GRUY FEDERAL, INC.

NV0/1528-8A

INVESTIGATION AND EVALUATION OF
GEOPRESSURED-GEOTHERMAL WELLS

DETAILED REENTRY PROGNOSIS FOR
GEOPRESSURE-GEOTHERMAL TESTING OF
ALICE C. PLANTATION No. 2 WELL

GRUY FEDERAL, INC.
2500 TANGLEWILDE, SUITE 150
HOUSTON, TEXAS 77063

713/785-9200

JUNE 16, 1978

PREPARED FOR THE
DEPARTMENT OF ENERGY
DIVISION OF GEOTHERMAL ENERGY
UNDER CONTRACT EC-77-C-08-1528

The Gruy Companies

... Since 1950

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Mr. Ronald T. Stearns
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DOE/Nevada Operations Office
P. O. Box 14100
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Re: Contract No. EG-77-C-08-1528
Sun Oil Company
No. 2 Alice C. Plantation
"Wells of Opportunity" Program

Dear Mr. Stearns:

As an ongoing portion of the Gruy Federal, Inc. Gulf Coast Geopressured-Geothermal "Wells of Opportunity" Program, we transmit herewith the third revision of the reentry and testing recommendation for Geo L-9 in St. Mary Parish, Louisiana.

This well was originally drilled as Sun Oil Company No. 2 Alice C. Plantation in the South Garden City Area.

It will not be necessary to refer to previously furnished topographic maps or portions of electrical logs inasmuch as this presentation is complete.

All necessary permits from the state and the land owners have been secured for this reentry operation.

Yours very truly,

Richard J. Dobson
Vice President
Special Programs

RJD:je
Enclosures

GRUY FEDERAL, INC.

TABLE OF CONTENTS

	<u>Page</u>
Introduction.....	1
Geology.....	1
Mechanical Condition.....	4
Reentry Technique	6
Casing Design	6
Tubing Design	7
Blowout Preventers	8
Logging	8
Perforating	8
Wellhead Design.....	11
General Comments	11
Reentry Prognosis	14
General Procedure for Blowout Prevention	19
Estimated Reentry Cost	20
Saltwater Disposal Well	22
Estimated Disposal Well Cost.....	25
Well Test Procedure	26
Test Prognosis	27
Estimated Testing Cost	31
Analyses Required for Geo ² Water and Gas	32
Estimated Analytical Cost	34
Plugging and Abandonment Procedure	35
Estimated Plugging and Abandonment Cost	36
Site Specific Environmental Information	
Checklist.....	37

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LIST OF FIGURES

<u>Figure</u>	<u>Item</u>	<u>Page</u>
I	Location Map	2
II	Structure: Top of Porosity Lower Marginulina Assensionesis Series	3
III	Current Status versus Proposed Completion	5
IV	Bottom Hole Tubing Assembly	9
V	Blowout Preventer Design	10
VI	Geo ² Christmas Tree	12
VII	Surface Testing Facilities	30

GEOPRESSURED-GEOTHERMAL REENTRY PROSPECT L-9
SOUTH GARDEN CITY AREA
ST. MARY PARISH, LOUISIANA
ALICE C. PLANTATION NO. 2

Introduction

This Gruy Federal Type II-B geopressured-geothermal (Geo²) prospect was drilled as the Sun Oil Company, No. 2 Alice C. Plantation. It is located in Section 2, Township 16-S, Range 10-E, St. Mary Parish, Louisiana. The well site is 3,705.61 feet S 64 degrees 10' 43" W from U.S.C. & G.S. marker "Foster". This is located in a sugar cane field, but is accessible by a short extension of an existing road through the Cabot Corporation's carbon black plant located adjacent to the well site. The well was drilled to a depth of 19,000 feet and abandoned as a dry hole in January, 1964. The location is shown on the west central area of the USGS topographic sheet, "North Bend". A portion of this sheet is included as Figure I.

Geology

Figure II is a structural interpretation on the top of the porosity of the lower Marginulina ascensionensis sand series. This has been modified from the Cambe Geological Map L-4 which depicts the structure at the 13,000-foot level, or some 4000 feet higher in the section.

The well site is located just south of the south bounding Garden City regional fault which forms the north boundary of an extensive down thrown and synclinal area between the Garden City and Bayou Sale structures which is indicated to contain in excess of 21,000 acres of potential drainage area. This large area is considerably more extensive than in any of the Geo² prospects reviewed to date.

SOLD BY
GRUY & ASSO. INC.
 ENGINEERS

ROAD CLASSIFICATION

Heavy-duty	—————	Light-duty	—————
Medium-duty	- - - - -	Unimproved dirt	
	U. S. Route		State Route

**POINTS FOR
 BELE SURVEY MAPS
 HOUSTON, TEXAS**

QUADRANGLE LOCATION

NORTH BEND, LA.
 NW/4 BELLE ISLE 15' QUADRANGLE
 N2937.5—W9122.5/7.5

1966

GRUY FEDERAL, INC.
 Houston, Texas

**LOCATION MAP
 North Bend
 St. Mary Parish, Louisiana**

FIGURE I

⊕ Control Wells
 * ⊕ Wells not penetrative horizon of interest

Graphic Scale
 0 1 mile 2

FIGURE II

GRUY FEDERAL, INC.
 Houston, Texas
 South Garden City Area
 St. Mary's Parish, Louisiana
 STRUCTURE: TOP OF POROSITY
 LOWER MARGINULINA
 ASCENSIONENSIS SAND SERIES

The potential Geo² aquifers penetrated by this well are from 16,810 feet to 16,990 feet, from 17,090 feet to 17,230 feet and from 17,700 feet to 17,900 feet. Based on the SP curve of the electric log, these sands contain 95 feet, 100 feet and 120 feet of net porous sand. Neither porosity logs nor cores were taken through the Geo² section of this well. The objective sands are correlative with producing sands in the Garden City field, therefore, it is reasonable to assume that the porosity of the objective sand in this well approximates the field wide average weighted porosity of 21.5 percent. This average value was obtained from log and core analyses in correlative gas sands at Garden City.

During drilling operations through these sands, a mud weight of 16.9 pounds per gallon was used. This would indicate the static aquifer pressure to be 14,650 psi (assuming 1,000 psi overbalance) at 17,800 feet. The maximum recorded mud temperature through these sands was 277 degrees Fahrenheit (136 degrees Centigrade) which would indicate an aquifer temperature of 305 degrees Fahrenheit (152 degrees Centigrade) based upon correction factors developed for South Louisiana by AAPG.

