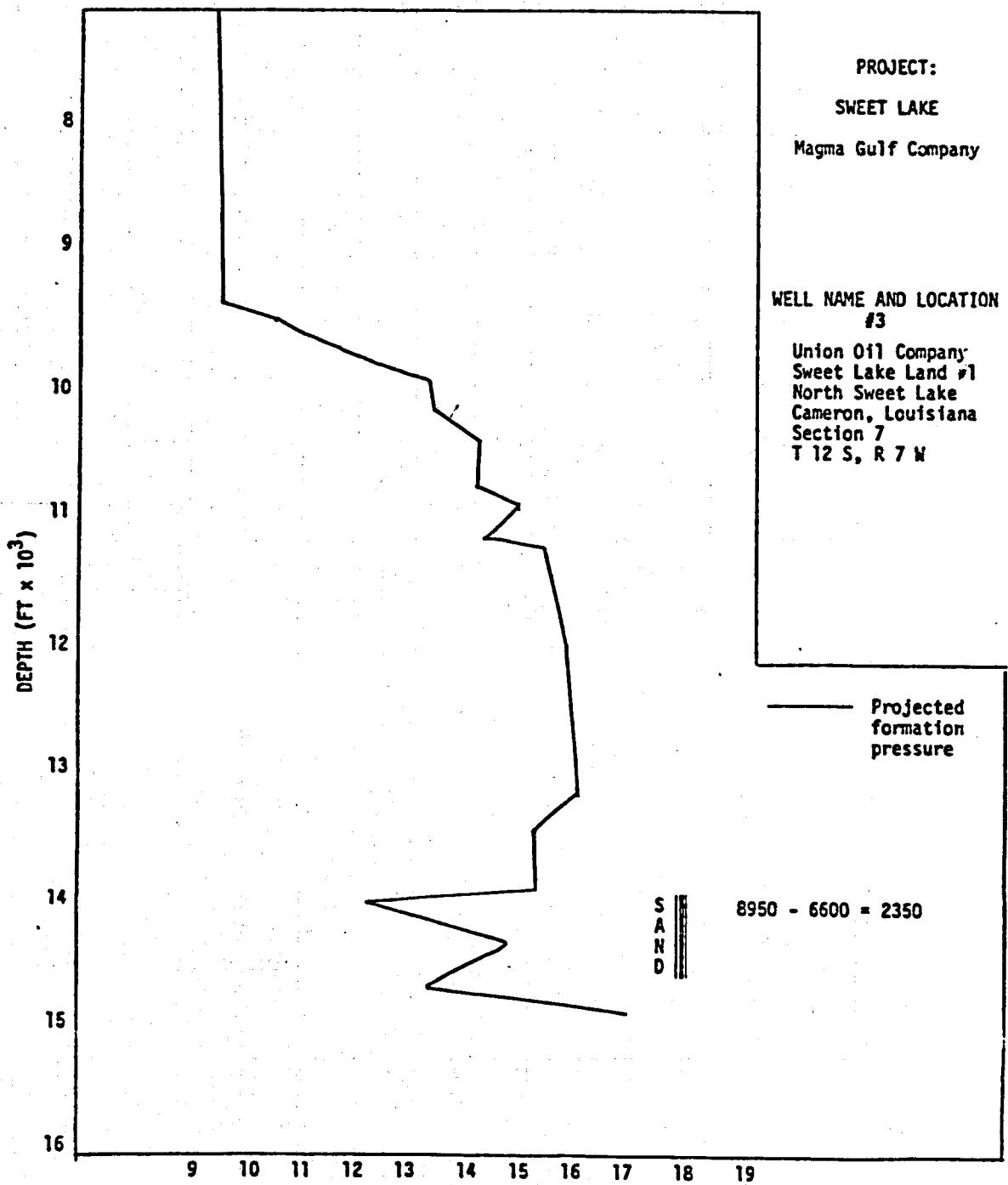


Figure 4-5

PRESSURE EXPRESSED AS MUD WEIGHT (PPG): WELL #3

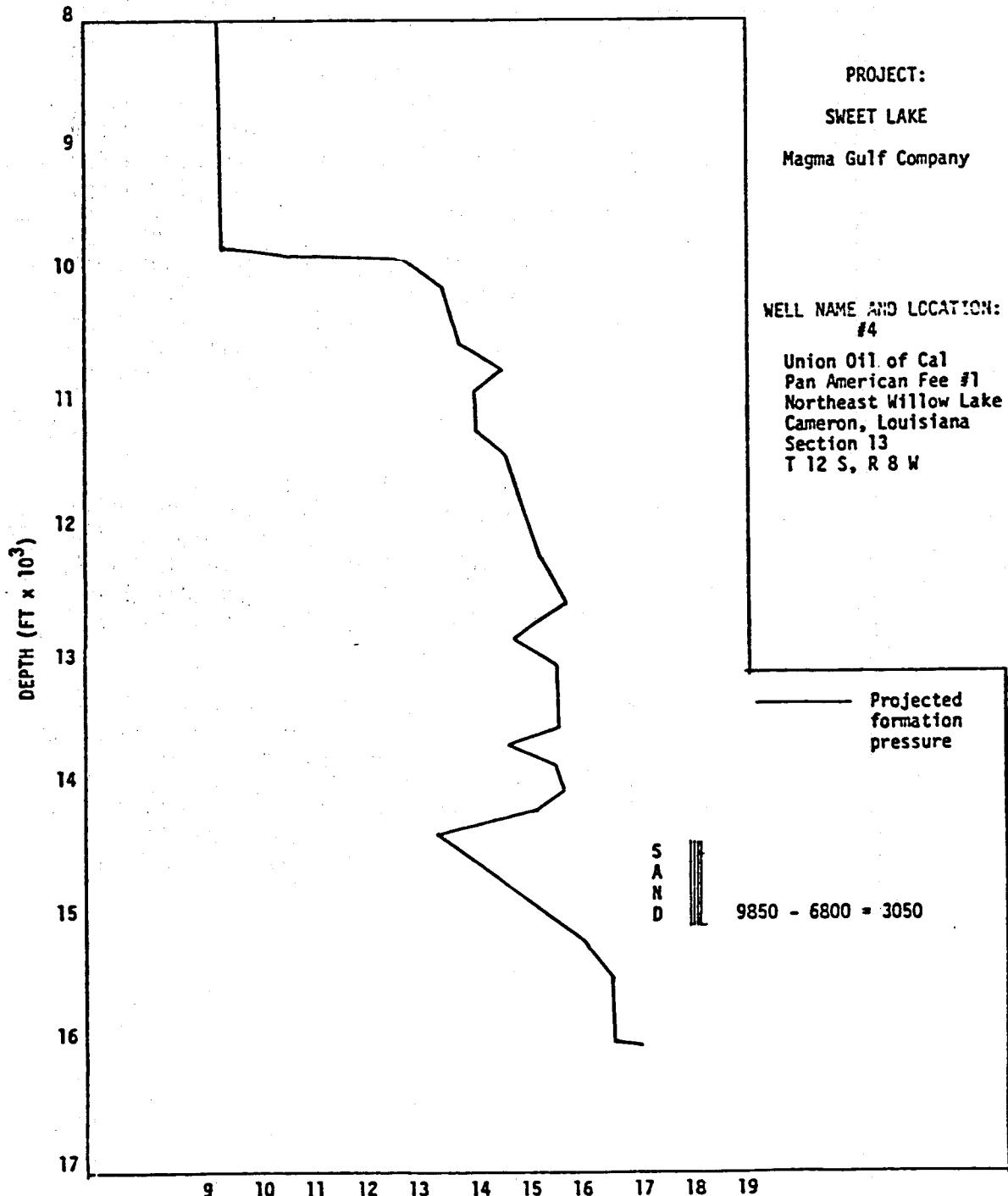


Figure 4-6
PRESSURE EXPRESSED AS MUD WEIGHT (PPG): WELL #4

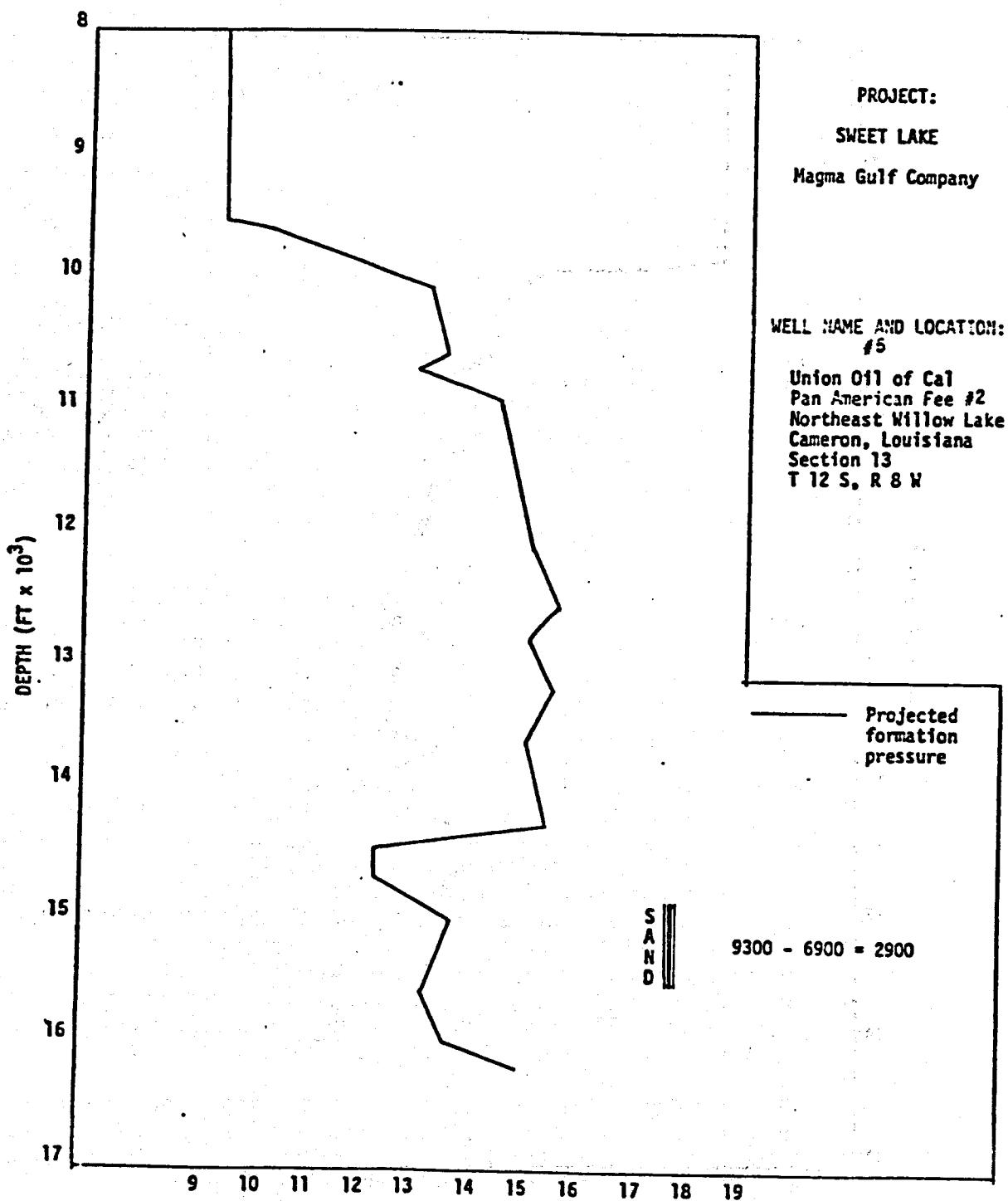


Figure 4-7
PRESSURE EXPRESSED AS MUD WEIGHT (PPG): WELL #5

the geopressure factor is also increased. The anticipated wellhead pressure could now be as much as 5,000 psi.

4.2.4 Sand Character

The net sand averages 400 feet in the three control wells in the graben, but is expectedly thinner on the adjacent higher fault blocks. A well on the upthrown fault block to the southwest of the graben has virtually the same sand and net sand thickness as the wells in the graben further east. Furthermore, because of similar northwesterly dip both in the graben and in the fault block containing this well to the south, the sand is at approximately the same depth as in the eastern portion of the graben. Consequently, the sand is prospective in this area also. Presence of the sand in this thickness south of the basin supports a conclusion that it is present throughout the basin and probably in much greater thickness than in the structurally higher wells surrounding the basin.

For the 1978 study, no core analysis was available for the Miogyp sand, but interpretation based on logs was made. Porosity calculations were made from the sonic log and a density log; porosity of 22% was obtained in each case. Permeability in such a sand was expected to be high, but no value was available for that study.

Four diamond cores were taken from various sands within the Miogyp sequence in the test well. The depths of the cores are shown on the log in Figure 4-8. It should be noted that, with the exception of Core No. 3, the cores did not sample the potentially good production sands. The most promising sand is that at a depth of 15,385'-15,415', and is the only sand that was cored through the part that might be perforated; the Core Laboratories analysis shows a porosity of 24% and a permeability of 3,600 md. The porosity compares very well with what had been predicted, but the permeability far exceeds the expected value.

The seven potentially productive sands within the Miogyp sequence are all fairly clean sands with a good SP deflection. These individual sands correlate extremely well with the sands in the three control wells (Figure 4-8). The sands at the top and bottom of the sequence are more shaly than those in the middle, and have lower porosities and permeabilities.

Table 1 summarizes the porosities and permeabilities that have been calculated in various manners for the seven sands. The core porosities and permeabilities are those

MG-T/DOE
AMOCO FEE #1

UNION OF CAL
PAN AM FEE #2

UNION OF CAL
PAN AM FEE #1

UNION OF CAL
SWEET LAKE #1

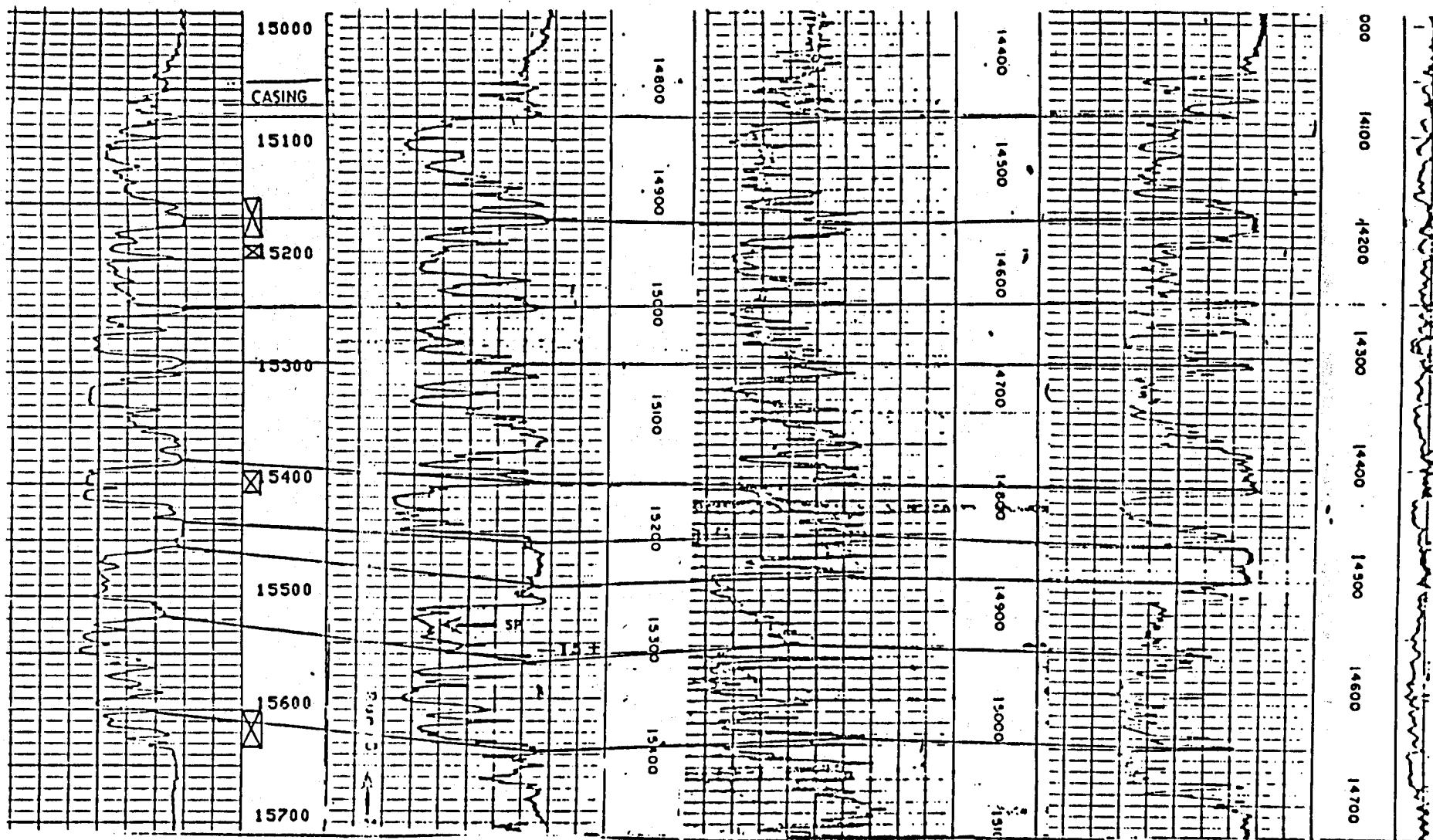


FIGURE 4-8
INDUCTION LOG CROSS-SECTIONS OF MIOGYP SANDS IN TEST WELL AND THREE CONTROL WELLS

TABLE #1

MEASURED AND CALCULATED POROSITIES AND PERMEABILITIES

Sand Depth	Net Sand	Porosity, %				Permeability, md				Hydraulic Capacity, md-ft	Percent Hydraulic Capacity
		Core	Saraband	Neutron-Density Crossplot	Intercomp	Core, Air	Saraband, Air	Intercomp, Air	Estimated, Water		
15080-15144	41'	16.6	12.3	15.7	16.34	30	175	275	20	820	3.71
15170-15240	42'	16.3	12.1	14.6	13.86	122	143	48	20	840	3.80
15250-15285	27'	--	15.4	20.0	20.42	--	700	1011	140	3,780	17.11
15305-15355	25'	--	15.3	18.8	18.12	--	750	690	140	3,500	15.85
15385-15415	27'	24.3	19.0	23.2	20.84	3670	2960	2703	400	10,800	48.89
15460-15505	41'	--	12.2	15.0	15.69	--	130	90	20	820	3.71
15520-15600	51'	--	12.9	17.3	16.30	--	280	143	30	1,530	6.93
TOTAL	254'									22,090	100.00
	=====									=====	=====

measured by core laboratories. The Saraband porosity was calculated by averaging the foot-by-foot data calculated by Schlumberger for the Saraband log. These values are low compared to the measured core porosities for two reasons; first, the computed porosity is often 2% lower than the measured values; and second, the Saraband values have been averaged. The Saraband permeabilities are also an average of the foot-by-foot data provided by Schlumberger. A correction factor was used to bring the computed values to the measured permeabilities and these data were then averaged. The neutron-density crossplot porosity was obtained from Mr. Frank Millard's analysis of the logs. Intercomp Resource Engineering and Development calculated porosity and permeability using an in-house computer program, and these values are also shown in Table 1. All of the calculated or measured permeabilities are reported as permeability to air; the permeability to water would be much lower. The final column in Table 1 shows the estimated permeability to water for each of the sands. The best sand is that at 15,385'-15,415', and two sands above that (15,250'-15,285' and 15,305'-15,355') are also promising. The remaining four sands have porosities and permeabilities comparable to one another. It should be noted that the best sand contains approximately 50% of the hydraulic capacity of the entire sequence.

Analyses of the target sand (15,385'-15,415') by Baker Sand Control and Accumin Analysis show that the sand consists of 75% quartz, 19% feldspar, 4% illite, 2% illite/smectite mixed layer clay, and a trace of kaolinite. The cementing material is quartz overgrowths. SEM photos show that the clays are very fine hairs and are present as pore linings, not as cementing material. Thus, although the clays will move when the well is flowed, they will not cause the sand to move. The Director of Research of Baker Sand Control, after examining the SEM photos, the logs, and a piece of core, concluded that there should be no sand production.

4.2.5 Salinity of Fluid

Electric log computations have provided salinity data in the Miogyp sand of key wells. Salinities ranged from 46,000 to 100,000 ppm. The highest salinities appear to be at the greatest depths. Salinities calculated for the seven sands in the test well are shown in Table 2. The SP salinity was calculated from the SP log by the conventional method and using the Dresser Atlas salinity chart. The RW/2 salinity was calculated as a first approximation of the method derived from research at the University of Texas of Austin.

TABLE 2

CALCULATED SALINITIES, PPM

<u>Sand Depth</u>	<u>SP</u>	<u>RW/2</u>	<u>Saraband</u>	<u>Intercomp</u>
15080-15144	50,000	125,000	76,000	100,000
15170-15240	50,000	125,000	68,000	100,000
15250-15285	70,000	140,000	98,000	125,000
15305-15355	70,000	140,000	125,000	175,000
15385-15415	70,000	140,000	125,000	175,000
15460-15505	50,000	125,000	74,000	175,000
15520-15600	70,000	140,000	103,000	175,000

This research has shown that the RW calculated in the standard manner is often twice the actual value. Using RW/2 in place of RW approximately doubles the salinity. The Saraband log computed by Schlumberger also calculated salinity, and the Saraband salinity shown in Table 2 is an average of the foot-by-foot values from the Saraband log. Intercomp calculated salinity using an in-house computer program and these values are also shown. Based on the salinities calculated from the control wells, and the salinities calculated for the test well, the best estimate of salinity that can be made at this time is 100,000 - 175,000 ppm.

4.2.6 Petroleum Production

Of the 17 deep wells used in the 1978 study, 5 have been produced. The Union Oil of California Pan Am Fee #1 was plugged and abandoned in 1976 after producing gas from the thin sand 195 feet below the base of the Miogyp. The other wells produced from the Camerina and Anahuac sands.

As far as can be determined, the Miogyp sand has not been tested in this area. Producing sands in the Big Lake Field, 5 miles west of the well site, have been the Camerina and stratigraphically higher sands. Other fields, such as Chalkley and Sweet Lake, are across major faults from the well site, and again produced from sands stratigraphically higher than the Miogyp. In producing the test well, there should be no interference with any oil or gas producing wells in the area.

4.2.7 Size of Basin

The seismic lines and most of the wells used in the 1978 study are located in the vicinity of the eastern termination of the basin. This is because the geological interpretation of prior data was uncertain, and the 1978 study was designed to determine the fault pattern in that area. Furthermore, few wells have been drilled in the deeper part of the basin, and none of those penetrate the Miogyp sand.

The geological interpretation made in 1978 has not been modified by the drilling of the test well. This interpretation depicts the northern fault turning northward in Section 11, T 12 S., R 8 W. It is likely that the basin extends a considerable distance north of the area studied, with the referenced fault forming the eastern extent. A review in 1978 of proprietary gravity data supports the conclusion that the study area includes only the southeastern

portion of a larger basin. The basin appears to be a collapse feature associated with salt withdrawal to supply the Hackberry - Big Lake - Sweet Lake salt ridge to the south.

Intercomp has modelled the reservoir for the high permeability sand (15,385'-15,415'). The northern fault and the far western fault described by the Lafayette Geological Society, shown on Figure 4-3, have been extended to the intersection in Section 2, T 12 S, R 8 W. There is as yet no geologic evidence for extending these faults to an intersection; this was done to create an enclosed minimum reservoir for modelling purposes. According to Intercomp's calculations, because of the high permeability of the sand, the change in slope of the pressure drawdown curve which would indicate the presence of the two major faults should be noted in the first 1 to 2 days of the reservoir limit test. The change in slope that would indicate the existence of the third fault should be seen within 10 days. Figure 4-9 shows the pressure drawdown curve for the high permeability sand at a flow rate of 20,000 B/D. At a rate of 40,000 B/D, the length of time needed to see the faults would not change, but the magnitude of the pressure drop would be greater. The reservoir limit test should thus help determine the extent of the reservoir in the area where other geological data are lacking.

Even if the bounding faults are present, the reservoir would encompass 12 square miles. The net sand in the test well (sand with an SP deflection 40 mv above the shale base line) is 254'. This would give an estimate of approximately 0.6 cubic mile of sand volume in the area mapped. This estimate is most likely low, since the net sand in the three control wells averages approximately 400'. Since the sands thicken toward the faults and toward the basin, the sand volume in the mapped reservoir may approach 1 cubic mile. If the basin does extend northwestward instead of being limited by a fault, the sand volume would accordingly greatly increase.

The amount of net sand and the number of barrels of water in place were calculated for a portion of the reservoir. Isopach maps of net sand were constructed for the seven potential production sands. These maps are at best an approximation, since there are only four data points in the graben. Additional points were constructed from the seismic lines and by projecting the thickening between any two of the four wells. Fourteen points were added by these methods, for a total of 18 points within the graben.

Since there were no seismic lines and no wells in the western portion of the reservoir, the construction of the isopach maps

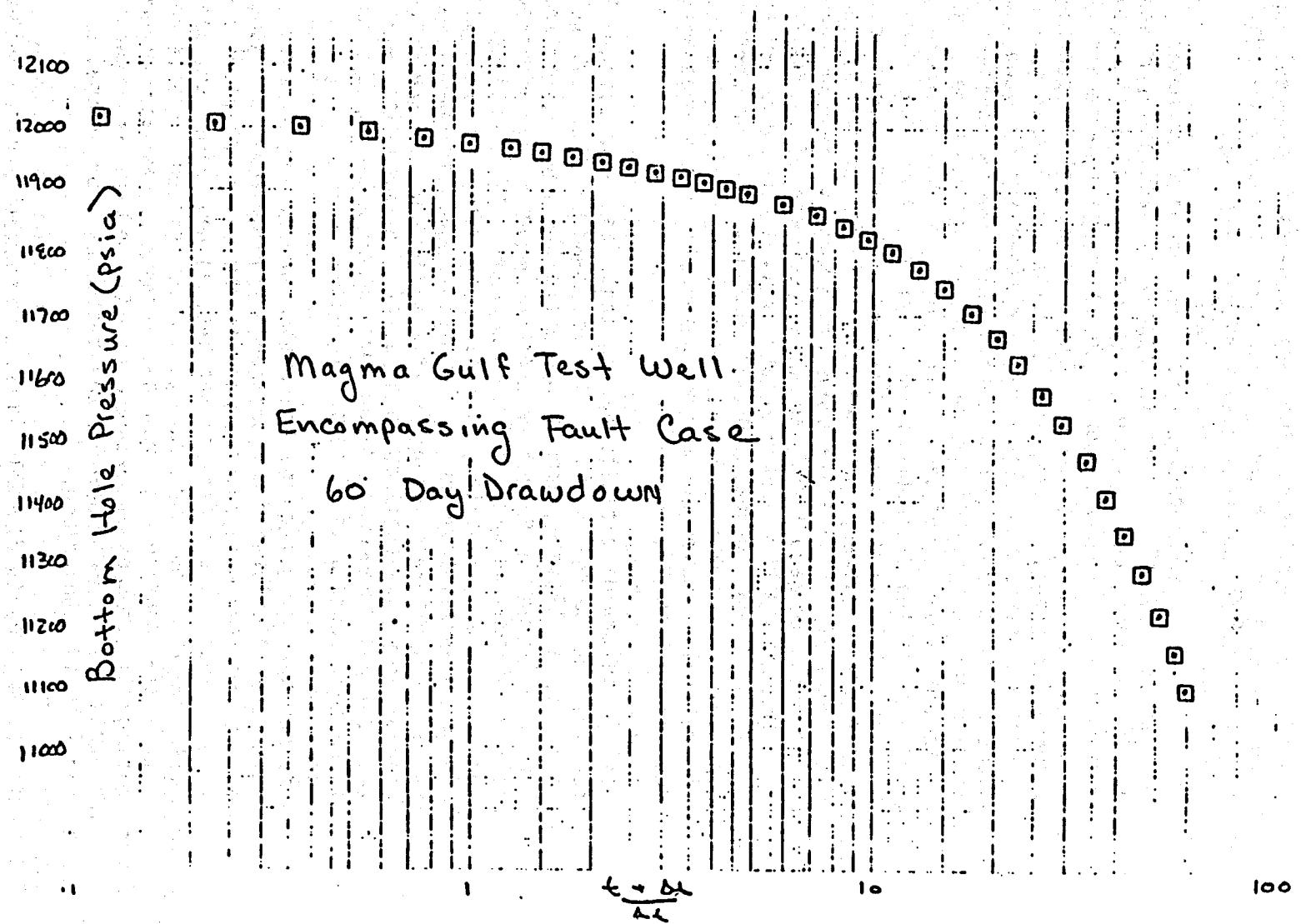


FIGURE 4-9
 COMPUTED PRESSURE DRAWDOWN CURVE FOR 15,385'-15,415' SAND AT A FLOW RATE OF 20,000 BPD

was limited to the eastern part. Any interpretation of the western part at this time would have to be hypothetical.

The amount of sand with an SP deflection of 40 mv above the shale base line was determined for each of the sands in the four wells. (The Union Oil of California Pan Am Fee #1 was logged with a gamma ray through the Miogyp sand, and so the amount of net sand in this well is an approximation.) The average percent of net sand was calculated for each sand and these percentages were used to determine the amount of net sand at each of the remaining data points. Several assumptions had to be made in doing this, including: 1) the sands thicken toward the faults; 2) the sands thicken toward the basin; and 3) the sands thicken at a constant rate. Isopach maps for each sand were then contoured.

Each map was then planimetered over the area shown in Figure 4-10, and the barrels of water in place were calculated (Table 3). Several points should be noted concerning these calculations. First, the number of barrels of water calculated must be viewed as a first approximation. A constant average porosity for each sand was assumed, which may or may not be geologically reasonable. However, without further data, no other assumption could be made. The second point is that the numbers calculated are the number of barrels in place, not stock tank barrels; no correction has been made for the change in volume due to methane gas coming out of solution. Third, since the isopach maps were constructed for only a portion of the graben, as noted above, the barrels calculated represent the water present in only a portion of the reservoir. The area for which the isopach maps were made is 36% of the bounded reservoir. Therefore, the number of barrels present in the bounded reservoir is approximately three times that presented in Table 3. If the third, enclosing fault does not exist, these figures would increase accordingly. A fourth point to be noted is that these figures are barrels in place. The amount of water actually produced will be a fraction of what is in place. This fraction can only be estimated at this time, but may be on the order of 5-10%.

4.3 SEISMIC EVALUATION

Seven seismic lines totaling approximately 27 miles were used to evaluate a proposed drill site for the Magma Gulf geothermal prospect, Sec. 7, T12S, R7W, North Sweet Lake area, Cameron Parish, Louisiana. The lines were purchased from Union Oil Company of California in August, 1978. They were shot around 1969 by United Geophysical using dynamite. They are sixfold data and are rated good to poor.

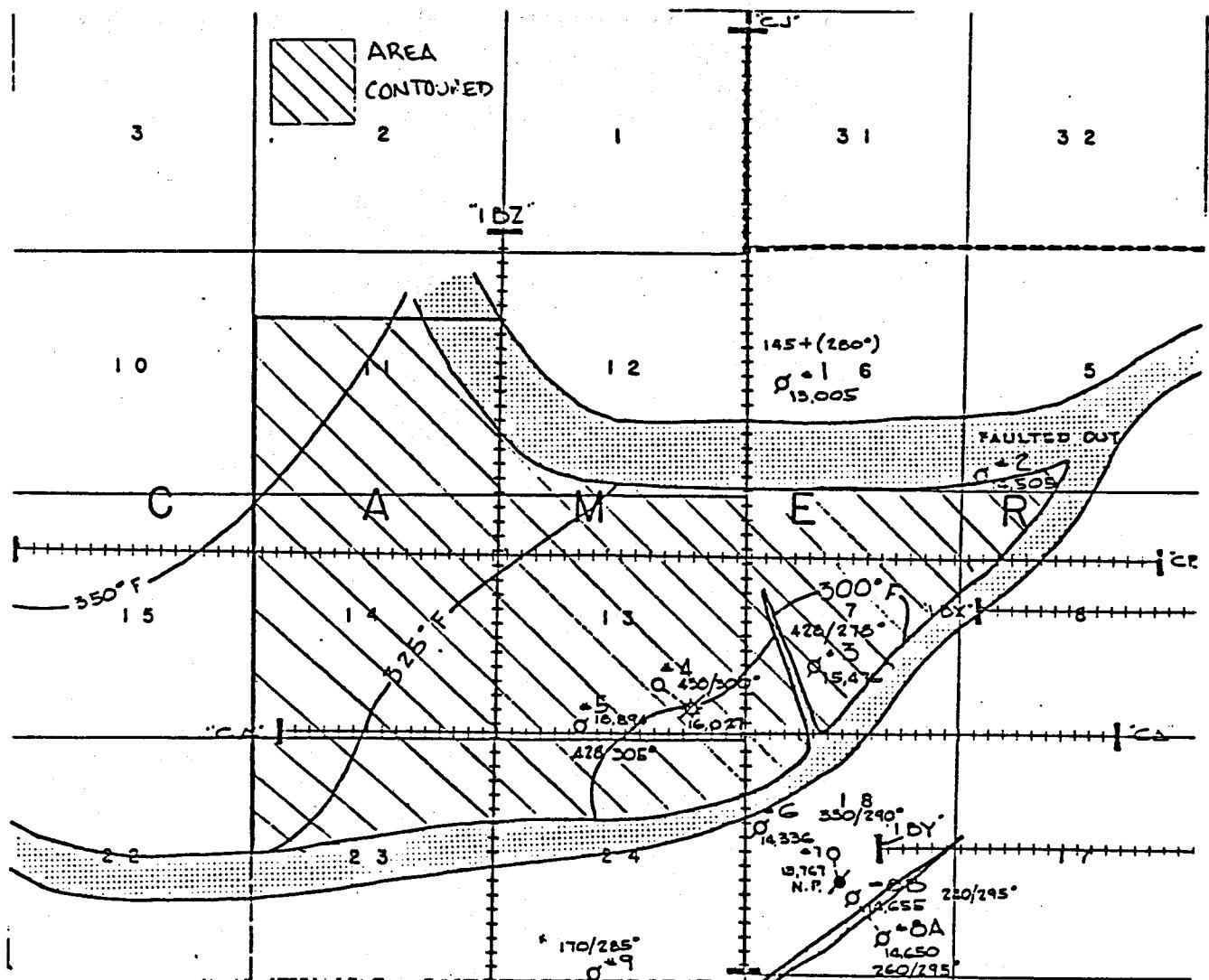


FIGURE 4-10
AREA OF GRABEN CONTOURED AND PLANIMETERED

TABLE 3

BARRELS OF WATER
IN PLACE FOR MIOGYP SANDS
UNDER AREA SHOWN IN FIGURE 4-10

<u>Sand Depth</u>	<u>Barrels in Place</u>
15080-15144	164,385,891
15170-15240	133,916,510
15250-15285	118,036,535
15305-15355	135,050,934
15385-15415	129,334,200
15460-15505	120,195,354
15520-15600	173,959,680

The seismic lines, combined with well control, were used to construct a structure map on top of the Miogypsina sand, Camerina zone, Frio formation. This thick sand is the objective geothermal reservoir in the area.

4.3.1 Procedure

The following steps were used to prepare the Miogypsina structure map.

1. Coordination with Dr. C. O. Durham on formation tops and fault cuts in wells in the area of interest.
2. Computation of a velocity function using the sonic (velocity) log from the Union of California Sweet Lake Land and Oil 1, Sec. 7, 12S, 7W, Cameron Parish.
3. Correlation of the seismic data with the subsurface (well log) data based on the velocity function for time-depth relationship.
4. Interpretation of faulting based on seismic and subsurface data.
5. Hand migration of some of the seismic data for proper position in space.
6. Conversion of Miogypsina seismic times to depth based on the velocity function and contouring map.

4.3.2 Geology

Previous interpretation of this area by other workers indicated a complicated fault system. Our combined geophysical/geological work shows that much of the stratigraphic thinning previously interpreted as faulting is actually due to thinning across a paleo-structural high. Recognition of this simplifies the structural picture tremendously.

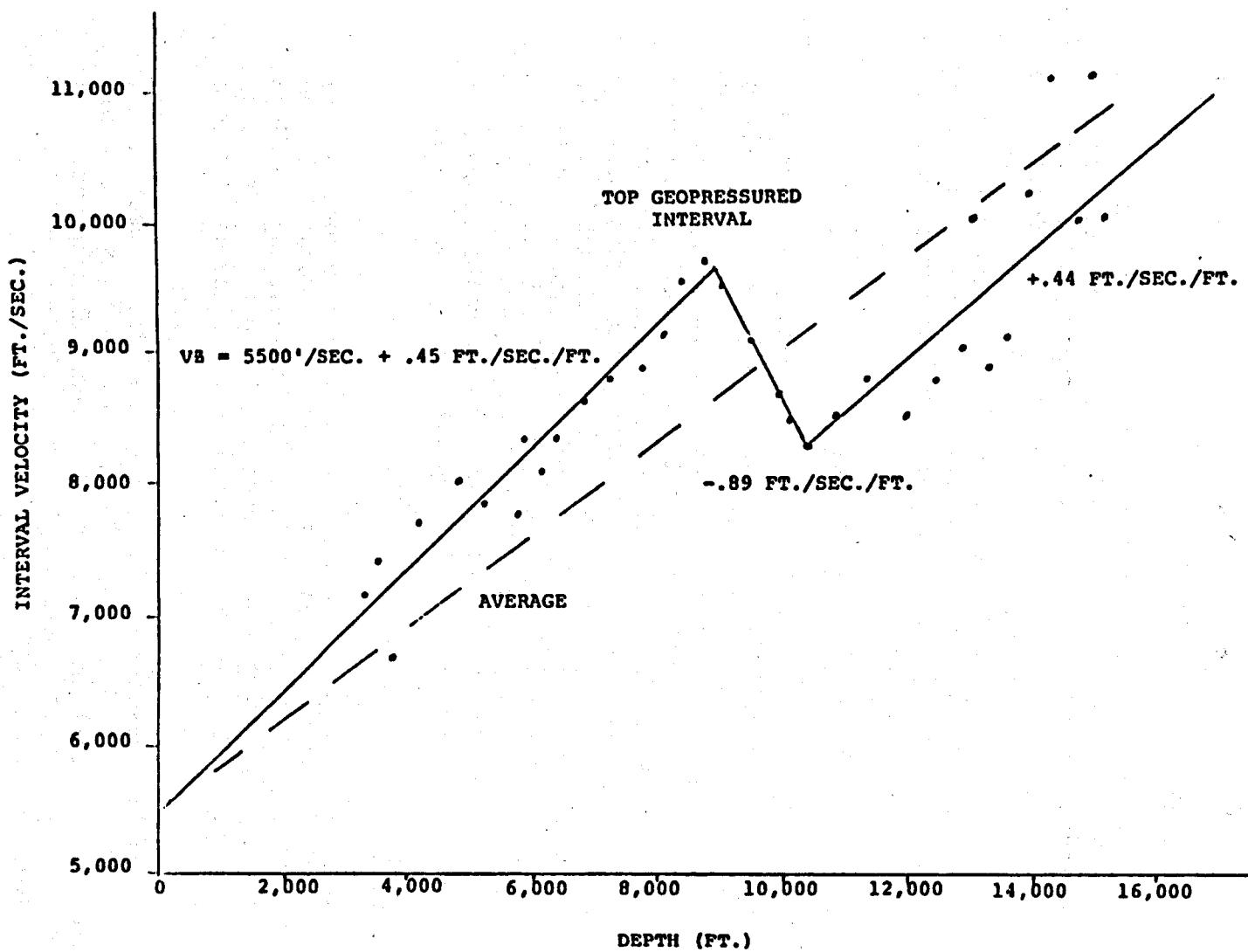
4.3.3 Velocity Function

The velocity values for time-depth correlations are listed in Table 4. The velocity function for these values is plotted on Figure 4-11 as interval velocity vs. depth. The sharp decrease in interval velocity with depth at 8,840 feet marks the top of the geopressured interval. Geologically, this is associated the base of the massive Miocene sands and the top of the massive Anahuac shale. Below the log depth

Table 4

VELOCITY FUNCTION--NORTH SWEET LAKE
 (FROM BHCS LOG, UNION OF CALIFORNIA
 SWEET LAKE LAND AND OIL 1)

<u>DEPTH</u>	<u>TWO-WAY TIME</u>	<u>AVERAGE VELOCITY</u>	<u>INTERVAL DEPTH</u>	<u>INTERVAL TIME/THICKNESS</u>	<u>INTERVAL VELOCITY</u>
3300	1.000	6600	1650	.5/3300	6600
3550	1.070	6635	3425	.035/250	7140
3720	1.116	6666	3635	.023/170	7410
3850	1.154	6672	3785	.019/130	6667
4680	1.370	6832	4265	.108/830	7690
5100	1.474	6919	4890	.052/420	8000
5400	1.550	6967	5250	.038/300	7810
5740	1.634	7025	5570	.042/340	8060
5900	1.674	7048	5820	.020/160	7750
6010	1.700	7070	5955	.013/110	8330
6240	1.756	7107	6125	.028/230	8060
6670	1.858	7179	6455	.051/430	8330
6880	1.906	7219	6775	.024/210	8620
7600	2.070	7342	7240	.082/720	8770
7970	2.152	7407	7785	.041/370	8850
8350	2.234	7475	8160	.041/380	9090
8700	2.306	7545	8525	.036/350	9520
8980	2.364	7597	8840	.029/280	9710
9350	2.440	7664	9165	.038/370	9520
9880	2.556	7730	9615	.058/530	9090
10100	2.606	7751	9990	.025/220	8700
10350	2.664	7770	10225	.029/250	8470
10700	2.748	7787	10525	.042/350	8330
11000	2.818	7806	10850	.035/300	8470
11880	3.018	7872	11440	.100/880	8770
12200	3.092	7891	12040	.037/320	8470
12750	3.216	7929	12475	.062/550	8770
13050	3.282	7952	12900	.033/300	9010
13190	3.310	7969	13120	.014/140	10000
13350	3.346	7979	13270	.018/160	8850
13790	3.442	8012	13570	.048/440	9090
14150	3.512	8058	13970	.035/360	10200
14700	3.610	8144	14425	.049/550	11110
14890	3.648	8163	14795	.019/190	10000
15040	3.674	8187	14965	.013/150	11110
15430	3.752	8224	15235	.039/390	10000
16000	3.855	8300	15715	.051/570	11067
16500	3.944	8367	16250	.044/500	11235
17000	4.031	8434	16750	.043/500	11479
17500	4.116	8503	17250	.042/500	11699
18000	4.20	8571	17750	.041/500	11919



4-25

Figure 4-11

VELOCITY FUNCTION--NORTH SWEET LAKE FIELD (FROM BHCS LOG, UNION OF CALIFORNIA SWEET LAKE L&O 1)
SECTION 7, 12S, 7W, CAMERON PARISH, LOUISIANA

of 15,500 (Table 4) time-depth relationships were extrapolated using a .44 ft./sec./ft. increase in velocity with depth.

4.3.4 Migration

Only one of the seven lines was migrated. Fortunately, this was the north-south line CJ (Figure 4-1) near the proposed location. For the most part, dips were not great enough to seriously distort the map. However, it was necessary to migrate the down-to-the-north fault on line CA, Sec. 7, T12S, R7W, some 1,400 feet N 45° W because of dips. This migration is shown on the Miogypsina structure map (Figure 4-1). The velocity function used for this migration is the average line in Table 4.

4.3.5 Geological-Geophysical Interpretation

The Miogypsina structure map shown in Figure 4-1 represents our geological-geophysical interpretation of structure at the level of the objective geothermal reservoir. The proposed geothermal well location shown on this map is in a graben between a large down-to-the-south fault on the north and a down-to-the-north fault on the south. For the most part the Miogypsina sand in this graben dips north to northwest around 17° from about 14,000 to 18,000 feet. The exception is southeast dips of 10° to 20° encountered in the Union of California Sweet Lake Land and Oil 1 just above the Miogypsina sand.* The small "splinter" fault in Sec 7, 7W, off the larger down-to-the-north fault could account for these southeast dips by rotation between the two faults.

4.4 CONCLUSIONS

The Sweet Lake prospect has been confirmed as an excellent site for testing a geopressured-geothermal well. Porosities and permeabilities equal or exceed the predicted values, and the Miogyp sand appears to be capable of producing 40,000 B/D. The actual temperature is at least as high as predicted, and may be as much as 20°F higher.

The bottom-hole pressure is 2,000 psi greater than expected. The pressure at the wellhead may thus be as much as 5,000 psi. Salinities are still expected to be around 100,000 ppm. The methane content is estimated at 35 cubic feet per barrel, with approximately 30 cubic feet recoverable.

*The dipmeter log in this well was not run over the Miogypsina interval because of borehole condition.

The basin is bounded on the north and south by two faults which converge to the east and form a graben. The reservoir may, or may not, be limited on the west and northwest by a third fault. If this major third fault is present to the west-northwest, it should be possible to determine the limits of the reservoir within 10-20 days.

5.0 GENERAL SITE ACTIVITIES

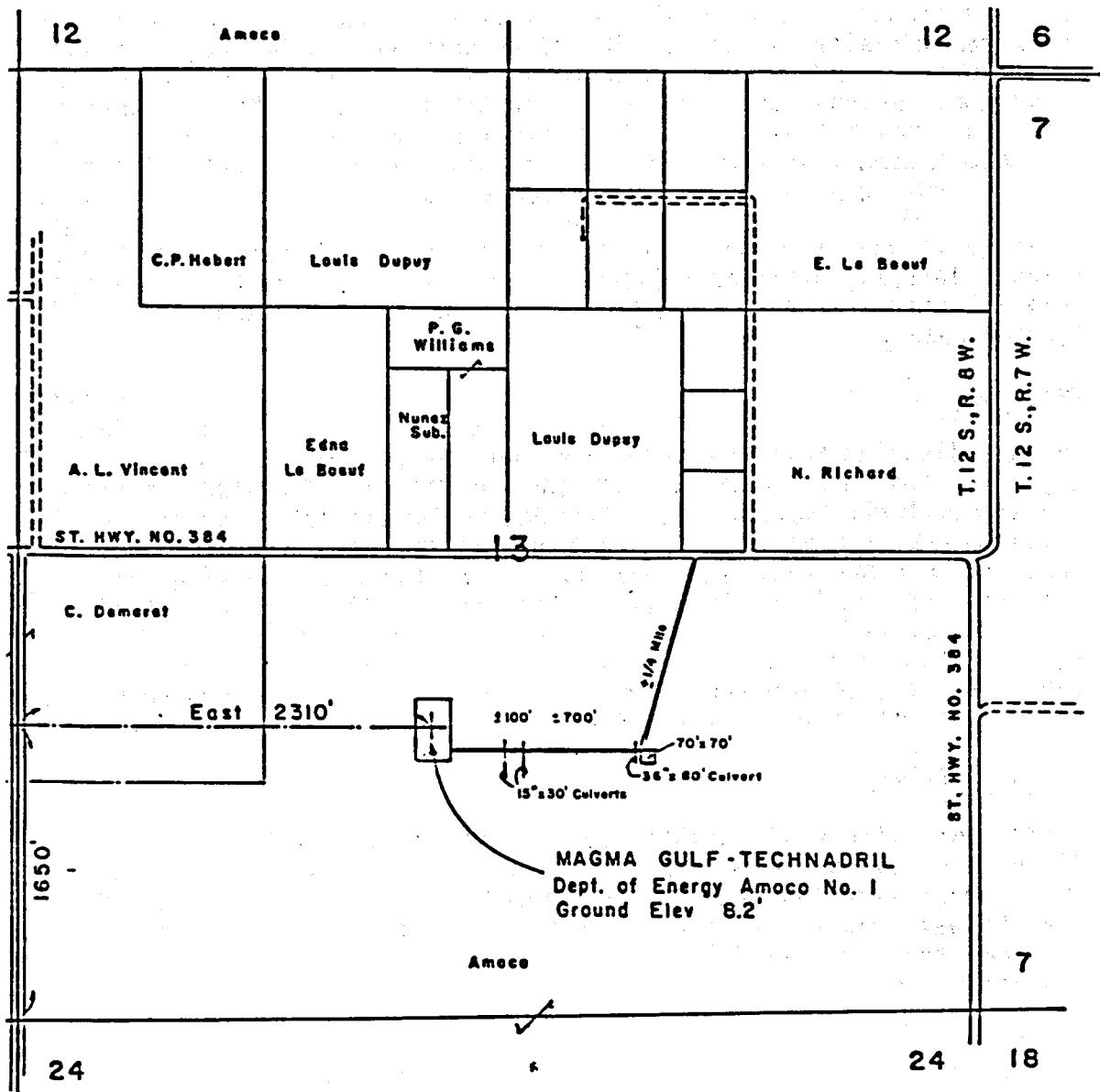
5.1 SITE PREPARATION

The existing road from Louisiana Highway 384 to the turnaround (Figure 5-1) was graded and covered with 6 inches of shell. The turnaround area, site manager's trailer location, was also graded and covered with shell. This turnaround was used as a staging and storage area during the site preparation and start-up operations. The site manager's trailer and a guard station were located at the turnaround to control access to the site. This was particularly necessary since all drill cuttings and drilling fluids had to be hauled to a waste disposal site, as no reserve pits could be used at the site. The state of Louisiana requires that the disposal of such materials must be closely monitored.

The access road from the turnaround to the well site was graded and covered with one layer of Dupont 3401, 4 ounce pervious TYPAR. This material was then covered with 12 inches of shell which was rolled and compacted prior to placement of the boards. Due to the delays caused by unavailability of tubular goods, the shell road was used without the board covering until it was time for rig start-up operations. The board road was three ply consisting of a bottom ply laid 14 feet wide containing 17 mud boards. The second ply contained cross ties placed on 9 inch centers. The top ply contained 12 board runners set on vehicular track spacing. The first two plys were used board lumber, and the top ply was new board lumber nailed with a minimum of four 60P nails per board.

The test well site was approximately 250 feet by 325 feet in area. The areas of heavy traffic were underlain with Dupont 3401 TYPAR, and covered with 12 inches of shell. These areas were covered with three ply boarding, with the bottom ply laid on 12 inch centers and the middle and top plys laid on 9 inch centers. In the area of the rig substructure a fourth ply laid on 9 inch centers was also used. All the boards were 3 X 9 scant good hardwood. The two bottom plys were used lumber and the top ply and top two plys in the area of the rig substructure were new boards. The top layers were nailed with a minimum of four 60P nails per board. Prior to laying the boards in the area of the rig substructure, ninety 12 inch pilings were driven with a diesel hammer to refusal and then cut off at ground level.

A ring levee was constructed around the turnaround area which was low enough to protect, but not interfere with, framing operations. A three feet high ring levee was then constructed along the north side of the board run access road to the well site, and then around the test well site. Subsequently the ring levee was also constructed around the disposal well site. The levee system and



**SWEET LAKE
GEOTHERMAL WELL
VICINITY MAP AND
GENERAL LOCATION PLAN**

Cameron, La.

FIGURE 5-1
LOCATION OF TEST WELL

parallel drain ditch drained to a low point from which excess water could be pumped into a local drain ditch or picked up by vacuum truck for off-site disposal. The levee and drain ditch were constructed to protect the well site from flooding, and to protect the local farming operations from any possible contamination. One 36" X 80' culvert and two 15" X 30' culverts with gates were constructed beneath the access road in order to facilitate irrigation, and not interrupt the rice farming operations.

No reserve pits were used in compliance with the lease requirements. Instead, drilling fluids, solids, and excess surface water were hauled by truck to a State of Louisiana approved disposal site located nearby.

5.2 TRAILERS

The trailers at the site were provided by the various firms and agencies involved. These included the Magma Gulf - Technadril site manager's office trailer located at the turnaround access gate, the Magma Gulf - Technadril company trailer at the well site, the tool pusher's trailer, the mud engineer's trailer, the mud-logger's trailer, and trailers for the drilling crew. Upon completion of drilling operations the trailers used during this phase were removed from the location. The site manager's office trailer was moved from the turnaround to the test well site and the turnaround area returned to the surface lessee.

5.3 COMMUNICATIONS

A telephone line was installed to the site manager's trailer, and lines were run to the well site for telephone installations in the MG-T company trailer and the tool pusher's trailer. An intercom system was available for communications between the company trailer, the tool pusher's trailer, the mud-logger's trailer and the rig floor.

5.4 POWER

A power line from Jefferson Davis REA was provided to the site manager's trailer. Additional power was provided by the rig generators.

5.5 WATER SUPPLY

Water supply wells were drilled for the test well and disposal well. The supply well for the disposal well was subsequently capped and abandoned according to State of Louisiana Department of Conservation rules. The water supply well at the test well site is being used for water needed during the testing phase of operations.

5.6 SANITATION

A 500 gallon sheet steel, tar-coated septic tank and PVC pipe were installed on the north side of the turnaround and connected to the site manager's trailer. A septic tank system was also installed on the west side of the test well site.

5.7 SITE CLEAN UP AND RESTORATION

At the termination of the drilling and completion phase, the turnaround area was returned to the surface lessee, the guard house removed, and on-site materials associated with the drilling operations are being processed - salvaged or sold. All reusable drilling fluid has been sold. Water wells not needed for the testing phase have been capped according to state law. Excess boards and shell not required for the site during testing are being salvaged.

6.0 OCCUPATIONAL SAFETY AND HEALTH

6.1 GENERAL

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

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:

6.1.1 A safe and healthful environment for the employees.

6.1.2 Control and minimization of hazards to the public and to personnel of other participants.

6.1.3 Minimization of accidental damage or loss of equipment, materials, and property.

6.2 SITE ACCESS

Because of the hazardous nature of geopressured-geothermal well drilling and testing operations, MG-T controlled access to the test site and arranged all visits of nonproject personnel.

6.3 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.

6.4 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.

6.5 SAFETY HAZARDS

6.5.1 Hydrogen Sulfide

Normal precautions were taken by placing H₂S detectors in the drilling fluid container areas and monitoring them with the mud logging unit.

6.5.2 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 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.

Although a problem with a well kick did occur, and apparently an underground blowout did take place, no problems regarding the safety of personnel occurred at the surface. The problem was resolved and drilling operations ultimately resumed without further problems.

7.0 TEST WELL - DRILLING AND COMPLETION

7.1 INTRODUCTION

On August 16, 1980, Resource Drilling Company's Rig No. 12 began moving on location at the Sweet Lake site. Rigging up was completed, and on August 19, began driving the 30" conductor casing to 126' below ground level. The flow lines were nipped up and the well was spudded on August 22, 1980.

7.2 INTERVAL TO 20" CASING POINT

The 24" hole interval to 835' was drilled in 2 days using a Magcogel mud which was gradually increased from 8.7 to 9.4 lb./gal. At 550' the hole was circulated clean due to an excess solids control problem. At 835' the hole was logged with 4 arm 60" calipers, and then circulated and conditioned preparatory to running the 20" casing.

Thirteen joints of 20" 133 lb. K-55 B.T.C. and 9 joints of 20" 169 lb. K-55 B.T.C. were then run to 824'. The casing was cemented with 750 sacks of Class "H" plus 35% silica flour plus 3% CaCl_2 , 13.4 lb./gal. cement for the tail slurry, and 1650 sacks of light-weight plus 35% silica flour plus 3% salt, 13.4 lb/gal. cement for the lead slurry. Two hundred sixty-five sacks were returned to the surface. The cement was set in 5 hours and then the 30" and 20" casing were cut. The 20" 3000 lb. FMC OCT casing head was welded and then tested to 1250 psi for 30 minutes. The 20" 3000 lb. spacer spool, 20" 3000 lb. X 20" 2000 lb. double studded adapter, 2-4" valves, 20" 2000 lb. spacer spool with 2-4" valve outlets, and the 20" 2000 lb. Hydril were nipped up. The 20" Hydril BOP's were nipped up, and the 20" casing and BOP's were tested to 1000 psi for 30 minutes. The cement and float collar were then drilled out.

7.3 INTERVAL TO 13 3/8" CASING POINT

The 17 1/2" hole to 4050' was drilled in 3 days with a 9.2 lb./gal. Magcogel and caustic mud. A bridge was reamed from 1,485' to 1,490', and the hole then drilled to 4,050'. A gyro survey was run with a 3/4° deviation at 3,500'. A 4 arm caliper was run from 4,046' to 826', and the hole was then circulated and conditioned preparatory to running casing. Forty-five joints of 13 3/8" 72 lb. L-80 B.T.C. casing, a float shoe and float collar, and 69 joints of 13 3/8" 72 lb. N-80 B.T.C. casing were run to 4,050'. The hole was circulated and cleaned with 1000 bbl. of SAM-5 10 lb./gal. chemical wash. The casing was cemented with 5000 sacks of high temperature, low density cement plus 1.7% Halad 22A, 1/4 lb./sack Kwik Seal, tailed by 475 sacks of Class "H" plus 40% silica

flour plus 0.75% CFR-2, 16.3 lb./gal. cement. The casing was cemented to the surface with 887 sacks returned. The 13 3/8" casing was hung with 200,000 lb. on OCT Type C-29 slips and then cut. The 13 5/8" 5000 lb. X 20" 3000 lb. OCT C-22 casing head was tested to 1,400 psi for 30 minutes. The 13 5/8" Type U 10,000 lb. BOP's were nipped up. The BOP's, pipe rams Hydril and valves were all pressure tested. Leaks were noted and repaired, and preparations were made to drill out the cement. The cement and float shoe were drilled, and a leak-off test to 14.0 lb./gal. mud weight equivalent was made.

7.4 INTERVAL TO 9 5/8" CASING POINT

The 12 1/4" hole to 10,230' was drilled in 16 days with no problems. The mud weight was gradually increased from 9.0 lb./gal. to approximately 10.0 lb./gal. until a depth of 10,102' was reached. At this point the mud weight was rapidly increased to 11.2 lb./gal., and then to 13.1 lb./gal. at 10,221'. Refer to the Magcobar mud report for a detailed review of the mud characteristics. The hole was then circulated and conditioned preparatory to logging. Schlumberger ran Dual Induction, Formation Density, Gamma Ray, Neutron, Sonic, and Dipmeter logs. Twenty-four sidewall cores were attempted across the geopressured transition zone with 16 cores recovered. Bottoms up were circulated and 40 units of gas were recorded. The hole was then circulated preparatory to running casing.

Eight joints of 9 5/8" P-110 47 lb./ft., and 225 joints of 9 5/8" N-80 47 lb./ft. casing were run to 10,230', and the hole was then circulated. The 9 5/8" casing was then cemented with 900 sacks of Class "H" cement plus 40% silica flour, plus 0.25% CFR-2 plus 0.1% HR5, followed by 400 sacks of Class "H", plus 40% silica flour, plus 0.4% Halad 22-A 0.75% CFR-2, plus 0.25% HR12. There were 100% returns throughout the cementing job. The plug did not bump, and there were 6 bbl. over displaced. The cement was allowed to set up for 16 1/2 hours, and then the pipe was pulled. The pipe slipped and the cement was allowed to set another 6 hours. A temperature survey was run with the cement top determined at approximately 6,400'. The 9 5/8" casing was then pulled to 810,000 lb. and stretched 54". The slips were set at 735,000 lb. The 13 5/8" 5000 X 11" 10,000 OCT C-22 casing head was nipped up and tested to 3,500 psi. A gyro survey was run from 11,007' to 3,987' with a horizontal displacement equal to 51.33' at N39° 18'W.

The 13 5/8" BOP rams, valves, and Kelly valves were tested to 5,000 psi. The annular BOP was tested to 3,500 psi, and the 9 5/8" casing tested to 1,500 psi. Hard cement was then drilled from 10,012' to 10,070'. Hard cement and 10' of formation was then drilled to 10,240', and the casing shoe tested to 1,500 psi. A leak-off test with 14.0 lb./gal. mud equivalent to 16.8 lb./gal. tested O.K.

7.5 INTERVAL TO 7 5/8" CASING POINT

While drilling the 8 1/2" hole to the 7 5/8" casing point unstable hole conditions resulted in the drill bit being stuck at 13,556'. After washover and fishing operations, the hole was plugged back at 11,015'. A random sidetrack was then started at 10,645'.

After setting the 9 5/8" casing the hole was drilled to 11,155' with 13.8 lb./gal. mud gradually increased to 14.5 lb./gal. At 11,155' 851 units of trip gas were recorded. Drilling continued to 11,337' and the BOP's, rams, valves and Kelly cock were tested to 5,000 psi. The Hydril was tested to 3,500 psi. A drilling break was noted at 11,728' to 11,732'. A directional survey was run at 11,987' and the instrument was lost in the hole. The drill pipe was rabitted and junk drilled from 11,960' to 11,987'. Drilling continued to 12,280' where the BOP's, rams, and valves were tested to 5,000 psi. The annular BOP was tested to 3,500 psi. Drilling continued to 12,460' where a survey was attempted at 12,457'. The survey was misrun and drilling continued to 12,064', where another survey was run. A Tri-State Concave mill and 2-7" boot were run into the hole and junk milled from 12,604' to 12,607'. Drilling continued to 12,872', and the hole was reamed from 12,800' to 12,872'.

Drilling continued with a drilling break at 12,808' to 12,894'. Some slight movement was noted, and the hole was circulated and mud weight increased to 15.3 lb./gal. Maximum gas was recorded at 1,080 units, with background gas at 280 units. The mud weight was increased to 15.5 lb./gal., and the background gas dropped to 19 units. Drilling continued to 13,126', where 10 stands of pipe were pulled and the hole was not taking mud. Bottoms up were circulated with excessive large cuttings and 440 units of gas. The 15.6 lb./gal. mud weight was cut to 14.2 lb./gal. The gas was circulated out of the hole and the drill pipe was pulled. The BOP's were tested to 5,000 psi, and the Hydril tested to 3,500 psi. Went in the hole and washed from 13,050' to 13,126', and drilled to 13,140'. The hole was circulated to clear bottoms up. Maximum gas was recorded at 1,400 units, with 12,900 Cl₂.

Drilling continued to 13,273' where circulation with 15.8 lb./gal. mud was lost. Circulation pressure was reduced to attempt to regain circulation. The annulus stayed full. Three stands of pipe were pulled, but the hole stayed full. The pipe was slugged twice, and 33 stands of pipe were pulled slowly back into the 9 5/8" casing. Circulation was attempted at 10,230' for 10 minutes, but returns were lost. The mud weight was cut from 15.8 lb./gal. to 15.6 lb./gal., and waited for the hole to heal. The hole was allowed to heal for 5 1/2 hours and then circulation was resumed slowly. Bottoms up at 10,230' were circulated with 43 units of gas. Went back in the hole with 18 stands of pipe and circulated

bottoms up at 11,964'. There were excessive shale cuttings and 472 units of gas. Went in the hole with 10 stands of pipe, and again circulated bottoms up with less shale and 294 units of gas. Went in hole with 1 stand of pipe and started to take weight. The hole was reamed to 13,273', with some excess shale noted, and 199 units of gas recorded. The hole was then drilled to 13,335' with only 16 units of gas recorded. The hole was then drilled to 13,554' with 15.6 lb./gal. mud with no further problems.

At this point, 13,554', a 20 stand short trip was made to 11,700' in order to pressure test the hole. The well started to swab in with 15.6 lb./gal. mud. The bit was lowered back to bottom and drilled to 13,556'. For over half an hour 15.8 lb./gal. mud was circulated, and then the well started flowing. The Cameron annular BOP was closed with 800 psi on the casing and 50 psi on the drill pipe, and the well was circulated through the choke. The 13 3/8" Cameron annular BOP started leaking. The rams were closed and the well killed. The mud was cut to 8.5 lb./gal. with gas and 27,000 Cl₂. The rams were opened and circulation was attempted, but the pipe was stuck. A Schlumberger temperature survey was run from the surface to 13,550'. A CBL-VDL-GR log was run from 13,527' to 10,000', and a second temperature survey was run from 13,530' to 9,000'. The bit appeared to be stuck at 13,520'. Mud was pumped through the drill pipe for half an hour at 650 lb. at 20 strokes per minute, and at 1,050 lb. at 28 strokes per minute. The formation broke down at 1,250 psi.

A 1 13/16" junk shot was run to 13,531' and fired to remove the bit jets. The drill string was then cemented with 530 sacks of Class "H" plus 0.75% CFR-2, plus 0.7% HR-12 slurry with a density of 16.4 lb./gal. The annulus started to flow 30 minutes after placing the cement, and after 12 hours pressure increased to 400 psi on the drill pipe and to 210 psi on the annulus. The pressure on the drill pipe was bled to 0 psi, and after 6 hours the pressure on the annulus increased to 300 psi.

Another temperature survey was run from 12,924' to 8,000' and a CBL-VDL-GR log was run from 13,500' to 8,000'.

A 5" drill pipe was hung on the rams and the Cameron Type D annulus BOP rubber was changed. A Gyro directional survey was run, and the temperature log was rerun from 10,530' to 8,000'. A Dialog string shot and free point indicator were run. A comparison of the logs and free point indicator showed the pipe stuck at 11,000' and free at 10,472'. An attempt was made to back off at 10,170' but the string shot failed to fire. The string shot was rerun and the annulus started flowing. The well was shut in and the annulus pressure increased to 100 psi. The drill pipe was pressurized to 1,500 psi and 1 bbl. of fluid was injected at a 1 bbl./min. rate.

The pressure declined to 520 psi on the drill pipe and increased to 210 psi on the casing. A go plug was set in the drill collar at 12,900' and the 5" drill pipe was perforated from 12,520 to 12,591' with five 0.33" holes using a 2 1/8" Hyperjet gun. The well was then circulated at 1 bbl./min. at 2,500 psi, with some flow from the annulus. The 5" drill pipe was again perforated from 12,585' to 12,586' with five 0.33" holes using a 2 1/8" Hyperjet gun. The well was circulated for 1 hour at a 1 1/2 bbl./min. rate.

The pipe was worked for 1 hour attempting to re-establish circulation, and the pipe parted at 4,712'. The well started to flow and it was shut in with 160 psi on the casing. Fifty stands of pipe were chained out of the hole. Went back in the hole slowly while tightening each tool joint and screwed into the fish at 4,712'.

A free point indicator was run and showed the pipe stuck at 9,350' inside the 9 5/8" casing. A second free point indicator was run with the same results.

The drill pipe was perforated at 10,120' with 2 misfires, and circulation was attempted with no results. The drill pipe was then perforated at 9,350', but circulation still could not be established. The drill pipe was then pulled to 320,000 lb. to 9,290' before the fish came free and circulation was established. The hole was circulated and the mud conditioned and cut from 15.1 lb./gal. to 14.0 lb./gal. to stop mud loss. Four hundred barrels of salt water and contaminated mud were recovered from the casing. While pulling the fish out of the hole the master drum clutch cracked which necessitated a 48 hour delay before finishing pulling out of the hole.

The hole was then re-entered with fishing tools to wash out around the stuck drill pipe. The pipe was washed over to 9,930' and the hole circulated. The drill pipe was screwed into at 9,354'. A free point indicator and collar locator with string shot was run and the pipe was backed off at 10,147'. The hole was then circulated to 10,147' and 27 joints of drill pipe and 2 damaged joints with perforations were recovered.

The BOP's, rams, and valves were then tested before going back in the hole with the 7 5/8" wash pipe fishing assembly. The pipe was then rotated and washed to 10,215', and then slowly washed and rotated with some torque problems from 10,215' to 10,234'.

While washing over the fish at 10,235' the well started flowing. The drill pipe was shut in with 100 psi, and the casing with 260 psi. The mud weight was increased from 14.1 lb./gal. to 15.1 lb./gal. The shut in pressure increased to 800 psi on the drill

pipe and 900 psi on the casing. The well was then circulated for 2 hours through the choke while washing over the fish from 10,235' to 10,363'. The circulated mud was cut from 15.6 lb./gal. to 15.3 lb./gal. with 360 units of gas. Continued washing over the fish from 10,363' to 10,521' while increasing the mud weight back to 15.6 lb./gal. The mud was conditioned and the hole circulated while backing off the fish. The hole was circulated clean and the fish re-engaged. A free point and string shot were run which showed the pipe free at 11,000' in torque and free at 12,000' in tension. The 5" drill pipe was backed off at 11,015'. The fish and wash pipe were pulled back into the 9 5/8" casing and then pulled out of the hole. The 5" drill pipe was stripped from the 7 5/8" wash pipe. Open-ended 5" drill pipe was lowered to 8,000', the hole circulated, and then lowered to 11,008'. The circulated mud was cut to 13.4 lb./gal. with 4,200 units of gas and 30,000 ppm. Cl_2 . An open hole plug was set at 11,015' on top of the fish. The plug was set with 110 sacks of Class "H" plus 40% silica flour, plus 3/4% CFR-2, plus 0.1% HR5.

The hole was then reamed from 10,550' to 10,579' and cement drilled from 10,579' to 10,602'. The hole was circulated with the mud cut to 13.2 lb./gal. with 3,600 units of gas. The pipe was pulled to 10,200' and a leak-off test was made at the casing shoe. The shoe and formation tested to 16.8 lb./gal. equivalent. Schlumberger ran a borehole geometry log from 10,608' to 10,234'.

7.6 SIDETRACKED INTERVAL TO 7 5/8" CASING POINT

On November 11, 1980, a random sidetrack was begun by drilling with a Dynadrill from 10,645' to 10,725'. A survey showed a deviation of 1 3/4° at 10,523'. An 8 1/2" bit was then used to drill to 10,812'. A survey was run and the formation tested at 10,800' to 16.8 lb./gal. equivalent. The BOP's, rams, and all valves were tested to 5,000 psi, and the Hydril tested to 3,500 psi. The hole was then drilled to 11,891' with periodic surveys to check hole inclinations.

The bottom-hole assembly and all surface equipment were checked and tested, and the hole drilled to 12,203'. The hole was circulated and the mud weight raised to 15.4 lb./gal. The hole was then drilled to 12,614, bottoms up were circulated, and a leak-off test to an equivalent of 16.5 lb./gal. was made. The hole was then drilled to 12,723' where the pipe became stuck briefly. The hole was circulated and 10 stands were pulled slowly, and then rerun to the bottom. The formation was tested to 16.8 lb./gal. mud weight equivalent. The hole was then reamed from 12,164' to 12,723', and drilled to 12,894'. The mud was circulated and the drill pipe pulled out of the hole. The directional survey showed a 4° deviation. The surface equipment was checked and a new bit was lowered into the hole.

The hole was slowly reamed from 12,804' to 12,894', and drilled to 13,077'. The hole was drilled to 13,115', and circulated clean. Drilling continued to 13,550', the hole circulated and a leak-off test to 16.8 lb./gal. mud weight equivalent was performed. The pipe was pulled to inspect the bottom-hole assembly and then run back in the hole, wiping the key seats from 10,230' to 13,550'. The hole was reamed from 13,490' to 13,550'. The hole was then drilled to 13,680', where a trip was made to change the stabilizer positions. Deviation at this point was 6 3/4°. The bit was lowered back to bottom and circulation was lost while drilling at 13,687'. The bit was pulled with the hole swabbing. Circulation was attempted at 10,200' and 9,700' with approximately 25% returns. The well was observed for 4 hours to let it heal and the bit was raised to 7,860'. The hole continued to swab and the bit was raised to 3,300'. Circulation was established and the mud conditioned. The bit was then lowered, stopping to circulate and condition the mud at 4,300'; 5,700'; 7,500'; 10,200'; 11,576'; and 12,952'.

Drilling was continued to 14,146', with a drilling break at 13,858'. The surface equipment was tested and the hole drilled to 14,480'. The bit was changed and the hole surveyed. The survey was misrun. The hole was then drilled to 14,725', and reamed from 14,591' to 14,651'. The hole was then drilled to 14,856' where a trip was made to change the bit and test the surface equipment. Trip gas was 150 units. The top of the Camerina II sand was noted at 14,856'.

Drilling continued to 15,065', with the first appearance of the microfossil Miogypsina at 14,958'. The hole was circulated and conditioned preparatory to logging. The top of the Miogyp sand was at approximately 15,065'. Deviation at 15,065' was 8 1/2°.

Schlumberger ran ISF-Sonic, CNL-FDC-GR, and Dipmeter logs. Forty-eight sidewall cores were attempted from 12,875' to 15,065'. Forty-two were recovered, data from 26 was retrieved, and 6 cores were lost in the hole. A McCullough caliper log was run on the 9 5/8" casing. A trip was made to 10,200' and then to 15,065' to circulate.

The pipe rams were changed to casing rams and 251 joints of 7 5/8" 39 lb. SFJ casing was run to 15,065'. The casing was cemented with 1,600 sacks TCH with 3% KCl, plus 0.6% HA 22A, plus 1% CFR-2, plus 0.27% D-AIR, plus 8% HR-12 at a slurry density of 17.0 lb./gal., with 20 bbl. ahead and 5 bbl. behind. The plug was displaced down with mud. There were 60% returns at 5 bbl./min. after the cement started across the formation. The plug was bumped with 2,000 psi, and excess cement, 10 bbl. of good cement, was reversed out.

The casing rams were changed to pipe rams, and a RTTS tool was run in the hole to 9,628' to test the liner top to an 18.1 lb./gal. equivalent. The estimated pump-in rate was 2 bbl./min. at 1,300 psi. One hundred fifty sacks of Class "H" with 20% silica flour, plus 20% Oklahoma No. 1, 1% CFR-2, plus 0.27% D-AIR, plus 0.2% HR-5 were squeezed at a slurry density of 16.4 lb./gal.

After 12 hours a 4 3/4" drill collar assembly was lowered to tag the cement top at 9,750'. The cement was drilled from 9,750' to 9,814', and the liner top tested to 2,000 psi. The liner leaked, and a RTTS tool was set at 9,585' and tested the liner top to 2,000 psi. The test was O.K., and a differential test of 1,500 psi was also O.K. The RTTS tool was then pulled.

The drill pipe rams were changed to 3 1/2", and the BOP's tested to 5,000 psi. The Hydril was tested to 3,500 psi. The liner top was cleaned off at 9,814'.

Five inch drill pipe was then run in the hole to the float collar at 14,980'. The float collar, 84' of cement, the float shoe, and 5' of formation were drilled to 15,070'. The casing shoe was tested to 17.0 lb./gal. equivalent and the pipe was pulled for a new bit.

7.7 INTERVAL TO 5 1/2" LINER POINT (TOTAL DEPTH)

A 6 1/2" 533F bit was lowered to bottom and drilling continued to 15,144' when the pressure dropped on the drill pipe. The pipe was pulled to check for washouts, and the bit was found to be washed out in the shanks.

The Schlumberger RFT tool was run with a pressure differential of 1 lb./gal. or 800 psi. Pressure in the sand at 15,144' was indicated at 11,990 psi.

A junk mill and tandem boot baskets were run in the hole and the hole reamed from 15,065' to 15,144'. The hole was conditioned and the mud weight cut from 16.2 to 15.7 lb./gal. Junk removed from the hole appeared to be pieces of the sidewall core bullets and the 6 1/2" bit which had been washed out.

After further conditioning the hole a 4 1/8" X 2 1/8", 60' core barrel was run into the hole. The diamond bit was a 6" X 2 1/8" type MC-20. The hole was cored from 15,144' to 15,185' when the core barrel jammed. The core was pulled after coring 41' of section with 36' of recovery.

A 6 1/2" M44SF bit was lowered to 15,144' and a 6" rat hole was reamed to 15,182'. The 6" bit was pulled and the second core barrel was lowered. The hole was cored from 15,185' to 15,204'

when the barrel again jammed. When the diamond bit was removed there was evidence of junk on top of the bit, but there was no damage to the bit. Nineteen feet of section was cored with 17' of recovery in the second coring run.

A rat hole was reamed with a M44NF bit from 15,144' to 15,204', then drilled from 15,204' to 15,234'. The bit was pulled and the surface equipment was tested. A J-33 bit was then used to drill from 15,234' to 15,389'. The hole was then circulated and conditioned preparatory to running core number 3.

The hole was cored from 15,389' to 15,408'. Nineteen feet of section were cored with 17' of recovery. A J-33 bit was then used to ream a rat hole and drill from 15,408' to 15,435'.

A 6 1/2" hole was drilled from 15,435' to 15,600', bottoms up were circulated and the drill pipe pulled.

The fourth coring run was then made from 15,600' to 15,634' with 32' of recovery. A J-33 bit was used to ream a rat hole from 15,600' to 15,634' and then drill from 15,634' to 15,740' - total depth. A short trip was made and the hole circulated preparatory to logging.

Schlumberger ran an ISF-Sonic-GR log to total depth. A maximum recording thermometer recorded 300°F bottom-hole temperature. An FDC-CNL-GR log was run, and again the maximum recording thermometer recorded 300°F. A dipmeter log was run, and the maximum bottom-hole temperature recorded at 300°F. A trip was made to total depth and the hole circulated. A short trip was made and the hole circulated. Deviation at total depth, 15,740', was 18 1/2°. The bit was pulled and preparations were made to run casing.

