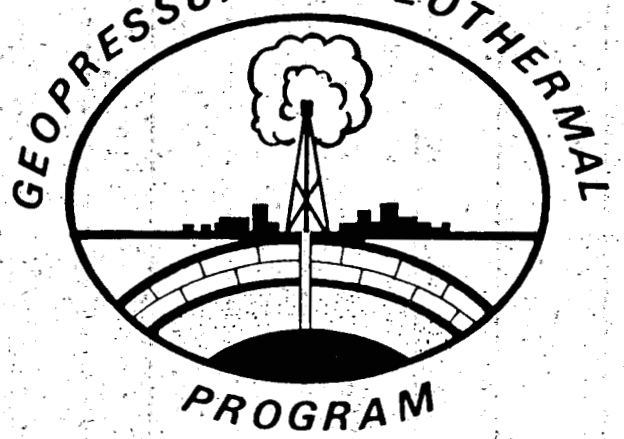


TESTING GEOPRESSURED GEOTHERMAL RESERVOIRS IN EXISTING WELLS

U.S. DEPARTMENT OF ENERGY
CONTRACT NO. DE-AC08-80ET27081

DETAILED COMPLETION PROGNOSIS

FOR GEOPRESSURED - GEOTHERMAL WELL OF OPPORTUNITY

PROSPECT #7

C & K - FRANK A. GODCHAUX, III, WELL NO. 1

EATON OPERATING COMPANY, INC.
3100 EDLOE, SUITE 205
HOUSTON, TEXAS 77027
713-627-9764

DISCLAIMER

TESTING GEOPRESSURED - GEOTHERMAL RESERVOIRS IN EXISTING WELLS

DETAILED COMPLETION PROGNOSIS FOR GEOPRESSURED - GEOTHERMAL WELLS OF OPPORTUNITY

C & K - FRANK A. GODCHAUX, III, WELL NO. 1

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

LIST OF TABLES

LIST OF FIGURES

LIST OF FIGURES (continued)

GEOPRESSURED-GEOTHERMAL WELLS OF OPPORTUNITY

PROSPECT NO. 8

EATON OPERATING COMPANY - D.O.E. - C & K PETROLEUM, INC.

FRANK A. GODCHAUX, III, NO. 1

VERMILION PARISH, LOUISIANA

1.0 INTRODUCTION

Eaton Operating Company recommends D.O.E. funding for a geopressured-geothermal test of C & K Petroleum, Frank A. Godchaux, III, No. 1 under the Wells of Opportunity Program. Total estimated cost to complete the Godchaux Well No. 1, drill a saltwater disposal well, test the well and plug and abandon both wells is $2,959,000.

This prospect was drilled by C & K Petroleum to a total depth of 16,000 feet. The well has a 7-5/8" liner set at 12,387 feet. Eaton proposes to test the Planulina sand from 15,584 to 15,692 feet. Estimated bottom hole pressure at 15,638 feet is 14,480 psi. A mud weight of 17.8 lb/gal. was used during the drilling of the proposed test zone. Estimated temperature is 298^{o}F and maximum estimated salinity 75,000 ppm. Assuming saturation, the gas content is estimated to be 44 SCF/BBL.

Work on the project would begin in late June, 1981 and would be completed at the end of September, 1981. An optional test involving a conventional workover plugback with a rig on location would cost an estimated $689,000.

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

2.0 SUMMARY

This book is a detailed prognosis covering the acquisition, completion, drilling, testing and abandonment of the Frank A. Godchaux, III, Well No. 1 under the Wells of Opportunity Program.

The well is located approximately 12 miles southeast of the city of Abbeville, Louisiana. Eaton Operating Company proposes to test a section of the Planulina sand at a depth ranging from 15,584 to 15,692 feet. The reservoir pressure is estimated to be 14,480 psi and the temperature of the formation water is expected to be 298°F. The water salinity is calculated to be 75,000 ppm. The well is expected to produce 20,000 barrels of water per day with a gas content of 44 standard cubic feet per barrel.

The well was acquired from C & K Petroleum, Inc. on March 20, 1981. C & K abandoned the well at a total depth of 16,000 feet. The well has a 7-5/8" liner set at 13,387 feet. Eaton proposes to set 5-1/2" casing at 16,000 feet and produce the well through the casing using a 2-3/8" tubing string for wireline protection and for pressure control. A 4,600 foot saltwater disposal well will be drilled on the site and testing will be conducted similar to previous Eaton tests. The total estimated cost to perform the work is $2,959,000. An optional test from 14,905 to 15,006 feet may be performed after the original test and will require a workover with a rig on location to perform the plugback.

The surface production equipment utilized on previous Eaton WOO tests will be utilized on this test. This equipment has worked satisfactorily and all parties involved in the testing are familiar with its operation. The Institute of Gas Technology and Mr. Don Clark will handle the sampling and testing and reservoir evaluation, respectively, as on the previous Eaton tests..

3.0 LEGAL AGREEMENTS

This section contains copies of the signed agreements with C & K Petroleum and the Godchaux's.

EATON OPERATING COMPANY, INC.

March 12, 1981

C & K Petroleum, Inc.
3900 Capitol Bank Plaza
Houston, Texas 77002

Re: #1 Frank Godchaux III
Section 88, Township 14 South,
Range 3 East
Vermilion Parish, Louisiana

Gentlemen:

This letter, if accepted by you, and two (2) signed copies thereof are returned to the undersigned by the 1st day of April, 1981, the effective date of this agreement, shall constitute an agreement between C & K Petroleum, Inc. (hereinafter referred to as "C & K"), and Eaton Operating Company, Inc. (hereinafter referred to as "Eaton") as to the following matters:

1. Pursuant to a contract with the Division of Geothermal Energy, Department of Energy (hereinafter referred to as "DOE"), Eaton has agreed to carry out, among other things, research, field testing, evaluation and reporting on selected sites in the Texas-Louisiana Frio Miocene Trend, where reservoir and production data can be obtained to assess the energy potential of Gulf Coast Geopressured-Geothermal Aquifers. C & K has made a decision to plug and abandon the Godchaux #1 Well, Section 88, Township 14 South, Range 3 East, Vermilion Parish, Louisiana (hereinafter referred to as "well"). Eaton has expressed an interest in using the bore of the well in which to conduct experimental tests of the geopressured sand sections disclosed in the well.

2. Eaton and C & K agree and contract as follows:

a. C & K agrees to delay the proposed plugging operation of the well for a period of ninety (90) days from effective date of this letter agreement.

b. Eaton shall have the option for a period of ninety (90) days from the effective date hereof to take over the well and conduct its research pursuant to its contract with the DOE, subject to landowner's consent, to be obtained by Eaton with assistance from C & K.

PHONE 713-627-9764
TWX 910-881-1793
EDEC-HEC-HOU

3100 EDLOE, SUITE 205
HOUSTON, TEXAS 77027

U.S. DEPARTMENT OF ENERGY
CONTRACT NO.
DE-AC08-80ET27081

c. At the end of ninety (90) days, or within ten (10) days of commencement of Eaton's operations, whichever is the earliest, Eaton shall pay to C & K the sum certain of Seventy-Five Thousand Dollars ($75,000.00), which sum is the consideration for the option granted herein.

d. C & K shall be the sole corporation liable to fairly and equitably distribute the payment made by Eaton to other working interest owners, if any, and C & K agrees to hold Eaton harmless from such distribution.

e. If Eaton does, in fact, test said well and exercise its option, it will be necessary for Eaton to drill a saltwater disposal well in close proximity to the Godchaux well. After testing, Eaton will plug and abandon both wells in accordance with the requirements of the Louisiana Department of Conservation and clean up the well sites.

f. Eaton will begin re-entry operations on the Godchaux well within 90 days of the date hereof.

g. Any hydrocarbons recovered and sold during Eaton's operations shall remain the property of C & K.

3. After Eaton (DOE) has completed its geothermal testing, C & K has the right (but not obligation) to take operations of the Frank Godchaux III No. 1 for additional testing for hydrocarbon potential.

a. If C & K exercises said option, C & K agrees to defend and hold Eaton harmless for any and all claims and demands of whatsoever nature arising out of, or in any manner connected with C & K's testing operations.

b. If the testing is successful, then the remainder of Eaton's responsibility under the option agreement would terminate and revert back to C & K as stated in the original lease.

c. If the testing is unsuccessful, then all plugging and clean up operations once again become Eaton's responsibility.

4. Eaton expressly agrees that neither Eaton, DOE, or their respective servants, agents, employees, successors, or assigns shall acquire any ownership rights in (i) the leasehold interest owned by C & K, or (ii) the real property, or (iii) the minerals on or under said land, or (iv) any production attributable hereto.

5. Eaton expressly agrees that the test well and disposal well are its only interest, and said wells are expressly for research and evaluation only. All water, if any, shall be reinjected and all associated gas, if any, shall be flared and burned.

6. If Eaton exercises its option, Eaton shall assume all liability for location clean-up, back-filling, road restoration, etc.

7. Eaton shall assume responsibility for filing necessary State permits, to cover re-entry and testing operations, and upon conclusion, to file necessary State P&A reports.

8. Eaton shall maintain insurance coverage in the following amounts, to-wit:

a. General liability and third party liability in the policy amount of Eighty Million Dollars ($80,000,000).

b. Cost of well control in the policy amount of Twenty-Five Million Dollars ($25,000,000).

9. Eaton pledges and agrees that all information as to flow rates, gas content, water analyses, reservoir evaluation, and any and all information of whatsoever kind shall be furnished to C & K as said information becomes available to Eaton.

10. C & K expressly represents that it owns or, in its capacity as Operator, represents the owners of a one hundred percent (100%) interest in and to the well. C & K does not represent that it owns any rights with respect to any minerals, including geothermal energy.

11. Eaton agrees to defend and hold C & K harmless from any and all claims and demands of whatsoever nature arising out of, or in any manner connected therewith, Eaton's use of the well, and C & K and its partners shall be named additional assureds in Eaton's insurance coverage listed in item 8 above.

Whenever notice is required or permitted under the terms of this agreement, same shall be in writing and shall be deemed to have been given if sent by telegram, registered, or certified mail to the respective parties as follows:

C & K Petroleum, Inc.
3900 Capital Bank Plaza
Houston, Texas 77002

Eaton Operating Company, Inc.
3104 Edloe, Suite 200
Houston, Texas 77027

This agreement shall be binding upon the heirs, successors, and assigns of the parties hereto.

Attached hereto are the following documents, incorporated by reference herein as set out and marked as Exhibit I and Exhibit II.

If the above conforms to your understanding of the agreement between us, please sign and return two (2) copies to us in the time specified above.

Very truly yours,

EATON OPERATING COMPANY, INC.

By B A Eaton
B. A. Eaton
President and Project Manager

ACCEPTED AND AGREED TO THIS 20TH DAY OF March, 1981.

C & K PETROLEUM, INC.

By E R Manson
Name E.R. MANSON
Title VICE PRESIDENT

EXHIBIT I

TERMS AND CONDITIONS OF PURCHASE ORDER

1. INSPECTION AND ACCEPTANCE — Inspection and acceptance will be at destination, unless otherwise provided. Until delivery and acceptance, and after any rejections, risk of loss will be on the Contractor unless loss results from negligence of the Purchaser.

2. VARIATION IN QUANTITY — No variation in the quantity of any item called for by this contract will be accepted unless such variation has been caused by conditions of loading, shipping, or packing, or allowances in manufacturing processes, and then only to the extent, if any, specified elsewhere in this contract.

3. DISCOUNTS — Discount time will be computed from date of delivery at place of acceptance or from receipt of correct invoice at the office specified by the Purchaser, whichever is later. Payment is made, for discount purposes, when check is mailed.

4. FOREIGN SUPPLIES — This contract is subject to the Buy American Ace (41 CFR-1-6.10405).

5. CONVICT LABOR — In connection with the performance of work under this contract, the Supplier agrees not to employ any person undergoing sentence of imprisonment except as provided by (41 CFR-1-11.204).

6. OFFICIALS NOT TO BENEFIT — No member of, or delegate to, Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

7. COVENANT AGAINST CONTINGENT FEES — The Supplier warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon any agreement or understanding for a commission, percentage, brokerage, or contingent fees, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Supplier for the purpose of securing business. For breach or violation of this warranty the Purchaser shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover the full amount of such commission, percentage, brokerage, or contingent fee.

8. FEDERAL, STATE AND LOCAL TAXES — Except as may be otherwise provided in this contract, the contract price includes all applicable Federal, State, and local taxes and duties in effect on the date of this contract but does not include any taxes from which the Purchaser, the Supplier on this transaction is exempt.

9. Goods must be shipped as per instructions; otherwise any extra handling charge will be billed back to seller.

Approved By: _____

Title: _____

Date: _____

ADDITIONAL
TERMS AND CONDITIONS OF PURCHASE ORDER

Except where the word "Contractor" is used, substitute the word "Subcontractor", and where the word "Government is used, substitute the word "Purchaser".

Applies to Subcontracts or purchase orders which exceed $2,500

1. "Employment of the Handicapped" (41-CFR-1-12.904)

Applies to Subcontracts or purchase orders which exceed $10,000

1. "Notice and Assistance Regarding Patent and Copyright Infringement" (41-CFR-9-9.104)
2. "Utilization of Small Business Concerns" (41-CFR-1-1.710-3)
3. "Utilization of Labor Surplus Area Concerns" (41-CFR-1-1.805-3)
4. "Utilization of Minority Business Enterprises" (41-CFR-1-1.1310.2)
5. "Equal Opportunity" (41-CFR-1-12.803.12)
6. "Disabled Veterans and Veterans of the Vietnam Era"
7. "Termination for Convenience of the Government"(41-CFR-1-8.705-1)
8. "Pricing Adjustment"(41-CFR-1-7.102-20)
9. "Walsh Healy Public Contracts Act"(41-CFR-1-12.605)

Applies to Subcontracts or purchase orders which provide for the performance of Service

1. "Contract Work Hours and Safety Standard Act - Overtime Compensation" (41-CFR-1-12.303)
2. "Service Contract Act of 1965 - As Amended" (41-CFR-1-12.904)

Applies to Subcontracts or purchase orders which exceed $100,000

1. "Cost Accounting Standard" (41-CFR-1-3.1204-1)
2. "Authorization and Consent" (41-CFR-9-9.102-1)
3. "Examination of Records" (41-CFR-1-7.103-3)
4. "Audit and Record" (41-CFR-1-3.814.2)
5. "Subcontractor Cost and Pricing Data" (41-CFR-1-3.814-3)
6. "Price Reduction for Defective Cost or Pricing Data" (41-CFR-1-3.814-1)
7. "Notice of Labor Disputes"

EATON OPERATING COMPANY, INC.

March 13, 1981

Mr. Charles Godchaux
P.O. Box 278
Abbeville, Louisiana 70510

Mr. Frank A. Godchaux, III
P.O. Box 278
Abbeville, Louisiana 70510

Re: Frank Godchaux, III Well No. 1
Section 88-14S-3E
Live Oak Field
Vermilion Parish, Louisiana

Gentlemen:

I.

Eaton Operating Company, Inc. (hereinafter referred to as "EATON"), a Texas corporation, is a party to a written contract with the Department of Energy (hereinafter referred to as "D.O.E.") which calls for EATON to carry out research, field testing and evaluation of well sites in the Louisiana - Texas Gulf Coast area where reservoir and production data can be obtained to assess the energy potential of the Gulf Geopressured-Geothermal Aquifers.

EATON is seeking well locations which, if they are not presently productive of oil or gas, can be taken for a short test when the operator has made the decision to plug and abandon such a well.

C & K Petroleum, Inc. (hereinafter referred to as "C & K") has drilled the above referenced well to a projected total depth of approximately Sixteen Thousand Feet (16,000 ft.) and has elected to plug the well as non-commercial.

II.

EATON is of the opinion that the subject well qualifies as a well of opportunity candidate within the definition of the EATON-D.O.E. contract, and EATON recommends a production test of one or more aquifers within the well bore for D.O.E. approval, sponsorship and sole financial support.

III.

EATON has acquired from C & K an option to use the Frank Godchaux, III Well No. 1 for geothermal testing. The option gives EATON the right (but not obligation) to develop the Frank Godchaux, III Well No. 1 for test purposes; operations to begin on or before June 30, 1981, the expiration date of the option. The agreement between EATON and C & K is subject to a satisfactory agreement between EATON and the landowner.