Mechanical Condition

Figure III illustrates the present and proposed mechanical condition of the well. Information on the present condition of the well was obtained from the plugging and abandonment reports filed with the Louisiana Department of Conservation, from the completion report published by Petroleum Information Corporation and from microfilm records of Sun Oil Company. It will be necessary to run 3,425 feet of 9-5/8" OD casing to tie back to the existing cut-off casing, so that the hole will accommodate the heavy mud required to control the aquifer pressure while clean-out operations are in progress in open hole. After reaching a depth of 18,100 feet, it will be necessary to run a full string of 7" OD casing through the Geo² sands and to the surface. In terms of tubular requirements, this is the most expensive well proposed by Gruy Federal. It is anticipated, however, that a large portion of the 7" OD casing will have been salvaged from earlier Geo² tests prior to this operation, and therefore will reduce the actual cost substantially. Alternatively, if this well should be chosen as the first reentry most of this casing can be utilized in a third or subsequent reentry or well-of-opportunity.

SUN OIL COMPANY
 ALICE C. PLANTATION NO. 2
 SEC. 2, T-16-S, R-10E
 SOUTH GARDEN CITY AREA
 ST. MARY PARISH, LOUISIANA

CURRENT STATUS

SUN OIL COMPANY
 ALICE C. PLANTATION NO. 2
 SEC. 2, T-16-S, R-10E
 SOUTH GARDEN CITY AREA
 ST. MARY PARISH, LOUISIANA

PROPOSED COMPLETION

GROUND LEVEL

FIGURE III

Reentry Technique

A detailed reentry and recompletion prognosis is included. In designing equipment and specifying procedures, the primary consideration was the safety of the operation. Procedures have been patterned after the experience of prudent operators who have successfully penetrated and produced from geopressured-geothermal gas reservoirs in the Louisiana Gulf Coast.

The design of the tubular program for each individual well is not optimal in the sense that it satisfies all mechanical constraints at minimum cost. Instead, tubular goods were selected on the basis of accomplishing the goals of a multi-well program at minimum cost.

The drilling mud program was designed to track the mud weight and other physical characteristics of the mud used during the original drilling of the well. Provision has been made to salvage as much of the heavy drilling mud as possible and store it for a period between well operations and rig moves for subsequent reuse so that maximum saving can be realized.

For estimating purposes the cost of equipment used during any reentry operation has not been allocated to each well but rather has been debited to the well for which it was first purchased. This method will cause some anomalous cost patterns between wells.

Casing Design

The minimum design factors for selecting the production casing is as follows:

Burst	1.0
Collapse	1.0
Tension Load	1.6

The burst pressure under operating conditions was computed by assuming that the casing would be exposed internally to the static aquifer pressure with no fluid outside the casing. Similarly, the collapse pressure under operating conditions was calculated assuming that the casing would be exposed externally to the maximum hydrostatic pressure exerted by the 16.9 pound per gallon mud in the annular space; and on the assumption that the production casing will never have less than a 3,000 foot column of formation salt water in the lower section of the pipe. The loss in collapse resistance as a function of tensile loading was incorporated into the casing design.

Standard API threads and couplings were determined to be adequate except for that portion of the production casing run into open hole below protection pipe. Flush joint connections in lieu of longthread couplings were selected to provide maximum clearance in the reduced size open hole.

Production casing was designed with the above safety factors; and ultimately in weights and grades that enable using the salvageable portion of pipe in other wells.

The short portion of 9-5/8" casing was designed on the basis of exposure to static aquifer pressure at the surface.

Tubing Design

Tubing has been selected on the basis of anticipated flow capacity, pressure requirements, and with joint connections that will withstand reuse in subsequent wells. To meet these requirements, we have selected the primary string to be 3-1/2" OD, 12.95# per foot, P-105 grade, PH-6 Hydril threaded pipe. Provisions have been made to utilize the 3-1/2" OD tubing in inventory at Intracoastal City. If this is not the first reentry project, however, the tubing in inventory will be used on a previous well and may or may not be available.

The tubing string will be equipped with a seal assembly on the production tube which extends through the production packer. A sufficient length of the seal

assembly (approximately 10 feet) will be run to allow for expansion and contraction of the tubing within the packer element as a result of increased temperature during flowing operations and a decrease temperature during plug and abandonment operations. A landing nipple to receive the subsurface pressure gauges during testing operations will be provided. A sliding sleeve circulating valve will be placed in the tubing string immediately above the seal element in order to permit selective communication between the tubing and casing should this become necessary. This bottom hole tubing assembly is shown in Figure IV.

Blow-Out Preventers

Figure V contains a sketch and specifications of the BOP hook-up and choke manifold. It sets out the necessary procedures for surface blowout prevention such as have been adopted by IADC, API and prudent operators in Geo² areas.

Logging Program

After cleaning out and conditioning the open hole below the 9-5/8" OD casing at 16,234 feet to a depth of 18,100 feet a complete suite of electrical logs including Induction - Electrical, Compensated Neutron and Density logs will be run.

Experience in the Garden City field has indicated a very poor record of side wall core recovery. For this reason and in order to reduce risk of fishing jobs, sidewall cores are not recommended.

Perforating

Perforating will be accomplished with a 2-1/8" high temperature powder charge, through tubing jet perforating gun with four shots per foot and zero phasing. When fired inside 7" casing this jet is credited with creating a hole of approximately 0.31" in diameter and an effective penetration of about 3-1/2" beyond the cement sheath in this type of formation. Assuming 100 percent firing efficiency, this configuration should provide a productivity equal to 79 percent of the open hole productivity.

SUN OIL COMPANY
 ALICE C. PLANTATION NO. 2
 SEC. 2, T-16-S, R-10E
 SOUTH GARDEN CITY AREA
 ST. MARY PARISH, LOUISIANA

BOTTOM HOLE TUBING ASSEMBLY

BLOWOUT PREVENTER DESIGN

Minimum operating equipment for preventers will be as follows: (1) multiple pumps, driven by a continuous source of power, capable of fluid charging the total accumulator volume within twenty minutes; and (2) accumulators with a pre-charge of nitrogen at not less than 750 psi and capable of receiving a fluid charge from the (charging) pumps. Fluid charge volume shall be the amount required to increase accumulator pressure from nitrogen pre-charge pressure to rated pressure. Charging pumps are to be connected to the hydraulic operating system which is to be a closed system. When requested, an additional remote and equivalent source of power shall be available to operate the pumps. The pressurized fluid volume stored in the accumulators shall be sufficient to close all pressure operated devices simultaneously within 20 seconds with charging pumps shut down. Minimum accumulator pressure shall be 1500 psi initially and not less than 1200 psi when all preventers are closed.