Eight joints of 5 1/2" 25.5 lb./ft. FL4S casing were run as a liner with shoe, float collar, polished-bore receptacle, liner hanger, and tie-back sleeve. The 5 1/2" liner was run to 15,735' on the drill pipe and was cemented with 155 sacks of Class "H" with 40% silica flour No. 1, 2 sacks of KCl, 6% Halad 22A, 1% CFR-2, 0.2% D-AIR-1, and 0.8% HR-12. The float collar was at 15,661 PBTD. A mill was run to dress the top of the 7 5/8" tie-back sleeve at 14,535'. Part of the drill pipe was pulled and the casing and cement at the top of the liner were tested to 1,000 psi.

Two hundred forty-seven joints of 7 5/8" casing with an 8.58' stem into the liner tie-back sleeve was run and set at 9,815'. The string had 1 joint of FJP casing 43.15' from the stem to the float collar, and 2 joints of FJP to the cross-over (1.12') and 243 joints of X-line casing.

The casing was cemented with 215 sacks of Trinity Class "H" and 20% silica flour (regular grade), 20% coarse silica flour, 10% CFR-2, and 0.27% D-AIR-1. Twenty bbl. of SAM-5 spacer was pumped on top of the plug, and displaced with 372 bbl. The pump pressure increased from 1,000 to 2,000 psi. The pressure was released and the casing repressured to 3,500 psi. The pumping rate was 4 bbl./min. at 1,000 psi.

The cement set up for 46 hours before an attempt to pre-stress the 7 5/8" casing. The casing pulled free with only 30,000 lb. of tension. Schlumberger ran a temperature survey and located the plug at 8,995', with cement to 8,780'.

A Power Swivel was rigged up and the 7" diameter BOP stack was nipped up. A 6 blade, 6 3/4" mill was run in the hole on 2 7/8" tubing and drilled cement from 8,905' to 9,812'. The Power Swivel was rigged down and measured out of the hole with the mill. The pipe was pulled out of the PBR and circulation was broken. The hole was then circulated.

The 7 5/8" tie-back string was then cemented with 265 sacks of Class "H", 20% Oklahoma No. 1, 20% silica flour, 0.75% CFR, 0.27% D-AIR-1, and 0.2% HR-5 with a 17 lb./gal. density. The cement was displaced with 416 bbl. with 20 bbl. SAM-5 spacer ahead and 10 bbl. behind. The cement was pumped at a rate of 4 bbl./min. The cement set for 18 hours and a Schlumberger Temperature Survey showed the cement top inside the 7 5/8" casing at 9,438'. Waited on cement approximately 24 hours and pulled 65,000 lb. above the pipe weight. There was a slight movement of the pipe. The pipe was set back in the PBR with 35,000 lb. and continued to wait on the cement. After an additional 8 hours the casing moved with 60,000 lb. of pull.

The cement was drilled from 9,528' to 9,593'. A 6 1/2" Varel Y-33 bit with Power Swivel was used to drill the cement from 9,593' to 9,828'. The hole was circulated open at 9,890'.

Again the 7 5/8" casing was stressed and it pulled free at 40,000 lb. above the weight of the string. The hole was circulated and Halliburton cemented the 7 5/8" tie-back string with 320 sacks of Trinity Class "H", with 40% coarse silica flour, 1% CFR-2, 0.2% HR-5, displaced with 417 bbl. of 15.4 lb./gal. mud. After 18 hours a Schlumberger Temperature Survey located cement inside the casing at 9,570'.

After an additional 63 hours of waiting on the cement, 81 hours in all, the 7 5/8" casing was pulled with 650,000 lb. and the slips set. The 7 5/8" casing was cut and a 9" - 10,000 psi Tubing Spool, and double studded adapter flange 9" - 10,000 psi X 13 5/8" -

10,000 psi were installed. The casing hanger was tested to 7,000 psi.

The BOP's were nipped up and all rams, flanges, and valves tested to 5,000 psi. The Hydril was tested to 3,500 psi. A 6 1/4" bladed mill was used to drill the cement plug at 9,546', and drilled cement to 9,596'. Cement was then drilled to 9,622'. A 6 1/4" Hughes X3A bit was used to drill cement to 9,825'. The hole was circulated, and the 7 5/8" casing was gauged in the hanger spool. The slips had swaged the pipe inward to 6,375'. The bit was run in the hole with 2 7/8" tubing and the 7 5/8" casing cleaned from 12,719' to 14,536'. No cement was found at the top of the 5 1/2" liner at 14,534'.

The hole was circulated at the liner top, and the 7 5/8" casing, 7 5/8" tie-back sleeve, and top of the 5 1/2" liner were tested to 2,000 psi with 15.2 lb./gal. mud. A 6 3/8" mill and 7 5/8" casing scraper were used to scrape the casing. Bottoms up were circulated from the top of the liner casing at 14,534'. A Type M-14 Packer and jars, and 6 drill collars were run in the hole, and the packer was set at 14,419'. The tubing and casing sides were tested individually to 1,000 psi. The Halliburton lines and valves were tested to 5,000 psi. Sixty-two and a half bbl. of mud were displaced from the tubing with water with the equivalent weight of 9.5 lb./gal. mud.

A dry test of the 5 1/2" liner top was made with a 4,300 psi differential. The water was reversed out, the pipe pulled out of the hole to 9,780', and the hole circulated. The tubing was displaced with 42.5 bbl. of water, and the tie-back tested with 2,908 psi differential. The test was good, the water reversed out, and a 4" mill was run in the hole. The hole was washed and reamed from 15,482' to 15,661' to the orifice type float collar. Schlumberger ran temperature and CBL-VDL logs from 15,661' to 9,450'.

A Brown Oil Tools 5 7/16" Polishing Mill was run into the PBR at 14,558'. The hole was circulated and the tool pulled out.

A Dummy Seal Assembly was run to 14,536'. The casing side of the seal was tested to 2,300 psi, and the tubing side to 3,500 psi.

The 5" pipe rams were changed to 5 1/2" in the BOP. The rams were tested to 5,000 psi, and the Hydril to 3,500 psi.

A 4" mill was run to 15,661' and the hole circulated. All lines were tested to 5,000 psi, and Halliburton pumped 30 bbl. of HEC Polymer Spacer and 400 bbl. of 10 lb./gal. brine filtered to 25

microns. Continued to filter the brine water to 25 microns for several hours.

While coming out of the hole with the bottom-hole assembly, three 3 1/2" drill collars, cross-over, 7 5/8" casing scraper, cross-over, and 39 joints of 2 7/8" stinger was left in the hole. The top of the fish was at 14,351'. Picked up three 4 3/4" drill collars, bumper jars, oil jars, 3 1/2" grapple, and 6 1/8" overshot, and went in the hole with 2 7/8" tubing. The fish was engaged and the total fish recovered.

A Polishing Mill was run in the hole to 14,534' and dressed the PBR from 14,534' to 14,558'. The Polishing Mill was then pulled out of the hole.

The 5 1/2" FL4S 23.0 lb./ft. tubing was run. The landing collar was hubbed up and the annulus tested to 2,000 psi. The casing and seal assembly were tested to 6,000 psi. Twenty bbl. of spacer and 265 bbl. of 13 lb./gal. packer fluid were placed in the annulus. The BOP's were picked up, landing joint backed out, and the blanking plug installed in the hanger. The BOP's were nipped down. The Christmas tree was nipped up, and all flanges and valves tested to 10,000 psi.

The rig was released at 1400 hours on 2/27/81.

8.0 SALT WATER DISPOSAL WELL - DRILLING AND COMPLETION

8.1 INTRODUCTION

On September 18, 1980, the Goldrus Drilling Co. Rig No. 4 began moving on location at the Sweet Lake site. Rig up operations were completed on September 19, and the 20" conductor pipe was driven to a depth of 93'.

8.2 INTERVAL TO 13 3/8" CASING POINT

The salt water disposal well was spudded at 1200 hours on September 19, 1980. A 17 1/2" hole was drilled to the 13 3/8" casing point in 3 1/2 days. The drilling fluid was a Barite, Gel, and caustic mud that was gradually increased from 8.7 lb./gal. to 8.9 lb./gal.

At 1,375' a short trip was made, bottoms up were circulated, and the hole conditioned preparatory to logging and running casing.

Schlumberger ran Induction and Borehole Geometry logs from 1,375' to 96'. The hole was again circulated, and 20 joints of 72 lb. N-80 and 10 joints of 68 lb. K-55 13 3/8" casing were run. The casing was cemented with 450 sacks of HLW and 3% salt, and 1,350 sacks of CRH, with 0.75% CFR-2 and 35% silica flour. The 20" and 13 3/8" casing were cut, and the 13 5/8" Braden head was welded in place and tested to 1,100 psi. The BOP's were nipped up and a Gyro survey was run from 1,280' to 100'. Location relative to the surface was 3.51' N 81° 59'W. The BOP's were tested to 5,000 psi, and the Hydril to 3,500 psi.

8.3 INTERVAL TO 9 5/8" CASING POINT (TOTAL DEPTH)

A 12 1/4" hole was drilled to total depth of 7,436' using a drilling fluid that was gradually increased from 9.0 lb./gal. to 9.2 lb./gal.

A 12 1/4" bit was used to tag the cement at 1,290', and the plugs and cement were drilled to 1,375'. The formation was then drilled to 4,757' where a trip was made to change bits. Surveys were run at 1,888'; 2,392'; 2,908'; 3,410'; 3,910'; 4,155'; and 4,600'. The maximum deviation was 3/4° at 4,600'.

The hole was then drilled to 6,316', where a bit change was made. A survey at 6,159' showed 1/2° deviation. Drilling continued to 6,580' when the stabilizers balled up and the pipe stuck. This was caused by drilling with a high viscosity mud which was the result of not having reserve pits available. The hole was then drilled to 7,440'. A survey at 7,170' showed 0° deviation.

After total depth of 7,440' was reached, a short trip was made and the hole circulated and conditioned preparatory to logging. Schlumberger ran an ISF/Sonic log from 7,458' (Schlumberger wire line reading) to 1,383'. FDC-CNL-GR and Borehole Geometry logs were also run from 7,458' to 1,383'. Sidewall cores were taken from 7,400' to 6,700'. Thirty-four cores were attempted and recovered. The cores were taken at selected points throughout the interval of prospective injection sands. The hole was then cleaned up and circulated preparatory to running casing.

Two hundred and two joints of 9 5/8" casing, consisting of 13 joints of 43.5 lb. S-95; 105 joints of 43.5 lb. L-80, N-80, and S-95; 35 joints of 40 lb. S-95, P-110, and N-80; and 49 joints of 47 lb. AR-95; were run. The casing was cemented with 1,225 sacks of HLW with 35% silica flour and 3% salt, and 510 sacks CLH with 40% silica flour, with full returns. The plug was bumped with 5,000 psi. The Schlumberger temperature survey showed the top of the cement at 1,970'. The 9 5/8" casing was hung with 510,000 lb., cut off, and the 9 5/8" casing spool installed.

A casing scraper and bit were run in the hole and tagged cement at 6,637'. The top of the plug was drilled, and the mud was displaced with water. The cement was drilled from 6,637' to 7,350'. Schlumberger ran a CBL-VDL log from 7,350' to 1,850'.

The fresh water in the hole was circulated and conditioned with 100 barrels of water with detergent to clean the casing. The water and detergent were displaced with 9.5 lb./gal. brine inhibited to prevent corrosion.

A casing caliper log was run from 7,350' to the surface and a Gyro directional survey was run. The coordinates were 277.3° azimuth, inclination 0.55, and total deviation 13.27' from surface.

A Baker F-1 packer was run in the hole to 6,250', but would not set. A trip was made for a new packer setting sleeve. The packer had released from the tool. A new seal assembly was run in the hole and the packer was pushed to 7,348'. A decision was made not to risk fishing for the packer, and a new packer was ordered. While waiting on the packer, the drill pipe was run in the hole, and the drill string and 9 5/8" casing were pressure tested to 1,500 psi.

The second Baker F-1 packer was run in the hole but prematurely set at 1,233'. The packer was milled over 12' with an 8 3/5 X 6 7/8 milling shoe after engaging the packer and pulling 20,000 lb. to recover. The packer started moving down the hole. The pipe was pulled out of the hole but failed to recover the packer. The bottom-hole assembly was changed and the packer was pushed to 7,330'. Thirty thousand pounds were set down on the spear and the

pipe was pulled, but failed to recover the packer. Went back in the hole with fishing tools and engaged the packer and chained out of the hole. The bottom-hole assembly consisted of a 6" Bowen spear, 8 3/5 X 6 7/8 burning shoe, cross-over bushing, 7 5/8" wash pipe pup joint, J-joint, 7 5/8" wash pipe pup joint, Camfield bushing, cross-over sub, 7" boot basket, cross-over, 6" bumper jars, 6" oil jars, cross-over sub, and six 6" drill collars.

A trip was made with a bit and scraper while waiting for the packer setting sleeve to be repaired. The hole was reverse circulated and then circulated conventionally until the water was clean.

A Schlumberger wire line junk basket and 8 1/2" Baker gauge ring were run prior to running the packer. The Baker F-1 packer was then run into the hole, and this time was set at 6,254' with no problems. A Baker 6" X 4.875 190-40 seal assembly was run in the hole to 6,255'.

The 7" casing completion string was run and spaced out. The FMC-OCT TC-1A-EN hanger was installed with 130,000 lb. on the hanger. The casing and packer seal assembly were tested to 1,500 psi for 30 minutes.

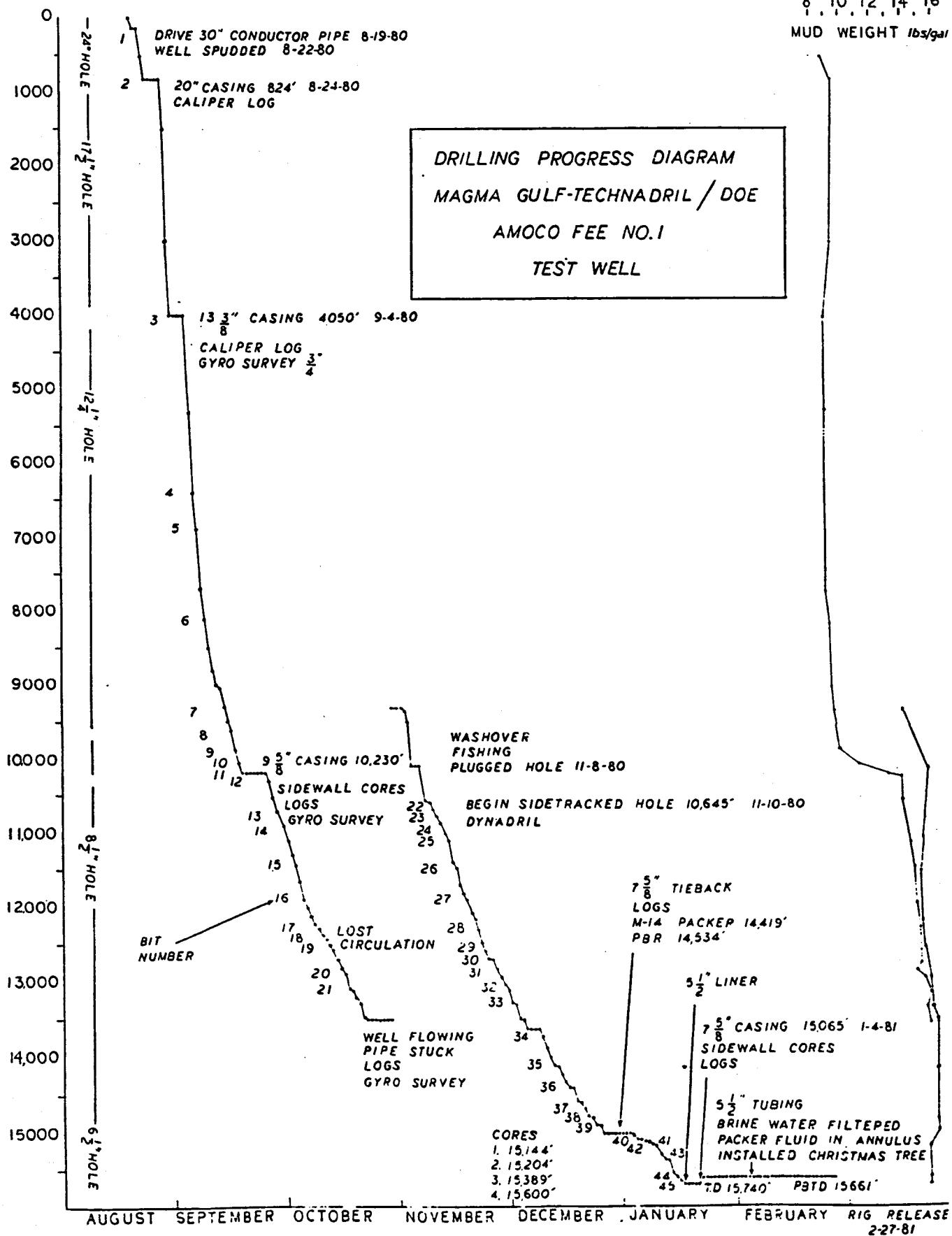
The 13 5/8" BOP's were rigged down. The 11" 5,000 X 9" 5,000 Christmas tree flange was installed on top of the 9 3/4 FMC OCT TC-1A-EN hanger and capped with the 9" 5,000 X 6" 5,000 spool and 6" blind companion flange.

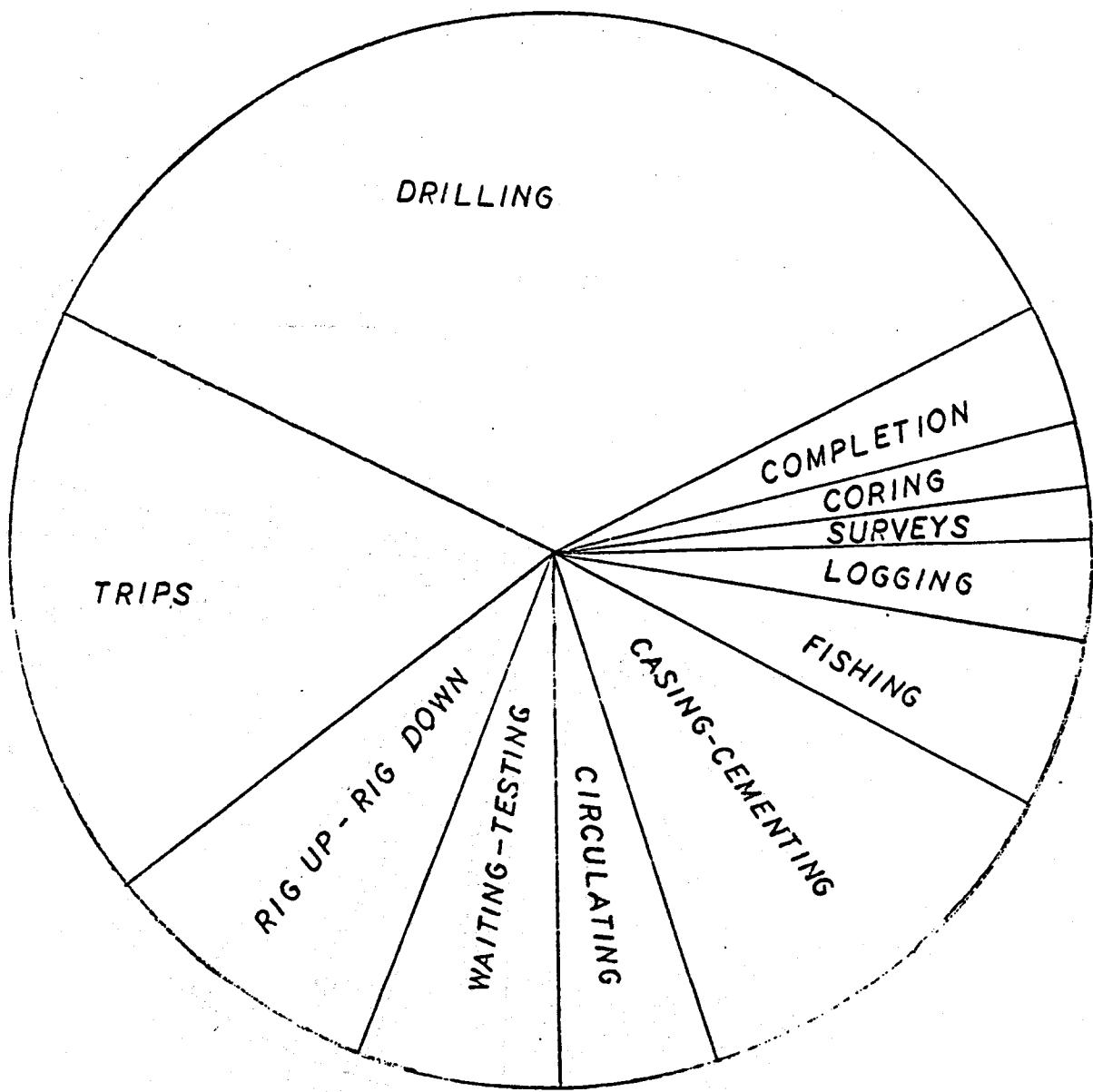
The tanks were cleaned and the rig was released at 2400 hours, October 12, 1980.

APPENDIX A - TEST WELL

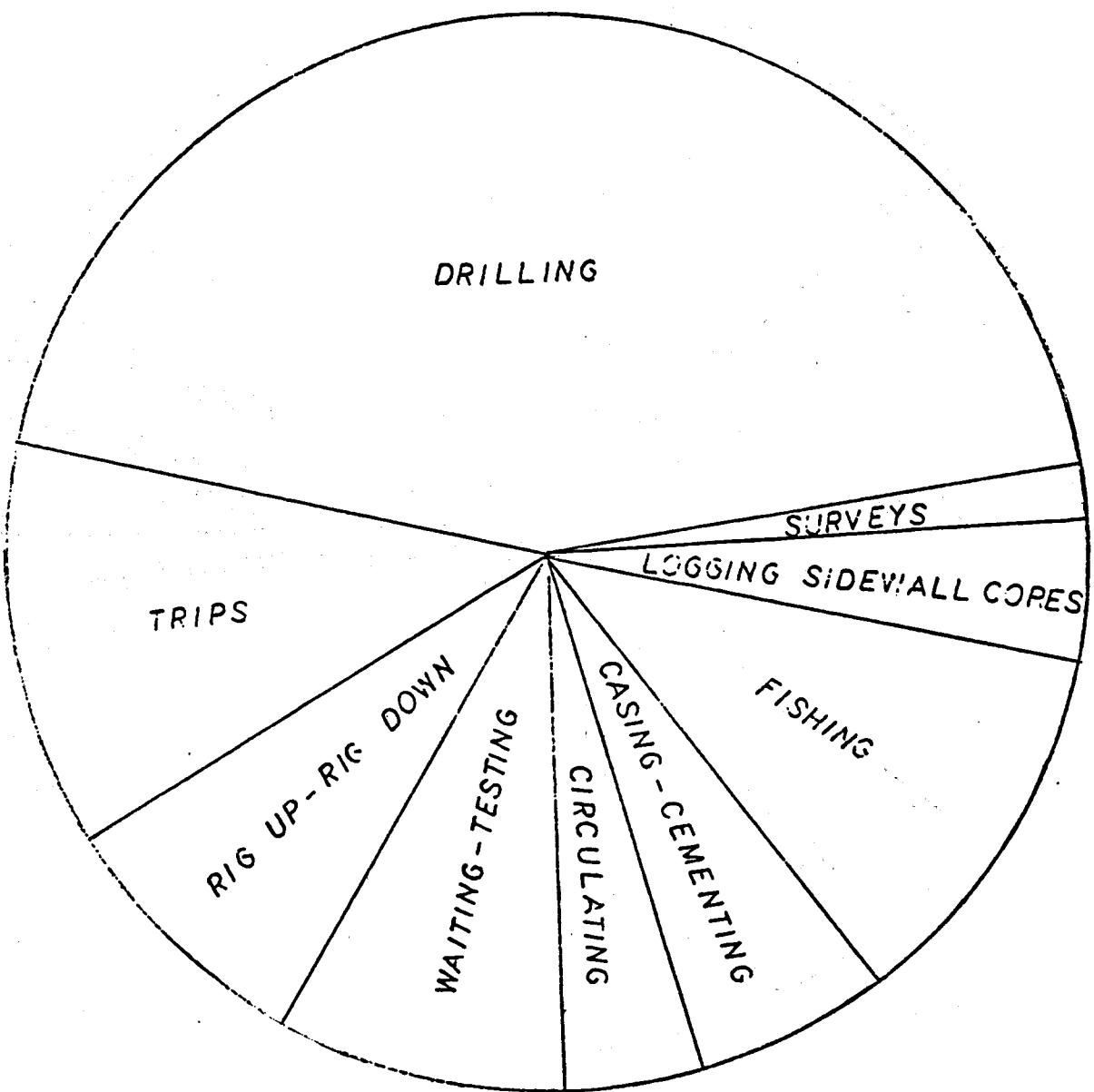
A.1 Time Utilization Diagrams

8, 10, 12, 14, 16
MUD WEIGHT lbs/gal

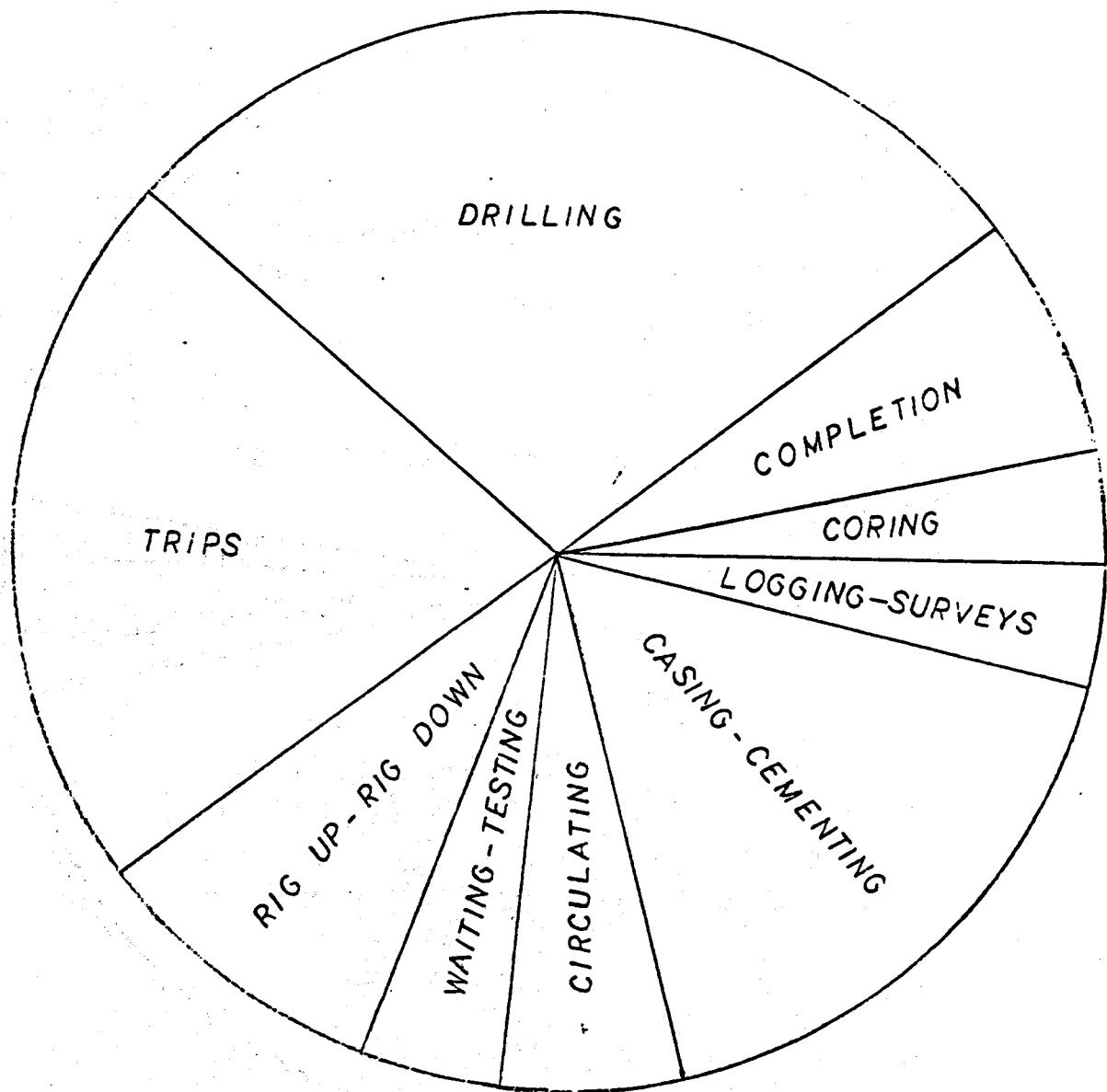




TIME UTILIZATION FOR DRILLING AND COMPLETING
MAGMA GULF-TECHNADRIL/DOE
AMOCO FEE NO.1
TEST WELL



TIME UTILIZATION FOR DRILLING
MAGMA GULF-TECHNADRIL/DOE
AMOCO FEE NO.1
TEST WELL
FIRST PHASE - TO 13,556 FEET



TIME UTILIZATION FOR DRILLING AND COMPLETING
MAGMA GULF-TECHNADRIL/DOE
AMOCO FEE NO.1
TEST WELL
SIDE TRACKED SECTION

<u>ACTIVITY</u>	<u>% TIME</u>
DRILLING	35.2
TRIPS	17.8
RIG UP - RIG DOWN	8.5
WAITING - SERVICE OF RIG - TESTING BOP'S	6.2
CIRCULATING	4.7
CASING - CEMENTING	12.2
FISHING	5.0
LOGGING	3.1
CORING (SIDE WALL AND CONVENTIONAL CORES)	2.0
SURVEYS	1.5
COMPLETION	<u>3.8</u>
	100%

PERCENT TIME UTILIZATION
DRILLING AND COMPLETION

MAGMA GULF-TECHNADRIL/DOE-AMOCO FEE NO. 1
TEST WELL

<u>ACTIVITY</u>	<u>% TIME</u>
DRILLING	44.12
TRIPS	12.22
RIG UP - RIG DOWN	7.93
WAITING - SERVICE OF RIG - TESTING BOP'S	8.63
CIRCULATING	4.10
CASING - CEMENTING	5.75
FISHING	11.25
LOGGING	4.14
CORING (SIDE WALL CORES)	0.19
SURVEYS	<u>1.67</u>
	100%

PERCENT TIME UTILIZATION
DRILLING

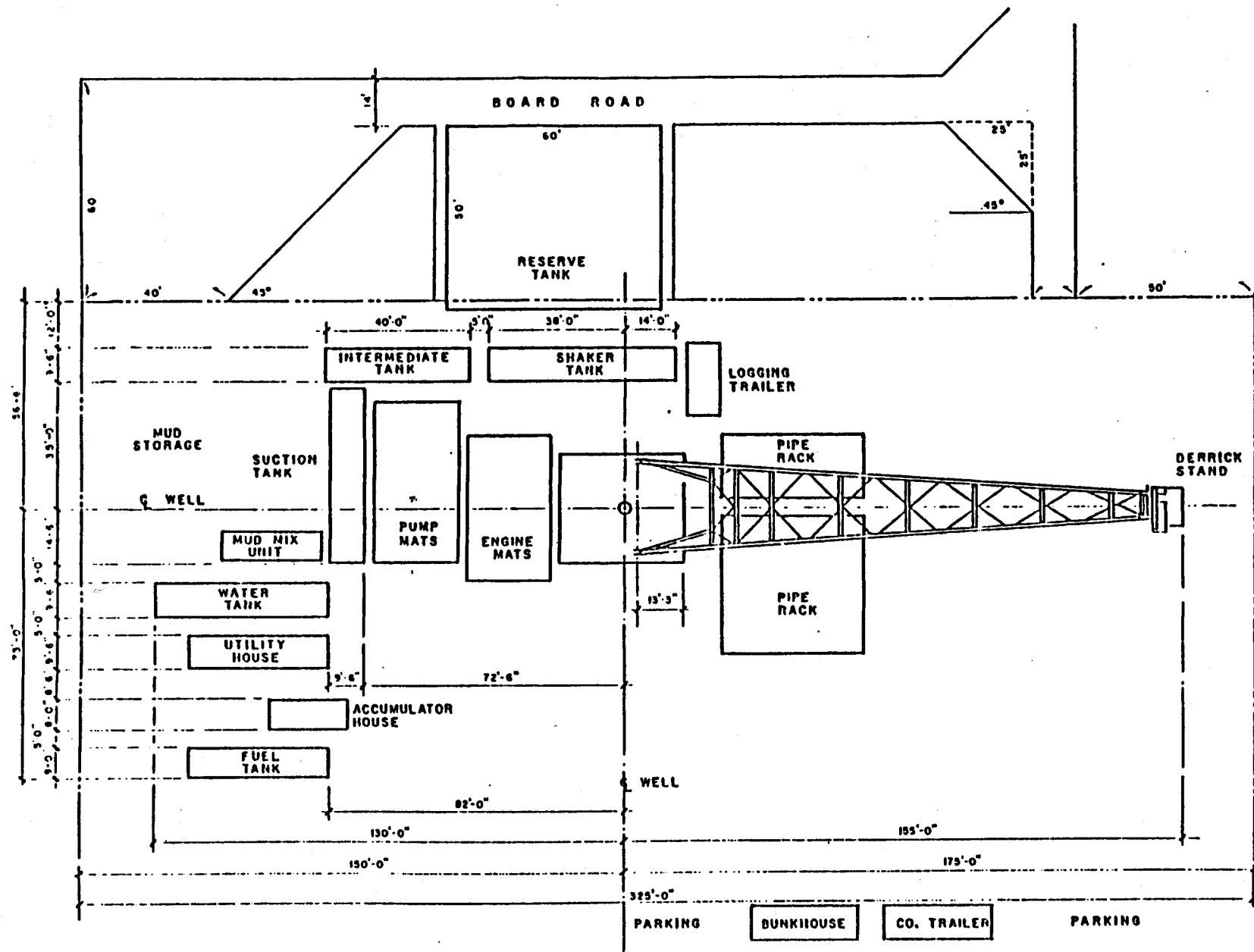
MAGMA GULF-TECHNADRIL/DOE-AMOCO FEE NO. 1
FIRST PHASE - TO 13,556 FEET

<u>ACTIVITY</u>	<u>% TIME</u>
DRILLING	28.40
TRIPS	21.80
RIG UP - RIG DOWN	9.00
WAITING - SERVICE RIG - TESTING BOP'S	4.25
CIRCULATING	5.19
CEMENTING	17.11
FISHING	0.36
LOGGING	2.33
CORING (SIDE WALL AND CONVENTIONAL CORES)	3.38
SURVEYS	1.38
COMPLETION	<u>6.80</u>
	100%

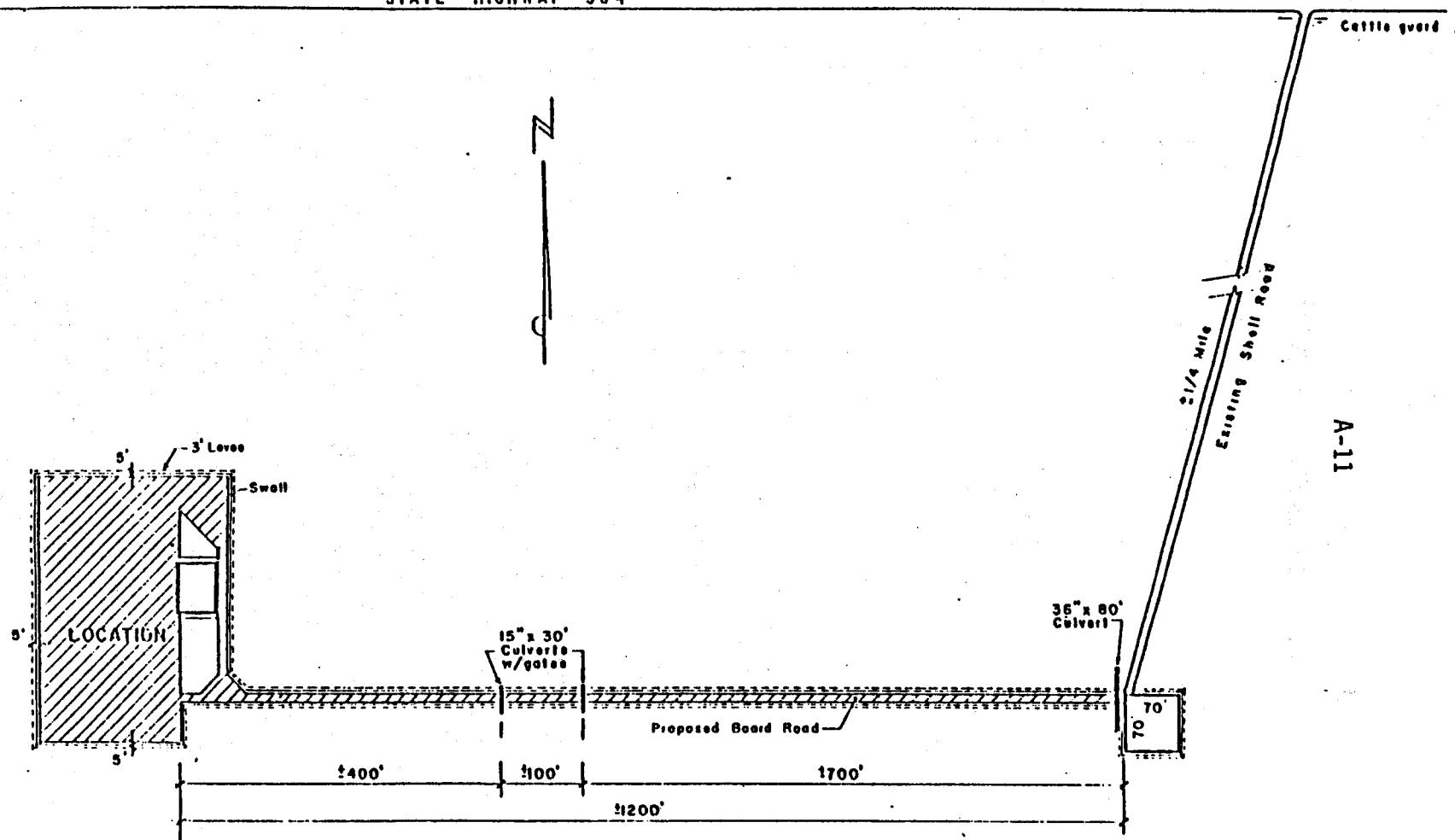
PERCENT TIME UTILIZATION
DRILLING AND COMPLETING

MAGMA GULF-TECHNADRIL/DOE-AMOCO FEE NO. 1
SIDE TRACKED SECTION

A.2 Site and Rig Layout

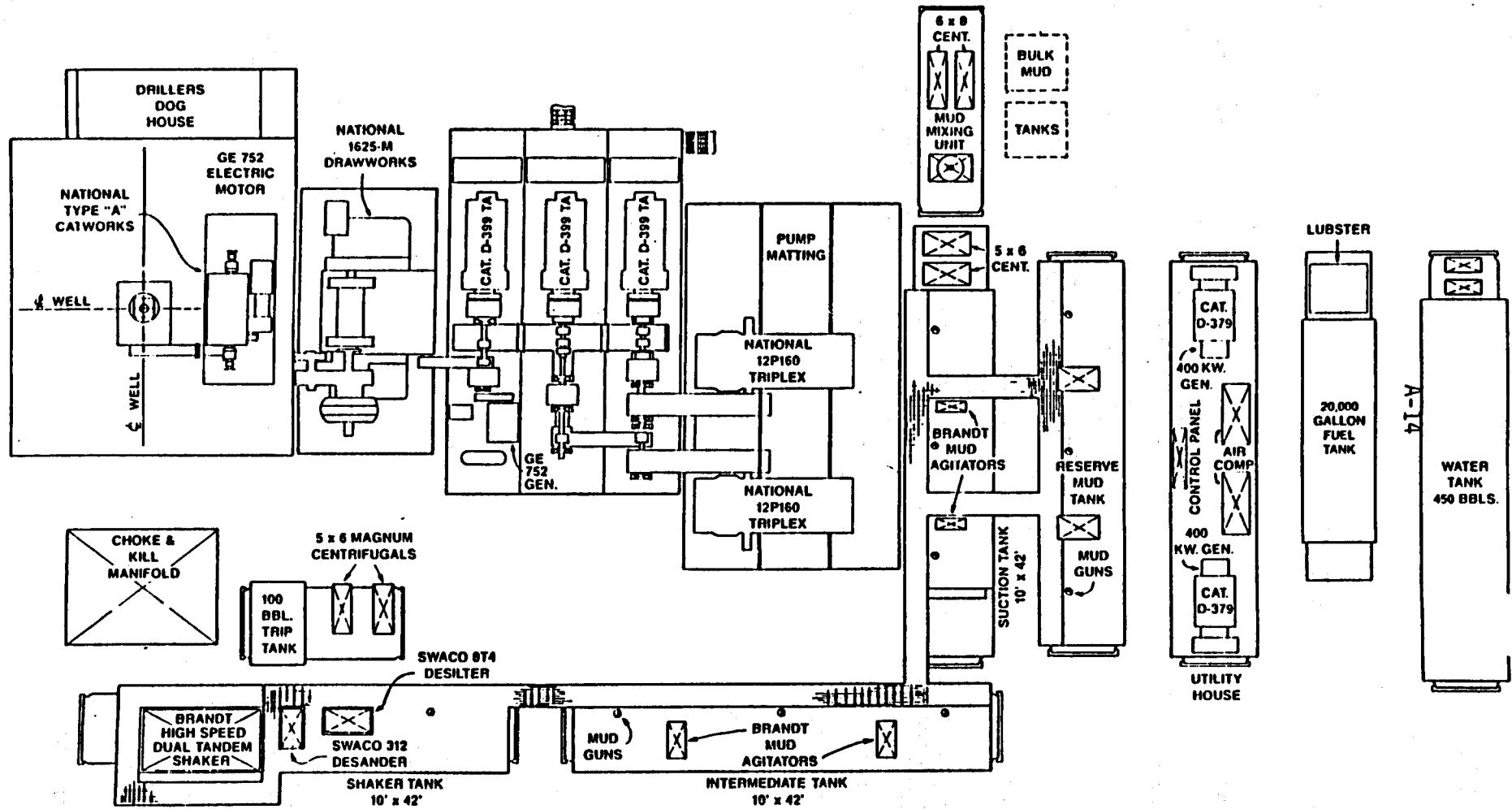


STATE HIGHWAY 384



SWEET LAKE
GEOTHERMAL WELL
WELL PAD AND
ACCESS ROAD LAYOUT

A.3 Rig Specifications

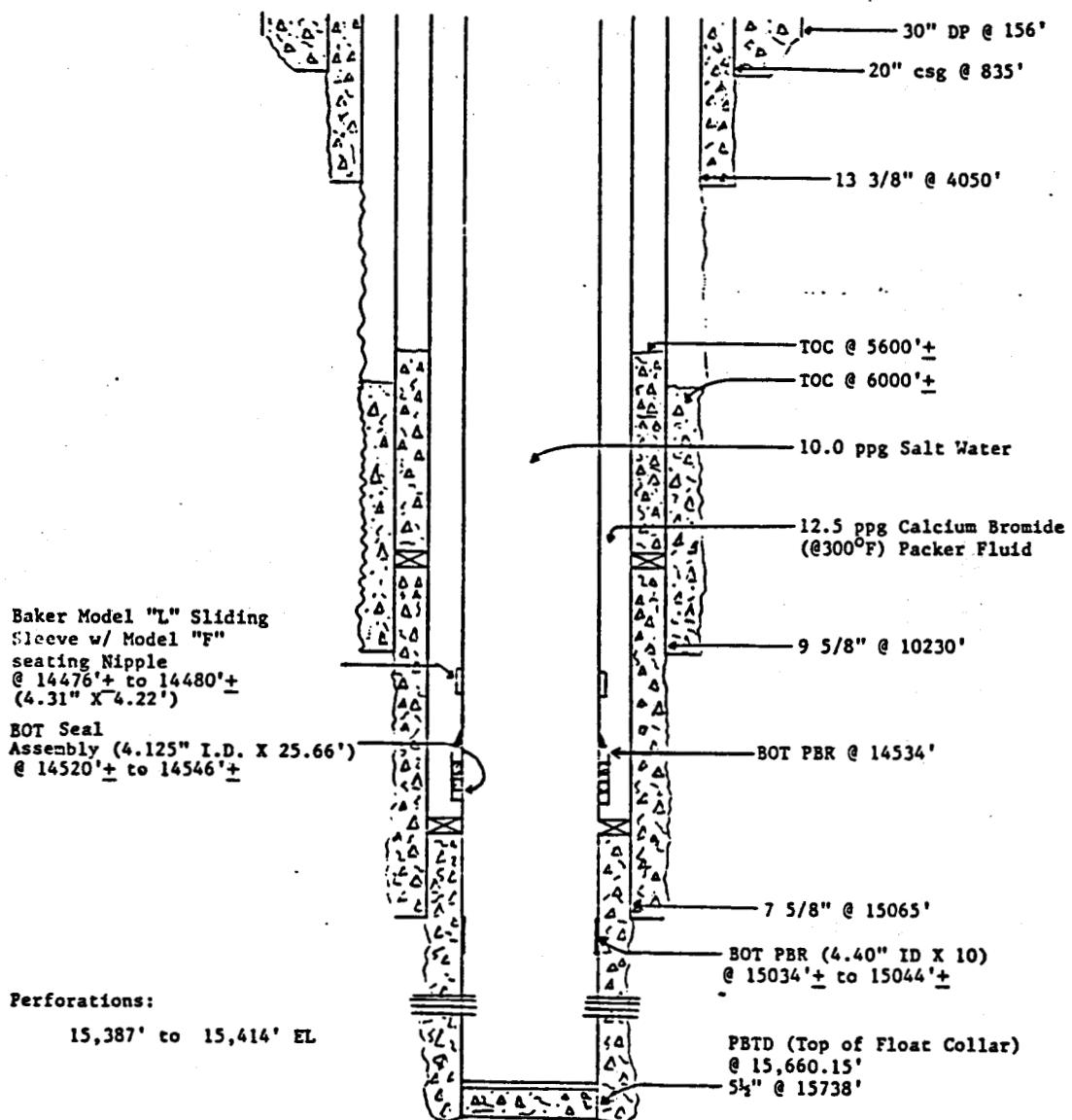


1625-M Rig Layout

Please confirm dimension prior to construction

Proposed Rig Layout

A.4 Producing Well Diagram and Wellhead

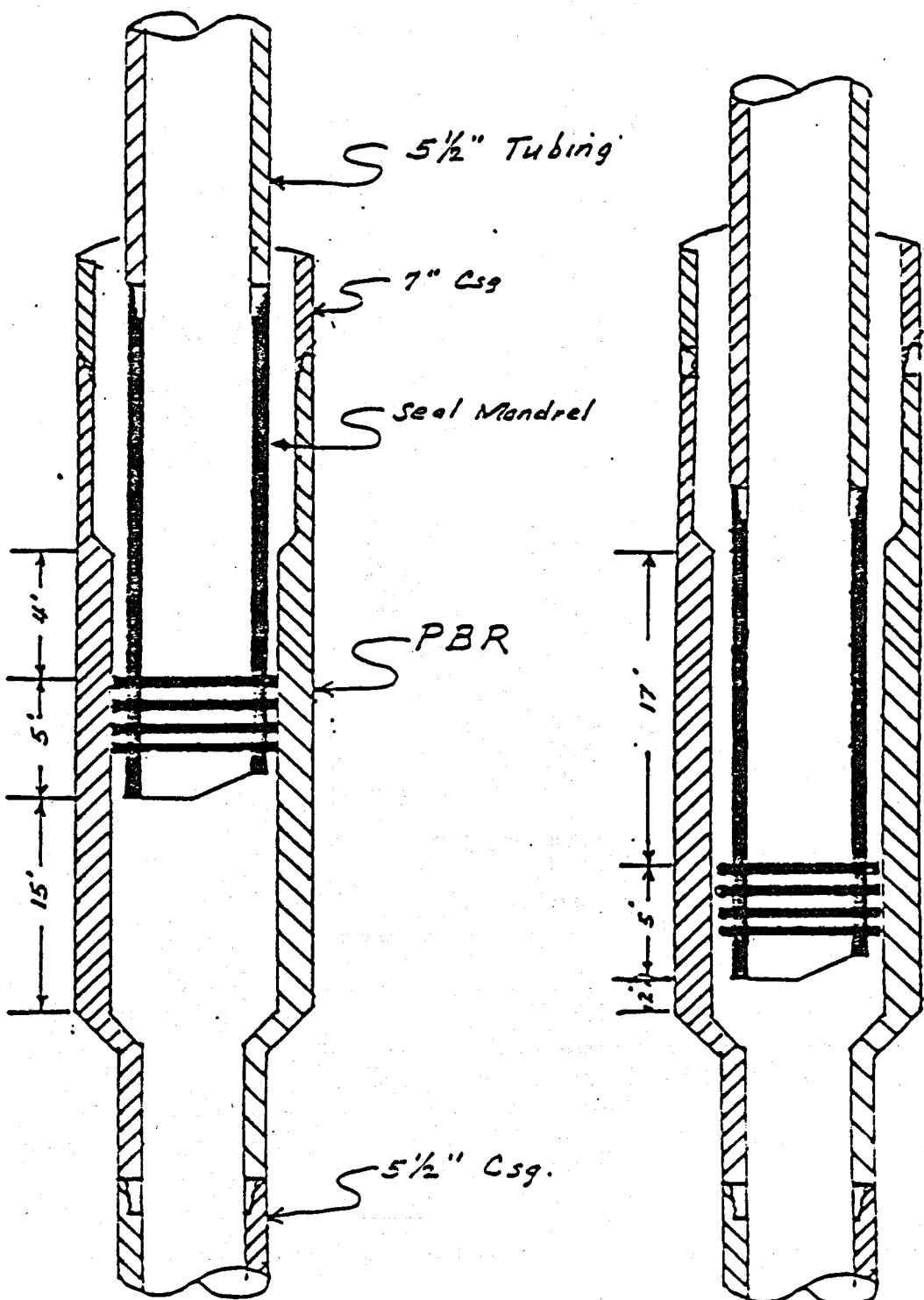


	<u>Collapse</u> (psi)	<u>Burst</u> (psi)	<u>Tension</u> (lbs)	<u>I.D.</u> (inches)	<u>Drift</u> (inches)	<u>Capacity</u> (Bbls/ft)
5 1/2" 23# C-95 Exline	12,920	12,540	606,000	4.545*	4.42*	0.0211
5 1/2" 25.54# S0095 FL4S	15,020	14,390	513,000	4.423*	4.298*	0.02
7 5/8" 39# C-95 Exline	9,980	10,900	941,000	6.625	6.50	0.0426
5 1/2" X 7 5/8" Annulus	(Cross-section area = 6.21 in ² or Equivalent to a 3.17 in. diameter)					0.0133

* All 5 1/2" Tubing is plastic coated and therefore the I.D. and Drift listed are reduced by an 1/8 (.125) inch.

Also, the smallest restriction in the 5 1/2" tubing string is the seal assembly (4.125" (4 1/8") X 25.66"). The 5 1/2" seal assembly is rated for 11,138 psi (collapse) and 14,474 psi (burst).

MGT-DOE-AMOCO FEE NO.1
 Cameron Parish, La.
 PBR & Seal Assembly



Position of Seal Mandrel
 When Tubing Is Hung
 at Normal Well Temp.

Position of Seal Mandrel
 When Well is on Production
 Water Temp. 300° FTP 3000 ps.

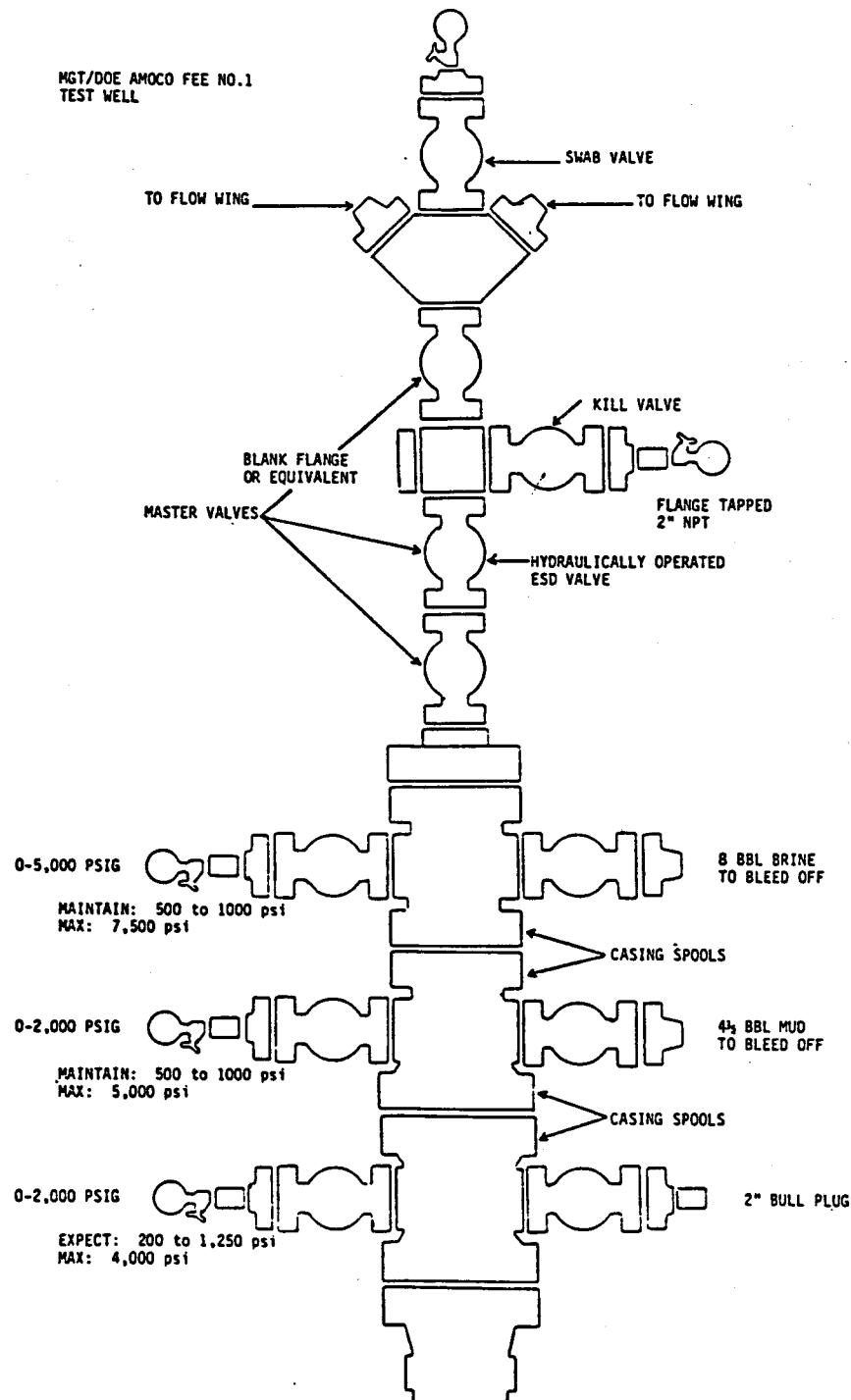


FIGURE 18
TEST WELLHEAD AND CASING SPOOLS

A.5 Wire Line Operations

Wireline Logs MG-T/DOE Amoco Fee #1

<u>Log</u>	<u>Date</u>	<u>Bottom</u>	<u>Top</u>
Borehole Geometry	8/23/80	845	154
Induction Spherically Focused	8/30/80	4046	826
Borehole Geometry	8/30/80	4046	826
Cement Bond	9/19/80	4053	200
Dual Induction-Sonic	9/19/80	10230	4053
Dual Induction-Formation Density-Compensated Neutron	9/19/80	10230	4053
Dipmeter	9/19/80	10230	4053
Cyberlook	9/19/80	10150	6800
Saraband	9/19/80	10200	4050
Salinity Saraband	9/19/80	10200	4050
Temperature	9/22/80	10010	2570
Temperature	10/23/80	13550	surface
Cement Bond	10/23/80	13518	10000
Temperature	10/25/80	12924	8000
Cement Bond	10/25/80	13500	8000
Temperature	10/26/80	13530	8000
Casing Collar and Perforating	10/27/80	12590	12591
Borehole Geometry	11/ 9/80	10608	10234
Induction Spherically Focused-Sonic	10/26/80	15065	10242
Formation Density-Compensated Neutron	12/26/80	15065	10242
Dipmeter	12/26/80	15065	10242
Cyberlook	12/26/80	15065	10242
Saraband	12/26/80	15050	10300
Salinity Saraband	12/26/80	15050	10300
Casing Inspection	12/27/80	10160	surface
Repeat Formation Tester	1/ 5/81	15144	15065
Dual Induction-Sonic	1/17/81	15740	15065
Formation Density-Compensated Neutron	1/17/81	15740	15065
Dipmeter	1/17/81	15740	15065
Cyberlook	1/17/81	15740	15065
Saraband	1/17/81	15740	15065
Salinity Saraband	1/17/81	15740	15065
Temperature	1/22/81	8850	100
Casing Collar and Perforating	1/22/81	10230	surface
Temperature	1/24/81	8783	5000
Temperature	1/30/81	9432	100
Temperature	1/31/81	9432	5000
Temperature	2/ 5/81	9555	100
Temperature	2/ 6/81	9550	100
Cement Bond	2/ 7/81	9579	4000
Variable Density	2/ 7/81	9579	4000
Temperature	6/13/81	15661	surface

A.6 Directional Surveys

Directional surveys are used to determine the orientation of a line or point in space. The surveyor uses a theodolite to measure the horizontal angle between the line of sight and a reference line. The reference line is usually the north-south line, but it can also be a line of known orientation. The surveyor also measures the vertical angle between the line of sight and a horizontal reference line. This information is used to calculate the direction of the line in space.

sperry-sun



P. O. Box 2201, Lafayette, Louisiana 70502 (318) 234-5171

J. A. Fouché
President

October 28, 1980

Mr. R. W. Rodgers
MAGNA GULF-TECHNADRIL
1111 Fannin Suite 1010
Houston, Texas 77002

RE: SUL.75-2795; BOSS-2610;
SUL.75-2448
Amoco Fee Well Number 1
Sweet Lake Field
Cameron Parish,
Louisiana

Dear Sir:

Enclosed please find the original results and fifteen (15) copies of our Job Number, SUL.75-2795, a Gyroscopic Surwel Survey of the above well run October 26, 1980, from a depth of 10,007 feet to a depth of 12,900 feet.

This composite survey report also includes the surveys previously run on this well. The job numbers, dates run, and survey depths are as follow:

<u>Job Number</u>	<u>Date</u>	<u>Survey Depths</u>
SUL.75-2448	August 30, 1980	Assumed vertical to 450 feet 450 feet to 3,987 feet
BOSS-2610	September 24, 1980	3,987 feet to 10,007 feet

The original results include the film, field data sheet, and the tabulation sheets. Also included is the Horizontal Plot as per customer request. If we can be of further assistance to you, please feel free to contact us.

Sincerely,

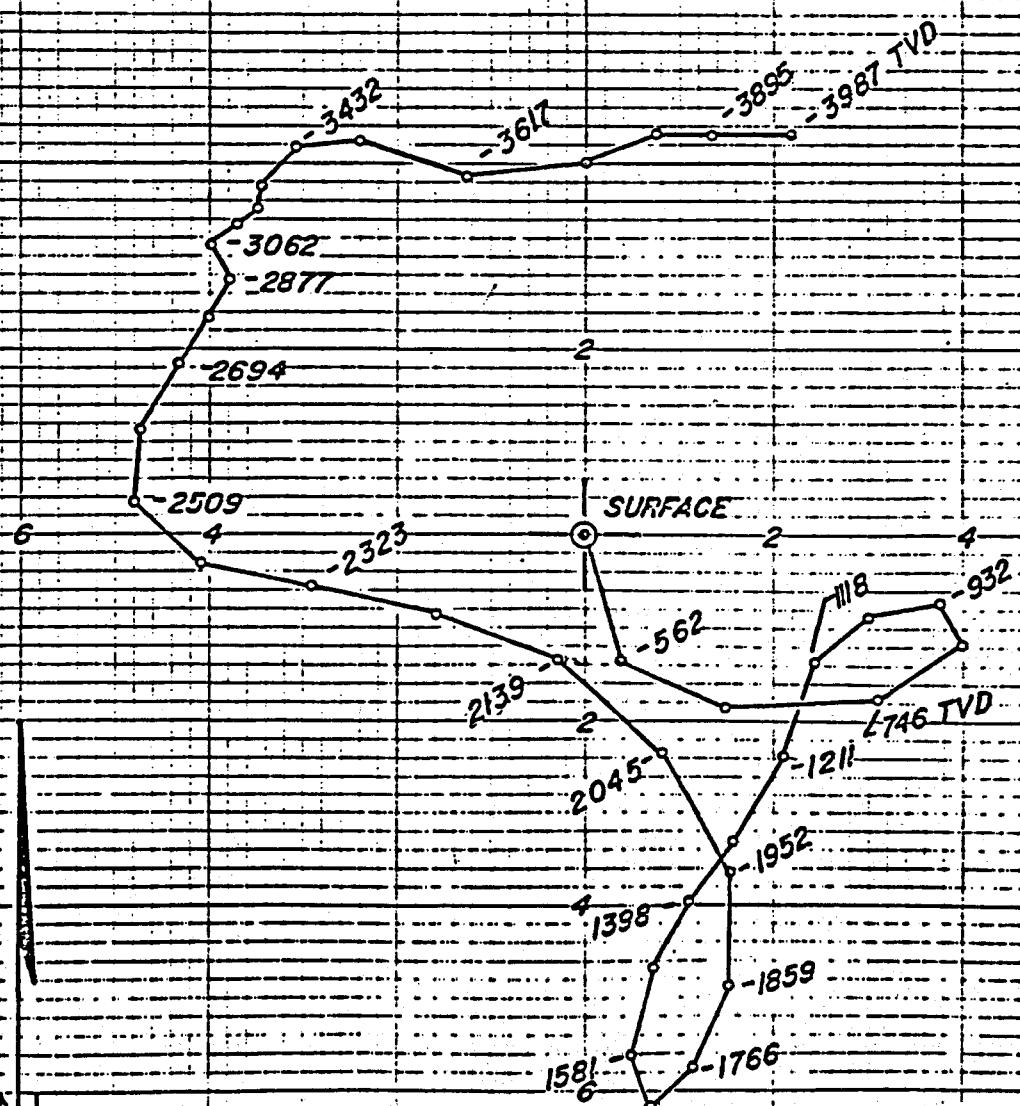
Carl J. Chitty
District Manager

CJC:krt

MAGNA GULF TECHNADRIL, INC.
AMOCO-FEE WELL NO. 1
SWEET LAKE FIELD

HORIZONTAL PLAN

Scale 1" = 2'



**PROJECTION FURNISHED
BY
SPERRY-SUN, INC.**

BOTTOM HOLE CLOSURE = 4.84° N 26° 43' E

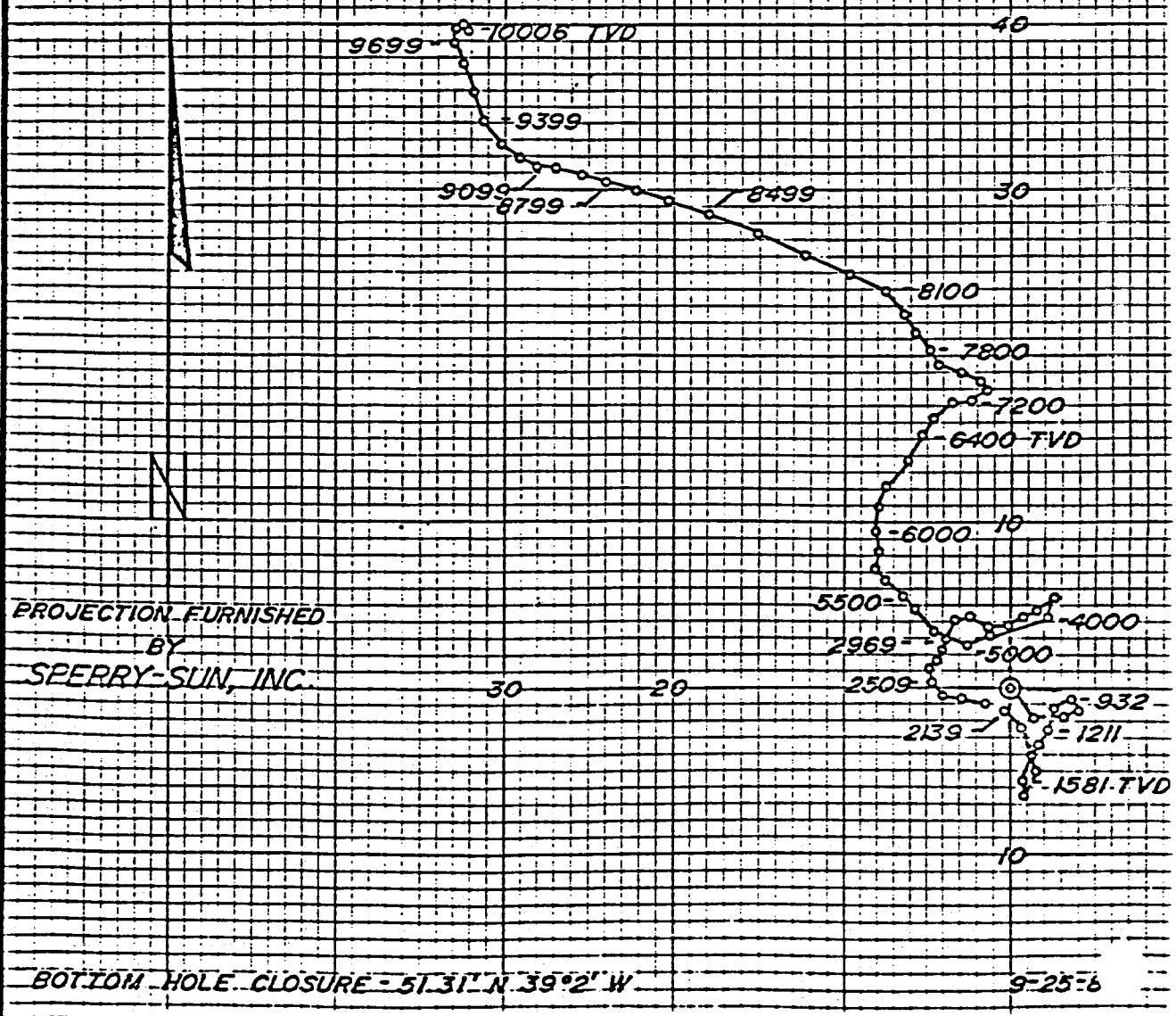
9-2-80

AMOCO FEE N° 1
SWEET LAKE FIELD

A-24

HORIZONTAL PLAN

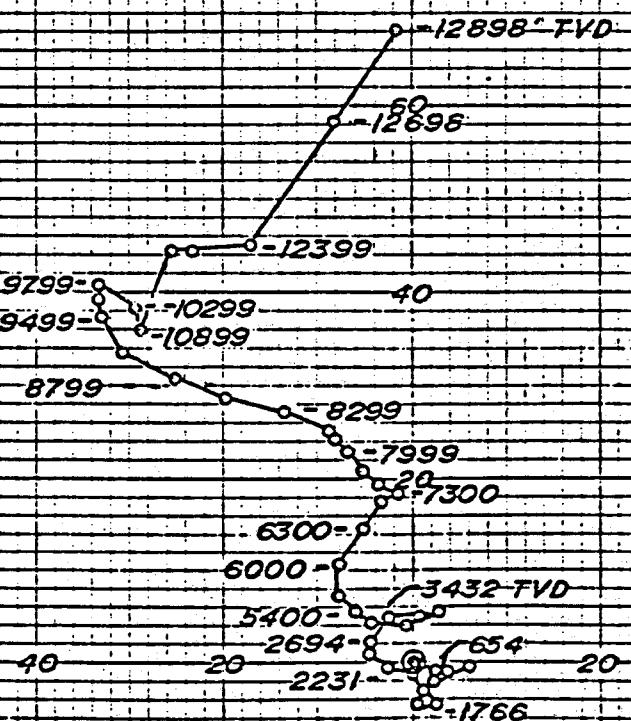
SCALE 1" = 10'



MAGNA-GULF TECHNADRIL
AMOCO FEE WELL №1
SWEET LAKE FIELD

HORIZONTAL PLAN

Scale 1" = 20'



N

PROJECTION FURNISHED
BY
SPERRY-SUN, INC.

BOTTOM HOLE CLOSURE = 68.20° N 1° 28' W

10-27-80

SPERRY-SUN INCORPORATED
SWEET LAKE FIELD, CAMERON PARISH, LOUISIANA

PAGE 1

MAGNA-GULF TECHNADRIL
AMOCO FEE WELL #1SUS 75-2725
OCTOBER 26, 1971

TOTAL DEPTH	DIRECTION DEG MIN	ANGLE DEG MIN	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DDG LEG
0	N 0 0	0 E 0	0 0	0.00	0.00 E	0.00	0.00
450	N 0 0	0 E 0	0 0	450.00	0.00 N	0.00 E	0.00
469	S 14 0	0 E 0	45 0	469.00	0.25 S	0.06 E	-0.24 3.95
562	S 28 0	0 E 0	50 0	561.99	1.52 S	0.53 E	-1.53 0.13
654	N 82 0	0 E 1	5 5	653.97	1.26 S	2.25 E	-1.33 1.33
746	N 90 0	0 E 0	55 0	745.96	1.28 S	3.72 E	-1.37 0.24
838	N 17 0	0 E 0	45 0	837.95	0.13 S	4.87 E	-0.22 1.69
932	S 75 0	0 N 0	30 0	931.95	0.33 S	3.27 E	-0.40 1.16
1025	S 78 0	0 N 0	30 0	1024.94	0.50 S	2.46 E	-0.55 0.02
1118	S 20 0	0 N 0	30 0	1117.94	1.26 S	2.20 E	-1.38 0.52
1211	S 19 0	0 N 0	50 0	1219.93	2.54 S	1.76 E	-2.57 0.36
1304	S 43 0	0 N 0	30 0	1303.93	3.13 S	1.21 E	-3.15 0.46
1398	S 30 0	0 N 0	30 0	1397.92	3.94 S	0.89 E	-3.85 0.12
1489	S 30 0	0 N 0	30 0	1488.92	4.53 S	0.48 E	-4.53 0.00
1581	S 0 0	0 E 0	45 0	1588.91	5.73 S	0.48 E	-5.73 0.44
1674	N 77 0	0 E 0	15 0	1673.91	5.54 S	0.30 E	-5.55 0.91
1766	N 32 0	0 E 0	30 0	1765.91	4.96 S	1.22 E	-4.98 0.40
1859	N 29 0	0 E 0	45 0	1858.90	3.82 S	1.64 E	-3.95 0.30
1952	N 19 0	0 N 0	50 0	1951.89	2.54 S	1.20 E	-2.56 0.57
2045	N 39 0	0 N 1	0 0	2044.87	1.26 S	0.16 E	-1.27 0.39
2139	N 59 0	0 N 0	50 0	2138.86	0.57 S	1.61 N	-0.54 0.38
2231	N 75 0	0 N 0	55 0	2230.85	0.19 S	2.43 N	-0.12 0.29
2323	N 79 0	0 N 0	45 0	2322.84	0.05 N	3.51 N	0.14 0.19
2416	N 77 0	0 N 0	45 0	2415.84	0.32 N	4.88 N	0.44 0.03
2509	N 15 0	0 N 0	35 0	2508.83	1.24 N	5.04 N	1.36 0.75
2602	N 23 0	0 E 0	30 0	2601.83	1.98 N	4.72 N	2.10 0.39
2694	N 36 0	0 E 0	30 0	2693.82	2.63 N	4.25 N	2.74 0.12
2784	N 34 0	0 E 0	15 0	2783.82	2.96 N	4.03 N	3.06 0.28
2877	N 28 0	0 E 0	20 0	2876.82	3.44 N	3.78 N	3.53 0.10
2969	S 61 0	0 N 0	15 0	2968.82	3.37 N	4.17 N	3.48 0.57
3062	N 35 0	0 E 0	15 0	3061.82	3.74 N	4.00 N	3.84 0.47
3155	N 67 0	0 E 0	15 0	3154.82	3.90 N	3.63 N	3.59 0.19
3247	N 36 0	0 E 0	5 0	3246.82	4.02 N	3.57 N	4.11 0.21
3339	N 1 0	0 N 0	15 0	3338.82	4.42 N	3.57 N	4.51 0.20
3432	N 58 0	0 E 0	30 0	3431.81	4.85 N	3.89 N	4.92 0.46
3525	S 60 0	0 E 0	30 0	3524.81	4.55 N	2.13 N	4.60 0.49
3617	S 72 0	0 E 1	0 0	3616.80	4.05 N	0.51 N	4.06 0.55
3710	N 52 0	0 E 0	50 0	3708.79	4.38 N	0.47 E	4.37 0.94
3802	S 72 0	0 E 0	15 0	3801.78	4.75 N	0.25 E	4.73 0.2
3895	N 30 0	0 E 0	30 0	3894.78	4.75 N	1.65 E	4.71 0.12

SPERRY-SUN INCORPORATED
SWEET LAKE FIELD, CAMERON PARISH, LOUISIANA.