PHONE 713-627-9764
TWX 910-881-1793
EDEC-HEC-HOU

3100 EDLOE, SUITE 205
HOUSTON, TEXAS 77027

U.S. DEPARTMENT OF ENERGY
CONTRACT NO.
DE-AC08-80ET27081

IV.

Frank Godchaux, III and Charles R. Godchaux (hereinafter referred to as "GODCHAUX") are the owners of record for that portion of Section 88-14S-3E, Vermilion Parish, Louisiana, upon which the C & K Frank Godchaux, III Well No. 1 is located.

V.

Should EATON exercise the option with C & K for geothermal testing, EATON agrees to the following:

1. Obtain all federal, state and local governmental permits required for such operations.

2. Provide insurance coverage through the length of testing and research, at limits of $80,000,000.00 liability and $25,000,000.00, cost of well control.

3. Begin development operations on or before June 30, 1981.

4. Drill a saltwater disposal well near the Frank Godchaux, III Well No. 1 to dispose of all brines produced during the testing.

5. At the conclusion of all tests, both the Godchaux, III Well No. 1 and the saltwater disposal well will be plugged and abandoned in compliance with applicable governmental regulations. The drill sites and access roads will be restored to as near original condition as practicable.

6. At the conclusion of geothermal testing, C & K has the option to conduct additional tests to determine hydrocarbon potential. If C & K exercises their option, EATON shall be released of all liabilities associated with the Frank Godchaux, III Well No. 1, during C & K's testing operations.

VI.

If the option granted to EATON by C & K is not exercised by June 30, 1981, all responsibility for plugging the Frank Godchaux, III Well No. 1, as well as restoring the well site and roads, will be the sole responsibility of C & K.

VII.

GODCHAUX will provide EATON with:

1. Access to the drill site and the right to conduct geothermal-geopressured testing on the well site and in the aquifers below same.

2. Approval to drill a saltwater disposal well on GODCHAUX's land near the site of the Frank Godchaux, III Well No. 1, as herein described.

3. Approval for EATON's reasonable use of the surface rights surrounding the well bore and disposal well location site.

VIII.

This agreement does <u>not</u> convey to EATON any ownership interest in the land, nor does EATON have any vested interest in any minerals or energy resources produced during any of the tests, and it is expressly agreed between EATON and GODCHAUX that no energy resources will be saved or sold.

IX.

EATON further expressly states that any and all portions of this agreement or the exhibits attached hereto and incorporated by reference herein, shall be subject to the approval of the D.O.E. and should said agency disapprove any of this agreement in whole or in part, then this agreement shall be null and void.

X.

This agreement shall be binding on the legal representatives, successors and assigns of the parties hereto.

XI.

Attached hereto are the following documents incorporated by reference herein as set out and marked as Exhibit I and II, III and IV.

XII.

With reference to Paragraph (11) on Page 4 of Exhibit III, incorporated herein as stated above, the parties do agree that the four inches of road topping type shell therein referred to is defined to mean either clam shell or limestone aggregate, and that all road topping work shall be completed no less than thirty (30) days after the termination of EATON's operations hereunder.

This letter when accepted and agreed to by GODCHAUX shall, subject to the conditions stipulated herein, be evidence of agreement between EATON and GODCHAUX.

Sincerely,

EATON OPERATING COMPANY, INC.

BY: B A Eaton
B. A. Eaton, President and Project Manager

ACCEPTED AND AGREED TO THIS 9th DAY OF April, 1981.

GODCHAUX BROS.

BY: Charles R Godchaux
FRANK A. GODCHAUX, III or
CHARLES R. GODCHAUX

EXHIBIT I

TERMS AND CONDITIONS OF PURCHASE ORDER

1. INSPECTION AND ACCEPTANCE — Inspection and acceptance will be at destination, unless otherwise provided. Until delivery and acceptance, and after any rejections, risk of loss will be on the Contractor unless loss results from negligence of the Purchaser.

2. VARIATION IN QUANTITY — No variation in the quantity of any item called for by this contract will be accepted unless such variation has been caused by conditions of loading, shipping, or packing, or allowances in manufacturing processes, and then only to the extent, if any, specified elsewhere in this contract.

3. DISCOUNTS —Discount time will be computed from date of delivery at place of acceptance or from receipt of correct invoice at the office specified by the Purchaser, whichever is later. Payment is made, for discount purposes, when check is mailed.

4. FOREIGN SUPPLIES — This contract is subject to the Buy American Ace (41 CFR-1-6.10405).

5. CONVICT LABOR — In connection with the performance of work under this contract, the Supplier agrees not to employ any person undergoing sentence of imprisonment except as provided by (41 CFR-1-11.204).

6. OFFICIALS NOT TO BENEFIT — No member of, or delegate to, Congress, or resident commissioner, shall be admitted to any share or part of this contract, or to any benefit that may arise therefrom; but this provision shall not be construed to extend to this contract if made with a corporation for its general benefit.

7. COVENANT AGAINST CONTINGENT FEES — The Supplier warrants that no person or selling agency has been employed or retained to solicit or secure this contract upon any agreement or understanding for a commission, percentage, brokerage, or contingent fees, excepting bona fide employees or bona fide established commercial or selling agencies maintained by the Supplier for the purpose of securing business. For breach or violation of this warranty the Purchaser shall have the right to annul this contract without liability or in its discretion to deduct from the contract price or consideration, or otherwise recover the full amount of such commission, percentage, brokerage, or contingent fee.

8. FEDERAL, STATE AND LOCAL TAXES — Except as may be otherwise provided in this contract, the contract price includes all applicable Federal, State, and local taxes and duties in effect on the date of this contract but does not include any taxes from which the Purchaser, the Supplier on this transaction is exempt.

9. Goods must be shipped as per instructions; otherwise any extra handling charge will be billed back to seller.

Approved By: _____

Title: _____

Date: _____

ADDITIONAL
TERMS AND CONDITIONS OF PURCHASE ORDER

Except where the word "Contractor" is used, substitute the word "Subcontractor", and where the word "Government is used, substitute the word "Purchaser".

Applies to Subcontracts or purchase orders which exceed $2,500

1. "Employment of the Handicapped" (41-CFR-1-12.904)

Applies to Subcontracts or purchase orders which exceed $10,000

1. "Notice and Assistance Regarding Patent and Copyright Infringement" (41-CFR-9-9.104)
2. "Utilization of Small Business Concerns" (41-CFR-1-1.710-3)
3. "Utilization of Labor Surplus Area Concerns" (41-CFR-1-1.805-3)
4. "Utilization of Minority Business Enterprises" (41-CFR-1-1.1310.2)
5. "Equal Opportunity" (41-CFR-1-12.803.12)
6. "Disabled Veterans and Veterans of the Vietnam Era"
7. "Termination for Convenience of the Government"(41-CFR-1-8.705-1)
8. "Pricing Adjustment"(41-CFR-1-7.102-20)
9. "Walsh Healy Public Contracts Act"(41-CFR-1-12.605)

Applies to Subcontracts or purchase orders which provide for the performance of Service

1. "Contract Work Hours and Safety Standard Act - Overtime Compensation" (41-CFR-1-12.303)
2. "Service Contract Act of 1965 - As Amended" (41-CFR-1-12.904)

Applies to Subcontracts or purchase orders which exceed $100,000

1. "Cost Accounting Standard" (41-CFR-1-3.1204-1)
2. "Authorization and Consent" (41-CFR-9-9.102-1)
3. "Examination of Records" (41-CFR-1-7.103-3)
4. "Audit and Record" (41-CFR-1-3.814.2)
5. "Subcontractor Cost and Pricing Data" (41-CFR-1-3.814-3)
6. "Price Reduction for Defective Cost or Pricing Data" (41-CFR-1-3.814-1)
7. "Notice of Labor Disputes"

EXHIBIT III

GEOTHERMAL TESTING ENERGY CONTRACT

THIS AGREEMENT is made and entered into as of the ____ day of _____, 1981, by and between:

GODCHAUX BROS., a partnership composed of Frank A. Godchaux, III and Charles R. Godchaux (hereinafter referred to as "GODCHAUX),

AND

EATON OPERATING COMPANY, INC.

(hereinafter referred to as "GRANTEE");

W I T N E S S E T H:

GODCHAUX, for and in consideration of Ten Dollars and no/100 ($10.00) DOLLARS and other valuable consideration, paid by GRANTEE to GODCHAUX, the receipt and adequacy of which are hereby acknowledged, and in consideration of the covenants and agreements hereinafter set forth, grants unto GRANTEE the right to enter upon GODCHAUX'S property, which is described on Exhibit "A" hereto, and there to conduct appropriate tests to determine the energy potential of any geopressured-geothermal aquifers located within the well also described on Exhibit "A", all on the following terms and conditions.

TERMS AND CONDITIONS

(1) GRANTEE shall have the right of ingress and egress across GODCHAUX'S lands and road system for the passage of personnel, vehicles and equipment, but in exercising said right, GRANTEE shall be responsible for any damage it causes to the road system and land, and the crops growing thereon, as hereinafter provided and it shall not, in any event, obstruct drainage. Upon termination of this agreement, the surface of said land affected by the right of ingress and egress shall be returned to the same condition as it now exists, and further, GRANTEE shall pay GODCHAUX for any and all damage to crops. In exercising this right, GRANTEE recognizes that GODCHAUX has on its property known as "Live

Oak Plantation" an extensive system of improved roadways consisting of approximately twenty (20) miles of well shelled roads and timbered bridges. Therefore, in exercising its rights herein granted, GRANTEE shall take care to see that its operations result in minimum damage to such road systems. GRANTEE agrees, so long as it exercises the rights granted hereunder, to maintain and repair any damage it causes to the existing roads and bridges located upon the property of GODCHAUX and leading to the aforesaid premises and used by GRANTEE; provided that GRANTEE shall repair all roads and bridges located upon the property of GODCHAUX which may become damaged or destroyed by GRANTEE in exercising its rights of ingress and egress to and from the premises. The right of ingress and egress shall be a reasonable use and shall not be exclusive, GODCHAUX having the right, along with its agents, employees, assigns, licensees, or other persons permitted by it to traverse and use such roads. Such right of use is also conditioned on the provisions of Paragraph (11) hereafter.

(2) GRANTEE shall have the right to use the same surface portion of the GODCHAUX premises as was heretofore used by C & K Petroleum, Inc. in drilling the oil or gas well described on Exhibit "A". In addition to using the same portion of the surface, GRANTEE shall have the right to use the bore hole of the said well to test the energy potential of any geopressured-geothermal aquifers located therein, using such conventional oil field drilling rigs, equipment, methods and techniques as GRANTEE may deem suitable, with the right to re-enter, re-drill, deepen and test said test well with free use of any existing pipe, casing, tubing, liners and equipment located therein and thereon, to add to, reset, remove, replace or modify any or all of such pipe, casing, tubing, liners and equipment, and for testing purposes to produce, test, store, utilize, process, convert, treat and

dispose of all or any part of such test well's effluence of extractable minerals, gases, hot springs, hot water, hot brines and salt water, thermal energy, geothermal water and/or steam resulting from or created by or extracted from the natural heat of the earth or the heat below the surface of the earth or due to magmatic differentiation, in whatever form such heat or energy occurs from the rocks, fluids, rock-fluid systems and energy in the aquifers,and all purposes incident thereto, such as erecting buildings, tanks, dams, gas lines, water lines, pipe lines, booster stations and such other buildings or structures as may be necessary for GRANTEE to properly and efficiently engage in such operations.

(3) This permit shall be for a term of Three (3) months from the date EATON exercises its option with C & K Petroleum, Inc., and so long thereafter as operations are being conducted in the test well, but not to exceed a total period of Six (6) months from the date EATON exercises its option with C & K Petroleum Inc., after which all rights of GRANTEE in the premises shall cease.

(4) GRANTEE agrees to maintain the leased premises and any improvements thereon in good, clean condition at all times and to permit no waste or injury to said premises or the property of GODCHAUX adjacent and contiguous thereto. Upon the termination of this lease, GRANTEE agrees to clean up and restore said premises to as near its present condition as is practicable, smoothing and leveling the surface, and removing therefrom all trash and debris, and refinishing roads as described in paragraph (11) below. All structures or improvements placed on the premises by GRANTEE shall be removed therefrom within sixty (60) days. The test well shall be plugged and abandoned in such a manner as to satisfy the requirements of the Louisiana Department of Conservation.

(5) In the event there is an increase in the ad valorem taxes of the land due to erection of improvements on said land,

GRANTEE, shall be obligated to reimburse GODCHAUX for any such taxes. Further, if any improvements erected by GRANTEE on said land are taxed separate and apart from the land, GRANTEE agrees and obligates itself to pay said ad valorem taxes.

(6) GRANTEE acknowledges that it has examined the premises and that it is familiar therewith, and GRANTEE assumes responsibility for the condition of the premises during the term of this contract and all liability for damage to person or property of itself, its agents or employees or any person going on or being upon the premises as a result of GRANTEE's activities, during the term of this agreement and will indemnify and hold GODCHAUX harmless from any and all claims or demands, including GODCHAUX's court costs and attorney's fees, of whatsoever nature or kind for loss or damage to person or property of itself, its agents, employees or third persons situated on the premises, arising out of or resulting from any work or construction undertaken or done by GRANTEE or out of or in anyway connected with the use of or operations on the premises by GRANTEE, provided further that this and all other liabilities and indemnifications on the part of GRANTEE herein shall be limited by the provisions of Section V 2, of the letter agreement to which this Exhibit III is attached.

(7) This grant is made without warranty and expressly subject to any and all rights in any third party, whomsoever.

(8) The rights herein granted to GRANTEE may not be assigned, either in whole or in part, without the express written concurrence of GODCHAUX.

(9) GODCHAUX shall at all times be entitled to examine and to receive copies of any and all information and reports relative to GRANTEE's testing activities on the premises, including, but not limited to, seismic reports, geological reports and geophysical reports.

(10) GRANTEE shall own no interest in any oil, gas or other substance produced from the test well and shall not be

obligated to account for or pay any royalty with respect thereto. GRANTEE shall drill a salt water disposal well on the leased premises and inject such substances therein below any fresh water sands, and shall take care not to harm the surface and subsurface lands of GODCHAUX, all subject to the rules and regulations of the Louisiana Department of Conservation.

(11) As an essential condition of this agreement, GRANTEE agrees that, upon termination of its operations hereunder, it will place a minimum of Four (4) inches of road topping type shell, at the direction of said landowner, at a cost not to exceed Twenty Five Thousand ($25,000.00) dollars, on roadways which are marked in red on the map which is attached hereto and made part hereof, and marked Exhibit IV, and will further make such road or bridge repairs as may be shown on drawings or specifications which are attached hereto, signed for identification herewith and thus made a part hereof.

IN WITNESS WHEREOF, this instrument is executed as of the day first above written.

WITNESSES:

GODCHAUX BROS.

_____

BY: _____
CHARLES R. GODCHAUX or
FRANK A. GODCHAUX, III

_____

_____

EATON OPERATING CO. INC.

_____

BY: B A Eaton

STATE OF LOUISIANA

PARISH OF VERMILION

On this _____ day of _____, 1981, before me personally came and appeared _____, to me known to be the person described in and who executed the foregoing instrument on behalf of the partnership, Godchaux Bros., and who acknowledged to me that he executed the same as the free act and deed of said partnership.

_____
NOTARY PUBLIC

STATE OF TEXAS

PARISH (OR COUNTY) OF HARRIS

On this _____ day of _____, 1981, before me appeared _____, to me personally known, who being by me duly sworn, did say that he is the President of Eaton Operating Co., Inc., and that said instrument was signed in behalf of said corporation by authority of its Board of Directors and the said Ben A. Eaton acknowledged said instrument to be the free act and deed of said corporation.

_____
NOTARY PUBLIC

4.0 GEOPRESSURED-GEOTHERMAL PROSPECT

4.1 Location

The C & K Petroleum, Inc., Frank A. Godchaux III, No. 1 well is located in Live Oak Field, Vermilion Parish, Louisiana (Figure 4-1).

In order to drive from Abbeville, Louisiana to location, go south on Highway 82. In approximately two miles Highway 82 turns into Highway 330. Proceed southeast on Highway 330 approximately 5 miles. Turn west on State Route 690. In one and one half miles, before going over Vermilion River's free ferry, turn south onto an unnamed road. This road should closely follow the eastern side of Vermilion River. Four miles down the road will be the Godchaux property. It is called Live Oak Plantation (Figure 4-2). Near the gate entrance security or a guide will direct all traffic entering the premises to and from the test well site on a twenty four hour basis, until test completion.