The closing manifold and remote closing manifold (floor-mounted) will have a separate control for each pressure operated device. Each control will be labeled to designate which pressure device it controls and to show open and closed positions. A pressure reducer and regulator is to be provided for the Hydril GK. Hydraulic oil shall be used as the operating fluid. One-inch size seamless steel piping shall be used to connect the closing unit to the preventers. Piping is to be tested to maximum rated pump pressure. The choke manifold, the four-inch choke flowline and the four-inch relief line shall be supported by metal stands or reinforced concrete. The choke lines shall be anchored. No sharp bends or curves will be permitted in the choke flowline from the preventers to the pits. Header to have three way outlet: (1) to reserve pit, (2) to choke box, (3) to separator. Easy and safe access will be maintained to the choke manifold. If deemed necessary, walkways and stairways will be provided in and around choke manifold. All valves throughout the assembly shall be selected for operation in the presence of oil, gas and drilling fluids. Valves connected adjacent to the drilling spool and all ram-type preventers will be equipped with stem extensions, universal joints, if needed, and operating wheels which are to extend beyond edge of derrick substructure. Any other valves within the limits of the derrick substructure will be so equipped when requested.

FIGURE V

The perforating interval length will be designed to achieve a productivity equal to 1/3 of the open hole productivity. Although the perforated interval cannot be specified until all logs are available, it is likely that the entire sand portion of the electric log interval from 17,700 feet to 17,900 feet will be opened.

Christmas Tree Design

Figure VI is a sketch of a Geo² christmas tree design for this program by WKM Well Head Systems Division. The christmas tree is rated to a working pressure of 10,000 psi. All valves have T-24 steel vertical runs with packing and seals for high temperature fluids (360 degrees Fahrenheit). The tree consists of two 3-1/16 inch master gate valves and a 3-1/16 inch swab valve. Between the master valve and the swab valve is a double wing assembly to house the choke bodies. One wing will contain a positive choke and the other will contain an adjustable choke. Each wing will consist of a Hi-Lo safety valve and a conventional wing valve. This specific design limits the anticipated high pressures to the tree assembly, thus permitting lighter weight pipe for all surface pipes and fittings.

During squeeze cementing to plug and abandon the well, the well head pressure may exceed 10,000 psi. To overcome this problem it is planned to utilize a well head isolation tool developed by Halliburton. The tool is attached to the top of the swab valve on the tree and a mandrel is hydraulically positioned through the master valves and locked in the production tubing. This device, rated at 20,000 psi working pressure, isolates the well head from the treating fluid or kill pressure.

The casinghead used to set the production string has been designed to accept any casing size of the wells under consideration and to be compatible both with the blow out preventers and the upper christmas tree assembly.

General Comments

The No. 2 Alice C. Plantation well has been proposed as a Geo² test prospect for the following reasons:

- (1) The well contains a known quantity of thick, hot and apparently permeable lower Miocene sand.

GEO² CHRISTMAS TREE
TO BE ADAPTED FOR ALL REENTRY WELLS
BY GRUY FEDERAL, INC.

- (2) These sands are correlative with sands in the adjacent Garden City field which have a known average porosity in excess of 20% and which, judging by high per well cumulative production, exhibit characteristics of wide aerial extent.
- (3) This location appears to be capable of draining a large area in a down-thrown fault block containing two synclinal areas.
- (4) The area is located on land. If a Geo² resource is developed, there are potential industrial or agricultural applications nearby, as contrasted to a marsh location.
- (5) A reasonable contract has been finalized with the landowners and all permits have been obtained.
- (6) Site preparation time is minimal and can be finished in 10 days or less.

WELL PROGNOSIS
FOR
ALICE C. PLANTATION NO. 2
SOUTH GARDEN CITY AREA

Work Day
Schedule

1. Prepare location.
2. Dig out cellar, extend 13-3/8" surface casing to proper elevation and weld on casinghead.
- 1st 3. Move in and rig up drilling rig and install BOP.
- 4th 4. Clean out 13-3/8" OD casing with 12-1/4" OD rock bit to the top of the cut-off 9-5/8" OD casing. Run 12-1/4" rock bit, 6-1/2" OD drill collars, 3-1/2" OD drill pipe. Pull out of hole.
5. Run 11-1/2" OD lead impression block on bottom of 6-1/2" OD drill collars and 3-1/2" OD drill pipe. Pull out of hole.
6. If required from the appearance of the lead impression block, run 8-3/4" OD long tapered carboloy junk mill to dress out top of cut-off 9-5/8" OD casing. Alternatively run 8-3/4" OD rock bit. Run mill or rock bit on bottom of 6-1/2" OD drill collars and 3-1/2" OD drill pipe. Dress out top of cut-off 9-5/8" OD casing and clean out to approximately 75 feet below top of cut. Pull out of hole.

- 5th 7. Go in hole with two joints 11-3/4" OD 54# Hyd FJ WP washover pipe, 11-3/4" OD tooth type carboloy rotary shoe, top bushing, and hydraulic oil jars on bottom of 6-1/2" OD drill collars and 3-1/2" OD drill pipe. Wash over approximately 60 feet of the 9-5/8" OD casing. Pull out of hole.
8. Go in hole with hydraulic pressure operated mill dressed to cut 9-5/8" OD casing. Run on bottom of 6-1/2" OD drill collars and 3-1/2" OD drill pipe. Locate first casing collar using minimum pressure/slack-off technique, sliding cutter down hole until cutter knives catch in joint and cutter stops moving down-hole. Bleed pressure, drop 5 feet to 10 feet below collar and make inside cut. Mill approximately 6" of the 9-5/8" OD casing and dress top smooth for external casing patch. Pull out of hole.
- 6th 9. Go in hole with 9-5/8" casing spear, 3' extension, 9-5/8" OD stop sub, lubricated bumper jars, and hydraulic oil jars on bottom of 6-1/2" OD drill collars. Retrieve fish.
10. Go in hole with external casing patch on bottom of 3,600 feet of 43.5# N80 LT&C casing.
- 6th 11. Nipple up casing, install blowout preventers and test same to 5,000 psi.
12. Go in hole with drill pipe, drill collars and bit and condition mud to top of cement retainer plug at 16,020 feet. Test casing to equivalent of 17.2#/gallon mud for 30 minutes. Repair casing, if necessary, by cement squeezing.

8th 13. Drill out cement retainer and cement from 16,020 feet to 16,234 feet (bottom of 9-5/8" casing). Then continue in hole washing and reaming open hole to a depth of 18,100 feet. Not more than 500 feet increments of open hole should be made without at least one full circulation of the mud system from the bottom of the hole.

12th 14. Run the following electric logs in the open hole from 18,100 feet to 16,234 feet:

Induction Electric Log
Compensated Density Log
Compensated Neutron Log
Sonic Log
Sidewall Cores, if hole conditions permit;
and if desired.

13th 15. Make trip with the drill pipe and condition hole to 18,100 feet and measure out of hole.