PAGE 1

MAGNA-GULF TECHNADRIL
AMOCO FEE WELL #1SU1.75-2795
OCTOBER 26, 1980

TOTAL DEPTH	DIRECTION DEG MIN	ANGLE DEG MIN	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DOG LEG
3987	N 86 0 E	0 30	3986.78	4.81 N	2.46 E	4.75	0.04
4000	N 38 0 E	0 40	3999.78	4.93 N	2.56 E	4.86	3.89
4100	N 5 48 W	0 15	4099.77	5.38 N	2.51 E	5.32	0.51
4200	N 36 30 E	0 11	4199.77	5.64 N	2.79 E	5.56	0.18
4300	S 63 12 W	0 18	4299.77	5.40 N	2.23 E	5.34	0.47
4400	S 24 36 W	0 17	4399.76	4.94 N	2.02 E	4.89	0.29
4500	S 83 36 W	0 48	4499.75	4.78 N	0.63 E	4.77	0.70
4600	S 52 24 W	0 23	4599.75	4.38 N	0.11 E	4.37	0.51
4700	S 67 30 W	0 39	4699.74	3.94 N	0.95 W	3.97	0.38
4800	S 39 6 W	0 35	4799.73	3.15 N	1.60 W	3.19	0.31
4900	S 55 12 W	0 31	4899.72	2.64 N	2.33 N	2.70	0.17
5000	S 77 42 W	0 23	4999.72	2.49 N	3.00 W	2.57	0.21
5100	N 57 38 W	0 36	5099.71	3.06 N	3.88 W	3.15	0.42
5200	N 44 18 W	0 39	5199.70	3.87 N	4.67 W	3.99	0.15
5300	N 41 42 W	0 38	5299.70	4.70 N	5.42 W	4.84	0.03
5400	N 54 24 W	0 28	5399.69	5.17 N	6.07 W	5.32	0.22
5500	N 43 18 W	0 34	5499.68	5.88 N	6.74 W	6.05	0.14
5600	N 48 38 W	0 26	5599.68	6.41 N	7.34 W	6.60	0.11
5700	N 56 12 W	0 32	5699.67	6.93 N	8.11 W	7.13	0.10
5800	N 10 42 W	0 22	5799.67	7.54 N	8.23 W	7.75	0.38
5900	N 6 48 E	0 43	5899.66	8.79 N	8.08 W	9.00	0.39
6000	N 0 6 E	0 53	5999.64	10.33 N	8.07 W	10.53	0.19
6100	N 4 0 W	0 46	6099.63	11.67 N	8.17 W	11.87	0.12
6200	N 36 54 E	1 2	6199.61	13.12 N	7.08 W	13.38	0.68
6300	N 42 0 E	1 11	6299.59	14.66 N	5.69 W	14.80	0.18
6400	N 25 54 E	0 46	6399.57	15.86 N	5.11 W	15.98	0.51
6500	N 32 24 E	0 33	6499.57	16.67 N	4.59 W	16.78	0.22
6600	N 66 5 E	0 35	6599.56	17.08 N	3.67 W	17.16	0.33
6700	N 9 12 E	0 18	6699.55	17.59 N	3.59 W	17.68	0.49
6800	S 15 42 E	0 8	6799.55	17.36 N	3.52 W	17.44	0.43
6900	S 71 36 E	0 24	6899.55	17.14 N	2.96 W	17.21	0.34
7000	N 1 30 W	0 14	6999.54	17.54 N	2.87 W	17.61	0.52
7100	N 80 12 E	0 5	7099.54	17.57 N	2.71 W	17.63	0.23
7200	N 68 24 E	0 29	7199.54	17.87 N	1.93 W	17.92	0.39
7300	N 61 48 E	0 18	7299.53	18.12 N	1.47 W	18.15	0.19
7400	S 69 54 W	0 14	7399.53	17.98 N	1.85 W	18.03	0.53
7500	N 13 36 W	0 15	7499.52	18.40 N	1.99 W	18.44	0.34
7600	N 58 28 W	1 19	7599.50	19.69 N	3.95 W	19.70	1.14
7700	N 59 24 W	0 22	7699.49	19.92 N	4.49 W	20.03	0.95
7800	N 39 42 W	0 50	7799.48	21.04 N	5.42 W	21.17	0.51

SPERRY-SUN INCORPORATED
SWEET LAKE FIELD, CAMERON PARISH, LOUISIANA

PAGE 3

MAGNA-GULF TECHNADRIL
AMOCO FEE WELL #1SUI.75-2795
OCTOBER 26, 1975

TOTAL DEPTH	DIRECTION DEG MIN	ANGLE DEG MIN	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DOG LEG
7900	N 34 48 W	0 46	7899.47	22.14 N	6.19 W	22.29	0.09
8000	N 25 18 W	0 43	7999.46	23.27 N	6.72 W	23.44	0.13
8100	N 52 48 W	1 24	8099.43	24.75 N	8.67 W	24.97	0.33
8200	N 72 36 W	1 27	8199.39	25.51 N	11.09 W	25.78	0.49
8300	N 61 30 W	1 41	8299.34	26.92 N	13.68 W	27.26	0.39
8400	N 65 24 W	1 55	8399.29	28.30 N	16.71 W	28.72	0.25
8500	N 73 42 W	1 34	8499.25	29.07 N	19.34 W	29.56	0.42
8600	N 67 54 W	1 15	8599.22	29.89 N	21.36 W	30.43	0.35
8700	N 82 30 W	1 11	8699.20	30.16 N	23.40 W	30.75	0.32
8800	N 64 0 W	0 55	8799.18	30.86 N	24.83 W	31.48	0.43
8900	N 73 24 W	0 58	8899.16	31.34 N	26.43 W	32.00	0.16
9000	N 79 18 W	0 37	8999.15	31.54 N	27.49 W	32.23	0.35
9100	N 80 42 W	0 46	9099.14	31.75 N	28.82 W	32.48	0.15
9200	N 58 18 W	0 32	9199.14	32.25 N	29.62 W	33.00	0.34
9300	N 43 12 W	1 2	9299.12	33.46 N	30.98 W	34.24	0.52
9400	N 18 6 W	0 59	9399.10	35.09 N	31.51 W	35.88	0.53
9500	N 26 0 W	1 9	9499.08	36.89 N	32.39 W	37.71	0.22
9600	N 13 54 W	1 4	9599.06	38.70 N	32.84 W	39.53	0.25
9700	N 12 42 W	0 36	9699.05	39.59 N	33.17 W	40.53	0.47
9800	N 29 24 E	0 20	9799.05	40.25 N	32.96 W	41.08	0.40
9900	S 51 6 E	0 22	9899.04	39.34 N	32.46 W	40.66	0.58
10000	N 28 18 E	0 7	9999.04	40.03 N	32.36 W	40.35	0.41
10007	N 48 12 E	0 5	10006.04	40.04 N	32.35 W	40.85	0.67
10300	S 53 47 E	0 40	10299.02	38.82 N	29.60 W	38.77	0.22
10600	S 56 13 W	0 0	10599.01	38.92 N	29.60 W	38.77	0.22
10900	S 17 35 E	0 25	10899.00	35.94 N	28.94 W	36.67	0.14
11000	N 23 39 E	0 35	11799.95	44.40 N	25.42 W	45.03	0.10
12100	N 82 52 E	0 29	12098.95	44.61 N	23.68 W	45.21	0.17
12400	N 85 57 E	1 15	12398.88	45.08 N	17.16 W	45.50	0.31
12700	N 33 59 E	3 5	12698.44	58.46 N	8.14 W	58.64	0.84
12900	N 33 15 E	3 29	12898.09	68.13 N	1.76 W	68.20	0.13

THE DOGLEG SEVERITY IS IN DEGREES PER ONE HUNDRED FEET.
THE VERTICAL SECTION WAS COMPUTED ALONG N 1 23 W

BASED UPON TANGENTIAL TYPE CALCULATIONS. THE BOTTOM HOLE
DISPLACEMENT IS 68.20 FEET, IN THE DIRECTION OF N 1 23 W
BOTTOM HOLE DISPLACEMENT IS RELATIVE TO WELLHEAD.
SUI.75-2443; S093-2619; SUI.75-2795.

SCALE: 80 FT/IN

480'

A-29

400'

320'

240'

160'

80'

0'

NORTH

SOUTH

80'

240'

160'

80'

0

80'

160'

240'

WEST

EAST

COMPUTED CONTINUOUS DIRECTIONAL SURVEY
MAGMA GULF-TECHNADRIL/DOE
AMOCO FEE NO.1
TEST WELL

DEPTH 15,737' LIES NORTH 400.2' AND
EAST 191.9' OR 443.9' NORTH 26° EAST
OF SURFACE LOCATION.

15,000'

14,000'

13,000'

12,000'

11,000'

10,300'

N



A.7 Bit Record

BIT RECORD

PRINTED IN U. S. A.

COUNTY			FIELD			STATE	SECTION	TOWNSHIP	RANGE	LOCATION			WELL NO									
Cameron			Sweet Lake			LA	13	12S	8W	Amoco F.e			1									
CONTRACTOR						RIG NO.	OPERATOR				TOOLPUSHER	DALEMAN										
Resource						12	Magma Gulf-Technadrill/DOE			Davis Manuel												
SPUD	UNDER SURF.	UNDER INTER.	SET BAND ST	REACHED T.D.	PUMP NO. 1		LINER	PUMP NO. 2		LINER	PUMP POWER		TYPE MUD									
8-21-80	9-4-80	9-25-80			National 12P160	6	Naitonal 12P160	6			3-D-399											
DRILL PIPE	SIZE			TYPE	O.D.	NUMBER			O.D.	LENGTH			DRAWWORKS POWER									
5" - 19.5	TOOL JOINTS	4	IF	X-Hole	6	DRILL COLLARS	15	8	2													
21						21	6		2													
NO	SIZE	MAKE	TYPE	JET 32ND IN	SERIAL	DEPTH OUT	FEET	HOURS	FT/HR	ACCM DRILL HRS	WT 1000 LBS.	R P M	VERT. DEV.	PUMP PRESS	PUMP OPER-ATION	S P M	MUD	DULL. COND.	FORMATION REMARKS			
1	24	HTC	OSC3AJ	3-18	WF414	835	835	32	26	32				1	1550	P	100	100	2.4	76	16.8	1 2 I
2	17	HTC	OSC3AJ	3-18	CX143	4050	3215	58	55	90				1	1100	S	120	9.2	41	22.4	2 4 I	
3	12	HTC	OSC3AJ	3-12	DE157	5308	1258	22	56	13	30				2400	S	105	9.0	38	28	2 4 I	
4	12	HTC	X-3A	3-12	DH035	6929	1621	22	74	35	35	160			2500	S	106	9.0	36	25	5 6 I	
5	12	HTC	X-3A	3-12	DF397	7963	1034	23	45	158	35	150			2000	S	90	9.0	43	26	4 6 I	
6	12	Reed	HSS1P	3-12	649425	9092	1129	86	13	244	30	90	1	2200	S	100	9.1	39	10.4	1 E I		
7	12	HTC	X-3A	3-12	DL204	9536	444	31	14	275	30	120	1	2800	S	10	9.5	43	7.2	4 5 I		
8	12	HTC	X-3A	3-12	DM082	9904	368	27	3.6	292	30	120			2800	S	95	9.9	52	6.8	4 4 I	
9	12	HTC	X-3A	2-11	DF055	10230	326	27	11.8	320		120			2900	S	95	11.1	39	5.0	3 3 I	
10	8	HTC	X-3A	3-11	AL031	10241	11	2	5.5	322		90			2600	S	65	13.9	54	5.2	8 8 I	
11	8	HTC	X-3A	3-11	EB861	10344	103	11	9.4	333		90			2600	S	65	11.8	44	5.6	1 1 I	
12	8	HTC	X-3A	3-11	EB852	10599	255	25	10.2	358		90			2600	S	65	14.1	44	5.8	2 4 I	
13	8	HTC	X-3A	3-11	EB857	10963	364	31.5	11.6	389		90			2650	S	65	14.2	45	5.8	2 6 I	
14	8	HTC	X-3A	3-11	EB850	1137	374	36	10.2	426		90			2650	S	66	14.6	43	4.6	7 7 I	
15	8	HTC	J-1	3-10	DP048	11987	650	66	9.8	492		90			3000	S	47	15.1	49	6.4	7 E I	
16	8	HTC	J-1	3-10	DX514	12280	293	56	5.2	548		80			2900	S	60	15.3	42	6.8	6 7 I	
17	8	HTC	J-1	3-10	AX950	12482	202	39	5.2	587		80			2900	S	60	15.3	43	6.8	6 7 I	
18	8	HTC	J-1	3-10	DX445	12604	122	26	4.7	603		80	2		2800	S	60	15.3	43	6.8	6 2 I	
19	8	HTC	J-1	3-10	AW914	12872	265	43	6.2	646		100	3		2900	S	60	15.0	41	4.8	8 E	
20	8	HTC	J-2	3-10	EJ050	13126	254	24.5	10.4	671		100	3		3000	S	60	15.7	42	5.0	7 E I	
21	8	HTC	J-22	2-11	CE522	13556	430	54.5	7.9	7256	25	80			2900	S	60	15.6	40	5.8		
22	8	HTC	X-3A	3-16	AK950	10645	43	13	3.1	739					1800	S	60	15.5	41	5.0	1 4 I	

Left
in hole
Dyna
Drill

BIT RECORD

PRINTED IN U. S. A.

COUNTY		FIELD			STATE		SECTION		TOWNSHIP		RANGE		LOCATION		WELL NO						
CONTRACTOR		RIG NO.		OPERATOR				TOOLPUSHER				SALESMAN									
SPUD	UNDER SURF.	UNDER INTER.	SET BAND ST.	REACHED T.D.	PUMP NO. 1	LINER		PUMP NO. 2		LINER		PUMP POWER		TYPE MUD							
DRILL PIPE		TOOL JOINTS		SIZE		TYPE		O.D.		DRILL COLLARS		NUMBER		O.D.		I.D.		LENGTH		DRAWWORKS POWER	
NO	SIZE	MAKE	TYPE	JET 32ND IN	SERIAL	DEPTH OUT	FEET	HOURS	FT/HR	ACCU. CHG. HRS	WT 1000 LBS.	R.P.M.	VERT. DEV.	PUMP PRESS.	PUMP OPERATION	S.P.M.	MUD	DULL. COND.	FORMATION	REMARKS	
23	8	HTC	X3A	3-10	EJ779	10812	117	19	6	930		120	3°	2800	S	60	15.5	42	11.0	2 4 I	
24	8	SEC	S33S	3-10	203825	11095	283	31	9	962		100	2°	3000	S	60	15.4	41	8.2	3 3 I	Chg. BBLA. Low wt to lose K
25	8	SEC	S33SF	3-10	927282	11422	327	37	8.8	999		100	1	3000	S	60	15.4	42	8.0	6 E I	"
26	8	SEC	S33SF	3-10	913332	11891	469	55	8.5	1054				3000	S	60	15.2	44	7.0	6 I I	
27	8	SEC	S33SF	3-10	913331	12203	312	29	7.9	1093		90	1°	3000	S	60	15.2	46	6.8	8 I I	
28	8	HTC	J-1	2-10 1-11	ET293	12614	411	46	8.8	1140		80	2	3000	S	60	15.6	48	6.2	S E I	
29	8	HTC	J-1	2-10 1-11	EL783	12723	109	15	7.3	1151		85	2	3000	S	61	15.7	45	5.6	4 E I	
30	8	HTC	J-2	2-10 1-11	EE380	12894	171	37	4.6	1192		90	4°	3000	S	61	15.8	45	5.8	8 E I	
31	8	HTC	J-2	2-11 1-10	##309	13115	221	24	9.0	1217		90	3	3000	S	63	15.8	43	5.6	4 E I	Low wt to lose K
32	8	HTC	J-2	2-11 1-10	FD914	13341	226	30	7.5	1247	20	100	3	2800	S	63	15.8	46	6.0	4 E I	
33	8	HTC	J-2	3-11	C	13550	209	30	7.0	1277	20	100	6°	2800	S	63	16.4	48	5.2	4 E I	
34	8	HTC	J-22	3-10	ET527	14146	596	91	6.5	1368	20	85	5	3000	S	60	16.2	46	1.8	1 I I	#1 seal out
35	8	HTC	J-22	3-10	CT221	14480	334	69	4.8	1437	20	80		3000	S	59	16.2	42	1.4	2 E I	
36	8	HTC	J-1	3-10		14651	171	33	5.2	1470	18	85		3000	S	59	16.2	43	1.2	5 E I	
37	8	HTC	J-1	3-10	EC779	14818	167	35	4.8	1505	18	90	7	3000	S	59	16.3	42	1.0	7 E I	
38	8	HTC	J-2	3-10	EX107	14958	138	31	4.5	1530	18	100	7	3000	S	58	16.3	42	1.4	8 E I	
39	8	HTC	J-22	3-10		15605	107	14	7.6	1550	12	74	8	3100	S	58	16.3	40	1.4	0 E I	
			SET 7 " LINER																		
40	6	SEC	S-33-F	2-13 B1k.	960294	15165	79	13	5.9	1560	15	80		3000	S	25	15.7	43	1.6	8 I O	Junk on top of bit
41	6	SEC	M44NF	2-13 B1k.	962403	15201	86	16	7.5	1576	5	75		3000	S		15.7	41	2.0	6 E O	Ream core rat hole
42	6	SEC	M44NF	2-13 B1k.	944008	15234	33	5	6.5	1591	12	80		2500	S		15.7	42	1.6	2 E I	Ream rat hole & drlg.
43	6	HTC	J-33	2-13 B1k.		15389	155	19	8.2	1610		60		2500	S		15.7	41	1.4		Ream core

PRINTED IN U. S. A.

BIT RECORD

A.8 Mud Report

MAGMA GULF - TECHNADRIL

1111 FANNIN STREET
HOUSTON, TEXAS 77002

WELL SUMMARY

DOE - AMOCO FEE #1
SECTION 13, T-12S, R-8W
CAMERON PARISH, LOUISIANA

REPORT TO: MR. C. S. ADKINS

PREPARED BY: ROB RICHIE, SALES ENGINEER
JIM BERRY, SENIOR ENGINEER
MARVIN SELF, AREA ENGINEER



MAGCOBAR GROUP, DRESSER INDUSTRIES, INC. HIGHWAY 1947 LAKE CHARLES, LOUISIANA 70601

Magma Gulf - Technadril
1111 Fannin Street
Houston, Texas 77002

Attention: Mr. C. S. Adkins

Dear Sir:

Enclosed is our well summary of your well drilled in Cameron Parish, Louisiana, the DOE-Amoco Fee #1. Also included is a material consumption by casing interval to show cost distribution, a total material consumption price breakdown, and graphs depicting depth versus mud weight, depth versus days, and depth versus mud cost.

This well was spudded and drilled to 15,740 feet over a period of 149 days for a MagcoBar mud cost of \$597,723.23. After reaching 13,556 feet, the drill string was stuck when the pipe rams were closed while circulating out a salt water flow. This problem required 19 days and a MagcoBar mud cost of \$55,800.70 to recover enough drill pipe so that the hole could be sidetracked at 10,602 feet. An additional 26 days and a MagcoBar mud cost of \$95,310.14 was required to reach 13,445 feet again. No other severe problems occurred while drilling to the total depth of 15,740 feet.

The well was completed over a period of 37 days for a MagcoBar mud cost of \$50,550.66. Three hundred (300) barrels of 13.5 pounds per gallon calcium bromide was used as a packer fluid and 30 barrels of HEC polymery slurry was used as a spacer between the packer fluid and the brine system. The total MagcoBar mud cost to drill and complete your well was \$648,273.89.

We would like to express our appreciation and thank you for this job. Please call if we can be of any further service.

Sincerely,

Marvin Self
Marvin Self
Area Engineer

MS:bd

Enclosures

OPERATOR: Magma Gulf-Technadril
WELL: DOE - Amoco Fee #1
LOCATION: Section 12, T-12S, R-8W
Cameron Parish, Louisiana

MATERIAL CONSUMPTION BREAKDOWN BY INTERVAL:

Interval: 0' -- 835'

Magcobar (Sack)	96 sxs
Magcogel	770 sxs
Caustic Soda	27 sxs
Lime	16 sxs
Magcopaks	40 sxs
Engineering Service	1 day

Interval: 835' -- 4050'

Magcobar (Sack)	69 sxs
Magcogel	255 sxs
Caustic Soda	34 sxs
S. A. P. P.	7 sxs

OPERATOR: Magma Gulf-Technadril
WELL: DOE - Amoco Fee #1
LOCATION: Section 13, T-12S, R-8W
A-38 Cameron Parish, Louisiana

MATERIAL CONSUMPTION BREAKDOWN BY INTERVAL CONTINUED:

Interval: 4050' -- 10230'

Magcobar (Bulk)	466.03 tns
Magcobar (Sack)	290 sxs
Magcogel	735 sxs
Spersene	229 sxs
Tannathin	298 sxs
Caustic Soda	130 sxs
Lime	136 sxs
S. A. P. P.	18 sxs
Aluminum Stearate	3 sxs
Magcopaks	43 ea.
Installation, Bulk Tanks	3 tnk
Engineering Service	8 dys

Interval: 10230' -- 13556' (Stuck Pipe)

Magcobar (Bulk)	602.03 tns
Magcobar (Bulk)	368.15 tns
Magcobar (Sack)	1008 sxs
Magcogel	190 sxs
Spersene	451 sxs
Tannathin	163 sxs
XP-20	230 sxs
Resinex	180 sxs
Caustic Soda	147 sxs
Lime	357 sxs
Desco	34 sxs
Sodium Chromate	15 sxs
Aluminum Stearate	2 sxs
Engineering Service	22 dys
Engineering Service	8 dys

OPERATOR: Magma Gulf-Technadrill
 WELL: DOE - Amoco Fee #1
 LOCATION: Section 13, T-12S, R-8W
 Cameron Parish, Louisiana

MATERIAL CONSUMPTION BREAKDOWN BY INTERVAL CONTINUED:

Interval 13556' -- 10602' (Recovering stuck pipe to sidetrack)

Magcobar (Bulk)	250.66	tns
Magcobar (Sack)	7	sxs
Magcobar (Sack)	63	sxs
Magcogel	150	sxs
Magcogel	2	sxs
Spersene	30	sxs
Tannathin	90	sxs
Caustic Soda	35	sxs
Lime	39	sxs
Drispac	7	sxs
14.0 lb/bbl Liquid Mud	520	bbl
Engineering Service	19	dys

Interval 10602' -- 15065'

Magcobar (Bulk)	619.15	tns
Magcobar (Sack)	987	sxs
Magcogel	111	sxs
Spersene	170	sxs
Spersene	467	sxs
Tannathin	49	sxs
Tannathin	712	sxs
XP-20	151	sxs
Resinex	260	sxs
Resinex	269	sxs
Caustic Soda	107	sxs
Caustic Soda	229	sxs
Lime	202	sxs
Lime	96	sxs
Drispac	11	sxs
Aluminum Stearate	11	sxs
Sodium Chromate	5	sxs
16.4 lb/bbl Liquid Mud	540	bbl
Trucking--Liquid Mud	9	lds
Trucking	1	ea.
Engineering Service	49	dys

OPERATOR: Magma Gulf-Technadril
WELL: DOE - Amoco Fee #1
LOCATION: Section 13, T-12S, R-8W
Cameron Parish, Louisiana

A-40

MATERIAL CONSUMPTION BREAKDOWN BY INTERVAL CONTINUED:

Interval 15065' -- 15740' (T.D.)

Magcobar (Bulk)	172.71	tns
Magcogel	97	sxs
Spersene	223	sxs
XP-20	364	sxs
Resinex	226	sxs
Caustic Soda	69	sxs
Lime	9	sxs
Drispac	8	sxs
Sodium Chromate	2	sxs
Soda Ash	4	sxs
Fine Mica	5	sxs
Fine Nut Plug	48	sxs
Medium Nut Plug	48	sxs
Engineering Service	22	dys

Interval: Completion

Magcobar (Bulk)	10.26	tns
Spersene	65	sxs
Soda Ash	6	sxs
Aluminum Stearate	2	sxs
H E C Polymer	6	sxs
13.5 lb/gal Calcium Bromide	300	bbl
Engineering Service	37	dys

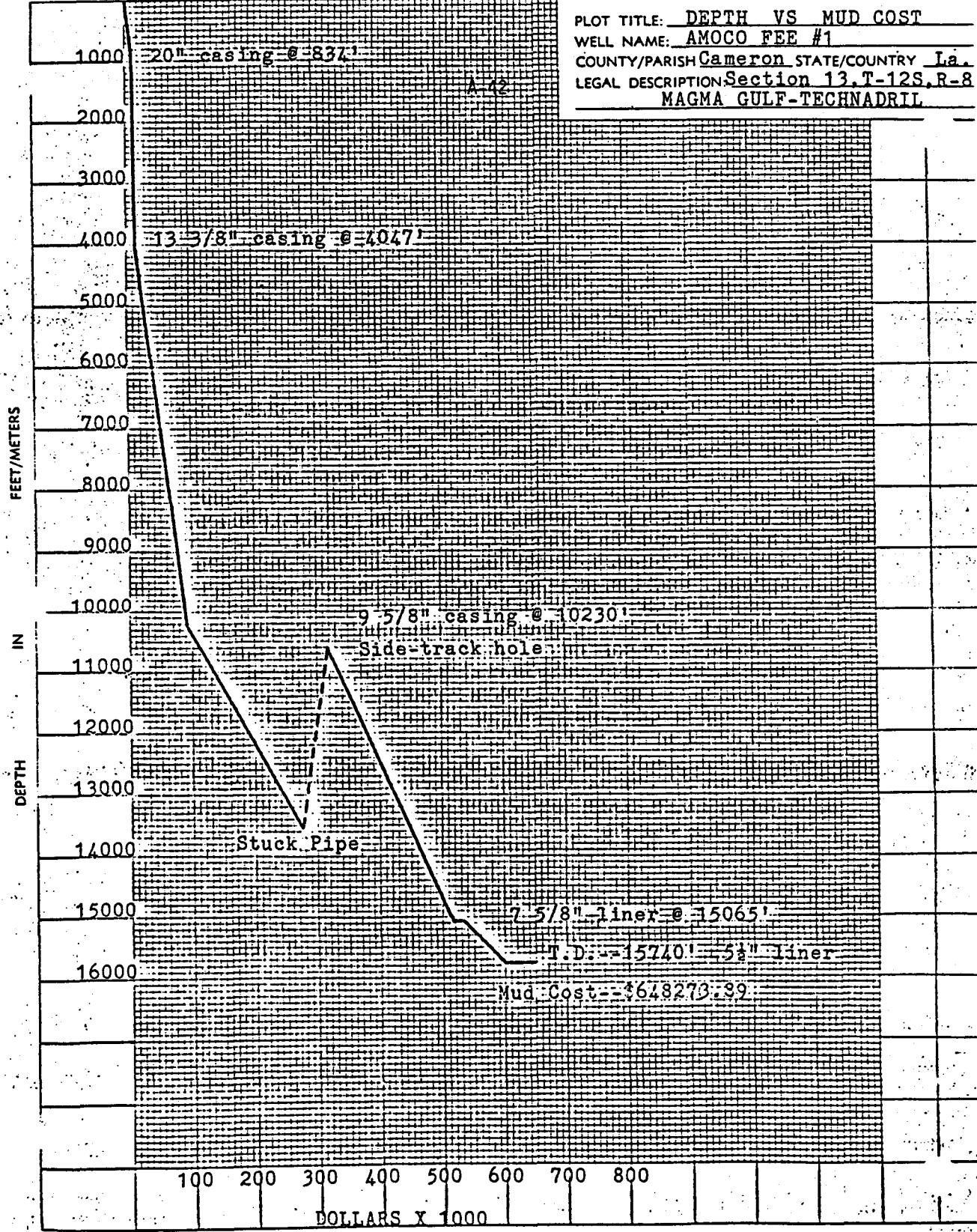
OPERATOR: Magma Gulf-Technadril
WELL: DOE - Amoco Fee #1
LOCATION: Section 13, T-12S, R-8W
Cameron Parish, Louisiana

A-41

TOTAL MATERIAL CONSUMPTION:

Magcober (Bulk)	1068.06 tns
Magcober (Bulk)	1420.93 tns
Magcober (Sack)	1470 sxs
Magcober (Sack)	1050 sxs
Magcogel	2100 sxs
Magcogel	210 sxs
Spersene	880 sxs
Spersene	755 sxs
Tannathin	600 sxs
Tannathin	712 sxs
XP-20	745 sxs
Resinex	440 sxs
Resinex	495 sxs
Caustic Soda	480 sxs
Caustic Soda	298 sxs
Lime	750 sxs
Lime	105 sxs
Drispac	26 sxs
S. A. P. P.	25 sxs
Desco	34 sxs
Sodium Chromate	22 sxs
Soda Ash	10 sxs
Aluminum Stearate	16 sxs
Aluminum Stearate	2 sxs
Fine Mica	5 sxs
Fine Nut Plug	48 sxs
Medium Nut Plug	48 sxs
H E C Polymer	6 sxs
14.0 lb/gal Liquid Mud	520 bbl
16.4 lb/gal Liquid Mud	540 bbl
13.5 lb/gal Calcium Bromide	300 bbl
Magcopaks	83 ea.
Bulk Tank Installation	3 tnk
Trucking - Liquid Mud	9 lds
Trucking	1 ea.
Engineering Service	31 dys
Engineering Service	135 dys

PLOT TITLE: DEPTH VS MUD COST
WELL NAME: AMOCO FEE #1
COUNTY/PARISH Cameron STATE/COUNTRY La.
LEGAL DESCRIPTION Section 13, T-12S, R-8
MAGMA GULF-TECHNADRIL

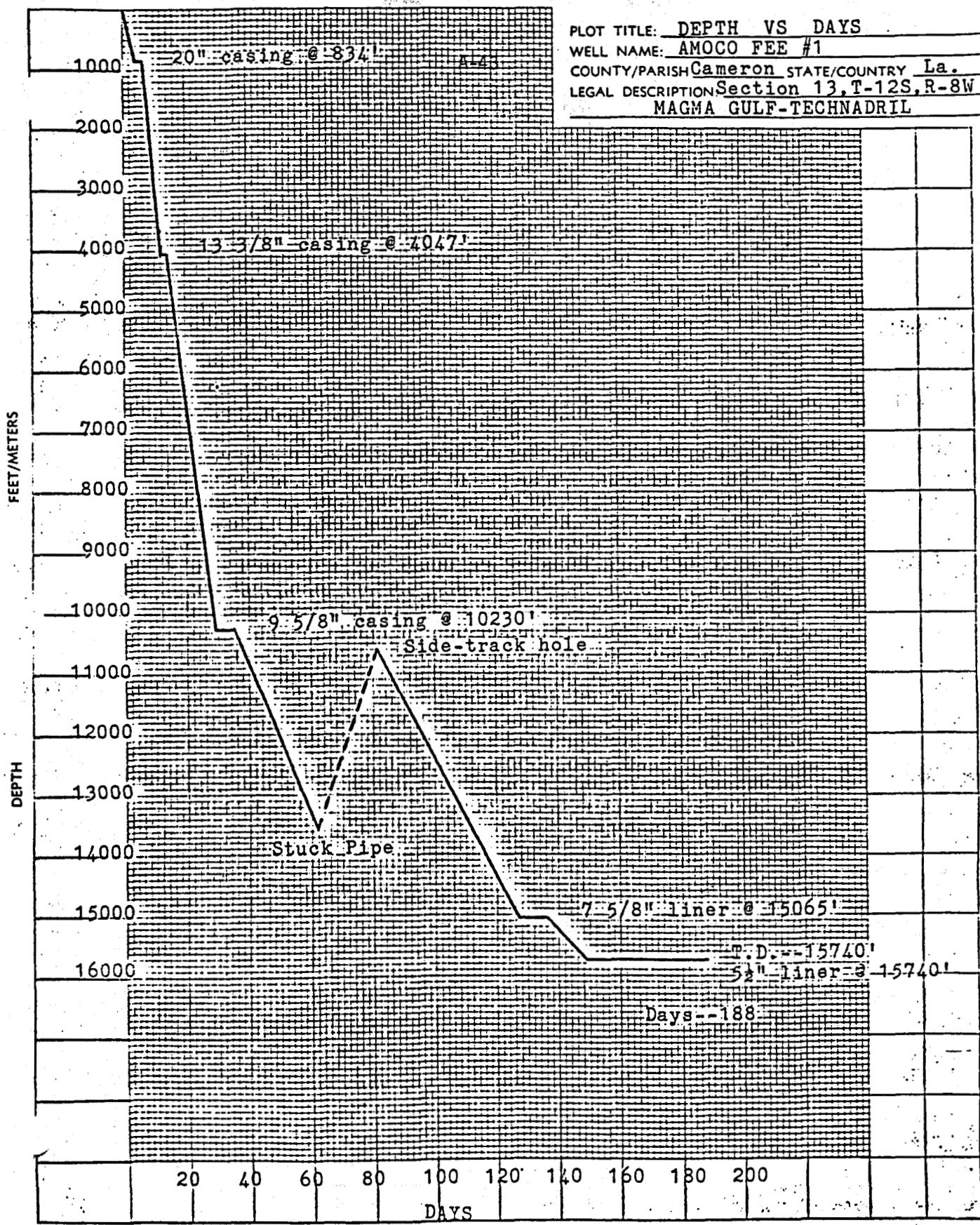


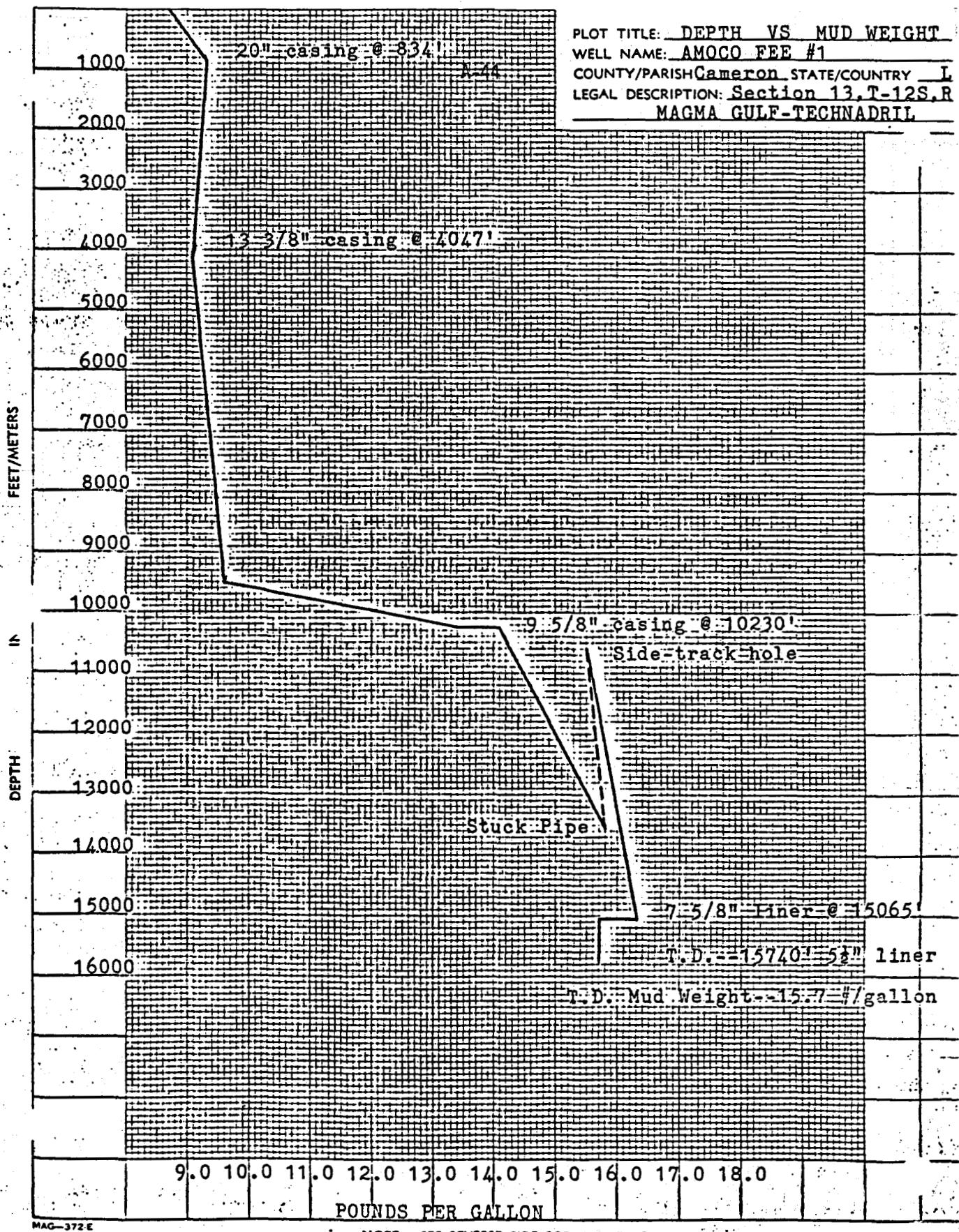
PLOT TITLE: DEPTH VS DAYS

WELL NAME: AMOCO FEE #1

COUNTY/PARISH Cameron STATE/COUNTRY La.LEGAL DESCRIPTION Section 13, T-12S, R-8W

MAGMA GULF-TECHNADRIL





MAG-372-E

NOTE: SEE REVERSE SIDE FOR LIABILITY CLAUSE

WELL DATA SHEET



Page 1

MAG-380-B

OPERATOR WELL CONTRACTOR ENGINEER	SURVEY SEC. FIELD										CASING SIZE		DEPTH		BIT SIZE		
	13 T 12S R 8W										20"		834'		24 1/2"		
	SWEET LAKE										13 3/8"		4047'		17 1/2"		
	CAMERON										9 5/8"		10230'		12 1/4"		
LOUISIANA										7 5/8"		15065'		8 1/2"			
										5 1/2"		15740'		6 1/2"			
DATE	DEPT	WT	VIS	PM	P	S	GELS	T _A	W/L	PF	C _L M _G /F	C _A M _G /F	SOL	NO	H.T.P.	TOTAL MUD COST:	TOTAL DEPTH:
1980																	15740'
8-20	8.7	47	5.5	119	516	11.5	30.02.0		100	120	6						
8-21	8.7	45	5.5	119	516	11.5	30.02.0		100	120	6						
8-22 194	8.7	80	2.0	2034	510	9.0	18.6	.4	200	40	7						
8-23 835	9.1	76	.3	2938	1223	8.7	16.8	.1	800	0	8						
8-24 835	9.3	73	.3	2632	1323	8.7	16.2	.1	800	0	10						
8-25 835	9.2	74	.3	2132	1226	8.7	16.4	.1	800	0	10						
8-26 835	9.2	77	.3	2534	1326	8.7	16.4	.1	800	0	10						
8-27 835	9.1	44	.7	1724	1020	9.5	17.8	.2	600	0	10						
8-28 1460	8.9	42	3.2	634	1221	11.8	22.8	1.3	600	0	7						
8-29 3006	9.3	43	1.1	625	918	10.3	22.0	.4	750	0	7						
8-30 4000	9.2	41	1.2	726	920	10.6	22.4	.3	900	0	8						
8-31 4000	9.2	46	1.2	826	1022	10.6	22.8	.2	900	0	9						
9-01 4050	9.0	43	1.2	824	820	10.4	22.8	.2	850	0	8						
9-02 4050	9.0	42	1.8	922	718	10.5	24.4	.2	800	0	6						
9-03 4050	8.9	38	2.6	918	716	10.8	25.6	1.0	700	0	6						
9-04 4070	9.0	36	4.8	525	915	12.2	27.6	1.9	1700	280	6						
9-05 5285	9.0	38	4.0	628	1015	11.8	28.0	.8	2000	0	8						
9-06 6165	9.0	37	3.0	812	1425	11.0	24.4	.7	1700	0	7						
9-07 6929	9.0	35	2.2	910	518	10.5	25.0	.6	1400	0	8						
9-08 7755	9.0	43	2.0	108	1030	10.0	26.0	.8	1100	0	8						
9-09 8080	9.2	46	2.2	128	1023	11.0	24.0	.8	900	0	10						
9-10 8470	9.2	43	2.0	1411	318	10.5	16.6	.4	900	0	12						
9-11 8819	9.2	43	1.3	1510	322	10.5	13.8	.4	1100	0	13						
9-12 8992	9.2	42	1.3	138	319	10.5	10.4	.1	1500	0	13						
DATE SPUD:	DATE T.O.:			B.H.T.	COMPLETION FLUID TYPE:						COST:						
8-21-80	1-17-81				PACKER MUD TYPE:						COST:						

WELL DATA SHEET CONTINUATION



Page 2

MAG-381-C

WELL: AMOCO FEE #1

DATE	DEPTH	WT.	VIS.	PM	PV	YP	GELS	pH	W/L	PF	CL MB/1	CA MB/1	SOL %	OIL %	H.T.H.P.	REMARKS:
9-13	9092	9.3	39	1.3	9	3.2	8	10.4	10.4	.4	1800	0	10			Trip for bit #7.
9-14	9335	9.5	39	2.012	5.3	14	11.2	8.4	.7	1800	0	10			Drilling.	
9-15	9536	9.6	43	2.010	5.2	12	10.3	7.2	.6	2000	0	11			Trip for bit #8.	
9-16	9694	9.6	41	2.115	8.2	10	10.4	6.8	.5	2000	0	13			Trip change bottom hole assent	
9-17	9902	9.6	52	1.821	15	3	15	10.3	6.8	.5	2100	0	18			Drilling and trip.
9-18	10082	11.2	17	2.921	12	2	12	10.6	5.4	1.2	1900	Tr	16			Trip gas 190 units. Drilling.
9-19	10230	13.1	39	3.021	9	2	7	10.6	5.0	1.1	1800	Tr	22			Trip to log.
9-20	10230	13.0	37	2.719	7	2	6	10.5	5.2	1.0	1700	Tr	20			Logging.
9-21	10230	13.4	41	2.421	8	2	6	10.5	5.0	.9	1600	Tr	21			Run casing.
9-22	10230	13.3	40	2.220	8	2	6	10.4	5.0	.8	1600	Tr	20			Cement casing.
9-23	10230	13.4	40	2.120	8	2	5	10.3	5.4	.8	1600	Tr	20			Run temperature log.
9-24	10230	13.4	40	2.120	.8	2	5	10.3	5.4	.8	1600	Tr	20			Nipple up.
9-25	10230	14.0	56	3.021	17	5	10	11.5	5.2	.7	1700	0	20			Drilling cement, raising mud weight as ordered.
9-26	10241	13.9	54	3.020	16	5	12	11.5	5.2	.7	1800	0	20			Test formation, trip new bit.
9-27	10360	13.8	44	3.119	7	2	8	10.0	5.6	.6	1800	0	20			Trip bit locked up.
9-28	10599	14.1	44	3.222	9	2	10	10.0	5.8	.7	1800	0	21			Drilling.
9-29	10757	14.2	48	2.820	9	2	8	10.0	5.6	.6	1800	0	22			Drilling.
9-30	10963	14.2	45	3.525	10	2	7	11.5	5.8	.1	1800	0	26			Drilling.
10-01	11130	14.5	41	3.821	6	2	4	11.0	4.6	.2	1700	Tr	21	24.0		Trip and drilling.
10-02	11333	14.6	43	4.024	6	2	5	10.8	4.6	.2	1600	Tr	24	24.8		Drilling.
10-03	11467	14.8	40	3.520	5	1	4	10.8	3.6	.2	1600	Tr	21	18.4		Drilling.
10-04	11683	14.9	49	6.022	12	4	37	11.2	5.0	.6	1600	200	25	22.4		Carbonate contamination, treating with lime.
10-05	11916	15.1	43	8.024	14	3	21	11.2	6.22	.1	1600	360	27	28.0		Mud cleaner down 10 hours solid building up.
10-06	11986	15.1	45	10.24	11	3	22	11.2	6.42	.3	1200	240	28	28.0		Trip new bit.
10-07	12067	15.1	40	5.523	5	1	4	11.2	5.4	.5	1500	240	22	25.6		Trip gas 850 units. Drilling.
10-08	12169	15.1	40	5.016	8	1	4	11.0	7.2	.2	1800	0	18	27.6		Drilling.
10-09	12279	15.2	42	5.024	10	2	7	11.5	6.8	.4	2200	0	25	27.6		Drilling.
10-10	12318	15.3	42	5.026	11	2	8	11.5	6.8	.4	2300	0	25	26.8		Trip for bit #17.
10-11	12430	15.3	43	4.524	12	2	7	11.8	6.8	.4	2500	0	24	26.8		Drilling on junk.
10-12	12482	15.3	43	4.625	12	2	8	11.8	6.8	.3	2500	0	26	26.8		Trip change BHA.

WELL DATA SHEET CONTINUATION

MAG-381-C

WELL: AMOCO FEE #1

Page 3

DATE	DEPTH	WT.	VIS.	PM	P	YP	GELS	pH	W/L	PF	CL MG/L	CA MG/L	SOL %	OIL %	H.T.H.P.	REMARKS:
10-13	12592	15.3	425.0	2110	2	8	11.8	6.8	1.4		2500	025			26.4	Drilling.
10-14	12604	15.3	444.5	2512	2	8	11.6	6.6	1.2		2600	026			26.4	Trip for mill and 2 boat baskets.
10-15	12737	15.2	444.0	258	2	6	10.6	4.8	.8		3300	4025			24.0	Cut weight to 15.2 ppg as per company orders.
10-16	12868	14.9	414.0	237	2	8	10.6	4.8	.7		3100	4024			28.0	Cut weight to 14.9 ppg as per company orders.
10-17	12908	15.5	404.0	2216	6	24	10.6	5.6	.7		8200	8030			32.8	Drilling break at 12886', 1080 units of gas, maximum chlorides 27,900 mg/l, raise mud weight to 15.5 ppg.
10-18	13121	15.6	423.5	2211	3	9	10.5	5.0	.6		7500	4030			31.2	Weight up to 15.6 ppg to kill well swabbing on trip, went to bottom circulate up with 40 units of gas, weight cut to 14.2 ppg, raise weight to 15.8 ppg.
10-19	13130	15.8	444.0	2015	5	18	10.8	5.6	.9		7700	4030			32.4	Trip for new bit, gas off bottom 1400 units. Drilling.
10-20	13273	15.8	413.5	218	2	7	10.7	5.4	.8		7000	4030			32.4	Lost returns at 13273', pulled 3 stands wait on hole to heal hole standing full.
10-21	13320	15.6	403.0	2011	4	9	10.4	5.8	.5		6600	4029			32.8	Pulled into 9 5/8", wait 4 hours, cut weight to 15.6 ppg, circulate at 12825' with full returns. Reamed 12 joints to bottom, drilling ahead.
10-22	13510	15.6	403.8	2512	3	9	10.8	5.8	1.2		6300	027			32.8	Drilling.
10-23	13556	15.8	424.2	205	4	21	11.8	12.6	3.1		23000	14028			37.8	Drilled to 13554', made 25 stand short trip, hole swabbing, went to bottom drilled to 13555'. well flowed, SIDPP=50 PSI, SICP 850 PSI. Circulate out on choke with 15.8 ppg mud, low cut of 8.3 ppg, chlorides 27000 mg/l, pipe stuck.

WELL DATA SHEET CONTINUATION



Page 5

MAG-381-C

WELL: AMOCO FEE #1

DATE	DEPTH	WT.	VS	PM	PV	SP	GELS	H	WL	PF	CL Mg/l	CA Mg/l	SOL %	oil	H.T.H.P.	REMARKS:
1980																
11-07	11015	15.6	42	3.826	9	3	8	11.0	11.81.0	20500	8027				Run Dialog free point, back off trip with fish.	
11-08	10602	15.5	41	3.625	8	3	8	11.0	11.80.8	23000	10027				Trip in hole open ended, circulate out, mud cut to 13.3, chlorides up to 29000 mg/l. Set cement plug, pick up drilling assembly.	
11-09	10602	15.5	41	3.826	9	3	8	11.0	11.80.8	23000	10027				Tag cement at 10579', dress cement to 10602', circulate out, mud cut to 13.3, test shoe to 16.8 #/gallon. Trip for Dyna-Drill.	
11-10	10645	15.5	41	6.225	6	3	12	11.8	11.22.0	19000	8026				Dyna-drilling.	
11-11	10720	15.5	44	6.024	8	3	10	11.8	11.21.8	19000	8026				Drilling.	
11-12	10812	15.5	42	5.026	8	3	9	11.7	11.01.5	18200	8027				Drilling.	
11-13	10911	15.5	44	6.027	10	4	11	11.0	9.81.9	19000	8028				Trip, drilling.	
11-14	11075	15.4	41	6.026	8	3	10	10.9	8.61.2	16900	8028				Drilling.	
11-15	11175	15.4	41	6.026	9	3	10	10.7	8.00.9	16600	8028				Drilling.	
11-16	11397	15.4	42	5.527	9	3	9	10.8	8.01.0	14100	4028				Drilling.	
11-17	11522	15.3	43	5.026	9	3	10	10.9	8.21.1	13600	4028				Drilling.	
11-18	11735	15.2	44	4.525	9	3	8	10.6	7.00.8	11700	4026				Drilling, let weight drop to 15.2.	
11-19	11891	15.2	44	4.626	10	3	10	11.0	7.00.8	11000	4027				Drilling, trip for bit #27.	
11-20	11928	15.2	46	4.428	12	3	12	11.3	6.80.8	11000	4030				Drilling, trip gas 1300 units.	
11-21	12126	15.2	46	4.628	12	3	12	11.3	7.01.0	11000	4028				Drilling.	
11-22	12204	15.4	46	4.428	13	3	12	11.3	6.80.9	11000	4029				Drilled to 12204', pulled 15 stands, hole did not take correct amount of mud, trip to bottom, raise mud weight to 15.4 #/gallon.	
11-23	12323	15.4	40	4.428	11	3	13	11.8	6.61.2	12000	6029				Drilling.	
11-24	12535	15.6	45	4.630	13	3	12	11.8	6.21.4	11500	6032				Drilling, raised weight to 15.6 as per company orders.	
11-25	12614	15.6	48	4.428	14	3	12	11.6	6.21.2	11000	6030				Trip for bit #29.	
11-26	12723	15.7	45	4.527	11	3	10	11.3	6.61.0	11000	4029				Raised weight to 15.7 #/gallon, pipe key seated at 12' 3", worked pipe free, trip for bit #29 and key sent wiper.	



WELL DATA SHEET CONTINUATION

MAG-381-C

WELL: AMOCO FEE #1

Page 6

DATE	DEPTH	WT.	VIS.	PM	PV	YP	GELS	pH	W/L	PF	CL Mg/l	CA Mg/l	SOL %	OIL %	H.T.H.P.	REMARKS:
1980																
1-27	12756	15.7	45	4.527		9	2	8	11.6	5.61.3	10500	4029				Drilling.
1-28	12865	15.7	44	4.528		8	2	8	11.6	6.21.4	8000	8030				Drilling.
1-29	12894	15.8	45	4.528		10	3	11	11.5	6.21.3	7500	8029				Bit trip.
1-30	13048	15.8	46	4.529		9	2	9	11.0	6.00.9	6500	4030				Drilling.
2-01	13115	15.8	43	4.027		8	2	6	11.1	5.61.1	6200	4029				Drilling, bit trip.
2-02	13289	15.8	48	4.529		15	2	14	11.1	6.01.0	6500	4030				Drilling.
2-03	13355	16.0	46	2.532		14	2	16	10.9	6.00.7	6500	8031				Drilling, bit trip.
2-04	13516	16.4	44	4.529		9	1	3	11.4	5.01.5	6200	4034				Drilling.
2-05	13550	16.4	48	4.129		12	2	7	11.0	5.21.3	6200	4034				Drilling.
2-06	13643	16.4	46	5.025		8	1	3	11.5	4.01.8	6200	4034	21.4			Drilling.
2-07	13687	16.4	48	5.029		9	1	3	11.4	4.01.8	6200	4035	20.2			Lost returns.
2-08	13687	16.4	48	4.038		13	1	2	10.7	2.81.2	6200	4033	0.5	15.2		Pulled into 9 5/8" casing, attempt to circulate, no returns.
2-09	13687	16.2	43	5.229		10	1	3	11.2	4.42.0	6200	16032	0.5	27.6		Regained circulation at 3300', stage in hole with full returns to 11576'.
2-10	13764	16.4	42	5.528		10	1	3	10.9	4.01.1	6600	8033	1.0	15.2		Stage to bottom with full returns Maximum gas 104 units, maximum chlorides 7200 mg/l. Drilling.
2-11	13883	16.4	44	5.532		11	2	3	11.1	3.41.2	6300	8034	1.0	15.6		Drilling, wiper trip.
2-12	14041	16.4	46	4.531		12	1	3	11.0	3.41.1	6500	4034	1.0	13.6		Drilling.
2-13	14146	16.2	46	4.532		10	1	3	11.2	1.80.9	6000	4033	1.0	12.4		Drilling, let weight drift to 16.2
2-14	14164	16.2	48	4.033		11	2	3	11.6	1.81.3	6300	4033	0.5	12.4		Pipe key seated at 10795', working pipe free, trip.
2-15	14281	16.2	45	5.130		10	1	3	11.5	1.21.3	6000	8033	1.0	9.6		Drilling.
2-16	14368	16.2	46	4.531		11	1	3	11.5	1.21.3	6000	8033	0.5	8.8		Drilling, short trip.
2-17	14424	16.2	43	4.028		8	1	2	10.9	1.61.2	5700	8033	0.5	9.2		Drilling.
2-18	14480	16.2	42	4.232		10	1	2	10.8	1.41.1	5200	20034	tr	10.6		Drilling, bit trip.
2-19	14616	16.1	43	4.533		9	1	2	11.3	1.61.4	4200	16034	tr	9.0		Drilling, trip gas 73 units.
2-20	14651	16.2	43	4.134		10	1	2	11.3	1.21.3	5200	4034	tr	9.4		Drilling, rig repairs.
2-21	14718	16.2	45	4.128		10	1	2	11.5	1.41.2	5000	8034	tr	9.8		Drilling.
2-22	14818	16.2	42	4.127		10	1	2	11.3	1.01.0	5000	tr33	tr	7.8		Drilling, hole tight.
2-23	14856	16.3	42	4.031		9	1	2	11.8	1.01.2	5000	12033	tr	6.8		Trip gas 150 units, raise weight to 16.3 #/gallon, drilling.



WELL DATA SHEET CONTINUATION

MAG-301-C

WELL: AMOCO FEE #1

Page 7

DATE	DEPTH	WT.	VIS.	PM	PV	YP	GELS	pH	W/L	PF	CL MSL	CA MSL	SOL %	OIL %	H.T.H.P.	REMARKS:
1980																
12-24	14928	16.3	41	3.527	6	1	2	11.8	1.41.5	5000	80	32	tr	7.6	Drilling.	
12-25	14975	16.3	42	3.529	7	1	2	10.9	1.41.0	5200	40	33	tr	8.8	Drilling.	
12-26	15065	16.3	40	4.025	6	1	2	11.8	1.41.6	5500	40	32	tr	8.0	Drilling, trip to log.	
12-27	15065	16.3	41	3.527	6	1	2	11.6	1.41.5	5500	40	32	tr	8.0	Logging.	
12-28	15065	16.3	42	3.523	6	1	2	11.6	1.61.5	5200	40	32	tr	9.2	Stage in hole, conditioning mud	
12-29	15065	16.3	43	3.525	6	1	2	11.0	1.61.2	5200	40	33	tr	9.6	Run 7 5/8" liner.	
12-30	15065	16.3	43	3.528	4	1	2	10.9	1.21.2	5000	40	33	tr	7.2	Cement liner.	
12-31	15065	16.3	61	10.31	18	2	6	12.1	1.62.3	5000	320	35	tr	11.2	Reverse out cement, trip for RT tool and squeeze at 9628'.	
1-0	15065	16.3	44	10	32	11	1	2	12.1	2.22.3	5000	320	34	tr	11.2	Trip with 8 1/2" bit to dress top of liner at 9815'.
1-0	15065	16.3	45	10	33	12	1	3	12.1	2.02.3	5000	320	34	tr	11.2	Tested liner.
1-0	15065	16.3	45	10	33	12	1	3	12.1	2.02.3	5000	320	34	tr	11.2	Test BOP'S, pick up 3 1/2" drill p
1-0	15071	16.3	43	9.232	8	1	2	11.8	1.62.3	5000	240	33	tr	10.2	Tag cement at 14982', mill to 15071', test formation to 17.0 #/gallon equivalent, trip new b	
1-05	15145	16.4	42	6.532	7	1	2	11.8	1.61.7	3500	240	32	tr	10.2	Drilling, trip for wash out.	
1-06	15145	15.7	40	6.528	5	1	2	12.0	1.42.1	3200	240	31	tr	10.6	Reduced weight to 15.7 #/gallon. Mill on junk.	
1-07	15186	15.7	40	6.527	4	1	2	12.0	2.02.0	4500	200	30	tr	12.0	Coring, core barrel jammed, trip.	
1-08	15186	15.7	42	7.029	5	1	2	12.0	2.02.0	4500	200	30	tr	11.2	Reamed 6" core hole to 6 1/2", tri	
1-09	15201	15.7	41	7.026	5	1	2	12.0	1.81.8	4300	160	30	tr	10.4	Coring, trip.	
1-10	15234	15.7	42	6.526	5	1	2	12.0	1.61.8	4500	160	29	tr	10.0	Reamed 6" core hole to 6 1/2", dri	
1-11	15375	15.7	41	7.024	5	1	2	12.1	1.41.6	4500	160	29	tr	9.2	Drilling.	
1-12	15398	15.7	43	6.523	5	1	2	12.0	1.41.6	4800	160	29	tr	8.8	Drilling, trip for core barrel.	
1-13	15425	15.7	45	7.521	5	1	2	12.2	1.42.0	4500	160	29	tr	6.8	Cored to 15411', reamed core hole drilling ahead.	
1-14	15600	15.7	42	7.032	7	1	2	11.9	1.21.9	3500	200	29	tr	6.8	Drilling, trip.	
1-15	15634	15.7	42	7.030	7	1	2	11.9	1.01.8	3500	200	30	tr	5.6	Coring, trip.	
1-16	15699	15.7	42	7.030	6	1	2	11.9	1.01.9	3500	200	30	tr	5.2	Drilling.	
1-17	15740	15.7	41	6.931	5	1	2	11.9	1.02.0	3500	200	31	tr	5.2	Drilling, trip.	
1-18	15740	15.7	42	6.532	5	1	2	11.9	1.02.0	3500	200	31	tr	5.2	Logging.	
1-19	1740	15.7	42	6.532	5	1	2	11.9	1.02.0	3500	200	31	tr	5.2	Run 5 1/2" liner to 157	
1-20	1740	15.7	43	7.032	5	1	2	12.0	1.02.0	3500	200	31	tr	5.2	Cement liner.	

WELL DATA SHEET CONTINUATION

Magcobar

DRESSER

MAG-381-C

WELL: AMOCO FEE #1

Page 8

DATE	DEPTH	WT.	VIS.	PH	PV	YP	GELS	PH	W/L	RF	CL M&P	C A M&P	SOL %	OIL %	H.T.M.P.	REMARKS:
1981																
1-21	15740	15.7	43	7.0	29	6	1	2	12.0	1.2	2.0	4000	200	29	tr 5.6	Dress top of 5 1/2" liner, trip laying down pipe.
1-22	15740	15.7	43	7.0	29	7	1	2	11.9	1.2	1.9	4000	200	29	tr 6.0	Run 7 5/8" tie back string.
1-23	15740	15.7	43	7.0	29	7	1	2	11.8	1.2	1.9	4000	200	29	tr 6.0	Cement, left 34 bbls cement in 7 5/8" casing.
1-24	15740	15.7	43	7.0	28	6	1	2	11.8	1.2	1.9	4000	200	29	tr 6.0	Nipple down, wait on cement.
1-25	15740	15.7	43	7.0	28	6	1	2	11.8	1.2	1.7	4000	200	29	tr 6.0	Stress 7 5/8" casing, free with 30000 lbs of pull. Rig up Flopro Swivel, nipple up, trip with 2 7/8" tubing.
1-26	15740	15.6	43	7.5	23	5	1	2	12.3	1.4	2.1	4000	280	29	tr 6.8	Tag cement at 8905', plug at 8975' drilling cement.
1-27	15740	15.4	49	11	2710		1	2	12.3	1.6	2.3	3500	400	31	tr 7.6	Drilling cement at 9570'.
1-28	15740	15.4	47	12	26	8	1	2	12.3	1.6	2.5	3500	320	30	tr 8.0	Drilling cement at 9840'.
1-29	15740	15.4	48	15	26	8	1	2	12.3	1.6	2.5	3500	360	30	tr 8.0	Drilling cement to 9877', trip rig up Haliburton.
1-30	15740	15.4	48	15	26	7	1	2	12.2	1.6	3.2	3500	400	30	tr 8.4	Cement, wait on cement.
1-31	15740	15.4	48	15	26	9	1	2	12.2	1.6	3.3	3500	360	30	tr 8.4	Wait on cement.
2-01	15740	15.4	47	15	26	8	1	2	12.2	1.6	3.2	3500	360	30	tr 8.4	Ran temperature logs, pulled 365000 pounds on 7 5/8" casing.
2-02	15740	15.4	48	15	27	7	1	2	12.3	1.8	3.2	3500	320	30	tr 8.4	Casing pulled free, wait on cement. Pulled 380000 pounds on 7 5/8" casing, pulled free, trip to drill cement.
2-03	15740	15.5	49	15	25	9	1	2	12.5	2.0	3.5	2500	240	30	tr 9.6	Tag cement at 9528', drill to 982'.
2-04	15740	15.5	48	15	27	9	1	2	12.5	2.0	3.5	2200	320	30	tr 10.0	Trip pick up 7 5/8" stringer and circulate bottoms up.
2-05	15740	15.5	48	15	28	8	1	2	12.5	2.0	3.5	2200	280	30	tr 10.0	Circulate hole clean, cement 7 5/8" stringer to 9 5/8" casing.
2-06	15740	15.5	48	15	27	8	1	2	12.5	2.0	3.5	2200	240	30	tr 10.0	Ran temperature log, found cement at 9570'.
2-07	15740	15.5	48	15	28	8	1	2	12.5	2.0	3.5	2200	240	30	tr 10.0	Ran temperature log, bottom hole temperature 187 degrees.
2-08	15740	15.5	48	15	28	8	1	2	12.5	2.0	3.5	2200	240	30	tr 10.0	Ran CBL log, top of cement at 9587', stretch and hang 7 5/8"



WELL DATA SHEET CONTINUATION

MAG-301-S

WELL: AMOCO FEE #1

Page 9

 MAGCOBAR ENGINEERING
 M. I. D. A. S COMPUTER APPLICATIONS
 MUD RECAP

TECHNADRIL, INC
 AMOCO FEE NO. 1
 RESOURCE DRILLING
 CAMERON
 LOUISIANA
 SPUD DATE = 8-21-80

30.00 INCH CASING AT 154 FEET
 20.00 INCH CASING AT 824 FEET
 13.00 INCH CASING AT 4047 FEET
 9.625INCH CASING AT 10230 FEET
 7.625INCH CASING AT. 15065 FEET

depth	wt. fann	pv/yp	gels	ph	fluid loss	pf/pm	cec	chl	ca	oil	snd	sol	
vis													
0	8.7	45	4/19	5/16	11.5	30.0	2.0/5.5	.0	100	120	.00	.5	6.0
494	8.7	80	20/34	5/10	9.0	18.6	.4/2.0	.0	200	40	.00	.5	7.0
835	9.4	76	29/38	12/23	8.7	16.8	.1/.3	.0	800	40	.00	.5	8.0
835	9.3	74	25/33	12/24	8.7	16.2	.1/.3	.0	800	40	.00	.5	9.0
835	9.2	74	24/32	12/26	8.7	16.4	.1/.3	.0	800	40	.00	.5	10.0
835	9.1	44	17/24	10/20	9.5	17.8	.2/.7	.0	600	40	.00	.5	10.0
1460	8.9	42	6/34	12/21	11.8	22.8	1.3/3.2	.0	600	40	.00	.5	7.0
3006	9.3	43	6/25	9/18	10.3	22.0	.4/1.1	.0	750	0	.00	.5	7.0
4000	9.2	41	7/26	9/20	10.6	22.4	.3/1.2	30.0	900	0	.00	.5	8.0
4000	9.2	46	8/26	10/22	10.6	22.8	.2/1.2	30.0	900	0	.00	.5	9.0
4000	9.0	43	8/24	8/20	10.4	22.8	.2/1.2	30.0	850	0	.00	.5	9.0
4055	9.0	42	5/22	7/18	10.5	24.4	.2/1.8	30.0	800	0	.00	.5	6.0
4070	9.0	36	5/25	9/15	12.2	27.6	.9/4.8	26.5	1700	280	.00	.5	6.0
5285	9.0	38	6/28	10/15	11.8	28.0	.8/4.0	32.5	2000	0	.00	.5	8.0
6155	9.0	37	8/12	14/25	11.0	14.4	.7/3.0	28.0	1700	0	.00	.5	7.0
6929	9.0	35	9/10	5/18	10.5	25.0	.6/2.2	30.0	1400	0	.00	.5	8.0
7755	9.0	43	10/ 8	10/20	10.0	26.0	.8/2.0	32.0	1100	0	.00	.5	8.0
8080	9.1	46	12/ 8	10/23	11.0	24.0	.8/2.2	27.5	900	0	.00	.5	10.0
8470	9.2	43	14/11	3/18	10.5	16.6	.4/2.0	27.0	900	0	.00	.5	12.0
8819	9.2	43	15/10	3/22	10.5	13.8	.4/1.3	26.5	1100	40	.00	.5	13.0
8992	9.2	42	12/ 8	3/19	10.5	10.4	.4/1.3	26.0	1500	40	.00	.5	12.0
9092	9.3	39	9/ 3	2/ 8	10.4	10.4	.4/1.3	24.5	1800	40	.00	.5	10.0
135	9.5	39	12/ 5	3/14	11.2	8.4	.7/2.0	26.5	1800	40	.00	.5	10.0

depth	wt.	funn	pv/yp	gels	ph	fluid	pf/pm	cec	chl	ca	oil	snd	sol
vis						loss							
9536	9.6	43	10/ 5	2/12	10.3	7.2	.6/2.0	25.5	2000	40	.00	.5	11.0
9694	9.6	41	15/ 8	2/10	10.4	6.8	.5/2.1	25.0	2000	40	.00	.5	13.0
9902	9.9	52	21/15	3/15	10.3	6.8	.5/1.8	25.0	2100	40	.00	.5	18.0
10082	11.2	47	21/12	2/12	10.6	5.4	1.2/2.9	30.0	1900	40	.00	.5	16.0
10221	13.1	39	21/ 9	2/ 7	10.6	5.0	1.1/3.0	32.5	1800	40	.00	.5	22.0
10221	13.4	41	21/ 8	2/ 6	10.5	5.0	.9/2.4	30.0	1600	40	.00	.5	20.0
10221	13.4	40	20/ 8	2/ 6	10.4	5.0	.8/2.2	30.0	1600	40	.00	.5	20.0
10230	14.0	56	21/17	5/10	11.5	5.2	.7/3.0	28.0	1700	40	.00	.5	20.0
10241	13.9	54	20/16	5/12	11.5	5.2	.7/3.0	27.5	1800	40	.00	.5	20.0
10360	13.8	44	19/ 7	2/ 8	10.0	5.6	.6/3.1	26.5	1800	40	.00	.5	20.0
10599	14.1	44	22/ 9	2/10	10.0	5.8	.7/3.2	25.5	1800	40	.00	.5	24.0
10757	14.2	48	20/ 9	2/ 8	10.0	5.6	.6/2.8	25.0	1800	40	.00	.5	22.0
10963	14.2	45	25/10	2/ 7	11.5	5.8	1.1/3.5	24.5	1800	40	.00	.5	26.0
11130	14.5	41	21/ 6	2/ 4	11.0	4.6	1.2/3.8	25.0	1700	40	.00	.5	21.0
11333	14.6	43	24/ 6	2/ 6	10.8	4.6	1.2/4.0	30.0	1600	40	.00	.5	24.0
11467	14.8	40	20/ 5	1/ 4	10.8	3.6	1.2/3.5	27.5	1600	40	.00	.5	21.0
11683	14.9	49	22/12	4/37	11.4	5.0	1.6/6.0	22.5	1400	200	.00	.5	25.0
11916	15.1	43	24/14	3/21	11.2	6.2	2.1/8.0	22.5	1600	360	.00	.5	27.0
11986	15.1	45	24/11	3/22	11.2	6.4	2.3/***	20.0	1200	240	.00	1.0	28.0
12067	15.1	40	23/ 5	1/ 4	11.1	5.4	1.5/5.5	20.0	1500	240	.00	.5	22.0
12169	15.1	40	16/ 8	1/ 4	11.0	7.2	1.2/5.0	32.0	1800	40	.00	.5	18.0
12279	15.2	42	24/10	2/ 7	11.5	6.8	1.4/5.0	20.5	2200	40	.00	.5	25.0
12318	15.3	42	26/11	2/ 8	11.5	6.8	1.4/5.0	21.5	2300	40	.00	.5	25.0
12430	15.3	43	24/12	2/ 7	11.8	6.8	1.4/4.5	22.0	2500	40	.00	.5	25.0
12482	15.3	43	25/12	2/ 8	11.8	6.8	1.3/4.6	22.0	2500	40	.00	.5	26.0
12592	15.3	42	24/10	2/ 8	11.8	6.8	1.4/5.0	22.0	2500	40	.00	2.5	25.0
12604	15.3	44	25/12	2/ 8	11.6	6.6	1.2/4.5	22.0	2600	40	.00	.5	26.0
12737	15.2	44	25/ 8	2/ 6	10.6	4.8	.8/4.0	22.5	3300	40	.00	.5	25.0
12868	14.9	41	23/ 7	2/ 8	10.6	4.8	.7/4.0	25.0	3100	40	.00	.5	24.0
12908	15.5	40	22/16	6/24	10.6	5.6	.7/4.0	25.0	8200	80	.00	.5	30.0
13121	15.6	42	22/11	3/ 9	10.4	5.0	.6/3.5	25.0	7500	40	.00	.5	30.0
13130	15.8	44	20/15	5/18	10.7	5.6	.8/4.0	25.0	7700	40	.00	.5	30.0
13274	15.8	41	21/ 8	2/ 7	10.6	5.4	.7/3.5	23.5	7000	40	.00	.5	30.0
13320	15.6	40	20/11	4/ 9	10.4	5.8	.5/3.0	23.5	6600	40	.00	.5	29.0
13510	15.6	40	25/12	3/ 9	10.8	5.8	1.2/3.8	23.5	6300	40	.00	.5	27.0
13555	15.8	42	20/ 5	4/21	11.8	12.6	3.1/6.0	20.0	23000	140	.00	.5	28.0
13555	15.8	40	20/ 5	3/20	11.8	12.6	3.0/6.0	20.0	23000	140	.00	.5	28.0
13555	15.8	40	21/ 6	4/20	11.8	12.4	3.0/6.0	20.0	23000	130	.00	.5	28.0
13555	15.8	40	22/ 7	4/20	11.8	12.4	3.0/6.0	20.0	23000	130	.00	.5	28.0
13555	15.8	40	22/ 8	4/20	11.8	12.4	3.0/6.0	20.0	23000	130	.00	.5	28.0

PAGE - 3
 TECHNADRIL, INC
 AMOCO FEE NO. 1

depth	wt.	funn	pv/yp	gels	ph	fluid	pf/pm	cec	chl	ca	oil	snl	sol
vis						loss							

13555	15.8	40	22/7	4/20	11.8	12.8	2.6/5.8	20.0	23000	130	.00	.5	28.0
10234	14.1	42	20/10	4/12	11.0	9.2	1.3/3.8	27.5	20000	80	.00	.5	25.0
10521	15.6	41	25/8	3/9	11.0	11.8	1.0/3.8	27.5	20500	80	.00	.5	26.0
11015	15.6	42	26/9	3/8	11.0	11.8	1.0/3.8	27.5	20500	80	.00	.5	27.0
10602	15.5	41	25/8	3/8	11.0	11.8	.8/3.6	27.0	23000	100	.00	.5	27.0
10602	15.5	41	26/9	3/8	11.0	11.8	.8/3.8	27.0	23000	100	.00	.5	27.0
10634	15.5	41	25/6	3/12	11.8	11.2	2.0/6.2	27.0	19000	80	.00	.5	26.0
10720	15.5	44	24/8	3/10	11.8	11.2	1.8/6.0	27.0	19000	80	.00	.5	26.0
10812	15.5	42	26/8	3/9	11.7	11.0	1.5/5.0	27.5	18200	80	.00	.5	27.0
10911	15.5	44	27/10	4/11	11.0	11.0	1.9/6.0	26.0	19000	80	.00	.5	28.0
11075	15.4	41	26/8	3/10	10.9	8.6	1.2/6.0	25.0	16900	80	.00	.5	26.0
11175	15.4	41	26/9	3/10	10.7	8.0	.9/6.0	25.0	16600	80	.00	.5	28.0
11397	15.4	42	27/9	3/9	10.8	8.0	1.0/5.5	25.0	14100	40	.00	.5	28.0
11522	15.3	43	26/9	3/10	10.9	8.2	1.1/5.0	26.5	13600	40	.00	.5	28.0
11735	15.2	44	25/9	3/8	10.6	7.0	.8/4.5	25.0	11700	40	.00	.5	26.0
11891	15.2	44	26/10	3/10	11.0	7.0	.8/4.6	24.5	11000	40	.00	.5	27.0
11928	15.2	46	28/12	3/12	11.3	6.8	.8/4.4	25.0	11000	40	.00	.5	30.0
12126	15.2	46	28/12	3/12	11.4	7.0	1.0/4.6	25.0	11000	40	.00	.5	28.0
12204	15.4	46	28/13	3/12	11.3	6.8	.9/4.4	25.0	11000	40	.00	.5	29.0
12323	15.4	40	28/11	3/13	11.8	6.6	1.2/4.4	25.5	12000	40	.00	.5	29.0
12535	15.6	45	30/13	3/12	11.8	6.2	1.4/4.6	25.0	11500	40	.00	.5	32.0
12614	15.7	48	28/14	3/12	11.6	6.2	1.2/4.4	25.0	11000	60	.00	.5	30.0
12723	15.7	45	27/11	3/10	11.3	6.6	1.0/4.5	25.0	11000	40	.00	.5	29.0
12756	15.7	45	27/9	2/8	11.6	5.6	1.3/4.5	25.0	10500	40	.00	.5	29.0
12865	15.7	44	28/8	2/8	11.6	6.2	1.4/5.5	25.0	8000	40	.00	.5	30.0
12894	15.8	45	28/10	3/11	11.5	6.2	1.3/5.5	22.5	7500	80	.00	.5	29.0
13048	15.8	46	29/9	2/9	11.0	6.0	.9/4.5	25.0	6500	40	.00	.5	30.0
13150	15.8	43	27/8	2/6	11.1	5.6	1.1/4.0	26.5	6200	40	.00	.5	29.0
13289	15.8	48	29/15	2/14	11.1	6.0	1.0/4.5	27.5	6500	40	.00	.5	30.0
13355	16.0	46	32/14	2/16	10.9	6.0	.7/2.5	27.5	6500	80	.00	.5	31.0
13516	16.4	44	29/9	1/3	11.4	5.0	1.5/4.5	30.0	6200	40	.00	.5	34.0
13550	16.4	48	29/12	2/7	11.0	5.2	1.3/4.1	30.0	6200	40	.00	.5	34.0
13648	16.4	46	25/8	1/3	11.5	4.0	1.8/5.0	30.0	6200	40	.00	.5	34.0
13679	16.4	48	29/9	1/3	11.4	4.0	1.8/5.0	30.0	6200	40	.00	.5	35.0
13687	16.4	48	38/13	1/2	10.7	2.8	1.2/4.0	27.5	6200	40	.00	1.0	33.0
13687	16.2	43	29/10	1/3	11.2	4.4	2.0/5.2	25.0	6200	160	.00	.5	32.0
13764	16.4	42	28/10	1/3	10.9	4.0	1.1/5.5	27.5	6600	80	.00	.5	33.0
13883	16.4	44	32/11	2/3	11.0	3.4	1.2/5.5	30.0	6300	80	.00	.5	34.0
14041	16.4	46	31/12	1/3	11.0	3.4	1.1/4.5	30.0	6500	40	.00	.5	34.0
14146	16.2	46	32/10	1/3	11.2	1.8	.9/4.5	27.5	6000	40	.00	.5	33.0

depth	wt.	funn	pv/yp	gels	ph	fluid	pf/pm	cec	chl	ca	oil	snd	sol
						loss							
14164	16.2	48	33/11	2/ 3	11.6	1.8	1.3/4.0	27.5	6300	40	.00	.5	33.0
14281	16.2	45	30/10	1/ 3	11.5	1.2	1.3/5.0	26.5	6000	80	1.00	.5	33.0
14368	16.2	46	31/11	1/ 3	11.5	1.2	1.3/4.5	25.0	6000	80	.50	.5	33.5
14424	16.2	43	28/ 8	1/ 2	10.9	1.6	1.2/4.0	25.0	5700	80	.00	.5	33.5
14480	16.2	42	32/10	1/ 2	10.8	1.4	1.1/4.2	30.0	5200	200	.50	.5	34.0
14616	16.1	43	33/ 9	1/ 2	11.3	1.6	1.4/4.5	27.5	4700	160	.00	.5	34.0
14651	16.2	43	34/10	1/ 2	11.3	1.2	1.3/4.0	27.5	5200	40	.00	.5	34.0
14718	16.2	45	28/10	1/ 2	11.5	1.4	1.2/4.5	27.5	5000	80	.00	.5	34.0
14818	16.2	42	27/10	1/ 2	11.3	1.0	1.0/4.2	25.0	5000	40	.00	.5	33.5
14856	16.2	42	31/ 9	1/ 2	11.8	1.0	1.2/4.0	27.0	5000	120	.00	1.0	33.5
14948	16.3	41	27/ 6	1/ 2	11.8	1.4	1.5/3.5	30.0	5000	80	.00	.5	32.0
14975	16.3	42	27/ 7	1/ 2	10.9	1.4	1.0/3.5	27.5	5200	40	.00	.3	27.5
15065	16.3	40	25/ 6	1/ 2	11.8	1.4	1.6/4.0	27.5	5500	40	.00	.3	32.0
15065	16.3	41	27/ 6	1/ 2	11.6	1.4	1.5/3.5	27.5	5500	40	.00	.3	33.0
15065	16.3	42	23/ 6	1/ 2	11.6	1.6	1.5/3.5	27.5	5200	40	.00	.3	32.0
15065	16.3	43	25/ 6	1/ 2	11.4	1.6	1.2/3.5	27.5	5200	40	.00	.3	33.0
15065	16.3	43	28/ 4	1/ 2	10.9	1.2	1.2/3.5	27.5	5000	40	.00	.3	33.0

depth	mud cost	cost/ foot	remarks
0	3200.00	*****	BUILT SPUD MUD
494	5645.00	11.43	SPUDDED IN-DRILLING-RAISE VIS
835	7122.00	8.53	CIRC & COND HOLE-POOH TO LOG
835	7297.00	8.74	LOG-RUN 20" CASING
835	7297.00	8.74	CEMENTED 20" CASING-NIPPLE UP
835	7297.00	8.74	TESTED BOP-GIH-COND. MUD
1460	8739.00	5.99	DRLG OUT 20"-TREAT CEMENT
3006	9706.00	3.23	DRILLING AHEAD
4000	9903.00	2.48	CONDITIONING TO RUN 13 3/8"
4000	10323.00	2.58	RUN GYRO SURVEY & ELECTRIC LOGS
4000	10558.00	2.64	RUN 13 3/8" CASING - CEMENTING
4055	10558.00	2.60	NIPPLING UP ON 13 3/8" CASING
4070	10558.00	2.59	DRILLED CEMENT - RAN LEAK OFF TEST - OK
5285	11980.00	2.27	DRILLING AHEAD
6165	13032.00	2.11	DRILLING AHEAD - BUILDING VOLUME
6929	13699.00	1.98	DRILLING - RUN SURVEY
7755	14659.00	1.89	DRILLING AHEAD - BUILT VOLUME
8080	16751.00	2.07	DRILLING AHEAD - NO PROBLEMS
8470	18165.00	2.14	DRILLING AHEAD
8819	18829.00	2.14	DRILLING 8 1/2" HOLE
8992	21155.00	2.35	DRILLING
9092	22684.00	2.49	DRILLING-TRIP-TEST BOP
9335	23650.00	2.53	DRILLING
9536	25253.00	2.65	DRILLING-TRIP
9694	27119.00	2.80	TRIP-CHANGE BHA-DRILLING
9902	33004.00	3.33	RAISED WT. PER CO. ORDERS
10082	57460.00	5.70	TRIP GAS 190 U. -ADDED COST OF STORED BUL
10221	76189.00	7.45	POOH TO LOG
10221	92773.00	9.08	LOGGED-TIH-B. U. GAS 49 U. -RAISED WT-POOH
10221	92968.00	9.10	SET 9 5/8" CASING @ 10220'-CEMENTING
10230	93553.00	9.14	DRLG CEMENT @ RAISED WT PER CO. ORDERS

depth	mud cost	cost/ foot	remarks
10230	93553.00	9.14	DRLG CEMENT @ RAISED WT PER CO. ORDERS
10241	104907.00	10.24	DRILLED OUT-LEAK OFF TEST-POOH
10360	107544.00	10.38	DRILLING
10599	108927.00	10.27	DRILLING
10757	110549.00	10.28	DRILLING
10963	112494.00	10.26	DRILLING BREAK @ 10780'
11130	123522.00	11.10	DRILLING SHALE-LOWER HTHP
11333	130425.00	11.51	DRILLING-80/120 MESH ON SHAKERS
11467	135064.00	11.78	DRILLING-BUILT 400 BBL VOL-LOST TESTING
11693	152067.00	13.02	DRILLING-TREATING CO3 & SOLIDS
11916	178122.00	14.95	TREATING CO3 & SOLIDS-CENT. & SWECO DOWN
11986	180616.00	15.07	DRILLING-SOLIDS EQUIP. NOT ADEQUATE
12067	190147.00	15.76	DRILLING
12169	192221.00	15.80	DRILLING
12279	202571.00	16.50	DRILLING
12318	203285.00	16.50	DRILLING-TRIP-TEST BOP
12430	205618.00	16.54	DRILLING-JUNK IN HOLE
12482	206049.00	16.51	DRILLING-POOH
12592	207275.00	16.46	DRILLING
12604	207945.00	16.50	DRILLING-JUNK IN HOLE
12737	215764.00	16.94	DRLG. SND & SHL - CO. ORDERS CUT WT TO 1
12868	216490.00	16.82	CO. ORDERS TO CUT WT TO 14.9 - DRLG
12908	223495.00	17.31	DRLG BRK @ 12866'-GAS 1080 U. -WT 13.9
13121	235917.00	17.98	TREAT SALT H2O-BARITE #23722-POOH-SWAB
13130	230620.00	17.56	CIRC BU-440 U. GAS-TRIP-BU GAS 1400 U.
13274	236886.00	17.85	DRLG-LOST 100 BBLS-HOLE STAND FULL
13320	255360.00	19.17	PULL TO CASING [SWAB]-BUILT 300 BBLS-DRL
13510	257404.00	19.05	DRILLING AHEAD
13555	277826.00	20.50	PULLED 25 STDS [SWAB] TIH-KICK-SHUT IN
13555	278041.00	20.51	PIPE STUCK 12900-TD. [TEMP LOG]
13555	278401.00	20.54	DIALOG SHOT BIT JETS-CEMENTED BHA
13555	278615.00	20.55	RUN TEMP SURVEY & CYRO SURVEY - R&R HYDR
13555	278931.00	20.57	RUN DIP LOG - ATTEMPT BACKOFF
13555	279046.00	20.59	WELL FLOWED-SET DP PLUG @ 12900-PERF DP
10234	298022.00	29.12	WASHING OVER
10521	314467.00	29.89	WASH OVER-GAS CUT-RAISED WEIGHT
11015	314601.00	28.57	DIALOG FREEPOINT-POOH W. FISH
10602	315025.00	29.71	SET 110 SX CMT @ 11015-POOH
10602	315240.00	29.73	DRESSED CMT PLUG-TEST SHOE Y_TO 16.8
10634	316584.00	29.77	DYNADRILLING-NG-SURVEY-POOH

depth	mud cost	cost/ foot	remarks
10634	316584.00	29.77	DYNADRILLING_NG-SURVEY-POOH
10720	333422.00	31.10	DRILLING 8 1/2" HOLE
10812	336029.00	31.08	DRILLING- FL OK PER CO. ORDERS
10911	336244.00	30.82	TEST CASING SEAT TO 16.8-TEST BOP
11075	337151.00	30.44	DRILLING-ALLOWING WT. TO DRIFT DOWN
11175	337892.00	30.24	DRILLING-TRIP-GAS CUT TO 14.0 #/GAL-OK
11397	338780.00	29.73	DRILLING-NO PROBLEMS
11522	340306.00	29.54	DRILLING-TRIP-GAS CUT TO 15.1 #/GAL-OK
11735	341145.00	29.07	ALLOWING WT. TO DROP- DRILLING -OK
11891	342054.00	28.77	DRILLING 8 1/2" HOLE - TRIP FOR N/B
11928	349541.00	29.30	TRIP - GAS CUT TO 14.2 #/GAL - OK
12126	350700.00	28.92	DRILLING
12204	352176.00	28.86	SHORT TRIP-SWAB-RAISED WT-POOH
12323	353659.00	28.70	GAS CUT TO 15.1 #/GAL ON TRIP - OK
12535	354750.00	28.30	DRILLING - CO. ORDERS TO RAISE WT.
12614	368490.00	29.21	DRILLING - SURVEY - TRIP
12723	369539.00	29.05	KEYSEATED-FREED-POOH FOR WIPER
12756	371218.00	29.10	WIPED TITE SPOT @ 11800'-TRIP CUT TO 12.5
12865	371533.00	28.88	DRILLING
12894	390192.00	30.26	DRILLING - TRIP
13048	391132.00	29.98	GAS CUT TO 15.5 #/GAL ON TRIP - OK
13150	392620.00	29.86	DRILLING - TRIP
13289	393043.00	29.64	TRIP-GAS CUT TO 13.2 #/GAL-DRILLING
13355	402512.00	30.14	RAISED WT. - TRIP
13516	404271.00	29.91	RAISED WT. TO REDUCE BACKGROUND GAS
13550	405006.00	29.89	TESTED CASING SEAT TO 16.8 #/GAL
13648	411600.00	30.16	HTHP=21.4 DRILLING
13679	414540.00	30.30	TRIP-DRILLED TO 13687'-LOST RETURNS
13687	415783.00	30.38	POOH TO 3000'-STAGED IN HOLE-MUD THICK
13687	428000.00	31.27	LOST 650 BBLS-FUNNEL VIS=165 OFF BOTTOM
13764	432151.00	31.40	DRILLING-NO PROBLEMS HTHP=15.2
13883	443172.00	31.92	SHORT TRIP-NO GAS CUT -DRILLING
14041	446684.00	31.81	SHORT TRIP-NO GAS CUT -DRILLING
14146	451593.00	31.92	LET WT. DROP - HTHP=12.4
14164	453090.00	32.05	KEYSEAT @ 10795'-TRIP-GAS CUT TO 12.5-OK
14281	457548.00	32.04	DRILLING
14368	461628.00	32.13	SHORT TRIP-NO MUD CUT-HTHP=8.8 (12/16/80)
14424	463544.00	32.14	SHORT TRIP-CUT TO 14.7 ON B/U-OK-DRILLIN
14480	480004.00	33.15	TRIP - SURVEY
14616	482982.00	33.04	FINISH TRIP-800PSI TO BREAK CIRC. -OK

depth	mud cost	cost/ foot	remarks
14616	482982.00	33.04	FINISH TRIP-800PSI TO BREAK CIRC. -OK
14651	484855.00	33.09	TRIP-REPAIR RIG
14718	488590.00	33.20	TRIP-1200PSI TO BREAK CIRC. -HTHP=9.8
14818	493861.00	33.33	DRILLING - TIGHT SPOTS - TRIP
14856	495777.00	33.37	TRIP (00H 18 HRS)-CUT TO 16.0 - DRLG
14948	513768.00	34.37	DRILLING - HTHP=7.6 - NO PROBLEMS
14975	516024.00	34.46	TRIP (00H 15 HRS)-MAX VIS OFF BOT. =65 -
15065	517928.00	34.38	DRILLING - SHORT TRIP - POOH TO LOG
15065	518143.00	34.39	LOGGING - HTHP = 8.0
15065	519577.00	34.49	TIH (00H 43 HRS)-MAX F. VIS=82
15065	519792.00	34.50	CIRC. HOLE-LAY DOWN 5" DP-RUN 7 5/8" CAS
15065	520007.00	34.52	7 5/8" LINER TO TD-CIRC-MAX VIS=72 CEMNT

A.9 Casing and Cementing Reports

TECHNADRIL, INC.
CASING AND CEMENTATION DETAIL

FIELD Sweet Lake WELL Amoco Fee #1 DATE 9-2-80

DRLG. CONTRACTOR Resource RIG 12 ENGINEER J. F. Eggleston

HOLE SIZE 17 1/2 " DEPTH 4050 CSG. SIZE 13-3/8 LAST CSG. SIZE 20 SET AT 824

MUD PROP. WHILE CEM'TING: WT. 9.0 PV 8 VP 24 WL 22.8 pH 10.4 OIL - % TYPE Native

Bottom Hole Logging Temp. °F

Bottom Hole Static Temp. °Fest.