The specific well location is as follows:

From the northeast corner of irregular Section 88, Township 14S and Range 3E, go south 23 degrees 42 minutes west 1600' and north 66 degrees 18 minutes west 1500' (Figure 4-3).

4.2 Geology

The prospective geopressured reservoirs occur in the deep Planulina sands found in the lower Miocene series. The primary target sand

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.

Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

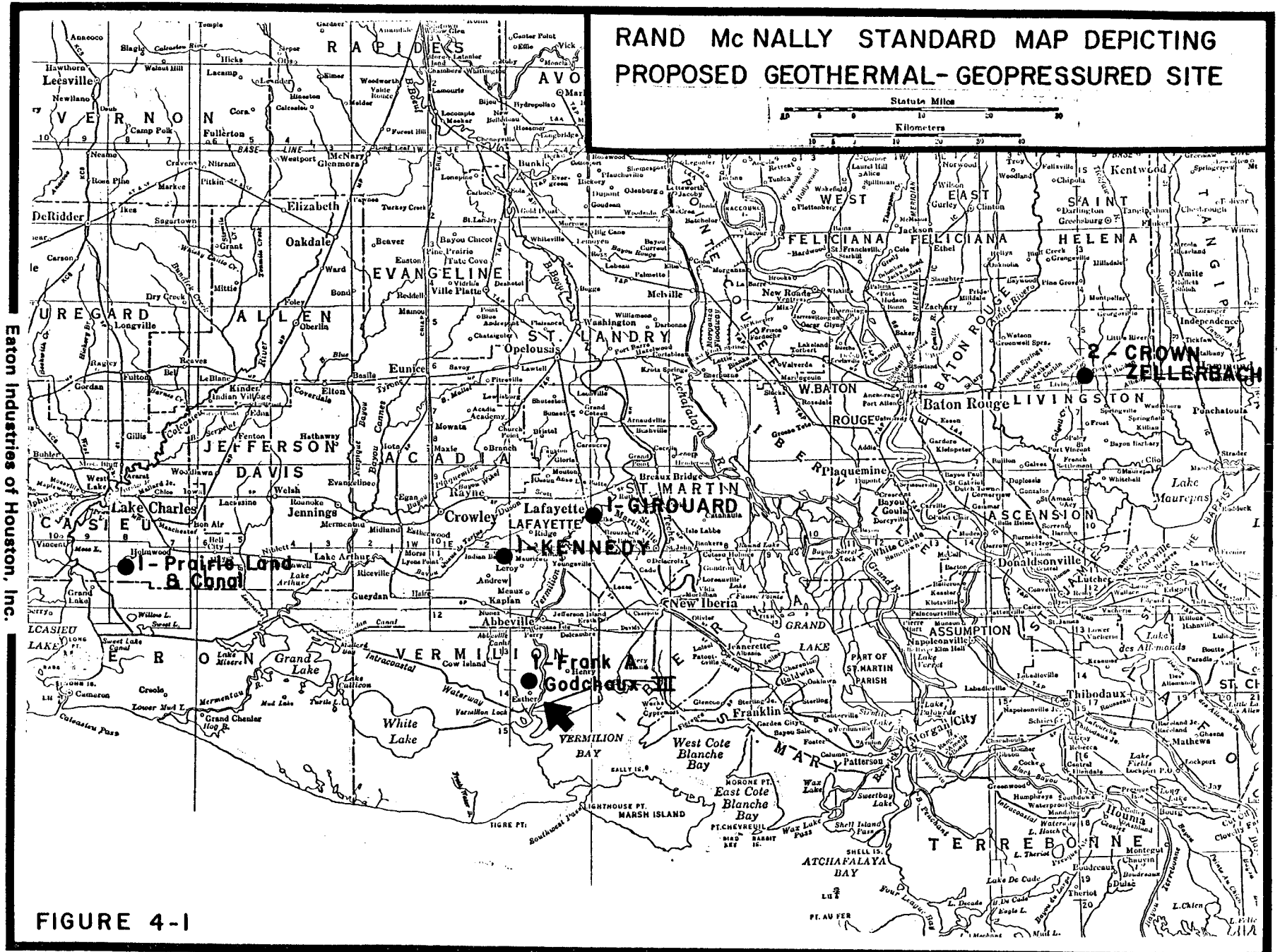
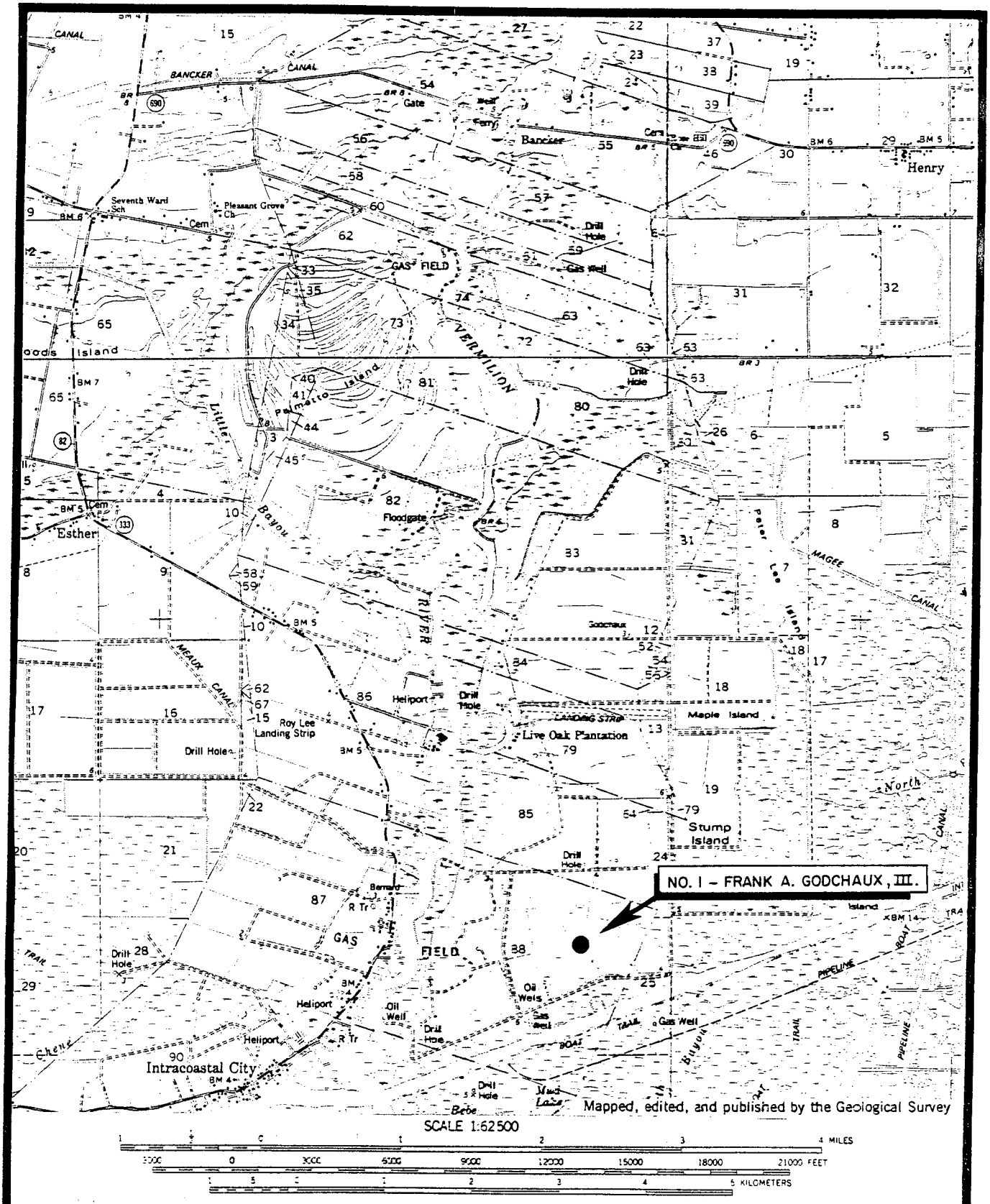


FIGURE 4-1



TOPOGRAPHIC MAP

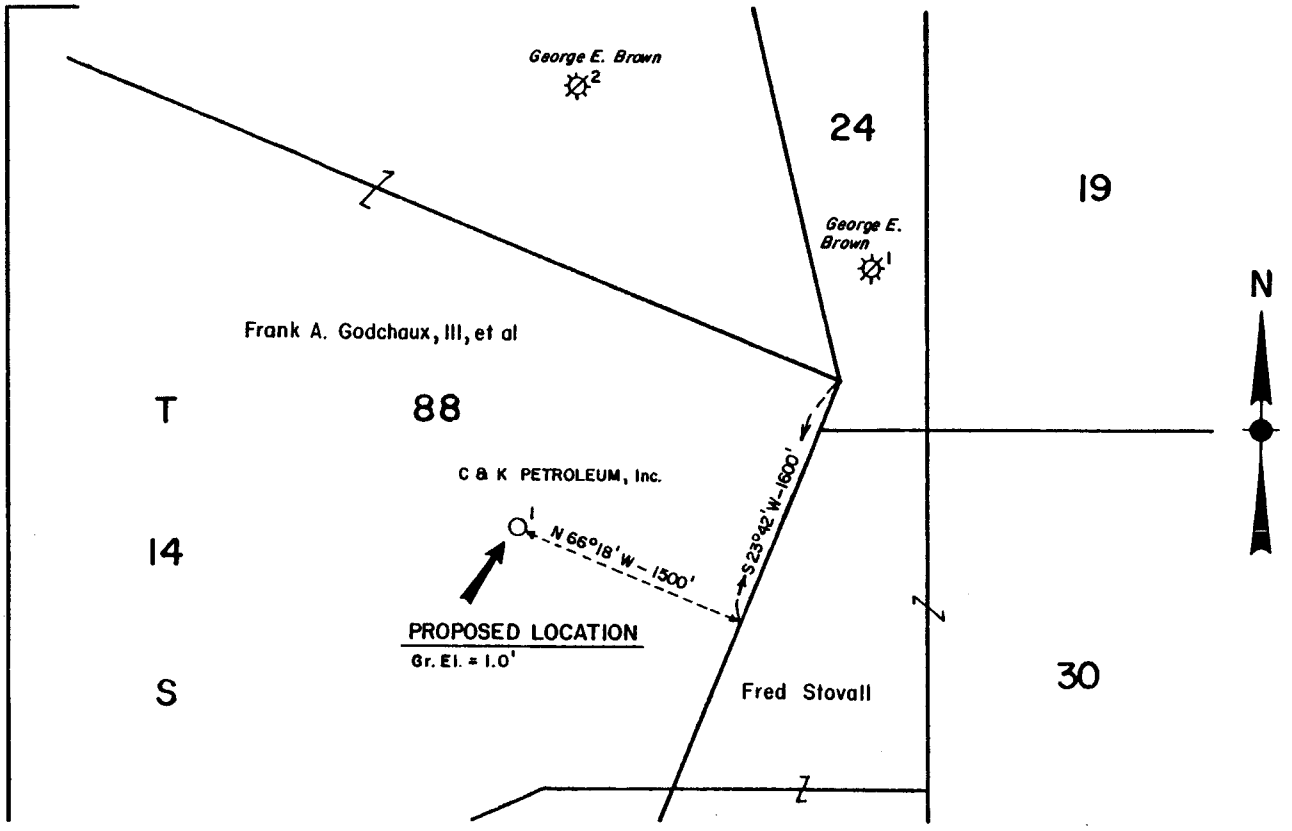
ABBEVILLE QUADRANGLE
LOUISIANA—VERMILION PARISH
15 MINUTE SERIES (TOPOGRAPHIC)

FIGURE 4-2

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

DOE CONTRACT NO.
DE-AC08-80ET-27081



LOCATION MAP

C & K PETROLEUM, INC.

FRANK A. GODCHAUX, III., et al No. 1

FIGURE 4-3

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

interval is at a depth of 15,455' to 15,963' (Figure 4-4), and the alternate target sand interval is at a depth of 14,904' to 15,275' (Figure 4-5).

The structure map shown in Figure 4-6, and the two cross-sections, illustrated in Figures 4-7 and 4-8, were developed by using electric logs in the immediate area. The C & K Petroleum, Inc., Frank A. Godchaux III, No. 1 well is bounded by an east-west bifurcated down-to-the-coast growth fault approximately 3/4 mile to the north and 1/4 mile to the south. The interpretation of these data indicate the northern section of the bifurcated fault to have some 800 feet of throw and the smaller southern fault to have approximately 500 feet of throw.

There are no apparent faults to the immediate east of the well. Therefore, there should be a minimum drainage area of three square miles.

4.3 Reservoir Characteristics

Based on analysis of the C & K Petroleum, Inc., Frank A. Godchaux III, No. 1 ISF/Sonic Log, the predicted reservoir characteristics are as follows:

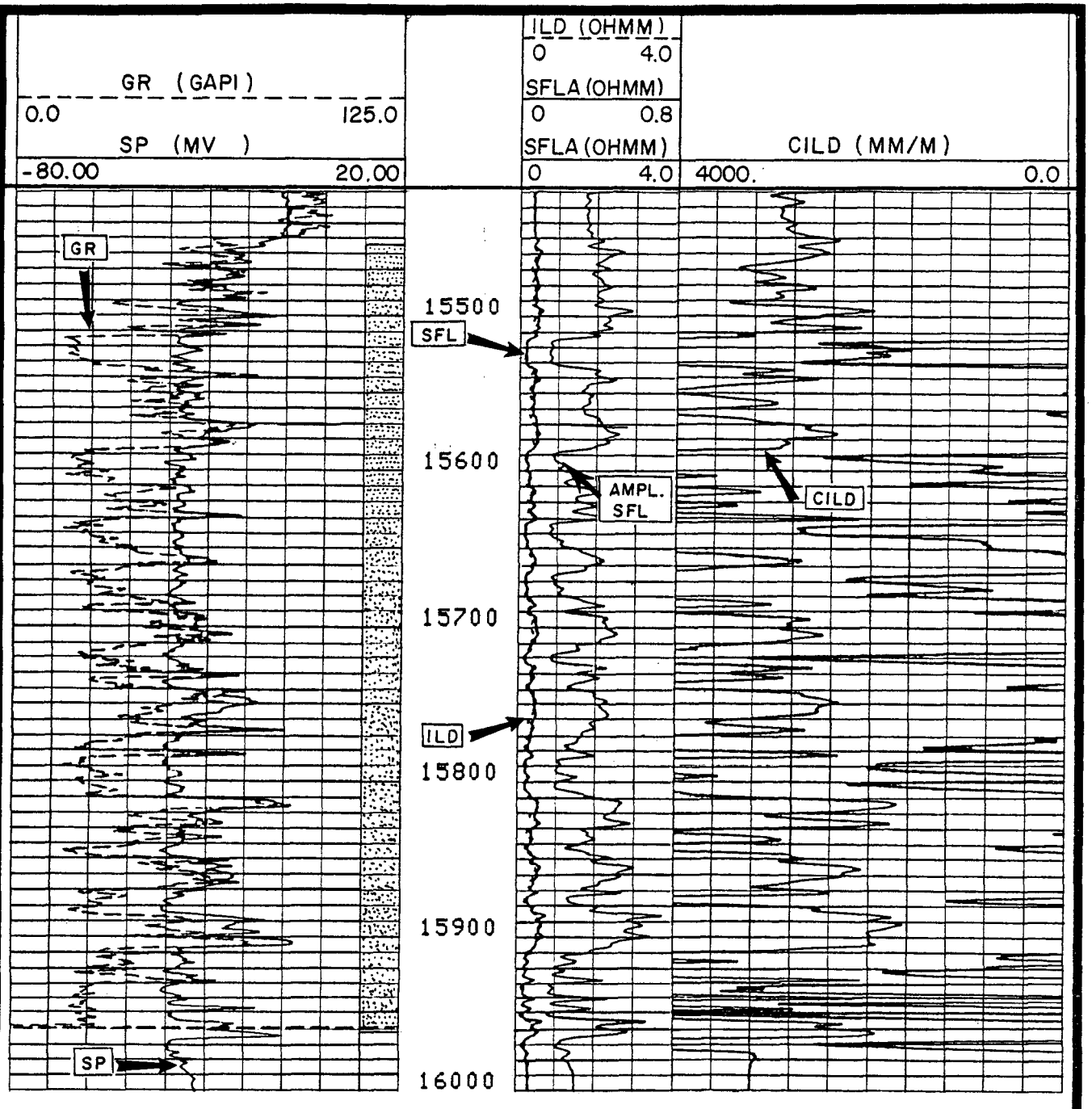
I. Sand "A" - Primary Target (15,455' - 15,963')

Gross Sand Thickness:

The known gross sand thickness of this target interval is 508' (Figure 4-9).