14th 16. Laying down drill pipe rig up and run 7" OD casing to 18,100 feet as follows:

<u>From</u>	<u>To</u>	<u>Size</u>	<u>Weight/ Foot</u>	<u>Grade</u>	<u>Type Ends</u>	<u>Section Length</u>
18,100'	16,200'	7"	38	P110	F.J.	1,900'
16,200'	13,750'	7"	38	P110	LT&C	2,450'
13,750'	11,750'	7"	35	P110	LT&C	2,000'
11,750'	200'	7"	32	P110	LT&C	11,550'
200'	0'	7"	38	P110	LT&C	200'

Use guide shoe on bottom with float collar two joints above bottom. Also use centralizers on each joint of casing on bottom 600 feet and one centralizer per 100 feet to 16,000 feet. Use sufficient cement to fill the annular space to 500 feet inside the 9-5/8" casing.

- 16th 17. Nipple up 7" casing and put on BOP.
18. Pick up 3-1/2" OD 12.70# P105 PH-6 Hydril tubing with bit on bottom and go to top of float collar on 7" casing at approximately 18,000 feet and test casing to 7,500 psi surface pressure. If okay, displace mud from hole with 10#/gallon CaCl_2 water.
- 17th 19. Pull tubing and run gamma ray cement bond log from approximately 18,000 feet to 16,000 feet. If cement bond not good, proceed to block squeeze to obtain cement bonds then drill out cement.
- 19th 20. Run production packer on wire line and set same at a depth to be determined after perforating interval is selected from the new electric logs.
21. Make up bottom hole completion equipment shown on the enclosed drawing and go in hole for completion using the 3-1/2" tubing string. Test each joint of tubing going in hole to 7,500 psi. Space out in packer and test packer to 6,500 psi differential from the bottom and 5,000 psi from the top.

- 21st 22. Set tubing in packer with full tension from pipe weight when locator sub sets on packer top. Remove BOP and install christmas tree. Nipple christmas tree, set retrievable plug in bottom of tree and test same to 10,000 psi and release rig.
23. Move out rig.
- 24th 24. Complete moving out rig.
- 27th 25. Suspend operations while drilling salt water disposal well.
26. Resume operations and rig up wireline unit and install high pressure perforating lubricator. Test same to 10,000 psi.
27. After final selection of perforated interval from new electric logs, go in hole with through tubing perforating gun (maximum length 46 feet - 4 shots per foot) and perforate lowest 46 feet of selected interval.
NOTE: This perforating will be done with a pressure differential to the well bore; therefore, the wellhead pressure should instantly increase substantially when the gun is fired. The wing valves on the tree should be closed before perforating is done.
28. Repeat trips with perforating gun until the entire completion interval is shot. Release perforating unit.
29. Proceed to hook up production unit and place well on test.

GENERAL PROCEDURE FOR BLOWOUT PREVENTION:

1. Use BOP design as attached. The minimum assembly will consist of three preventers. The bottom and middle preventers may be Cameron QRC, Cameron Type F or Shaffer Hydraulic Single, and the upper preventer will be Hydril GK. Double preventers or space savers may be used if approved by the company supervisor. An accumulator with a closing unit is required. Accumulator reservoir pressure shall be sufficient to close all preventers simultaneously in 20 seconds with the charging pumps closed down. Minimum accumulator pressure shall be 1,500 psi initially and not less than 1,200 psi when all preventers are closed.
2. When nipping up production casing, test BOP's and choke manifold to 7,500 psi with cold water, or as specified by the company representative. BOP's will be tested at least once each day thereafter when working in open hole and once each week otherwise.
3. Have a full opening safety valve and Grey inside BOP with drill pipe connections on the rig floor.
4. Have extra pipe rams on location at all times while drilling or completing.
5. Locate all choke manifolds, lines and valves at the side of and away from the substructure. Adequately support and tie down the choke assembly.

ESTIMATED REENTRY COST
FOR
ALICE C. PLANTATION NO. 2
SOUTH GARDEN CITY AREA

<u>Activity</u>	<u>Estimated Amount</u>
1. Lease acquisition and legal fees	\$ 35,000
2. Location preparation	70,500
3. Rig transportation costs	30,000
4. Rig time - 24 days at \$6,000/day	144,000
5. Bits	2,000
6. Mud and chemicals	80,000
7. Casinghead	2,000
8. Christmas tree (including surface safety equipment)	80,500 (1)
9. Casing patch for 9-5/8" casing (incl. bits & rentals)	15,000
10. Rental tools and equipment	10,000
11. 3-1/2" drill pipe & drill collar & sub rental	25,000
12. Trucking other than rig transportation	10,000
13. Cement and cement services	16,000
14. Logging and coring	40,000
15. Perforating	40,000
16. 3,5600 ft. 9-5/8" OD 53.5# N80 LT & C casing	39,300
17. 18,000 ft. 7" OD casing per prognosis	330,000
18. Subsurface completion equipment	3,500
19. 8,400 ft. of 3-1/2" OD 12.7# P105 PH6 tubing (new)	172,200
9130' of 3-1/2" OD 12.7# P105 tubing from State Lease 4183 No. 1 well	5,500 (1) (2)

(1) Can be reused on alternate wells after minor shopping.

(2) Available from inventory either at Intracoastal City or from State Lease 4183 No. 1, dependent upon which is the first project well.

GRUY FEDERAL, INC.

NVO-1528-8A
Estimated Reentry Cost

	<u>Estimated Amount</u>
20. Supervision	\$ 10,000
21. Miscellaneous	20,000
22. Contingencies	45,000
23. Material Handling @1.3% of all except items 1, 20, & 22	14,700
24. G&A @ 18% of items 1, 20	<u>8,100</u>
TOTAL	\$1,248,300

SALT WATER DISPOSAL WELL
FOR
ALICE C. PLANTATION NO. 2

The available electrical logs covering the potential disposal well sands from the bottom of the surface casing (approximately 3,500 feet) to a depth of 5,000 feet indicate the need to drill this salt water disposal well to 4,600 feet to provide adequate sand to accommodate injection. To date we have not located a log of the surface sands down to 3,500 feet to evaluate the possibilities of shallower potential disposal sands and to delineate maximum depth for fresh water sands. We will continue this search and will revise the depth upward if it can be safely justified.

The basic design of the casing program conforms with the requirements of the Department of Conservation. No tubing is recommended for the well because it acts to increase the surface injection pressure and would only be utilized if backflushing is required. The need for backflushing appears to be remote for the following reasons: (1) a volume of less than 200,000 barrels will be injected, (2) filters are provided downstream from the pumps to reduce solid and scale build-up, (3) the closed system prevents bacterial growth, and (4) two injection pumps (one of which is a standby) capable of delivering 10,000 barrels per day at an injection pressure of 500 psi.

In the event that formation plugging prevents disposal of the water, coiled tubing can be lubricated into the well and the sand back-washed using nitrogen.

Operational
Day

0 1 Drive 13-3/8" OD casing to refusal or $\pm$ 125 feet.