CASING DETAIL: (BOTTOM UP)

8 Davis-Lynch, tubbelizers - ran 4 on bottom 2 joints and 1					
@ 260', 400', 600' and 800' above shoe - ran 5 rigid cento 50' 150', 350' 500' and 750' Cumulative Total					
No. Jts.	Wt.	Grade	Cplg.	Length	
Shoe	72	L-80	Buttress	1.98	1.98
2	72	L-80	Buttress	51.37	53.35
Collar	72	L-80	Buttress	1.37	54.72
43	72	L-80	Buttress	1371.27	1425.99
69	72	N-80	Buttress	2661.20	4087.19
LESS ABOVE KELLY BUSHING					
40.19					
CASING SETTING DEPTH AT KELLY BUSHING					
4047.00					
LESS KELLY BUSHINGS TO BRADENHEAD FLANGE					
35.95					
CASING SETTING DEPTH AT BRADENHEAD					
4011.05					

Casing Running Data: Start Time 10:30 Finish Time 20:30 Torque Applied 900 to 12,000 ft. lbs.
Reciprocated? yes Length Strokes 15 to 20 Csg. Shoe Type & Manufacturer: Davis-Lynch Type 501
Collar Type & Manufacturer Davis-Lynch Type 700 Float Equip. Performance OK

CEMENTING DATA: Halliburton Lake Charles Joe Chapman
Cementing Company Halliburton District Sam-5 Field Engineer Joe Chapman
Type, amount, and position of wash used: 100 barrels 10.0#/gal circ out
Plugs used: Top Halliburton Bottom: Halliburton Displacement Fluid 9.0 #/gal mud
Calculated Displacement: 596 bbls Actual Displacement 606 Type pump used to Disp. HT-400
Pumping Rate: Mixing: 2-8 bbl./min. Displacing: 4 bbl./min. Calculated excess 25 % Caliper Table

Volume API Class Cement + Additives 5000 Halliburton high temp. low density Slurry Wt. 13.2 Mixing H₂O 7.14 Slurry Yield 1.52 Slurry Vol. 7600 Pumping Time 1352 (Pilot) +12 (Blend)
cement + 1.7% Halad 22A + 1/2#/sk Kwik Seal 16.3 5.70 1.47 698 124 5 1/2 +12
475 Class H + 40% slilca flour + .75% CFR-2 0100 (AM) (MM) Bump Plug 0830 (AM) (MM) with 1000 psi Held 15 min.
Returns 100 % Cement final wt. 16.3 # Csg. wt. in air 294,278 # Csg. wt. in mud 254,000 Hung with 200,000 #
Csg. returned traced on location Additional information and remarks circulated 887 sacks of lead cement
(352 bbls) out at surface @ 13.2#/gal - reciprocated 13 3/8" casing until plug
bumped 15' to 20' up and down

Date Issued: 9-2-80 James F. Eggleston
Technadril Engineer

TECHNADRIL, INC.

CASING AND CEMENTATION DETAIL

FIELD Sweet Lake WELL Amoco Fee #1 DATE 9-21-80DRLG. CONTRACTOR Resource RIG 12 ENGINEER _____HOLE SIZE 12 1/4 " DEPTH 10,230 ft CSG. SIZE 9 5/8" LAST CSG. SIZE 13-3/8" SET AT 4047MUD PROP WHILE CEM'TING: WT. 13.1 PV 20 YP 8 WL 5.4 pH 10.3 OIL - % TYPE Lig-Sul
Bottom Hole Logging Temp. 150 °FBottom Hole Static Temp. _____ °F

CASING DETAIL: (BOTTOM UP)

No. Centralizers Spacing Midway 1st ht, 1st clr., midway 2nd jt, 6 every other clr
Additional Equipment 2 on 1st two jts below casing spool

No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Shoe			Buttress	1.50	1.50
<u>2</u>	<u>53.5</u>	<u>P-110</u>	Buttress	<u>84.48</u>	<u>85.98</u>
Collar			Buttress	1.50	87.48
<u>6</u>	<u>53.5</u>	<u>P-110</u>	Buttress	<u>250.15</u>	<u>337.63</u>
<u>255</u>	<u>53.5</u>	<u>C-95</u>		<u>9913.70</u>	<u>10251.33</u>
					<u>21.33</u>
					<u>10250.00</u>
					<u>33.95</u>
					<u>10194.05</u>

Casing Running Data: Start Time 0530 am Finish Time 1600 Torque Applied 6000-7500 ft. lbs.
Reciprocated? yes Length Strokes 20' Csg. Shoe Type & Manufacturer Davis - Lynch
Collar Type & Manufacturer Davis Lynch Float Equip. Performance Good

CEMENTING DATA:		L.C.	Field Engineer	Leon Harvin
Cementing Company	<u>HOWCO</u>	District		
Type, amount, and position of wash used:		<u>20 bbl H₂O</u>		
Plugs used: Top	<u>yes</u>	Bottom:	<u>yes</u>	Displacement Fluid <u>mud</u>
Calculated Displacement:	<u>718</u>	Actual Displacement	<u>724</u>	Type pump used to Disp. <u>HT-400</u> H ₁ a _b .
Pumping Rate: Mixing:	<u>6</u> bbl./min.	Displacing:	<u>4</u> bbl./min.	Calculated excess <u>10</u> % Caliper Table
Volume API Class Cement + Additives		Slurry Wt. <u>(#/gal)</u>	Mixing H ₂ O <u>(gal/sk.)</u>	Slurry Yield <u>(CF/sk.)</u>
<u>900</u>	<u>CTH 407% SF-1 ~ 1/2</u>	<u>16.3</u>		<u>1.47</u>
<u>400</u>	<u>CTH 1/10 HR-4</u>			
Cementing Detail: Start Mixing <u>(AM) (PM)</u> Bump Plug <u>NO</u> (AM) (PM) with <u>600</u> psi Held <u>5</u> min.				
Returns <u>100</u> % Cement final wt. <u>16.3</u> * Csg. wt. in air <u>548</u> # Csg. wt. in mud <u>470</u> # Hung with <u>735m</u> *				
Csg. returned <u>6</u> jts Additional information and remarks <u>Good returns throughout job</u>				

Date Issued: 9-22-80

Technadril Engineer

M. R. Larlan

TECHNADRIL, INC.

CASING AND CEMENTATION DETAIL

FIELD Sweet Lake WELL DOE AMOCO Fee #1 DATE 12/30/80DRLG. CONTRACTOR Resource RIG 12 ENGINEER HarlanHOLE SIZE 8 1/2 " DEPTH 15065 CSG. SIZE 7 5/8 LAST CSG. SIZE 9 7/8 SET AT 10,230MUD PROP.WHILE CEM'TING: WT. 16.3 PV 28 VP 4 WL 12 pH 10.85 OIL tB %TYPE Lignosulfonate,
Bottom Hole Logging Temp. 300 °F
Bottom Hole Static Temp. 300 °Fest.CASING DETAIL: (BOTTOM UP)No. Centralizers Spacing 5 - 10 - 48 - 80 - 120 - 160Additional Equipment Float collar, orifice float collar, slips, tie back steam

No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Shoe				1.90	1.90
L.C.				0.92	2.82
Collar					
2	39	S-95	-	82.74	85.56
1 FC.	-	-	-	1.27	86.83
131 jts.	39	S-95	-	5132.12	5218.95
X-over				0.81	5219.76
Hanger	-			11.57	5231.33
PBR				7.38	5238.71
<u>LESS ABOVE KELLY BUSHING</u>					
<u>LESS SEEKS DEEPER BUSHING</u>					
Pack off					
LESS KELLY BUSHINGS TO BRADENHEAD FLANGE					
Setting tool					
CASING SETTING DEPTH AT BRADENHEAD					

Casing Running Data: Start Time 12-29-80 Finish Time 09:00 12-30-81 Torque Applied 6500 ft. lbs.
Reciprocated? No Length Strokes 12 Csg. Shoe Type & Manufacturer Davis-Lynch
Collar Type & Manufacturer Davis-Lynch Float Equip. Performance GoodCEMENTING DATA:
Cementing Company Halliburton District Lake Charles, LA Field Engineer Lenard
Type, amount, and position of wash used: 20 Bbls ahead 10 Bbls behind
Plugs used: Top Drilling Pipe Bottom: None Displacement Fluid Mud 15.4
Calculated Displacement: 296 Bbls Actual Displacement 290 Type pump used to Disp. Halliburton
Pumping Rate: Mixing: 3 bbl./min. Displacing: 5 bbl./min. Calculated excess - % Caliper TableVolume API Class Cement + Additives Slurry Wt. Mixing H₂O Slurry Yield Slurry Vol. Pumping Time
(#/gal) (gal/sk.) (CF/sk.) (CF) (Bbls.) (Pilot) (Blend)
17 1.36Cementing Detail: Start Mixing 16:00 (AM) (PM) Bump Plug 08:00 (AM) (PM) with 800 psi Held min.
Returns 100 % Cement final wt. 17 # Csg. wt. in air - # Csg. wt. in mud - # Hung with 150,000 #
Csg. returned 45 Additional information and remarks _____Date Issued: 12/30/81 Technadril Engineer M. R. Harlan

TECHNADRIL, INC.

CASING AND CEMENTATION DETAIL

FIELD Sweet LakeWELL DOE AMOCO FEE #1 DATE 1/18/81DRLG. CONTRACTOR ResourceRIG 12 ENGINEER SchneiderHOLE SIZE 6 1/2 " DEPTH 15740 CSG. SIZE 5 1/2 LAST CSG. SIZE 7 5/8 SET AT 15,065MUD PROP WHILE CEM'TING: WT. 15.7 PV 29 YP 6 WL 1.2 pH 12 OIL % TYPE Resinex - Lime - H
Bottom Hole Logging Temp. 300 °F

CASING DETAIL: (BOTTOM UP)

Bottom Hole Static Temp. °Fest.No. Centralizers Spacing NoneAdditional Equipment Hanger - tie back conn., shoe, and orifice float collar

No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Shoe					
1	-	Brown	-	1.75	1.75
Collar					
1	-	-	-	1.15	290
<u>Hanger & tie back conn.</u>				45.31	48.21
2.8	26	S0095	-	1156.72	1204.93

LESS ABOVE KELLY BUSHING NoneCASING SETTING DEPTH AT KELLY BUSHING NoneLESS KELLY BUSHINGS TO BRADENHEAD FLANGE NoneCASING SETTING DEPTH AT BRADENHEAD 15,738Casing Running Data: Start Time 16:30 Finish Time 17:30 Torque Applied ft. lbs.
Reciprocated? Yes Length Strokes 10' Csg. Shoe Type & Manufacturer: Brown - v - set
Collar Type & Manufacturer Float Equip. Performance good

CEMENTING DATA:

Cementing Company Halliburton District Lake Charles, LA Field Engineer Leon HarvinType, amount, and position of wash used: 20 Bbls SAM-5Plugs used: Top Yes Bottom: No Displacement Fluid Drilling MudCalculated Displacement: - Actual Displacement: - Type pump used to Disp. HalliburtonPumping Rate: Mixing: 2-3 bbl./min. Displacing: 2-3 bbl./min. Calculated excess - % Caliper TableVolume API Class Cement + Additives Slurry Wt. Mixing H₂O Slurry Yield Slurry Vol. Pumping Time
(#/gal) (gal/sk.) (CF/sk.) (CF) (Bbls.) (Pilot) (Blend)155 sx class H 17 Cementing Detail: Start Mixing (AM) (PM) Bump Plug (AM) (PM) with psi Held min.
Returns 100 % Cement final wt. 17 # Csg. wt. in air - # Csg. wt. in mud - # Hung with 2' off bottomCsg. returned - Additional information and remarks Date Issued: 1/18/81Technadril Engineer

TECHNADRIL, INC.
CASING AND CEMENTATION DETAIL

FIELD Sweet Lake WELL DOE AMOCO FEE #1 DATE 1/29/81
 DRLG. CONTRACTOR Resource RIG 12 ENGINEER Schneider
 HOLE SIZE 8 1/2 " DEPTH 15065 CSG. SIZE 7 5/8 LAST CSG. SIZE 9 5/8 SET AT 10,230
 MUD PROP. WHILE CEM'TING: WT. 16.3 PV 32 YP 11 WL 1.2 pH 10.85 OIL % TYPE Resinex - Lime - H₂O
 Bottom Hole Logging Temp. 300 °F
 CASING DETAIL: (BOTTOM UP) Bottom Hole Static Temp. °Fest.

No. Centralizers	Spacing	None			
<u>Additional Equipment</u>					
No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Shoe					
Stem	-	-	-	8.58	8.58
Collar					
Orifice float collar		-	-	1.30	9.88
247	39	P-110	11,060	9840	9843.88
LESS ABOVE KELLY BUSHING		11'			
CASING SETTING DEPTH AT KELLY BUSHING		9838			
LESS KELLY BUSHINGS TO BRADENHEAD FLANGE		9806			
CASING SETTING DEPTH AT BRADENHEAD		9806			

Casing Running Data: Start Time 07:00 Finish Time 24:00 Torque Applied _____ ft. lbs.
Reciprocated? Yes Length Strokes 10' Csg. Shoe Type & Manufacturer: Tie Back stem
Collar Type & Manufacturer Brown Oil Tool Float Equip. Performance Brown Oil Tool

CEMENTING DATA:
 Cementing Company Halliburton District Lake Charles, LA Field Engineer Schneider
 Type, amount, and position of wash used: 20 BB1s H₂O, 20 BB1 SAM 5
 Plugs used: Top Yes Bottom: 2 No Displacement Fluid Mud
 Calculated Displacement: 417 BB1s Actual Displacement 417 BB1s Type pump used to Disp. Halliburton
 Pumping Rate: Mixing: 5 BB1s bbl./min. Displacing: 5 bbl./min. Calculated excess 0 % Caliper Table
 Volume API Class Cement + Additives Slurry Wt. Mixing H₂O Slurry Yield Slurry Vol. Pumping Time
 (±/gal) (gal/sk.) (CF/sk.) (CF) (Bbls.) (Pilot) (Bbls.)
320 ± class "H" 40% Oklahoma = 1
1% CFR-2, + 0.2 OP 1% HR-5
 Cementing Detail: Start Mixing 1300 (AM) (PM) Bump Plug - (AM) (PM) with Displaced 30 min.
 Returns 100 % Cement final wt. 18 # Csg. wt. in air 305,000 # Csg. wt. in mud 290,000 Hung with 650,000 #
 Csg. returned 48' Additional information and remarks

Date Issued: 1/29/81 Techpadril Engineer

TECHNADRIL, INC.
CASING AND CEMENTATION DETAIL

FIELD Sweet Lake WELL DOE AMOCO FEE #1 DATE 2-25-81

DRLG. CONTRACTOR Resource RIG 12 ENGINEER B. Blake

HOLE SIZE 7 5/8" DEPTH 14534 CSG. SIZE 5 1/2 LAST CSG. SIZE 7 5/8 SET AT 15,065

MUD PROP.WHILE CEM'TING: WT. 10 PV YP WL pH OIL %TYPE

Bottom Hole Logging Temp. °F

Bottom Hole Static Temp. °Fest.

CASING DETAIL: (BOTTOM UP)

No. Centralizers Spacing None

Additional Equipment -

No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Surf Surface	-	-	-	25.66	25.66
25.5	25.5	S0095	-	39.64	65.30
Casing X-over	-	-	-	0.80	66.10
Siding Sleeve	-	-	-	4.22	70.32
X-over	-	-	-	0.85	71.17
26 jts FL4S	25.5	S0095	-	1,074.16	1,145.33
X-over	-	-	-	0.96	1,146.29
334 jts. x-line 23	23	S-95	-	13,339.52	14,485.81
LESS BUSHING Plugs, 1-double pin				31.27	14,517.08
CASING SETTING DEPTH AT BRADENHEAD BUSHING				1.00	14,518.08
LESS BUSHING Elevation				28.15	14,546.23
Casing Setting Depth at Bradenhead					
Seal Assembly spaced out to elongate 11.82'					

Casing Running Data: Start Time Finish Time Torque Applied ft. lbs.
 Reciprocated? Length Strokes Csg. Shoe Type & Manufacturer:
 Collar Type & Manufacturer Float Equip. Performance

CEMENTING DATA:

Cementing Company None District String Field Engineer B. Blake

Type, amount, and position of wash used: None

Plugs used: Top None Bottom: None Displacement Fluid None

Calculated Displacement: None Actual Displacement None Type pump used to Disp. None

Pumping Rate: Mixing: None bbl./min. Displacing: None bbl./min. Calculated excess None % Caliper Table

Volume API Class Cement + Additives	Slurry Wt. (lb/gal)	Mixing H ₂ O (gal/sk.)	Slurry Yield (CF/sk.)	Slurry Vol. (Bbls.)	Pumping Time (Pilot) (Blend)
None				None	

Cementing Detail: Start Mixing (AM) (PM) Bump Plug (AM) (PM) with psi Held min.

Returns % Cement final wt. * Csg. wt. in air None # Csg. wt. in mud * Hung with *

Csg. returned Additional information and remarks

Date Issued: 2/26/81 Technadril Engineer

Well MGT AMOCO FEE #1 Date 8/33/80

Size 30 Wt. 1" WALL Gr. DRIVE PIPE Pthd. NSE

A-69

Rn. Make

	FEET	FEET	FEET	FEET	FEET
1	20 05	OUT			
2	27 00	OUT			
3	33 60	CUT PIECE	REMOVED FROM		
4		WELL.			
5					
6					
7				3 ABOVE JOINTS	
8				RACKED ON LOCATION	
9					
10					
11					
12					
13					
14					
15					
16					
17					
18					
19					
20					

Total No. Joints _____ Feet _____

CASING1	TUBING
Float Shoe.....	Down Meas.
Float Collar.....	____ Jts. ____ Tbg.
Total Pipe.....	Choke At.....
Out Joints	____ Jts. ____ Tbg.
Pipe In Hole	Side Seals.....
Down Meas.	Tail Pipe
Casing Seat	Swung At.....
1st Collar Ft. Below Csgd.	Off Bottom
	Packer Set At

Tallied By:

James F. Eggleston

A.10 5 1/2" Tubing and Liner Specifications

MGT - DOE - AMOCO FEE #1
5 $\frac{1}{2}$ " TUBING & LINER SETTING
LINER

15740.00' - T.D. of 6 $\frac{1}{2}$ " hole
2.00' - Suspended off bottom
15738.00'
1.75' - BOT Double Float Shoe
15736.25'
74.13' - 2 jts. - 5 $\frac{1}{2}$ " 25.54# S0095 FL4S casing
15662.12'
1.15' - BOT Double Float Collar
15660.97'
.82' - BOT Liner Plug Latch In Collar
15660.15' - PBTD
615.86' - 15 jts. - 5 $\frac{1}{2}$ " 25.54# S0095 FL4S casing
15044.29'
9.64' - BOT PBR (4.40" I.D.)
15034.65'
466.73' - 11 jts. - 5 $\frac{1}{2}$ " 25.54# S0095 FL4S casing
14567.92'
9.41' - BOT Type CMC Liner Hanger
14558.51'
24.67' - BOT 6 $\frac{1}{2}$ " O.D. X 5 $\frac{1}{2}$ " I.D. PBR
14533.84' - Top of liner assembly

MGT - DOE AMOCO FEE #1
5½" TUBING & LINER SETTINGTUBING

15660.15' - PBTD 5½" 25.54 S0095 FL4S casing
1126.31' - Liner Assembly above latch in collar
14533.84' - Top of BOT (5½" I.D.) PBR
24.00' - Length of BOT PBR
14557.84' - Bottom of BOT PBR
11.61' - Seal Assembly suspended off btm. of PBR
14546.23' - Bottom of BOT (5½" X 4 1/8") seal assembly
25.66' - BOT Seal Assembly (5½" X 4 1/8")
14520.57' - Top of locator sub on BOT Seal Assembly
39.64' - 1 jt. of 5½" 25.54# S0095 FL4S casing
14480.93'
.80' - Crossover - 5½" 26# P110 FL4S X LT&C (ABC mod)
14480.13'
4.22' - Baker model 'L' sliding steve
14475.91'
.85' - Crossover - 5½" 26# P110 FL4S X LT&C (ABC mod)
14475.06'
1074.16' - 26 jts. 5½" 25.54 S0095 FL4S
13400.90'
.96' - Crossover - 5½" 26# P110 Exline X FL4S
13399.94'
13340.12' - 337 jts. 5½" 23# C-95 Exline
59.82'
16.92' - 3 pup jts - 5½" 23# C-95 Exline
42.90'
.75' - Double pin sub - 5½" 23# C-95 Exline
42.15'
13.00' - 1 pup jt. - 5½" 23# C-95 Exline
29.15'
1.00' - Tubing hanger bushing
28.15'
28.15' - RKB to GL

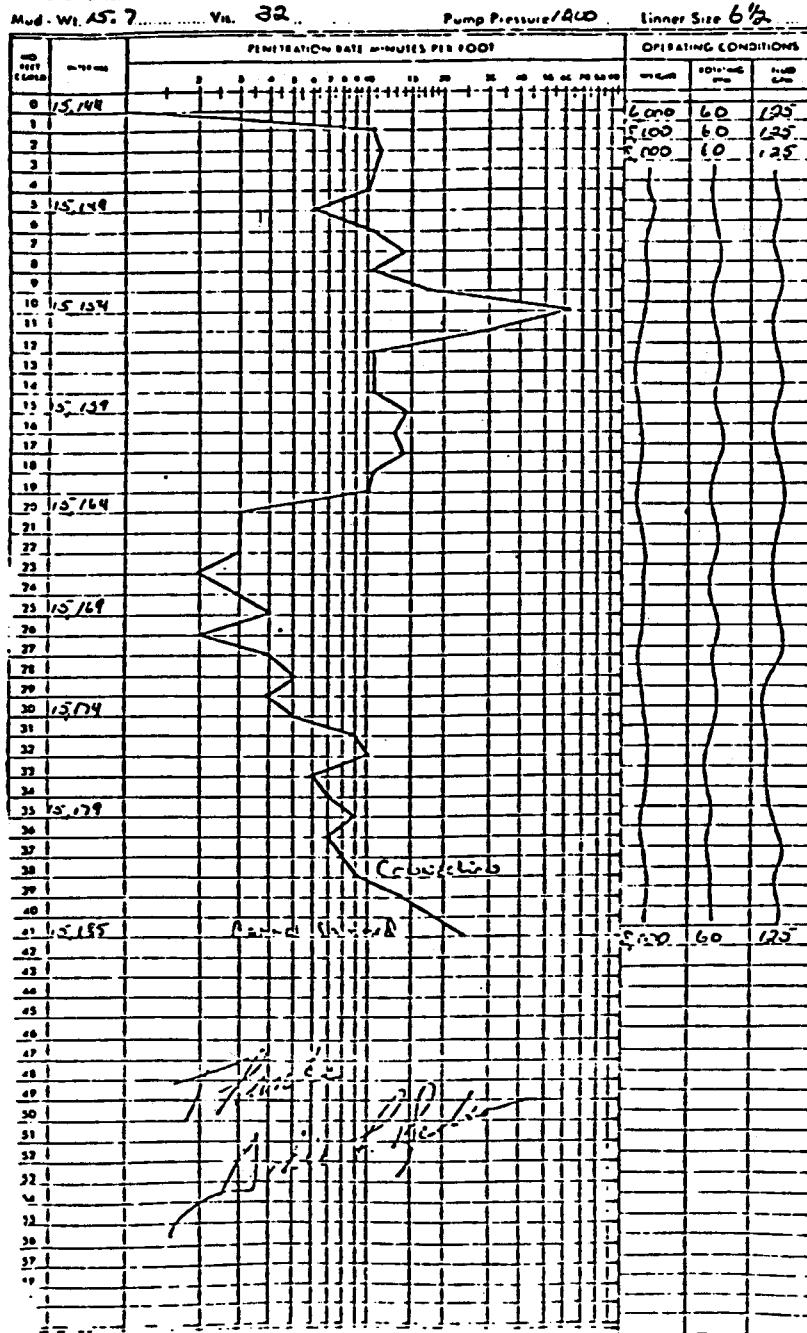
A.11 Coring Procedure



WELL INFORMATION
Company: Magnus Gulf
Contractor: Resource #12
Number: D.E. Amico Test 1 Site: Shallow
County: Cameron State: LA
Hole Size: 6"
Formation Name: Shale + sand
Formation Disc: Shale + sand
Mud. Wt: 15.7 Viz: 32

EQUIPMENT
Core Barrel No: 426
Size: 4 1/2" x 8 1/2" length: 60'
Bit No: 3L 6415
Size: 6" 2 1/2" Type: MC-20
Previous footage: 0
This core: 41 Core No: 21
Total footage: 41

Date: 1-6-81
PERFORMANCE
Interval Cored - Total: 15/185
- Starts: 15/144
Footage Cored: 41
Core Recovery: 36
% Recovery: 87%





CORING LOG from
CHRISTENSEN DIAMOND PRODUCTS INC.

Home Office, 1937 South 2nd West, Mail P.O. Box 387, Salt Lake City, Utah

WELL INFORMATION

Company IF. 25 ft. Gulf
 Contractor Research #12
 Number D.O.E. Amoco Field Sample
 County Salt Lake State Utah
 Hole Size 6"
 Formation Name Shark
 Formation Date Shark
 Mud. Wt. 15.2 Visc 32

EQUIPMENT

Core Barrel No. 426
 Size 4 7/8" length 60'
 Bit No. 14 6405
 Size 6" x 2 1/2" Type MC-30
 Previous footage 41
 This core 10 Core No. 52
 Total footage 60

Date 1-9-61

PERFORMANCE

Internal Cored - Finish 120 ft
 - Stop 120 ft
 Footage Cored 19
 Core Recovery 17
 % Recovery 87.70

TEST NUMBER	DEPTH FT. METERS	PENETRATION RATE MINUTES PER FOOT			OPERATING CONDITIONS
		DRILLING RATE MIN/FT	ROTATING RATE MIN/FT	HYD. HEAD PSI	
0	116.102				1,000 60 120
1					2,000 60 125
2					3,000 60 125
3					
4					
5	115.183				
6					
7					
8					
9					
10	115.183				
11					
12					
13	115.183				
14					
15					
16					
17					
18					
19	115.261				2,000 60 125
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					
33					
34					
35					
36					
37					
38					
39					
40					
41					
42					
43					
44					
45					
46					
47					
48					
49					
50					
51					
52					
53					
54					
55					
56					
57					
58					
59					
60					
61					
62					
63					
64					
65					
66					
67					
68					
69					
70					
71					
72					
73					
74					
75					
76					
77					
78					
79					
80					
81					
82					
83					
84					
85					
86					
87					
88					
89					
90					
91					
92					
93					
94					
95					
96					
97					
98					
99					
100					
101					
102					
103					
104					
105					
106					
107					
108					
109					
110					
111					
112					
113					
114					
115					
116					
117					
118					
119					
120					
121					
122					
123					
124					
125					
126					
127					
128					
129					
130					
131					
132					
133					
134					
135					
136					
137					
138					
139					
140					
141					
142					
143					
144					
145					
146					
147					
148					
149					
150					
151					
152					
153					
154					
155					
156					
157					
158					
159					
160					
161					
162					
163					
164					
165					
166					
167					
168					
169					
170					
171					
172					
173					
174					
175					
176					
177					
178					
179					
180					
181					
182					
183					
184					
185					
186					
187					
188					
189					
190					
191					
192					
193					
194					
195					
196					
197					
198					
199					
200					
201					
202					
203					
204					
205					
206					
207					
208					
209					
210					
211					
212					
213					
214					
215					
216					
217					
218					
219					
220					
221					
222					
223					
224					
225					
226					
227					
228					
229					
230					
231					
232					
233					
234					
235					
236					
237					
238					
239					
240					
241					
242					
243					
244					
245					
246					
247					
248					
249					
250					
251					
252					
253					
254					
255					
256					
257					
258					
259					
260					
261					
262					
263					
264					
265					
266					
267					
268					
269					
270					
271					
272					
273					
274					
275					
276					
277					
278					
279					
280					
281					
282					
283					
284					
285					
286					
287					
288					
289					
290					
291					
292					
293					
294					
295					
296					
297					
298					
299					
300					
301					
302					
303					
304					
305					
306					
307					
308					
309					
310					
311					
312					
313					
314					
315					
316					
317					
318					
319					
320					
321					
322					
323					
324					
325					
326					
327		</td			



CORING LOG from

CHRISTIE-SEX PLATINUM PRODUCTS CO.

Home Office, 1937 South 2nd West Mail P. O. Box 387 Salt Lake City, Utah

WILL INFORMATION

Company Michigan Gulf
Contractor R. L. Clegg #12
Number 117, Street 1st, South Lake
County Cass State Ind.
Hole Size 6 1/2
Formation Name
Formation Description
Mud. Wt. 15.3 Vn. 32

Equipment

Core barrel No 126
 Size 5 1/2" length 60"
 Bit No 1L E 455
 Size 6 1/2" Type AK-30
 Previous footage 60
 This core 14 Core No. 13
 Total footage 79

Date ١٠-٦-٢٠٢١

PERFORMANCE

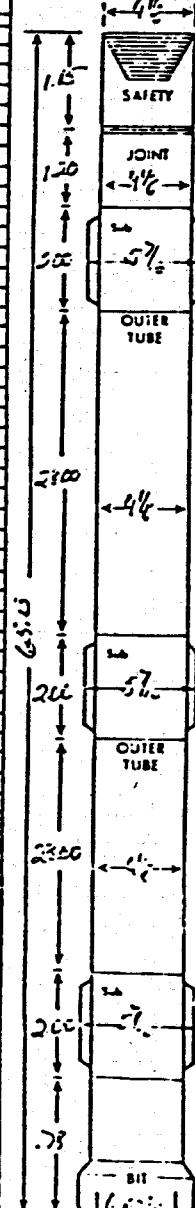
PERFORMANCE
Interval Cured - Finish 17 1/2%
- Start 17 1/2%
Footage Cured 19 ...
Core Recovery 17 ...
% Recovery 89% ...

Mod. Wt. / 5.0 Vn. 32

Pura Pura

Litter Size 67

Section 27



A-12 Core Analysis Report

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

CORE ANALYSIS REPORT

FOR

MAGMA GULF - TECHNIDRILL

D.O.E.-AMOCO FEE NO.1
WILDCAT
CAMERON PARISH, LOUISIANA

A-79

June 22, 1981

Magma Gulf-Technadril
1111 Fannin Street, Suite 1010
Houston, Texas 77002

Subject: Core Analysis Report
D.O.E.-Amoco Fee No. 1
Wildcat
Cameron Parish, Louisiana
CLI File No.: 2202-12070

Gentlemen:

Diamond coring equipment and water base drilling fluid were used to core the Frio formation, intervals 15144.0 feet to 15201.0 feet, 15389.0 feet to 15411.0 feet and 15600.0 feet to 15634.0 feet, in the subject well. Recovered cores from these intervals were sampled and preserved at the well site by a geologist from Core Laboratories, Inc., as directed by a representative of Magma Gulf-Technadril.

These samples were transported to Core Laboratories, Inc., in Houston, Texas, where a conventional core analysis was performed on the core. The results of these analyses are presented in tabular form on pages 1 through 2 of this report.

Gamma radiation measurements were made on the entire core from the subject well and are presented in graphical form on the enclosed Core-Gamma Correlation Log.

The core remnants from the subject well were split and preserved in sealable plastic and then shipped as per instructions from Magma Gulf-Technadril.

It has been a pleasure to be of service.

Very truly yours,

CORE LABORATORIES, INC.


Mike E. Foley

Laboratory Manager

MAGMA GULF -- TECHNIDRILL
P.O.E.-AMOCO FEE NO.1
WILDCAT
CAMERON PARISH, LOUISIANA

DATE : 7-JAN-81
FORMATION : FRI0
DRLG. FLUID:
LOCATION :

FILE NO : 2202-12070-3
LABORATORY: HOUSTON, TEXA
ANALYSTS : MASON
ELEVATION :

CONVENTIONAL CORE ANALYSIS

SMP NO	DEPTH	PERM MD (KA) HORZ	PERM MD (KA) VERT	POR %	OIL% PORE	WTR% PORE	PROB PROD	GAS% BULK	GRAIN DEN(M)	DESCRIPTION
CORE NO.1 15144.0 - 15184.0 CUT 40 FT REC 35 FT										
1	15144.0-44.4	27.	34.	16.6	0.0	48.5		8.6	2.66	SD F-MG SSLTY N FLU
	15144.4-52.0									NO ANALYSIS BY REQUEST
2	15152.0-52.4	32.	2.65	14.3	0.0	39.3		8.7	2.67	SD F-MG SSLTY N FLU
	15152.4-63.0									NO ANALYSIS BY REQUEST
	15163.0-79.0									SHALE
	15179.0-84.0									LOST CORE
CORE NO.2 15185.0 - 15201.0 CUT 16 FT REC 12.5 F										
3	15185.0-91.0									NO ANALYSIS BY REQUEST
	15191.0-91.4	122.	83.	16.3	0.0	71.2		4.7	2.64	SD M-CG SSLTY N FLU
	15191.4-97.5									NO ANALYSIS BY REQUEST
	15197.5-01.0									LOST CORE
CORE NO.3 15389.0 - 15411.0 CUT 22 FT REC 16.5 F										
4	15389.0-03.0									NO ANALYSIS BY REQUEST
	15403.0-03.5	3670.	3526.	24.3	0.0	81.2		4.6	2.65	SD M-CG SSLTY N FLU
	15403.5-05.0									NO ANALYSIS BY REQUEST
	15405.0-11.0									LOST CORE
CORE NO.4 15600.0 - 15634.0 CUT 34 FT REC 32 FT										
5	15600.0-04.1									NO ANALYSIS BY REQUEST
	15604.1-04.5	4.29	5.23	18.8	0.0	49.3		9.5	2.66	SD F-VFG SLTY N FLU

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

PAGE 2

MAGMA GULF - TECHNIDRILL
D.O.E.-AMOCO FEE NO.1,

DATE : 7-JAN-81
FORMATION : Frio

FILE NO : 2202-12070-3
LABORATORY: HOUSTON, TEXAS

CONVENTIONAL CORE ANALYSIS

SMP NO	DEPTH	PERM MD (KA) HORZ	VERT	POR %	OIL% PORE	WTR% PORE	PROB PROD	GAS% BULK	GRAIN DEN(M)	DESCRIPTION
	15604.5-32.0									NO ANALYSIS BY REQUEST
	15632.0-34.0									LOST CORE

(M) = MEASURED

A-82

MAGMA GULF - TECHNIDRILL
D.O.E.- AMOCO FEE NO. 1
WILDCAT
15144
2202-12070

SIEVE ANALYSIS DATA

	INCHES	MM	US MESH	SAMPLE WTS	ZWTS	CUM% WTS
	0.0166	0.4204	40	2.57	13.8	13.8
	0.0139	0.3536	45	1.84	9.9	23.7
	0.0098	0.2500	60	5.18	27.7	51.4
FGR	0.0083	0.2102	70	3.99	21.4	72.8
	0.0070	0.1768	80	2.37	12.7	85.5
	0.0059	0.1487	100	1.31	7.0	92.5
	0.0049	0.1250	120	0.32	1.7	94.2
VFGR	0.0041	0.1051	140	0.34	1.8	96.0
	0.0035	0.0884	170	0.24	1.3	97.3
	0.0025	0.0625	230	0.39	2.1	99.4
SILT	0.0021	0.0526	270	0.07	0.4	99.8
	0.0017	0.0442	325	0.04	0.2	100.0
				0.01	0.0	100.0
			TOTALS	18.67	100.0	100.0

MEDIAN GRAIN SIZE = 0.0099" (0.2517 MM)

MEAN GRAIN SIZE CALCULATED FROM 68.0% OF THE DISTRIBUTION = 0.0103" (0.2618 MM)

STANDARD DEVIATION CALCULATED FROM 68% OF THE DISTRIBUTION = 0.5593 PHI

COEFFICIENT OF SKEWNESS CALCULATED FROM 68% OF THE DISTRIBUTION = -0.1521

TRASK'S SORTING COEFFICIENT = 1.3028

INSUFFICIENT DATA TO CALCULATE ADDITIONAL STATISTICS

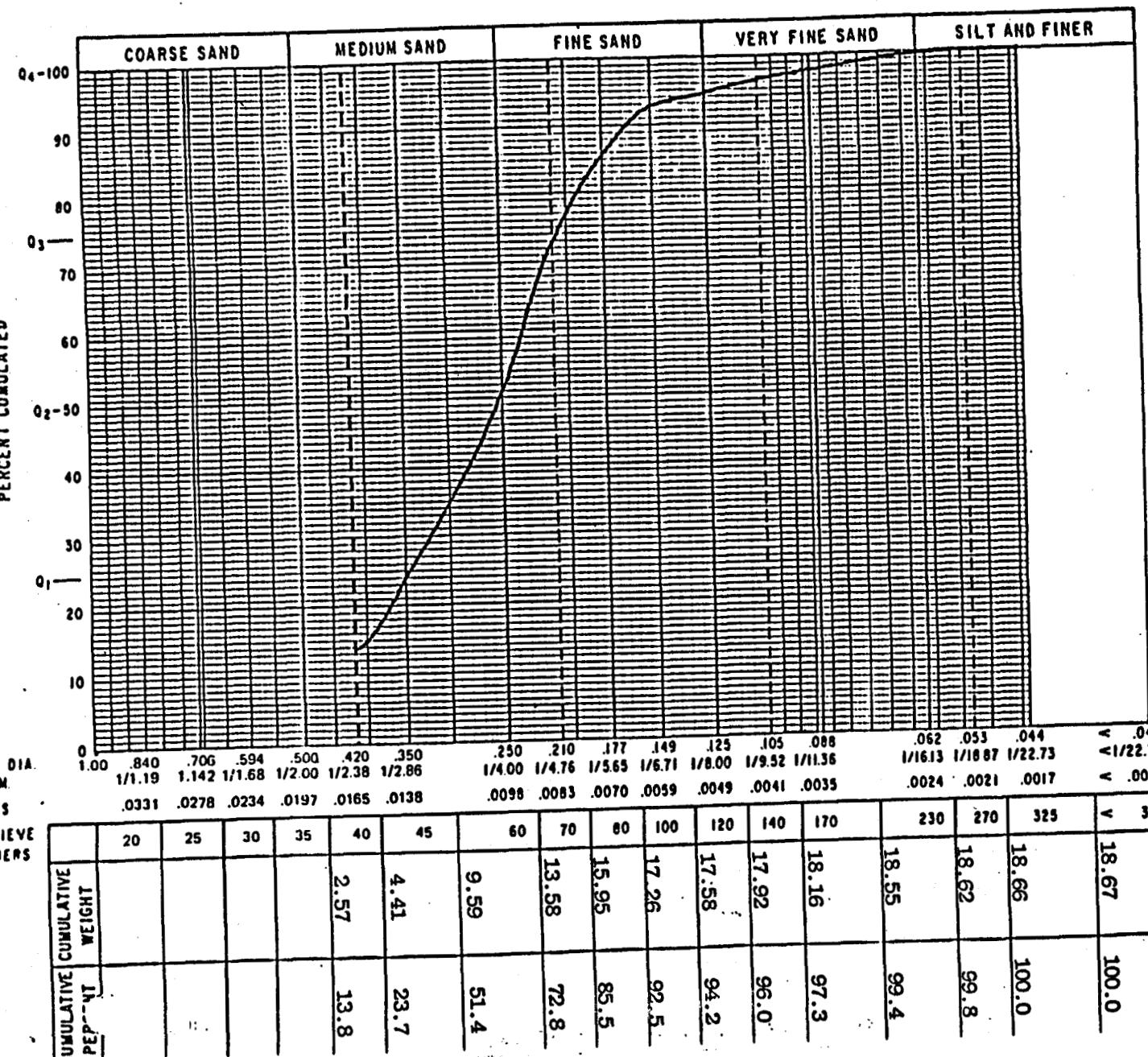
SIEVE ANALYSIS REPORT

A-84 15144

COMPANY MAGNA GULF-TECHNIDRILL DEPTH 15144 SOURCE
DOE - AVOCO FEE NO. 1 FILE NO: 2202-12070

WELL U.S.E. - 1000 DATE 1-9-81
FIELD WILDCAT

COUNTY CAMERON PARISH STATE LA
DESCRIPTION _____



MAGMA GULF - TECHNIDRILL
D.O.E. - AMOCO FEE NO. 1
WILDCAT
15152
2202-12070

SIEVE ANALYSIS DATA

	INCHES	MM	US MESH	SAMPLE WTS	ZWTS	CUMZ WTS
	0.0166	0.4204	40	4.01	21.2	21.2
	0.0139	0.3536	45	2.31	12.2	33.4
	0.0098	0.2500	60	5.28	27.9	61.3
FGR	0.0083	0.2102	70	2.67	14.1	75.4
	0.0070	0.1768	80	1.63	8.6	84.0
	0.0059	0.1487	100	1.22	6.4	90.4
	0.0049	0.1250	120	0.41	2.2	92.6
VFGR	0.0041	0.1051	140	0.43	2.3	94.9
	0.0035	0.0884	170	0.30	1.6	96.5
	0.0025	0.0625	230	0.48	2.5	99.0
SILT	0.0021	0.0526	270	0.09	0.5	99.5
	0.0017	0.0442	325	0.07	0.4	99.9
				0.01	0.1	100.0
			TOTALS	18.91	100.0	100.0

MEDIAN GRAIN SIZE = 0.0113" (0.2868 MM)

TRASK'S SORTING COEFFICIENT = 1.3626

INSUFFICIENT DATA TO CALCULATE ADDITIONAL STATISTICS

01

COMPANY MAGIA GULF-TECHNIDRILL

A-86

SOURCE

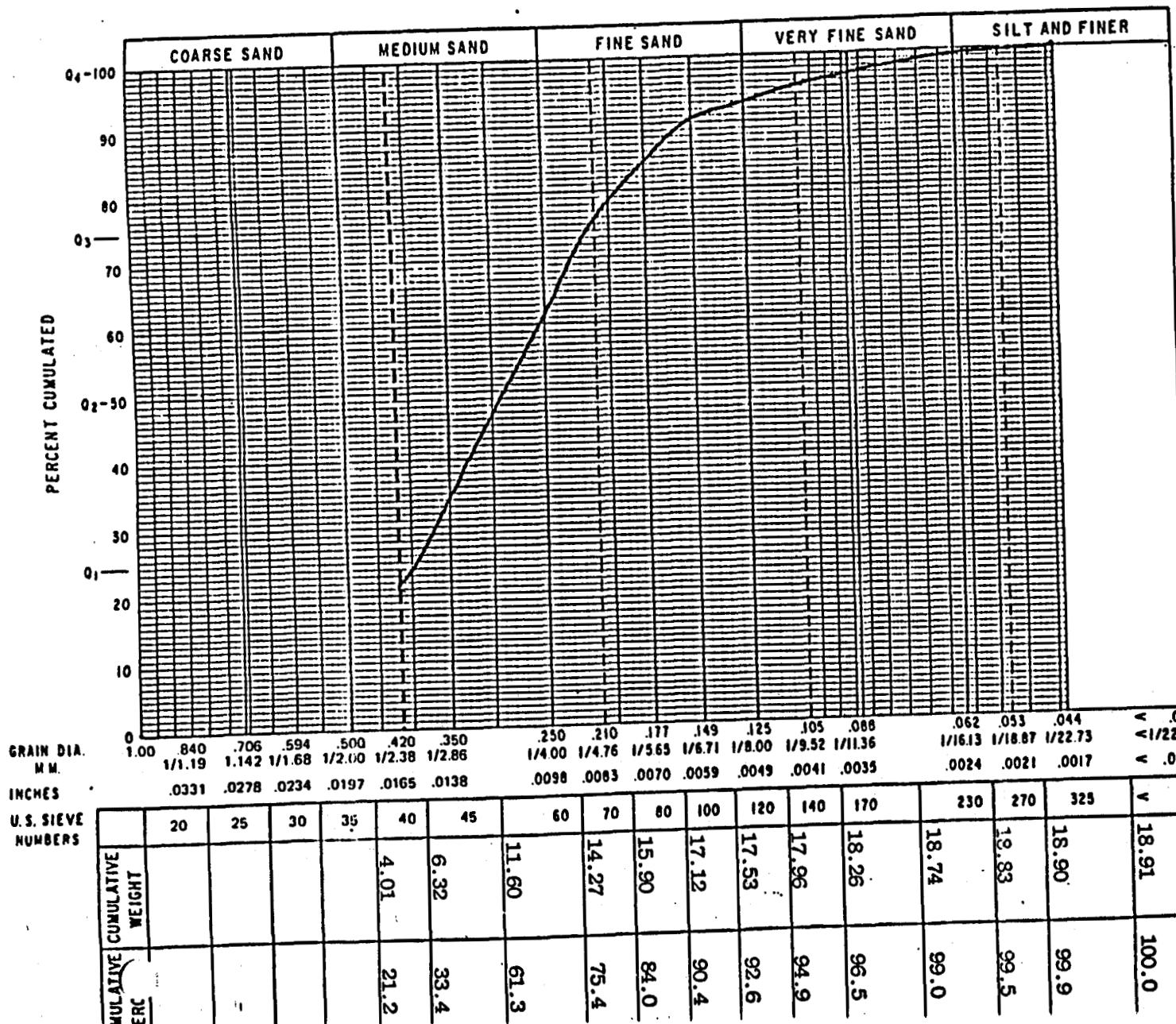
WELL D.O.E.-ANODD FEE NO. 1 FILE NO. 2202-12070
WILDCAT DATE 1-9-81

FIELD _____ COUNTY **CAMERON PARISH** STATE **LA**

DESCRIPTION _____
COUNTRY _____

卷之三

	LOSS	g	%
44 2.73 017 325	ORIGINAL SPL. WT.	18.91 g	10.0 J



MAGMA GULF - TECHNIDRILL
D.O.E. - AMOCO FEE NO. 1
WILDCAT
15191
2202-12070

SIEVE ANALYSIS DATA

	INCHES	MM	US MESH	SAMPLE WTS	ZWTS	CUM% WTS
	0.0166	0.4204	40	1.71	7.1	7.1
	0.0139	0.3536	45	4.25	17.7	24.8
	0.0098	0.2500	60	9.32	38.8	63.6
FGR	0.0083	0.2102	70	3.76	15.6	79.2
	0.0070	0.1768	80	1.74	7.2	86.4
	0.0059	0.1487	100	1.09	4.5	90.9
	0.0049	0.1250	120	0.33	1.4	92.3
VFGR	0.0041	0.1051	140	0.46	1.9	94.2
	0.0035	0.0884	170	0.36	1.5	95.7
	0.0025	0.0625	230	0.51	2.1	97.8
SILT	0.0021	0.0526	270	0.39	1.6	99.4
	0.0017	0.0442	325	0.09	0.4	99.8
				0.03	0.2	100.0
			TOTALS	24.04	100.0	100.0

MEDIAN GRAIN SIZE = 0.0112" (0.2857 MM)

MEAN GRAIN SIZE CALCULATED FROM 68.0% OF THE DISTRIBUTION = 0.0108" (0.2737 MM)

STANDARD DEVIATION CALCULATED FROM 68% OF THE DISTRIBUTION = 0.4996 PHI

COEFFICIENT OF SKEWNESS CALCULATED FROM 68% OF THE DISTRIBUTION = 0.1847

TRASK'S SORTING COEFFICIENT = 1.2573

INSUFFICIENT DATA TO CALCULATE ADDITIONAL STATISTICS

SIEVE ANALYSIS REPORT

COMPANY MAGIA GULF-TECHNIDRILL DEPTH 15191

四

SOURCE

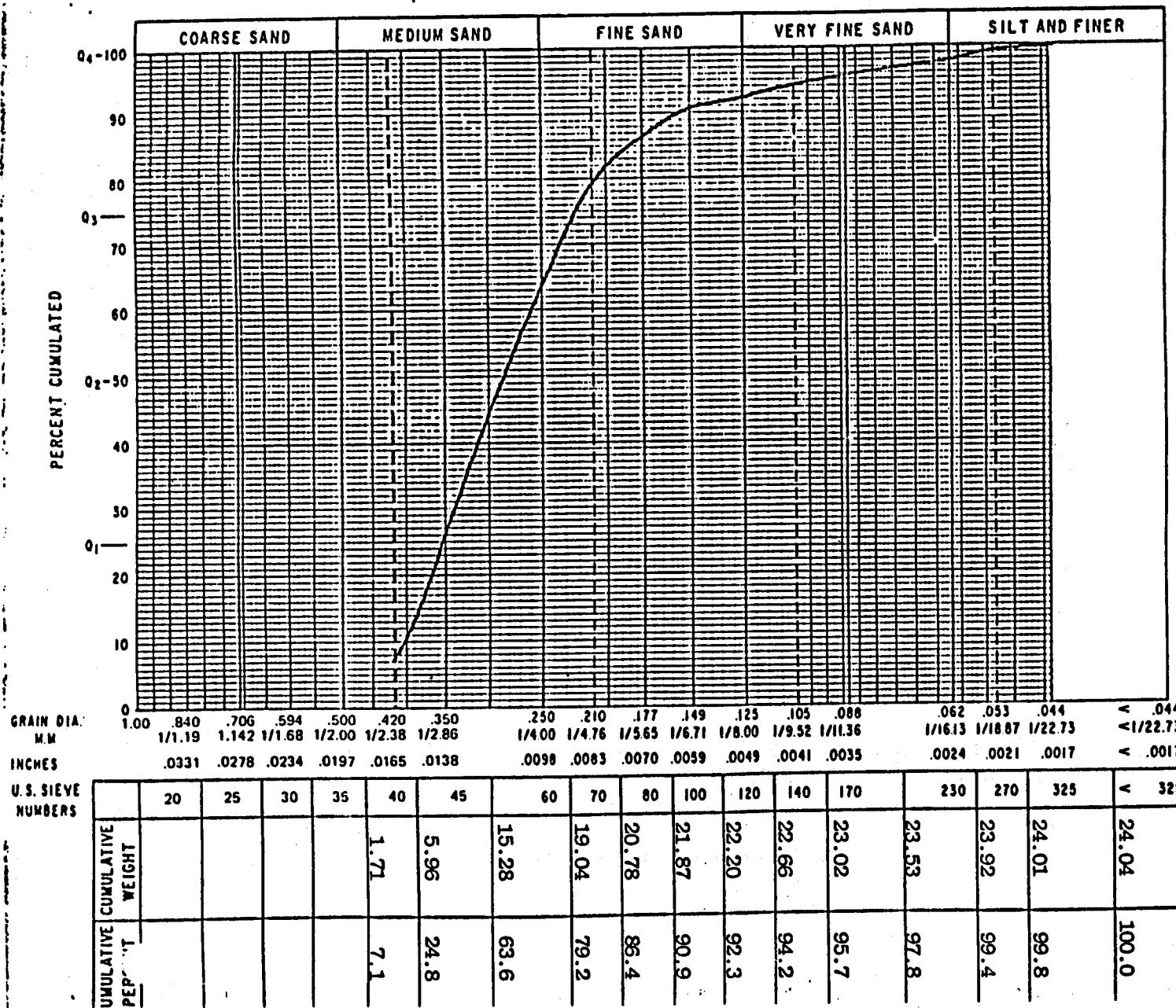
WELL D.O.E.-ANCOO FEE NO. 1 FILE NO. 2202-12070
FIELD WILDCAT DATE 6-22-81

DATE 6-22-81

Losses

COUNTY CAMERON PARISH STATE LA

ORIGINAL SPL. WT.	24.04 g	100.0
----------------------	---------	-------



MAGMA GULF - TECHNIDRILL
D.O.E. - AMOCO FEE NO. 1
WILDCAT
15403
2202-12070

SIEVE ANALYSIS DATA

	INCHES	MM	US MESH	SAMPLE WTS	CUM% WTS
	0.0166	0.4204	40	3.48	15.6
	0.0139	0.3536	45	4.96	22.2
	0.0098	0.2500	60	9.50	42.5
FGR	0.0083	0.2102	70	2.27	10.2
	0.0070	0.1768	80	0.91	4.1
	0.0059	0.1487	100	0.57	2.5
	0.0049	0.1250	120	0.17	0.8
VFGR	0.0041	0.1051	140	0.14	0.6
	0.0035	0.0884	170	0.10	0.4
	0.0025	0.0625	230	0.15	0.7
SILT	0.0021	0.0526	270	0.02	0.1
	0.0017	0.0442	325	0.03	0.1
				0.03	0.2
					100.0
			TOTALS	22.33	100.0
					100.0

MEDIAN GRAIN SIZE = 0.0127 " (0.3220 MM)

MEAN GRAIN SIZE CALCULATED FROM 68.0% OF THE DISTRIBUTION = 0.0125 " (0.3174 MM)

STANDARD DEVIATION CALCULATED FROM 68% OF THE DISTRIBUTION = 0.4057 PHI

COEFFICIENT OF SKEWNESS CALCULATED FROM 68% OF THE DISTRIBUTION = 0.0765

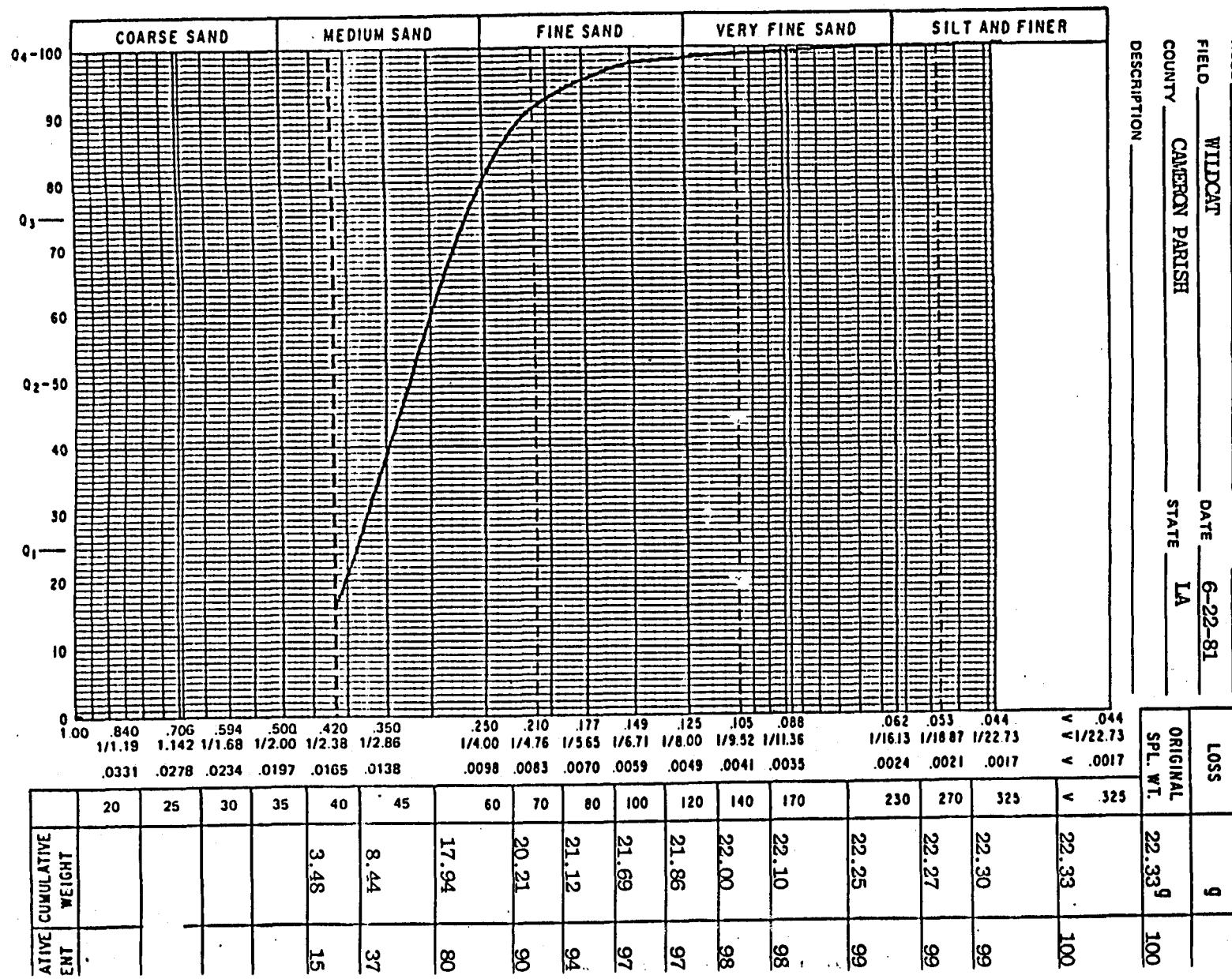
TRASK'S SORTING COEFFICIENT = 1.2125

INSUFFICIENT DATA TO CALCULATE ADDITIONAL STATISTICS

CORE LABORATORIES, INC.
SIEVE ANALYSIS REPORT

A-90

COMPANY MAGMA GULF-TECCENTDRILL DEPTH 15403 SOURCE
D.O.E.-AMDOO FEE NO. 1 FILE NO. 2202-12070



MAGMA GULF - TECHNIDRILL
D.O.E.- AMOCO FEE NO. 1
WILDCAT
15604
2202-12070

SIEVE ANALYSIS DATA

	INCHES	MM	US MESH	SAMPLE WTS	%WTS	CUM% WTS
	0.0139	0.3536	45	0.51	2.3	2.3
	0.0098	0.2500	60	3.59	16.2	18.5
FGR	0.0083	0.2102	70	2.90	13.0	31.5
	0.0070	0.1768	80	2.66	12.0	43.5
	0.0059	0.1487	100	3.36	15.1	58.6
	0.0049	0.1250	120	2.23	10.0	68.6
VFGR	0.0041	0.1051	140	1.97	8.9	77.5
	0.0035	0.0884	170	1.23	5.5	83.0
	0.0025	0.0625	230	1.63	7.3	90.3
SILT	0.0021	0.0526	270	0.31	1.4	91.7
	0.0017	0.0442	325	0.47	2.1	93.8
				1.36	6.2	100.0
			TOTALS	22.22	100.0	100.0

MEDIAN GRAIN SIZE = 0.0065 " (0.1641 MM)

MEAN GRAIN SIZE CALCULATED FROM 68.0% OF THE DISTRIBUTION = 0.0060 " (0.1531 MM)

STANDARD DEVIATION CALCULATED FROM 68% OF THE DISTRIBUTION = 0.8050 PHI

COEFFICIENT OF SKEWNESS CALCULATED FROM 68% OF THE DISTRIBUTION = 0.1861

TRASK'S SORTING COEFFICIENT = 1.4382

INSUFFICIENT DATA TO CALCULATE ADDITIONAL STATISTICS

COMPANY MAGIA GULF-TECHNIDRILL A-92

DEPTH 15604

SOURCE

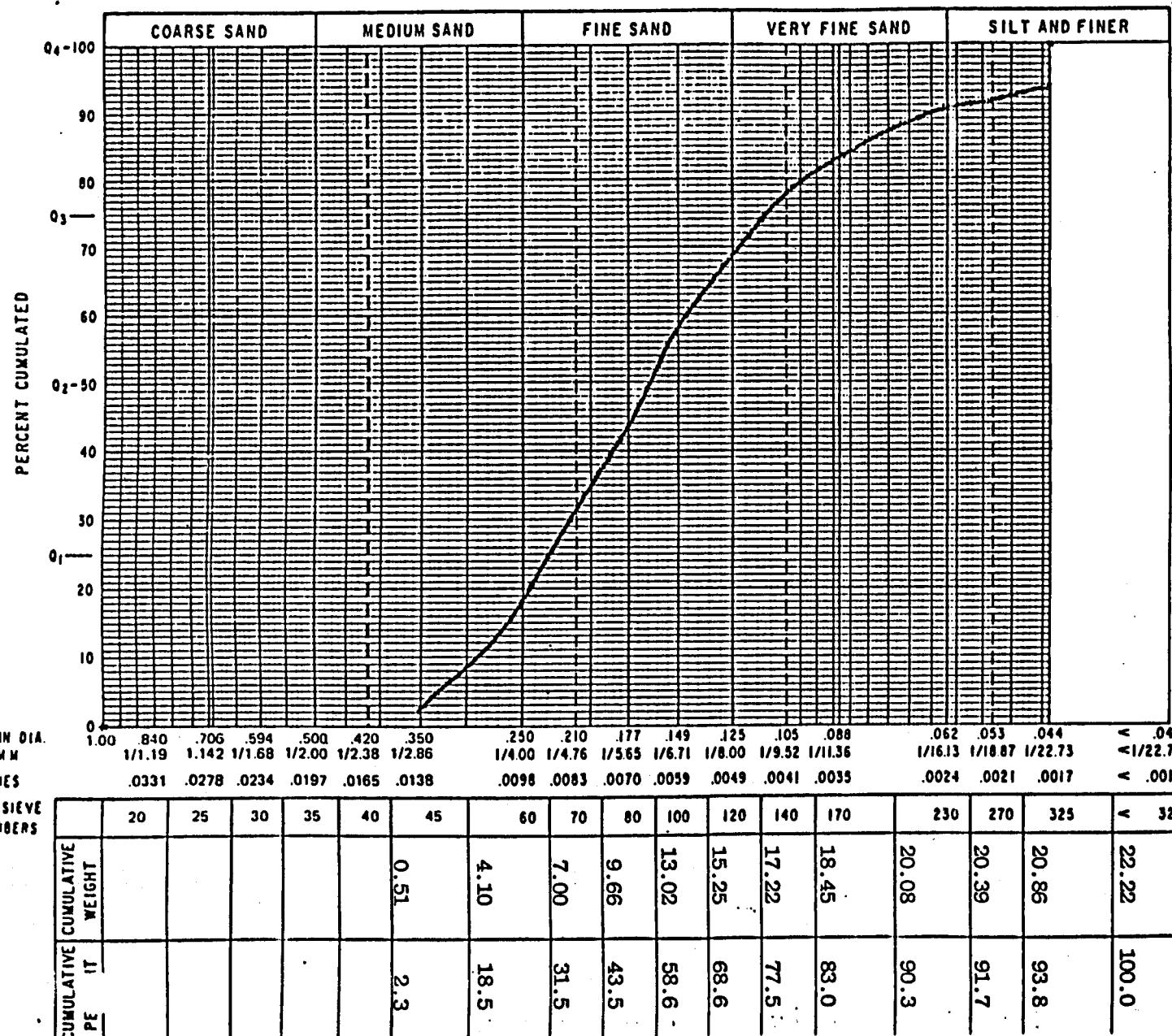
WELL D.O.E.-ANOCO FEE NO. 1 FILE NO. 2202-12070

FIELD WILDCAT

COUNTY CAMERON PARISH

DESCRIPTION

	LOSS	g	%
	ORIGINAL SPL. WT.	22.22 g	100.0



CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS

MAGMA GULF-TECHNADRIL
D.O.E.-AMOCO FEE NO. 1 d
WILDCAT
CAMERON PARISH, LOUISIANA

DATE 7-JAN-81

FILE NO.: 2202-12070
LABORATORY : HOUSTON, TEXAS
ANALYSIS: MASON

DISTRIBUTION OF FINAL REPORT

3OC MAGMA GULF-TECHNADRIL
1111 FANNIN STREET, SUITE 1010
HOUSTON, TEXAS 77002

CORE LABORATORIES

SIDE WALL CORE ANALYSIS

C	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
.3	6490.0	680.	29.1	0.0	81.3	WTR	0.0	6.7	0	36	SD VFG SSLTY NO FLU
.0	6990.0										EMPTY BOTTLE
.4	7020.0	500.	30.7	0.0	81.5	WTR	0.0	5.7	0	40	SD VFG CLN NO FLU
.0	7050.0	480.	29.0	0.0	81.6	WTR	0.0	5.3	0	39	SD VFG SSLTY NO FLU
.3	7070.0	410.	28.4	0.0	81.5	WTR	0.0	5.3	0	40	SD VFG SLTY NO FLU
.0	7090.0	980.	30.8	0.0	84.4	WTR	0.0	4.8	0	35	SD FG SSLTY NO FLU
.0	7120.0	920.	30.7	0.0	82.1	WTR	0.0	5.5	0	36	SD FG SLTY NO FLU
.4	9400.0								0		SHALE
.0	9420.0								0		SHALE
.2	9440.0								0		SHALE SCALC
.0	9480.0										EMPTY BOTTLE
.0	9500.0										EMPTY BOTTLE
.0	9510.0								0		SHALE
.2	9580.0								0		SHALE VCALC
.0	9600.0								0		SHALE VCALC

A-95

CORE LABORATORIES

SIDE WALL CORE ANALYSIS

C	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
.1	9630.0						0				SHALE LMY
.0	9700.0						0				SHALE LMY
.1	9710.0						0				SHALE LMY
.4	9720.0						0				SHALE
.0	10030.0										EMPTY BOTTLE
.3	10050.0						0				SHALE
.0	10070.0										EMPTY BOTTLE
.2	10200.0						0				SHALE LMY
.0	10210.0										EMPTY BOTTLE
.3	10220.0						0				SHALE
.0	12875.0										EMPTY BOTTLE
.0	12895.0										EMPTY BOTTLE
.0	13055.0										EMPTY BOTTLE
.0	13065.0										EMPTY BOTTLE
.8	13085.0						0				SHALE
.8	13120.0	480.	24.6	0.0	76.9	WTR	0.0	5.7	0	35	SD VFG SSLTY SCALC NO FLU
.0	13835.0	250.	23.3	0.0	85.1	WTR	0.0	3.5	0	40	SD VFG VSSHY SSLTY NO FLU

CORE LABORATORIES

SIDE WALL CORE ANALYSIS

C.	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
	13856.0	365.	24.1	0.0	75.4	WTR	0.0	5.9	0	37	SD VFG SLTY CALC NO FLU
	13875.0	7.5	19.5	0.0	84.4	(6)	0.0	3.0	0	67	SILT VSHY LAM SCALC NO FLU
	13926.0	2.4	17.6	0.0	81.1	(6)	0.0	3.3	0	69	SILT VSHY SCALC NO FLU
.4	13945.0	65.	22.7	0.0	75.9	WTR	0.0	5.5	0	52	SILT VCALC NO FLU
.4	14035.0	58.	22.1	0.0	82.8	WTR	0.0	3.8	0	52	SILT LMY NO FLU
.4	14055.0	35.	21.2	0.0	81.8	WTR	0.0	3.0	0	57	SILT SSHY LAM SCALC NO FLU
.5	14305.0	22.	20.4	0.0	86.5	WTR	0.0	2.8	0	61	SILT SSHY HARD SCALC NO FLU
.0	14327.0										EMPTY BOTTLE
.9	14345.0								0		SHALE LMY NO FLU
.9	14445.0								4		SHALE LMY NO FLU
.6	14475.0								0		SHALE
.6	14595.0	0.9	16.5	0.0	76.4	(6)	0.0	3.9	0	69	SILT VSHY LAM LMY NO FLU
.0	14607.0										EMPTY BOTTLE
.5	14632.0	1.4	17.4	0.0	80.0	(6)	0.0	3.5	0	70	SILT VSHY LMY NO FLU
.6	14645.0								0		SHALE
.4	14846.0	14.	20.0	0.0	81.5	WTR	0.0	3.7	0	63	SILT SHY LMY NO FLU
.2	14856.0					(3)			0		SILT SHY CALC NO FLU

CORE LABORATORIES

SIDE WALL CORE ANALYSIS

C	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
.4	14868.0								0		SHALE SSLTY NO FLU
.6	14923.0	4.2	17.1	0.0	86.2	(6)	0.0	2.4	0	67	SILT VSHY VCALC NO FLU
.0	14935.0										EMPTY BOTTLE
.4	14952.0	8.8	19.5	0.0	78.9	(6)	0.0	4.1	0	67	SILT SHY-VSHY LAM LMY NO FLU
.0	14975.0										EMPTY BOTTLE
.0	14980.0										EMPTY BOTTLE
.2	14990.0					(3)			0		SILT SHY LMY NO FLU
.0	15000.0										EMPTY BOTTLE
.0	15010.0										EMPTY BOTTLE
.0	15020.0										EMPTY BOTTLE
.0	15025.0										EMPTY BOTTLE
.0	15030.0										EMPTY BOTTLE
.0	15040.0										EMPTY BOTTLE
.6	15045.0	11.	20.0	0.0	78.1	WTR	0.0	4.4	0	65	SD VFG SHY-VSHY LAM CALC NO FLU
.0	15050.0								0		SHALE
.0	15060.0										EMPTY BOTTLE
.4	15070.0	26.	20.5	0.0	83.3	WTR	0.0	3.4	0	59	SILT SSHY SCALC NO FLU
.6	15075.0	62.	22.0	0.0	79.5	WTR	0.0	4.5	0	52	SILT SCALC NO FLU

7020, 7050, 7090, DOUBLE SHOTS

(3) INSUFFICIENT SAMPLE
 (6) LOW PERMEABILITY

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

CORE LABORATORIES

SIDE WALL CORE ANALYSIS

C	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
---	---------------	---------------	----------	--------------	--------------	--------------	--------------	--------------	------------	--------------	-------------

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.