Net Sand Thickness:

The net sand thickness of this target interval is 360'. This fact



ISF/SONIC 1" LOG

FRANK A. GODCHAUX, III., et al No. 1

TARGET SAND "A"

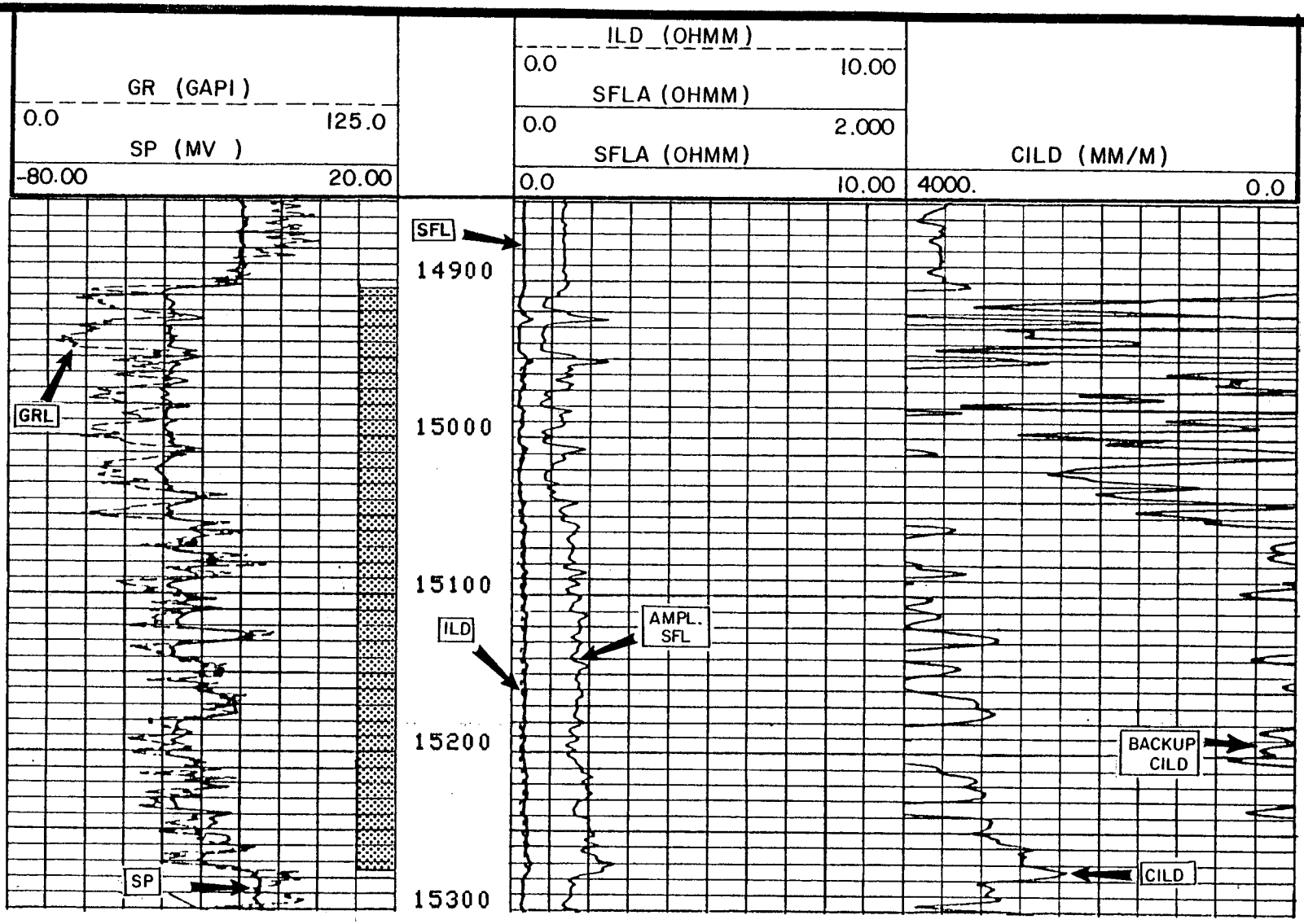
FIGURE 4-4

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

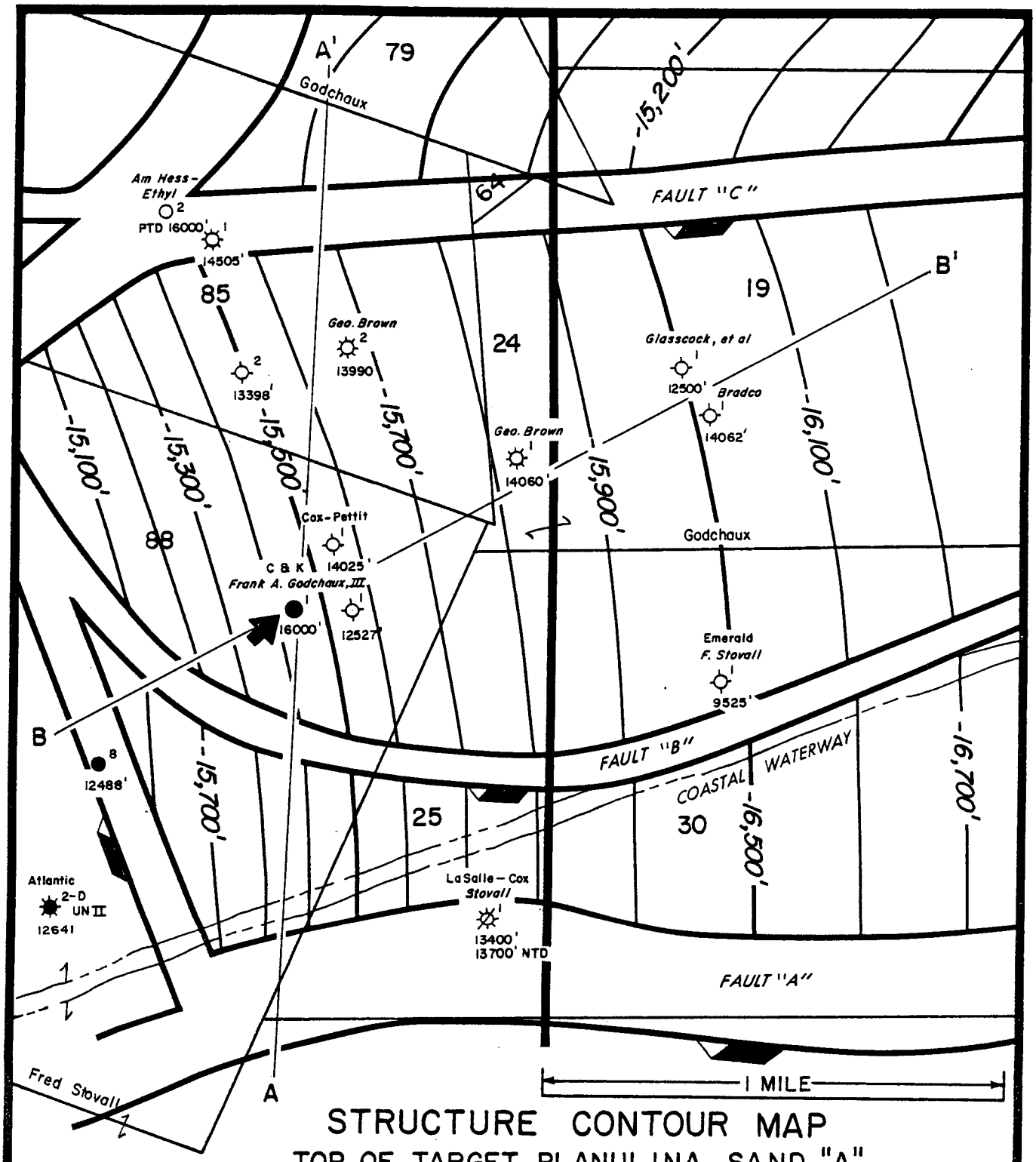


ISF/SONIC 1" LOG

FRANK A. GODCHAUX, III., et al No. 1

ALTERNATE TARGET SAND "B"

FIGURE 4-5



STRUCTURE CONTOUR MAP

TOP OF TARGET PLANULINA SAND "A"

LIVE OAK FIELD

VERMILION PARISH, LOUISIANA

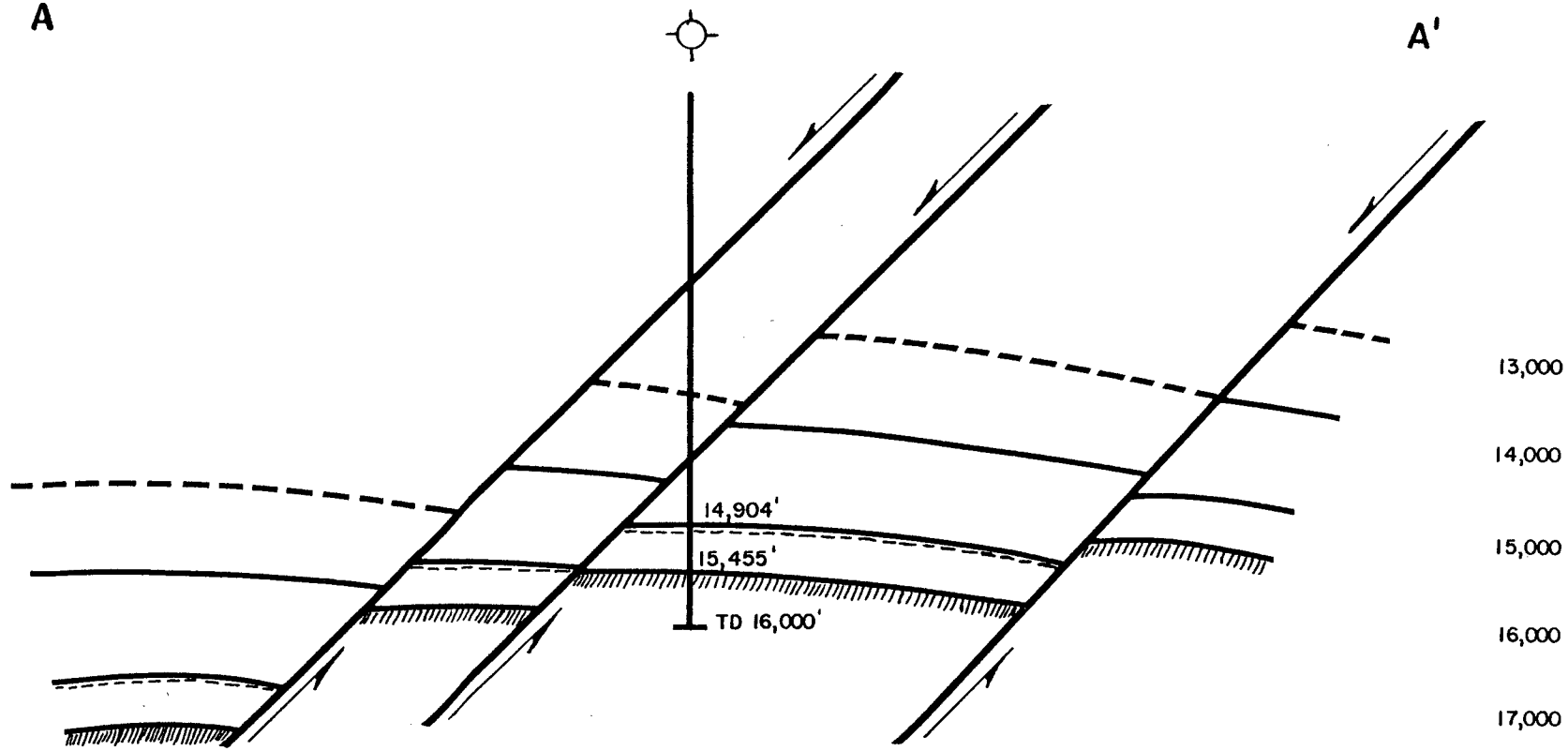
FIGURE 4-6

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764



GENERALIZED CROSS-SECTION A–A'

LIVE OAK FIELD

VERMILION PARISH, LOUISIANA

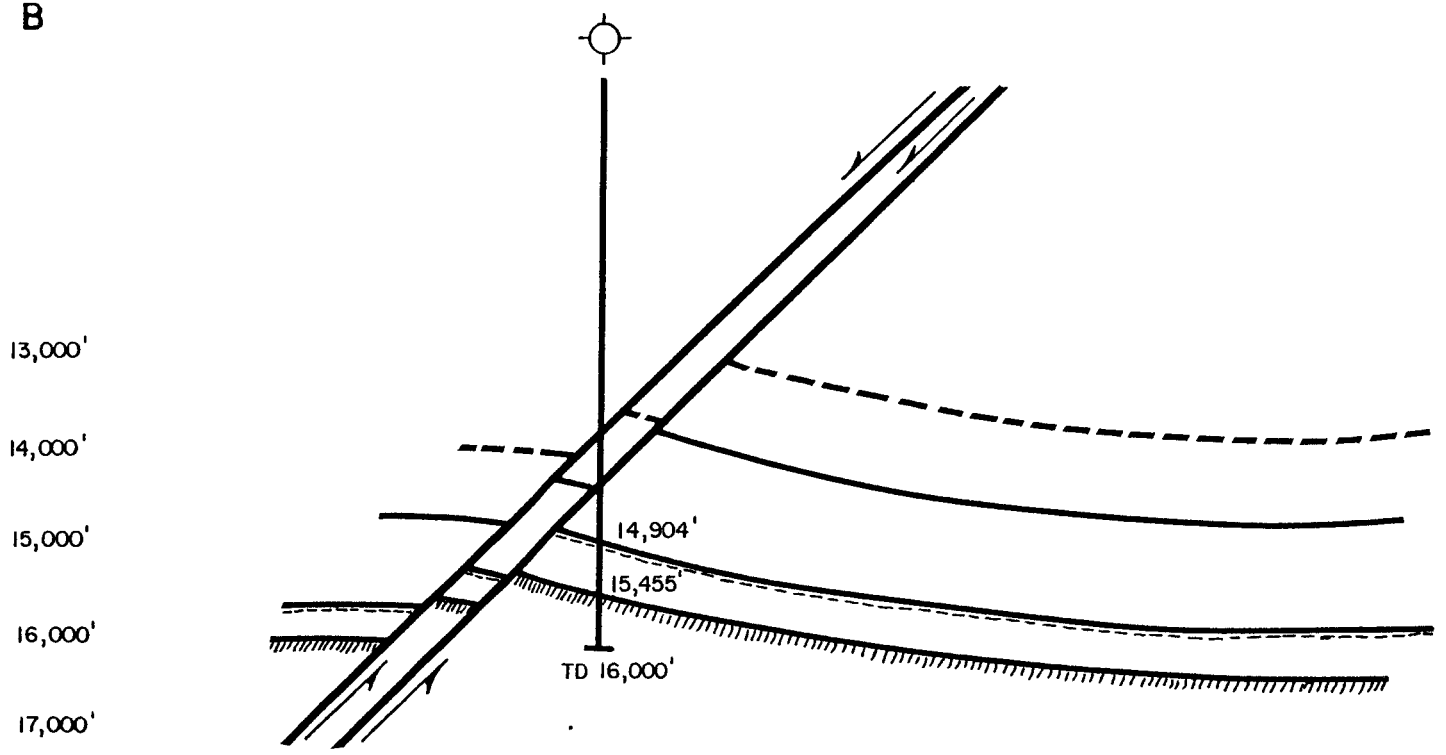
SCALE: 1 = 2000'

FIGURE 4-7

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

C & K PETROLEUM, INC.
FRANK A. GODCHAUX, III., NO. 1



GENERALIZED CROSS-SECTION B–B'