- 27th 2. Move in and rig up water well rig.
- 29th 3. Drill 12-1/8" hole to 1,200 feet.
- 30th 4. Run 1,200 feet of 9-5/8" 35.0# H-40 casing with guide shoe on bottom and a float collar one joint above bottom. Use one centralizer per 100 feet of casing for bottom 500 feet and cement casing to surface.
- 32nd 5. Drill 8-3/4" hole below surface casing to 4,600 feet.
- 39th 6. Run Induction Electric and Density logs and SWC if desired.
- 35th 7. Run 5-1/2" OD 15.5# J-55 casing with guide shoe on bottom and float collar two joints above bottom. Run centralizers on every other joint of casing for bottom 500 feet. Cement casing with sufficient cement to get returns at the surface.
- 36th 8. Make trip with 2-7/8" work string and condition hole to float collar at approximately 4,420 feet and displace mud in hole with water. Lay down work string.
- 37th 9. Nipple up 5-1/2" casing and install christmas tree.
- 10. Test casing and tree to 2,000 psi surface pressure with water in hole.
- 38th 11. Run gamma ray - cement bond log from total depth to 1,200 feet and block squeeze with cement if necessary to obtain good bond.

- 39th 12. Rig down and move out water well rig.
13. Perforate approximately 50 feet of the lowest clean sand determined from electrical logs with four shots per foot using a casing bullet gun and rig down wireline unit.
- 40th 14. Test injectivity of well with rig pumps or pump truck to achieve 10,000 barrels per day injection rate at 150 psi or less. If injection rate is not sufficient, select and perforate additional sand interval or consider treatment with mud cleanout acid, or both, if deemed necessary.

ESTIMATED COST
OF
SALT WATER DISPOSAL WELL
FOR
ALICE C. PLANTATION NO. 2

<u>Activity</u>	<u>Estimated Amount</u>
1. Move in rig, drill to 4,000 feet, 12 days @ \$4,200	\$ 50,400
2. Location preparation	5,000
3. 130 feet of 13-3/8" 65# J-55 plain end casing	4,000
4. 1,200 feet of 9-5/8" 36# H-40 casing ST&C or LTC	14,000
5. 4,000 feet of 5-1/2" 15.5# J-55 ST&C or LT&C	21,400
6. Stand by rig time	4,200
7. Cement and Services	14,000
8. Electric logging	12,000
9. Perforating	8,000
10. Wellhead equipment	3,000
11. Stimulation	2,500
12. Supervision	3,600
13. Miscellaneous supplies and rentals	7,500
14. Trucking	3,000
15. Contingencies	14,000
16. Material handling at 1.3% of all items except supervision and contingencies	<u>1,900</u>
Total Well Cost	\$168,500

WELL TEST PROCEDURE

The well test procedure was established to provide the maximum amount of reservoir rock and fluid information that can be obtained within the fixed time frame subject to the limitations of the available equipment. The only bottomhole pressure device capable of operating at these temperatures and pressures is a 15,000 psi (full scale deflection) Amerada RPG-3 bourdon tube pressure gauge. This gauge has no surface read-out capability and has 3, 5, and 7 day clocks. The maximum accuracy of the bomb is ± 0.25 percent (37.5 psi) under controlled calibration conditions. These limitations impact the scope of meaningful transient tests which can be conducted.

Before testing commences it will be necessary to flow the well into a reserve pit in order to clean the perforations of mud and foreign solids. After this has been accomplished the well will be shut-in to measure the static reservoir pressure. The well will be placed on production at a low rate through the test equipment in order to establish the drawdown characteristics at a safe level. Every 24 hours the rate will be increased until the choke size which allows flow at 10,000 barrels per day is determined. The well will be shut-in and the pressure build-up recorded. These data will be analyzed to determine the flow capacity of the formation and the skin effect or formation damage.

During each flow period, full flow stream samples will be taken and analyzed for chemical composition. Separator gas-water ratios will be carefully metered to detect changes as a function of the flow rate.

After the well bore pressure has returned to static conditions, the well will be flowed at a rate of 10,000 barrels per day for approximately two weeks. The pressure data from this flow can be used to verify the reservoir parameters computed from the build-up analysis.

At selected intervals throughout the flow periods, separator gas and liquid samples will be taken in order for laboratory recombination studies to be conducted.

TEST PROGNOSIS
FOR
ALICE C. PLANTATION NO. 2

Operational
Day

42nd	1.	Move in and nipple up test equipment. Hydraulically test all systems with water to 4000 psi.
45th	2.	Run two Amerada RPG-3 pressure gauges with 24 hour clocks and 15,000 psi full-scale deflection to 15,153 feet, stopping for fifteen minutes each 3,000 feet. Hang bombs for two hours and record surface pressure with deadweight tester. Retrieve pressure bombs.
	3.	Hook up two-pen pressure recorder to tubing upstream from the choke and to the casing to observe for tubing or packer leaks.
	4.	Place well on production through adjustable choke at low setting and record surface flowing pressure every thirty minutes by deadweight tester.
	5.	Record gas and liquid flow rates by calibrating the liquid turbine meter with the test tank.
46th	6.	Gradually increase the flow rate in increments until either the maximum flow rate from the well or 10,000 barrels per day is achieved. Continue to flow at this rate for 24 hours while recording surface temperature, pressure, and gas and liquid production. If maximum flow rate of well not sufficient, do one of the following:

- (1) acidize
- (2) perforate more interval

- 47th 7. Shut well in and measure surface pressure build-up with dead-weight tester.
- 48th 8. When well bore pressure has stabilized, run two Amerada RPG-3 pressure bombs with five day clocks and latch into landing nipple at bottom of tubing.
- 49th 9. Place well on production at 1,000 barrels per day for 24 hours, monitor surface pressure, temperature and flow rates and take the following samples:
 - (a) Two, one liter, full well stream samples for chemical analysis.
 - (b) Three, one liter, separator liquid samples.
 - (c) Two, one liter, separator gas samples.
- 50th 10. Increase flow rate to 4,000 barrels per day for 24 hours and sample as before.
- 51st 11. Increase flow rate to 7,000 barrels per day for 24 hours and sample as before.
- 52nd 12. Increase flow rate to 10,000 barrels per day for 24 hours and sample as before.
- 53rd 13. Shut well in, measure build-up for 24 hours, then retrieve pressure bombs.

- 54th 14. Place well on production at low rate and gradually increase rate over a 12 hour period until it reaches 10,000 barrels per day.
15. Flow well at this rate for nine days while measuring surface pressure, temperature and flow rates.
16. Sample as before prior to shutting well in.
- 67th 17. Shut well in and run two pressure gauges to 16,060 feet and record until deadweight tester at surface indicates static conditions have been reached.
- 68th 18. Pull pressure gauges, release test equipment and move same out.
19. Proceed with plug and abandonment operations.