A-99

MAGMA GULF-TECHNADRIL
1111 FANNIN ST., SUITE 1010
HOUSTON, TX 77002
ATTN: BOB ROGERS (6)

Mineral Content Determinations

for

MAGMA GULF

Magma Gulf-Amoco Fee No. 1 Well
Wildcat
Cameron Parish, Louisiana

November 20, 1980

Magma Gulf
430 Highway 6 South, Suite 208
Houston, Texas 77079

Attention: Mr. R. W. Rodgers

Subject: Mineral Content Determinations
Magma Gulf-Amoco Fee No. 1 Well
Wildcat
Cameron Parish, Louisiana
File Number: SCAL-308-80420

Gentlemen:

On or about September 26, 1980, core material from the subject well was submitted to the Special Core Analysis Department of Core Laboratories, Inc., at Dallas, Texas, with a request for Mineral Content Determinations by X-Ray Diffraction. Portions of the samples, which represented depth intervals of 7020, 7050, and 7090 feet, were analyzed in bulk utilizing an X-ray diffraction technique with mono-chromatic CuK α radiation. The results are presented in tabular form on Page 1. It should be noted that the sample from a depth of 7020 feet contained a large quantity of barite, possibly as a result of contamination by drilling mud. The tests also indicated the presence of some clays; however, only through clay analysis can the amounts be quantified. In the absence of further analysis, standard procedure is mathematical normalization of the remaining minerals present to 100 percent total.

It has been a pleasure performing this study on behalf of Magma Gulf. We regret that this report was delayed pending notification of whether further analyses would be required. Should there be any questions concerning the test results, or if we could be of any further assistance, please do not hesitate to contact us.

Very truly yours,

Core Laboratories, Inc.

John A. Koerner

John A. Koerner, Laboratory Supervisor
Special Core Analysis

JAK:CAD:kw
7 cc. - Addressee

CORE LABORATORIES, INC.
Petroleum Reservoir Engineering
DALLAS, TEXAS 75247

Page 1 of 1
File SCAL-308-80420

Mineral Content Determination
(by X-ray Diffraction)

Sample Number	26	23	21
Sample Depth, Feet:	<u>7020</u>	<u>7050</u>	<u>7090</u>
Particle Size of Sample Fraction:	Whole Rock	Whole Rock	Whole Rock

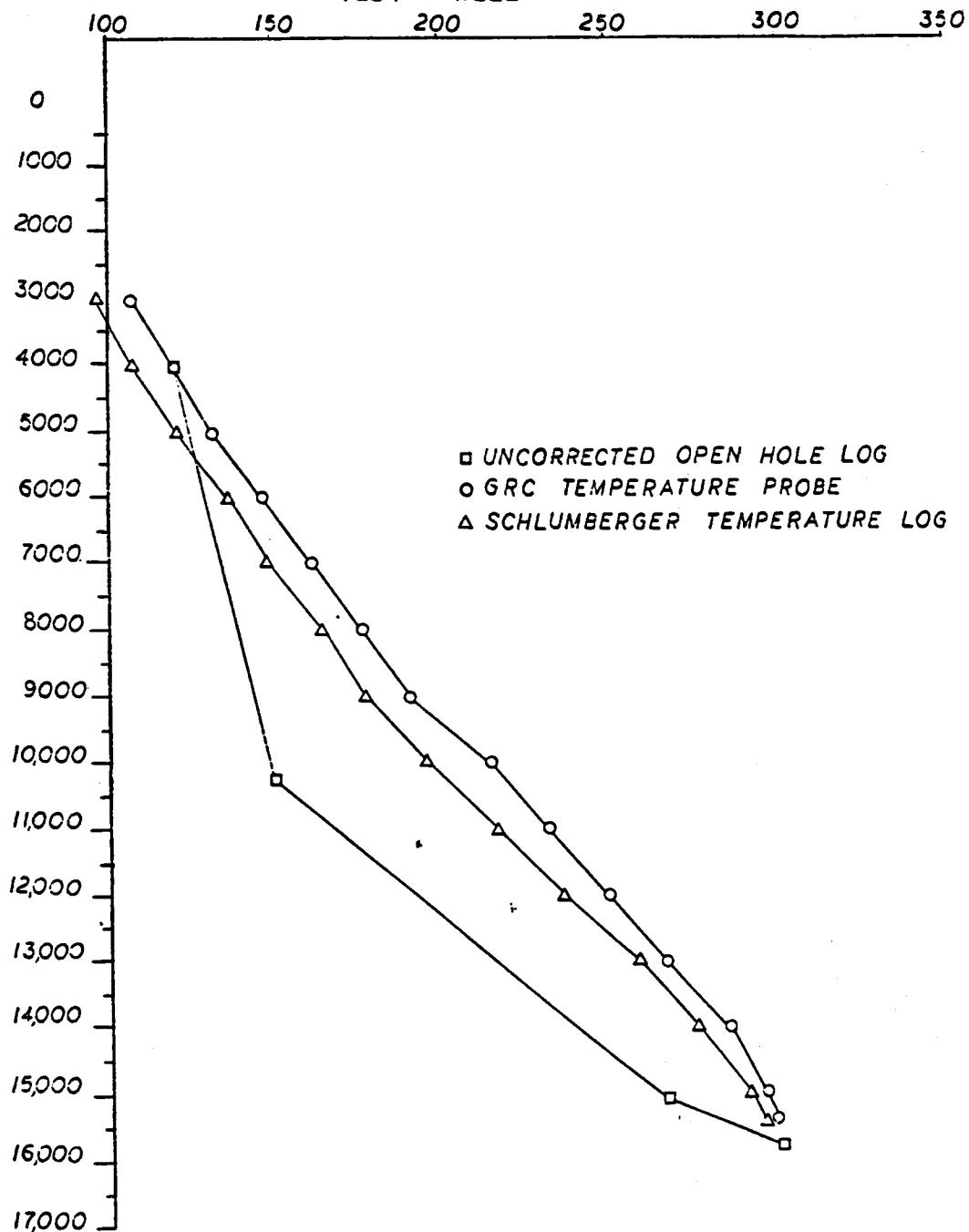
<u>Mineral</u>	<u>Percent of Sample Analyzed</u>		
Quartz	54	89	97
Feldspars	07	11	03
Calcite	07	TR	
Barite (Mud contaminant)	32		

* Inseparable

A-102

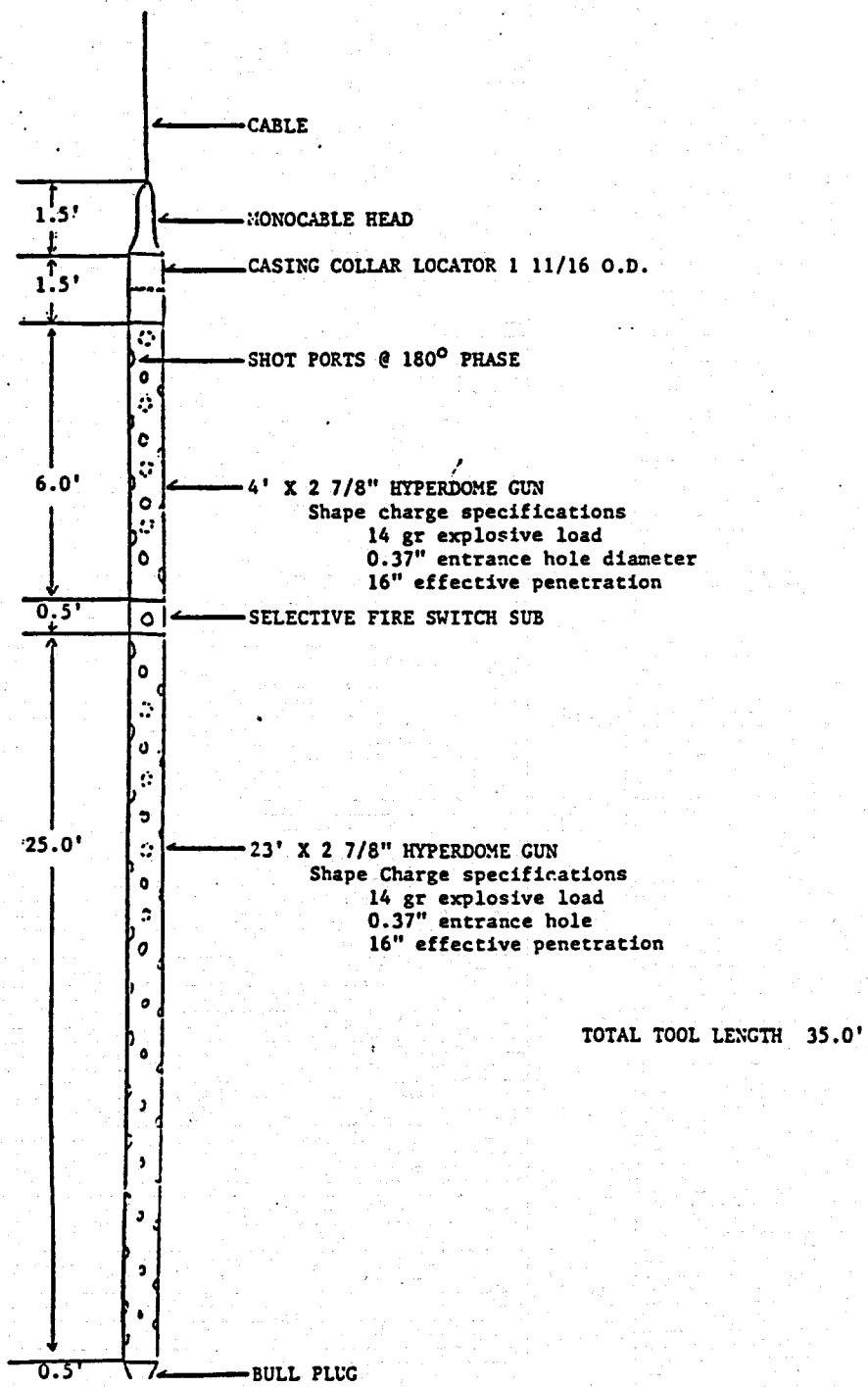
A.13 Temperature Surveys

TEMPERATURE SURVEY
MAGMA GULF-TECHNADRIL/DOE
AMOCO FEE NO. 1
TEST WELL



A.14 Perforating Procedure

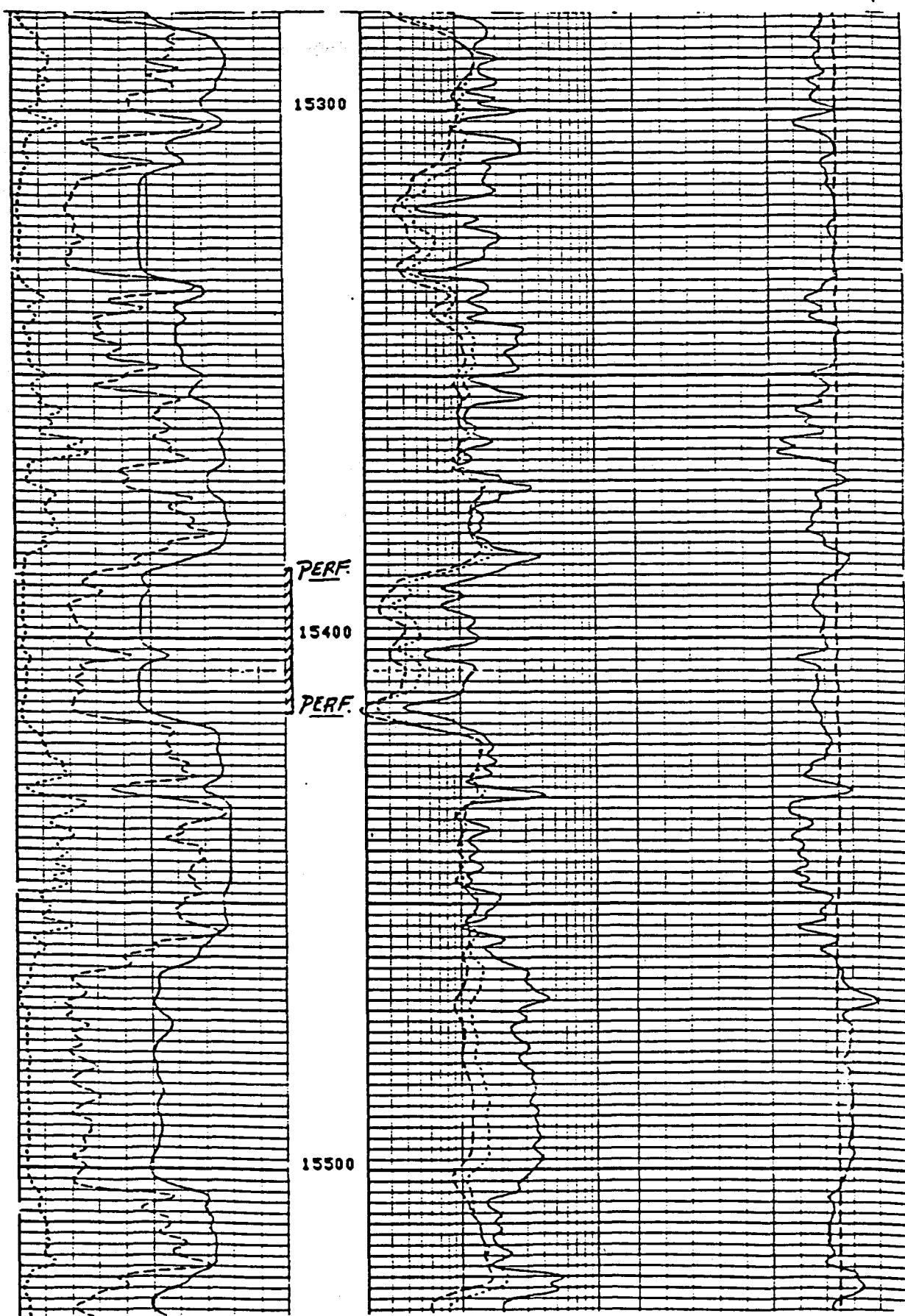
1. Check pressure on tubing and casing. If no pressure or pressure bleeds off remove blanking cap.
2. Remove FMC back pressure installed in 5 $\frac{1}{2}$ " tubing hanger. This back pressure valve is constructed in two parts: one part is a 5" seating assembly which is landed in the 5 $\frac{1}{2}$ " tubing hanger the second part to a 2" back pressure valve which seats in the 5" seating assembly. FMC will be able to determine whether there is pressure below the back pressure valve or not by running a manual back pressure setting tool. If there is no pressure remove the back pressure valve. If there is pressure, install and test Schlumberger's 10,000 psi lubricator and use a wireline retrieving tool and bumber jars to retrieve the 2" back pressure valve. Once the 2" back pressure valve is removed, bleed off the trapped pressure. Remove the lubricator and retrieve the 5" seating assembly with FMC's equipment.
3. Install and test Schlumberger 5 $\frac{1}{2}$ " 10,000 psi lubricator.
4. Run a 4" gauge ring and junk basket to 15,660' PBD.
5. Run a temperature survey 15,660'. Instruct logger to construct temperature profile graph on 100' spacing.
6. Run a Gamma Ray - Collar Locator Log to 15660' and correlate with the Cement BondLog Gamma Ray ran on 2/16/81. Special attention to be given to define position of: 1) The BOT PBR at approximately 15034' to 15044' 2) The BOT PBR and seal assembly at approximately 14520' to 14534' (Note: The seal assembly bottom was landed approximately 12' off of the bottom of the BOT PBR - special effort to confirm this position should be made) and 3) The Baker model 'L' sliding sleeve at approximately 14476' to 14480'. See attached tubing setting detail for aid in counting collars.
7. Run Schlumberger's Electronic Thickness Log from 15660' to 0'. As instructed in step 5, confirm position of the previous listed equipment. The position of all three of these items is critical to the life and safety of this well.
8. Retest 10,000 psi lubricator.
9. Go in hole with a 35' Schlumberger 2 7/8" Hyperdome (3 1/8" charges) with 4 shots per foot. Pressure up on casing side to 1,000 psi. Pressure up on tubing side to 3,000 psi. (This should allow for a differential of 1,000 psi into the wellbore). Expect for shut in wellhead pressure to be approximately 4,000 psi after perforating. Perforate from 15387' to 15414' EL. Note: Drawing of gun.
10. Rig down Schlumberger.
11. Flow well and monitor returns. Expect to recover 300+ BBls of 10.0 ppg brine water prior to production of formation water (expected to weigh 8.9 ppg).
12. Flow test well as per Testing Departments recommendations.



AMOCO FEE NO. 1

SWEET LAKE

A-108



A.15 Daily Drilling Progress Report

AMOCO FEE TEST WELL

8/19/80 - First Report. Rigged up and drilled rat hole and mouse hole. Started to drive 30" conductor casing. Resource Rig #12 went on day rate.

8/20/81 - Finished driving 30" to 126' below GL. Rigged down diesel hammer. Nipped up 30" bell nipple and unloaded 20" casing. Installed shale shaker and dump trough.

8/21/80 - Nipped up flow lines on 30" drive pipe. Rigged up floor and equipment to spud well.

8/22/80 - Spudded and drilled to 515'. Surveyed at 400' with 1° deviation. Drilled to 550' and circulated due to excess solids. Had pea size gravel from 450' to 515'.

8/23/80 - Drilled to 835'. Circulated hole clean due to solids. Strapped out of hole. Ran in hole to circulate and condition mud. Ran survey at 835'. Surveyed at 835' with 1° deviation.

8/24/80 - Pulled out of hole to log 4 arm 60" calipers. Logged from 845' to 154'. Ran in hole to circulate and conditioned mud.

Pulled out of hole to run 20" casing. Ran 13 joints of 20" 133# K-55 B.T.C. and 9 joints of 20" 169# K-55 B.T.C. hung in center of rotary. Ran in hole with cementing stab in equipment. Circulated and conditioned mud for 5 hours. Mixed and pumped 750 sacks of class "H" plus 35% silica flour plus 3% CaCl_2 , 13.4 lb./gal. cement for tail slurry, and 1650 sacks lightweight plus 35% silica flour plus 3% salt, 13.4 lb./gal. for lead slurry.

8/25/80 - Continued cementing 20" casing. Had 265 sacks returned on surface. Waited on cement 5 hours and cut 30" and 20" pipe.

8/26/80 - Welded 20" 3000# FMC OCT casing and tested to 1250 psi for 30 minutes. Nipped up 20" 3000# spacer spool, 20" 3000# x 20" 2000# double studded adapter, 2-4" valves, 20" 2000# spacer spool with 2-4" valve outlets and 20" 2000# Hydril.

8/27/80 - Nipped up 20" Hydril BOP's. Ran in hole with 470' of 5" D.P. Tested 20" casing and BOP's to 1000 psi for 30 minutes. Picked up 8" Monel D.C. and 2 stabilizers. Ran in hole and drilled out cement and float collar.

8/28/80 - Drilled out cement and drilled to 1500'.

8/29/80 - Surveyed at 1500' with 1/2° deviation. Reamed bridge from 1485' to 1490' and drilled to 3006'. Surveyed at 2000' and 2500' with 3/4° and 0° deviation, respectively.

8/30/80 - Drilled to 4000'. Circulated and conditioned mud to run Gyro survey. Survey at 3500' with 3/4° deviation.

8/31/80 - Chained and measured out of hole with Gyro-survey. Ran 4 arm calipers from 4046' to 826'. Ran in hole to circulate and condition mud to run 13 3/8" casing.

9/1/80 - Rigged up casing crew and ran 13 3/8" casing to 4043'. Circulated mud and tagged bottom at 4050' with 45 joints 13 3/8" 72# L-80 B.T.C., float shoe, float collar and 69 joints 13 3/8" 72# N-80 B.T.C. Circulated and conditioned mud to cement. Pumped 1000 bbl of SAM-5 10 lb./gal. chemical wash. Mixed and pumped 5000 sacks high temperature, low density cement plus 1.7% Halad 22A, 1/4 lb./sack Kwik Seal tailed by 475 sacks class "H" plus 40% silica flour plus 0.75% CFR-2 at 16.3 lb./gal.

9/2/80 - Cemented casing to surface with 887 sacks returned. Nipped down 20" Hydril and hung 13 3/8" casing with 200,000# on OCT Type C-29 slips and cut 13 5/8" casing. Nipped down

Hydril. Tested 13 5/8" 5000# x 20" 3000# OCT C-22 casing-head to 1400 psi for 30 minutes. Nipped up 13 5/8" Type U 10,000 psi BOP's.

9/3/80 - Nipped up BOP's. Tested BOP's. Flange leak repaired on 4" choke manifold. Tested pipe rams to 5000 psi, Hydril to 3000 psi, and valves to 5000 psi.

9/4/80 - Finished testing BOP's and repaired leaks. Rigged up floor and made up bottom-hole assembly. Drilled out cement and shoe and performed leak-off test. Tested to 14.0 lb./gal. equivalent. Drilled to 4174'.

9/5/80 - Drilled to 5308'. Ran surveys at 4558' with 1° deviation, and 5042' with 1/2° deviation.

9/6/80 - Pulled out of hole. Circulated and conditioned mud. Ran in hole and drilled to 6427'. Ran surveys at 5539' with 3/4° deviation and 6000' with 1/2° deviation.

9/7/80 - Drilled to 6929'. Circulated hole clean. Pulled out of bottom-hole assembly and inspected same. Tested 4" choke line and checked manifold to 5,000 psi. Went in hole with new bit and drilled to 7783'.

9/8/80 - Drilled to 7783'. Ran survey at 7515 with 1/2° deviation.

9/9/80 - Drilled to 7963'. Pulled out of hole to change bottom-hole assembly. Ran in hole to casing seat. Repaired Crown-o-Matic and cut 93' of drilling line. Ran survey at 7963' with 1/2° deviation.

9/10/80 - Drilled to 8525'.

9/11/80 - Drilled to 8840'.

9/12/80 - Drilled to 9010'. Ran survey at 9010' with 1° deviation.

9/13/80 - Drilled to 9082'. Pulled out of hole to change bit. Over pulled 30,000 to 40,000# in spots. Tested 13 5/8" BOP's. rams and all valves to 5000 psi. Tested Hydril to 3500 psi. Ran survey at 9082' with 1° deviation.

9/14/80 - Tested Kelly valves to 5000 psi and changed blind rams. Ran in the hole with new bit and drilled to 9335'.

9/15/80 - Drilled to 9536'. Ran directional survey and pulled out of hole.

9/16/80 - Inspected drill collars and drilled to 9698'. Ran survey at 9526' with 1° deviation.

9/17/80 - Drilled to 9904'. Circulated and conditioned mud. Pulled out of hole to change bit.

9/18/80 - Drilled to 10,102'.

9/19/80 - Drilled to 10,221'. Circulated and conditioned mud. Increased mud weight from 12.5 lb./gal. to 13.0 lb./gal.

9/20/80 - Pulled out of hole to log. Ran Dual Induction, Formation Density, Gamma Ray, Neutron, Sonic and Dipmeter Logs and took sidewall cores. Attempted 24 shots and recovered 16 sidewall cores across geopressured transition zone.

9/21/80 - Circulated bottoms up with 40 units of gas. Rigged up to run 9 5/8" casing.

9/22/80 - Ran 8 joints of 9 5/8" P-110 47 lb./ft., 225 joints 9 5/8" N-80 47 lb./ft. casing. Circulated bottoms up. Cemented 9 5/8" casing with Class "H" cement plus 40% Silica Flour plus 0.25% CFR-2 plus 0.1% HR5. Followed with 400 sacks Class "H" plus 40% Silica Flour plus 0.4% Halad 22-A 0.75% CFR-2 plus 0.25% HR 12. Nippled down BOP's and waited on cement.

9/23/80 - Waited on cement 16.5 hours. Attempted to pull pipe. Pipe slipped. Waited on cement additional 6 hours and ran temperature survey.

9/24/80 - Cement top at 6400'. Pulled 9 5/8" casing 54" to 810,000#. Set slips with 735,000#. Nippled up 13 5/8" 5000 x 11" 10,000 OCT C-22 casing head and tested to 3500 psi. Nippled up BOP's. Ran Gyro survey from 11,007' to 3987'. Horizontal displacement equals 51.33' at N 39° 18' W.

9/25/80 - Tested 13 5/8" BOP rams, lines and all valves. Kelly valves tested to 5000 psi. annular BOP to 3500 psi. Tested 9 5/8" casing to 1500 psi. Drilled out hard cement from 10,012' to 10,070'.

9/26/80 - Drilled to 10,240'. Tested casing shoe to 1500 psi. Leak-off test performed with 14.0 lb./gal. mud to equivalent of 16.8 lb./gal. Drilled to 10,241'. Pulled out of hole to change bit. Ran in hole with new bit.

9/27/80 - Drilled to 10,344'. Pulled out of hole to change bit. Ran in hole with new bit and drilled to 10,367'.

9/28/80 - Drilled to 10,599'. Pulled out of hole to change bit.

9/29/80 - Ran in hole with new bit and drilled to 10,757'. Ran survey at 10,589 with 3/4° deviation.

9/30/80 - Drilled to 10,963'. Pulled out of hole to change bit. Ran survey at 10,950' with 1/4° deviation.

10/1/80 - Drilled to 11,155'. Trip gas was 851 units. Background gas approximately 12-14 units.

10/2/80 - Drilled to 11,337 and tested BOP's. Mud weight raised to 11.6 lb./gal. Ran survey at 11,337' with 1/4° deviation.

10/3/80 - Finished testing BOP's, rams, valves and kelly cock to 5000 psi. Tested Hydril to 3500 psi. Inspected bottom-hole assembly. Drilled to 11,495'.

10/4/80 - Drilled to 11,700'.

10/5/80 - Drilled to 11,915' with a drilling break from 11,728' to 11,732'.

10/6/80 - Drilled to 11,987'. Performed directional survey and pulled out of hole. Changed stabilizers and ran in hole. Rabbited drill pipe looking for survey instrument.

10/7/80 - Continued in hole to 10,200' rabbiting DP for survey instrument. Drilled on junk from 11,960' to 11,987'. Drilled to 12,080'.

10/8/80 - Drilled to 12,170'.

10/9/80 - Drilled to 12,279'.

10/10/80 - Drilled to 12,280'. Dropped directional survey. Tested rams, valves and BOP's to 5000 psi. Tested annular BOP to 3500 psi. Drilled to 12,318'. Ran survey at 12,270' with 3/4° deviation.

10/11/80 - Drilled to 12,430'.

10/12/80 - Drilled to 12,460'. Pulled out of hole and changed out stabilizers and bit. Ran survey at 12,457' - misrun.

10/13/80 - Drilled to 12,592'.

10/14/80 - Drilled to 12,604'. Ran directional survey. Tripped out of the hole due to junk and ran in the hole with a Tri-State Concave mill and 2-7" boot and milled from 12,604' to 12,607'. Pulled out of hole and layed down mill. Survey at 12,594' with 2 3/4° deviation.

10/15/80 - Drilled to 12,750'.

10/16/80 - Drilled to 12,872'. Dropped survey and pulled out of hole.

10/17/80 - Reamed from 12,800' to 12,872'. Drilled from 12,872' to 12,930'. Drilling break at 12,808'-12,894'. Slight movement. Circulated and built up mud weight to 15.3 lb./gal. Maximum gas at 1080 units. Background gas at 280 units. Continued to build mud weight to 15.5 lb./gal. Background gas dropped to 19 units. Ran survey at 12,872' with 3 1/4° deviation.

10/18/80 - Drilled to 13,126'. Dropped survey and slugged pipe. Pulled 10 strands of pipe out of hole. Hole was not taking mud. Circulated bottoms up with maximum gas at 440 units and excessive shale in cuttings. Mud weight at 15.6 lb./gal. mud weight cut to 14.2 lb./gal.

10/19/80 - Circulated out gas and pulled out of the hole. Tested BOP's rams and valves to 5000 psi, and Hydril to 3500 psi. Ran in hole and washed from 13,050' to 13,126', and drilled to 13,140'. Circulated to clear bottoms up with maximum gas at 1400 units, and 12,900 C12. Survey deviation of 3 1/4°.

10/20/80 - Drilled to 13,273'. Lost circulation with 15.8 lb./gal. mud. Reduced circulation pressure to attempt to regain circulation. Annulus stayed full. Attempted to circulate at 10,230'. Circulated for 10 minutes, but lost returns. Waited for hole to heal. Cut down mud weight to 15.6 lb./gal.

10/21/80 - Waited on hole to heal. Broke circulation slowly and circulated bottoms up. Tripped in the hole with 18 stands and circulated bottoms up. Tripped in with 10 stands and circulated bottoms up. Ran in the hole with 1 stand and started to take weight. Reamed to 13,273'. Drilled to 13,335'.

10/22/80 - Drilled to 13,510'.

10/23/80 - Drilled to 13,554'. Made a 20 stand short trip to 11,700' and well started to swab in with 15.6 lb./gal. mud. Drilled to 13,556'. Circulated 15.8 lb./gal. mud. Well started flooding. Shut well in with 800 psi on casing and 50 psi on drill pipe and circulated through choke. Opened rams and attempted to circulate. Pipe was stuck. Rigged up Schlumberger to run temperature survey. Ran temperature survey from 0-13,520'. Bit at 13,520'.

10/24/80 - Ran temperature survey (HRT) and CBL-VDL-GR. Temperature survey was run from the surface to 13,550' and the CBL-VDL-GR from 13,527' to 10,000'. Second HRT run from 9000' to 13,530'. Pumped into DP with 20 SPM and 650# and 28 SPM at 1050#. The formation broke down at 1250 psi.

10/25/80 - Ran 1 13/16" junk shot to 13,531. Fired junk shot to remove jets from bit. Cemented drilling string with 530 sacks of Class "H" plus 0.75% CFR-2 + 0.7% HR-12 slurry with a density of 16.4 lb./gal. Waited on cement to set. Annulus started to flow 30 minutes after placing cement. After 12 hours pressure increased to 400 psi on DP and 210 psi on annulus. Bled pressure on drill pipe from 400 psi to 0. After 6 hours annulus pressure increased to 300 psi.

10/26/80 - Ran HRT from 12,924' to 8000' and CBL-VDL-GR from 13,500' to 8000'. Hung 5" DP on rams and changed Cameron Type "D" annulus BOP rubber. Ran Gyro directional survey.

RECAP OF RIG OPERATIONS FROM 10/19/80 to 10/26/80

On 10/19/80 while drilling at 13,273' with 15.8 ppg mud, circulation was lost. The bit was immediately pulled back into the 9 5/8" casing set at 10,230'. After waiting 3 hours circulation was regained inside the casing. The bit was then lowered back to bottom with three intermediate stops to circulate. Large pieces of splintered shale were recovered.

Drilling was resumed after the shale was circulated out and the hole returned to a stable condition. A mud weight of 15.6 ppg was mixed to avoid losing circulation again.

Drilling continued with no further problems to a depth of 13,556' with 15.6 ppg mud. Drilling was temporarily halted here to make a short trip and pressure test the hole before penetrating a higher pressured sand which would require an increased mud weight. The previous lost circulation problem noted above required that the hole be tested before continuing drilling.

The bit was pulled up to 11,700' when the well started swabbing in. Immediately the bit was run back to bottom. For one half hour 15.8 ppg mud was circulated. Then the well started flowing. The Cameron annular BOP was closed with 800 psi on the casing and 50 psi on the drill pipe. Circulation was continued while working the pipe and checking the returns.

The 13 3/8" Cameron Type D annular BOP started leaking excessively after 68 minutes. This short time is an extremely poor performance for this type of equipment. This leak necessitated closing the pipe rams, which in turn prevented working the pipe. Losing the ability to work the pipe contributed significantly toward sticking the pipe.

Circulation was continued intermittently for 10 hours after the BOP's were closed. Lack of a reserve pit prevented the diversion of water contaminated mud to avoid mixing with the conditioned mud. Circulation had to be stopped regularly to allow for conditioning the mud. Total

actual circulation time was about 4 hours of the total 10 hours. After the above 10 hours all returns were lost, and the pipe was stuck. Apparently, the well bridged off down hole. A cement bond log was run to determine where the hole caved in and stuck the pipe. The log indicated some packing off behind the pipe at 9400' and also just below the 9 5/8" casing shoe.

A temperature log was run to determine if, or where, an underground blow-out had occurred. Conditions indicated that a blowout did take place.

The annulus was then cemented to shut off the underground blowout. A cement bond log and temperature log which were run after the cement had set, indicated the underground flow was stopped. A directional survey was run to record the downhole location of the drill pipe and collars. This was necessary to avoid drilling into them if the well was to be eventually sidetracked.

A free-point indicator found the pipe stuck at 11,000' and free at 10,472'. Two string shots were run and the pipe failed to back off at 10,170'. This varied with the results of the cement bond log which was run earlier. While preparing to run a third shot the well started to flow. The well was then shut in with 100 psi on the casing.

10/27/80 - Ran Gyro directional survey and reran HRT from 10,530' to 8000'. Ran string shot and free point indicator. Pipe stuck at 11,000'. Tried to back-off but had misrun with string shot. Shot failed to fire.

10/28/80 - Reran string shot and annulus started flowing. Shut well in and pressure increased to 100 psi on annulus. Pressured up drill pipe to 1500 psi and injected 1 bbl. at 1 bbl./min. rate. Pressure declined to 520 psi on drill pipe and increased to 210 psi on casing. Set go plug in drill collars at 12,900'. Perforated 5" drill pipe from 12,590' to 12,591' with five 0.33 holes with 2 1/8" Hyperjet gun. Circulated well at 1 BPM at 2500 lbs. Perforated from 12,585' to 12,586' with 2 1/8" Hyperjet and circulated well at 1.5 bbl./min.

10/29/80 - Worked pipe and attempted to establish circulation. Pipe parted at 4712' and well started to flow. Shut in well with 160 psi on casing. Chained 50 stands out of the hole. Screwed into fish at 4712'. Ran Free Point Indicator. Result showed the pipe stuck at 9350' (inside the casing). Reran different tool with same results. Went in hole to perforate 5" drill pipe at 10,100'.

10/30/80 - Perforated drill pipe at 10,120' with 2 misfires. Attempted to circulate. Perforated drill pipe at 9350'. Pulled 320,000 lbs. to 9290' before fish became free and circulation established. Circulated and conditioned mud. Cut mud from density of 15.1 to 14.0 lb./gal. to stop mud loss. Recovered 400 bbls. salt water and contaminated mud from casing.

10/31/80 - Started to pull out of the hole with the fish. Layed down 21 joints and pulled 10 stands. Master drum clutch cracked.

11/1/80 - Repaired master clutch.

11/2/80 - Finished repairing master clutch and finished pulling out of the hole (steel line measure). Ran in the hole with fishing assembly to 9354'. Worked over fish and washed over drill pipe.

11/3/80 - Washed over drill pipe. Pulled out of the hole for a new shoe and ran back in hole to wash over drill pipe.

11/4/80 - Washed over the fish to 9930' and circulated. Screwed into drill pipe at 9354'. Ran Free Point and collar locator with string shot and backed off drill pipe at 10,147'. Circulated at 10,147'. Pulled out of hole with fish and recovered 27 joints of drill pipe and 2 damaged joints with perforations.

11/5/80 - Layed down 8 joints of 7 5/8" wash pipe. Tested BOP's rams and valves to 5000 psi. Tested annular BOP's to 3500 psi. Went in hole with 7 5/8" wash pipe fishing assembly and started to take on weight at 10,102'. Rotated and washed down to 10,215'. Washed from 10,215' to 10,234' very slowly with torque problems.

11/6/80 - Washed over fish to 10,235'. Well started flowing and shut in drill pipe with 100 psi and shut in casing with 260 psi. Increased mud weight from 14.1 lb./gal. to 15.1 lb./gal. Shut in drill pipe pressure of 800 psi and shut in casing pressure of 900 psi. Circulated well for 2 hours through choke and washed over fish from 10,235' to 10,363'. Circulated mud cut to 15.3 lb./gal. with 360 units of gas. Washed over fish from 10,363' to 10,521' and increased mud density to 15.6 lb./gal. Circulated and conditioned mud prior to backing off fish.

11/7/80 - Circulated hole clean. Screwed back into the fish and rigged up to run free point - string shot. Free point analysis showed pipe free at 11,000' in torque and 12,000' in tension. Backed off 5" drill pipe at 11,015'. Pulled fish and wash pipe in to the 9 5/8" casing. Rigged down service company and pulled fish out of hole.

11/8/80 - Went in the hole with open-ended 5" drill pipe to 8000'. Circulated and conditioned mud. Mud cut to 13.4 lb./gal. with 4200 units of gas. Set open hole plug and pulled out of hole. Plug set with 110 sacks of Class "H" plus 40% SF plus 3/4% CFR-2 plus 0.1% HR5 plug on top of fish at 11,015'.

11/9/80 - Ran in hole to 10,550' and reamed from 10,550' to 10,579', drilled cement from 10,579' to 10,602'. Circulated and

conditioned mud. Mud cut to 13.2 lb./gal. with 3600 units of gas. Pulled out of the hole to 10,200' and performed leak off test at casing shoe. Test showed 16.8 lb./gal. equivalent. Ran Schlumberger borehole geometry tool and logged from 10,608' to 10,234'.

11/10/80 - Ran in hole with Dynadrill for random sidetrack. Drilled with Dynadrill from 10,645' to 10,725'. Deviation of 1 3/4° at 10,623'. Began sidetrack hole at this point.

11/11/80 - Pulled Dynadrill out of the hole and changed bottom-hole assembly to bit. Went in hole with 8 1/2" bit to 10,645'. Drilled from 10,645' to 10,725'.

11/12/80 - Drilled to 10,812'. Dropped directional survey and started out of the hole. Tested the formation at 10,800' to 16.8 lb./gal. equivalent and pulled out of the hole.

11/13/80 - Finished pulling out of the hole. Tested BOP and all valves to 5000 psi, tested Hydril to 3,500 psi. Ran in hole and drilled from 10,812' to 10,927'.

11/14/80 - Drilled from 10,927' to 11,090'. Ran survey at 11,090' with 3° deviation.

11/15/80 - Drilled to 11,190'. Survey at 11,053' with 2° deviation.

11/16/80 - Drilled to 11,415'. Survey at 11,197' with 2° deviation.

11/17/80 - Drilled to 11,537'. Survey at 11,390' with 1 1/4° deviation.

11/18/80 - Drilled to 11,750'.

11/19/80 - Drilled to 11,891' and started out of the hole.

11/20/80 - Inspected bottom-hole assembly. Tested BOP's rams and valves to 5000 psi and Hydril to 3500 psi. Ran in the hole to 11,891' Circulated bottoms up and drilled from 11,891' to 11,940'.

11/21/80 - Drilled to 12,130'.

11/22/80 - Drilled to 12,203'. Circulated and raised the mud weight from 15.2 lb./gal. to 15.4 lb./gal. and pulled out of the hole. Ran survey at 12,203' with 1° deviation.

11/23/80 - Changed swivel packing and drilled from 12,203' to 12,333'.

11/24/80 - Drilled to 12,535'.

11/25/80 - Drilled to 12,614' and circulated bottoms up. Started to pull out of hole. Leak off tested the formation to a mud weight equivalent of 16.5 lb./gal. Pulled out of hole to change bit. Ran in the hole and drilled to 12,620'. Survey at 12,614' with deviation of 2 1/2°.

11/26/80 - Drilled to 12,723'. Worked stuck pipe free and circulated bottoms up. Pulled 10 stands slowly, reran to bottom and dropped directional survey tool. Tested formation to 16.8 lb./gal. mud weight equivalent.

11/27/80 - Pulled out of the hole to change bit and position of stabilizers. Ran in hole to 12,164 and reamed from 12,164' to 12,723'. Drilled from 12,723' to 12,762'. Deviation at 12,725' was 2 1/2°.

11/28/80 - Drilled to 12,800'.

11/29/80 - Drilled to 12,894' and circulated mud. Dropped directional survey and pulled out of hole. Tested BOP's rams and all valves to 5000 psi, Hydril to 3500 psi. Changed bit and shock sub and ran in hole. Deviation at 12,894' was 4°.

11/30/80 - Reamed 90' slowly to 12,894'. Drilled to 13,077' and found top of sand at 12,905'.

12/1/80 - Drilled to 13,115'. Circulated hole clean and pulled out of the hole slowly. Changed mud saver valve on kelly. Ran back in hole and drilled to 13,117'. Deviation at 13,115' was 3 3/4°.

12/2/80 - Drilled to 13,310'.

12/3/80 - Drilled to 13,355'. Changed stabilizers in BHA down 30'. Deviation at 13,293' was 3 3/4°.

12/4/80 - Drilled to 13,519'.

12/5/80 - Drilled to 13,550'. Circulated out and performed leak-off test to 16.8 mud weight equivalent. Pulled out of the hole to inspect bottom-hole assembly. Deviation survey misrun.

12/6/80 - Ran in the hole wiping key seats from 10,230' to 13,550'. Reamed 12,500' and 13,490' to 13,550'. Drilled from 13,550' to 13,660'.

12/7/80 - Drilled to 13,680'. Dropped directional survey instrument and pulled out of the hole to change stabilizer positions. Ran in hole and drilled to 13,687'. Lost circulation while drilling. Deviation at 13,660' was 6 3/4°.

12/8/80 - Pulled out of the hole with hole swabbing. Attempted to circulate at 10,200' and 9700' with little returns. Observed well and let it heal. Pulled out of the hole to 7860' but the well was still swabbing.

12/9/80 - Pulled out of the hole to 3300'. Circulation was established, and continued to circulate and condition mud. Ran in the hole, circulated and conditioned mud at 4300', 5700', 7500', 10,200', 11,576', and 12,952'.

12/10/80 - Ran in the hole to 13,687', circulated and conditioned mud. Drilled to 13,774'.

12/11/80 - Drilled to 13,817'. Dropped directional survey. Drilled to 13,845' and circulated bottoms up. Drilling break noted at 13,858' with absolute top of sand at 13,821'. Deviation at 13,812' was 6°. Drilled to 13,904'.

12/12/80 - Drilled to 13,958'. Circulated bottoms up and drilled to 14,023'. Dropped directional survey and retrieved instrument. Drilled to 14,051'. Deviation at 14,023' was 5 1/2°.

12/13/80 - Drilled to 14,146'.

12/14/80 - Pulled out of the hole and tested BOP's to 5000 psi, Hydril to 3000 psi. Tested kelly cocks to 5000 psi. Ran in the hole and reamed from 14,100 to 14,146'. Drilled to 14,171'. Deviation at 14,100' was 5 1/4°.

12/15/80 - Drilled to 14,292'.

12/16/80 - Drilled to 14,380'.

12/17/80 - Drilled to 14,450'.

12/18/80 - Drilled to 14,480', dropped directional survey instruments and pulled out of the hole. Inspected bottom-hole assembly and ran in the hole. Survey misrun at 14,480'.

12/19/80 - Drilled to 14,614'.

12/20/80 - Drilled to 14,651' and pulled out of hole to change bit. Survey misrun at 14,651'.

12/21/80 - Drilled to 14,725'. Reamed 60' of hole from 14,591' to 14,651'.

12/22/80 - Drilled to 14,818'.

12/23/80 - Pulled out of the hole to change bit. Tested BOP's to 5000 psi and Hydril to 3500 psi. Drilled to 14,856'. Circulated bottoms up. Trip gas was 150 units. Camerina II Sand at 14,856'.

12/24/80 - Drilled to 14,956'.

12/25/80 - Drilled to 14,985'. Circulated bottoms up and ran survey. Deviation at 14,958' was 7°. First appearance of Miogypsina above top of Miogyp target sand.

12/26/80 - Drilled to 15,065'. Circulated and conditioned mud to log and pulled out of the hole. Top of Miogyp sand at approximately 15,065'. Deviation at 15,065' was 8 1/2°.

12/27/80 - Logged Schlumberger ISF-Sonic, CNL-FDC-GR, Dipmeter, and took sidewall cores. Rigged up McCullough caliper log for 9 5/8" casing. Attempted 48 sidewall cores from 12,875' to 15,065'. Recovered 42. Recorded data from 26. Six shots lost in hole.

12/28/80 - Ran McCullough caliper log on 9 5/8" casing. Ran in hole to 10,200' and circulated bottoms up. Ran to 15,065' and circulated.

12/29/80 - Rigged up crew. Changed pipe rams to casing rams. Ran 120 joints of 7 5/8", 39# SFJ casing.

12/30/80 - Finished running 5181', 131 joints, of 7 5/8" casing. Ran in hole with liner hanger and set. Cemented liner with 1600 sacks TCH with 3% KCl plus 0.6% HA 22A plus 1% CFR-2 plus 0.27% D-AIR plus 0.8% HR-12 at a slurry density of 17.0 ppg., with 20 bbl. ahead and 5 bbls. behind. Displaced plug down with mud. Had 60% returns at 5 BPM after cement started across formation.

12/31/80 - Finished pumping plug down and pumped with 2000 psi. Reversed out excess cement (10 bbl. of good cement) and pulled out of the hole with liner setting assembly. Changed casing rams to drill pipe rams. Ran in hole to 9628' with RTTS and tested liner top to 18.1 lb./gal. mud weight equivalent with estimated pump in rate of 2 BPM at 1300 psi. Squeezed 150 sacks Class "H" with 20% Silica Flour plus 20% Oklahoma #1, 1% CFR-2 plus 0.27% D-AIR and 0.2% HR-5 at a slurry density of 16.4 lb./gal.

1/1/81 - Waited on cement at top of liner and pulled out of the hole. Ran in hole with 4 3/4 D.C. to 8000'.

1/2/81 - Tagged cement at 9750'. Drilled out cement from 9750' to 9814' and tested liner top to 2000 psi (leaked). Pulled out of the hole and ran in with RTTS tool and set at 9585' and tested liner top at 2000 psi. O.K. Differential test of 1500 psi was also O.K. Pulled out of the hole with RTTS tool.

1/3/81 - Changed drill pipe rams to 3 1/2" size and tested BOP's to 5000 psi and Hydril to 3500 psi. Ran in hole to clean off liner top at 9814'.

1/4/81 - Ran in hole to float collar at 14,980'. Drilled out float collar, 84' cement, float shoe and 5' of formation to 15,070'. Tested shoe to 17.0 lb./gal. mud weight equivalent. Pulled out of hole for bit and drilled from 15,070' to 15,075'.

1/5/81 - Drilled from 15,075' to 15,144' with 533F bit (6 1/2") when pressure dropped on drill pipe. Pulled out of the hole to check pipe for washout and found bit washed out in shanks. Rigged up Schlumberger and started running RFT on wire line.

1/6/81 - Finished RFT run with pressure differential of 1 lb./gal. or 800 psi. Ran in hole with junk mill and tandem boot baskets and reamed 15,065'-15,144'. Conditioned mud and cut weight from 16.2 to 15.7 lb./gal. Pulled out of hole and started in

with core barrel. Core barrel pipe was 4 1/8" x 2 1/8", 60 feet in length. The bit was a 6" x 2 1/8" type MC-20.

1/7/81 - Finished in hole with core barrel and cored from 15,144' to 15,185'. Barrel jammed; pulled out of the hole, recovered core, and laid down core barrel. Cored 41' of section with 36' recovery. Core No. 1.

1/8/81 - Ran in hole with M44SF bit (6 1/2") to 15,144' and reamed 6" rat hole to 15,182'. Pulled out of the hole. Started in hole with core barrel.

1/9/81 - Finished going in the hole and cored from 15,185'-15,204'. Pulled out of hole with core barrel. Core barrel was jammed-evidence of junk on top of the diamond bit. There was no evidence of damage to the bit. Cored 19' of section with 17' recovery. Core No. 2.

1/10/81 - Ran in hole with M44NF bit and reamed rat hole from 15,144' to 15,204'. Then drilled from 15,204' to 15,234'. Pulled out of the hole and tested BOP's to 5000 psi, and tested all valves. Tested Hydril to 3500 psi.

1/11/81 - Ran in hole with J-33 bit and drilled from 15,234' to 15,389'.

1/12/81 - Circulated and pulled out of hole with bit. Ran in the hole with core barrel and cored from 15,389' to 15,403'.

1/13/81 - Cored to 15,408' and pulled out of hole with core barrel. Cored 19' of section and recovered 17' of core. Core No. 3. Ran in hole with J-33 bit, reamed rat hole and drilled from 15,408' to 15,435'.

1/14/81 - Drilled 6-1/2" hole from 15,435' to 15,600', circulated bottoms up and started out of hole.

1/15/81 - Finished pulling out of the hole with bit. Ran in hole with core barrel and cored from 15,600' to 15,634' when core barrel jammed. Cored 34' of section. Started out of hole.

1/16/81 - Finished pulling out of the hole with core barrel and recovered 32' of core. Core No. 4. Ran in hole with J-33 bit and reamed rat hole from 15,600' - 15,634', then drilled from 15,634' to 15,700'.

1/17/81 - Drilled from 15,700' to 15,740' Total Depth. Made short trip and circulated hole. Pulled out of hole with bit, and rigged up Schlumberger. Ran Induction-Sonic-Gamma Ray Log to T.D. Maximum recording thermometer recorded 300°F bottom-hole temperature.

1/18/81 - Ran FDC-CNL-GR-Dipmeter Log and rigged down Schlumberger. Ran in hole with bit to Total Depth, circulated, made short trip, and circulated hole. Deviation at 15,740' was 18 1/2".

1/19/81 - Pulled out of hole with bit. Rigged up pipe lay down unit and laid down bottom-hole assembly. Rigged up casing crew and ran 8 joints 5 1/2" 25.5 lb./ft. FL4S casing as a liner with shoe, float collar, polish bore receptable, liner hanger, and tie-back sleeve.

1/20/81 - Finished running 5-1/2" liner to 15,735' on drill pipe and cemented liner casing with 155 sacks Class "H" cement, with 40% silica flour #1, 2 sacks KCl, 6% Halad 22A, 1% CFR-2, 0.2% D-AIR-1, and 0.8% HR-12. Float Collar at 15,661 BPTD. Pulled out of hole with drill pipe and ran in hole with mill to top of tie-back sleeve at 14,535'.

1/21/81 - Dressed 7 5/8" tie-back sleeve. Pulled out of hole laying down drill pipe with part of drill pipe in hole. Tested casing and cement plug at top of liner with 1000 psi. O.K. Finished laying down drill pipe and drill collars.

1/22/81 - Ran 247 joints 7 5/8" casing with 8.58' stem into liner tie-back sleeve and set casing at 9815'. String had 1 joint FJP casing 43.15' from stem to float collar, and 2 joints FJP

to X-over (1.12') and 243 joints X-line casing. Rigged down pipe lay down unit and casing tools, rigged up cementing equipment, and started mixing cement.

1/23/81 - Finished mixing 215 sacks of Trinity Class "H" cement and 4042 lbs. (20%) silica flour (regular grade), 4042 lbs (20%) coarse silica flour, CFR-2 (1%) 202 lbs., and D-AIR-1 (.27%) 55 lbs. Pumped 20 bbl SAM-5 Spacer on top of top plug. Displaced with 372 bbl and pump pressure increased from 1000 to 2000 psi. Released and re-pressured to 3,500 psi. Schlumberger later found plug at 8995', with cement to 8780' with Temperature Survey. Waited on cement 22 hours.

1/24/81 - Waited on cement for 24 hours and nipped down.

1/25/81 - Attempted to pre-stress 7 5/8" casing in tension, but pipe pulled free at only 30,000 lb. pull. Ran Schlumberger Temperature Survey (results above). Rigged up Power Swivel and nipped up 7" diameter BOP Stack. Picked up 6 blade mill (6 3/4"), bottom-hole assembly, and 3500' of 2 7/8" tubing.

1/26/81 - Finished picking up 2 7/8" tubing and drilled cement from 8905' - 9220'.

1/27/81 - Drilled cement from 9220' to 9613'.

1/28/81 - Drilled cement from 9613' to 9812'.
1/29/81 - Finished drilling cement. Rigged down power swivel and measured out of hole with mill. Pulled out of Polished Bore Receptacle and broke circulation. Nipped up flow line and bell nipple. Circulated hole.
1/30/81 - Cemented 7 5/8" tie-back string with 265 sacks Class "H" cement, 20% Oklahoma #1 and 20% silica flour, 0.75% CFR, 0.27% D-AIR-1, 0.2% HR-5. Slurry yield 1.37 ft. 3Sk and 17 lb./gal. density. Displaced with 416 bbl. Used 20 bbl. SAM-5 Spacer ahead of cement and 10 bbl. behind. Waited on cement 18 hours.
1/31/81 - Waited on cement and ran Schlumberger Temperature Survey. Cement top inside 7 5/8" casing at 9438'.
2/1/81 - Continued Temperature Survey and waited on cement. Pulled 65,000 lbs. above pipe weight. At 1930 hours had slight movement of pipe. Set back in Polished Bore Receptacle with 35,000 lbs. and waited on cement to set.
2/2/81 - Waited on cement additional 8 hours, and again had casing movement with 60,000 lb. pull on 7 5/8" casing. Rigged up and drilled cement from 9528' - 9593'.

2/3/81 - Made trip with 6 1/4" Varel Y-33 bit with Power Swivel and drilled cement from 9593' to 9828'. Circulated open hole at 9890'.

2/4/81 - Pulled out of hole with bit. Again attempted to stress 7 5/8" casing and it pulled free at only 40,000 lb. pull above the weight of the string. Circulated 7 5/8" casing.

2/5/81 - Rigged up Halliburton and cemented 7 5/8" tie-back string with 320 sacks Trinity Class "H" cement with 40% coarse silica flour, 1% CFR-2, 0.2% HR-5, and displaced with 417 bbl. 15.4 lb./gal. mud. Cement in place at 1200 hours (noon). Waited on cement 18 hours. Started running Schlumberger Temperature Survey and found cement inside casing at 9570'.

2/6/81 - Continued temperature survey and waited on cement 24 hours.

2/7/81 - Waited on cement and continued temperature survey (24 hours).

2/8/81 - Waited on cement 15 hours, then pre-stressed 7 5/8" casing with 650,000 lb. pull and set slips. Cut off 7 5/8" casing and installed 9" - 10,000 psi Tubing Spool, and double studded adapter flange 9" - 10,000 psi x 13 5/8" - 10,000 psi, and tested casing hanger to 7000 psi.

2/9/81 - Nipped up BOP's and tested all rams, flanges, and valves to 5000 psi and tested Hydril blowout preventer to 3500 psi. Ran in hole with 6 1/4" bladed mill, drilled cementing plug at 9546', and drilled cement from plug to 9596'.

2/10/81 - Drilled cement to 9622', made trip for 6 1/4" Hughes X3A bit and drilled cement to 9825'.

2/11/81 - Circulated hole, rigged up pipe lay down unit to pick up tubing. Gauged 7 5/8" casing in hanger spool and found slips had swaged pipe inward to 6.375'. Picked up 2 7/8" tubing and ran in hole with bit.

2/12/81 - Cleaned out 7 5/8" casing from 12,719' to 14,536'. Found no cement on top of 5 1/2" liner at 14,534'.

2/13/81 - Circulated at liner top and pressure tested 7 5/8" casing, 7 5/8" tie-back sleeve, and top of 5 1/2" liner to 2000 psi, with 15.2 lb./gal. mud. Pulled out of hole with bit. Ran in hole with mill (6 3/8") and 7 5/8" casing scraper and scraped casing. Circulated bottoms up from top of liner casing at 14,534'.

2/14/81 - Pulled out of hole with mill and scraper. Picked up Type M-14 Packer and jars, and 6 drill collars. Set packer at

14,419' and tested tubing and casing sides individually to 1000 psi. Tested Halliburton lines and valves to 5000 psi, and displaced 62.5 bbl of mud from tubing with water with the equivalent weight of 9.5 lb./gal. mud.

2/15/81 - Made a dry test of 5 1/2" liner top (a differential of 4300 psi) and it tested "good." Reversed out water, pulled out of hole to 9,780' and circulated. Displaced tubing with 42.5 bbl. of water and tested tie-back with 2,908 psi differential. Tested "good" and reversed out water. Pulled out of hole and ran in hole with 4" mill. Washed and reamed from 15,482' to 15,661' to orifice type float collar.

2/16/81 - Circulated and pulled out of hole with mill. Ran Schlumberger Temperature Survey, CBL, and Variable Density Logs from 15,661' to 9450'. Rigged down Schlumberger and picked up Brown Oil Tools 5 7/16" Polishing Mill.

2/17/81 - Ran in hole with Polishing Mill to Polished Bore Receptable (PBR) at 14,534'. Polished PBR to 14,558', circulated and pulled out of hole.

2/18/81 - Picked up Dummy Seal Assembly and ran in hole to 14,535'. Tested casing side of Seal to 2000 psi and tested tubing side to 3500 psi. Circulated and pulled out of hole. Changed

from 5" to 5 1/2" pipe rams in BOP. Tested pipe rams to 5,000 psi, and Hydril to 3,500 psi. Rigged down test unit.

2/19/81 - Finished testing kill lines, valves and blind rams to 3000 psi with rig pump. Ran in hole with 4" mill to 15,661' and circulated. Rigged up Halliburton and tested lines to 5000 psi. Pumped in 30 bbl HEC Polymer Spacer and 400 bbl 10 lb./gal. brine.

2/20/81 - Displaced casing with 10 lb./gal. brine filtered with 25 micron filters.

2/21/81 - Filtered brine at 9800' to 25 microns. Ran in hole to 15,660' and filtered brine to 25 microns. Well was stable. Layed down 2 7/8" tubing.

2/22/81 - Finished laying down 2 7/8" tubing and three 3 1/2" drill collars. Left three 3 1/2" drill collars, X-over, 7 5/8" casing Scraper, X-over, and 39 joints 2 7/8" stringer in hole at 1309'. Top of fish at 14,351'. Picked up three 4 3/4" drill collars, bumper jars, oil jars, 3 1/2" grapple, and 6 1/8" overshot. Picked up 2 7/8" tubing, ran in hole, engaged "fish" and started out of hole with "fish."

2/23/81 - Finished pulling out of hole with fish and recovered the total "fish." Broke down fishing tools. Ran in hole with Polishing Mill to 14,534'. Dressed PBR 14,534' to 14,558'. Pulled out of the hole and layed down 2 7/8" tubing.

2/24/81 - Finished laying down 2 7/8" tubing. Rigged up and ran 120 joints of 5 1/2" FL4S 23.0 lb./ft. tubing.

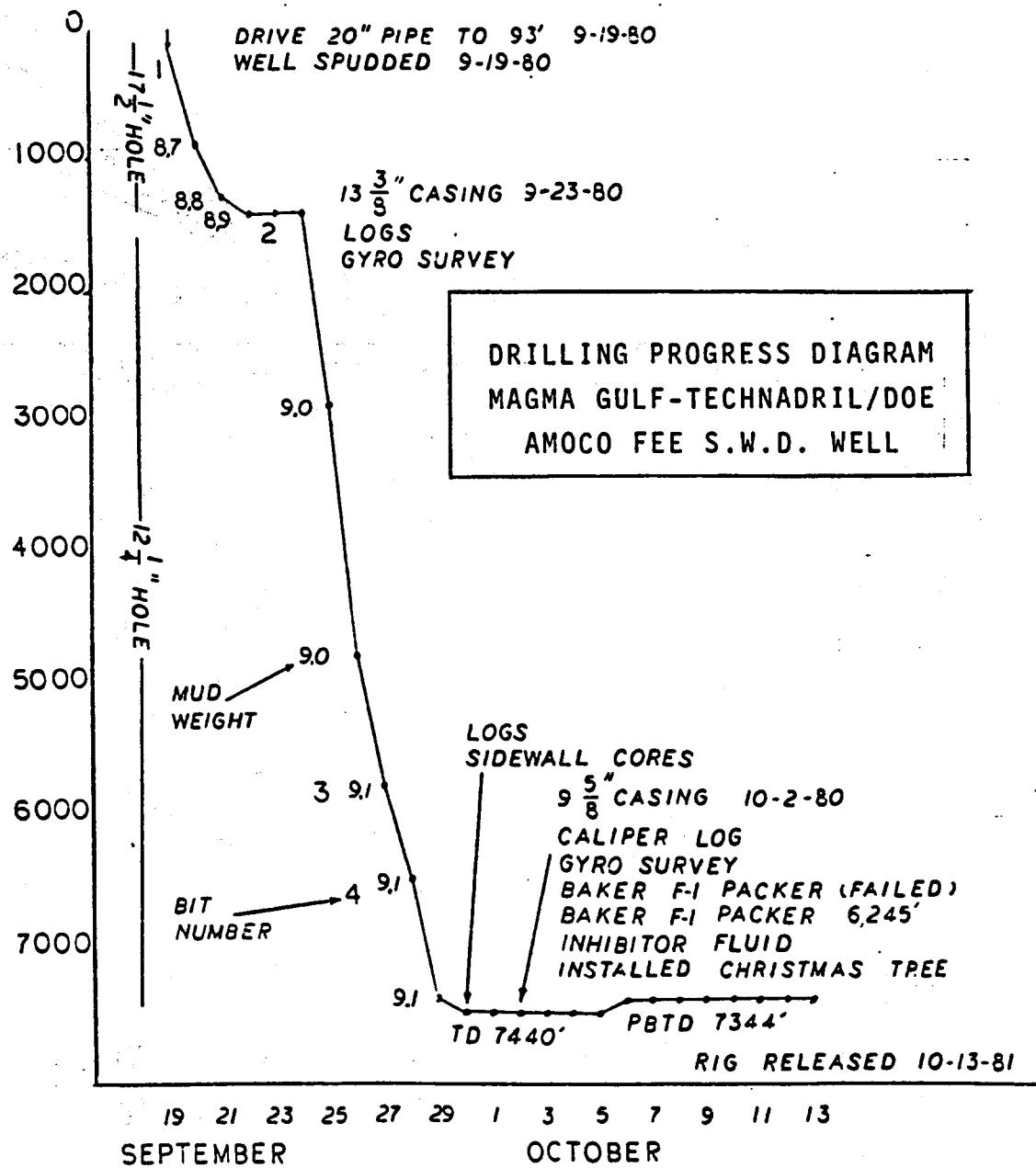
2/25/81 - Finished running 5 1/2" tubing. Hubbed up landing collar and pressure tested annulus to 2000 psi. Tested casing and seal assembly to 6000 psi. Filtered brine water with 25 micron filters.

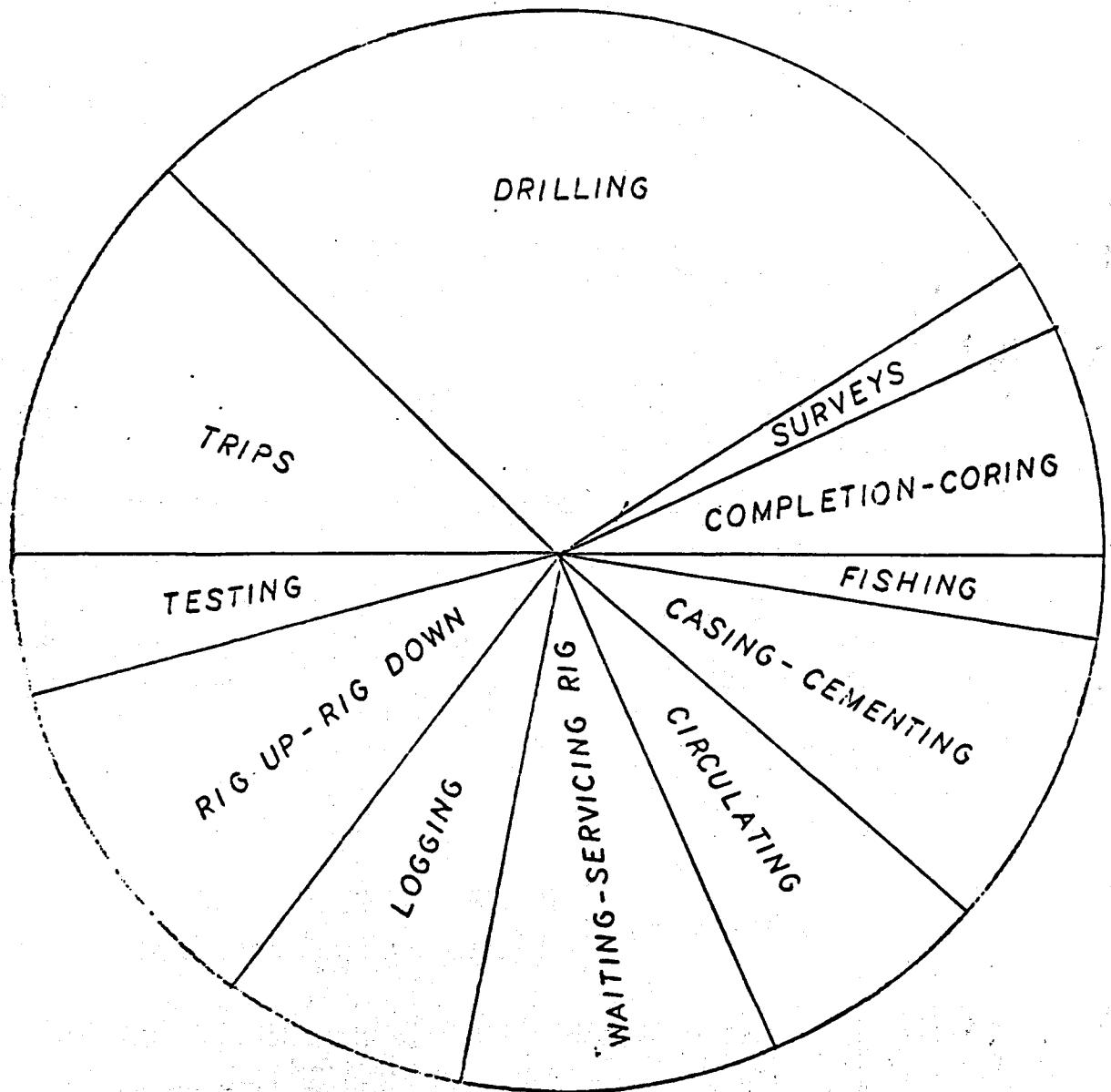
2/26/81 - Continued to filter brine water. Dropped 20 bbls. spacer and 265 bbls. 1316 packer fluid in annulus. Picked up BOP's. Backed out landing joint and installed blanking plug in hanger. Layed down 5 1/2" casing tools. Nipped down BOP's.

2/27/81 - Nipped up tree and tested flanges and valves to 10,000 psi. Released rig at 1400 hours on 2/27/81.

APPENDIX B - SALT WATER DISPOSAL WELL

B.1 Time Utilization Diagram





TIME UTILIZATION FOR DRILLING AND COMPLETION
MAGMA GULF-TECHNADRIL/DOE
AMOCO FEE NO.1
SALT WATER DISPOSAL WELL

<u>ACTIVITY</u>	<u>% TIME</u>
DRILLING	28.60
TRIPS	12.40
TESTING BOP'S, ETC.	4.25
RIG UP - RIG DOWN	10.55
LOGGING	7.30
WAITING AND SERVICE OF RIG	9.32
CIRCULATING	6.83
CORING (SIDEWALL CORES)	0.35
CASING AND CEMENTING	8.90
FISHING	2.40
SURVEYS	2.40
COMPLETION	<u>6.70</u>
	100%

PERCENT TIME UTILIZATION
DRILLING AND COMPLETION

MAGMA GULF-TECHNADRIL/DOE-AMOCO
SALT WATER DISPOSAL WELL

B.2 Rig Specifications

RIG #4 - GOLDRUS DRILLING COMPANYDRAWWORKS

Brewster N-75
 Grooved Drum for 1-1/8" Drilling Line
 Parkersburg 46" Hydromatic Brake

DERRICKS

Continental Emsco Mast
 133'
 830,000 lbs. nominal capacity

SUBSTRUCTURE

Continental Emsco
 15'
 1,000,000 lbs. nominal capacity

ENGINES

Three-Detroit Diesel 12 V 71
 Driving Drawworks compound
 Intermittent HP-1200
 Continuous HP-900
 One-Caterpillar D-353 - 392
 Continuous HP driving rotary table

PUMPS

Two-B-750 Brewster Duplex Pumps
 7-3/4" x 16" 750 HP with Southwest
 Fluid Ends
 Both pumps powered off drawworks
 compound

MUD MIXING PUMPS

Three-6" x 8" centrifugal pumps
 Each driven by a 120 continuous HP
 Caterpillar D3306 diesel engine

DRILL STRING

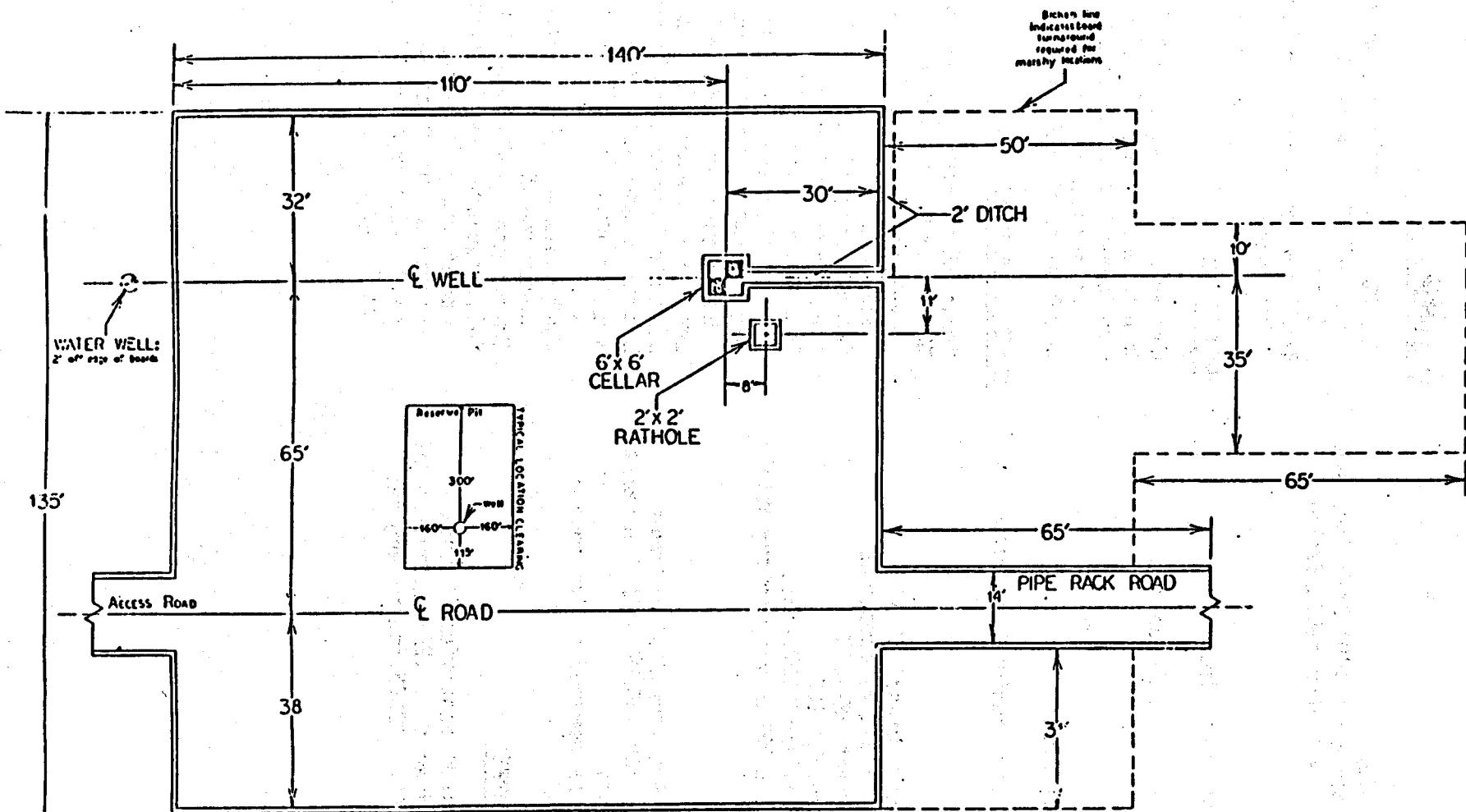
13,500' - 4-1/2" O.D., 16.6#/ft., GR.
 E., 4-1/2" XH x 6-1/4" O.D. tool
 joints
 Drill collars furnished based on
 inventory

PREVENTERS

One Hydril, Model GK 10" Series 1500
 Two Cameron, Model QRC 10" Series 1500
 One Payne 4-station w/accumulator
 with remote control unit
 One Cameron 4" HCR Valve

OTHER EQUIPMENT

Crown Block-Emsco, 6 sheaves
 Traveling Block-National, 300 tons
 Hook-Byron Jackson, Model 4300
 300 tons
 Swivel-National, LB-400 Emsco
 Kelly Spinner-Foster
 Rotary Table-Ideco 23"
 Shale Shaker-Derrick, Inc.
 Mud Tanks-Two 330 bbl. steel tanks
 Equipped with Lightnin' Mixers
 Desilter-Pioneer, 12-4" cones
 Desander-Picenco, 2-12" cones
 Lights-Hutchinson, vapor proof
 Light Plants-Two 150 KW, 110/220 volts
 A.C.
 Bunk House-8' x 40' skidded, air
 conditioned
 Communications-Two way UHF system
 Fully equipped with air compressors,
 water pumps, line pipe, tools,
 fittings and other auxiliary equipment
 necessary for efficient
 drilling



GOLDRUS RIG No. 4 - LOCATION LAYOUT

B.3 SWD Well Diagram and Wellhead

B-9
 MGT - DOE AMOCO FEE NO. 2
 SALT WATER DISPOSAL WELL

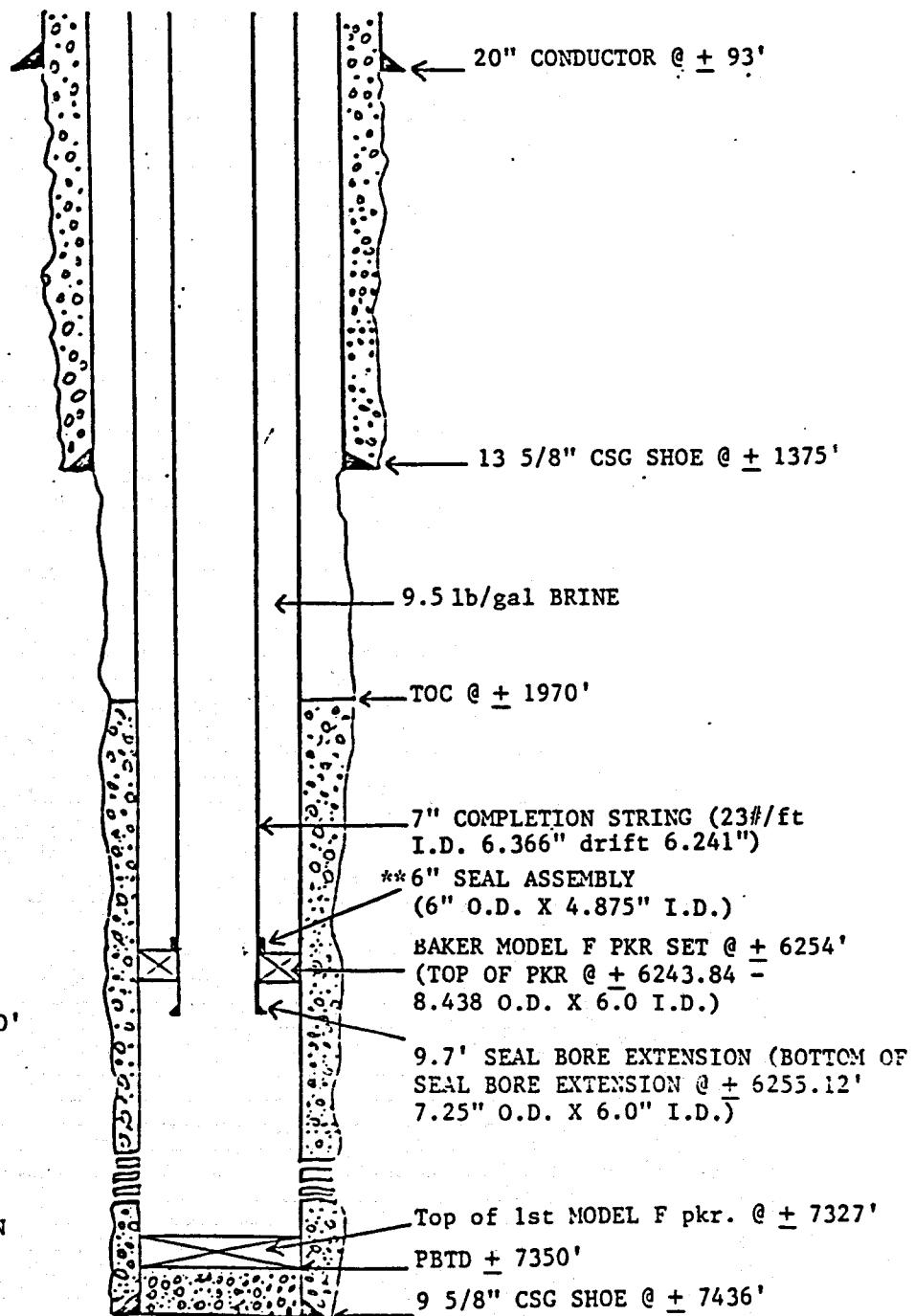


FIGURE 6

MGT-DOE-Amoco Fee-SWD No. 02
9 5/8" x 7" Packer Setting

B-10

A detailed technical cross-section diagram of a mechanical device, likely a lock or valve. The diagram shows a central vertical rod with a handle at the top. A locking mechanism is located in the middle section, featuring a series of pins and notches. The base of the device is a rectangular housing with internal parts and a small circular component at the bottom. The entire diagram is rendered in black and white with fine lines and cross-hatching to indicate depth and material.

