GRUY FEDERAL, INC.

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

MAY 1, 1978

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

The Gruy Companies
... Since 1950

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GRUY FEDERAL, INC.

CONSULTANTS IN ENERGY SYSTEMS

May 1, 1978

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Mr. Ronald T. Stearns
Engineering and Construction Division
DOE/Nevada Operations Office
P. O. Box 14100
Las Vegas, Nevada 89114

Dear Mr. Stearns:

We hereby transmit the revised recommendation to reentry and test for the Gulf Coast geopressured-geothermal well-of-opportunity program.

The Gruy Federal, Inc. Geo² L-9 well, which was originally drilled as the Sun Oil Company No. 2 Alice C. Plantation well in the South Garden City Area,

The original recommendation and the accompanying Electric Log and Topographic Map were included in the Prospective Test Wells In The Texas and Louisiana Gulf Coast report dated March 20, 1978.

Sincerely,

GRUY FEDERAL, INC.

Richard J. Dobson
Vice President
Special Projects

RJD:paw
Enclosures

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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 and 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° 10' 43" W from U.S.C. & G.S. marker "Foster". The well site is located in a sugar cane field, and is accessible by approximately 2,500 feet of cane fieldroad. The well was originally drilled to a depth of 19,000 feet and abandoned as a dry hole in December, 1963. The location is shown on the west central area of the USGS topographic sheet, "North Bend," Louisiana, in the Gruy Federal report, "Investigation and Evaluation of Geopressured-Geothermal Wells, Prospective Test Wells in the Texas and Louisiana Gulf Coast", March 20, 1978.

Geology

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 respectively contain 95 feet, 100 feet and 120 feet of net porous sand. No porosity logs, nor cores were run through the Geo² section of this well; but since the objective sands are correlative with the field producing sands in the Garden City Field proper, it would appear reasonable to assume that the porosity of the sands in this well approximate the average weighted porosity of 21.5 percent derived by log and core analysis from all wells operated by the Unit Operator for 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 psia (assuming 1,000 psi overbalance) at 17,800 feet. The maximum recorded mud temperature through these sands was 277°F (136°C) which would indicate an aquifer temperature of 305°F (152°C) based upon correlation factors developed for South Louisiana by AAPG.

The aquifers of interest in this well occur on the downthrown side of a known regional, down to the Coast, fault of structure to the south of Garden City gas field; and is within the Synclinal Area between the Garden City and the Bayou Sole Field. The area extent of the Geo² sands may be seen on the geological contour map on the following page.

NET SAND ISOPACHOUS MAP
LOWER MARGINULINA ASCENSIONENSIS SAND SERIES

L9

GRUY FEDERAL, INC.
Houston, Texas

South Garden City Area
St. Mary Parish, Louisiana

STRUCTURE: TOP OF POROSITY
LOWER MARGINULINA ASCENSIONENSIS SAND SERIES

L9

Mechanical Condition

The diagrammatic sketch on the following page illustrates the current mechanical condition of the well and the proposed well design for testing. The present condition of the well was obtained from the plugging and abandonment reports filed with the Louisiana Department of Conservation; and from the completion reports published by "Petroleum Information Corporation" (IRA Rinehart's Oil Reports). It will be necessary to run 3,450 feet of 9-5/8" OD casing and tie back sleeve and tie into the existing cut off casing, so that the hole will accomodate the heavy mud required to control the aquifer pressure while 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. In terms of tubular requirements, this is the most expensive well proposed by Gruy Federal, Inc. It is anticipated, however, that we will be in a position to utilize the 7" OD casing that will have been salvaged from earlier Gruy Federal Geo² wells prior to this operation; and therefore reduce actual cost substantially.

Reentry Technique

A detailed reentry and completion prognosis is enclosed. In designing the equipment and specifying the procedures. The primary consideration was the safety of the operation and the experience of prudent operators to successfully penetrate, complete and produce from Geo² gas reservoirs in the area.