DEADWEIGHT TESTER

SAFETY VALVES

CHOKE

CHOKE

SONIC SAND DETECTOR

TEMPERATURE

SCALE DETECTOR

FLARE

GAS SAMPLER

ORIFICE METER

2/500 psi, 10,000 BBL/DAY
CENTRIFUGAL PUMPS

FLOW STREAM
SAMPLER

1440 psi-
WP
Test
Separator

RELIEF
VALVE

LIQ. SAMPLER

23,000,000 BTU/HR
AIR COOLER

LIQ.
METER

100 BBL
CALIBRATION
TANK

FILTER
FILTER

LIQUID
METER

INJECTION WELL

MUD PITS

FIGURE VII
SURFACE TESTING FACILITIES
Gruy Federal, Inc.

GRUY FEDERAL, INC.

ESTIMATED TESTING COST
For
NO.2 ALICE C. PLANTATION

<u>Activity</u>	<u>Estimated Amount</u>	
1. Two data headers	\$ 108	
2. Two-phase separator	3,780	
3. 100-barrel tank	1,090	
4. Two 10,000 BPD centrifugal pumps	1,940	
5. 23,400,000 BTU/hr air cooler	12,159	(1)
6. Piping	740	
7. Sonic sand detector	300	
8. Wireline unit w/pressure gauge	1,440	
9. Gate valve w/activator	500	
10. House trailer w/power plant	850	
11. Generator	20,000	
12. Expansion loops	900	
13. Supervision and Labor	46,200	
14. Material handling	572	(2)
15. Test Accessories	<u>200</u>	
TOTAL		\$ 90,779

(1) One charge only of \$8700 debited to well for overtime work.

(2) Charged at a rate of 1.3% on all items except 14.

ALICE C. PLANTATION NO. 2
SOUTH GARDEN CITY AREAAnalyses Required for Geo² Water and GasChemical Analysis of Water

A. Metals

1. Copper
2. Zinc
3. Boron
4. Arsenic
5. Chromium
6. Mercury
7. Lead
8. Cadmium

B. Solids

1. Dissolved
2. Total

C. Hardness

1. Calcium Carbonate
2. Magnesium Carbonate

D. Others

1. Carbonate
2. Bicarbonate
3. Chloride
4. Iron
5. Sulfate
6. Dissolved Silicate

ALICE C. PLANTATION NO. 2
SOUTH GARDEN CITY AREAChemical Analysis of Vapor

A. Hydrocarbons (percent)

1. Methane
2. Ethane
3. Iso-propane
4. Normal Propane
5. Iso Butane
6. Normal Butane
7. Pentane
8. C₆+

B. Other

1. Hydrogen Sulfide
2. Carbon Dioxide
3. Radon

Chemical Properties of Water

1. Density
2. Compressibility
3. Conductivity
4. Viscosity
5. pH

Recombination PVT Analysis

1. Solution gas-water ratio
2. Formation volume factor for water
3. Supercompressibility factor of gas

GRUY FEDERAL, INC.

ALICE C. PLANTATION NO. 2
SOUTH GARDEN CITY AREAAnalytical Costs for Geo² Water and Gas

Recombination	
2 samples per well	\$ 10,000
Chemical Analysis of Water	
5 samples per well	750
Material Handling at 1.3%	<u>140</u>
TOTAL	\$ 10,890

PLUGGING AND ABANDONMENT PROCEDURE
FOR
ALICE C. PLANTATION NO. 2

1. Move in and rig up pulling unit capable of plugging and abandonment.
2. Nipple up pump trucks to wellhead.
3. Squeeze cement perforations.
4. If squeeze pressure is not obtained overdisplace cement into formation with water and repeat squeeze cementing until successful.
5. When squeeze pressure is obtained, unbolt christmas tree from tubing hanger, pick up tubing out of packer and reverse excess cement.
6. Remove tree and install BOP's.
7. Run in hole with chemical casing cutter and cut 7" casing at approximately 16,000' and recover.
8. Run in hole with tubing and set cement plug 100' in and 100' out of cut off 7" casing.
9. Pull tubing and set a plug from 50' to surface.
10. Cut off 13-3/8" casing 3' below ground level and weld on plate.
11. Release rig.
12. Send tubing and casing to pipe yard for inspection and repair.
13. Send christmas tree to shop for overhaul.

GRUY FEDERAL, INC.

ESTIMATED PLUGGING COSTS

For

South Garden City Area
St. Mary Parish, Louisiana
Alice C. Plantation No. 2

<u>Activity</u>	<u>Amount</u>
1. Pulling unit at \$1,000/day	\$ 10,000
2. Rental tools at \$500/day	4,000
3. Trucking	3,000
4. Cement and services	4,000
5. Supervision	2,000
6. Contingencies	2,400
7. Material handling on all but items 5 & 6 @ 1.3%	300
8. G&A @ 18% of item 5	<u>400</u>
 TOTAL	 \$ 26,100

GRUY FEDERAL, INC.

SITE-SPECIFIC ENVIRONMENTAL INFORMATION CHECKLIST
GEOPRESSURED-GEOTHERMAL WELL TEST PROGRAM
GRUY FEDERAL, INC.
NO. L-9

(Drilled as Sun Oil Company No. 2
Alice C. Plantation)
St. Mary Parish, Louisiana

A. GENERAL

1. Is the proposed site located in the area covered by the "Gulf Coast Programmatic Environmental Assessment, Geothermal Well Testing, the Frio Formation of Texas and Louisiana October 1977"?

Yes X No If no explain.

2. Has a federal, state and/or local environmental assessment been conducted previously for the proposed test well or other wells in the area?

Yes No X If yes, provide a copy, if available.

3. Have all required permits, licenses, and/or agreements for proposed project been obtained?

Yes X No If no, explain.

4. Does the project site fall within the habitat of rare or endangered species?

Yes No X If yes, explain.

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5. Are known archeological sites, historic sites, or natural landmarks within or visible from the site area?

Yes _____ No X If yes, explain.

6. Will expected continuous noise levels from site operations be 65 dBA or less at the nearest residence?

Yes X No _____ If no, explain.

B. SITE CONSTRUCTION

1. Will additional land clearing be required for the test well (e.g., drill pad, road construction, mud reserve pits, pipeline)?

Yes X No _____ If yes, describe.

Boardmatting for drilling pad and road.

2. Will additional land clearing be required for the disposal well (e.g., drill pad, reserve pits, utilities, road construction, pipeline)?

Yes _____ No X If yes, describe.

GRUY FEDERAL, INC.

3. Will the site and related roads be treated to minimize dust?

Yes _____ No X If no, explain.

There will be board road matting on fill with no dust.