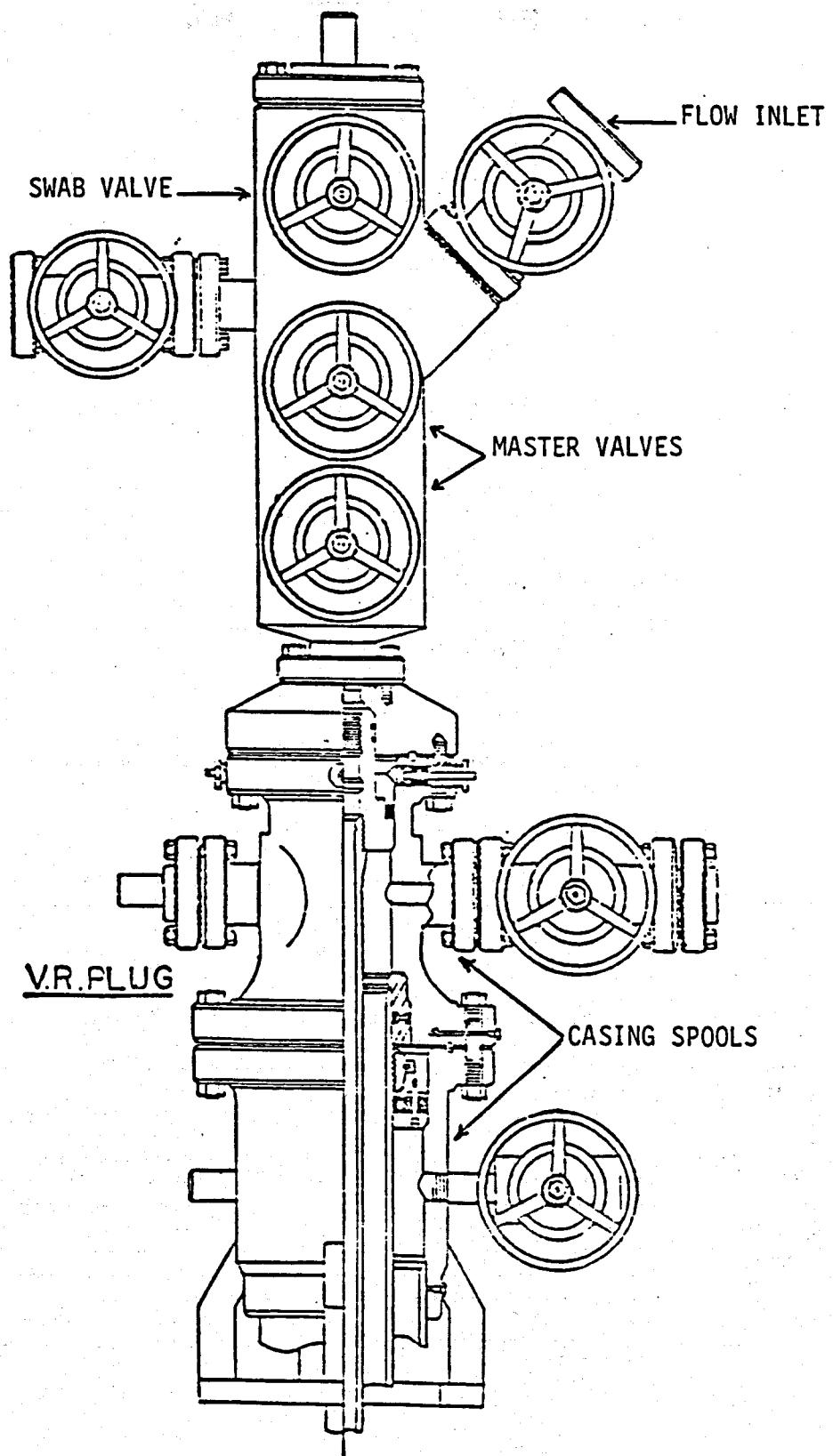


FIGURE 26
SALT WATER DISPOSAL WELLHEAD AND CASING SPOOLS

B.4 Wire Line Operations

Wireline Logs MG-T/DOE Amoco Fee SWD

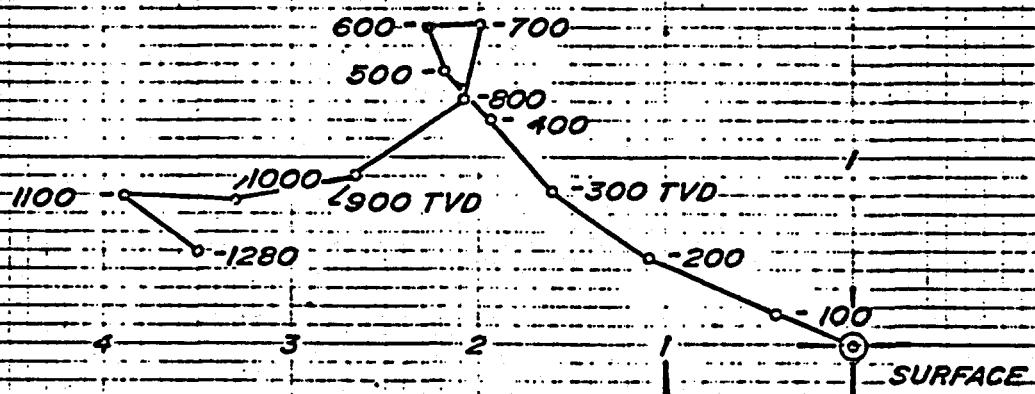
<u>Log</u>	<u>Date</u>	<u>Bottom</u>	<u>Top</u>
Induction	9/21/80	1350	96
Borehole Geometry	9/21/80	1350	96
Induction-Sonic	9/29/80	7458	1383
Formation Density-Compensated Neutron	9/29/80	7458	1383
Cyberlook	9/29/80	7458	1383
Borehole Geometry	9/29/80	7458	1383
Saraband	9/29/80	7450	1400
Cement Bond-Variable Density	10/ 4/80	7360	1850
Casing Profile Caliper	10/ 6/80	7310	surface
Casing Collar and Perforating	10/11/80	7400	surface

B.5 Directional Survey

MAGNA GULF - TECHNADRIL
MGT - DOE AMOCO FEE N° 1
SWEET LAKE FIELD

HORIZONTAL PLAN

Scale 1"=1'



PROJECTION FURNISHED
BY
SPERRY-SUN, INC

BOTTOM HOLE CLOSURE - 3.52' N 81°59' W

SPERRY-SUN INCORPORATED
SWEET LAKE FIELD, CAMERON PARISH, LOUISIANA

PAGE 1

MAGNA GULF-TECHNADRIL
MGT-DOE AMOCO FEE #1SU3-E
SEPTEMBER 24, 1968

TOTAL DEPTH	DIRECTION DEG MIN	ANGLE DEG MIN	VERTICAL DEPTH	LATITUDE FEET	DEPARTURE FEET	VERTICAL SECTION	DOG LEG
0	N 0 0 E	0 0	0.00	0.00 N	0.00 E	0.00	0.00
100	N 66 8 W	0 30	100.00	0.18 N	0.41 W	0.42	0.50
200	N 70 4 W	0 20	200.00	0.45 N	1.08 W	1.12	0.17
300	N 43 58 W	0 25	299.99	0.81 N	1.61 W	1.70	0.19
400	N 29 52 W	0 10	399.99	1.20 N	1.93 W	2.07	0.26
500	N 55 45 W	0 15	499.99	1.45 N	2.19 W	2.35	0.12
600	N 36 21 E	0 10	599.99	1.69 N	2.28 W	2.48	0.31
700	S 65 57 E	0 15	699.99	1.72 N	1.99 W	2.20	0.27
800	S 43 15 W	0 30	799.99	1.31 N	2.09 W	2.23	0.63
900	S 72 28 W	0 30	899.99	0.91 N	2.57 W	2.76	0.26
1000	S 84 42 W	0 25	999.98	0.78 N	3.31 W	3.38	0.12
1100	N 76 4 W	0 15	1099.98	0.80 N	3.88 W	3.95	0.20
1200	S 75 50 E	0 15	1199.98	0.80 N	3.88 W	3.95	0.50
1280	S 39 34 E	0 30	1279.98	0.49 N	3.49 W	3.52	0.42

THE DOGLEG SEVERITY IS IN DEGREES PER ONE HUNDRED FEET.
THE VERTICAL SECTION WAS COMPUTED ALONG N 81 59 W

BASED UPON MINIMUM CURVATURE TYPE CALCULATIONS. THE BOTTOM HOLE
DISPLACEMENT IS 3.52 FEET, IN THE DIRECTION OF N 81 59 W
BOTTOM HOLE DISPLACEMENT IS RELATIVE TO WELLHEAD.

B.6 Bit Record

BIT RECORD

PRINTED IN U. S. A.

B.7 Casing Record

B-20
STATE OF LOUISIANA
OFFICE OF CONSERVATION

AFFIDAVIT OF TEST OF CASING IN WELL

DATE WORK DONE 10/13/80 WELL SERIAL NO. WELL P-731, T-1067 (659-80)

L.C.

DISTRICT

(One copy to be filed with District Office)

NOTE: This Report Will Be Returned If Not Properly Completed and Signed

Field CHIPIRON 1/4 Parish COLIEN Sec. 13 Twp. 12-5 Rge. 8-W
Operator MONTE FLOOR TAKAHASHI Well Name DOE AMARO SWD Well No. ①
Size of casing 7" Weight 23" Make DUMPS, INC.
No. of threads per in. 8' Grade K-55 Seamless New 2nd

If second hand, was pipe tested _____ Describe _____

Depth casing shoe landed below derrick floor 6259' Ft. _____ Sacks of cement None
Size of hole 8 1/2" Ins. _____ Amount of cement left in pipe None
Method of cementing WATER Cement set in 0 hrs., under 0 psig.
Total depth 6259' Total time set Perm hrs.

DETAIL OF PRESSURE TEST BEFORE DRILLING PLUG

Date of test 10/12/80 Gauge pressure of casing 1500 # psig.
Pressure at end of 30 minutes 1500 # Pressure drop 0 psig.
Test fluid: Water Mud Weight 9.5 Visocity 27

Remarks: C50. T-1067 3.26' below Driller Assys. (Colle H-17 Expt. Stock) move 7" string 4' below Driller Assys.
② 6244' (7" C50 IN, TUB. IS 3.26' below Driller Assys (Colle H-17 Expt. Stock) move 7" string 4' below Driller Assys
This work was done according to the Rules and Regulations of the Department of Conservation.

James R. Bryant

PIRGINIA-ELVIE TECHNIQUE

WITNESS

Tom T. II

(SIGNED)

OPERATOR

James F. Eggleston

REPRESENTATIVE

TECHNADRIL, INC.

CASING AND CEMENTATION DETAIL

SWD TEST

FIELD Sweet Lake WELL AMOCO FEE #1 DATE 9/22/80DRILG. CONTRACTOR Goldrus RIG 4 ENGINEER HOLE SIZE 17 1/2 " DEPTH 1375 CSG. SIZE 13 3/8 LAST CSG. SIZE 20 SET AT 93'MUD PROP. WHILE CEM'TING: WT. 89 PV 13 YP 17 WL 10 pH 9.4 OIL - % TYPE FW. Gel
Bottom Hole Logging Temp. 121 °F
Bottom Hole Static Temp. °Fest.

CASING DETAIL: (BOTTOM UP)

No. Centralizers Spacing Mid way 1st jt, 1st cir, midway 2nd jt.

Additional Equipment

No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Shoe	<u>72</u>	<u>N-80</u>	<u>Buttress</u>	<u>1.50</u>	<u>1.50</u>
2	"	"	"	<u>76.39</u>	<u>77.89</u>
Collar	"	"	"	<u>1.50</u>	<u>79.39</u>
24	"	"	"	<u>907.82</u>	<u>987.21</u>
10	<u>68</u>	<u>K-55</u>	"	<u>403.05</u>	<u>1390.26</u>
					<u>15.26</u>
					<u>1375.00</u>
					<u>20.30</u>
					<u>1354.70</u>

Casing Running Data: Start Time Finish Time Torque Applied 9000 ft. lbs.
 Reciprocated? Yes Length Strokes 15' Csg. Shoe Type & Manufacturer Davis-Lynch
 Collar Type & Manufacturer Davis-Lynch Float Equip. Performance Good

CEMENTING DATA:
 Cementing Company HowCO District L.C. Field Engineer None

Type, amount, and position of wash used: 5 BB1 H₂O

Plugs used: Top Yes Bottom 2 Yes Displacement Fluid Mud

Calculated Displacement: 207 Actual Displacement 207 Type pump used to Disp. HT-400 HowCO

Pumping Rate: Mixing: 1 bbl./min. Displacing: 5 bbl./min. Calculated excess 10 % Caliper Table

Volume API Class	Cement + Additives	Slurry Wt. (#/gal)	Mixing H ₂ O (gal/sk.)	Slurry Yield (CF/sk.)	Slurry Vol. (CF)	Pumping Time (Pilot)	Pumping Time (Blend)
<u>950</u>	<u>HLW</u> + 3% Salt	<u>13.6</u>		<u>2.12</u>			
<u>1350</u>	<u>C1 H</u> + 3/4% CRF-2 + 35% SF			<u>1.47</u>			

Cementing Detail: Start Mixing (AM) (PM) Bump Plug (AM) (PM) with 1200 psi Held 5 min.
 Returns 100 % Cement final wt. 13.6 # Csg. wt. in air 100,000 # Csg. wt. in mud R5M # Hung with ROM *

Csg. returned Additional information and remarks

Approx. 400 BB1 cement to surface
 Casing Set on Bottom.

Date Issued: 9/23/80 Technadril Engineer M. R. Harlen

TECHNADRIL, INC.

CASING AND CEMENTATION DETAIL

SWD

FIELD Sweet Lake WELL AMOCO Fee #1 DATE 10-2-80DRLG. CONTRACTOR Goldrus RIG 4 ENGINEER _____HOLE SIZE 12 1/4 " DEPTH 7436 CSG. SIZE 9 5/8" LAST CSG. SIZE 13 3/8 SET AT 1375MUD PROP. WHILE CEM'TING: WT. 9.2 PV 12 YP 7 WL 2.0 PH 9.7 OIL - % TYPE FW Gel

Bottom Hole Logging Temp. _____ °F

Bottom Hole Static Temp. _____ °Fest.

CASING DETAIL: (BOTTOM UP)

No. Centralizers Spacing 1-10' from F.S., 1st Cir. Middle 2cd it., 5-every other cir.

Additional Equipment

No. Jts.	Wt.	Grade	Cplg.	Length	Cumulative Total
Shoe	<u>435</u>		Buttress	<u>1.72</u>	<u>1.72</u>
2	<u>435</u>	<u>S-95</u>	Buttress	<u>84.88</u>	<u>86.60</u>
Collar				<u>1.40</u>	<u>88.00</u>
11	<u>435</u>		Buttress	<u>470.91</u>	<u>558.91</u>
105	<u>435</u>	<u>L-80, S-95, H-80</u>	Buttress	<u>4081.80</u>	<u>4640.71</u>
35	<u>40</u>	<u>S-95, P-110, H-80</u>	Buttress	<u>1350.18</u>	<u>5990.89</u>
49	<u>47</u>	<u>AR-95</u>	Buttress	<u>1457.11</u>	<u>7448.00</u>
					<u>12.00</u>

LESS ABOVE KELLY BUSHING _____

CASING SETTING DEPTH AT KELLY BUSHING 7436.00LESS KELLY BUSHINGS TO BRADENHEAD FLANGE 14.70CASING SETTING DEPTH AT BRADENHEAD 7421.30Casing Running Data: Start Time 1:00 p.m. Finish Time 4:30 p.m. Torque Applied Buttress ft. lbs.
Reciprocated? Yes Length Strokes 15' Csg. Shoe Type & Manufacturer Davis-Lynch 501
Collar Type & Manufacturer Davis-Lynch 700 Float Equip. Performance OKCEMENTING DATA:
Cementing Company HOWCO District Lake Charles, LA Field Engineer Leon HarwinType, amount, and position of wash used: 40 BBL H₂O AttendPlugs used: Top Yes Bottom: Yes Displacement Fluid MudCalculated Displacement: 226 Actual Displacement 227 Type pump used to Disp. HT 400Pumping Rate: Mixing: 4 bbl./min. Displacing: 6 bbl./min. Calculated excess 10 % Caliper Table

Volume API Class	Cement + Additives	Slurry Wt. (#/gal)	Mixing H ₂ O (gal/sk.)	Slurry Yield (CF/sk.)	Slurry Vol. (CF) (Sbts.)	Pumping Time (Pit): (Blend)
<u>1225</u>	<u>HLW</u> <u>35% SF + 3% Salt</u>	<u>13.4</u>	<u>10.7</u>	<u>2.12</u>	<u>2597</u>	<u>4-15</u>
<u>510</u>	<u>C1H</u> <u>40% SF</u>	<u>15.8</u>	<u>6.4</u>	<u>1.56</u>	<u>795</u>	<u>2-58</u>

Cementing Detail: Start Mixing 1 (AM) (PM) Bump Plug 4:30 (AM) (PM) with 5000 psi Held 5 min.Returns 100 % Cement final wt. 15.8 # Csg. wt. in air _____ # Csg. wt. in mud 310 * Hung with 510 *Csg. returned 7 Additional information and remarks _____

Did not get cement to surface

Date Issued: 10-2-80 Technadril Engineer M. R. Harnan

233-3442
MORGAN CITY
384-6244

OFFSHORE HAMMER, INC.

P. O. BOX 53508
LAFAYETTE, LOUISIANA 70505
ALL INQUIRIES CALL 318/233-9331

PICK-UP
&
DELIVERY
TICKET

LIVERY DATE	RETURN DATE	ORDERED BY	ORDER NO	WEIGHT	SPEEDOMETER READING
-------------	-------------	------------	----------	--------	---------------------

COMPANY EST. DATE THIS _____ LEASE _____

LEASE _____

WELL NO. _____

RIG NO. _____

TIME: _____ MILEAGE: _____

ESTUARIES AND COASTS (2006) 29: 1003–1013
DOI 10.1007/s12237-006-0063-0
© Springer 2006

B.8 Cementing Record



B-25

HALLIBURTON SERVICES

P. O. BOX 1149, LAKE CHARLES, LOUISIANA 70602

A. J. MOORE
District Superintendent

October 3, 1980

TO: Mr. Mickey Harlen
Magma Gulf - Technadrill
Sweetlake, La.

FROM: Mr. Leon Harvin
Halliburton Services
Lake Charles, La. 70602

Dear Mr. Harlen:

The following cement and its properties was used on the DOE Amoco # 1 Disposal Well 9-5/8" Casing:

LEAD SLURRY: 1225 SACKS HALLIBURTON LIGHT CEMENT + 35% SILICA FLOUR + 3% SALT.

SLURRY WEIGHT - 13.4 #/GALLON
WATER RATIO - 10.7 GALLONS FRESH H₂O/SK.
SLURRY VOLUME - 2.12 CU.FT./SK.
PUMPING TIME - 4 HOURS 15 MINUTES

COMPRESSIVE STRENGTH - 12 HOURS - 475
24 HOURS - 800

<u>RPM READINGS:</u>	<u>RPM</u>	<u>RATE OF SHEAR</u>
	600	74
	300	64
	200	58
	100	52
	6	22
	3	17

TAIL SLURRY: 510 SACKS CLASS H + 40% SILICA FLOUR.

SLURRY WEIGHT - 15.8 #/GALLON
WATER RATIO - 6.39 FRESH WATER
SLURRY VOLUME - 1.56 CU.FT./SK.
PUMPING TIME - 2 HOURS 58 MINUTES

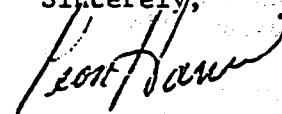
COMPRESSIVE STRENGTH - 12 HOURS - 1000 PSI
24 HOURS - 1600 PSI

RPM READING:RPMRATE OF SHEAR

600	155
300	120
200	97
100	75
6	23
3	17

If further information is needed, please advise.

Sincerely,



Leon Harvin
Field Engineer

LH/md

cc: A. J. Moore
file



B-27

HALLIBURTON SERVICES

P. O. BOX 1149, LAKE CHARLES, LOUISIANA 70602

A. J. MOORE
District Superintendent

September 27, 1980

TO: Mr. Buster Adkins
Technadrill
1111 Fannin - Suite 1010
Houston, Texas 77002

FROM: Mr. George Fuller
Halliburton Services
Lake Charles, La. 70602

SUBJECT: CEMENTING RECOMMENDATION FOR YOUR COMBINATION PRODUCTION STRING ON THE
AMOCO FEE # 1 AT SWEETLAKE.

WELL DATA: INTERMEDIATE CASING, DEPTH -----	9-5/8" 53.5 PPF, 10,240'
HOLE SIZE -----	8-1/2"
CASING STRING (TOP) -----	7-5/8" 39 PPF, 14,700'
CASING STRING (BOTTOM) -----	5-1/2" 23 PPF, 1,000'
MUD WEIGHT (EST)-----	16.2 PPG
BOTTOM HOLE TEMP. (EST) -----	300°F - 350°F
DESIRED CEMENT FILL -----	7,460'
	FROM 15,700' to 8,240'
RECOMMENDED EXCESS -----	50% OR CALIPER + 25%

CEMENT RECOMMENDATION:

PRECEDE CEMENT WITH 20 BBLS. CS-2 SPACER MIXED AT MUD WEIGHT. FOLLOW WITH 770 SACKS CLASS H + 40% COARSE SILICA FLOUR + 3% KCL + .4% HALAD 22A + 1% CFR-2 + .25% D-AIR-1 + RETARDER NECESSARY FOR ADEQUATE PLACEMENT TIME. THIS CEMENT SHOULD BE LAB TESTED PRIOR TO THE JOB.

SLURRY WEIGHT - 17.0 LBS/GALLON
SLURRY VOLUME - 1.33 CU.FT./SK.
WATER RATIO - 4.7 GALLONS/SK.
TURBULENT FLOW RATE - 8.0 BPM (EST).

COST ESTIMATE:

770 SACKS CLASS H W/ADDITIVES -----	\$11,989.41
CEMENT SERVICE & DELIVERY -----	1,484.74
20 BBLS. SAM-5 SPACER -----	760.00
PUMPING CHARGE (8 HOURS) -----	5,375.50
MILEAGE (1 UNIT - 30 MILES) -----	49.50
7-5/8" x 5-1/2" COMBINATION PLUG -----	144.96
	<u>\$19,804.11</u>

CALCULATIONS:

40' 5-1/2" SHOE JOINT -----	.1189 (40)	= 4.76
1000' 5-1/2" x 8-1/2" ANNULUS (50% EXCESS)-.2291 (1000)(1.5)		= 343.65
4460' 7-5/8" x 8-1/2" ANNULUS (50% EXCESS)-.0770 (4460)(1.5)		= 515.13
2000' 7-5/8" x 9-5/8" 53.5 PPF ANNULUS -----.0802 (2000)		= 160.4
		<u>1023.94</u>

1023.94 cu. ft. divided by 1.33 FT³/sk. = 770 SACKS.

The unit prices stated in this proposal are based upon our current published prices. The projected equipment, personnel, and material needs are estimates only based upon information about the work presently available to us. At the time the work is actually performed, conditions then existing may require an increase or decrease in the equipment, personnel, and/or material needs. Charges will be based upon unit prices in effect at the time the work is performed and the amount of equipment, personnel and/or material actually utilized in the work. Taxes, if any are not included.

We are pleased to have this opportunity to present this proposal for your consideration. If you accept our proposal, all materials and equipment furnished and services performed will be under our General Terms and Conditions and pursuant to our applicable Work Order Contract (whether or not executed by you). Copies of the General Terms and Conditions and applicable Work Order Contract will be furnished on request.

Sincerely,

George Fuller
George Fuller
District Engineer

GF/md

cc: A. J. Moore
file



A. J. MOORE
District Superintendent

P. O. BOX 1149, LAKE CHARLES, LOUISIANA 70602

September 23, 1980

TO: Mr. Mickey Harlen
Magma Gulf - Technadrill
Sweetlake, La.

FROM: Mr. Leon Harvin
Halliburton Services
Lake Charles, La.

CEMENT DATA FOR YOUR DOE BRINE DISPOSAL WELL IN SWEETLAKE, LA.

Lead Cement:

700 sacks Halliburton Lite Cement + 3% Salt.

Slurry Weight - 12.7 pounds per gallon
Water Ratio - 9.9 gallons per sack
Slurry Volume - 1.84 cu.ft. per sack
Turbulent Flow - 19.6 BPM
Pumping Time - 5 hours 57 minutes

Compressive Strength: 12 hours - 200 PSI
24 hours - 625 PSI

RPM Readings:	<u>RPM</u>	<u>RATE OF SHEAR</u>
600	65	
300	42	

Plastic Viscosity = 23 cps
Yield Point = 19 lbs per 100 Ft.²

Tail Cement:

1250 sacks Class H + 25 % Silica Flour + 3/4% CFR-2

Slurry Weight - 15.8 lbs per gallon
Water Ratio - 6.32 gallons per sack
Slurry Volume - 1.55 Cu.Ft. per sack
Turbulent Rate- 59.6 BPM
Pumping Time - 5 hours 13 minutes

Compressive Strength: 12 hours - 500 PSI
24 hours - 1175 PSI

RPM Readings:	<u>RPM</u>	<u>RATE OF SHEAR</u>
600	123	
300	94	

Plastic Viscosity - 29 cps
Yield Point - 65 lbs per 100 Ft.²

If any further information is needed, please advise.

Sincerely,

Leon Marvin

Leon Marvin
Field Engineer

B.9 Side Wall Cores

CORE LABORATORIES

F:1021

AGMA GULF-TECHNADRIL
MOCO FEE SWD WELL
/C SWEETLAKE FIELD
AMERON, LA.

DATE : 29-SEPT-80
FORMATION :
DRLG. FLUID:

FILE NO : 2108-88
ANALYSTS : HQ/SE
LABORATORY: LAKE CHARLES
CORES : SCHLUMBERGER

SIDE WALL CORE ANALYSIS

CC N	DEPTH FEET	PERM MD(*)	FOR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
1.0	6580.0	1050.	30.2	0.0	90.2	WTR	0.0	2.9	0	35	SD VF-FG SSLTY NO FLU
1.0	6640.0	450.	27.5	0.0	84.9	WTR	0.0	4.2	0	39	SD VFG SLTY LMY NO FLU
1.2	6660.0	400.	25.4	0.0	80.9	WTR	0.0	4.9	0	38	SD VFG VSLTY VCALC NO FLU
1.1	6670.0	280.	23.3	0.0	83.3	WTR	0.0	3.9	0	39	SD VFG SHY LAM SLTY NO FLU
0.0	6680.0										NOT ANALYZED
0.4	6690.0	460.	24.5	0.0	85.7	WTR	0.0	3.5	0	36	SD VFG VSLTY SCALC NO FLU
1.1	6700.0	450.	25.2	0.0	82.5	WTR	0.0	4.4	0	37	SD VF-FG SSHY LAM CALC NO FLU
0.4	6810.0	2110.	30.4	0.0	93.2	WTR	0.0	2.1	0	34	SD VF-FG SSLTY NO FLU
1.1	6820.0	480.	25.3	0.0	81.3	WTR	0.0	4.7	0	36	SD VF-FG SSHY LAM SLTY CALC NO FLU
0.0	6830.0	1950.	28.9	0.0	85.0	WTR	0.0	3.2	0	33	SD VF SSLTY SCALC NO FLU
0.6	6850.0	1900.	28.2	0.0	92.4	WTR	0.0	2.2	0	32	SD FG SSLTY SCALC NO FLU
1.0	6930.0	400.	26.2	0.0	84.8	WTR	0.0	4.0	0	39	SD VFG SSHY LAM SLTY NO FLU
1.4	6950.0	250.	25.2	0.0	85.7	WTR	0.0	3.6	0	41	SD VFG SHY LAM SLTY NO FLU
0.5	6970.0	700.	27.6	0.0	85.1	WTR	0.0	4.1	0	35	SD VFG SLTY NO FLU
0.0	7010.0										NOT ANALYZED
0.8	7030.0	650.	26.9	0.0	87.8	WTR	0.0	3.3	0	35	SD VFG SLTY NO FLU
0.0	7050.0										NOT ANALYZED

B-32

CORE LABORATORIES

AGMA GULF-TECHNADRIL
MOCO FEE SWD WELLDATE : 29-SEPT-80
FORMATION :FILE NO : 2108-88
ANALYSTS : BQ/SE

SIDE WALL CORE ANALYSIS

EC N	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
1.0	7090.0	640.	26.9	0.0	91.5	WTR	0.0	2.3	0	35	SD VFG SLTY NO FLU
1.2	7110.0	1890.	29.4	0.0	94.1	WTR	0.0	1.7	0	33	SD FG SSLTY NO FLU
1.0	7160.0	600.	24.9	0.0	84.2	WTR	0.0	3.9	0	33	SD VFG VSLTY SCALC NO FLU
1.0	7170.0	540.	24.8	0.0	90.9	WTR	0.0	2.3	0	34	SD VFG VSLTY SCALC NO FLU
0.0	7190.0										NOT ANALYZED
1.0	7200.0	680.	26.8	0.0	93.2	WTR	0.0	1.8	0	34	SD VF-FG SLTY SCALC NO FLU
0.8	7210.0	1150.	30.2	0.0	90.9	WTR	0.0	2.7	0	34	SD VFG CLN NO FLU
0.8	7230.0	6.8	21.2	0.0	93.4	(6)	0.0	1.4	0	71	SD VFG VSHY SLTY NO FLU
0.8	7240.0	220.	25.3	0.0	90.3	WTR	0.0	2.5	0	43	SD FG SHY LAM NO FLU
0.0	7250.0										EMPTY BOTTLE
1.0	7270.0	1820.	28.0	0.0	95.2	WTR	0.0	1.3	0	32	SD FG SSLTY NO FLU
1.0	7300.0	420.	26.5	0.0	86.5	WTR	0.0	3.6	0	39	SD VFG SLTY NO FLU
0.0	7310.0										NOT ANALYZED
1.0	7320.0	1880.	28.8	0.0	94.8	WTR	0.0	1.5	0	33	SD FG SSLTY NO FLU
1.2	7330.0	2120.	30.4	0.0	92.6	WTR	0.0	2.2	0	34	SD FG CLN NO FLU
1.0	7340.0	2080.	30.1	0.0	92.0	WTR	0.0	2.4	0	34	SD FG CLN NO FLU
1.1	7410.0	640.	25.6	0.0	92.4	WTR	0.0	1.9	0	34	SD VFG SSLTY NO FLU
1.0	7420.0	625.	25.5	0.0	87.7	WTR	0.0	3.1	0	34	SD VFG SSLTY NO FLU

(6) LOW PERMEABILITY

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

CORE LABORATORIES

MAGNA GULF-TECHNADRIL
1000 FEE SWD WELLDATE : 29-SEPT-80
FORMATION :FILE NO : 2108-88
ANALYSTS : BQ/SE

SIDE WALL CORE ANALYSIS

IC	DEPTH FEET	PERM MD(*)	POR %	OIL% PORE	WTR% PORE	PROB PROD	OIL% BULK	GAS% BULK	GAS DET	CRIT WTR%	DESCRIPTION
----	---------------	---------------	----------	--------------	--------------	--------------	--------------	--------------	------------	--------------	-------------

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.

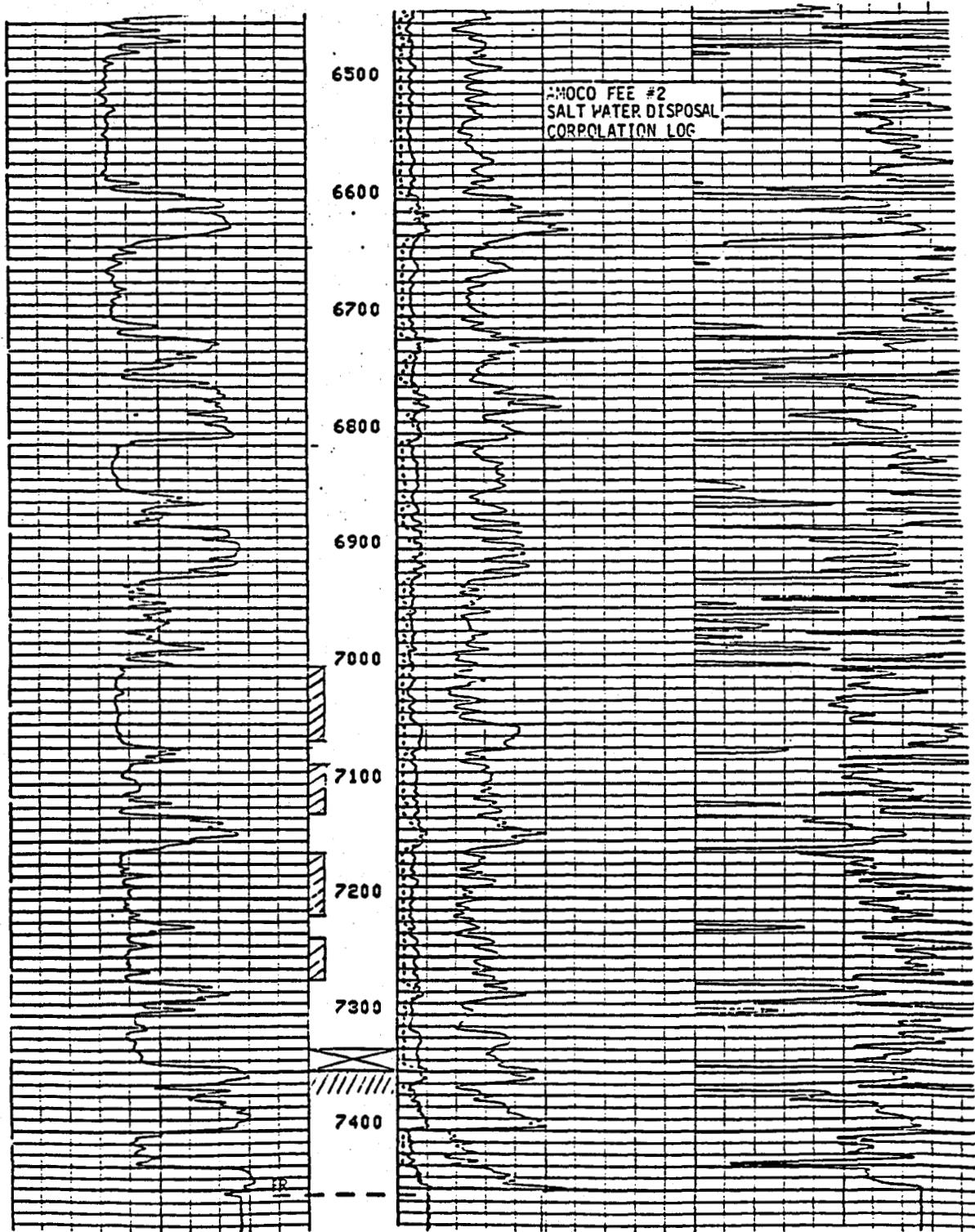
MAGNA GULF-TECHNIDRIL
1111 FANNIN ST., SUITE 1010
HOUSTON, TX 77002
ATTN: ROBERT W. RODGERS (6)

B.10 Perforating Procedure

MGT - DOE AMOCO FEE NO.2
SALT WATER DISPOSAL WELL

1. Check pressure on tubing and casing. If no pressure or if pressure bleeds off, remove blanking cap.
2. There is no back pressure valve in the wellhead of the disposal well. Close upper and lower master valves and rig up Schlumberger's type "A" lubricator. Test lubricator to 3,000 psi.
3. Run in hole with junk basket with 5" gauge ring to top of Baker locator sub @ ± 6254'.
4. Run in hole with Gamma Ray/CCL to 7320' and log up to 6100' to correlate with CBL-Gamma Ray ran on 10/4/80. Take note of the position of; 1) Bottom of mule shoe guide at +6258.94, 2) Baker model #190-40 seal bore extension from +6258.28' to +6238.12'.
5. Check fluid level in well.
6. Run in hole with Schlumberger 4" casing gun loaded with 4 shots per foot and perforate the following intervals: 7235' to 7270'; 7160' to 7215'; 7085' to 7125'; 7000' to 7065'. Off IES log of surveyed 9-29-80.
7. Check fluid level in wellbore after each perforation run and take note of any fluid drop. There is no anticipated pressure increase.
8. Rig down Schlumberger.
9. Flow test well as per testing department recommendations.

Mike Montes
March 31, 1981



B.11 Daily Drilling Progress Report

AMOCO FEE DISPOSAL WELL

9/19/80 - First Report. Rigged up and drilled rat hole and mouse hole. Drove 20" pipe to 93' penetration (GL).

9/20/80 - TD 838'. Mixed spud mud. Spudded 1200 Noon 9/19/80. Drilled 17 1/2" hole to 838'. Ran survey at 838'. 1/4° deviation.

9/21/80 - TD 1230'. Drilled to 1230'. Ran survey at 1020'. 1/4° deviation.

9/22/80 - TD 1375'. Drilled to 1375'. Conditioned hole and pulled out of hole to log. Ran Induction Log and BGT Caliper. Made clean up trip. Rigged up and ran 20 joints of 72# N-80 and 10 joints of 68# K-55 13 3/8" casing.

9/23/80 - TD 1375'. Finished running 13 3/8" casing (1387' Total). Casing cemented with 450 sacks of HLW and 3% salt, and 1350 sacks of CRH, with .75% CFR-2 and 35% silica flour. Cleaned out cellar and mud tanks (did not have reserve pits and had to clean excess cement out of reserve mud storage tanks). Welded 13 5/8" braden head in place and tested OK. Started nipping up BOP's.

9/24/81 - TD 1375'. Finished cleaning cement out of mud tanks caused by not having reserve pits. Finished nipple up of BOP's.

Ran Sperry Sun Gyro Survey from 1280' to 100'. Tested BOP's to 5000 psi, Hydril to 3500 psi. Started picking up 12 1/4" bit and bottom hole assembly (BHA).

9/25/80 - TD 2822'. Tagged cement at 1290'. Drilled plugs and cement to 1375'. Drilled formation to 2822. Ran surveys at 1888' and 2392'. 1/2° deviation.

9/26/80 - TD 4757'. Drilled to 4757'. Started out of the hole to change bits. Ran surveys at 2908' - 1/2°; 3410' - 1/2°, 3910' - 3/4°, 4155' - 3/4°, and 4600' - 3/4°.

9/27/80 - TD 5727'. Finished trip to change bits. Drilled to 5727'. Ran surveys at 5171' - 1/2° and 5620' - 1/2°.

9/28/80 - TD 6420'. Drilled to 6316'. Made trip to change bits. Drilled to 6420'. Ran survey at 6159' - 1/2°.

9/29/80 - TD 7329'. Stabilizers balled up and pipe was stuck once while drilling with high viscosity mud which was caused by not having reserve pits. Ran surveys at 6677' - 3/4° and 7170' - 0°.

9/30/80 - TD 7440'. Drilled to 7440'. Made short trip. Conditioned mud and hole. Pulled out of hole to log. Ran Schlumberger ISF/Sonic from 7455' to 1383'.

Ran Schlumberger FDC/CNL/GR from 7455' to 1383'. Ran Schlumberger B.G.L. Caliper Log from 7450' to 1385'. Schlumberger recovered 34 sidewall core samples from 7400' to 6700'.

10/1/80 - TD 7400'. Made clean up trip. Rigged up and ran 145 joints of 9 5/8" casing.

10/2/80 - TD 7400'. Finished running 9 5/8" casing (202 joints) to 7436' RKB. Cemented 9 5/8" casing with full returns. Casing cemented with 1225 sacks of HLW with 35% silica flour and 3% salt. Bumped plug with 5000 psi. Nipped down BOP's. Rigged up and ran Schlumberger temperature survey.

10/3/80 - TD 7436'. Cement top determined at 1970' by Schlumberger temperature survey. Installed 9 5/8" casing spool. Started in hole with bit and scraper inside 9 5/8" casing.

10/4/80 - TD 7436'. Tagged cement at 6637'. Drilled top of plug. Displaced mud with water. Pulled out of hole. Picked up (3) 6 3/4" drill collars and went in hole. Drilled cement 6637' to 7249'.

10/5/80 - TD 7436'. Drilled cement to 7350'. Pulled out of hole. Rigged up Schlumberger and ran CBL. Circulated fresh water

then circulated 100 bbl. of water with detergent to clean casing. Displaced water with 9.5 ppg brine (inhibited to prevent corrosion). Pulled out of hole.

10/6/80 - PBTD 7350'. Finished pulling out of hole. Ran casing caliper. Ran Gyro Survey. Laid down bottom-hole assembly. Picked up Baker F-1 packer and ran to 6250'. Would not set. Started out of hole for new setting sleeve.

10/7/80 - PBTD 7350'. Finished out of hole. Picked up seal assembly, went in hole and pushed packer to 7348'.

10/8/80 - PBTD 7344'. Waited on new packer. While waiting, ran drill string in hole and pressure tested drill string and 9 5/8" casing at 1500 psi.

10/9/80 - PBTD 7344'. Went in hole with second Baker F-1 packer. Prematurely set at 1233'. Waited on fishing tools.

10/10/80 - PBTD 7344'. Picked up fishing tools. Milled over packer. Attempted to engage fish. Pulled out of hole. No recovery. Changed bottom-hole assembly. Went in hole and pushed packer to 7330'. Set 30,000# down to catch fish (packer). Pulled out of hole. No recovery. Went back in hole with fishing assembly.

10/11/80 - PBTD 7344'. Finished in hole. Latched on to fish. Pulled out of hole and laid down bottom-hole assembly and fish. Made trip with bit and scraper. Reverse circulated volume of hole and then circulated volume of hole until the water was clean. Rigged up Schlumberger wire line junk basket and 8 1/2" Baker gauge ring.

10/12/80 - PBTD 7344'. Ran wire line junk basket and gauge ring. Rigged up Baker F-1 packer for setting on wire line. Ran and set at 6254'. Rigged down Schlumberger. Rigged up to run seal assembly on 7" casing. Baker 6" X 4.875 190-40 seal assembly.

10/13/80 - PBTD 7344'. Ran 7" casing completion string. Spaced out 7" casing and installed FMC-OCT TC-1A-EN hanger, installed with 130,000 pounds on hanger. Tested casing and packer seals to 1500 psi. OK. Rigged down casing tools and BOP's. Installed Christmas tree. Cleaned tanks. Released Rig at 2400 hours, 10/12/80.

B.12 Casing and Tubing Summary

SETTING DEPTH OF CASING AND TUBING

CASING

6877'-7436'	558.91'	13 jts. (used)	9 5/8"	43.5#/ft	Bts.	S95
2795'-6877'	4,081.80'	105 jts.	9 5/8"	43.5#/ft	Bts.	L80-S95-N80
1445'-2795'	1,350.18'	35 jts.	9 5/8"	40.0#/ft	Bts.	S95-P110-N80
0' - 1445'	1,445.00'	49 jts.	9 5/8"	47.0#/ft	Bts.	AR95

TUBING

0' - 6258' 161 jts. 7" 23.0#/ft ABC 8rnd. K-55

TUBULAR SPECS

	COLLAPSE	BURST	TENSION	I.D.	DRIFT	CAPACITY		
7"	23#	K55	3270	4360	348,000	6.366	6.241	0.0394
9 5/8"	43.5#	S95	5600	7510	0	8.755	8.599	0.0745
9 5/8"	43.5#	L80	3810	6330	0	8.755	8.599	0.0745
9 5/8"	43.5#	N80	3810	6330	0	8.755	8.599	0.0745

9 5/8-inch CASING SETTING

7440.00' TD of 12 1/2" hole
 4.00' Suspended Off Bottom
 7436.00'
 1.72' Davis Lynch 501 Casing Shoe
 7434.28'
 84.88' 2 Jts. of 9 5/8" 43.5# S95 Btts. Casing
 7349.40'
 1.40' Davis-Lynch 700 Float Collar
 7348.00'
 470.91' 11 Jts. used 9 5/8" 43.5# S95 Btts. Casing
 6877.09'
 4081.80' 105 Jts. Assorted 9 5/8" 43.5# S95, L80-N80 Btts. Casing
 2795.29'
 1350.18' 35 Jts. assorted 9 5/8" 40.0# S95, P110, N80 Btts. Casing
 1445.11'
 1457.11' 49 Jts. 9 5/8" 47# AR95 Btts. Casing
 12.00' Casing above RKB
 7436.00' Casing setting depth of RKB
 14.70' RKB to Bradenhead flange
 7421.31' Casing setting depth of Bradenhead

13 3/8" CASING SETTING

1375.00' TD 17 1/2" hole
 1.50' Davis-Lynch shoe
 1373.50'
 76.39' 2 Jts. 13 3/8" 72# N80 Btts. casing
 297.11'
 1.50' Davis-Lynch Float Collar
 1295.61'
 907.82' 24 Jts. 13 3/8" 72# N80 Btts. Casing
 387.79'

Setting Depth of Casing and Tubing
Page 2

403.05' 10 jts. 13 3/8" 68# K55 Btts. casing

15.26' Casing above RKB

1375.00' Casing setting depth at RKB

30.30' RKB to Bradenhead flange

1354.70' Casing setting depth at Bradenhead

7-INCH TUBING DETAIL

7350.00 Effective Total Depth

9.70 Baker Seal Bore Extension 7.25 O.D. X 6.00 I.D.

7340.30

.80 Baker F.B. Packer Guide 8.438 O.D. X 6.00 I.D.

7339.50

1.82 9 5/8" Baker Model F-1 Packer 8.438 O.D. X 6.00 I.D.

7337.68

Top of unset Packer Assembly Lost in Hole

7337.68 Top of Fish Left in Hole

1082.00 Off Bottom

6255.68 Setting Depth of Seal Bore Extension

9.70 Baker Seal Bore Extension 7.25 O.D. X 6.00 I.D.

6245.98

.80 Baker F.B. Packer Guide 8.548 O.D. X 6.00 I.D.

6245.18

1.34 9 5/8" Baker Model F-1 Packer 8.438 O.D. X 6.00 I.D.

6243.84

Top of Packer

6258.94 Setting Depth

.66 Baker Model #190-40 Mule Shoe Guide 6.00 O.D. X 4.87 I.D.

6258.28

20.16 Baker Model #190-40 Seal Assembly 6.00 O.D. X 4.87 I.D.

6238.12

.92 Baker Locator Sub Model #190-40 6.25 O.D. X 5.00 I.D.

6237.20

.79 7" L.T.&C. 8RD Box X 5½" L.T.&C. 8RD Pin Sub 7.62 O.D. X 5.00 I.D.

6236.41

161 Joints 7" 23# K-55 L.T.&C. 8RD A-B Mod Casing

6216.56

19.85 9 5/8 X 7" L.T.&C. 8RD FMC Oct. TC-1A-EN Hanger

1.15

18.70 RKB to Top of 11" 5000# Tubing Head

APPENDIX C - PALEO DATA

PALEO-DATA, INC.

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

January 21, 1981

Magma Gulf - Technadril
Sweet Lake Area
Section 13, T12S - R8W

#1 Amoco Fee
Cameron Parish, Louisiana

4010	First sample - In Ecologic Zone 1.
5450	First marine fauna
5720	Amphistegina B
8430	Siphonina davisii - Ecologic Zone 2
9390	Cristellaria R - Ecologic Zone 3
9690	Discorbis restricted
9780	Heterostegina sp.
10110	Cibicides jeffersonensis
10590	Bolivina perca
11100	Marginulina idiomorpha
11310	Marginulina vaginata
11550	Marginulina howei
12270	Textularia 14
12510	Camerina A
13530	Sample total depth - Original Hole
10620	First sample - Side Track Hole #1
11130	Marginulina idiomorpha
11220	Marginulina vaginata

Magma Gulf - Technadril
Sweet Lake Area
Sec. 13, T12S - R8W

#1 Amoco Fee
Cameron Parish, Louisiana

2.

11670 Marginulina howei
12330 Textularia 14
12570 Camerina A
14970 Miogypsinoides A
15720 Sample total depth - Side Track Hole #1

Respectfully submitted,

John B. Dunlap, Jr.

4010 (Lithology of washed cuttings) 70% shale, 30% sand & cement plus minor pyrite & shell fragments
No fauna

4040 (L) Same
No fauna

4070 (L) Same
No fauna

4100 (L) Same
No fauna

4130 (L) 60% shale, 40% shell fragments with minor pyrite & lignite
No fauna

4160 (L) 70% shale, 30% shell fragments as above
No fauna

4190 (L) 80% shale, 20% sand & shell fragments plus pyrite
No fauna

4220 (L) Same
No fauna

4250 (L) Same
No fauna

4310 (L) Same
No fauna

4340 (L) 80% shale, 20% quartz sand, very fine to fine grained, rounded to angular
No fauna

4370 (L) Same
No fauna

4400 (L) Same
No fauna

4430 (L) Same
No fauna

4460 (L) Same
No fauna

4490 (L) Same
No fauna

4520	(L) Same No fauna
4550	(L) Same No fauna
4580	(L) Same No fauna
4610	(L) Same No fauna
4640-70	Gap
4670	(L) 70% shale, 30% loose quartz very fine to fine grained sand plus minor calcareous sandstone, very fine to fine grained & shell fragments No fauna
4700	(L) Same No fauna
4730	(L) Same No fauna
4760	(L) Same No fauna
4790	(L) Same No fauna
4820	(L) 80% shale, 20% sand & shell fragments No fauna
4850	(L) Same No fauna
4880	(L) Same No fauna
4910	(L) Same No fauna
4940	(L) 70% shale, 30% loose sand, very fine grained calcareous sandstone & shell fragments with minor pyrite, Charapod (1) No fauna
4970	(L) Same with no Charapods No fauna

5000 (L) Same
No fauna

5030 (L) Same with increase in shell fragments & pyrite
No fauna

5060 (L) 70% shale, 30% shell fragments & sandstone plus
common pyrite
No fauna

5090 (L) Same
No fauna

5120 (L) Same
No fauna

5150 (L) Same
No fauna

5180 (L) 70% shale, 30% shell fragments & sand plus pyrite
No fauna

5210 (L) Same
No fauna

5240 (L) 60% shale, 40% sand & shell fragments plus lignite
No fauna

5270 (L) 70% shale, 30% shell fragments & sand
No fauna

5300 (L) Same
No fauna

5330 (L) 80% shale, 20% shell fragments & sand
No fauna

5360 (L) 70% shale, 30% very fine grained calcareous
sandstone plus shell fragments & minor pyrite
Charapod (1)

5390 (L) 80% shale, 20% sand & shell fragments
No fauna

5420 (L) 60% shale, 40% sand
No fauna

5450 (L) 50% shale, 40% shell fragments & sand plus
lignite & minor pyrite
Rotalia beccarii (2)

5480 (L) 70% shale, 30% shell fragments & sand plus pyrite & lignite
No fauna

5510 (L) 60% shale, 40% sand & shell fragments plus minor lignite & pyrite
Rotalia beccarii (1)

5540 (L) 60% finely crystalline white limestone & shell fragments, 40% shale
No fauna

5570 (L) 70% shale, 30% shell fragments with minor sand
No fauna

5600 (L) Same
No fauna

5630 (L) Same plus pyrite
No fauna

5660 (L) 70% shale, 30% sand & shell fragments
No fauna

5690 (L) Same
Rotalia beccarii

5720 (L) 80% shale, 20% sand & shell fragments
Amphistegina B (1)

5750 (L) Same
No fauna

5780 (L) Same
Rotalia beccarii, Amphistegina B (1)

5810-40 Gap

5840 (L) 70% shale, 30% sand & shell fragments
Amphistegina B

5870 (L) 80% shale, 20% sand & shell fragments
Rotalia beccarii

5900 (L) 70% shale, 30% shell fragments & very fine grained calcareous sandstone & loose sand
Amphistegina B, Rotalia beccarii

5930 (L) Same
Same fauna

5960 (L) Same
No fauna

6000 (L) Same
Amphistegina B, Rotalia beccarii

6030 (L) 70% shale, 30% sand & shell fragments
Rotalia beccarii

6060 (L) Same
No fauna

6090 (L) 80% shale, 20% sand & shell fragments
No fauna

6120 (L) Same
No fauna

6150 (L) 70% shale, 30% shell fragments & sand
No fauna

6180 (L) Same
No fauna

6210 (L) Same
No fauna

6240 (L) 80% shale, 20% sand & shell fragments
No fauna

6270 (L) Same
No fauna

6300 (L) Same
No fauna

6330 (L) Same
No fauna

6360 (L) Same plus minor limestone
No fauna

6390 (L) Same
No fauna

6420 (L) 60% shale, 40% very fine to coarse grained
loose quartz sand, shell fragments & limestone
No fauna

6450 (L) 70% shale, 30% sand as above
No fauna

6480 (L) 60% shale, 40% fine to coarse grained loose
quartz sand
No fauna

6510 (L) 70% shale, 30% sand
No fauna

6540 (L) Same
No fauna

6570 (L) Same
No fauna

6600 (L) Same
No fauna

6630 (L) Same
No fauna

6660 (L) Same
No fauna

6690 (L) Same
No fauna

6720 (L) Same
No fauna

6750 (L) 70% shale, 30% sand & shell fragments with minor
finely crystalline limestone
No fauna

6780 (L) Same
No fauna

6810 (L) 80% shald, 20% sand
No fauna

6840 (L) 70% shale, 30% fine to coarse grained sand
No fauna

6870 (L) 80% shale, 20% sand
No fauna

6900 (L) Same
No fauna

6930	(L) Same No fauna
6960	(L) Same No fauna
6990	(L) Same No fauna
7020	(L) Same No fauna
7050	(L) 70% shale, 30% loose quartz sand, rounded, frosted, fine to coarse grained No fauna
7080	(L) Same No fauna
7110	(L) Same No fauna
7140	(L) Same No fauna
7170	(L) Same No fauna
7200	(L) Same No fauna
7230	(L) 60% shale, 40% sand No fauna
7260	(L) Same plus minor pyrite No fauna
7290	(L) Same No fauna
7320	(L) Same No fauna
7350	(L) 70% shale, 30% loose quartz sand, medium to very coarse grained, frosted, rounded No fauna
7380	(L) 80% shale, 20% fine to coarse grained sand No fauna

7410 (L) Same
No fauna

7440 (L) Same
No fauna

7470 (L) 70% shale, 30% sand & shell fragments with minor pyrite
No fauna

7500 (L) 70% shale, 30% shell fragments with minor pyrite
No fauna

7530 (L) 80% shale, 20% sand & shell fragments with minor pyrite & lignite
No fauna

7560 (L) Same
No fauna

7590 (L) 70% shale, 30% very fine to fine grained, calcareous sandstone plus shell fragments
No fauna

7620 (L) 80% shale, 20% sand & shell fragments
No fauna

7650 (L) Same
No fauna

7680 (L) Same
No fauna

7710 (L) Same
No fauna

7740 (L) Same
No fauna

7770 (L) Same
Rotalia beccarii (1)

7800 (L) Same
No fauna

7830 (L) 70% shale, 30% fine to coarse grained quartz sand
No fauna

7860 (L) Same
No fauna

7890	(L) Same No fauna
7920-50	Gap
7950	(L) 70% shale, 30% sand & shell fragments No fauna
7980	(L) 70% shale, 30% very fine to fine grained calcareous sandstone plus minor limestone No fauna
8010	(L) Same No fauna
8040	(L) Same No fauna
8070	(L) 80% shale, 20% sand & shell fragments No fauna
8100	(L) Same No fauna
8130	(L) Same No fauna
8160	(L) Same No fauna
8190	(L) Same No fauna
8220	(L) 70% shale, 30% fine grained calcareous sandstone with minor limestone, shell fragments & pyrite No fauna
8250	(L) Same No fauna
8280	(L) Same No fauna
8310	(L) 80% shale, 20% sand & shell fragments Same fauna
8340	(L) 80% shale, 20% very fine to fine grained calcareous sandstone No fauna

8370 (L) Same
No fauna

8400 (L) Same
Rotalia beccarii (1)

8430 (L) Same
Siphonina davisi (1)

8460 (L) 60% shale, 40% very fine to fine grained calcareous sandstone plus pyrite & shell fragments
No fauna

8490 (L) 60% calcareous sandstone, & shell fragments,
40% shale plus pyrite
Elphidium sp., *Rotalia beccarii*

8520 (L) 70% shale, 30% sandstone & shell fragments
plus pyrite
Same fauna

8550 (L) 60% very fine to fine grained calcareous slightly glauconitic sandstone with shell fragments, 40% shale plus pyrite
Rotalia beccarii, *Nonion* sp., *Elphidium* sp.

8580 (L) Same
Rotalia beccarii, *Robulus americanus* (1), *Elphidium* sp.

8610 (L) 50% shale, 50% sandstone & shell fragments
No fauna

8640 (L) 60% shale, 40% sandstone & shell fragments with minor glauconite & pyrite
No fauna

8670 (L) Same
No fauna

3700 (L) Same
Elphidium sp.

8730 (L) 60% very fine grained to fine grained calcareous sandstone, 40% shale
No fauna

8760 (L) 60% shale, 40% sandstone & shell fragments plus pyrite
No fauna

8790 (L) 70% shale, 30% calcareous sandstone plus shell fragments & pyrite
Elphidium sp.

8820	(L) Same No fauna
8850	(L) Same No fauna
8880	(L) Same No fauna
8910	(L) Same Nonion sp. (1)
8940	(L) Same No fauna
8970	(L) 80% shale, 20% sandstone No fauna
9000	(L) Same No fauna
9030	(L) Same No fauna
9060	(L) 70% shale, 30% sandstone No fauna
9090	(L) 70% shale, 30% loose quartz sand, very fine to fine grained with minor shell fragments & pyrite No fauna
9120	(L) 60% shale, 40% calcareous sandstone & loose sand plus shell fragments & pyrite No fauna
9150	(L) 70% shale, 30% sand & shell fragments No fauna
9180	(L) Same No fauna
9210	(L) 70% shale, 30% sandstone & shell fragments No fauna
9240	(L) Same No fauna
9270	(L) 80% shale, 20% sand & sandstone No fauna

9300 (L) Same
No fauna

9330 (L) Same
Nonion sp., Globigerina sp.

9360 (L) Same
Cristellaria A, Cristellaria R, Siphonina davisi,
Globigerina sp.

9390 (L) Same plus minor glauconite pellets
Same fauna plus Eponides ellisoreae

9420 (L) Same
Same fauna, common

9450 (L) Same
Same fauna plus Cibicides concentricus, Uvigerina
howei (rare)

9480 (L) Same
Same fauna, rare

9510 (L) 70% shale, 30% sand, sandstone fragments, shell
material with common pyrite, rare glauconite
Cristellaria R, Cristellaria A, Liebusella cf.
byramensis, Globigerina spp., Nonion pizzarene,
Eponides antillarum, Robulus americanus, Discorbis
bolivarensis

9540 (L) Same
Same fauna

9570 (L) Same
Same fauna

9600 (L) Same
Same fauna

9630 (L) Same
Same fauna

9660 (L) Same
Same fauna

9690 (L) 90% shale, 10% sand & shell material
Same fauna, increase with Lenticulina jeffersonensis,
Uvigerina howei, Robulus chambersi, Siphonina advena,
Liebusella byramensis, Uvigerina peregrina, Textularia B,
Globigerina spp., common fauna

9720 (L) Same
Same fauna

9750 (L) Same
Same fauna

9780 (L) 60% shale, 40% sand & shell material
Same fauna with *Discorbis gravelli*, *Heterostegina* sp.,
rare

9810 (L) Same
Same fauna with *Discorbis gravelli*, *Heterostegina* sp.

9840 (L) Same
Same fauna

9870 (L) Same
Same fauna

9900 (L) Same
Same fauna

9930 (L) Same
Same fauna

9960 (L) Same
Same fauna

9990 (L) Same
Same fauna

10020 (L) Same
Same fauna

10050 (L) Same
Same fauna with *Globigerina* spp., common

10080 (L) 80% shale, 20% sand
Globigerina spp., common, *Lenticulina jeffersonensis*,
Cristellaria R, *Robulus chambersi*, *Quinqueloculina* sp.,
Siphonina advena, *Discorbis gravelli*, *Textularia* B,
Uvigerina howei, *Uvigerina peregrina*, *Bulimina* cf. *ovata*

10110 (L) Same
Same fauna plus *Cibicides jeffersonensis*

10140 (L) Same
Same fauna with *Globigerina* spp., abundant, *Cibicides*
jeffersonensis

10170 (L) Same
Same fauna

10200 Gap

10230 (L) Same
 Same fauna

10260 (L) Same
 Same fauna

10290 (L) Same with fairly common green glauconite
 Same fauna

10320 (L) Same with common glauconite
 Same fauna

10350 (L) Same
 Same fauna

10380 (L) Same
 Same fauna

10410 (L) 80% shale, 20% sand with common glauconite
 Globigerina spp., Cibicides jeffersonensis,
 Lenticulina jeffersonensis, Eponides ellisora,
 Siphonina advena, Liebusella byramensis,
 Nonion pizzarensis, Cristellaria cf. G, Bulimina
 cf. ovata, Discorbis bolivarensis, Discorbis
 gravelli, Gyroidina hannai

10440 (L) Same
 Same fauna

10470 (L) Same
 Same fauna

10500 (L) Same
 Same fauna

10530 (L) Same
 Same fauna

10560 (L) Same
 Same fauna

10590 (L) Same
 Same fauna with Bolivina perca

10620 (L) Same
Same fauna with *Bolivina perca* missing

10650 (L) Same
Same fauna plus *Uvigerina israelskyi*, *Robulus aff. lacerta*, *Bolivina perca*

10680 (L) Same
Same fauna with *Eggerella* sp., *Uvigerina israelskyi*, *Robulus aff. lacerta*

10710 (L) 80% shale, 20% limey sandstone & siltstone
Liebusella cf. *byramensis*, *Globigerina* spp., *Uvigerina israelskyi*, *Robulus* cf. *lacerta*, *Siphonina advena*, *Heterostegina* sp., *Robulus americanus*, *Eponides ellisorae*, *Textularia* 12, *Textularia* B, *Textularia mornhingegi*, *Lenticulina jeffersonensis*

10740 (L) Same
Same fauna

10770 (L) Same
Same fauna

10800 (L) Same
Same fauna

10830 (L) Same
Same fauna

10860 (L) Same
Same fauna

10890 (L) Same
Same fauna

10920 (L) Same
Same fauna with *Robulus* cf. *lacerta*

10950 (L) 80% shale, 20% sand
Robulus cf. *lacerta*, *Globigerina* spp., *Siphonina advena*, *Textularia* B, *Discorbis bolivarensis*, *Lenticulina jeffersonensis*, *Bulimina* cf. *ovata*, *Liebusella* cf. *byramensis*

10980 (L) Same
Same fauna plus *Textularia mornhinvegi*, *Bolivina perca*, *Uvigerina israelskyi*, *Robulus lacerta*, *Cibicides jeffersonensis*, *Uvigerina peregrina*

11010 (L) Same
Same fauna

11040 (L) Same
Same fauna

11070 (L) Same
Same fauna

11100 (L) Same
Same fauna with Marginulina idiomorpha, Angulogerina A

11130 (L) Same
Same fauna

11160 (L) Same
Same fauna

11190 (L) Same with mud additives
Same fauna plus Marginulina aff. vaginata fragments

11220 (L) Same
Same fauna with Textularia cf. 14

11250 (L) Same
Same fauna

11310 (L) Same
Same fauna plus Marginulina vaginata

11340 (L) 60% shale, 40% sand & sandstone fragments,
with mud additives
Same fauna with Reophax sp., Cristellaria cf. F,
with Marginulina vaginata missing

11370 (L) Same
Same fauna with Marginulina vaginata

11400 (L) 60% shale, 40% sand & sandstone fragments,
with mud additives
Globigerina spp., Uvigerina peregrina, Uvigerina
howei, Robulus lacerta, Liebusella byramensis,
Eponides ellisorae, Cristellaria F, Reophax sp.
Bolivina perca, Textularia cf. 14, Gyroidina
hanni, Cibicides (1-1)

11430 (L) 80% shale, 20% sand & sandstone fragments
with mud additives
Same fauna

11460 (L) Same
Same fauna

11490 (L) Same
Same fauna

11520 (L) Same
Same fauna

11550 (L) Same
Same fauna plus Marginulina howei, Marginulina
vaginata-hooked

11580 (L) Same
Same fauna with Marginulina howei

11610 (L) Same
Same fauna

11640 (L) Same
Same fauna

11670 (L) Same
Same fauna

11700 (L) Same
Same fauna

11730 (L) Same
Same fauna

11760 (L) Same
Same fauna with Cibicides (1-1) L

11790 (L) Same
Same fauna

11820 (L) Same
Same fauna

11850 (L) Same
Same fauna

11880 (L) Same
Same fauna

11910 (L) Same
Same fauna

11940 (L) Same
Same fauna

11970 (L) 80% shale, 20% sand
Uvigerina howei, Uvigerina peregrina, Globigerina spp.,
Liebusella byramensis, Cristellaria F, Marginulina
vaginata, Eponides ellisoreae, Siphonina advena,
Robulus lacerta

12000 (L) Same
Same fauna

12030 (L) Same
Same fauna with Cristellaria cf. G-close

12060 (L) Same
Same fauna

12090 (L) Same
Same fauna

12120 (L) Same
Same fauna

12150 (L) Same
Same fauna

12180 (L) Same
Same fauna

12210 (L) Same
Same fauna

12240 (L) Same
Same fauna

12270 (L) Same
Same fauna with Cibicides (1-1) L, Textularia 14,
Cristellaria G

12300 (L) Same
Same fauna with Camerina cf. A

12330 (L) 70% shale, 30% sand & sandstone fragments
Globigerina spp., Textularia 14, Eponides ellisoreae,
Textularia 12, Reophax sp., Marginulina vaginata,
Uvigerina howei, Cristellaria G, Cibicides (1-1) L,
Uvigerina israelskyi

12360 (L) Same
Same fauna

12390 (L) Same
Same fauna

12420	(L) Same Same fauna
12450	(L) Same Same fauna
12480	(L) 60% shale, 40% sand & sandstone fragments Same fauna
12510	(L) Same Same fauna with <i>Textularia</i> 14-coarse, <i>Cristellaria</i> G, <i>Camerina</i> A
12540	(L) Same Same fauna with <i>Camerina</i> A
12570	(L) Same Same fauna
12600	(L) Same Same fauna
12630	(L) Same Same fauna
12660	(L) Same Same fauna
12690	(L) Same Same fauna
12720	(L) Same Same fauna
12750	(L) Same Same fauna
12780	(L) Same Same fauna
12810	(L) Same Same fauna
12840	(L) Same Same fauna
12870	(L) Same Same fauna

12900 (L) 50% shale, 50% sand & sandstone fragments
Same fauna

12930 (L) 50% shale, 50% fine grained calcareous sandstone
Cristellaria sp., *Uvigerina howei*, *Globigerina* sp.

12960 (L) Same
Same fauna plus *Liebusella byramensis*

12990 (L) 70% shale, 30% sandstone
Globigerina sp., *Eponides ellisorae*, *Nonion* sp.,
Uvigerina howei

13030 (L) 50% shale, 50% sandstone
Discorbis sp.

13050 (L) 70% shale, 30% sandstone
Liebusella byramensis, *Robulus* sp., *Reophax* sp.,
Uvigerina howei

13080 (L) Same
Same fauna

13110 (L) 80% shale, 20% sandstone
Same fauna with *Uvigerina howei* common

13140 (L) Same
Same fauna

13170 (L) 70% shale, 30% sandstone
Same fauna

13200 (L) Same
Same fauna

13230 (L) 70% shale, 30% sandstone
Liebusella byramensis *Robulus* sp., *Uvigerina howei*,
Globigerina sp.

13260 (L) 80% shale, 20% sand
Same fauna plus *Eponides ellisorae*

13290 (L) Same
Same fauna

13320 (L) Same
Same fauna plus *Textularia* sp., *Marginulina vaginata*

13350 (L) Same
Same fauna

13380	(L) Same Same fauna plus <i>Nodosaria vertebralis</i>
13410	(L) Same Same fauna
13440	(L) Same Same fauna plus <i>Textularia</i> 14
13470	(L) Same Same fauna
13500 - 530	(L) Same Same fauna

SIDE TRACK HOLE

10620	(L) 70% shale, 30% sandstone, cement & mud additives <i>Globigerina</i> spp., (abundant), <i>Uvigerina israelskyi</i> , <i>Robulus lacerta</i> , <i>Cristellaria</i> A, <i>Nonion</i> sp., <i>Eponides ellisora</i> e, <i>Discorbis</i> sp., <i>Siphonina</i> <i>advena</i> , <i>Uvigerina howei</i> , <i>Bolivina perca</i>
10650	(L) Same Same fauna plus <i>Liebusella byramensis</i> , <i>Anomlaina bilaterialis</i> , <i>Discorbis bolivarensis</i>
10680	(L) 70% shale, 30% limey sandstone & shell fragments Same fauna
10710	(L) 80% shale, 20% limey sandstone plus pyrite Same fauna
10740	(L) Same Same fauna
10770	(L) Same Same fauna
10800	(L) Same Same fauna
10830	(L) Same Same fauna
10860	(L) Same Same fauna
10890	(L) Same Same fauna
10920	(L) 80% shale, 20% sand Same fauna

10950 (L) Same
Same fauna plus *Bulimina ovata* (small), *Uvigerina howei*, *Siphonina advena*, *Eponides ellisoreae*, *Lenticulina jeffersonensis*

10980 (L) Same
Same fauna plus *Discorbis gravelli*, *Bolivina perca*, *Uvigerina isrealskyi*, *Textularia* sp.

11010 (L) Same
Same fauna

11040 (L) Same
Same fauna

11070 (L) Same
Same fauna

11100 (L) Same
Same fauna

11130 (L) Same
Same fauna plus *Marginulina idiomorpha*, *Bifarina vicksburgensis*

11160 (L) Same
Same fauna

11190 (L) 80% shale, 20% sandstone & limestone plus pyrite
Same fauna plus *Marginulina cf. vaginata*, *Uvigerina howei* (common)

11220 (L) 80% shale, 20% sand
Same fauna plus *Marginulina vaginata*

11250 (L) Same
Same fauna plus *Reophax* sp., *Gyroidina hannai*

11280 (L) 70% shale, 30% sandstone plus very abundant
mud additives
Same fauna

11310 (L) Same
Same fauna

11340 (L) 80% shale, 20% sand
Same fauna

11370 (L) Same
Same fauna

11400 (L) Same
Same fauna

11430 (L) Same
Same fauna

11460 (L) Same
Same fauna

11490 (L) Same
Same fauna

11520 (L) 80% shale, 20% sand
Liebusella byramensis, *Lenticulina jeffersonensis*,
Siphonina sp., *Globigerina* sp., *Textularia* sp.,
Uvigerina howei

11550 (L) Same plus abundant pyrite
Same fauna plus *Nodosaria vertebralis*, *Bolivina perca*,
Robulus lacerta

11580 (L) Same
Same fauna plus *Marginulina howei*

11610 (L) Same
Same fauna

11640 (L) Same
Same fauna

11670 (L) 70% shale 30% sand & sandstone fragments
plus shell material, pyrite
Liebusella cf. *byramensis*, *Siphonina advena*, *Uvigerina peregrina*, *Uvigerina howei*, *Marginulina howei*,
Eponides ellisoreae, *Marginulina idiomorpha*, *Robulus lacerta*, *Lenticulina jeffersonensis*, *Textularia* 12,
Globigerina spp., *Spiroplectammina* cf. *mississippiensis*,
Heterostigina sp., *Bolivina perca*

11700 (L) Same
Same fauna with *Uvigerina isrealskyi*

11730 (L) Same
Same fauna

11760 (L) Same
Same fauna with *Cibicides* (1L), *Cyclammina* H

11790 (L) Same
Same fauna

11820 (L) Same
Same fauna

11850 (L) 60% shale, 40% sand & sandstone fragments
Same fauna

11880 (L) Same
Same fauna

11910 (L) Same
Same fauna with *Textularia morhenvegi*, *Reophax* sp.

11940 (L) Same
Same fauna

11970 (L) Same
Same fauna

12000 (L) 70% shale, 30% sand & sandstone fragments
Same fauna with *Cibicides* (1L) L, *Cristellaria* cf. G

12030 (L) Same
Same fauna

12060 (L) Same
Same fauna with *Cristellaria* cf. G-close

12090 (L) Same
Same fauna

12120 (L) 70% shale, 30% sand & sandstone fragments with
rare shell material, pyrite, glauconite
Marginulina howei, *Marginulina vaginata*, *Cristellaria*
cf. G-close, *Lenticulina jeffersonensis*, *Liebusella*
byramensis, *Uvigerina peregrina*, *Cristellaria* F,
Globigerina spp., *Eponides ellisora*e, *Bolivina perca*,
Cibicides (1L) L

12150 (L) Same
Same fauna

12180 (L) Same
Same fauna

12210 (L) Same
Same fauna

12240 (L) Same
Same fauna with *Cibicides* (1L) L-large, *Cristellaria* G

12270 (L) Same
Same fauna

12300 (L) Same
Same fauna with *Cristellaria* G-good

12330 (L) Same
Same fauna with *Textularia* 14

12360 (L) Same
Same fauna

12390 (L) Same
Same fauna

12420 (L) Same
Same fauna

12450 (L) Same
Same fauna

12480 (L) 60% shale, 40% sand & sandstone fragments
Same fauna

12510 (L) Same
Same fauna with *Reophax* sp., *Textularia* 14

12540 (L) Same
Same fauna with *Marginulina vaginata*-hooked

12570 (L) 80% shale, 20% sandstone, sand
Uvigerina peregrina, *Globigerina* spp., *Uvigerina howei*, *Uvigerina isrealskyi*, *Liebusella byramensis*, *Eponides ellisorae*, *Camerina* A, *Cibicides* (1L) L, *Cristellaria* G

12600 (L) Same
Same fauna with *Textularia* 14-coarse, *Camerina* A, rare

12630 (L) Same
Same fauna

12660 (L) Same
Same fauna

12690 (L) Same
Same fauna

12720 (L) 50% shale, 50% sandstone fragments & sand
Same fauna

12750 (L) Same
Same fauna

12780 (L) Same with mud additives
Same fauna

12810 (L) Same
Same fauna

12840 (L) Same
Same fauna

12870 (L) Same
Same fauna

12900 (L) Same
Same fauna

12930 (L) Same
Same fauna

12960 (L) 60% shale, 40% sandstone fragments & sand
Cristellaria G, Cibicides (1L) L, Textularia 14,
Globigerina spp., Liebusella byramensis, Uvigerina
howei, Uvigerina peregrina, Siphonina advena

12990 (L) Same
Same fauna

13020 (L) Same
Same fauna

13050 (L) Same
Same fauna, sparse

13080 (L) 80% shale, 20% sandstone fragments & sand
Same fauna, increase

13110 (L) Same
Same fauna

13140 (L) Same
Same fauna

13170 (L) Same
Same fauna

13200 (L) Same
Same fauna

13230 (L) Same
Same fauna

13260 (L) Same
Same fauna

13290 (L) Same
Same fauna

13320 (L) Same
Same fauna

13350 (L) Same
Same fauna

13380 (L) Same
Same fauna

13410 (L) Same
Same fauna

13440 (L) Same
Same fauna

13470 (L) Same
Same fauna

13500 (L) Same
Same fauna

13530 (L) Same
Same fauna with *Reophax* sp.