LIVE OAK FIELD
VERMILION PARISH, LOUISIANA

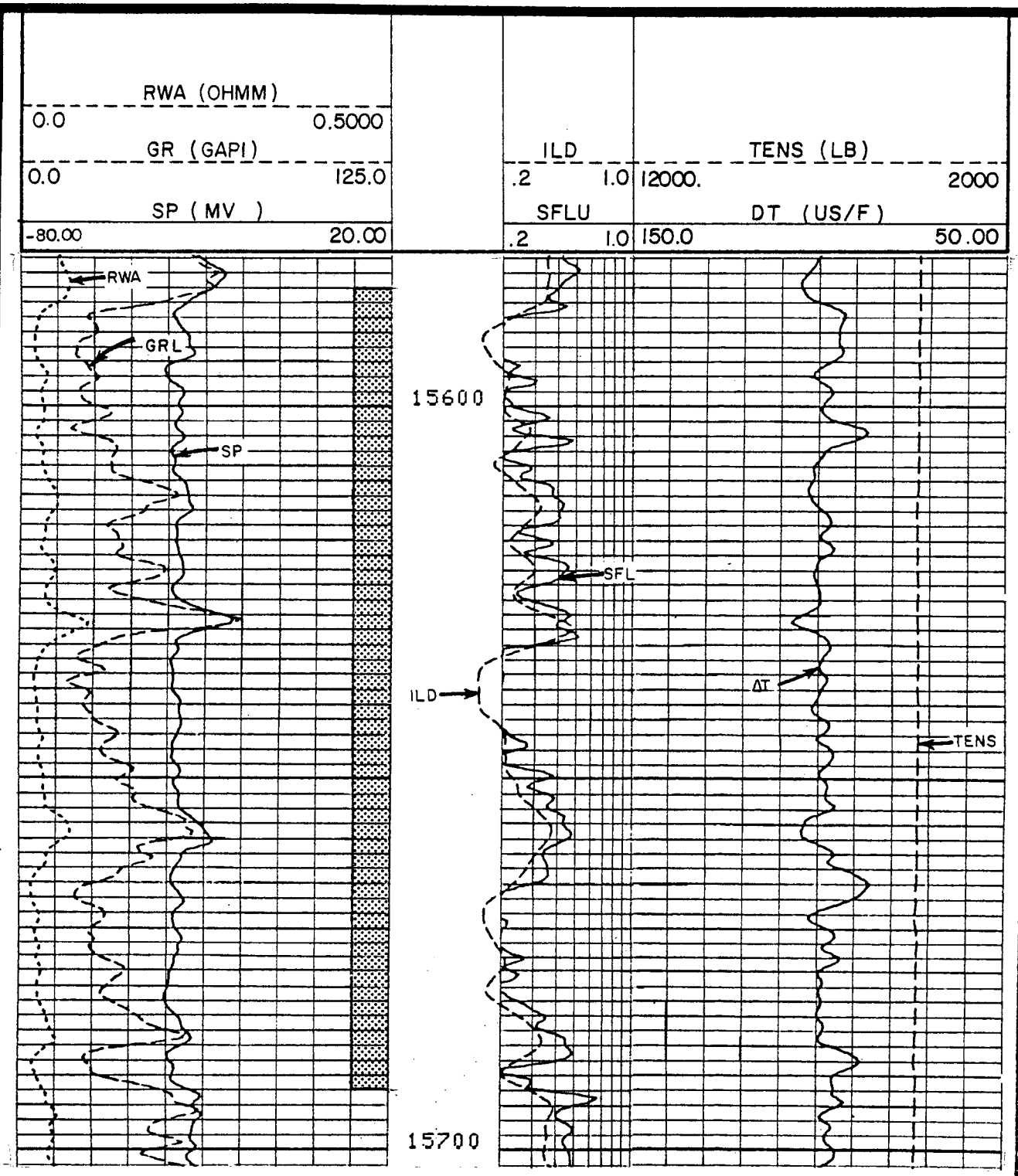
SCALE : 1" = 2000'

MAP DATUM "B" SAND (14,904')

MAP DATUM "A" SAND (15,455')

FAULT — DIP & THROW

FIGURE 4-8



ISF/SONIC 5" LOG

FRANK A. GODCHAUX, III., et al No. 1

TARGET SAND "A"

FIGURE 4-9

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

was determined by analysis of the SP log using -30 millivolts as a cutoff; where the maximum shale line is -8 millivolts and the maximum sand line is -40 millivolts.

Perforating Interval:

It is proposed to perforate 15,584' to 15,692'.

Porosity:

It has been determined from the volocity log that the porosity is 27%. A Δt_{sh} of 120 and a Δt_{ss} of 100 was used in coming to this conclusion.

Permeability:

In using two cores which were analyzed in this sand interval, the permeability average is 144 millidarcys (Figure 4-10).

Pressure:

The hydrostatic head in this target sand is estimated to be 14,775 psi. This pressure was derived by using 17.8#/gallon mud and a reservoir depth of 15,963'.

Temperature:

The sand temperature is estimated to be 298°F based on a bottom hole temperature of 271°F measured after circulation had been stopped for 6-1/2 hours.

Salinity:

The salinity, using the conventional SP log approach, is 75,000 ppm using the following parameters:

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

CORE ANALYSIS, INC.

PRELIMINARY CORE ANALYSIS

COMPANY C & K PETROLEUM CORPORATION DATE 1-2-80 FILE NO L-1393

WELL GODCHAUX III NO. 1 FIELD LIVE OAK COUNTY VERMILION STATE LA.

CORES SCHLUMBERGER SIDEWALLS ANALYST E. R. PEACHER

INTERVAL FEET	DEPTH FEET	PERMEABILITY MILLIDARCYS	POROSITY %	OIL % PORE	TOTAL WATER % PORE	PROBABLE PRODUCTION	GAS % PORE	S W	CUT	COMBUSTIBLE GAS UNITS			
										FORMATION DESCRIPTION	↓	ODOR	FLOURESCENCE
1.0	14906									Shale Calc	0		
0.8	14907									Shale Calc	0		
1.0	14908	210.	24.8	0.8	71.4	COND	6.9	43	POOR	Sd. VFgr Sli Shy	0	NO	VFT
0.8	14909	370.	26.1	1.2	59.0	COND.	10.4	40	NO	Sd. VFgr Silty Sli Calc	0	NO	VFT
0.8	14910	265.	25.0	0.8	76.4	WATER	5.7	41	POOR	Sd. VFgr Sli Shy	0	NO	VFT
1.3	15180	15.	19.0	0.0	74.8	WATER	4.8	62	NO	Sd. VFgr Shy Silty Calc	0	NO	NO
1.0	15181	2.6	16.3	0.0	78.1	LOW PERM	3.6	66	NO	Sd. VFgr Shy Silty Calc	0	NO	NO
0.8	15182	96.	23.3	0.0	77.0	WATER	5.4	50	NO	Sd. VFg Silty Calc. (Lam)	0	NO	NO
1.0	15183	50.	21.2	0.0	82.5	WATER	3.8	53	NO	Sd. VFgr Silty Calc	0	NO	NO
0.8	15907	37.	22.5	0.0	85.9	WATER	3.2	58	NO	Sd. VFg Silty (Lam) Calc	0	NO	NO
1.0	15909	250.	23.7	0.0	74.3	WATER	6.1	41	NO	Sd. Fgr Sli Shy	0	NO	NO

FIGURE 4-10

SP = -35

R_t = .4

T = 298°F

R_{mf} = .06

R_{we} = .027

ϕ = 23%

Using the modified Humble equation, $Rwa = \phi^2 R_t/.81$, the salinity calculates to be 52,000 ppm using the following parameters:

ϕ = 27% (Derived from the velocity log)

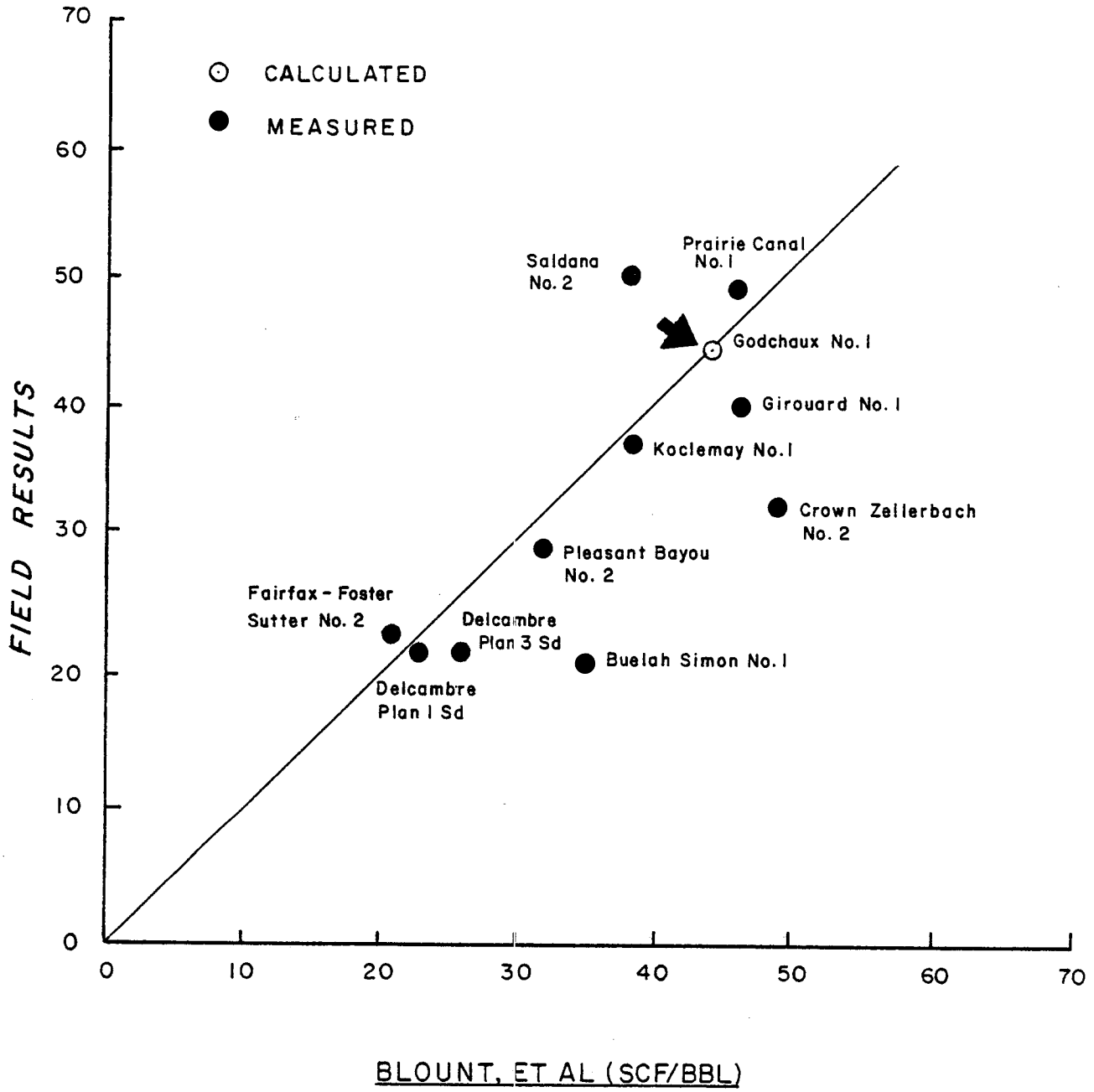
R_t = .4

Following is a table showing salinities calculated by analysts using the parameters given and their own salinity calculation methods:

Analyst	Salinity ppm	SP mv.	Temperature of
Dunlap (U. of T.)	140,000	32	259°F
Wallace (USGS)	85,000	43	280°F
Morton (BEG)	142,365	32	271°F
Bassiouni (LSU)	130,000	30	271°F
Bebout (LaDNR)	100,000-120,000	n/a	267°F

Gas Content:

Assuming saturation, a salinity of 75,000 ppm, a pressure of 14,775 psi and a temperature of 298°F, the methane content is estimated to be 44 SCF/bbl (Figure 4-11). This number was determined by using the following Blount, et al formula:



EATON OPERATING CO., INC. – JUNE, 1981

FIGURE 4-11

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

$$\log_e CH_4^* = -1.4053 - 0.002332t + 6.30E-06t^2$$
$$-0.004038S - 7.579E-06p$$
$$+0.5013 \log_e p + 3.235E-04t \log_e p$$

*CH_4 is in SCF per petroleum barrel.

t is in ^{o}Farhenheit.

S is salinity in grams per liter.

p is pressure in psi.

By applying an "Eaton Field Correction Factor" of .92 to the Blount, et al value, it is estimated that the actual methane content of the formation will be 40 SCF/bbl (Figure 4-15).

II. Sand "B" - Alternate Target (14,904' - 15,275')

Gross Sand Thickness:

The gross sand thickness of this target interval is 371' (Figure 4-12).

Net Sand Thickness:

The net sand thickness of this target interval is 300'. This fact was determined by analysis of the SP log using -30 millivolts as a cutoff; where the maximum shale line is -12 millivolts and the maximum sand line is -40 millivolts.

Perforating Interval:

It is proposed to perforate 14,904' to 15,006'.

Porosity:

It has been determined from the velocity log that the porosity is 31%. A Δt_{sh} of 130 and a Δt_{ss} of 110 was used in coming to this

conclusion.

Permeability:

In using seven cores which were analyzed in this sand interval, the permeability average is 144 millidarcys (Figure 4-10).

Pressure:

The hydrostatic head in this target sand is estimated to be 14,139 psi. This pressure was derived by using 17.8#/gallon mud and a reservoir depth of 15,275'.

Temperature:

This sand temperature is estimated to be 291°F based on a bottom hole temperature of 271°F measured after circulation had been stopped for 6-1/2 hours.

Salinity:

The salinity, using the conventional SP log approach, is 67,000 ppm using the following parameters:

SP = -30

R_t = .3

T = 291°F

R_{mf} = .062

R_{we} = .031

ϕ = 28%

Using the modified Humble equation, $Rwa = \phi^2 R_t/.81$, the salinity calculates to be 55,000 ppm using the following parameters:

ϕ = 31% (Derived from velocity log)

R_t = .3

Following is a table showing salinities calculated by analysts using the parameters given and their own salinity calculation methods:

Analyst	Salinity ppm	SP mv.	Temperature of
Dunlap (U. of T.)	115,000	20	247°F
Wallace (USGS)	68,000	30	275°F
Morton (BEG)	140,000	n/a	n/a
Bassiouni (LSU)	145,000	20	258°F
Bebout (LaDNR)	100,000-120,000	n/a	259°F

Gas Content:

Assuming saturation, a salinity of 67,000 ppm, a pressure of 14,139 psi and a temperature of 291°F, the methane content is estimated to be 43 SCF/bbl (Figure 4-11). This number was determined by using the following Blount, et al formula:

$$\log_e CH_4^* = -1.4053 - 0.002332t + 6.30E-06t^2$$
$$-0.004038S - 7.579E-06p$$
$$+0.5013 \log_e p + 3.235E-04t \log_e p$$

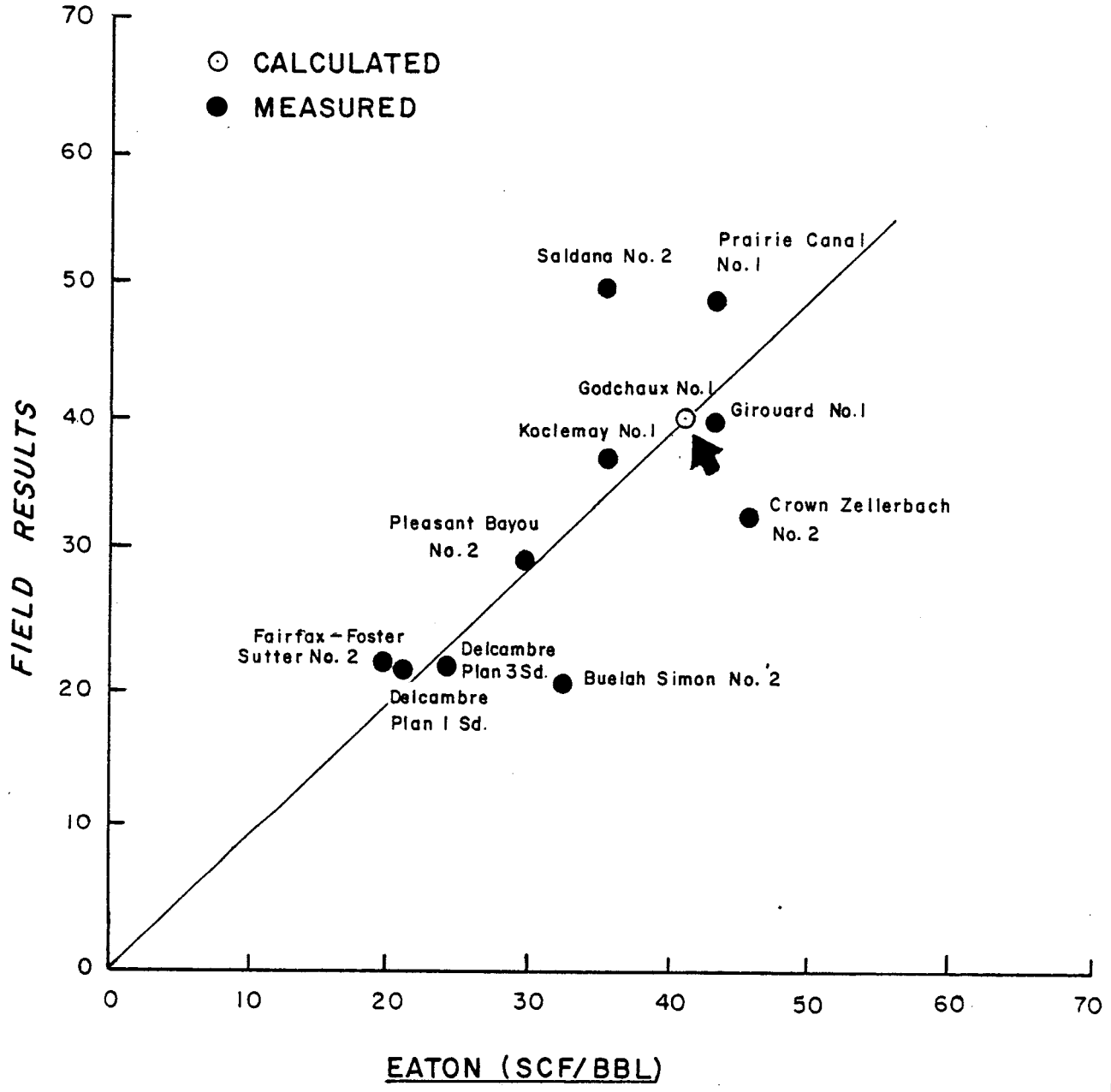
*CH_4 is in SCF per petroleum barrel.

t is in °Farhenheit.