4. Are portable sanitary facilities or an approved septic system to be used at the site?

Yes X No _____ If no, explain.

5. Will liquid and solid wastes be disposed in accordance with local regulations?

Yes X No _____ If no, explain.

6. Will erosion control be required for excavated areas?

Yes _____ No X If yes, explain.

7. Will dredge spoil be deposited in swamp forest or marshland?

Yes _____ No X If yes, explain.

8. Upon completion of proposed test program, will the site be restored to as natural a condition as possible by regrading, filling, and reseeding?

Yes X No _____ If no, explain.

GRUY FEDERAL, INC.

C. WELL TESTING AND SAFETY

1. Is fluid production from the well during testing expected to be 2 weeks or less in duration per formation?

Yes _____ No X If no, explain.

Tests expected to require four weeks.

2. Is the total dissolved solids of the produced geopressure fluid expected to be 90,000 mg/l or less?

Yes X No _____ If no explain.

3. Is the volume of geopressure fluid to be produced and injected expected to be 3,000,000 barrels or less?

Yes _____ No X If no, explain

Expect volume up to 3,000,000 barrels over test duration.

4. Is the temperature of produced geopressured fluid expected to be 260°C or less?

Yes X No _____ If no, explain.

5. Will the gas content of the produced fluid be flared?

Yes X No _____ If no, explain.

6. Will blowout preventers rated to at least 10,000 PSI be used?

Yes X No _____ If no, explain.

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7. Will production tubing rated to at least 20,000 psi, be used?

Yes _____ No X If no, explain.

3-1/2" tubing with capacity for expected fluid volume has pressure rating of 18,000 psi maximum expected pressure is approximately 14,000 psi.

8. Can safety valves be operated from remote locations?

Yes X No _____ If no, explain.

9. Will the test tree be rated to at least 10,000 psi

Yes X No _____ If no, explain.

10. Will a test well directional survey be conducted?

Yes _____ No X If yes, at what interval? _____ Feet.
If no, explain.

This is a reentry into old well.

11. Will a lined pond be used to hold all liquid effluents and production fluids that are not injected?

Yes x No _____ If no, explain.

12. Has an injection permit been obtained?

Yes X No _____ If no, explain.

GRUY FEDERAL, INC.

13. Will H₂S monitors be located onsite?

Yes _____ No X If no, explain.

No history of H₂S in area.

14. Will fire extinguishers be located onsite?

Yes X No _____ If no, explain.

15. Do contingency plans exist for evacuating personnel should a blowout occur or high levels of H₂S be detected?

Yes X No _____ If no, explain.

16. Will high-pressure engineering and mud logging personnel be onsite during production well drilling operations?

Yes X No _____ If no, explain.

Mud logging personnel not required for a reentry job.
High pressure engineering and/or drilling personnel will be present at all times.

EVENT	ACTUAL		PROGNOSIS	
	DAY	DATE	DAY	DATE
Move in and rig up	1	7/26	1	7/26
80% 10%	2	7/27		
100% 25%	3	7/28		
75%	6	7/31		
85%	7	8/1		
100%	8	8/2	3	7/28
Broke Tower @ 6 pm; Nipple up BOP	9	8/3		
Finish Nipple up BOP	10	8/4		
Install Rotary Chain & Rig Lights; Test BOP	13	8/7		
Drilled Plug @ SURF; Tested Rams	14	8/8		
Drilled & Washed to 3235	15	8/9		
Replaced Accumulator & Tested Rams & BOP's	16	8/10		
Replacing 4" HP Line from BOP Chokeman	17	8/11		
Test BOP, Surf. Csg. Drld to 3275	"	"		
Two Trips w/Mill & Junk Bask. Milled to 3324	18	8/12		
Two Trips " " " Milled to 3428	19	8/13		
Located Top of 9-5/8 inch csg. @ 3428	"	"		
Drld. Cmt. Inside 9-5/8 inch to 3503	20	8/14		
Wash over 9-5/8 inch from 3428-3490 ft.	21	8/15		
Cut 9-5/8 inch @3446; Rec. 19 ft 9-5/8 inch, Dressed Top	22	8/16		
Tied Back 9-5/8 inch csg. 3446 ft. to Surf.	23	8/17	6	7/31
Moved Out Csg. Patch Eqpt.	24	8/18		
Drld. Cmt. Plug Inside 9-5/8 inch 3503 ft. to 3522 ft.	27	8/21		
Washing & Reaming Mud @12615	28	8/22		
" " " 14250	29	8/23		
" " " 14530; 11 hr rig down				
Maint.	30	8/24		
" " " 16004	31	8/25		
Drld. Cmt. Ret. 16128-16132; Drlg. Cmt. @ 16172	34	8/28		
Drld. Cmt, Washed, Reamed to 16322	35	8/29		
Reaming Open Hole @ 16322	36	8/30		
Cond. Mud & Reaming @ 16442	37	8/31		
Ream & Wash. Orig. Hole @ 16309	38	9/1		
Circ. & Cond. Mud @ 16200, Repair Mud Mix Pump	42	9/5		
Washed & Reamed to 13100, Cond. Mud Prep to Log	43	9/6	8	8/2
Stabilizing Mud Prep to Logging	44	9/7		
Mud Problems - Heavy Rains, Ream Closing Hole 16474-534	45	9/8		
Ran ISF Sonic Log From TD to 16234	46	9/9	12	8/6
Obstr. @ 16474, Reamed Past	47	9/10		
Short Trip Obstr. @ 16474, Rotated Thru	48	9/11		
Ran "Stiff" Assembly Thru Obstruction @ 16474	49	9/12		