Casing Design

The minimum design for the production casing was made using the following safety factors:

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 was exposed externally to the maximum hydrostatic pressure exerted by the 17.2 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 tensil 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.

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

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 CK. 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.

Casing Design (Continued)

All production casing was designed, first, with the above maximum safety factors; and, second, only in weights and grades that will permit ease in re-using the salvagable portion of pipe in similarly designed strings for subsequent wells.

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

Tubing Design

The tubing selected is 3-1/2" OD 12.70 pound per foot, P-105, PH-6 Hydril threaded tubing. This provides adequate capacity to accomodate 10,000 barrels production per day and will withstand all anticipated pressure imposed by the aquifer. The PH-6 Hydril connections were selected for, both, desired seal under operating pressure and because of their durability in repeated use from well to well.

It is noted in the estimated cost summary that it is contemplated to use all possible available tubing from subsequent wells that might have been salvaged prior to the needs of this well.

The bottom hole assembly to be used below the tubing for completions is shown on the fox closed diagramitic sketch. It is noted that an Otis RN landing nipple is included to provide a means of securily landing the bottom hole pressure bomb. An Otis RA circulating sleeve is also included to provide a means to aid in killing the well after testing is completed.

Blow-Out Preventers

The enclosed well prognosis and the specifications set out on the following diagramatic sketch of the BOP hook-up and choke manifold sets out the necessary safeguard specifications and procedures for surface blowout prevention as they have been adopted and gathered by IADC, API and most prudent operators in the Geo² areas.

Logging Program

After conditioning the open hole below the 9-5/8" OD (16,234 feet) to a depth of 18,100 feet a complete suite of electrical logs will be run inclusive of Induction -Electric, Compensated Neutron and Density Logs.

The well history in these comparable sands in the Garden City Field indicate very poor side wall core recovery, at best. They are not recommended by Gruy Federal in this well; however, if it is desired and if hole conditions would permit, they could be attempted.

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

Perforating

The 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 creates a casing hole diameter of approximately 0.31" and an effective penetration of about 3-1/2" beyond the cement sheath in this type offormation. Assuming, 100 percent firing efficiency, this configuration should provide a productivity equal to 79 percent of the open hole productivity.

In selecting the fraction of the net sand to perforate after final review of the logs to be run, a perforating interval will be designed to achieve a productivity equal to 1/3 of the open hole productivity. Though we cannot specify the interval at this time it will likely be the entire sand portion of the electric log interval from 17,700 feet to 17,900 feet.

Wellhead Design

The wellhead christmas tree has been designed and a diagramatic sketch is enclosed on the following page. The tree has a rated working pressure of 10,000 psi and has T-24 grade trim throughout the vertical run and on the dual flow wing assembly. All valves have geothermal seals and packing.

The tree is designed from the tubing head up so that the entire assembly can be used on other test wells. The lower casing head will have to be rented and sized to accomodate the particular size of surface casing on each well. This will in some surface casing sizes, result in the requirement ot rent an additional casing spool to permit adaption of appropriate sized and pressure rated flanges and seals.

The tree consists of two 3-1/2" full opening master gate valves and ful opening 3-1/2" swab valve. A double Y flow cross is mounted between the upper master valve and the swab valve to permit a double wing flow line arrangement. Both wings contain a 3-1/2" 10,000 psi valve with high and low pressure controlled actuators for safety purposes. These Hi-Lo safety shut in valves are to be mounted "inboard" from a 3-1/2" 10,000 psi valve. Outboard from these valves are a positive choke body on one wing and an adjustable choke on the other wing.

It should be noted that on the Gruy Federal Reports titled "Detailed Reentry Prognosis for Geopressure-Geothermal Testing of The Watkins-Miller No. 1 (dated April 13, 1978), The Dr. M. O. Miller No. 1 (dated April 21) and The Gladys McCall No. 1 (dated April 21, 1978) Wells", a 15,000 psi working pressure tree with solid stainless steel valves was specified. Since that time we have learned that a new tool has been developed by Halliburton. It is a hydraulic well head protection sleeve and is used during the time of squeezing, fracturing, etc., when maximum pressures over and above those imposed by the reservoir are applied. This is the primary reason Gruy had specifies a 15,000 psi tree. This new tool is mounted on

Wellhead Design (Continued)

top of the swab valve on the tree and a 22,000 psi working pressure machined sleeve is hydraulically pumped down the vertical run of the tree and sealed off in the top of the tubing in the well. The tool has been tested extensively and has been on the market for less than one year. By employing its use at peak pressure requirements, we have now lowered our pressure rating requirements to a 10,000 psi working pressure tree.