S is salinity in grams per liter.

p is pressure in psi.

By applying an "Eaton Field Correction Factor" of .92 to the Blount, et al value, it is estimated that the actual methane content of the formation will be 39.6 SCF/bbl (Figure 4-15).



EATON OPERATING CO., INC. – JUNE, 1981

FIGURE 4-15

4.4 Resource and Deliverability Projections

I. Sand "A" - Primary Target (15,455' - 15,963')

The volume of brine and natural gas contained in the following target sand, 15,455' - 15,963', is estimated by volumetric calculation using the following assumptions:

a) The aquifer extends over a minimum distance of 3 square miles.

b) The net sand thickness is 360 feet.

c) The average porosity is 27%.

d) The dissolved gas content is 40 SCF/bbl.

In this sand the volume of in-situ brine is approximately 1.3855 billion barrels. Using the above gas solubility of 40 SCF/bbl, the volume of dissolved gas calculates to be 55.42 billion standard cubic feet. Approximately 70,000 barrels of brine and 2,800,000 standard cubic feet of dissolved gas will be produced during the test period of 13 days.

By using the fluid compressibility of 3.8×10^{-6} psi^{-1}, it is estimated that the static reservoir pressure loss at the end of the test period will be 13 pounds per square inch in the sand for the assumed reservoir area of 3 square miles.

In order to obtain an idea as to the magnitude of expected flow rates from the subject well, the radial flow equation for incompressible fluids in porous media, under steady state conditions, was evaluated as follows:

$$q = \frac{7.08\ kh\ (\Delta p)}{\mu B\ \ln\ (r_e/r_w)}$$

where:

q = calculated flow rate in bbls/day

k = permeability - darcies

h = gross sand thickness - feet

Δp = pressure drawdown at sand face - psi

B = formation volume factor - dimensionless

r_e = outer radius - feet

r_w = well bore radius - feet

μ = viscosity - centipoise

The radial flow equation was evaluated with the following parameter values which were based on log data and known geological and engineering data. Assume:

k = 150 md = .150 darcy

h = 360 feet

Δp = 2200 psi

μ = .32

B = 1.045

r_e = 5160.0 feet

r_w = .3 feet

Then:

q = 257,905 bbls/day

II. Sand "B" - Alternate Target (14,904' - 15,275')

The volume of brine and natural gas contained in the following target sand, 14,904' - 15,275', is estimated by volumetric calculation using the following assumptions:

a) The aquifer extends over a minimum distance of 3 square miles.

b) The net sand thickness is 300 feet.

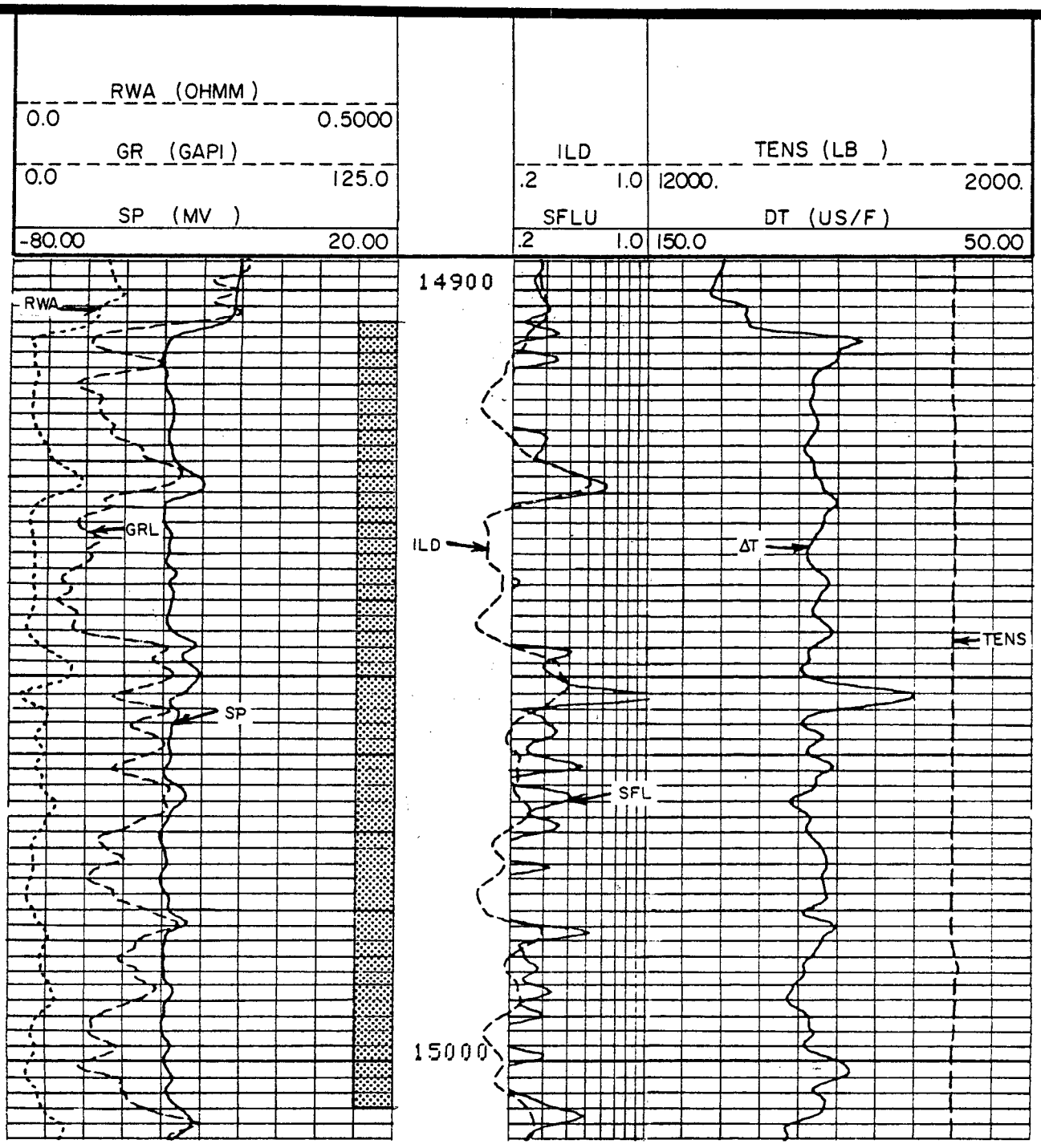
c) The average porosity is 31%.

d) The dissolved gas content is 39.6 SCF/bbl.

In this sand the volume of in-situ brine is approximately 1.3255 billion barrels. Using the above gas solubility of 39.6 SCF/bbl, the volume of dissolved gas calculates to be 52.49 billion standard cubic feet. Approximately 70,000 barrels of brine and 2,772,000 standard cubic feet of dissolved gas will be produced during the test period of 13 days.

Using the fluid compressibility of 3.8×10^{-6} psi^{-1}, it is estimated that the static reservoir pressure loss at the end of the test period will be 14 pounds per square inch in the sand for the assumed reservoir area of 3 square miles.

In order to obtain an idea as to the magnitude of expected flow rates from the subject well, the radial flow equation for incompressible fluids in porous media, under steady state conditions, was evaluated as follows:



ISF/SONIC 5" LOG

FRANK A. GODCHAUX, III., et al No.1

ALTERNATE TARGET SAND "B"

FIGURE 4-12

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

$$q = \frac{7.08\ kh\ (\Delta p)}{\mu B\ \ln\ (r_e/r_w)}$$

where:

q = calculated flow rate in bbls/day

k = permeability - darcies

h = gross sand thickness - feet

Δp = pressure drawdown at sand face - psi

B = formation volume factor - dimensionless

r_e = outer radius - feet

r_w = well bore radius - feet

μ = viscosity - centipoise

The radial flow equation was evaluated with the following parameter values which were based on log data and known geological and engineering data.

Assume:

k = 150 md = .150 darcy

h = 300 feet

Δp = 2200 psi

μ = .32

B = 1.045

r_e = 5160.0 feet

r_w = .3 feet

Then:

q = 214,921 bbls/day.

4.5 Reservoir Characteristics of the Disposal Well

The predicted reservoir characteristics of the target sand for the salt water disposal well are based on the log analysis of the George R. Brown, Frank A. Godchaux No. 1 well, which is approximately 3000' northeast of the C & K Petroleum Frank A. Godchaux III, No. 1 well.

I. Sand "A" - Primary Disposal Target (4190' - 4450')

Sand Thickness:

The gross sand thickness of this primary disposal target interval is 260' (Figure 4-13).

Porosity:

Calculated porosity from the Electrical log is 25%.

Pressure:

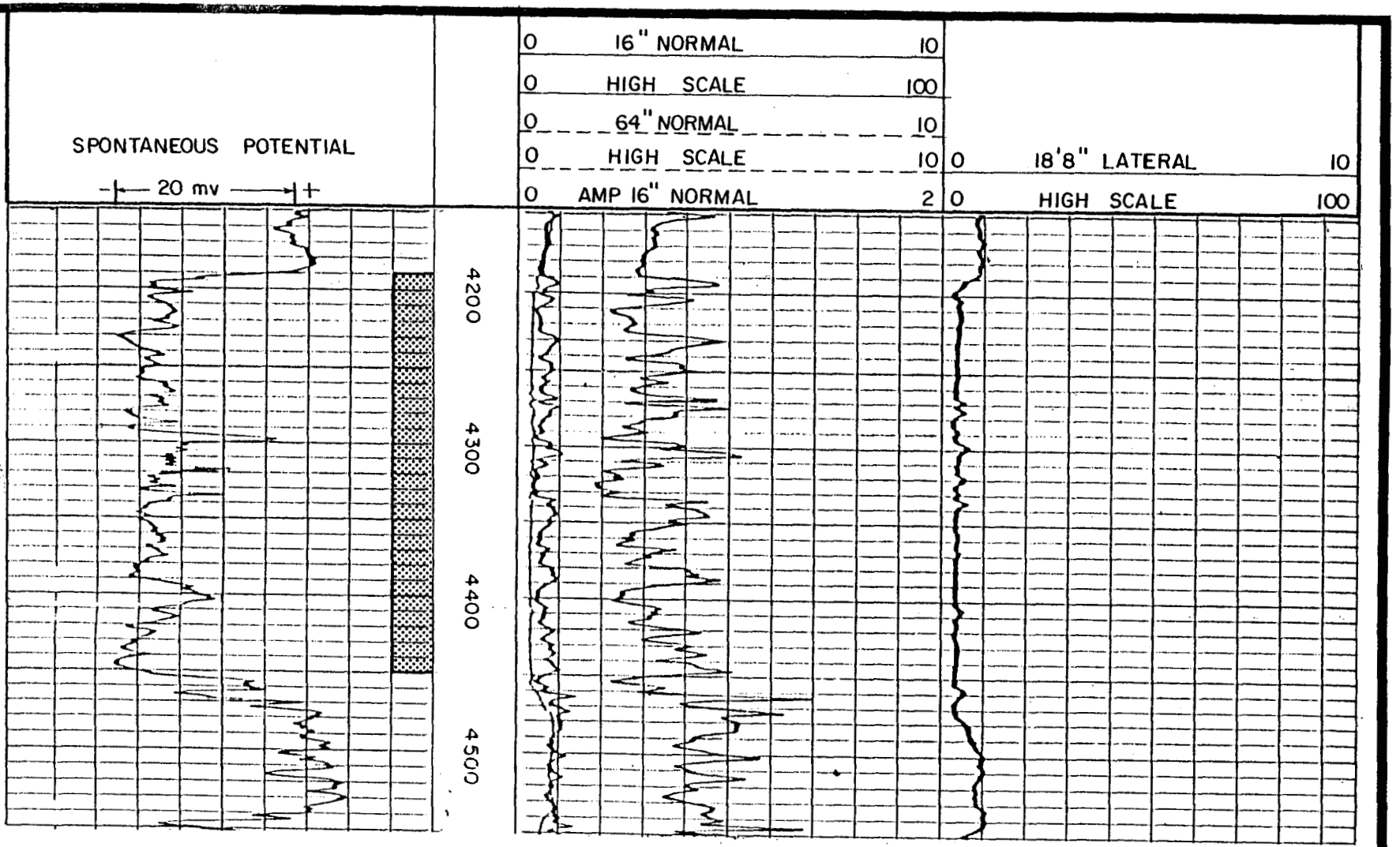
The average pressure in the target sand is estimated to be 2069 psi. This pressure was based on a gradient of 0.465 psi/ft. and a reservoir depth of 4450 feet.

Temperature:

The temperature is estimated to be 110°F based on an uncorrected temperature of 178°F at 12,040'.

Salinity:

Salinity is greater than 200,000 ppm based on calculations derived from the Electrical log.