13560 (L) 80% shale, 20% sandstone fragments & sand
Uvigerina howei, *Uvigerina peregrina*, *Globigerina* spp.,
Cibicides (1L) L, *Cristellaria* G, *Discorbis* *gravelli*,
Bolivina *perca*

13590 (L) Same with mud additives
Same fauna

13620 (L) Same
Same fauna

13650 (L) Same
Same fauna

13680 (L) Same
Same fauna

13710 (L) Same
Same fauna

13740	(L) Same Same fauna
13770	(L) Same Same fauna
13800	(L) Same Same fauna
13830	(L) Same Same fauna
13860	(L) Same Same fauna
13890	(L) Same Same fauna
13920	(L) Same Same fauna
13950	(L) Same Same fauna
13980	(L) Same Same fauna
14010	(L) Same Same fauna
14040	(L) Same Same fauna
14070	(L) Same Same fauna
14100	(L) Same Same fauna
14130	(L) 80% shale, 20% limey sandstone fragments & sand Liebusella byramensis, Quinqueloculina sp., Robulus americanus, Cristellaria G, Globigerina spp., Lenticulina jeffersonensis, Eponides antillarum, Uvigerina israelskyi

14160 (L) Same
Same fauna

14190 Gap

14220 (L) Same
Same fauna

14250 (L) Same
Same fauna with *Miogypsinoides cf. A*

14280 (L) Same
Same fauna

14310 (L) Same
Same fauna

14340 (L) Same
Same fauna

14370 (L) Same
Same fauna (fairly common)
plus *Miogypsinoides cf. A* (rare)

14400 (L) Same
Same fauna with *Miogypsinoides cf. A* missing

14430 (L) 90% shale, 10% sand plus mud additives
Globigerina sp., *Cristellaria* sp., *Eponides ellisorae*,
Siphonina advena, *Robulus lacerta*, *Textularia* 14,
Liebusella byramensis,

14460 (L) Same
Same fauna

14490 80% shale, 20% sand
Cristellaria A, *Eponides ellisorae*, *Globigerina* sp.,
Cristellaria R, *Nonion* sp., *Uvigerina howei*

14520 (L) 90% shale, 10% sand
Same fauna

14550 (L) Same
Same fauna

14580 (L) Same
Same fauna

14610 (L) 60% shale, 40% sand
Robulus lacerta, Robulus sp., Globigerina sp., Uvigerina howei, Nonion sp., Eponides ellisora, Gyroidina sp., Textularia sp.

14640 (L) Same
Same fauna plus Marginulina vaginata, Uvigerina israelskyi, Liebusella byramensis, Bolivina sp.

14670 (L) 70% shale, 30% sand
Same fauna plus Nodosaria vertebralis

14700 (L) Same
Same fauna

14730 (L) Same
Same fauna

14760 (L) Same
Same fauna

14790 (L) Same
Same fauna

14820 (L) Same
Same fauna plus Bathysiphon sp., Miogypsinoides sp. (1)

14850 (L) 60% shale, 40% sand
Same fauna with Miogypsinoides sp. missing

14880 (L) 70% shale, 30% sand
Same fauna

14910 (L) Same
Same fauna

14940 (L) Same
Same fauna

14965 (L) Same
Same fauna

14970 (L) Same
Same fauna plus Miogypsinoides A

15000 (L) 60% sand, 40% shale
Same fauna (decrease with *Miogypsinaoides A* missing)

15030 (L) Same
Nonion sp., *Robulus lacerta*, *Textularia* sp., *Globigerina* sp., *Liebusella byramensis*, *Uvigerina howei*

15060-69 (L) Same
Same fauna, sparse

15090 (L) 70% shale, 30% sand
No fauna

15120 (L) Same
No fauna

15150 (L) Same
Discorbis sp., (1)

15180 (L) 50% sand, 50% shale
No fauna

15210 (L) 60% shale, 40% sand
No fauna

15240 (L) Same
No fauna

15270 (L) 50% sand, 50% shale
No fauna

15300 (L) Same
No fauna

15330 (L) Same
No fauna

15360 (L) 80% shale, 20% sand
No fauna

15390 (L) 60% shale, 40% sand
No fauna

15420 (L) Same
No fauna

15450 (L) Same
No fauna

15480 (L) Same
No fauna

15510 (L) 60% sand, 40% shale
No fauna

15540 (L) 70% shale, 30% sand
No fauna

15570 (L) 60% shale, 40% sand
No fauna

15600 (L) Same
No fauna

15630 (L) 80% shale, 20% sand
No fauna

15660 (L) Same
No fauna

15690- 720 (L) 70% shale, 30% sand
No fauna

APPENDIX D - GEOCHEMICAL ANALYSIS (SUMMARY)

GEOCHEMICAL ANALYSES OF SWEET LAKE GEOTHERMAL TEST:WELL PROFILE REPORT

SUMMARY

The stratigraphic section penetrated by the Sweet Lake Louisiana Geothermal Test Well over the gross interval, surface to 15,720ft TD shows an immature grading to moderately immature thermal maturation profile. The fine grained sediments contain predominantly terrestrial organic matter through the entire section and have not given any commercially significant quantities of petroleum related hydrocarbons at this well location.

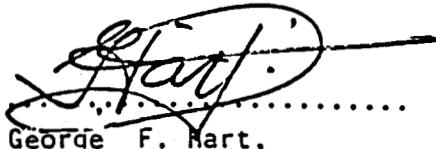
The sands penetrated within the interval 8,500 to 9,100 ft. may be prospective for reservoird gas and it is recommended that this zone be evaluated for this possibility.

The sands within the interval 14,1000 to 15,720 ft. do not appear to be prospective for methane gas production based upon the geochemical analyses. This lower part of the well has been infused with minor amounts of migrated good quality paraffinic liquid hydrocarbons. The sands in this interval could be prospective for oil liquids.

Based on the thermal maturation profile, the zone of peak generation of hydrocarbons lies at a much greater depth than that at which drilling ceased.

Prior to undertaking drilling for geopressured methane an evaluation should be made of the thermal maturation profile and organic content of the target-interval using adjacent well data including cuttings and side wall core analyses.

Geoffrey S. Bayliss
Geoffrey S. Bayliss
GEOCHEM LABORATORIES, INC.


George F. Hart,
HARTAX INTERNATIONAL, INC.
BATON ROUGE.

INTRODUCTION

This report summarizes the results of a detailed organic geochemical well study, carried out on a suite of cuttings and canned well cuttings samples, collected over the gross well interval, surface to 15,720 feet T.D., in the Sweet Lake Louisiana Geothermal Test Well, Cameron Parish, Louisiana. This well is the first well of a scheduled five (5) well program being carried out in Louisiana to investigate:

- the quality, type (gas versus oil), state of thermal maturity and the areal and stratigraphic distribution of any hydrocarbon source rocks penetrated by this well
- the crude oil-parent source rock relationships of any reservoired oil or gas encountered during the drilling of this well as a means of determining whether or not such shows represent indigenous hydrocarbon sourced from contiguous shales, or, migrated hydrocarbon generated in older and/or more mature source facies.
- the local geochemical controls influencing hydrocarbon generation, migration and reservoired petroleum composition (source material, thermal maturation and secondary thermal and nonthermal alteration etc.) in this specific area of interest.
- the quantity of methane gas which may be contained in, and producible from, the geopressured methane-rich aquifer systems potentially encounterable at depth in the local area of this well.

Analytical

In all, a total of three hundred and fourteen (314) samples comprising one hundred (100) bagged cuttings collected over the interval, surface to 6000+ feet, and two hundred fourteen (214), canned cuttings collected at sixty- (60) foot intervals over the gross well section, 6000+ feet to 15,720 feet T.D., were submitted to GeoChem for analysis. The cuttings samples collected for C₁-C₇ light gas hydrocarbon analysis were sealed in one (1) quart press-on-lid cans with bactericide added to offset bacterial methane gas generation.

The following analytical program was authorized for this study as per the original proposal submitted prior to the drilling of this well:

<u>Analytical Program</u>	<u>No. of Samples</u>
1. C ₁ -C ₇ Hydrocarbon Analysis of Headspace Cuttings.....	173
2. Washing of Samples & Bagging.....	314
3. Gross Lithological Description of Samples.....	314
4. Handpicking (wet) of Samples for Detailed C ₄ -C ₇ Hydrocarbon Analysis by Capillary Gas Chromatography.....	28
5. Detailed C ₄ -C ₇ Gasoline-range Hydrocarbon.....	28
6. Handpicking (dry) of Samples for C ₁₅₊ soxhlet extraction.....	28
7. C ₁₅₊ Soxhlet Extraction with Deasphalting.....	43
8. C ₁₅₊ Liquid Chromatographic Separation.....	43
9. C ₁₅₊ Paraffin-naphthene (P-N) Hydrocarbon Analysis.....	43
10. Picking of Sample for Total Organic Carbon (exclusive of 4 & 6).....	61
11. Total Organic Carbon Analysis.....	132
12. Visual Kerogen Assessment (OMT & TAI).....	46
13. Vitrinite Reflectance Analysis (%Ro).....	24
14. Pyrolysis by Rock-Eval.....	1

A brief description of the standard analytical procedures used in this study is appended at the rear of this report in Appendix A.

All the analytical data obtained on this well study, whether used in the final interpretation or not, is recorded in the appropriate Tables I through VII of this report, for completeness, and to serve as a future reference with data from other wells in this study program.

The results of the different geochemical analyses are presented in well-profile format in Figures 1 through 6. A lithopercantage log compiled from the gross lithological examination of the cuttings in each sample, is reproduced on Figures 1,2, and 3. The gross lithological description made on the contents of each can (or bag) is necessary to provide in-house quality control as well as being used during the interpretations. The gross lithological descriptions are provided for reference at the rear of this report under Appendix B.

The C₁₅₊ paraffin-naphthene (P-N) gas chromatographic traces have been reproduced in Figures 4-A, 4-B, 4-C and 4-D and the histogram distributions of the measured vitrinite populations in these samples are shown in Figure 5. A condensed Summary Interpretive Figure is presented along with the Summary at the beginning of this report. An additional set of all Figures is appended in a pocket at the rear of this report in order to aid the reader in cross-referencing the text with the well-profile data illustrated.

General Information

The data, interpretation, sample materials and all other matters pertaining to this well study have been treated in a highly confidential manner and are considered proprietary to the Department of Energy.

.....

ALL REMAINING USED AND UNUSED, PICKED AND UNPICKED CUTTING MATERIAL AND SIDE WALL CORES ARE DEPOSITED IN THE DEPARTMENT OF GEOLOGY AT LOUISIANA STATE UNIVERSITY, BATON ROUGE. IN ADDITION TO THE ROCK MATERIALS A SET OF THE GLASS STREW KEROGEN SLIDES AND THE VITRINITE PLUGS OF THE KEROGEN CONCENTRATES ANALYSED IN THIS STUDY, TOGETHER WITH THE LIQUID CHROMATOGRAPHIC FRACTIONS ISOLATED FROM THE SAMPLES ALSO ARE HOUSED IN THE DEPARTMENT OF GEOLOGY, LOUISIANA STATE UNIVERSITY, BATON ROUGE

ONE COPY OF THIS REPORT IS RETAINED BY HARTAX INTERNATIONAL, INC., ONE COPY IS LODGED WITH GEOCHEM LABORATORIES, INC., and FIVE COPIES HAVE BEEN SUPPLIED TO MAGMA GULF-TECHNADRIL, HOUSTON. ADDITIONAL COPIES MAY BE OBTAINED AT COST PLUS 15% HANDLING FEE.

RESULTS AND INTERPRETATIONSA. Organic Geochemical Zonation

The stratigraphic section penetrated by the Sweet Lake Louisiana Geothermal Test Well, over the gross well interval, surface to 15,720 feet T.D., can be divided into five (5) main zones of interest based upon the geochemical characteristics of the fine-grained sediments. One (1) of these zones, Zone C, can be further subdivided into three (3) subunits.

The zonation suggested for this well is:

<u>Zone A Sediments</u>	Surface to <u>3,300+</u> feet
<u>Zone B Sediments</u>	<u>3,300+</u> feet to <u>6,400+</u> feet
<u>Zone C Sediments</u>	<u>6,400+</u> feet to <u>9,100+</u> feet
Subzone C ₁	<u>6,400+</u> feet to <u>7,350+</u> feet
Subzone C ₂	<u>7,350+</u> feet to <u>8,500+</u> feet
Subzone C ₃	<u>8,500+</u> feet to <u>9,100+</u> feet
<u>Zone D Sediments</u>	<u>9,100+</u> feet to <u>14,100+</u> feet
<u>Zone E Sediments</u>	<u>14,100+</u> feet to 15,720 feet T.D.

The Zone A Sediments, surface to 3,300+ feet, were bagged wet samples representing a varied lithology comprised of sand, fossil fragments (shell), gravel, pebble and light gray mudstone. The sample quality was overall very poor.

Similar remarks apply to the Zone B Sediments, 3,300+ feet to 6,400+ feet, which were also collected in bags rather than being canned. This section represented a much more uniform light gray slightly calcareous shale lithology with minor amounts of sand, fossil fragments (shell) and coal interdispersed throughout the interval.

No comments can be made about the relative gas character or gas prospectiveness, of Zones A and B since the samples were not canned over this interval. Based upon the gross lithological description of the section, it would appear that this interval should be unfavorable for the trapping of any shallow gas which may have migrated from depth in the local area of this well. The upper Zone A sediments contain significantly higher amounts of organic carbon than do the sediments of Zone B. Both zones however, contain typically terrestrially derived woody-structured and herbaceous types of organic detritus, much of which was deposited close to its origin, and which overall has subsequently experienced only a low temperature history. The sediments of both zones also contain trace amounts of amorphous-sapropel kerogen with minor amounts of algal debris. Low percentages of extractable C₁₅₊ paraffin-naphthene (P-N) hydrocarbon along with the pronounced odd-even carbon preference in the C₂₃-C₃₁ paraffin portion of the gas chromatographic traces (Figure 4-A) are all in keeping with the observations made above.

Zone C Sediments, 6,400+ feet to 9,100+ feet (and inclusive of Subzone C₁, C₂ and C₃), represents a mixed coarse quartzose sand and slightly calcareous medium light gray glauconitic shale interval with very minor amounts of limestone, shell and coal. No shows were observed in the sands although the high and variable quantities of methane noted in the Subzone C₁, 6,400+ feet to 7,350+ feet, and Subzone C₃, 8,500+ feet to 9,100+ feet, units are suggestive of possible reservoir gas. In particular, the sands within the Subzone C₃ should be closely examined for reservoir gas.

The Zone C sediments geochemically appear very similar to the overlying Zones A and B having comparable organic carbon contents, similar woody-herbaceous kerogen populations, and in being thermally immature. The presence of trace amounts of amorphous-sapropel and algal organic matter is again supported by the C₁₅-C₂₅ "skewed" C₁₅₊ paraffin-naphthene (P-N) hydrocarbon (Figures 4-A, 4-B), the low amounts of total C₁₅₊ hydrocarbon and by the low C₁₅₊ paraffin-naphthene (P-N) hydrocarbon content. The kerogen and vitrinite reflectance data are consistent with an immature Stage 1+ to 2- or 0.3 to 0.4 %Ro (Tables II-B, VI, VII; Figures 3 and 6).

Zone D Sediments, 9,100+ feet to 14,100+ feet, represent the main interval of possible hydrocarbon source rock potential penetrated by this well. The interval lithologically comprises varicolored light gray, olive-gray, medium gray to dark gray slightly calcareous slightly glauconitic shales containing uniformly low amounts of organic carbon. These shales contain only fair quantities of methane (C₁) and 'wet' gas (C₂-C₄) hydrocarbon (approx: 1000 ppm- 4000 ppm; 15%-30%; Tables I-A, I-B, I-C; Figure 1) as well as almost insignificant amounts of C₁₅₊ extractable bitumen. The kerogen is terrestrially-derived woody and herbaceous plant debris which reflects a progressive increase in thermal history with increasing depth of burial. The C₁₅₊ paraffin-naphthene (P-N) hydrocarbon has an excellent paraffinic quality in which the C₂₃-C₃₁ components show a pronounced odd over even carbon predominance (Figure 4-C). It is interesting to note that, although the analysis of the gross canned sample indicates slightly higher contents of C₅-C₇, this finding was not confirmed by the more detailed C₄-C₇ gasoline-range hydrocarbon analysis of the picked cuttings. No explanation for this observation is made at this time, other than it may represent small amounts of migrated out-of-place light gas hydrocarbon.

There is also noted an interesting divergence in the TAI and the % Ro reflectance data over this interval. This variation is clearly shown in Figure 6 where the two (2) maturity parameters separate noticeably below 9,600+ feet. [It is understood that this is approximately the beginning of the overpressured sediment zone which may be a controlling factor]. From the visual kerogen data and the histogram distribution of the vitrinite populations, (Tables II, VI, VII; Figures 3,5,6), it appears that there are no 'reworked' populations of kerogen present within these samples.

Consequently, a possible explanation of this maturity divergence may be that whereas the vitrinite measurement is a surface phenomenon, the TAI measurement is a transmitted light phenomenon. It is conceivable that geopressure effects may cause an increase in the apparent maturity of the surface of the kerogen but have little effect upon the interior of the plant particle. Further comparisons of geopressured sediments will be necessary before this type of observation or hypothetical explanation can be confirmed.

The lower Zone F Sediments, 14,100+ feet to 15,720 feet T.D., grade through a similar type of light to medium gray slightly calcareous shale into siltstone and coarse quartzose sand. This zone is characterized by a slightly higher gas wetness, slightly higher C₄-C₇ gasoline-range hydrocarbon contents and uniformly lower iC₄/nC₄ ratios. The kerogen tends to be woody with secondary amounts of herbaceous material in the uppermost one thousand (1000) feet reversing to herbaceous with secondary amounts of wood plant remains in the sandy interval.

Although no 'shows' were noted in this sand zone, the C₁₅₊ bitumen and hydrocarbon data suggest that these sands contain migrated out-of-place petroleum hydrocarbon in detectable amounts (Note: reference is made in Appendix B to trace of contamination by "oil-base mud"; samples 1825-300, -312). The sands in this interval do not appear favorable for gas production at this well location.

In reviewing the geochemical data illustrated in Figures 1 through 6, arrows have been used to emphasize significant data changes. These changes may occur at the boundaries of the zones noted, or may occur within the zones themselves.

R. Thermal Maturity and Hydrocarbon Source Character of Sediments

1. Zone A Sediments (Surface to 3,300+ feet)

The sedimentary section penetrated by the Sweet Lake Louisiana Geothermal Test Well, over the well interval, surface to 3,300+ feet, has an immature poor oil and associated gas source character and has not generated any petroleum-related hydrocarbons in the local area of this well.

This interval is moderately rich in total organic carbon content although the kerogen is predominantly woody and herbaceous with trace quantities of amorphous-sapropel (0.07%-1.85%, mean 0.73%; Table II-A, II-B; Figure 3). The immaturity suggested by the coloration of the kerogen (Stage 1+ to 2-; Table II, VI; Figures 3, 6) and by the %Ro vitrinite reflectance (Table VII; Figures 5, 6) is also supported by the low yields of C₁₅₊ total hydrocarbon and by the notable naphthenic and C₁₅₋ C₂₃ "skewed" bimodal nature of the C₁₅₊ paraffin-naphthene (P-N) hydrocarbon (Figure 4-A).

2. Zone B Sediments (3,300+ feet to 6,400+ feet)

This interval, like the overlying Zone A section, has an immature poor to very poor oil and associated gas source character. The geochemical criteria supportive of this rating are similar with those discussed for Zone A. Based upon these comparisons, both Zones A and B are nongenerative for the formation of any oil or gas and it is also unlikely that any reservoir associated with these intervals will be prospective for hydrocarbon accumulation.

3. Zone C Sediments, (6,400+ feet to 9,100+ feet)

The stratigraphic section identified as Zone C can be further subdivided into three (3) subunits, Subzone C₁, 6,400+ feet to 7,350+ feet; Subzone C₂, 7,350+ feet to 8,500+ feet; and Subzone C₃, 8,500+ feet to 9,100+ feet.

Subzone C₁, (6,400)+ feet to 7,350+ feet)

This subzone unit is a mixture of light olive-gray shales and sands. Overall, the unit is better defined geochemically as a potential reservoir facies rather than a source facies. The fine-grained shales have experienced only a moderate time-temperature history and are rated as having an immature poor petroleum source rock character.

The poor source rating is clearly demonstrated by the low organic carbon content (0.18-1.53%, mean 0.52%) and by the very poor yields of C₁₅+ bitumen and C₁₅+ hydrocarbon (131-268 ppm, mean 217 ppm; trace -79 ppm; Table IV-B; Figure 3). The C₁₅+ paraffin-naphthene (P-N) hydrocarbon profiles (Figure 4-B), confirm an admixed type of kerogen population (W;H;Am) as well as reflecting the immature thermal history these sediments have experienced. Note the bimodal naphthene envelope and the odd-even carbon preference shown by the C₂₃-C₃₁ paraffins.

The sands within Subzone C₁ are nonprospective for oil liquids and most likely are devoid of commercial quantities of gas at this well location.

Subzone C₂ (7,350+ feet to 8,500+ feet)

The sediments penetrated over this interval represent an immature poor source unit which has not sourced any petroleum-related hydrocarbon to the adjacent sands of Subzones C₁ and/or C₃.

Based upon the coloration of the recognizable plant cuticle contained in the kerogen isolated from these sediments, an immature Stage 1+ to 2- thermal alteration index (TAI) is suggested. This immaturity is confirmed by the vitrinite reflectance measurements with values between 0.3% and 0.4% Ro (Table VII; Figures 5,6).

A poor source character is indicated by the low amount of organic carbon (mean 0.50%; Tables II-A, II-B; Figure 3), the lean to moderate amounts of C₁-C₇ light gas hydrocarbon, the absence of any detectable C₄-C₇ gasoline-range hydrocarbon and the poor yields of C₁₅₊ geochemical bitumen. This Subunit does contain a slightly greater quantity of amorphous-sapropel than does either Subzones C₁ or C₃ but the amount is insignificant at this well location. If the amorphous-sapropel richness was to increase significantly within this unit in a different part of the basin, then subzone C₂ could be a potentially favorable source interval.

Subzone C₃ (8,500+ feet to 9,100+ feet)

The interval designated Subzone C₃ is again a potential reservoir facies which, in this case, is very definitely prospective for methane gas accumulation. The calcareous shales of this interval have comparable source characteristics to the overlying shales of Subzones C₁ and C₂ and as such are rated as immature poor source rock candidates.

The presence of possibly reservoired methane gas is shown by the variable moderate to high amounts of gas analyzed in the cased samples collected over this interval. Very definitely, the well logs over this zone should be carefully evaluated for gas indications. No traces or shows of reservoired petroleum liquids were observed for this interval.

4. Zone D Sediments (9,100+ feet to 14,100+ feet)

The stratigraphic section penetrated from 9,100+ feet to 14,100+ feet, represents a thick, slightly calcareous shale which is the unit of greatest interest from a source rock point of view. Unfortunately, this shale interval is rated as an immature grading to moderately immature poor oil and associated gas source which has not generated any commercially significant amounts of hydrocarbons in the local area of the Sweet Lake Louisiana Geothermal Test Well.

The immature to moderately immature ranking is based upon the yellow to yellow-orange coloration of the recognizable plant cuticle contained in the herbaceous and woody kerogens which predominate in these fine-grained shales. The TAI ranking progressively increases with depth from a Stage 1+ to 2- to a Stage 2- to 2 at 14,100+ feet. [Note: GeoChem uses a Thermal Alteration Index (TAI) ranging from immature Stage 1 to eometamorphosed Stage 5].

Interestingly, the vitrinite reflectance measurements over the same interval show a much higher rate of change (0.40-0.6% Ro; Table VII; Figures 5,6). This change is real and is based upon the indigenous vitrinite since both methods of analysis confirm the absence of any 'reworked' kerogen populations in these shales. It is suggested herein that the fact that shales below 9,100+ feet are geopressured may, in some way, result in a higher induced surface maturation phenomenon occurring. The measured alteration values could then be higher for the surface measured effects than for the transmitted light values. This observation will require additional confirmation before it can be used as a measure of geopressing effects within sediments.

The poor hydrocarbon source quality of these shales is reflected by all the geochemical parameters listed below and is largely attributable to the immature character of the sedimentary section penetrated at this well location.

Geochemical Criteria	Range Value	Mean Values
C ₁	3000+ ppm	1200+ ppm
C ₂ -C ₄	50+5000+ ppm	800+ ppm
C ₄ -C ₇	Undetectable	-
C ₁₅₊ Bitumen	139-375 ppm	237 ppm
C ₁₅₊ Total HC	trace-97 ppm	73 ppm
C ₁₅₊ P-N HC	trace-50 ppm	42 ppm
TOC	0.23-0.66%	0.36%
TAI	(1+ to 2- ranging to 2- to 2)	
Kerogen	(W;H;- ranging to H;W;-)	
P-N/AROM	0.66-1.11	0.91
CPI-A	1.05-1.36	1.15
CPI-B	1.28-2.53	1.80

The three (3) prime controls governing source rock quality, (i) amount of total organic carbon, (ii) maturity, and (iii) kerogen type, are all unfavorable for this interval to be of interest as a commercially viable source rock candidate in the local area of this well.

Although these observations downgrade this shale unit as a favorable source interval, the quality of the C₁₅₊ paraffin-naphthene (P-N) hydrocarbon (as shown by the gas chromatographic traces (Figures 4-B,4-C)) indicates an excellent paraffinic oil-likeness. This could result in this interval sourcing paraffinic crude liquids if the sediments were subjected to a more severe time-temperature geothermal history elsewhere in this area. At this point in time, the C₁₅₊ paraffin-naphthene (P-N) has an excellent paraffin content with a pronounced odd-even carbon preference. In keeping with the increasing maturity profile with depth, the CPI-A and B (Carbon Preference Indices A and B) values also tend towards unity thereby complimenting this profile.

Observed sands at 13,000+ feet and at the base of Zone D, 13,800+ feet, appear nonprospective for either oil or gas at this well site. This is additional confirmation that the contiguous shales of Zone D surrounding these sands have not generated any petroleum products.

5. Zone E Sediments (14,100+ feet to 15,720 feet T.D.)

The lower Zone E sediments could conceivably be further divided into two (2) subunits; the shale section from 14,100+ feet to 15,100+ feet, and a reservoir facies section from 15,100+ feet to 15,720 feet T.D. This has not been done since the uppermost shale portion of this unit has all the geochemical similarities to the overlying Zone D shales, namely are representative of a moderately immature poor oil and associated gas source interval.

There is a slight overall increase in this zone of the light C₁-C₇ gas hydrocarbon components, largely reflected by the increase in the percent gas wetness and the C₅-C₇ hydrocarbon (Tables I-A, I-B, I-C; Figure 1). Similarly, the C₄-C₇ gasoline-range hydrocarbon is present in detectable amounts but perhaps more significantly, the C₁₅₊ paraffin-naphthene (P-N) and aromatic (AROM) hydrocarbon contents in the C₁₅₊ bitumen are considerably greater than in the overlying shales.

These observations, when considered with respect to the presence of trace amounts of reservoird oils being suggested in the underlying reservoir facies, indicate that the entire Zone E interval has been infused with oil most likely sourced from underlying and as yet unpenetrated source rocks at depth.

The presence of migrated crude oil in the shales and sands of this interval is shown by the relatively higher percentage of total hydrocarbon in the bitumen (bitumen 352-907 ppm, mean 601 ppm; total HC 124-506 ppm, mean 294 ppm; Table IV-B, Figure 3), the higher percentage of C₁₅₊ paraffin-naphthene (P-N) hydrocarbon (17.3-34.9%, mean 26.8%; Table IV-C; Figure 4-D) and by the excellent good quality paraffinic-oil like character of the C₁₅₊ paraffin-naphthene (P-N) hydrocarbon (Figure 4-D).

Interestingly, the sands below 15,100+ feet do not appear to contain any quantity of reservoird gas based upon the geochemical data. Consequently, unless geopressured sands thoroughly degassed during transport up the well bore, it would appear that these sands are nonprospective for insitu gas at this well location.

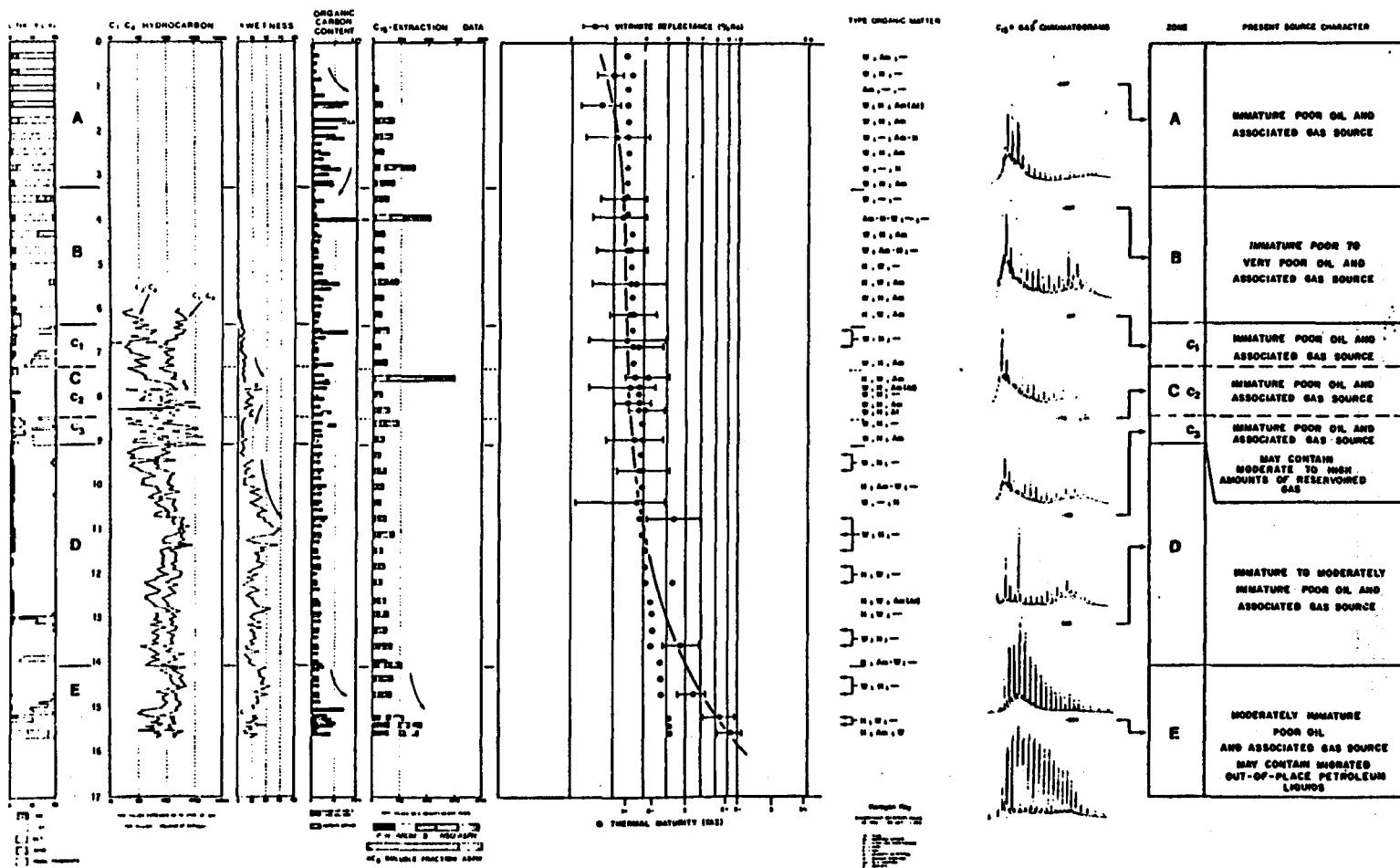
EXPLORATIONAL SIGNIFICANCE OF RESULTS

The stratigraphic section penetrated by the Sweet Lake Louisiana Geothermal Test Well, Cameron Parish, Louisiana, over the entire 15,720 feet has an immature grading to moderately immature poor oil and associated gas source character and it is unlikely that these shales have generated any significant amounts of oil or gas at this well location. Consequently, any of the potential reservoir facies penetrated by this well appear to be nonprospective for indigenously generated hydrocarbon. These sands can only be prospective if migrated oil and gas, sourced from more thermally mature and more organic rich lateral equivalents or from deeper and as yet unpenetrated sediments, has been entrapped.

Based upon the data obtained herein, the sands associated with Subzone C₃, 8,500+ feet to 9,100+ feet, are potentially prospective for methane gas but not for any petroleum liquids. Similarly, the sands below 14,100+ feet in Zone E are potentially prospective for petroleum-related liquids but do not appear favorable for gas. This latter statement must be tempered by the fact that little is known about the geochemical characteristics of geopressured reservoir sands or how efficiently they degas during the drilling and subsequent sampling operations.

There is evidence suggesting that oil liquids and minor amounts of associated gas, has moved into the lower Zone E section. Consequently, any reservoirs present within the underlying sedimentary sections may be prospective in the local area of this well.

INTERPRETIVE SUMMARY FIGURE



APPENDIX E - LOG ANALYSIS REPORT

Well Log Analysis Report

July 1, 1981

Sweetlake Project
Magma Gulf-Technadril-D.O.E.
Amoco Fee #1
Cameron Parish, Louisiana

F. S. Millard
Consultant

Well Log Analysis Report
Sweetlake Project
Magma Gulf - Technadril - D. O. E.
Amoco Fee #1, Cameron Parish, Louisiana

An analysis of the Miogypsina sands drilled in the Amoco Fee #1 has been completed and is presented herewith.

The best productivity results can be expected from Zone IV (15250' to 15282') and Zone VI (15384' to 15415') Both zones appear to be clean sands and exhibit good porosities. Other zones in order of preference are as follows; Zone V (15311' to 15324'), Zone VIII (15524' to 15573'), Zone VII (15463' to 15503'), Zone III (15172' to 15240') and Zone II (15082' to 15145').

Porosity values were determined from a cross plot of the neutron porosity log (corrected for borehole environment) and density log porosity. The depth intervals, log values, resultant porosity (ϕ_e), shale fraction (V_{sh}) and an Rwa analysis are presented on the "Well Log Analysis" work sheets. Results of the study including summaries and comments are also presented on the report forms.

Some variations in the Rwa analysis were observed, however they do not indicated gas saturation in my opinion.

Individual intervals analyzed for each Zone have been marked on the Induction log for reference and a copy is attached to the report.

July 1, 1981
F. S. Millard
Consultant

WELL Amoco Fee #1

ELEVATION 40.7' K.B.

LOCATION FSWC Sec. 13, N 1650' & E 2310' to Location, Sec. 13, 12S, 8W

FIELD	Sweetlake		COUNTY	STATE
DEPTH INTERVAL	NET FEET	POROSITY ESTIMATE %	WATER SATURATION ESTIMATE %	REMARKS
Zone I, 15036'	to 15080'			
15036-39	0	8.0		Sd., very shly, tight.
15054-58	0	8.7		Sd., very shly, tight.
15066-69	3	15.4		Sd., very shly.
15076-79	0	14.2		Sd., very shly, tight.
	3 Net Feet			
	15.4% = Average Porosity Estimate.			
	Poor sand quality.			
Zone II, 15080'	to 15172'			
15082-90	8	15.4		Sd., shly.
15093-95	2	14.8		Sd., slightly shly.
15096-99	3	18.4		Sd., shly.
15100-103	3	16.5		Sd., very shly.
15103-07	4	18.5		Sd., clean.
15107-12	5	18.8		Sd., slightly shly.
15112-14	2	16.4		Sd., slightly shly.
15114-20	0	7.6		Sd., very shly, tight.
15120-24	4	15.8		Sd., slightly shly.
15124-26	2	11.9		Sd., shly.
15126-29	3	14.0		Sd., very shly.
15129-32	0	10.4		Sd., very shly, tight.
15132-38	6	14.3		Sd., shly.
15138-45	7	13.7		Sd., very shly.
	49 Net Feet			
	15.7% = Average Porosity Estimate			
	Fair to good sand quality.			
Zone III, 15172'	to 15248'			
15172-78	6	16.7		Sd., slightly shly.
15178-85	7	12.1		Sd., very shly.
15185-90	5	14.9		Sd., clean.
15190-92	2	17.2		Sd., clean.
15192-94	2	15.7		Sd., clean.
15194-96	2	17.0		Sd., clean.
15200-205	5	17.0		Sd., clean.
15205-12	7	14.8		Sd., clean.
15212-17	5	14.5		Sd., slightly shly.
15218-24	6	16.0		Sd., slightly shly.
15224-27	3	13.6		Sd., slightly shly.
15227-30	3	12.5		Sd., very shly.
15230-32	2	15.0		Sd., slightly shly.
15232-36	4	13.0		Sd., very shly.
15236-40	4	10.5		Sd., shly.
	63 Net Feet			
	14.6% = Average Porosity Estimate			
	Fair to good sand quality.			

OPERATOR Magma Gulf - Technadril - D.O.E.

E-5

WELL Amoco Fee #1

ELEVATION 40.7' K.B.

LOCATION FSWC Sec. 13, N 1650' & E 2310' to Location, Sec. 13, 12S, 8W.

FIELD	Sweetlake		COUNTY	Cameron	STATE	Louisiana
DEPTH INTERVAL	NET FEET	POROSITY ESTIMATE %	WATER SATURATION ESTIMATE %		REMARKS	
Zone IV, 15248' to 15304'						
15250-55	5	19.5			Sd., clean.	
15255-57	0	14.5			Sd., very shly, tight.	
15257-59	0	7.0			Sd., very shly, tight.	
15265-69	4	20.5			Sd., clean.	
15269-73	4	20.5			Sd., clean.	
15273-79	6	18.8			Sd., clean.	
15279-82	3	22.2			Sd., clean.	
	22 Net Feet					
	20.0% = Average Porosity Estimate.					
	Excellent sand quality.					
Zone V, 15304' to 15384'						
15304-08	0	9.0			Sd., very shly, tight.	
15311-16	5	20.0			Sd., clean.	
15316-20	4	18.0			Sd., shly.	
15320-24	4	18.8			Sd., slightly shly.	
15324-30	6	18.4			Sd., clean.	
15340-48	0	12.8			Sd., very shly, tight.	
	19 Net Feet					
	18.8% = Average Porosity Estimate.					
	Good sand quality.					
Zone VI, 15384' to 15456'						
15388-96	8	23.3			Sd., clean.	
15396-402	6	22.5			Sd., clean.	
15402-04	0	20.0			Sd., very shly, tight.	
15404-12	8	23.3			Sd., clean.	
15412-15	3	23.7			Sd., clean.	
	25 Net Feet					
	23.2% = Average Porosity Estimate.					
	Excellent sand quality.					
Zone VII, 15456' to 15520'						
15463-66	3	16.5			Sd., clean.	
15466-70	0	5.6			Sd., very shly, tight.	
15470-72	2	17.2			Sd., clean.	
15472-76	4	13.0			Sd., slightly shly.	
15476-82	6	15.2			Sd., clean.	
15482-92	10	14.6			Sd., clean.	
15492-500	8	14.5			Sd., slightly shly.	
15500-503	3	17.3			Sd., clean.	
	36 Net Feet					
	15.0% = Average Porosity Estimate.					
	Good sand quality.					

OPERATOR Magma Gulf - Technadril - D.O.E.

WELL Amoco Fee #1

E-6

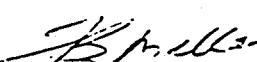
ELEVATION 40.7' K.B.

LOCATION FSWC Sec. 13, N 1650' & E 2310' to Location, Sec. 13, 12S, 8W.

FIELD	Sweetlake		COUNTY	STATE
DEPTH INTERVAL	NET FEET	POROSITY ESTIMATE %	WATER SATURATION ESTIMATE %	Louisiana
Zone VIII, 15520' to 15588'				
15524-28	4	19.2		Sd., slightly shly.
15532-41	9	17.1		Sd., clean.
15544-50	6	17.7		Sd., clean.
15557-59	2	15.6		Sd., clean.
15568-73	5	16.3		Sd., slightly shly.
	26 Net Feet			
	17.3% = Average Porosity Estimate.			
	Good sand quality.			
Zone IX, 15588' to 15627'				
15591-94	3	17.8		Sd., clean.
15594-96	2	16.3		Sd., shly.
15603-07	4	16.7		Sd., very shly.
15607-12	5	16.0		Sd., shly.
15612-14	2	15.2		Sd., very shly.
15624-27	3	15.0		Sd., very shly.
	19 Net Feet			
	16.2% = Average Porosity Estimate.			
	Fair to poor sand quality.			
Total net feet of sand for all Zones = 262'				

RECOMMENDATIONS: Test Zones IV and VI for maximum productivity. Test Zones II, III, V, VII, VIII and IX if necessary for additional productivity.

TEST INFORMATION:


LOG ANALYSIS BY: F. S. Millard

DATE July 1, 1981

WELL MA 9 GULF-TECHNADEN - D.O.E., Anoco FFF #1

LOCATION E SW 1/4 SEC. 13, N 1650' E E 2310' 70 LOC.

FIELD SWEET LAKE SEC. 18-125-8W

STATE LOUISIANA

DATE LOGS RUN 1-17-81

TYPE LOGS RUN DIL-SFL-SOMVR-FIX-CAL-BR(SW)

LOGS ANALYZED BY F. S. MILLARD

DATE ANALYZED 6-30-81

FT	°F	\$1m	\$2m	\$3m
0	610	0.78	0.49	
15737	300		0.157	
				Rate = 0.152
WATER = 37AIV, GROWTH = 17AIV, 1/1000 = 2				
DSM = 8.				
1 = 100%				
1 = 100%				

WELL LOG ANALYSIS

WELL MAGMA GULF - TECHNADRIC - D.O.E, AMOCO FEE \$1

LOCATION _____

DATE LOGS RUN 1-17-81

FIELD SWEETLAKE

TYPE LOGS RUN

TYPE LOGS RUN 1 LOGS ANALYZED BY F. S. MILLARD

124512-1

LOGS ANALYZED BY 1000000000

ZONE NO.	INTERVAL INVESTIGATED (REF: 1L-621)	(1) NET FT	(2) GR	(3) VSH % X 100	(4) dts	(5) dts	(6) dts	(7) dts X 100	(8) F	(9) Riva	(10) Riva ANG.	(11) Riva SP	(12) Riva L.D.	(13)	(14)	(15)
1	ZONE III															
2	15172-78	6	45.	5.	17.0	18.0	17.0	16.7	28.7	.031	.027	.033	0.98			
3	15178-85	7	57.	24.	17.5	19.0	14.0	12.2	53.7	.019			1.04			
4	15185-90	5	35.	0.	13.5	14.5	15.2	14.9	36.	.027			1.00			
5	15190-92	2	35.	0.	15.0	16.0	18.0	17.4	27.	.034			0.92			
6	15192-94	2	35.	1.	14.8	15.8	15.6	15.7	32.4	.030			0.98			
7	15194-96	2	35.	0	13.0	14.0	19.0	17.0	27.7	.035			0.99			
8	15200-05	5	35	0.	14.2	15.2	18.2	17.0	27.7	.033			0.90			
9	15205-12	7	40	0.	13.3	14.3	15.0	14.8	36.5	.032			1.15			
10	15212-17	5	40.	6.	13.2	14.2	15.0	14.5	38.	.029			1.10			
11	15218-24	6	45.	5.	16.5	17.5	16.5	16.0	31.3	.031			0.97			
12	15224-27	3	50.	5.	14.0	15.0	14.0	13.6	42.3	.023			1.00			
13	15227-30	3	55.	21.	15.8	16.8	12.3	12.5	51.2	.021			1.10			
14	15230-32	2	50	6.	15.5	16.5	15.0	15.0	35.5	.031			1.10			
15	15232-36	4	55.	23.	18.3	19.8	15.0	13.0	47.3	.021			1.00			
16	15236-40	4	45.	10.	15.0	16.3	12.3	10.5	72.5	.016			1.15			
17		63	NET FT					14.6 % = AVG. B								
18																
19	ZONE IV															
20	15250-55	5	42.	0	18.0	19.5	19.5	19.5	21.0	.028	.025	.031	0.60			
21	15255-57	0	60.	45.	26.0	27.5	18.0	14.5	38.7	.016			0.60			
22	15257-59	0	52.	40	17.2	18.2	10.0	7.0	-	-			0.70			
23	15265-69	4	35.	0	18.0	19.5	21.0	20.5	19.0	.031			0.60			
24	15269-73	4	29	2.	20.0	21.5	21.0	20.5	19.7	.016			0.30			

WELL 11 GULF - TECHNIDRILL - D.O.E., Airtron FILE #1
 LOCATION _____
 FIELD SWEETLAKE
 COUNTY CAMINADA
 STATE LOUISIANA

DATE LOGS RUN 1-17-81
 TYPE LOGS RUN _____
 LOGS ANALYZED BY F. S. MELLARD
 DATE ANALYZED 7-1-81

ZONE NO.	INTERVAL INVESTIGATED (REF: 1L-CR 1)	(11) NET FT	(12) GR	(13) VSN OF YEAR	(14) CNS	(15) DLS	(16) DID	(17) DIA X ^{1/2}	(18) F	(19) Rava	(10) Rava AVG.	(11) Raga	(12) RCo ₂	(13)	(14)	(15)
1	<u>15279-82</u>	3	30.	0	20.5	27.0	27.5	22.2	16.2	.019			0.31			
2		22	NET FT					20.0	0% =	Avg. 0						
3	ZONE V															
4	<u>15304-08</u>	0	45	36	18.0	19.5	17.0	9.0	98.	.001		-65	0.9			
5	<u>15311-16</u>	5	35.	0	18.0	19.5	20.5	20.0	20.0	.024	.020	.030	0.48			
6	<u>15316-20</u>	4	30.	15	20.5	22.0	19.0	18.0	24.7	.014			0.34			
7	<u>15320-24</u>	4	35.	5.	18.0	19.5	20.5	18.8	22.6	.019			0.42			
8	<u>15324-30</u>	6	30.	0.	16.5	17.5	19.0	18.4	23.6	.021			0.50			
9	<u>15340-48</u>	0	55.	29	19.5	21.0	15.0	12.8	48.2	.021			1.05			
10		19	NET FT.					18.8	0% =	Avg. 0						
11																
12	ZONE VI												-70			
13	<u>15388-96</u>	8	47.	0	21.5	23.0	23.5	23.3	14.7	.017	.021	.028	0.25			
14	<u>15376-402</u>	6	35.	0	19.5	21.0	23.5	22.5	15.8	.024			0.39			
15	<u>15402-04</u>	0	62.	40.	30.0	31.5	24.0	20.0	20.0	.015			0.30			
16	<u>15404-12</u>	8	35.	0	21.5	23.0	23.5	23.3	14.7	.026			0.39			
17	<u>15412-15</u>	3	31.	0	21.0	22.5	24.5	23.7	14.2	.014			0.20			
18		25	NET FT					23.2	0% =	Avg. 0						
19																
20	ZONE VII												-60			
21	<u>15463-66</u>	3	35.	0	13.5	14.5	17.5	16.5	29.3	.034	.030	.031	1.0			
22	<u>15466-70</u>	0	32.	25	11.5	12.5	7.5	5.6	-	-			0.9			
23	<u>15472-72</u>	2	30	0	15.2	16.5	17.8	17.2	27.0	.035			0.96			
24	<u>15472-76</u>	4	35.	5.	13.5	14.5	13.5	13.0	47.3	.021			1.0			
25	<u>15476-82</u>	6	37	2.	15.0	16.0	15.5	15.2	34.6	.029			1.0			

WELL LOG ANALYSIS

WELL MAGA GULF - TECHNICAL - D.O.E, AREA FEE #1

LOCATION _____

DATE LOGS RUN 1-17-81

FIELD SWEETLAKE

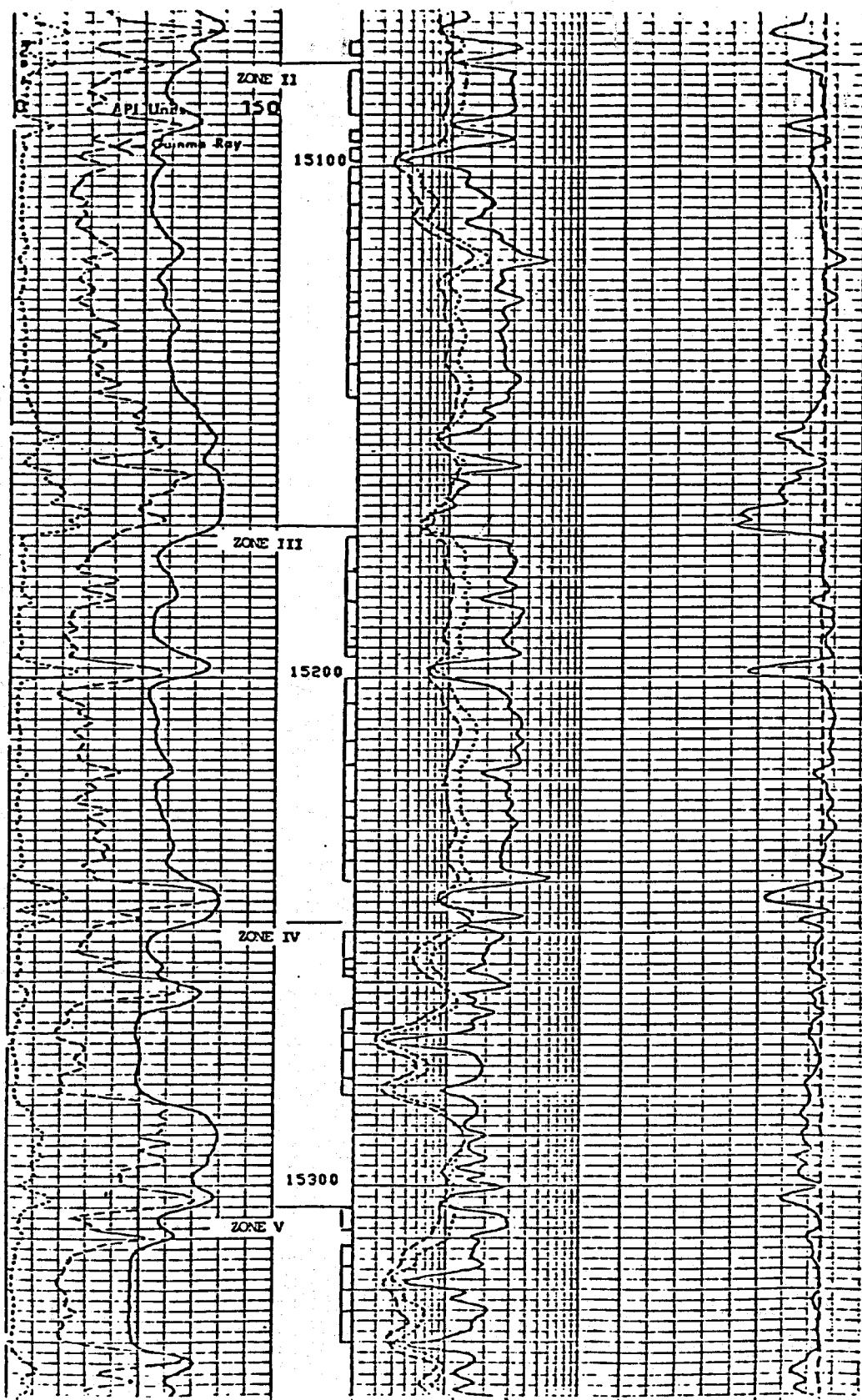
TYPE LOGS RUN

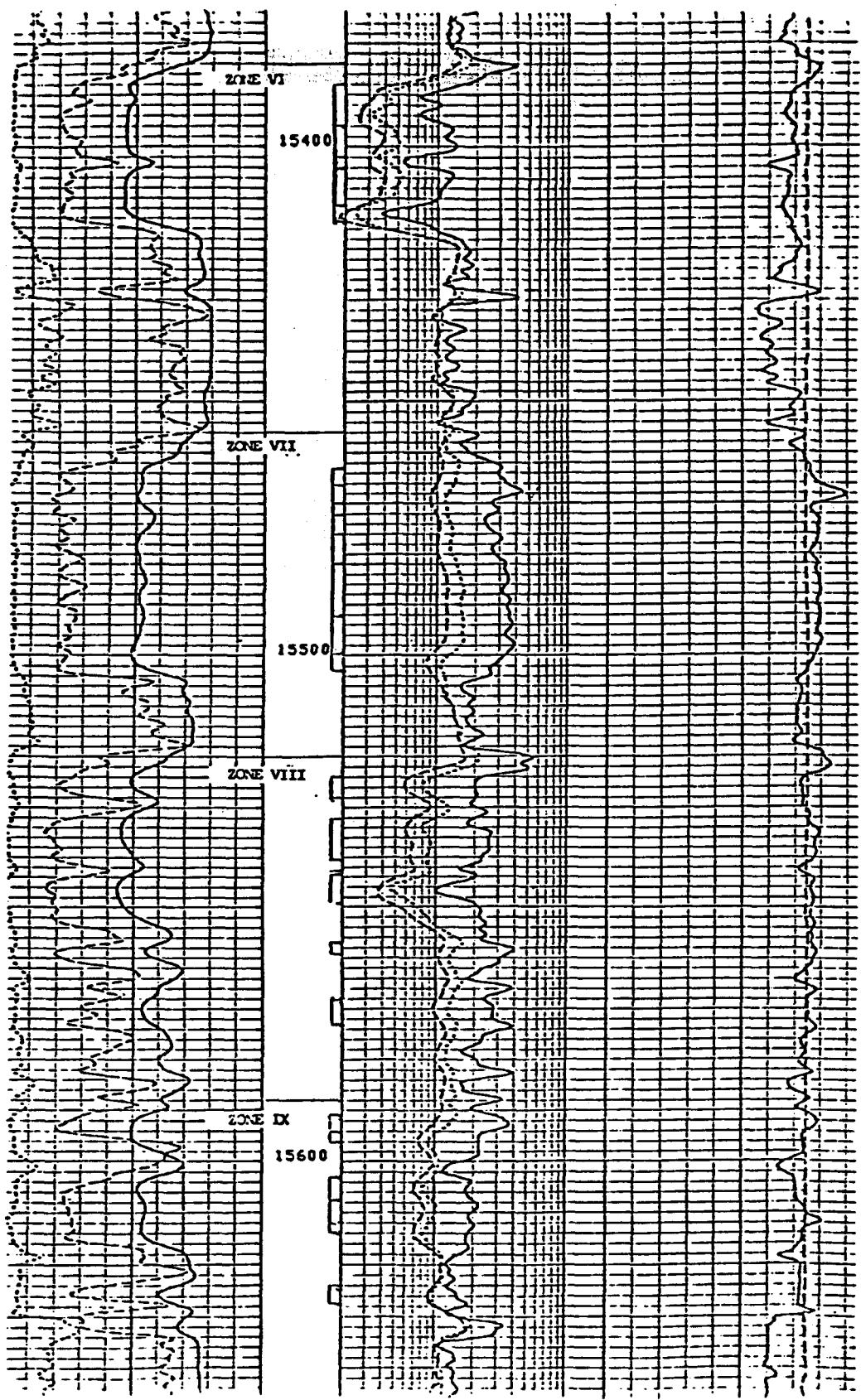
FIELD
COUNTY CAMEROON

LOGS ANALYZED BY F. S. MILLIARD

STATE Louisiana

DATE ANALYZED 7-1-81





APPENDIX F - SAND CONTROL REPORT

TECHNICAL SERVICE REPORT

NUMBER H181



To: Bob Rogers

From: Sue Donovan

Subject: Magna Gulf and Technidrill
Cameron Parish
Amoco Fee #1, 15403'

Date: 1-27-81

CONCLUSIONS

- 1). The formation sand of this well is relatively clean, containing only a small amount of migrating clays. The probability that clay migration may trigger sand production will be studied through scanning electron microscope (SEM) analysis.
- 2). Due to the high bottom hole temperature of this well, the effectiveness of polymeric stabilizers will be severely limited.
- 3). The formation sand of this well may be controlled with 20-40 U.S. mesh Baker Low Fine" gravel and a 12 (.012") gauge BAKERWELD" screen.

DISCUSSION

A small section of full core from Amoco Fee #1 was submitted for analysis. The sample was extremely well consolidated and required disaggregation with a mortar and pestle prior to cleaning. Repeated washings with 2% KCl were required to remove the aqueous fluids which saturated the core.

The x-ray diffraction analysis indicated that the sand at this depth is relatively clean. The sample contained 75% quartz, 19% feldspar and only 6% clay. The majority of these clays are the type referred to as "migrating" clays. The percentage found in the core is low, and the clays are only expected to pose production problems if they exist as cementing material. This geothermal well is expected to be produced at extremely high rates, and the resultant, near-wellbore turbulence could trigger the migration of these clays. If the clays exist as part of the cementing agent, the migration could result in sand production.

Copies to: H. Glaze
P. Pitre

Technical Service Report

H181

Page 2

The most effective treatment for the control of migrating clays is polymeric clay stabilization. These polymers are not extremely stable at temperatures above 300°F, however, and therefore are not recommended for this well. The probability of clay migration contributing to sand production will be further studied through SEM analysis.

To insure effective sand control the 50% grain size of the gravel should be a maximum of 6 times larger than the 50% grain size of the formation sand. Based on the sieve analysis data, the sand at this depth should be effectively controlled with 12-20 US. mesh gravel and a 20 (.020") gauge screen. Because only a small core from a long interval was analyzed, however, it is recommended that the smaller, 20-40 U.S. mesh gravel be used in this well. This gravel size will be effective in the event that the formation sand grain size is smaller at other depths.

Please call if you have any questions.

Sue Donovan

Sue Donovan
Regional Lab Manager

ph

MAGNA GULF AND TECHNIDRILL
CAMERON PARISH
AMOCO FEE #1

X-RAY DIFFRACTION - MINERAL PERCENTAGES

Quartz	75%
Feldspar	19%
Illite	5%
Kaolinite	Trace
Mixed Layered	
Illite/Smectite	.1%

*Solubility in 15% HCl - <1%

*Solubility in 12% HCl/3% HF - 5%

NOTICE

PORTIONS OF THIS REPORT ARE ILLEGIBLE. It
has been reproduced from the best available
copy to permit the broadest possible avail-
ability.

*Acid Solubilities refer to weight percent loss following one hour
exposure to 150°F.

GEOLOGICAL SURVEY DATA SHEET

WELL LOG NUMBER

WELL LOG DATE

GEOLOGICAL SURVEY DATA SHEET

COMPANY: MAGNA GULF AND TECHNIDRILL, BSC#181
 FIELD: CAMERON PARISH
 WELL NUMBER: AMOCO FEE#1
 FORMATION: UNKNOWN, DEPTH 15403-15404.5'

U.S. MESH	PHI UNITS	RUN 1	RUN 2	AVE
40.00	1.25	12.42	12.64	12.53
50.00	1.75	47.99	51.83	49.91
60.00	2.00	65.27	69.05	67.16
70.00	2.25	78.69	81.50	80.10
80.00	2.50	84.90	86.81	85.86
100.00	2.75	89.26	90.84	90.05

50 % TILE GRAIN SIZE (PHI)= 1.7513

50 % TILE GRAIN SIZE (INCH)= 0.0117

4 X INCH= 0.0468

8 X INCH= 0.0936

4 X MESH= 15.9

8 X MESH= 8.7

RECOMMENDED GRAVEL SIZE : 10-20

APPENDIX G -

TEST WELL COMPLETION RECOMMENDATIONS-PROPOSED PRODUCTION INTERVAL



KEN E. DAVIS
ASSOCIATES

**MAGMA-GULF COMPANY
PROPOSED PRODUCTION INTERVAL
MG-T/DOE AMOCO FEE #1
SWEETLAKE FIELD
CAMERON PARISH, LOUISIANA**

**KEDA PROJECT NO. 80-0079
FEBRUARY, 1981**

**PREPARED BY
KEN E. DAVIS ASSOCIATES**

TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.0	INTRODUCTION.....	1
1.1	BACKGROUND.....	1
1.2	SCOPE OF WORK.....	1
2.0	DISCUSSION.....	3
2.1	BRIEF COMPLETION REVIEW.....	3
2.2	GEOLOGY.....	3
2.3	RESERVOIR PARAMETERS.....	4
2.3.1	PRODUCTION ZONE DATA.....	5
2.3.2	INITIAL RESERVOIR EFFECTS.....	6
2.4	PERFORATION PRESSURE EFFECTS.....	6
3.0	CONCLUSIONS.....	9
4.0	RECOMMENDATIONS.....	10

FIGURES

FIGURE NO. 1: STRUCTURE MAP ON TOP OF MIOGYP SAND

FIGURE NO. 2: PRESSURE BEHAVIOR PREDICTION

APPENDIX

CORE LABORATORIES INC. - CORE ANALYSIS

1.0 INTRODUCTION

1.1 BACKGROUND

Following the study performed by Ken E. Davis Associates (KEDA) on Magma-Gulf's MG-T/DOE Amoco Fee SWD in Sweetlake Field, Cameron Parish, Louisiana, KEDA was requested to recommend a completion interval for the geopressured production well, MG-T/DOE Amoco Fee #1. KEDA was initially contacted by Ms. Karen Hoffman of Magma-Gulf Company by telephone. Additionally, such information as logs and core data was forwarded to KEDA's Mr. Fleniken along with follow-up conversations between Ms. Hoffman and Mr. Fleniken. A verbal recommendation was telephoned to Ms. Hoffman and Mr. Bob Rogers on January 23, 1981. This report covers the review of all the information as provided to KEDA and is the basis for the recommendations made herein. Erroneous data could negate or alter calculations and/or recommendations.

1.2 SCOPE OF WORK

A complete review was made of the logs and core data which were furnished to KEDA. The logs were analyzed to determine the productivity of the target sands below 15,000' with primary emphasis placed on the sands at 15,385 - 15,415' and 15460 - 15505'. These objective sands were evaluated for their ability to produce 40,000 barrels per day of geopressured brine water. The evaluation was performed on a high speed digital computer and consisted of calculating the hydraulic capacity in millidarcy - feet and predicting the surface pressure performance

(frictional losses included) with respect to time. In conjunction with this, the pressure effects across the perforations were also considered. The results of the analysis provides the foundation for the recommendations which follow.

2.0 DISCUSSION

2.1 BRIEF COMPLETION REVIEW

The MG-T/DOE Amoco Fee #1 is located 1650' north and 2310' east of the southwest corner of Section 13, Township 12S, Range 8W, in Sweetlake Field, Cameron Parish, Louisiana (see Figure No. 1). The well was drilled to a total depth of 15,740'± as a geopressured test well for production testing of geopressured brine waters below 15,000 feet.

The well was cased with 7" OD casing as an intermediate string. A 6 1/2" hole was drilled out from under the 7" OD casing and through the objective zones to a depth of approximately 15,740 feet. Subsequently, a 5 1/2" OD liner was cemented through the objective zones. It is KEDA's understanding that production will be through the 5 1/2" OD casing to the surface.

The geopressured sands of major concern are those sands below 15,000' with the zones at 15,385 - 15,415' and 15,460 - 15,505' being given priority consideration. The purpose of this study is to select sufficient footage having adequate permeability and perforation density to yield approximately 40,000 barrels of brine per day.

2.2 GEOLOGY

Geologically, the production sand lies within a graben and is bounded by two faults. This is shown in Figure No. 1, which is a structure map of the production sand, (Miogyp Sand).

Conventional cores were obtained from the well at the following depths:

- a) Core No. 1 (15,144 - 15,184')
- b) Core No. 2 (15,185 - 15,201')
- c) Core No. 3 (15,389 - 15,411')
- d) Core No. 4 (15,600 - 15,634')

The results of the analysis of the cores are provided in Attachment A. As indicated by the analysis description, the Tertiary Age Sands of the U.S. Gulf Coast typically show fine to very fine grain with small quantities of silt. The permeability values appear to be somewhat low for Core No. 1 and Core No. 4. Core No. 2, having a horizontal permeability of 122+ millidarcys, is the most representative analysis. This measurement is typical of that found in other penetrations in the Frio Sands between 12,000' and 20,000'. KEDA has reservations as to the accuracy of the 3 to 4' darcy determination for Core No. 3 (15,403 - 15,403.5') and feels such values are perhaps the result of a faulty test. Therefore, for purpose of evaluating the zones of interest in the sections to follow, an average effective permeability of 120 millidarcys has been used.

Analysis of both the compensated neutron-formation density log and the computer process log indicate comparable values for porosity which appear to be in the proper order of magnitude.

2.3 RESERVOIR PARAMETERS

The expected production performance evaluation is based on calculations made with the aid of a high speed digital computer

and the production zone data listed below. The basic mathematical theory of fluid flow through porous media was applied and calculations were performed to determine the surface pressure effects for various hydraulic capacities. Computer runs were made at capacities of 8,000, 10,000 and 12,000 millidarcy - feet for rates of 30,000 and 40,000 BWPD. The results of these computations are graphically illustrated in Figure No. 2. From this data sufficient net reservoir thickness was selected to provide adequate surface pressure for geopressure brine surface treatment. It was assumed that the required flowing surface pressure would be 1000 psi or greater.

2.3.1 PRODUCTION ZONE DATA

Average depth, feet	15,400
Top sand section, feet	15,385 - 15,416
Lower sand section, feet	15,461 - 15,505
(based on ISF/Sonic dated 1-17-81)	
Anticipated reservoir pressure, psi	12,000
Viscosity of produced brine, cps	0.280
Average porosity, percent	20
(based on core data and computer processed log dated 1-17-81)	
Average effective permeability, millidarcys	120
(based on core data)	
Effective brine compressibility, psi^{-1}	0.6×10^{-5}
Bottomhole pressure gradient, psi/ft	.0785

Wellbore radius, inches	2.3
Fluid density, lb/gal	8.56
Tubing inside diameter, inches	4.6

2.3.2 INITIAL RESERVOIR PRESSURE

The initial reservoir pressure of the target producing zones at 15,385' and 15,416' is expected to be approximately 12,000 psi. A pressure recording obtained by wireline tester (called repeat formation tester, RFT) on the sand at 15,070 - 15,150' indicated a bottomhole formation pressure of 11,900 psi. The anticipated initial bottomhole pressure was estimated by extrapolation to a depth of 15,400 feet so the two zones of interest could be evaluated as a unit sand member.

2.4 PERFORATION PRESSURE EFFECTS

When considering the most efficient design for high rate production, perforation density, diameter and penetration depth become the most critical factors. These factors should be analyzed collectively with the required hydraulic capacity to provide maximum diameter penetration and adequate density to afford minimal pressure drops. Since extensive studies have not been completed, investigating the basic sanding mechanisms for geopressured hot water wells, all of the above factors, should be considered in attempting to control sand influx. Limited tests in other geothermal wells have proven that sand influx is rate sensitive, i.e.,

there is a critical velocity at which the sand begins to flow through the perforations. By designing for minimal pressure drops across the perforation, there is a better chance that destruction to the formation stress state will not occur and cause a consequent large influx of sand. The 5" liner limits the perforation diameter to approximately 0.38 inches. Therefore, the abovementioned conditions can best be accomplished using a casing gun having an equivalent perforation diameter and a penetration range of 10 - 15" based on API test methods (see API RP43).

The pressure drop across the perforations can be mathematically determined using the following equation.

$$P_f = \frac{PQ^2}{8090 A_p^2}$$

Where: P_f = pressure drop across perforation in psi

P = density of injected fluid in #/gal

Q = production rate in GPM

A_p = effective cross sectional area of perforations in in^2

If this equation is applied for the following conditions,

- a) perforation density - 4 shots per foot
- b) perforation diameter - 0.38 inches
- c) production rate - 40,000 BWPD
- d) perforation interval - 75 feet

the pressure drop is negligible (3.5 psi) when also assuming that only 40% of the perforations are open.

An additional factor which would also affect the pressure drop across the perforations is skin damage due to perforation plugging or particulate invasion into the near wellbore area. These phenomena could be evaluated during the initial testing of the well. In the event it is determined that more perforations are required, the target zone could be re-perforated under dynamic conditions. Many of the perforating service companies offer a high pressure lubricator, which is easily rigged and capable of handling pressures in excess of 15,000 psi. With sufficient weight (sinker bars) added to the perforating gun, perforating under flowing pressure conditions can be accomplished.

3.0 CONCLUSIONS

- a) The target sands at 15,385' - 15,416' and 15,461' - 15,505', assuming a minimum average effective permeability of 120 millidarcys, indicate the capability of producing at rates of 40,000 BWPD with surface pressures greater than 1000 psi for a projected production period of 12 months (see Figure No. 2).
- b) The target sands provide approximately 75 feet of net reservoir thickness to yield a hydraulic capacity approaching 10,000 millidarcy - feet.
- c) KEDA has reservations regarding the accuracy of the core analysis and has based the ability of the well to produce on a minimum hydraulic capacity of 10,000 millidarcy - feet.
- d) Theoretical calculations indicate that negligible pressure drop occurs across the sands of interest (75') at a perforation density of four (4) shots per foot.
- e) In the event initial testing indicates a necessity to open additional sand intervals to the wellbore or increase the perforation density this can be accomplished under flowing conditions.
- f) Sand production is evident in high volume production wells and should be expected.

4.0 RECOMMENDATIONS

- a) Displace the mud system with 10#/gal filtered brine water (< 5 micron). This will provide a pressure differential to clean the perforations of debris and assist in formation clean up.
- b) Perforate the intervals 15,385 - 15,416' and 15,461 - 15,505' at four (4) shots per foot using a Schlumberger 2 7/8" Hollow Carrier Gun (or equivalent). These measurements were taken from the Dual Induction - SFL - Sonic log dated 1-17-81. Borea sandstone test shots with this gun show an average penetration depth of 13.67 inches and a hole diameter of .38 inches.

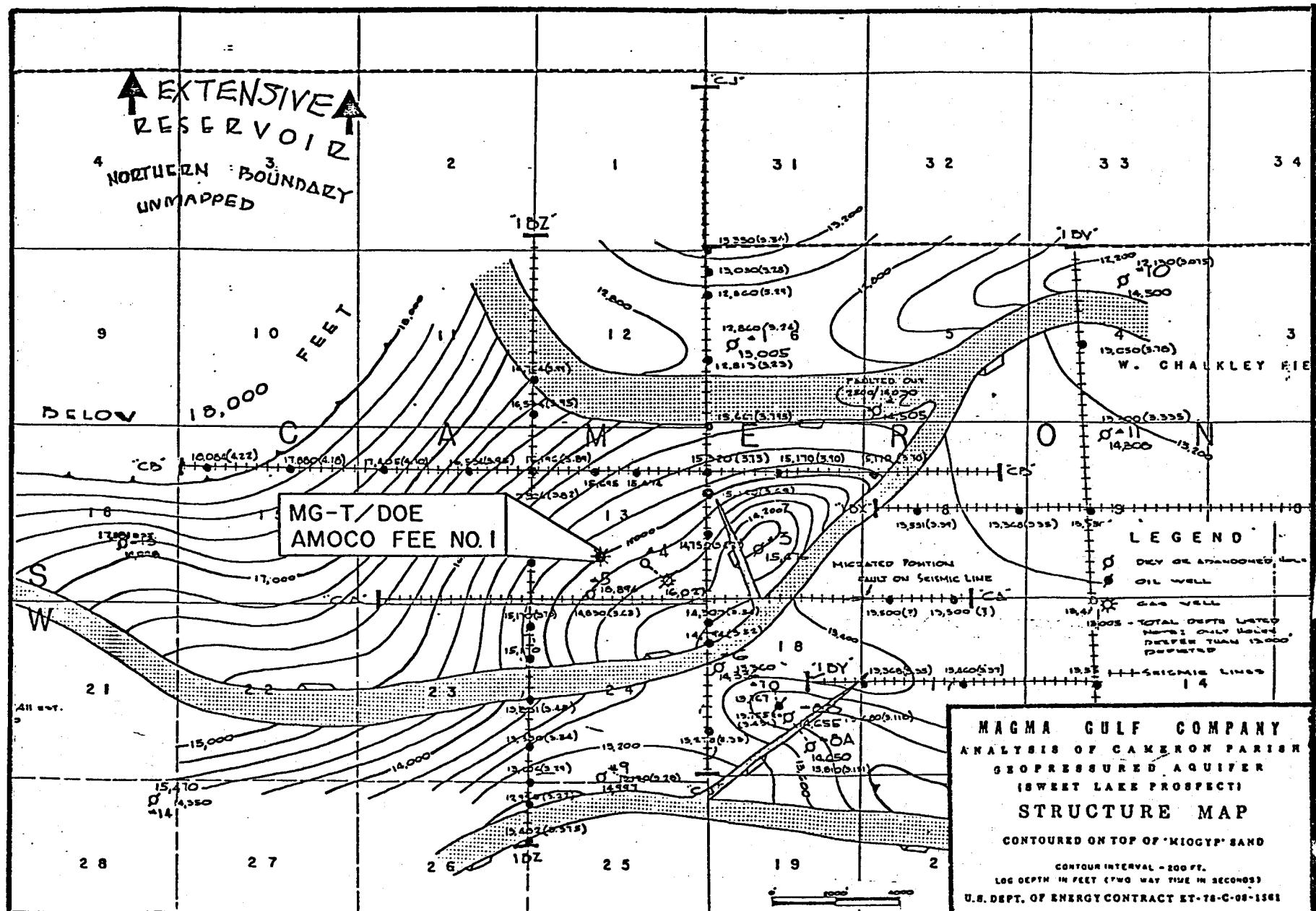


FIGURE. NO. 1

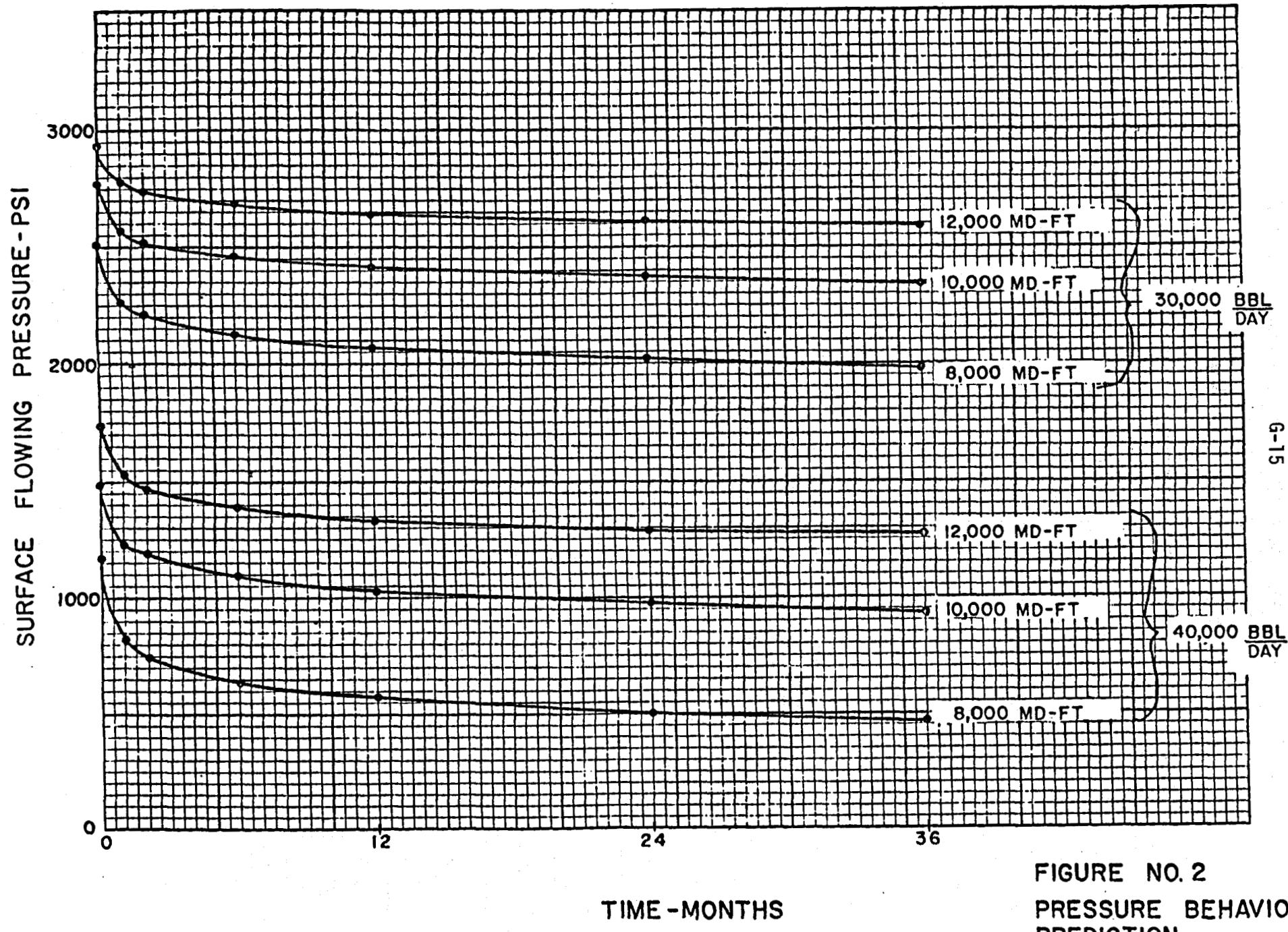


FIGURE NO. 2
PRESSURE BEHAVIOR
PREDICTION

G-16
CORE LABORATORIES, INC.
PRELIMINARY CORE ANALYSIS

Pg. 1 of 2

COMPANY Magma Gulf - Test. rig 11 DATE 9-29-50 FILE NO 2108-88
 # Amoco F-11 FIELD WIC Sweetlake COUNTY Cameron STATE LA
 CORE Subluminescent DRILLING FLUID

DEPTH FEET	PERMEABILITY MILLIDARCY	POROSITY %	OIL % PORE	TOTAL WATER % PORE	PROBABLE PRODUCTION	OIL % VOL.	GAS % VOL.	GRIT, WTR, S	COMB. GAS UNIT			
									FORMATION DESCRIPTION	IV	BBB	PLI C1
6530	1050.	27.2	0. 90.2	WTR	0°	2.9	34	sd. vfa ssHy		0	no	no
6540	450.	27.5	0. 84.9	WTR	0°	4.2	39	sd vfa sHy lmv		0	no	no
6660	400.	25.4	0. 88.9	WTR	0°	4.9	35	sd vfa vslHy scale		0	no	no
6670	250.	23.3	0. 83.3	WTR	0°	3.9	40	sd vfa shu lam sHy lam		0	no	no
6680								not analyzed				
6690	460.	24.5	0. 85.7	WTR	0°	3.5	36	sd vfa vslHy scale		0	no	no
6700	450.	25.2	0. 82.5	WTR	0°	4.4	36	sd vfa ssHy lam calc		0	no	no
6810	2110.	30.4	0. 93.2	WTR	0°	2.1	35	sd vfa ssHy		0	no	no
6820	480.	25.3	0. 81.3	WTR	0°	4.7	36	sd vfa ssHy lam vslHy calc		0	no	no
6830	1950.	28.9	0. 55.0	WTR	0°	3.2	33	sd vfa ssHy scale		0	no	no
6850	1900.	28.8	0. 92.4	WTR	0°	2.2	33	sd vfa ssHy scale		0	no	no
6930	400.	26.2	0. 84.8	WTR	0°	4.0	39	sd vfa ssHy lam sHy		0	no	no
6950	250.	25.2	0. 85.7	WTR	0°	3.6	42	sd vfa cl. lam sHy		0	no	no
6970	700.	27.6	0. 85.1	WTR	0°	4.1	35	sd vfa sHy		0	no	no
7010								not analyzed				
7030	650.	26.9	0. 87.3	WTR	0°	3.3	35	sd vfa sHy		0	no	no
7050								not analyzed				
7090	640.	25.9	0. 91.5	WTR	0°	2.3	36	sd vfa sHy		0	no	no
7110	1890.	29.4	0. 54.1	WTR	0°	1.7	33	sd vfa sHy		0	no	no
7140	600.	24.9	0. 88.2	WTR	0°	3.9	34	sd vfa vslHy scale		0	no	no
7170	540.	23.3	0. 90.8	WTR	0°	2.7	36	sd vfa vslHy scale		0	no	no
7190								not analyzed				
7200	650.	25.8	0. 87.2	WTR	0°	1.8	35	sd vfa ssHy scale		0	no	no
7210	1150.	30.2	0. 97.0	WTR	0°	2.7	35	sd vfa cl.		0	no	no
7230	65.	21.2	0. 82.5	(1)	0°	1.4	7.9	sd vfa shu sHy		0	no	no

CORE LABORATORIES, INC.