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.
- 2) The land is presently unleased and it appears likely that a deal can be made with the landowner.

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

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.
- 4th 4. Pick up 3-1/2" drill pipe and cement bit; then drill out cement plug from the surface to 20 feet.
5. Continue in hole with drill pipe, drill collars and cement bit. Condition mud and drill out cement from 3,325 feet to top of 9-5/8" OD. Casing at approximately 3,425 feet and dress same off.
- 5th 6. Run impression block on top of 9-5/8" casing to determine method of tie back for casing. Then tie back with approximately 3,600 feet of 9-5/8" OD 43.5# N-80 LT&C casing and cement same to the surface.
- 6th 7. Nipple up casing, install blowout preventers and test same to 5,000 psi.
8. 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 # mud for 30 minutes. Repair casing, if necessary, by cement squeezing.
- 8th 9. 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 10. 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
Sidewall Cores, if hole conditions permit;
and if desired.
- 13th 11. Make trip with the drill pipe and condition hole to 18,100 feet and measure out of hole.
- 14th 12. Laying down drill pipe rig up and run 7" OD casing to 18,100 feet as follows:

FROM	TO	SIZE	WEIGHT/ FOOT	GRADE	TYPE ENDS	SECTION LENGTH
18,100'	16,200'	7"	38	P110	F.J.	1,900'
16,200'	13,750'	7"	38	P110	LT&C	2,450'

Work Day
Schedule

12.	FROM	TO	SIZE	WEIGHT/ FOOT	GRADE	TYPE ENDS	SECTION LENGHT
/	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 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 13. Nipple up 7" casing and put on BOP.
14. 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 CAC12 water.
- 17th 15. 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 16. 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.
17. 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 18. 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.
- 21st 19. Move out rig.
- 24th 20. Complete moving out rig.
- 27th 21. Suspend operations while drilling salt water disposal well.
22. Resume operations and rig up wireline unit and install high pressure perforating lubricator. Test same to 10,000 psi.
23. 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.

Work Day
Schedule

24. Repeat trips with perforating gun until the entire completion interval is shot. Release perforating unit.
25. 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 Gray 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 aquisition and legal fees	\$ 30,000	
2. Location preparation	30,000	
3. Rig transportation costs	30,000	
4. Rig time - 24 days at \$8,000/day	192,000	
5. Bits	3,000	
6. Mud and chemicals	40,000	
7. Casinghead rental	2,000	
8. Christmas tree (shopping and reconditioning)	2,500	(1)
9. Casing patch for 9-5/8" casing	8,000	
10. Rental tools and equipment	20,000	
11. 3-1/2" drill pipe rental	20,000	
12. Trucking	15,000	
13. Cement and cement services	16,000	
14. Logging and coring	40,000	
15. Perforating	40,000	
16. 3,600 ft. 9-5/8" OD 43.5# N80 LT & C casing	89,100	
17. 18,000 ft. 7" OD casing per prognosis (excluding estimated salvage from Watkins Miller #1 or Dr. M. O. Miller)	180,000	(2)
18. Packer	3,500	
19. 17,500' of 3-1/2" OD 12.7# P105 PH6 tubing (use 3000' new and excluding salvage from previous wells plus inspection and shopping)	61,800	(3)

20. Supervision	\$ 10,000
21. Miscellaneous	10,000
22. Contingencies	<u>45,000</u>
TOTAL	\$ 887,900

(1) Total estimated cost for new tree	\$ 70,000
(2) Total estimated cost of new string FOB location	332,000
(3) Total estimated cost of new string	360,300

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

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 indicates 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. In view of these considerations, the following well prognosis and estimated well cost is submitted.