GEORGE R. BROWN, FRANK A. GODCHAUX NO. 1

DISPOSAL TARGET SAND "A"

ELECTRICAL LOG

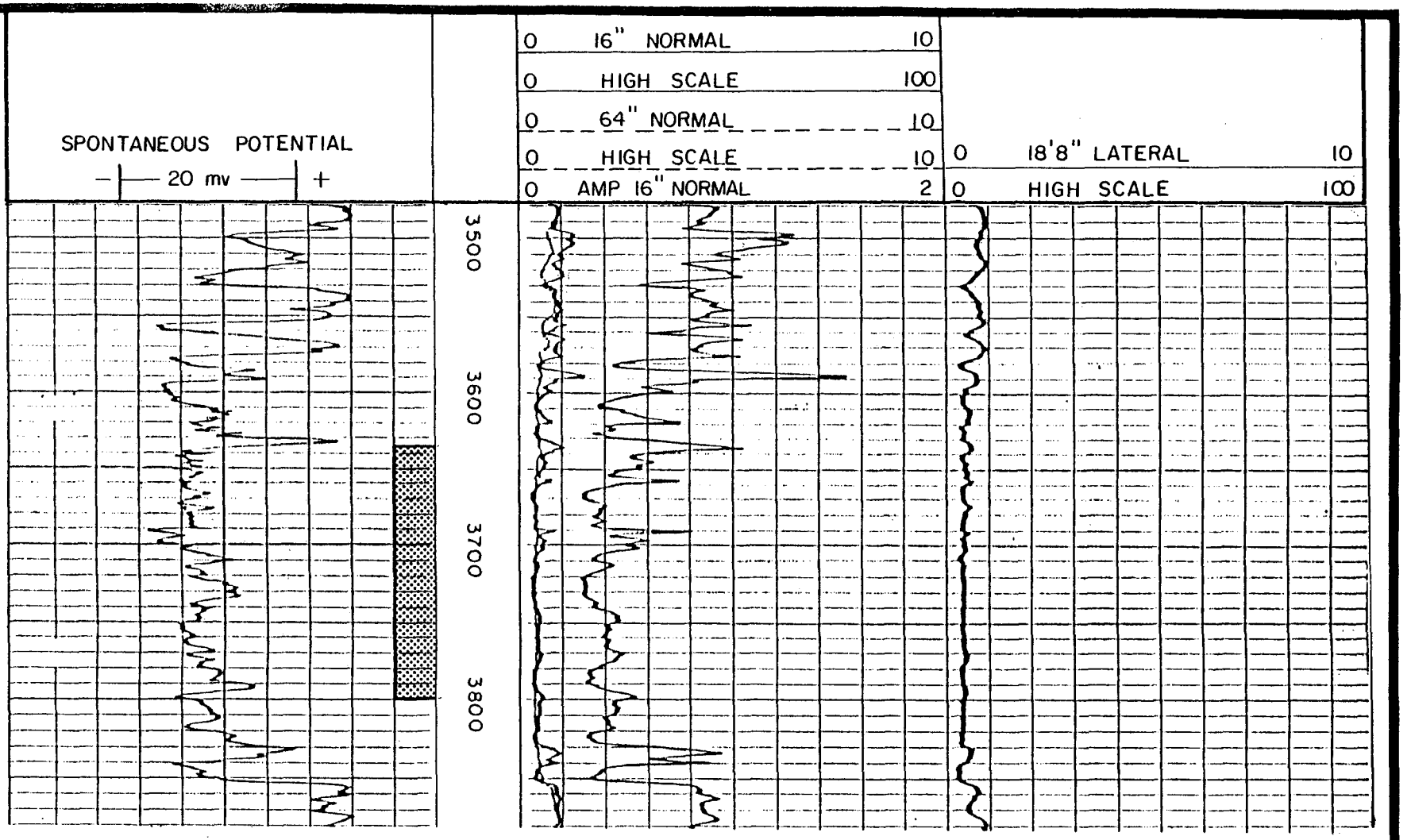
FIGURE 4-13

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764



GEORGE R. BROWN, FRANK A. GODCHAUX NO. 1
ALTERNATE DISPOSAL TARGET SAND "B"
ELECTRICAL LOG

FIGURE 4-14

II. Sand "B" - Alternate Disposal Target (3635' - 3800')

Sand Thickness:

Gross sand thickness of the alternate disposal target interval is 165 feet (Figure 4-14).

Porosity:

Calculated porosity from the Electrical log is 32%.

Pressure:

The average pressure in the alternate target sand is estimated to be 1767 psi. This pressure was based on a gradient of 0.465 psi/ft. and a reservoir depth of 3800 feet.

Temperature:

The average temperature is estimated to be 104°F based on the uncorrected temperature of 178°F at 12,040'.

Salinity:

Salinity is approximately 149,000 ppm based on calculations derived from the Electrical log.

5.0 MANAGEMENT PLAN

This operation will be completely under the control of Eaton Operating Company, Inc. personnel who will be responsible for direction and coordination of all subcontractor functions. Each section will report directly to Mr. D. A. Langford. The Management and Organization Chart is shown on Figure 5-1 which is followed by a description of each position's responsibilities and authority.

Two competent, experienced rig supervisors and one experienced mud engineer will be assigned to the re-entry, clean out and completion operations under the direct supervision of Mr. J. E. Evans. A cost accountant property manager, under the direct supervision of Mr. D. Graham, will be on location full time through rig up, re-entry, completion, testing and subsequent clean up. Quarters for these personnel will be located at the rig site.

Testing operations will be directed and coordinated by Mr. R. Z. Klauzinski. He will be responsible for engineering, reporting, technical conferences and technical papers.

Estimated daily and cumulative expenditures will be included in the daily report. Our finance and cost accounting group, directed by Mr. G. E. Frey with the assistance of Mr. D. Graham, will report actual incurred costs against estimated costs to Mr. D. A. Langford on a weekly basis.

The following pages set out Eaton's chart of accounts and also Eaton's planned method of cost control and weekly cost evaluation.

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

MANAGEMENT AND ORGANIZATIONAL CHART

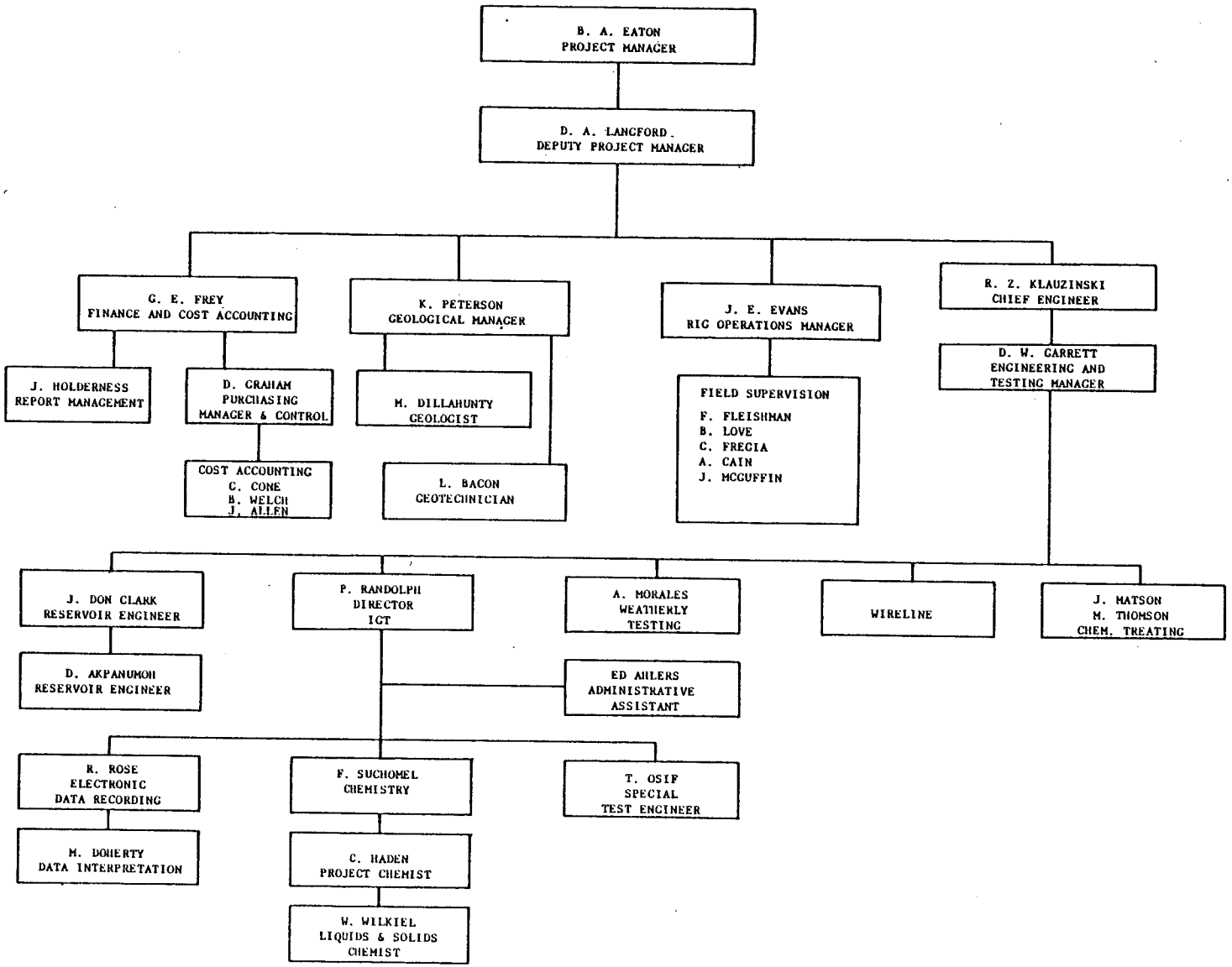


FIGURE 5-1

MANAGEMENT AND ORGANIZATION PLAN

TESTING OPERATIONS

PROJECT MANAGER (B. A. EATON)

Overall administrative and technical responsibility and authority of the Wells of Opportunity Program, i.e. development of policies and procedures, coordination of project activities, staff supervision, monitoring activities of contract organization to ensure proper cost control and organization and presentation of progress reports and briefings.

DEPUTY PROJECT MANAGER (D. A. LANGFORD)

Replace Project Manager in his absence, supervise performance of engineering, field operations and procurement managers. Responsible for discussions and negotiations with operator/leaseholder, obtain preliminary agreements for candidate wells and oversee preparation of all phases of reports and briefings (other than geologic).

CHIEF PETROLEUM ENGINEER (R. Z. KLAUZINSKI)

Responsible for engineering, reporting, technical conferences and technical papers.

ENGINEERING MANAGER (D. W. GARRETT)

Responsible for drilling, completion and surface facilities engineering, supervise review of candidate well conditions, supervise program schedules and cost estimates preparation, coordinate activities of subcontractor and supervise test program, data collection and reporting by assigned subcontractor or consultant.

RIG OPERATIONS (J. E. EVANS)

Supervision of well completion for production test and drilling and completion of disposal wells. Supervision of field supervisors on completions and drilling operations.

FIELD SUPERVISORS

On-site rig supervision on re-entry, clean out, completions and disposal well drilling and completion.

GEOLOGICAL MANAGER (KIM PETERSON)

Supervision of geologists monitoring candidate wells, mapping areas of interest, discussion of plans with operator/leaseholder, supervise pre-evaluation and submittal of preliminary request for approval for candidate wells and assist in final evaluation and plan to D.O.E. for approval.

GEOLOGIST - LOUISIANA (MEG DILLAHUNTY)

Monitor progress of candidate wells in Louisiana, map areas of interest, determine if wells are suitable for evaluation, pre-evaluation work and preparation of recommendation to D.O.E.

GEOLOGIST - TEXAS (KIM PETERSON)

Monitor progress of candidate wells in Texas, map areas of interest, determine if wells are suitable for evaluation, pre-evaluation work and preparation of recommendation to D.O.E.

MANAGER INDUSTRY RELATIONS (DOUG GRAHAM)

Supervision of all information and reports pertaining to candidate wells, monthly progress and annual summations for submittal to D.O.E. Supervision of initial and follow-up contacts with operators and landowners and assist in agreement negotiations for both parties.

FINANCE AND COST ACCOUNTING (G. E. FREY)

Overall responsibility for accounting, finance, purchasing, contract compliance and administrative.

PURCHASING MANAGER CONTROL (DOUG GRAHAM)

Directs all purchasing, subcontracting and material control activity consistent with approved purchasing and inventory control procedures. He supervises the preparation of RFP and RFQ's, evaluation of bids and award of contracts and purchase orders. Additionally, he will monitor and report on his effort to implement the flow-down provisions of the contract to the subcontractor and vendors.

COST ACCOUNTING

Responsible for preparation of estimate for each well, as well as reporting actual expenditures and variance on each well.

RESERVOIR ENGINEER (DON CLARK)

Analyze flow test results and reservoir performance and assist in production test and reporting.

RESERVOIR ENGINEER (DANIEL AKPANUMOH)

Assist Don Clark in analyzing reservoir performance, flow test results and report writing. Assist EOC geologists in monitoring and evaluation of candidate wells and preliminary reports and recommendations.

DIRECTOR IGT (PHIL RANDOLPH)

Overall supervision of IGT personnel and operations.

WEATHERLY ENGINEERING TESTING (A..MORALES)

Supervision of production equipment hook up and equipment operation and data gathering personnel.

WIRELINE OPERATION

Supervision of wireline equipment and operating personnel.

CHEMICAL TREATING (J. MATSON, M. THOMSON)

Monitoring of scale and corrosion inhibitor requirements.

EATON OPERATING COMPANY, INC.
OPERATING COST CODES

01 Engineering & Management Labor
Home Office Labor directly associated with project.

02 Field Labor
Drilling Engineers, Drilling Suptn., Mud Engineers, and Dispatchers working on project in the field.

03 Payroll Burden
All taxes, insurance and fringe benefits in which calculation based on labor cost on project.

04 Travel
Air travel, car rentals, mileage reimbursement, meals, lodging and per diem compensation.

05 Automobile Expense
Auto lease, gasoline, oil, tires, maintenance, repairs, insurance, licenses and auto allowance.

06 Communications Expense
Internal telephone, in-house telecopier, telex, etc.

07 Office Copying
Charge for xerox rental and copies prepared by office employees.

08 Outside Reproduction
Charges for reproduction of documents or special printing of forms or photocopy of charts, graphs, maps, etc.

09 Site Preparation
Includes all clearing of road and access cost, road materials including board road material, maintenance of site including equipment and labor for site work. Clean up cost and land owner settlement in lieu of clean up.

10 Drilling Expense
Rig mobilization, day rate billing, stand-by or force majeure and demobilization.

11 Tangible Cost
Casing, tubing, well-head equipment, packers, tublar nipples, tie back sleeves and related repairs to this equipment.

Operating Cost Codes Continued -

12 Expendables
Water, fuel, mud and chemicals, bits and reamers, corrosive inhibitors.

13 Cementing
Cement pumping, mileage, labor and stand-by costs, cementing shoes, centralizers and all related costs.

14 Perforating, Acidizing, & Treating (completion of well)
Completion operations such as inside casing logging, coring service, testing, acidizing and fracturing, etc.

15 Equipment and Tool Rental
Includes - surface equipment, downhole drilling equipment, completion equipment.

16 Contract Services
Includes drive pipe, conductor casing, surface casing, intermediate casing, production casing, liner casing, mud logger tubing make up and wireline work.

17 Freight & Transportation
Cost of moving various materials to and from the site - right of way permits, overage load charges, tools for road bridges and tunnels - (Mobilization and demobilization of the rigs should be charged to drilling)

18 Other
Includes utilities, infield living quarters, trailer house, etc., and other miscellaneous direct costs.

19 Insurance
General Liability, well control and loss of revenue insurance directly related to a specific well.

20 Legal Fees & Consultant Costs
Cost of consultants charges including expenses. Retainer fee also included for consultants involved in project - legal fees directly associated with and performed on project.

21 Land Use and Owners Equity
Lease and bonus payment to land owners for lease option and payment to operator for equipment left on the well.

Operating Cost Codes Continued -

22 Office Supplies
Supplies needed for office, such as books, etc.

23 Rent Expense
Monthly rental at 3100 Edloe

24 Testing
Includes surface equipment and pressure vessels, pipe, fittings, wireline service for testing, labor for hooking up permanent materials, sub-contract cost for collecting, sampling and analysis work.

COST MANAGEMENT WEEKLY REPORT

U.S. DEPARTMENT OF ENERGY
CONTRACT NO.
DE-AC08-80ET27081

EATON OPERATING COMPANY, INC.