Pg 2 of 2

PRELIMINARY CCRE ANALYSIS

COMPANY Marina Gulf - Technidril DATE 9-30-50 FILE NO 2105-8'
W Amoco Gas SWD 1000' C Sweetlake COUNTY Cameron STATE LA
Cores Schlumberger DRILLING FLUID

APPENDIX H -

DISPOSAL WELL COMPLETION RECOMMENDATIONS - PROPOSED INJECTION INTERVAL



KEN E. DAVIS
ASSOCIATES

MAGMA/GULF COMPANY
PROPOSED INJECTION INTERVAL
MG-T/DOE AMOCO FEE SWD
SWEETLAKE FIELD
CAMERON PARISH, LOUISIANA

KEDA PROJECT NO. 80-0079
NOVEMBER 28, 1980

PREPARED BY
KEN E. DAVIS ASSOCIATES

H-3
TABLE OF CONTENTS

<u>SECTION</u>	<u>TITLE</u>	<u>PAGE</u>
1.0	INTRODUCTION.....	1
1.1	Background.....	1
1.2	Scope of Work.....	1
2.0	DISCUSSION.....	3
2.1	Historical Review.....	3
2.2	General Comments.....	3
2.3	Geologic Setting.....	4
2.4	Reservoir Requirements.....	5
2.4.1	Injection Zone Data.....	5
2.4.2	Bottomhole Pressure Effects.....	6
2.5	Injection Tubing Frictional Losses.....	8
2.5.1	Perforation Pressure Effects.....	8
2.6	Expected Surface Injection Pressure...	10
3.0	CONCLUSIONS.....	12
4.0	RECOMMENDATIONS.....	13

FIGURES

FIGURE 1: STRUCTURE MAP ON TOP OF MIOGYP SAND

FIGURE 2: WELL SCHEMATIC

SECTIONS

SECTION A: CORE LABORATORIES INC. - CORE ANALYSIS

SECTION B: DRILLING COMPLETION PROGRAM

1.0 INTRODUCTION

1.1 BACKGROUND

As a result of several telephone conversations between Mr. Ken Davis of Ken E. Davis Associates (KEDA) and Mr. Bob Rogers of Magma/Gulf Company, KEDA was contracted to provide recommendations for the selection of a completion interval in the Amoco Fee SWD in Sweetlake Field, Cameron Parish, Louisiana. Information such as logs, core analyses and a drilling completion program, was provided to KEDA by Ms. Karen Hoffman of Magma/Gulf along with information obtained during telephone conversations between KEDA's Mr. John Fleniken and Ms. Karen Hoffman. This report is a review of the aforementioned information based on technical merit and is the basis for the recommended completion interval. The historical review section is a brief outline of KEDA's understanding of the past operations. Erroneous data in this section could negate associated calculations and recommendations.

1.2 SCOPE OF WORK

Initially, a review of all the data provided for this study was made. Considering the present condition and existing completion of the well the objective sands were analyzed for their ability to dispose of brine waters at rates of 40,000 barrels per day (BPD) and 60,000 barrels per day. The analyses consist of calculating the required reservoir thickness for disposing of 40 - 60,000 BPD determining the frictional loss in the 7" O.D. injection tubing and analyzing the pressure effects at the

H-6

perforations. From these analyses an acceptable surface operating injection pressure was determined such that the local fracture gradient is not exceeded.

2.0 DISCUSSION

2.1 HISTORICAL REVIEW

The MG-T/DOE Amoco Fee SWD is located in Section 13, north 1730 feet from the south line and east 2815 feet from the west line in Township 12S and Range 8W in Sweetlake Field, Cameron Parish, Louisiana (See Figure No. 1). The well was drilled to an approximate depth of $7440\pm$ feet for the purpose of disposing of geopressured produced brine waters.

The injection well was surface cased to $1350\pm$ feet with 13 3/8" O.D. casing and protection cased to approximately $7440\pm$ feet with 9 5/8" O.D. casing.

A 7" O.D. injection string was run on a 7" x 9 5/8" injection packer and set at $6200\pm$ feet (See Figure No. 2). The potential disposal sands are those located below $6200\pm$ feet with the primary target sands being those at $7150 - 7350\pm$ feet. The objective of this study is to select adequate footage with sufficient perforations per foot to effectively handle 40 - 60,000 BPD.

2.2 GENERAL COMMENTS

Screen liner, gravel pack type completions along with the careful attention and proper selection of drilling and completion fluids has proven to be the most efficient design for high rate disposal of brine waters. The screen liner, gravel pack type completion affords: 1) greater cross sectional area to the wellbore and is therefore capable of accepting fluid at

high rates and extremely low pressure drops across the screen liner, 2) improved permeability in the near wellbore area, 3) the advantage of the ability to sustain abuse by particulate plugging for longer periods of time and 4) greater ease of development or cleaning without the concern of degradation of cementation resulting in sand influx.

The primary complication experienced in gravel pack completions is solids regeneration beyond the gravel media in the formation itself. However, high rate backflowing techniques have proved to be successful in restoring injection efficiency.

Since the study well is a cased hole and will be a perforated completion, this study consists of recognizing the potential for sand influx, selection of perforation size and depth of penetrations and net usable reservoir opened, by perforating, to provide minimal pressure drops in the near wellbore area. Consideration is also given to the fact that the probability of obtaining open perforations for every shot is nil. A safe assumption is that approximately 40% of the total perforations will be open for transmitting fluid to the receiving formation.

2.3 GEOLOGIC SETTING

The Amoco Fee SWD target sands lie some 8 - 10,000 feet above the production sand, miogyp sand. As shown in Figure No. 1, which is the structure map for the miogyp sand, the production lies within a graben and is bounded by two faults. The faults top out

at 9 - 10,000 feet. Therefore, the disposal sands should not be affected by the faulting and, consequently, it would be expected that the sands should test as an unbounded reservoir having infinite areal extent.

Typical to Gulf Coast sands, as indicated by the core analysis, the target sands are fine to very fine grain, loosely cemented and calcareous. It is expected that these sands probably contain very small quantities of montmorillonite, kaolinite and illite.

2.4 RESERVOIR REQUIREMENTS

The following evaluation is the expected injection zone performance based on calculations made with the aid of Craft and Hawkins "Applied Petroleum Reservoir Engineering" (1959) and the injection zone data listed below. This evaluation aids in determining the required reservoir thickness needed to provide adequate hydraulic capacity to handle 40 - 60,000 barrels of brine per day. The calculations were made using the sand at 7146± feet to 7345± feet and 7398± feet to 7440± feet for an effective net usable sand thickness of 215 feet and a constant injection rate of 60,000 barrels per day.

2.4.1 INJECTION ZONE DATA

Top of injection zone, ft. 7152

(based on ISF - Sonic Log)

Bottom of injection zone, ft. 7345

(based on ISF - Sonic Log)

Bottomhole pressure gradient, psi/ft.	.465 (est.)
Fracture gradient, 0. 65 psi/ft.	4680 at 7100'
Injection tubing size, inches O.D.	7
Viscosity of injection fluid, cp.	1
Anticipated reservoir pressure, psi	3348 at 7200'
Average porosity, percent	30
(based on Computer Processed Log & core data)	
Average permeability, millidarcys	1500
(based on core data)	
Injection Zone Compressibility, psi^{-1}	6.5×10^{-6}
Net sand thickness, ft.	215

2.4.2 BOTTOMHOLE PRESSURE EFFECTS

Using the basic theory of fluid flow in porous media and the data in Section 2.4 above, the expected bottomhole pressure buildup can be determined (the diffusivity equation modified for steady state radial flow). The basic fluid flow equation assumes horizontal flow, negligible gravity effects, homogeneous and isotropic porous medium, single fluid of small and constant compressibility and applicability of Darcy's Law, and that viscosity of the injected fluid, compressibility of the system, permeability and porosity are independent of pressure. Additionally, the reservoir boundary condition must be of infinite areal extent.

Since minor wellbore damage may be experienced due to mud filtrate at start-up or later in the life of the well due to particulate plugging, a damage factor called "skin effect" has been included in the computation. This effect occurs in an infinitesimally thin zone around the wellbore contributing to additional pressure drop.

Increase in Bottomhole Pressure with Time

<u>Time</u> <u>(years)</u>	<u>Bottomhole Pressure</u>	
	<u>Skin</u>	<u>Increase, psi</u>
(40,000 BPD)		
1/2	0	202
1	0	210
5	0	223
1/2	2	238
1	2	245
5	2	259
1/2	5	291
1	5	297
5	5	311
(60,000 BPD)		
1/2	0	304
1	0	313
5	0	334
1/2	2	356

Increase in Bottomhole Pressure with Time

(60,000 BPD CONTINUED)

<u>Time</u> <u>(years)</u>	<u>Skin</u>	<u>Bottomhole Pressure</u> <u>Increase, psi</u>
1	2	365
5	2	387
1/2	5	435
1	5	444
5	5	465

2.5 INJECTION TUBING FRICTIONAL LOSSES

The frictional losses in the tubing are the major controlling factor in surface operating injection pressure for high rate disposal. The 7" O.D., 23#/ft. casing which is set to approximately 6,200 \pm feet has a frictional loss of approximately 200 \pm psi at 40,000 BPD injection and 415 \pm psi at 60,000 BPD injection.

These values were determined using a frictional coefficient for new, clean pipe.

2.5.1 PERFORATION PRESSURE EFFECTS

In analyzing the pressure effects due to perforations and selecting the type perforating technique the first thing to consider is the cross sectional flow area. When designing a completion for high rate injection, the flow rate per unit area should be reduced by:

- Providing clean large perforations through the target injection zone.

- b) increasing perforation density.
- c) improving the opening length of perforation section.
- d) penetration depth into the reservoir.

This can best be accomplished with a large diameter (0.75 inch diameter) casing gun having good penetration ranging from 12" to 16" based on test data from Section 2, API RP43, Third Edition, October 1974. Additionally, since it is seldom that more than 40% of the perforations are open, a large section should be perforated to compensate for the loss of this flow area.

The larger perforations afford lower flow velocity which in turn reduces the pressure drop across the perforation opening and prolongs degradation of the cementing matrix. The large perforations are also more conducive to the installation of a through casing gravel pack in the event sand control becomes necessary.

Mathematically, the pressure drop across 215 feet of .75" diameter perforations assuming 40% of the perforations open, can be determined using the following equation.

$$P_f = \frac{PQ^2}{8090 A_p^2}$$

Where: P_f = pressure drop across perforation in psi

P = density of injected fluid in #/gal

Q = injection rate in GPM

A_p = cross sectional area of perforations in sq in.

Applying this equation, it is apparent that the pressure drop is negligible and only becomes effective at 20 or less perforation openings.

2.6 EXPECTED SURFACE INJECTION PRESSURE

Assuming the wellbore has damage and the pressure at the wellbore after 5 years of injection at 60,000 BPD to be the worst case, the following observations can be made:

- a) With an average velocity of 17.65 ft/sec the friction loss in the 6200+ feet of injection tubing is approximately 415 psi.
- b) Assuming that the produced geopressured water has a density approximately 9#/gal (after separation of the gas and temperature reduce) and the formation water has an equivalent density, the hydrostatic pressure effect is balanced.
- c) The theoretical maximum change in bottomhole pressure caused by continuous operation of the well is 465 psi.
- d) Therefore, the theoretical wellhead injection pressure is $415 \text{ psi} + 465 \text{ psi} = 880 \text{ psi}$.

These calculations are theoretical and will be greatly effected by the condition of the injection pipe and the average effective permeability which can be determined only by proper well testing. For example, if the average permeability is reduced by 30%, the surface injection pressure will approach 1200 psi which is very near the fracture pressure.

3.0 CONCLUSIONS

- a) Analyses of the primary zone of interest from 7146± feet to 7440± feet indicates the ability to receive brine water at rates of 40 - 60,000 BPD.
- b) The product of permeability and net reservoir thickness which is called the hydraulic capacity is the controlling factor in the ability of the well to take fluid.
- c) Large diameter perforations offer improved cross sectional area, lower velocity and reduces the turbulence factor across the perforations to enhance formation stability and limit sand influx.
- d) The large diameter perforations are more suitable to a through casing screen gravel pack should sand control be required.
- e) Additional footage can be perforated to improve flow efficiency in the event injection testing indicates the well falls below the theoretical performance.

4.0 RECOMMENDATIONS

- a) Perforate using clean, non-damaging solids free fluid with differential pressure into the wellbore. A pressure differential into the wellbore of 200 - 500 psi is normally sufficient to clean the debris from the perforations.
- b) Perforate the intervals 7146 - 7274, 7282 - 7345, and 7398 - 7430 at four shots per foot using the Schlumberger 5" Hyper Pack Carrier Casing Gun (or equivalent) all measurements taken from the ISF/Sonic Log. Test shots into Borea sandstone with this casing gun yield an average hole diameter of .78" with approximately 19" penetration.
- c) Perform short term injection test at some selected rate less than the proposed 40 - 60,000 BPD to determine the virgin reservoir properties prior to attempting high rate testing. This data collected from the short term testing can be used to more closely predict the well performance at high rates.

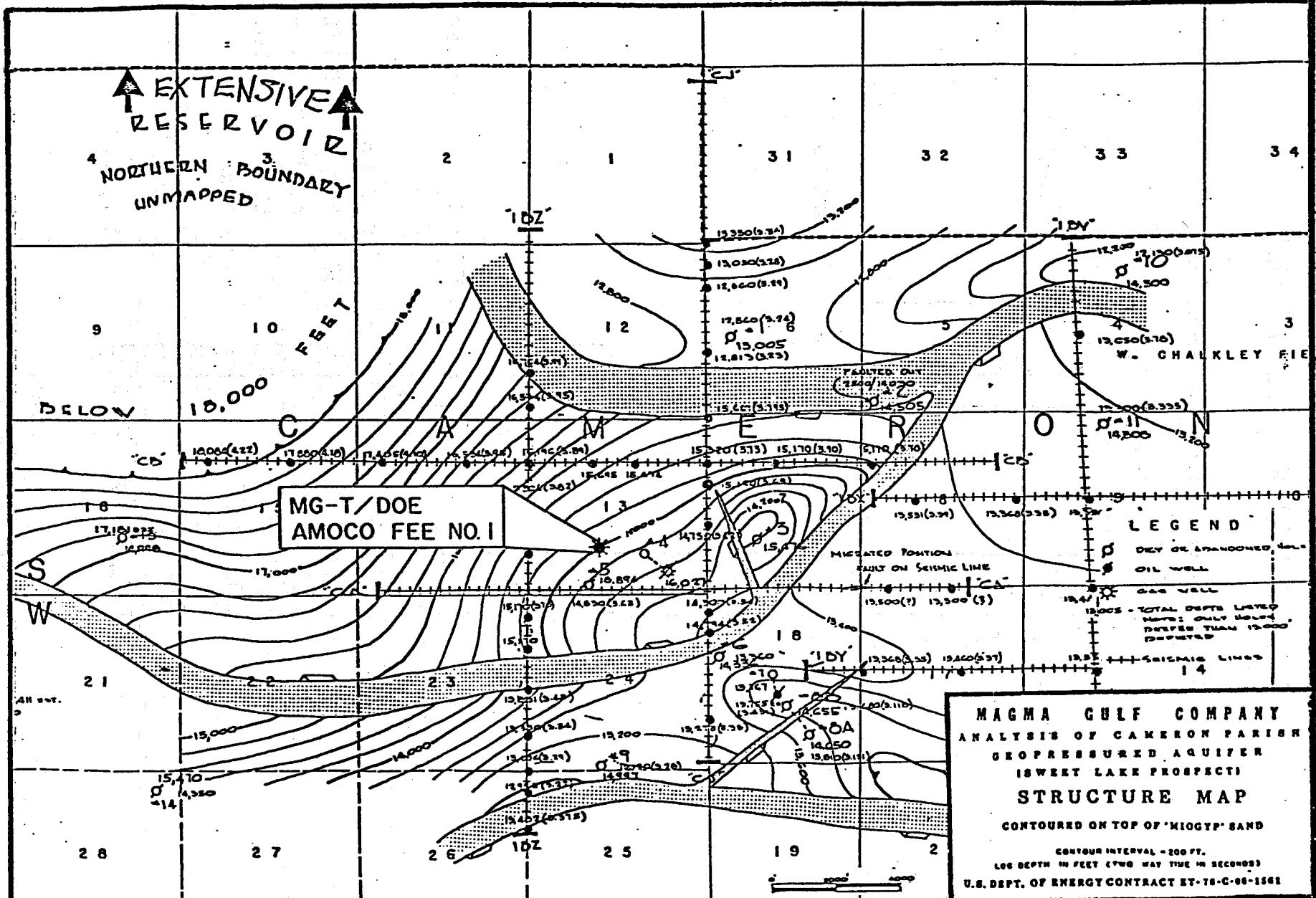


FIGURE NO. I

SWEET LAKE PROSPECT

DISPOSAL WELL DIAGRAM

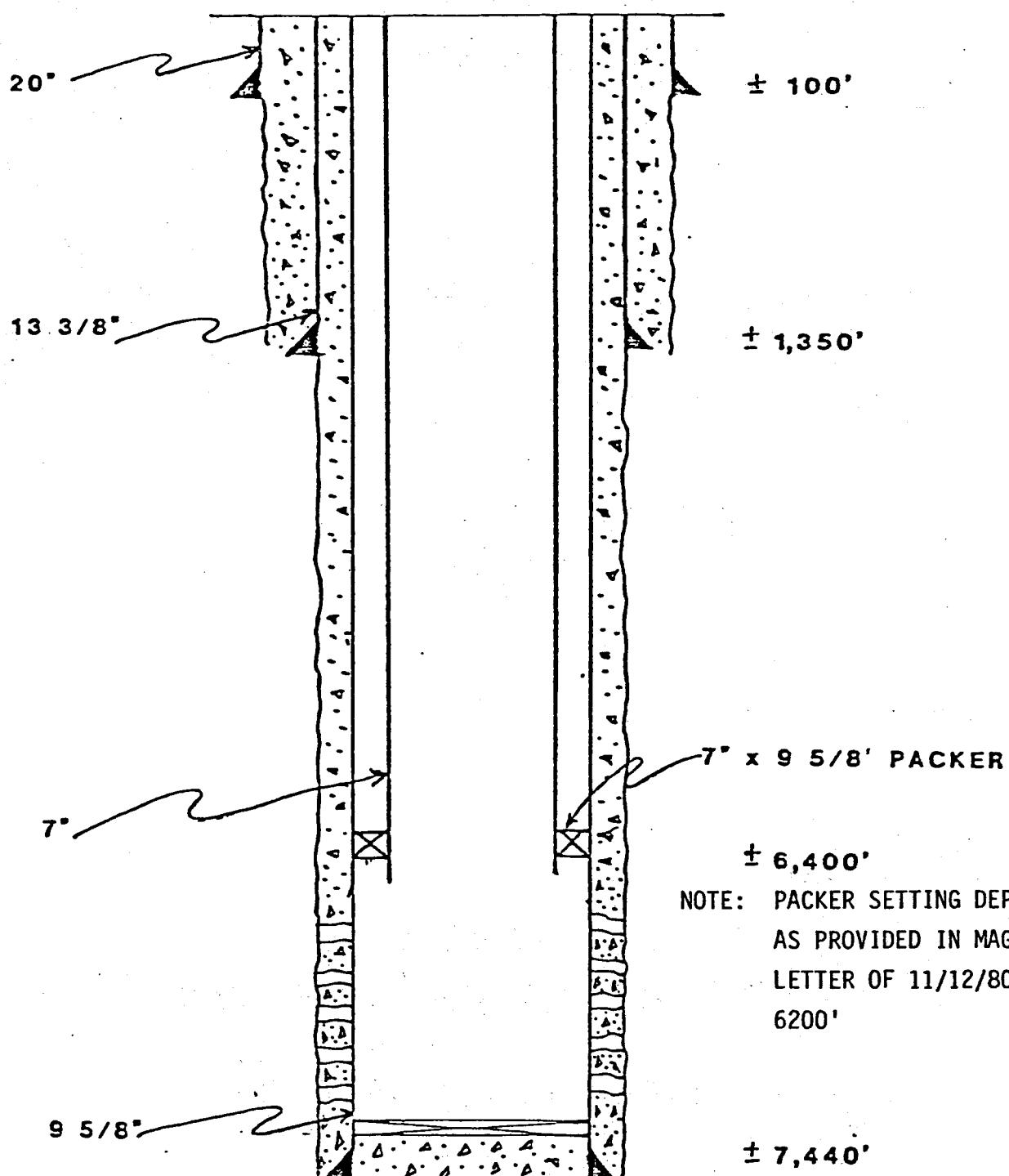


FIGURE NO. 2

SECTION A

CORE LABORATORIES, INC.

PRELIMINARY CORE ANALYSIS

COMPANY Magma Gulf - Toolingdrill DATE 9-29-50 FILE NO 2108-85
 ■ Amoco Foss SWD FIELD WIC Sweetlake COUNTY Cameron STATE LA
 CORES Schlumberger DRILLING FLUID

DEPTH FEET	PERMEABILITY MILLIDARCY	POROSITY %	OIL % PORE	TOTAL WATER % PORE	PROBABLE PRODUCTION	OIL % VOL.	GAS % VOL.	S	CRIT. WTP.		COMB. GAS UNIT		
									FORMATION DESCRIPTION	IV	BBBS	FLI C1	
6530	1050.	20. ⁷	0. ⁰	90. ²	WTR	0. ⁰	2. ⁹	34	sd v-fa sstty	0	no	no	
6640	450.	27. ⁵	0. ⁰	84. ⁹	WTR	0. ⁰	4. ²	39	sd v-fa sstty lmv	0	no	no	
6660	400.	25. ⁴	0. ⁰	82. ⁹	WTR	0. ⁰	4. ⁹	35	sd v-fa vstty vele	0	no	no	
6670	290.	23. ³	0. ⁰	93. ³	WTR	0. ⁰	3. ⁹	40	sd v-fa shu lam vstty lam	0	no	no	
6680									not analyzed				
6690	410.	24. ⁵	0. ⁰	85. ⁷	WTR	0. ⁰	3. ⁵	36	sd v-fa vstty scale	0	no	no	
6700	450.	25. ²	0. ⁰	82. ⁵	WTR	0. ⁰	4. ⁴	36	sd v-fa sstty lam scale	0	no	no	
6810	2110.	30. ⁴	0. ⁰	93. ²	WTR	0. ⁰	2. ¹	35	sd v-fa sstty	0	no	no	
6820	480.	25. ³	0. ⁰	91. ³	WTR	0. ⁰	4. ⁷	36	sd v-fa sstty lam scale	0	no	no	
6830	1950.	28. ⁹	0. ⁰	85. ⁰	WTR	0. ⁰	3. ²	33	sd fa sstty scale	0	no	no	
6850	1900.	28. ⁸	0. ⁰	92. ⁴	WTR	0. ⁰	2. ²	33	sd fa sstty scale	0	no	no	
6930	400.	26. ²	0. ⁰	84. ³	WTR	0. ⁰	4. ⁰	39	sd v-fa sstty lam sstty	0	no	no	
6950	250.	25. ²	0. ⁰	85. ⁷	WTR	0. ⁰	3. ⁶	42	sd v-fa ch. lam sstty	0	no	no	
6970	700.	27. ⁶	0. ⁰	85. ¹	WTR	0. ⁰	4. ¹	35	sd v-fa sstty	0	no	no	
7010									not analyzed				
7020	650.	26. ⁹	0. ⁰	87. ³	WTR	0. ⁰	3. ³	35	sd v-fa sstty	0	no	no	
7050									not analyzed				
7090	440.	25. ⁹	0. ⁰	91. ⁵	WTR	0. ⁰	2. ³	36	sd v-fa sstty	0	no	no	
7110	1990.	29. ⁴	0. ⁰	84. ¹	WTR	0. ⁰	1. ⁷	33	sd v-fa sstty	0	no	no	
7140	600.	24. ⁹	0. ⁰	84. ²	WTR	0. ⁰	3. ⁹	34	sd v-fa vstty scale	0	no	no	
7170	540.	25. ³	0. ⁰	90. ⁴	WTR	0. ⁰	2. ³	36	sd v-fa sstty scale	0	no	no	
7190									not analyzed				
7200	690.	25. ⁸	0. ⁰	82. ²	WTR	0. ⁰	1. ⁸	35	sd v-fa sstty scale	0	no	no	
7210	1150.	30. ²	0. ⁰	90. ³	WTR	0. ⁰	2. ⁷	35	sd v-fa cl.	0	no	no	
7230	6. ⁵	21. ²	0. ⁰	93. ⁴	(L)	0. ⁰	1. ⁷	7.9	sd v-fa vstty sstty	0	no	no	

CORE LABORATORIES, INC.

pg 2 of 2

Digitized by srujanika@gmail.com

DATE 9-30-50

File No. 2105-8

W. 1000' ESD. 1000' FIELD 400' ELEVATION 5000' COUNTY 5000' STATE 5000'

Course in Languages

DRILLING FLUID

SECTION B

**Excerpt from Magma Gulf-Technadril
Drilling and Testing Plan**

B. Disposal Well

1. Drilling Procedure (See Figure 13)

- a. Prepare location for rig.**
- b. Move in rig and rig up.**
- c. Drive 20-inch x 1/2-inch wall pipe per page 4-40.**
- d. Cut off drive pipe below rotary. Install flow line and fill-up line on 20-inch pipe.**

- e. Pick up 17 1/2-inch bit and bottom-hole assembly (BHA) and drill to 1,350 feet. Run deviation survey at less than 200-foot intervals. Allowable deviation is one-half degree per 100 feet with a maximum deviation of 2 degrees.
- f. Condition hole for logging SLM out of hole. Run open-hole logs 0-1,350 feet per page 4-44.
- g. Make cleanup trip. Circulate and condition hole to run casing. Check rig-hole alignment prior to running casing.
- h. Run and cement 13 3/8-inch casing per pages 4-40 and 4-42. Center 13 3/8-inch casing in rotary and hold while cement sets. Should cement not circulate, top out with recommended cement.
- i. Cut off 13 3/8-inch casing and 20-inch conductor. Install 13 3/8-inch slip-on type 3,000 WP wellhead with base plate (see Figure 14). Level base plate on 20-inch drive pipe and weld head onto 13 3/8-inch surface casing.
- j. Nipple up 12-inch, 3,000 psi blowout preventers (BOPs). See Figure 15.
- k. Test BOP assembly, including valves on choke and kill line plus circulating system to standpipe to 2,000 psi. Test casing to 2,000 psi. (Notify Louisiana Conservation representative for witness of casing test.)
- l. Pick up 12 1/4-inch bit and BHA and GIH. Drill out float collar, cement, and float shoe plus 10 feet of formation. Circulate for 30 minutes to check for mud loss. Should the formation take fluid, add sufficient gel to mud system to sustain full returns and drill ahead.
- m. Drill sufficient depth to bury BHA, then pull out of hole. Pick up 12 7/32-inch O.D. welded blade stabilizers at 60, 90, and 150 feet above bit. Pick up monel drill collar on last bit run prior to reaching total depth (approximately 7,440 feet).
- n. Drill 12 1/4-inch hole to depth equivalent to \pm 7,440 feet in UOC Pan Am Fee No. 1. SLM out of hole on next to last bit run.
- o. Condition hole to log. POH running multishot directional survey.
- p. Run open-hole logs per page 4-44.
- q. Lay down monel drill collar. GIH with stabilized BHA. Condition hole to run 9 5/8-inch casing.
- r. Run 9 5/8-inch casing per page 4-40 and cement per page 4-43. Should cement not circulate, top out with recommended cement.

- s. Install 13 5/8-inch, 3,000 WP x 11-inch, 5,000 WP casing head spool ("B" section, Figure 14).
- t. Nipple up blowout preventers and test to 3,000 psi as outlined in Step k.
- u. Pick up bit and scraper and BHA without stabilizers and clean out inside of casing to float collar. Displace mud with 9.5 ppg brine. POH. Lay down DP and DC.
- v. Run logs inside 9 5/8-inch casing per page 4-44.
- w. Rig up and run 7-inch casing to approximately 6,400 feet with injection packer. Space out with 60,000 pounds of weight-set injection packer applied just as casing hanger "shoulders-up" in "B" section head. See page 4-41.
- x. Nipple up tree and test seals as recommended by manufacturer.
- y. Release rig.
- z. Rig up nitrogen truck and coil tubing unit. Displace water from well down to above 2,000 feet.
- aa. Rig up wire line lubricator and perforate proposed injection interval with a casing gun.
- bb. If well will flow, clean out perforations by a limited flow test being careful to limit sand production.
- cc. Treat perforations and injection zone with HCl and HF to clean perforations and well bore damaged zone.
- dd. If well will not flow, rig up nitrogen truck and coil tubing unit. Clean out perforations by a limited "backflow" test.
NOTE: Injection efficiency contingent upon "backflow" rates and quantities.
- ee. Perform injection test.
- ff. SI for future operations.

2. Surface Equipment and Services

- a. Wellhead (See Figure 14)

The Christmas tree assembly will be rated at 5,000 psi WP.

- b. Blowout Prevention Equipment (See Figure 15)

The blowout preventer will be 3,000 psi WP, ram-type, hydraulic-controlled equipment. An annular-type preventer will be above the ram preventer which will be 3,000 psi WP also.

c. Drill Rig

The rig will be capable of drilling to 8,000 feet with 4 1/2-inch drill pipe and capable of running 9 5/8-inch casing to 7,440 feet. The mast should be capable of 750,000 pounds API static hook load and the substructure must have 750,000-pound capacity.

d. Drilling Recording Instruments

Drilling recording instruments consisting of a pit level device and three-pen recorder for measuring rate of penetration, pump pressure, and hook load.

3. Downhole Equipment and Services

a. Casing Program

(1) Conductor Casing

20-inch O.D., 1/2-inch wall, 104-pound, A-234 Grade B welded. Drive to \pm 100 feet with D-30 hammer. Required bearing load is \pm 540,000 pounds including safety factor.

(2) Surface Casing

<u>Depth</u>	<u>Size</u>	<u>Wt.</u>	<u>Grade</u>	<u>Conn.</u>	<u>Colps</u> <u>Rate/SF</u>	<u>Burst</u> <u>Rate/SF</u>	<u>Tension</u> <u>Rate</u> <u>1,000/SF</u>
0-1350	13 3/8"	72	N-80 and K-55	Butt.	2670/4+	5380/6+	1661/20+

- (a) Run float shoe and float collar two joints apart. Thread lok shoe, top of first joint, and collar.
- (b) Run two bow spring centralizers on bottom two joints.
- (c) Land casing in tension.
- (d) Set base plate flush and level on 20-inch pipe.

(3) Production String Casing

<u>Depth</u>	<u>Size</u>	<u>Wt.</u>	<u>Grade</u>	<u>Conn.</u>	<u>Colps</u> <u>Rate/SF</u>	<u>Burst</u> <u>Rate/SF</u>	<u>Tension</u> <u>Rate</u> <u>1,000/SF</u>
0-1700	9 5/8"	47	C-75	Butt.	4630/11.8	6440/5.3	1018/3.1
1700-7440	9 5/8"	43.5	N-80	Butt.	3810/2.4	6330/6.3	1005/5.7

- (a) Run float shoe and float collar two joints apart. Thread lok shoe, top of first joint, and collar.

(b) Run two flow diverter type centralizers on each of first two joints. Run one flow diverter type centralizer every second joint for the next 10 joints.

(c) Reciprocate pipe \pm 15 feet while cementing. Hold 2,500 psi on plug, after plug bumps, for \pm 4 hours or until the tail cement attains 250 psi compressive strength.

(d) Land casing in tension.

(4) Injection String

<u>Depth</u>	<u>Size</u>	<u>Wt.</u>	<u>Grade</u>	<u>Conn.</u>	<u>Colps Rate/SF</u>	<u>Burst Rate/SF</u>	<u>Tension Rate 1,000/SF</u>
0-6,400	7"	23#	K-55	LTC w/ ABC Mod. coupling	3270/1.1	4360/1.2	366/2.5

(a) Make up one joint of 7-inch casing below injection packer and 7-inch casing above.

(b) Run in hole to approximately 6,400 feet and set injection packer.

(c) Space out so that 60,000 pounds of casing weight is set down on packer at the same time the hanger "shoulders up" in tree. Back out landing joint.

(d) Nipple down BOPs.

b. Drilling Fluid Program

<u>Depth</u>	<u>Type Mud</u>	<u>Weight</u>	<u>Visc.</u>	<u>Percent Solids</u>	<u>Water Loss</u>	<u>PV/YP</u>
0-1350	Gel-water	9.0-9.2	40-50	6-7	30	8/12
1350-5000	Gel-water Lignite	9.0-9.2	35-40	3-5	20	7/12
5000-6400	Gel-water Lignite	9.0-9.2	35-38	3-5	15	5/10
6400-7400	Gel-water Lignite	9.0-9.2	40-45	3-5	2-4	14/7

(1) Have water loss below 4 cc at \pm 6,400.

- (2) After reaching total depth, wash mud tanks that will be used to circulate 9.5 ppg brine water.
- (3) It is estimated to require \pm 1,000 barrels to complete job.
- (4) Do not mix mud with brine.

c. Deviation Program

Single Shot

0-1,350 feet

Run Totco at least every 200 feet. Maximum allowable deviation is 2 degrees.

1,350-6,400 feet

Run Totco at least every 500 feet. Maximum allowable deviation is 5 degrees.

6,400-7,400 feet

Run Totco every 200 feet. Maximum allowable deviation is 5 degrees.

Multishot Directional

Run multishot from total depth to surface.

d. Cementing Program

(1) Surface Casing

Type Cement

Lead Slurry—Lightweight cement plus 35 percent silica flour and 3 percent salt mixed at 13.4 ppg yields 2.12 cubic feet per sack.

Tail Slurry—Class "H" plus 40 percent silica flour mixed at 15.8 ppg yields 1.55 cubic feet per sack.

Quantity

Lead Slurry—Using 100 percent excess should require 567 sacks for 850 feet of fill-up.

Tail Slurry—Using 100 percent excess should require 450 sacks for 500 feet of fill-up.

Top Out—Should cement not circulate, Class "H" plus 40 percent silica flour and 2 percent calcium chloride mixed at 15.8 ppg yields 1.55 cubic feet per sack.

(2) Production String

Type Cement

Lead Slurry--Lightweight cement plus 35 percent silica flour and 3 percent salt mixed at 13.4 ppg yields 2.12 cubic feet per sack.

Tail Slurry--Class "H" plus 40 percent silica flour mixed at 15.8 ppg yields 1.55 cubic feet per sack.

Quantity

Lead Slurry--Using 50 percent excess, 6,400 feet of fill-up should require 1,450 sacks.

Tail Slurry--Using 50 percent excess, 1,000 feet of fill-up should require 300 sacks.

Top Out--Should cement not circulate, Class "H" plus 40 percent silica flour and 2 percent calcium chloride.

e. Hydraulics Program

Assumptions

- (1) 500-foot, 7 3/4-inch O.D. x 12 13/16-inch I.D. drill collars.
- (2) 4 1/2-inch DP.
- (3) GD PZ9 Triplex pump (85% eff.).
- (4) 6 1/2-inch liners.
- (5) 100 SPM

Depth	Hole Size	Mud Wt.	AVDP Ft./Min.	GPM	Jets	J.Vel	Press Jets	Drop System	Pump Press
1850'	17 1/2"	9.0-9.2	60	331	9-9-10	525	2484	148	2632
					9-10-10	490	2159	148	2307
					10-10-10	459	1894	148	2042
					10-10-11	429	1655	148	1803
					10-11-11	403	1458	148	1506
4000'	12 1/4"	9.0-9.2	60	331	9-9-10	525	2484	276	2760*
					9-10-10	490	2159	276	2435
					10-10-10	459	1894	276	2170
					10-10-11	429	1655	276	1931
					10-11-11	403	1458	276	1734

*Exceeds working press of pump which is 2,650 pounds with 6 1/2-inch liners.

Size	Mud Wt.	AVDP Ft./Min.	GPM	Jets	J.Vel	Press Jets	Drop System	Pump Press
12 1/4"	9.0-9.2	60	331	9-9-10	525	2484	432	2916*
				9-10-10	490	2159	432	2591
				10-10-10	459	1894	432	2326
				10-10-11	429	1655	432	2087
				10-11-11	403	1458	432	1890

*Exceeds working press of pump which is 2,650 pounds with 6 1/2-inch liners.

f. Logging Program

Open Hole

Run 1--Induction	0-1350'
Run 2--Caliper	0-1350'
Run 3--Dual Induction	1350-7440'
Run 4--FDC-CNL-GR	1350-7440'
Run 5--Sonic with Caliper	1350-7440'
Run 6--Sidewall Cores	Various

Cased Hole--9 5/8-Inch Casing

Run 1--GR-N	0-7360'
Run 2--CBL-VDL	0-7360'
Run 3--Casing Caliper	0-7360'

g. Completion

- (1) Run and set 7-inch, 8 rd x 9 5/8-inch, 40-pound injection packer with 6-foot polish receptacle and locator sub with 7-inch O.D., 8 rd box top connection O-ring. Packoff overshot to seal over 5 1/2-inch polish back off sub. Overshot has 8-inch O.D. guide ring for 9 5/8-inch casing. Polish I.D. of packer is 7 3/8 inches x 12 feet.
- (2) Run hole with 9 5/8-inch retrievable squeeze tool on drill pipe with 900 feet of tail pipe below packer.
- (3) Displace liner with \pm 900 gallons of HCL acid.
- (4) Squeeze acid into formation.
- (5) Overdisplace acid with 50 barrels of clean solids-free 9.5 brine.
- (6) Lay down squeeze tool and tail pipe.
- (7) Complete well.

APPENDIX I -

TEST PROCEDURE EVALUATION - TEST WELL



1201 Dairy Ashford, Suite 200, Houston, Texas 77079, (713) 497-8400

December 1, 1980

Mr. Bob Rogers
Magma-Gulf
430 Highway 6 South
Suite 208
Houston, Texas 77079

Dear Bob:

Enclosed is our analysis of the test program as it was written. The only thing we can do to improve the procedure is to run the test longer. Even then, I question the ability to maintain a constant rate for the 200+ days it would take to see that third fault if it is there.

One additional point should be made. If we truly have 500 or 600 ft. of reservoir thickness, the times will remain the same, but the pressure drops will be less.

Sincerely,

A handwritten signature in black ink, appearing to read "Ken Ancell".

K. L. Ancell

KLA:djd
Enclosures

xc: Mr. Don Clark
Mr. Keith Westhusing

MAGMA - GULF
SWEET LAKE PROSPECT
TEST PROCEDURE EVALUATION

The following sensitivity analysis was performed on a geopressured-geothermal well in Cameron Parish, Louisiana for Magma-Gulf/Technadril and the Department of Energy. The purpose of the study was to determine whether or not the proposed drawdown and buildup test program would accurately define the reservoir and its limits.

Prior to making the study, INTERCOMP's reservoir simulator, BETA II, was initialized with the reservoir properties shown in Table 1. Then a grid system for Case I was developed. Case I was constructed to display the performance of an ideal homogeneous reservoir and its grid system is shown in Figure 1. The grid is cylindrical in form, surrounds the wellbore and is one dimensional in the z direction with a thickness of 100 feet. The outer limit of the reservoir is 100,000 feet because at that size, the reservoir behaves infinitely. At this point, the simulator was run according to the proposed test schedule shown in Table 2. An initial flow period of three days was run at 2400 BPD and the well was shut in for five days to allow the pressure to build back up. The reservoir limit test was then conducted by flowing the well at 20,000 BPD for 60 days and then shutting it in for 120 days. Figures 2 and 3 show the drawdown and buildup curves for the test. They perform as would be expected for a homogeneous infinite reservoir. Both are straight lines on the semi-log paper with the build up curve extrapolating back to initial reservoir pressure on a Horner plot.

It is unlikely, however, that this reservoir will behave homogeneously. In fact, as can be seen in Figure 4, the well is located in the vicinity of large fault zones. The shaded areas are faults that are known to exist and the dotted line is an area that could possibly be faulted also. In order to simulate these heterogenities, modifications had to be made to the grid system used in Case I. Figure 5 shows the changes that were made. First, the known fault zones were traced onto the grid system. Then coordinates were added in the angular direction at varying degrees to

approximate the faults. Finally, the areas representing the faults were made impermeable to flow. Two cases were run under these conditions. Case II approximated the faults known to be present in the reservoir. Case III added to those faults the one that could be present as indicated in Figure 4.

Both cases were run with the same test periods as Case I. The results were quite different from Case I with the drawdown curving downward at the end and the buildup curving upward defining the faults in close proximity to the well. However, there was no difference between Case II and Case III indicating that the test was not long enough to define that area of the reservoir. If the buildup were allowed to continue long enough, a small amount of depletion would be noted for Case III.

Case II and Case III were then run again extending the second drawdown period to 260 days and then shutting the well in for 300 days. The results of the drawdown are shown in Figure 6 and 7. Figure 6 shows the bottomhole pressure versus the log of time. As can be seen, the two cases are identical until well past 100 days where the pressure in Case III begins to deplete more rapidly. In Figure 7, time is also plotted on cartesian coordinates. While Case II continues to curve and show less depletion, Case III becomes a straight line which is indicative of a limited reservoir. The buildup portion of this study is shown in Figure 8. This Horner plot shows the most noticeable difference that will be seen if the fault is present as in Case III or not. If the zone is open ended as in Case II, and has contact with the rest of the reservoir, the pressure will continue to build and the Horner plot will extrapolate back to the initial reservoir pressure. If the reservoir is closed off, as in Case III, there will be no flow to replenish the depleted pressure. Therefore, the region will just reach an equilibrium pressure and will not reach its original level.

Due to the results found in this analysis, the length of the reservoir limit test should be extended. The drawdown should be run for at least 200 days or it will never be determined whether there is a fault present or if the well is in contact with the rest of the reservoir. The longer the test period the better the reservoir definition will be and it is necessary to define the reservoir to a greater extent than would be achieved by a 60 day drawdown.

TABLE 1
RESERVOIR PROPERTIES

Water Density	(GM/CM ³)	1.03
Water Compressibility	(1/PSI)	3x10 ⁻⁶
Water Formation Volume Factor	(RB/STB)	1.035
Water Viscosity	(cp)	.386
Gas Gravity (Density Relative to Air)		.64
Rock Compressibility		7x10 ⁻⁶
Reservoir Temperature	(°F)	300
Subsea Reservoir Depth	(ft)	15,700
Reservoir Thickness	(ft)	100
Permeability	(md)	200
Porosity	(FRACTION)	.22
Initial Reservoir Pressure	(PSIA)	10,000

TABLE 2
PROPOSED TEST SCHEDULE

<u>Test Period</u>	<u>Test Duration</u>	<u>Cumulative Test Time</u>	<u>Test Rate (BPD)</u>
Initial Test	3 Days	Day 3	2,400
Shut In	5 Days	Day 8	0
Reservoir Limit Test	60 Days	Day 68	20,000
Shut In	120 Days	Day 188	0

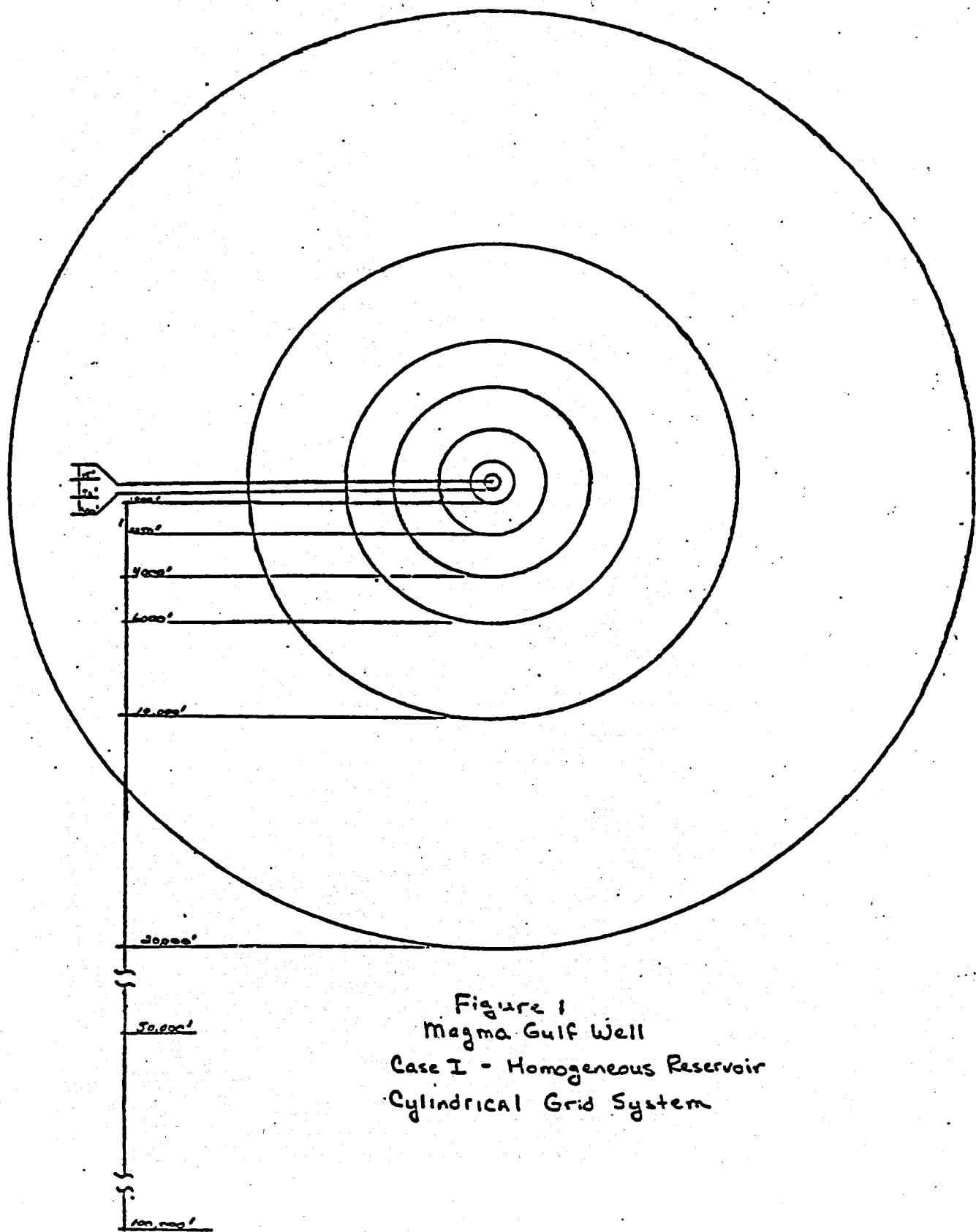
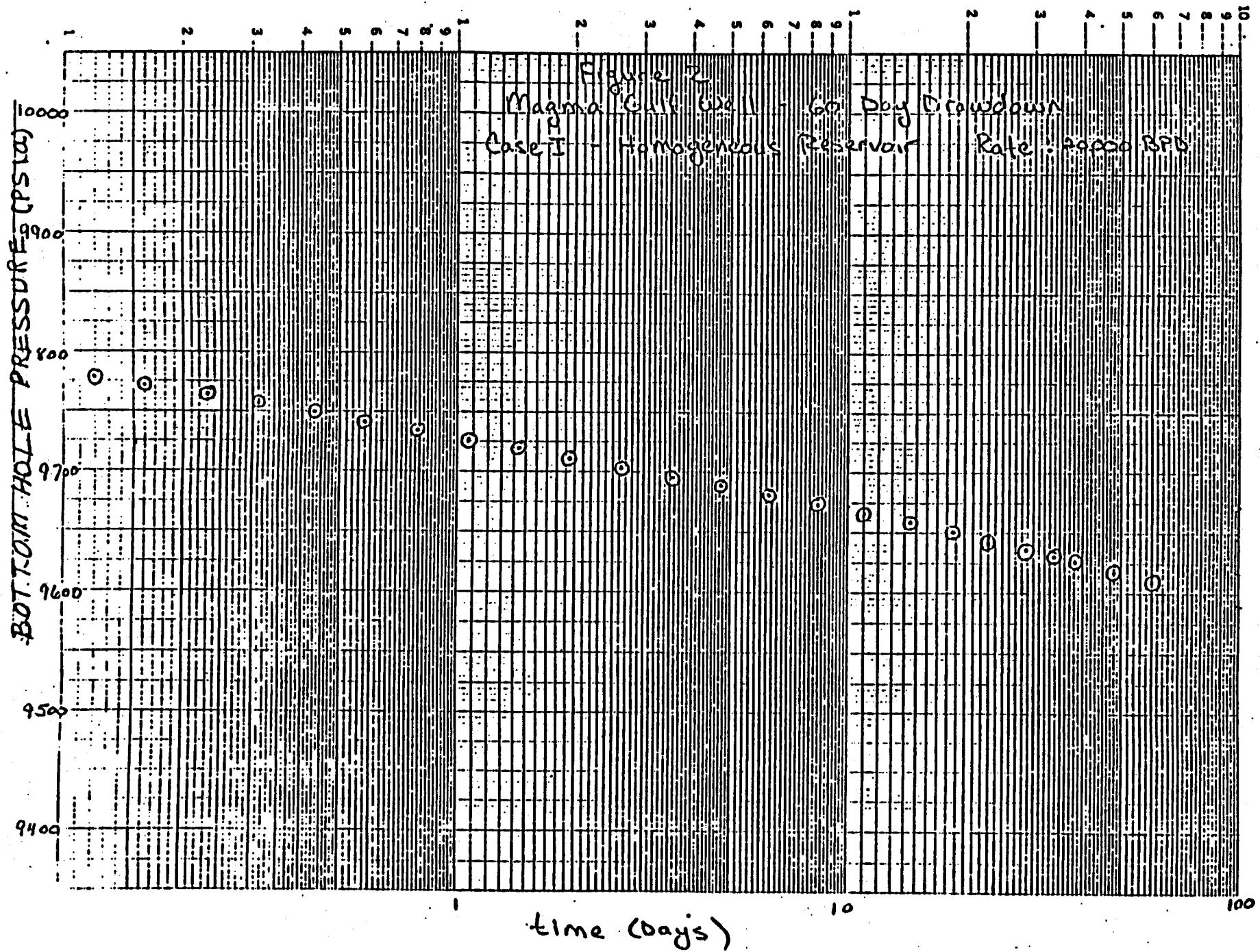


Figure 1
Magma-Gulf Well
Case I - Homogeneous Reservoir
Cylindrical Grid System



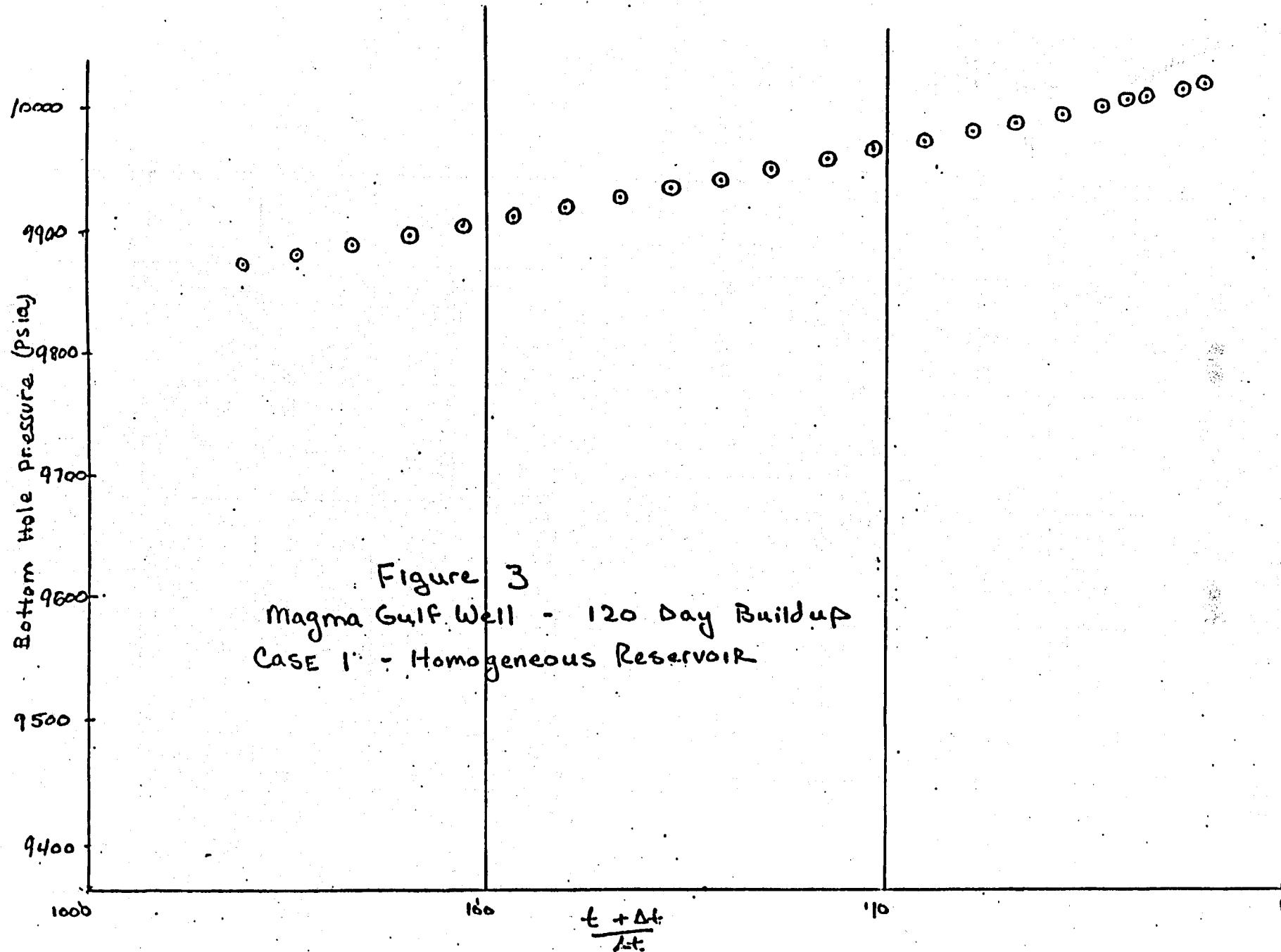
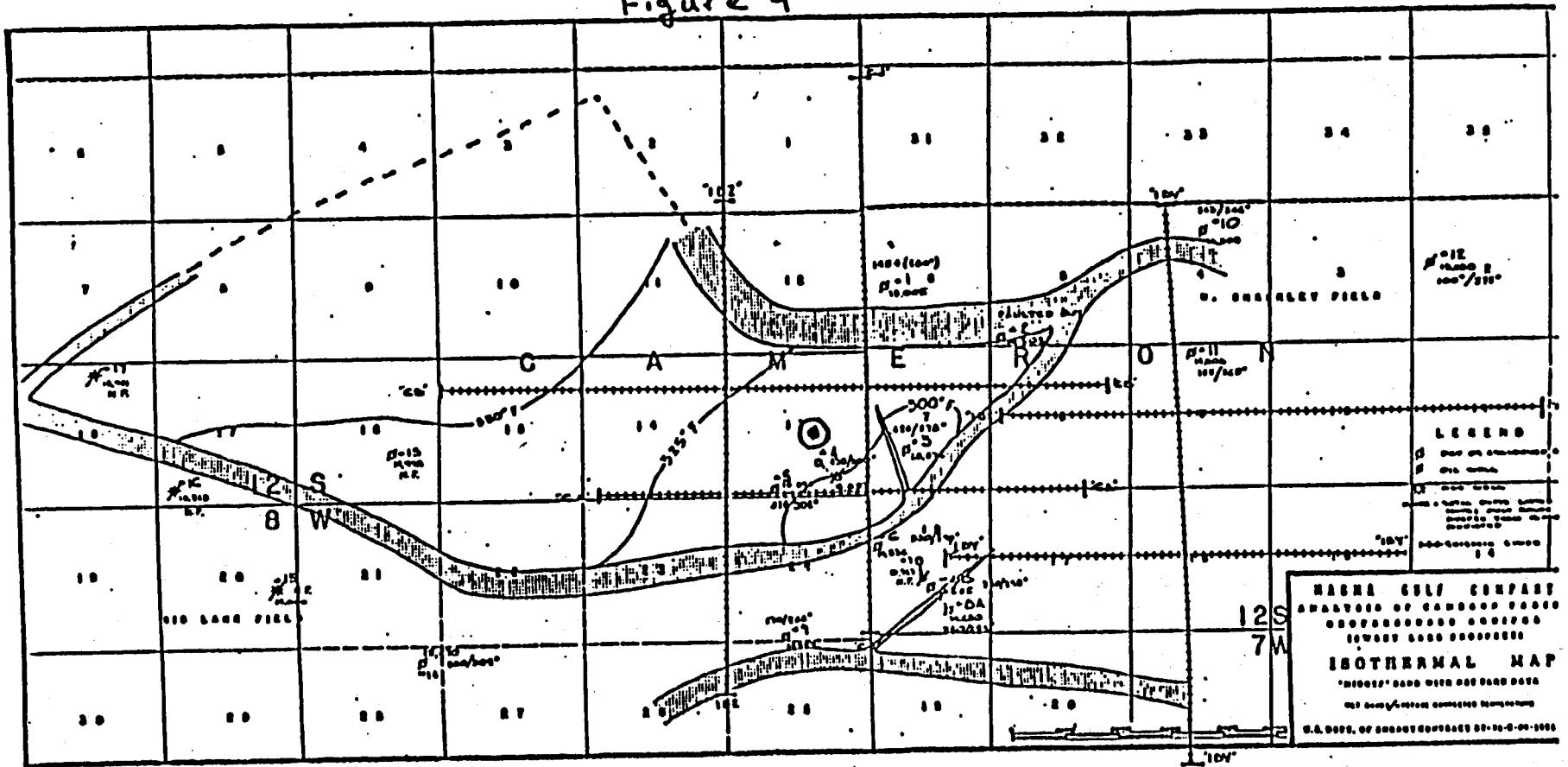


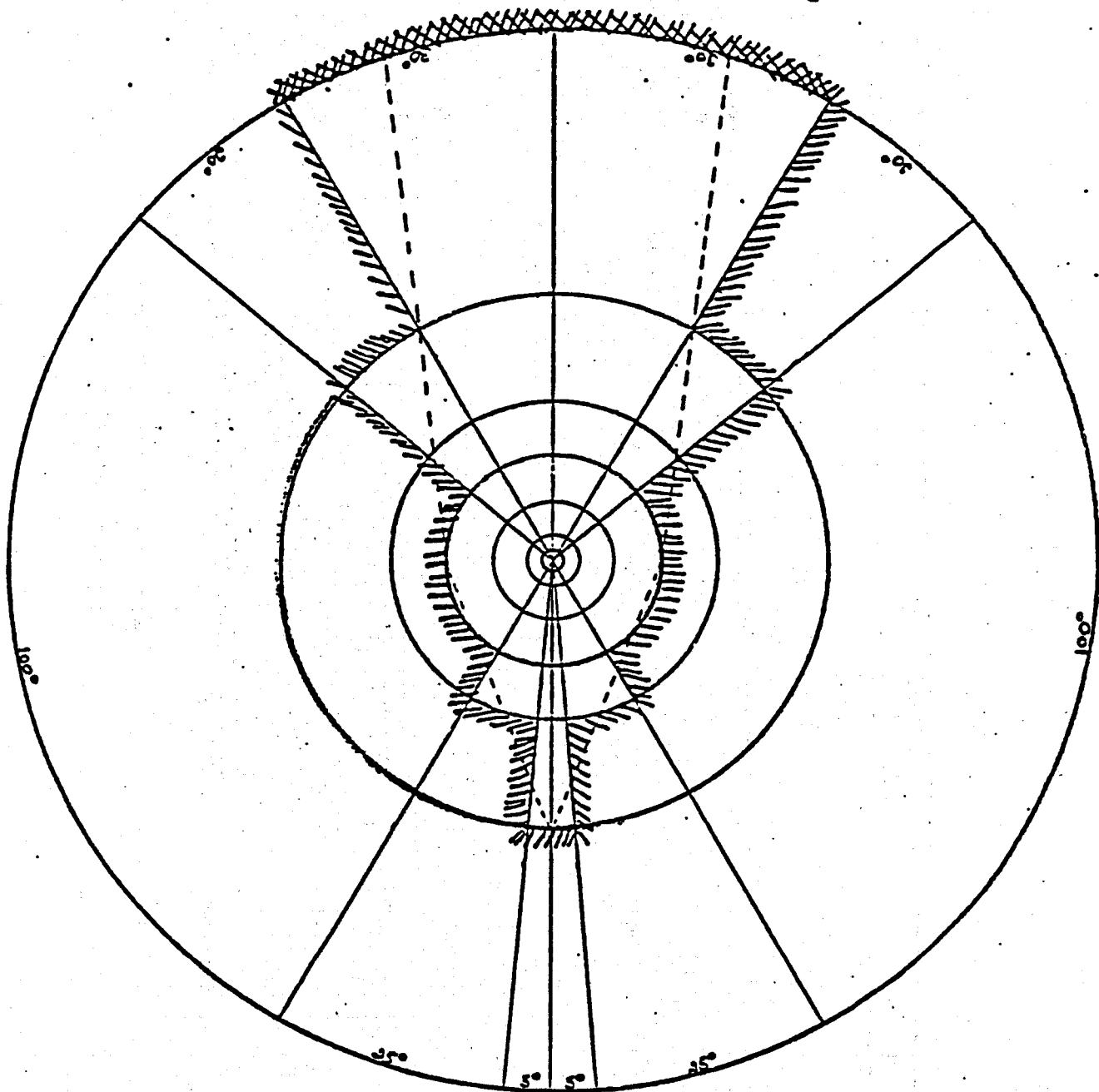
Figure 4



○ - Well Location

--- Possible Fault ZONE

Figure 5



Magma Gulf Well
 Case II - Linear Barriers
 Case III - Encompassing Barrier
 Cylindrical Grid System

----- Actual Fault Zone
 - Case II Fault Approximation
 - Case III Additional Fault Added

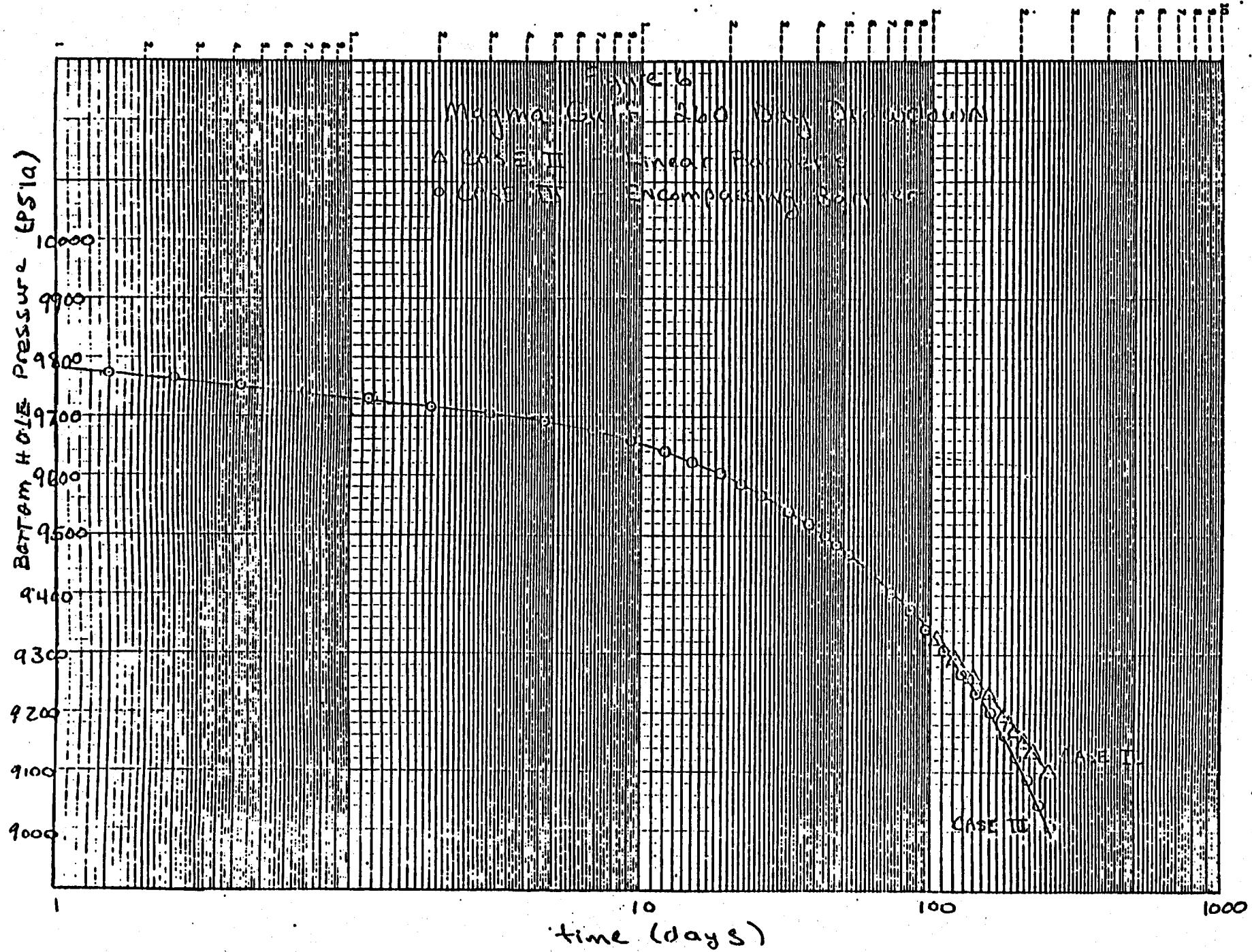
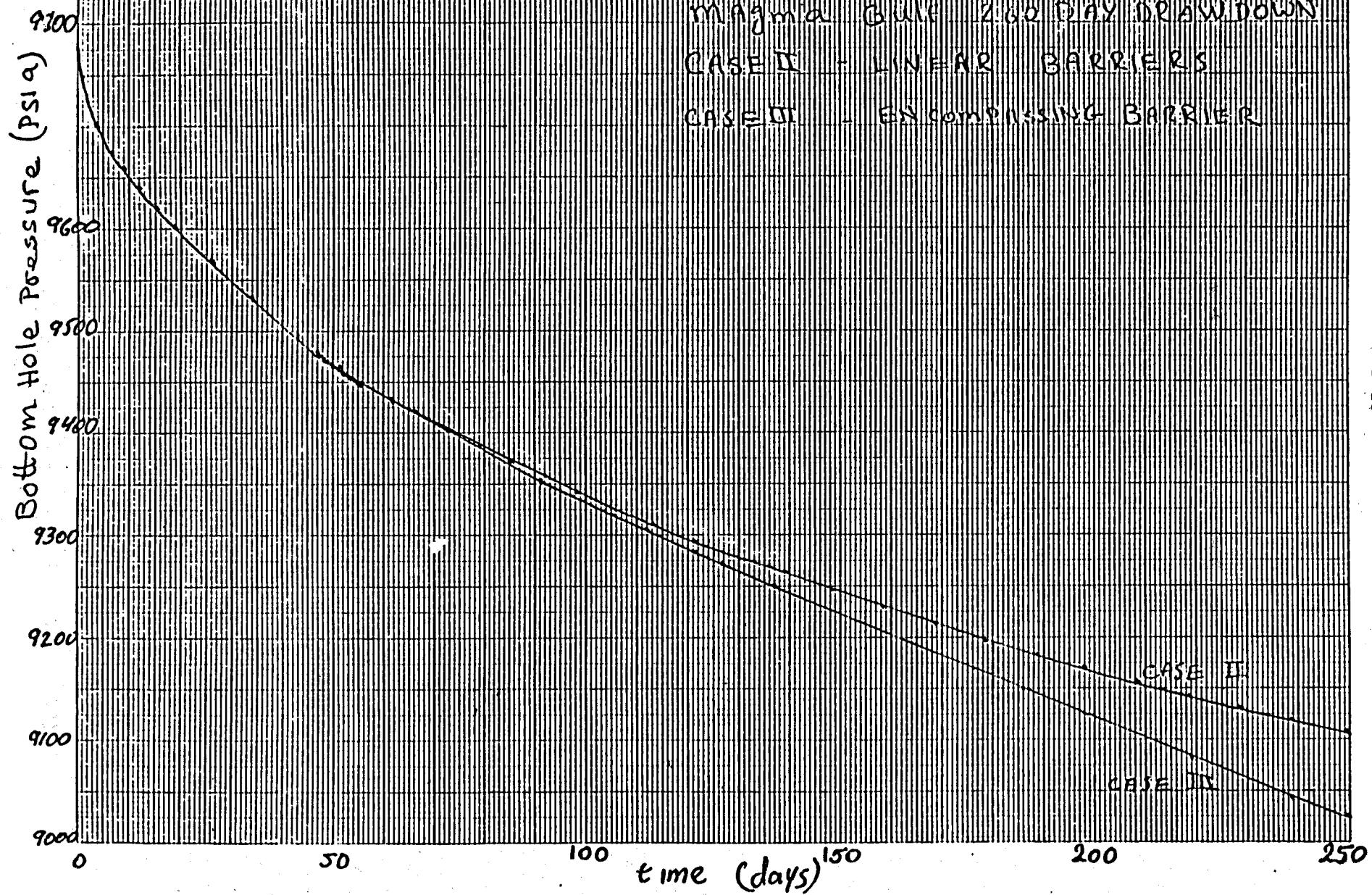
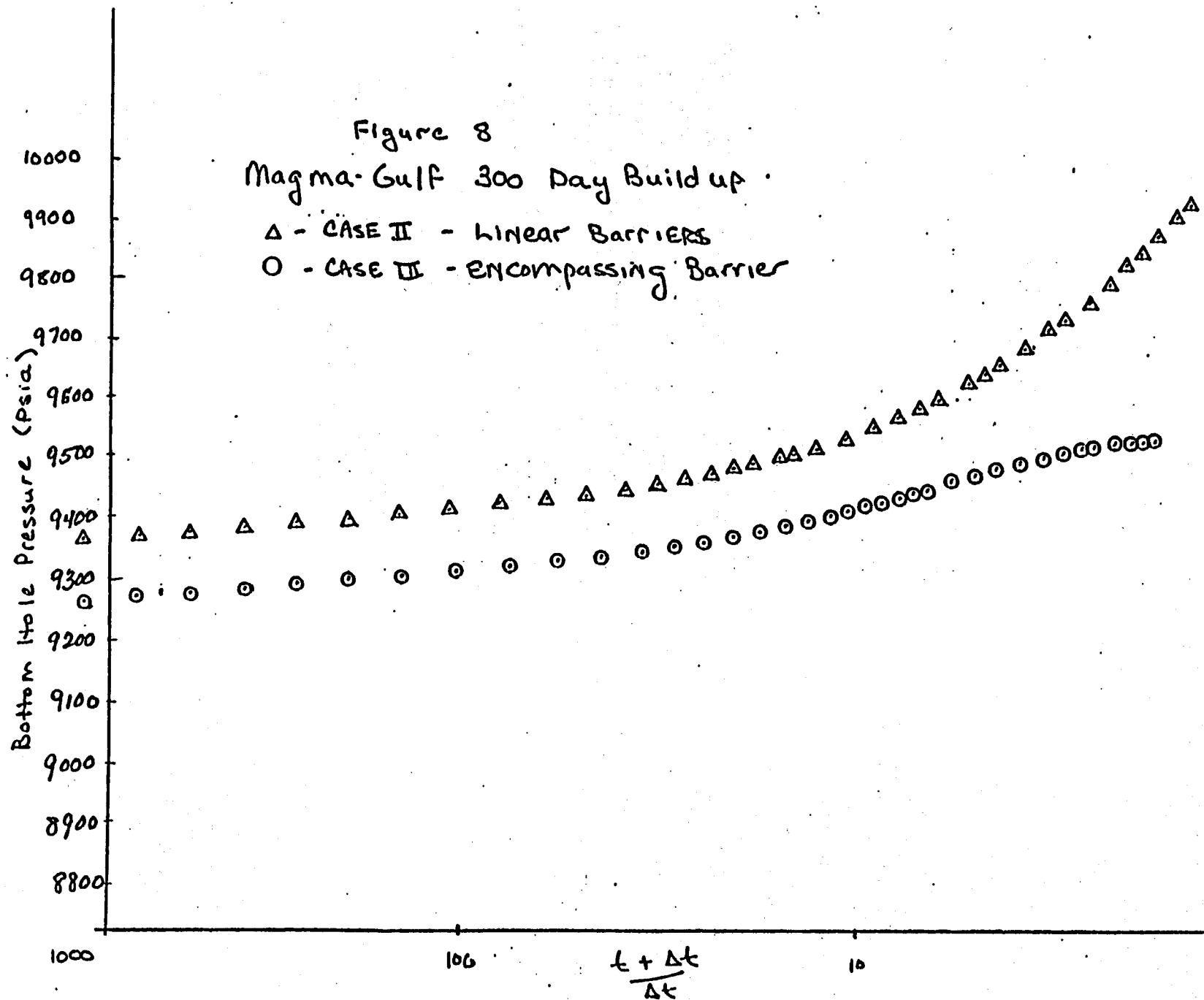


Figure 7
MAGMID GULF 260 DAY DRAWDOWN
CASE II - LINEAR BARRIERS
CASE III - EXPONENTIAL BARRIER







I-15

1201 Dairy Ashford, Suite 200, Houston, Texas 77079, (713) 497-8400

December 10, 1980

Mr. Keith Westhusing
Geopressure Projects Office
Suite 8620, Federal Building
515 Rusk Avenue
Houston, Texas 77002

Dear Mr. Westhusing:

After having completed our analysis of the test program, we received additional information from Don Clark. His belief is that the rock compressibility for this reservoir is in the order of 5×10^{-7} . This compares with a value of 7×10^{-6} used in the study. Having redone the analysis using the new smaller value, the drawdown shown in the figure is achieved. If this compressibility value is correct, it will be possible to recognize the third fault in a 50+ day drawdown test rather than the 200+ days required using the original number.

This would aid the test program, however, a value of 5×10^{-7} seems extremely incompressible.

Sincerely,

C. B. Keener

CBK/lf

Enclosure

cc: Don Clark
Bob Rogers

18/12/87 ONE