Operational
Day

0	1. Drive 13-3/8" OD casing to refusal of $\pm$ 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.
34th	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. Rig down and move out water well rig.
40th	12. Run gamma ray - cement bond log from total depth to 1,200 feet and block squeeze with cement, if necessary to obtain good bond.

Operational
Day

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.
- 41st. 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

1.	Move in rig, drill to 2,500 feet and set two casing strings.	\$ 36,000
	130 feet of 13-3/8" 65# J-55 plain end casing	3,600
	1,200 feet of 9-5/8" 35# H-40 casing ST & C or LT & C	18,200
	4,600 feet of 5-1/2" 15.5# J-55 ST & C or LT & C	31,650
	Stand by rig	3,000
	Cement and Services	8,000
	Electric logging	12,000
	Perforating	4,000
	Wellhead equipment	3,000
	Stimulation	2,500
	Miscellaneous supplies and rentals	5,000
	Trucking	1,500
	Contingencies	<u>14,000</u>
	TOTAL WELL COST	\$ 142,450

Operational
Day

(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 two weeks 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.

ESTIMATED TESTING COST
for
NO. 2 ALICE C. PLANTATION

<u>Activity</u>	<u>Estimated Amount</u>
Two phase separator	\$ 16,800
Air cooler	12,600
3 centrifugal pumps	4,200
110 barrel calibration tank	60
Sand detector and manifold	3,900
200' of 3" flow lines	2,850
2-3" expansion loops with unions	900
2 pen 10,000 psi recorder	600
Deadweight pressure gauge	600
Portable quartz iodide lights	600
Temperature recorder 0-400°	600
Trailer house for personnel	900
Supervision and labor	39,600
Sampling	1,500
Pressure gauges and wireline units	<u>10,000</u>
TOTAL	\$ 95,710

ALICE C. PLANTATION NO. 2
SOUTH GARDEN CITY AREA

Analyses Required for Geo² Water and Gas

Chemical 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

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

Total

\$ 10,750

ESTIMATED PLUGGING COSTS
For
South Garden City Area
St. Mary Parish, Louisiana
Alice C. Plantation No. 2

<u>Activity</u>	<u>Amount</u>
Pulling unit at \$1,000/day	\$ 10,000
Rental tools at \$500/day	4,000
Trucking	3,000
Cement and services	4,000
Supervision	2,000
Contingencies	<u>2,400</u>
TOTAL	\$ 25,400

SITE-SPECIFIC ENVIRONMENTAL INFORMATION CHECKLIST
GEOPRESSURED-GEOTHERMAL WELL TEST PROGRAM
GRUY FEDERAL, INC.

(Drilled as No. L-9 Sun Oil Company
No. 2 Alice C. Plantation)

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 No X If no, explain.

Cannot be applied for until arrangements with land owner has been finalized.
4. Does the project site fall within the habitat of rare or endangered species? Yes No X If yes, explain.
5. Are known archeological sites, historic sites, or natural landmarks within or visible from the site area? Yes
No X If yes, explain.

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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.

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 marshland 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 No X If no, explain.

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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.

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 300,000 barrels or less? Yes _____ No X
If no, explain. Expect volume up to 3,000,000 barrels over test duration.

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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.
7. Will production tubing rated to at least 20,000 psi, be used?
Yes No X If no, explain.

3½" 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? , 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 _____ No X

If no, explain.

Cannot file for a permit until deal has been made with land owner.

13. Will H_2S monitors be located on site? Yes _____ No X

If no, explain.

No history of H_2S in area.

14. Will fire extinguishers be located on site? Yes X No _____

If no, explain.

15. Do contingency plans exist for evacuating personnel should a blowout occur or high levels of H_2S be detected? Yes X
No _____ If no, explain.

16. Will high-pressure engineering and mud logging personnel be on site during production well drilling operations? Yes X
If no, explain.