EVENT	ACTUAL		PROGNOSIS	
	DAY	DATE	DAY	DATE
Cont. Reaming Thru Obstruction To TD	50	9/13		
Reamed & Washed to 18100 ft.	51	9/14		
Change 4 inch BOP to 7 inch Rams & Test	52	9/15		
Test Hydril, BOP & Choke Man; Repair Dwks on Rig	53	9/16		
In Hole to 18100, Laying Down & Loading Drill Pipe	54	9/17	14	8/8
*Well Started Flow on Csg. & Drill Pipe, Closed Rams.	55	9/18		
Could Not Make Up Valve on Drill Pipe, Well Unloaded	"	"		
Mud & Flowed Saltwater, Steam, Shale, for 4 hours	"	"		
Repairing & Rigging Up Pumps, Manifolds, BOP, Etc.	56	9/19		
Well Secured Awaiting Press. Contr. Eqpt.	"	"		
Rig Maint. & Awaiting Snubbing Eqpt.	57	9/20		
Assembling Snubbing Eqpt.	58	9/21		
Moving in Aux. & Snubbing Eqpt.	59	9/22		
Changed Out Ram Assembly & BOP's	60	9/23		
Test BOP - Ram Assembly	61	9/24		
Replace Hydril & Add'l BOP Prep to Rigging, Snub unit.	62	9/25		
Well Shut In, Gathering Eqpt & Supplies for Snub Eqpt.	63	9/26		
Tested Hydril & BOP, Installed Snub On It & Trip Tank	64	9/27		
Nipple Up Snubbing Unit, Rig Up Geronimos	65	9/28		
In Hole, Bridge @ 574, Washed to 705 ft. Cond. Mud	66	9/29		
Bridge @ 802, Drld Out to 967, Cond. Mud	67	9/30		
Ream 967 to 1243, Washout Bridge @ 1332 Down to 1500 ft.	68	10/1		
Bridge @ 1579 ft. & Int. to 1720 ft. Wash & Ream to 2380 ft.	69	10/2		
Snubbing in to 4640	70	10/3		
Bridge @ 4750, Washed to 4781				
Could Not Make	71	10/4		
Hole w/Snub. Eqpt. Rig Down Snub Eqpt.	"	"		
Continue Rig Down Snub Eqpt. Pull Out w/ 4½ Drill Pipe	72	10/5		
Circ. & Cond. Mud @ 4700 ft.	73	10/6		
Foundations for Trip Tank & Shale Shakers	74	10/7		
Nipple up Swaco Auto Choke on BOP Manifold	75	10/8		
Constr. Mud Flow Lines For Trip Tank & Sh. Shakers	76	10/9		
Laying Down 4½ Drill Pipe	78	10/11		

EVENT	ACTUAL		PROGNOSIS	
	DAY	DATE	DAY	DATE
Change & Test Rams on BOP's from 4½" to 3½"	79	10/12		
Start in hole w/3½" pipe and drilling assy.	80	10/13		
Bridge @ 4797; reamed & drilled to 4868	81	10/14		
Reamed to 4927	82	10/15		
Obstruction @ 5053; Ran impression block indicating collapsed csg. Prep to P&A	83	10/16		
In process of P&A; Cmt. plug 5053-4653	84	10/17		
Preparing to retrieve appr. 3400' of 9 5/8" csg	85	10/18		
Pulling 9 5/8" csg.	86	10/19		
Finished pulling 9 5/8" csg. Cmt plug 3268-3649	87	10/20		
Complete P&A; Rig down	90	10/23		

EVENTS NOT ACCOMPLISHED

Run 7" csg. to 18,100	14	8/8
Run gamma ray cmt. bond log		
18,000' to 16,000'	17	8/11
Perforate	27	8/21
Place well on test	28	8/29

ST. MARY

SA. GARDEN CITY

ST. MARY

COUNTY ST. MARY
FIELD of GARDEN CITY (S. EXT)
LOCATION SEC: 2-16S-10E
WELL ALICE C. P. & R. NO. 2

COMPANY SUN OIL CO.

COMPANY SUN OIL CO.
WELL ALICE C. P. & R.
NO. 2
FIELD GARDEN CITY (S. EXT)
LOCATION SEC: 2-16S-10E
COUNTY ST. MARY
STATE LOUISIANA

Other Surveys
SL-C,
Location of Well
1/4 U.S.C. & G.S.
"FOSTER" GO S
64° 10' 43" W
3705.61' TO LOC.
SERIAL #NA
PERMIT #NA
Elevation: K.B.: NA
D.F.: NA
or G.L.: NA
FILING No.

RUN No.	1 (ES)	2 (ES)	3 (ES)	4 (ES)	5 (ES)
Date	10-21-63	11-3-63	11-11-63	11-29-63	12-12-63
First Reading	15404	16004	16288	16920	18012
Last Reading	3546	11700	16004	16246	16920
Feet Measured	11858	4304	284	67.1	1092
Csg. Schlum.	3546	3546	3546	16246	16246
Csg. Driller	3537	3537	3537	16234	16234
Depth Reached	15406	16005	16289	16921	18013
Bottom Driller	15396	15998	16279	16907	18000
Depth Datum	1' / ROT = 24.25' / BHF				
Mud Nat.	SPERSENE				
Dens. / Visc.	12.3 47	12.8 43.0	12.9 52	16.9 54	16.9 54
Mud Resist.	0.69@105°F	0.77@93°F	0.55@104°F	0.72@74°F	0.72@74°F
Res. BHT	0.32@224°F	0.30@235°F	0.25@233°F	0.19@277°F	0.19@277°F
Rmf	0.24@224°F	0.72@64°F	0.46@79°F	0.10@277°F	0.10@277°F
Rmc	0.48@224°F	2.16@64°F	1.14@79°F	0.35@277°F	0.35@277°F
pH	9.5 @ - °F	9.5 @ - °F	8 @ - °F	9.0 @ - °F	9.0 @ - °F
Wtr. Loss	3.2 CC30 min.	3.1 CC30 min.	3.1 CC30 min.	1.6 CC30 min.	1.6 CC30 min.
Bit Size	12-1/4"	12-1/4"	12-1/4"	8-3/8"	8-3/8"
Specs.—AM	16"	16"	16"	16"	16"
MN	64"	34' 6"	34' 5"	34' 5"	34' 5"
IND.	18' 8"	6FF40	6FF40	6FF40	6FF40
Opr. Rig Time	3 HRS.	3 HRS.	3 HRS.	3 HRS.	3 HRS.
Truck No.	3710-MC	3709-MC	3711-MC	3709-MC	4501-MC
Recorded By	HARTDGEN	VAN SUFFELN	LOVILL	ROLL	THIBODEAU
Witness	WESSEL	WESSEL	LANDRY	WESSEL	WESSEL

RUN No.	6 (ES)	7 (ES)
Date	12-19-63	12-28-63
First Reading	18494	19009
Last Reading	18012	18494
Feet Measured	482	515
Csg. Schlum.	16246	16246
Csg. Driller	16234	16234
Depth Reached	18495	19010
Bottom Driller	18500	19000
Depth Datum	1' / ROT = 24.25' / BHF	
Mud Nat.	SPERSENE	XP-20
Dens. / Visc.	16.9 60	17.2 65
Mud Resist.	0.76@90°F	0.64@97°F
Res. BHT	0.24@284°F	0.21@290°F
Rmf	0.18@284°F	0.16@290°F
Rmc	0.36@284°F	0.32@290°F
pH	9.5 @ - °F	9.8 @ - °F
Wtr. Loss	1.6 CC30 min.	1.6 CC30 min.
Bit Size	8-3/8"	8-3/8"
Specs.—AM	16"	16"
MN	34' 6"	34' 6"
IND.	6FF40	6FF40
Opr. Rig Time	3 1/2 HRS.	3 HRS.
Truck No.	3711-MC	3711-MC
Recorded By	YELVERTON	YELVERTON
Witness	LANDRY-WESSEL	DUCOTE-LANDRY-DUCOTE