WELL NAME Frank Godchaux #1

WEEK ENDING:

TABLE 5-1
WEEKLY COST REPORT

CATEGORY (COSTS ARE IN $1,000's)	ESTIMATED COST	CURRENT COST	COST TO COMPLETE	OVER-RUN COST (UNDER-RUN COST)
1.0 MANAGEMENT & TECHNICAL SUPPORT				
1.1 OFFICE MANAGEMENT, OVERHEAD, G&A	3,995			
1.2 ENGINEERING & TECHNICAL SUPPORT, I&T, J.O.C.	1,508			
TOTAL MANAGEMENT & TECHNICAL SUPPORT	5,503			
2.0 TEST WELL DRILLING & COMPLETION				
2.1 SITE PREPARATION & MAINTENANCE, UTILITIES	210			
2.2 DRILL RIG, FUEL, MOVING	279			
2.3 TUBULARS, CSG CREWS, INSPECTION, CENTRALIZERS	668			
2.4 CEMENTING OPERATIONS, FLOATS	77			
2.5 DRILLING FLUIDS (MUD), MUD ENGINEER	50			
2.6 CORING	-			
2.7 LOGGING, OPEN HOLE & CASED HOLE	33			
2.8 DRILL BITS	1			
2.9 RENTALS, TRAILERS, GENERATORS	141			
2.10 COMPLETION, PERF., ACID, X-MAS TREE, PACKERS	196			
2.11 FISHING OPERATIONS, COST OF LOST EQUIPMENT	-			
2.12 TRANSPORTATION	25			
2.13 SITE MANAGEMENT & SUPERVISION	28			
TOTAL TEST WELL DRILL & COMPLETION	1,708			
3.0 DISPOSAL WELL DRILLING & COMPLETION				
3.1 SITE PREPARATION, UTILITIES	36			
3.2 DRILL RIG, FUEL, MOVING	103			
3.3 TUBULARS, CSG CREWS, INSPECTION, CENTRALIZERS	96			
3.4 CEMENTING OPERATIONS, FLOATS	24			
3.5 DRILLING FLUIDS (MUD) MUD ENGINEER	18			
3.6 CORING	-			
3.7 LOGGING, OPEN HOLE & CASED HOLE	22			
3.8 DRILL BITS	3			
3.9 RENTALS, TRAILERS, GENERATORS	32			
3.10 COMPLETION, PERF., ACID, X-MAS TREE, PACKERS	39			
3.11 FISHING OPERATIONS, COST OF LOST EQUIPMENT	-			
3.12 TRANSPORTATION	13			
3.13 SITE MANAGEMENT & SUPERVISION	15			
TOTAL DISPOSAL WELL DRILL & COMPLETION	401			
4.0 TESTING				
4.1 TEST FACILITY PLANS & ENGINEERING	-			
4.2 TEST EQUIPMENT, VESSELS, VALVES, PIPE	56			
4.3 SITE CONSTRUCTION, TRANSPORTATION, STORAGE	88			
4.4 TEST ANALYSIS	-			
4.5 DOWNHOLE & SURFACE INSTRUMENTATION	58			
4.6 TEST WELL MAINTENANCE & TREATMENT	-			
4.7 DISPOSAL WELL MAINTENANCE & TREATMENT	-			
4.8 TEST FACILITY MAINTENANCE & REPAIR	75			
4.9 GAS SALE ASSOCIATED COSTS	-			
4.10 SITE MANAGEMENT & SUPERVISION	20			
TOTAL TESTING	297			
5.0 SITE DISPOSITION				
5.1 EQUIPMENT DISASSEMBLY & DISPOSAL	-			
5.2 TRANSPORTATION	17			
5.3 PLUG & ABANDON TEST WELL	215			
5.4 PLUG & ABANDON DISPOSAL WELL	6			
5.5 SITE RESTORATION, CLEAN-UP & DISPOSITION	57			
TOTAL SITE DISPOSITION	295			
TOTAL PROJECT CATAGORY 2.0 THRU 5.0	2,701			
TOTAL CONTRACT INCLUDES ALL COSTS	18,165			

NOTE: ALL COSTS ARE ESTIMATES ONLY. EATON ACCOUNTING AND COMPUTER RECORDS WILL NOT NECESSARILY AGREE WITH SUB CATAGORY COSTS.

6.0 DELIVERABLES

Eaton will provide daily progress reports by telecopier to D.O.E. offices in Washington, Las Vegas, and Houston.

Eaton business office will provide weekly, bi-weekly, and monthly manpower and financial reports.

Eaton will prepare monthly technical reports which will provide preliminary interpretive data.

Eaton personnel will deliver talks or papers to industry or technical gatherings as appropriate.

Eaton personnel will interface with state and federal agencies other than D.O.E., including but not limited to the Environmental Protection Agency, Louisiana State University, Louisiana Department of Natural Resources, and the Bureau of Economic Geology at The University of Texas.

Eaton will furnish a final report summarizing all well and test activity and giving results of all engineering calculations on fluid flow, chemical and physical composition, fluids, reservoir behavior, reservoir boundaries, and all other chemical or physical data.

7.0 LOCATION AND FACILITIES

7.1 Site Layout

The present site layout is illustrated on Figure 7-1. A reserve pit is located as shown. The existing site is adequate for drilling a disposal well. A drainage ditch will surround the location to trap waste oil and grease which will then be disposed of so that no oil spill will contaminate the area. Prior to installing test equipment, the site will be covered with boards or gravel depending on availability and cost.

7.2 Living Quarters

Air conditioned living facilities will be provided for six individuals. This will be in addition to the rig contractors living facilities. Septic tanks will be installed for proper sanitation. The EOC house trailers will remain on location as long as necessary.

7.3 Water Supply

A water supply well will provide water for preparing drilling fluids, mixing cement and as engine coolant. Water for drinking and bathing will be brought to the site and stored in sanitary tanks. A local water supply company will provide the drinking water.

7.4 Communications and Power

A radiotelephone system will be installed on location with appropriate extensions in all living quarters.

TEST SITE LOCATION LAYOUT

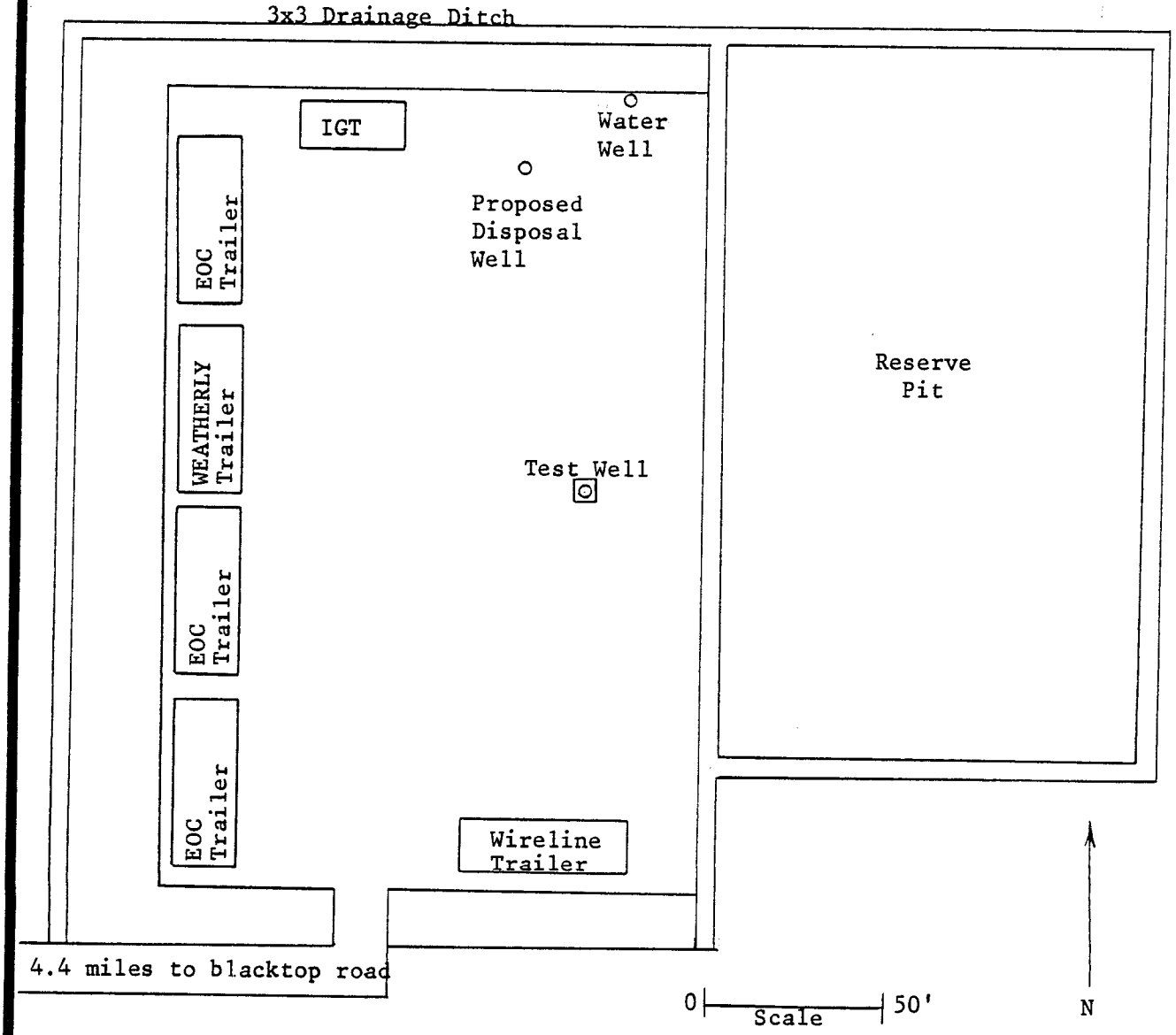


FIGURE 7-1

A power line will be extended to bring electric power from a nearby commercial source. Rental generators will be used, if necessary.

7.5 Site Cleanup and Restoration

At the termination of the test, all test equipment will be removed. A workover rig will be moved in to salvage the tubulars and to plug and abandon the test well and the disposal well in accordance with the rules of the Louisiana Office of Conservation. The workover rig will then be released. The reserve pit will be filled in, the boards removed and the site restored to the satisfaction of all concerned parties.

8.0 RE-ENTRY AND COMPLETION OPERATIONS - TEST WELL

8.1 Rig Selection

The contractor to be selected for the proposed re-entry and completion work will be chosen on the basis of experience, equipment, competitive price and availability. Consideration of the ability to supply a rig to meet the specified requirements and to furnish qualified personnel will be a primary factor in the selection. Each available rig will be inspected and a review of its past performance will be made by EOC before finalizing a contract.

The minimum requirements for the rig will be as described below:

A. Derrick Hookload Capacity: 700,000 lbs.

B. Power Available For Drawworks: 1,100 HP

C. Main Pumps: One 1,000 HP Mud Pump and One 800 HP Mud Pump

D. Rotary: 20-1/2 Inches

E. Substructure Height: 19 Feet

F. Drill Pipe: 10,000' of 4-1/2" 16.6#/Ft. Grade E
Other drill pipe will have to be rented.

G. Mud System: 500 Barrel capacity with steel tanks, mud mixing pumps and agitators.

H. Blowout Preventor (BOP) System:

1. Two Ram Type 5,000 PSI WP with Extra Rams
2. One Bag Type 5,000 PSI WP with Extra Bag
3. Kill Manifold with Power Operated Choke and Adjustable Choke

4. BOP Closing Unit with ability to close in 15 seconds. Sufficient capacity must be available to close, open and close again BOP and one ram BOP.

5. Two Station Closure for BOPs.

Note:

Extra rams and extra bag would be rented.

I. Accessories:

1. One air conditioned bunk house.
2. Two diesel electric generators.
3. Two lower kelly cock safety valves and one inside blowout preventer safety valve. These items may have to be rented.
4. Any other items EOC may consider necessary for a complete rig.

8.2 Drilling and Completion Fluids

The well was drilled to a total depth of 16,000' with a 17.8 ppg water based lignosulfonate mud. A 17.8 ppg water based lignosulfonate mud will be used for completion of this well. Excess mud will be stored on location when it is not in use.

8.3 Tubular Goods and Cementing Design

Figure 8-1 is a schematic diagram of the test well in its present condition. C & K Petroleum drilled the well to a total depth of 16,000'. The last string of pipe set in the well was 7-5/8" liner set at 12,387'. The company set a cement retainer at 13,278' and placed cement from 13,148' to

C & K FRANK GODCHAUX III WELL NO. 1

PRESENT CONDITION

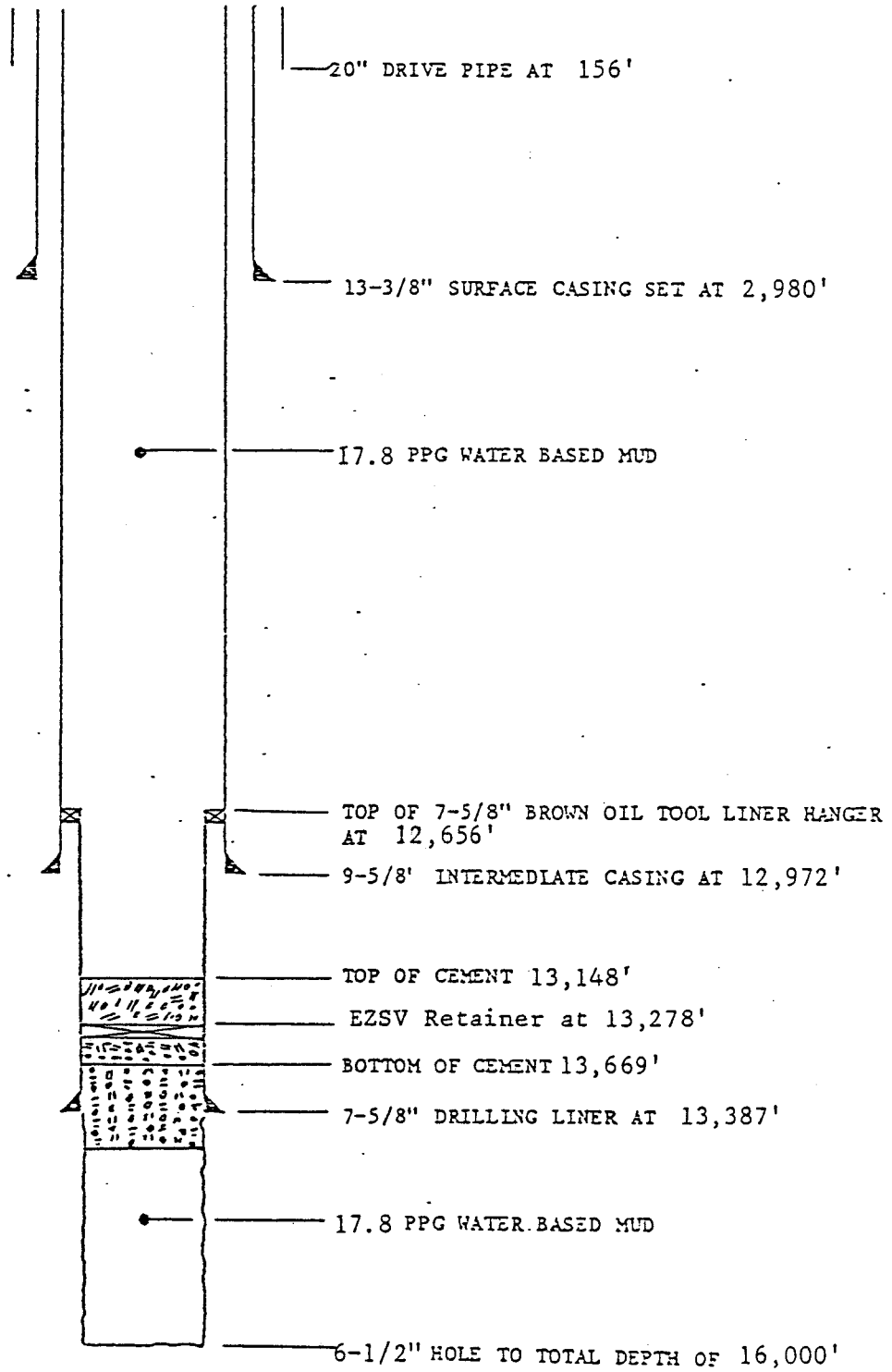


FIGURE 8-1

13,669'. A blind flange was installed on the intermediate casing head and the drilling rig was moved off location.

Figure 8-2 is a schematic diagram of the proposed test well completion. A string of 5-1/2" casing will be set at 16,000' and cemented back to 12,000 feet. A 2-3/8" tubing string will be run in the well to serve as protection for wireline instruments and as a kill string. Annular flow of fluids is planned for this test.

The designs for all tubular goods used in completing this well are based on the "maximum load" concept widely used in the oil and gas industry. The casing burst design criteria require the casing to withstand a surface pressure in excess of 7,000 psi when filled with formation salt water. The casing collapse design criteria assume that the highest collapse loading will occur when the casing is full of salt water and the surface pressure is zero. The buoyancy of the mud at the time of casing setting is incorporated into the tension design criteria. Figures 8-3, 8-4 and 8-5 are graphical illustrations of the casing design curves.

During testing, the temperature increase of the 5-1/2" casing will result in an increase in length of about 9' and a reduction in the wellhead weight load of 133,000 pounds. This temperature effect can be calculated as follows.

C & K FRANK GODCHAUX III WELL NO. 1

PROPOSED TESTING CONDITION

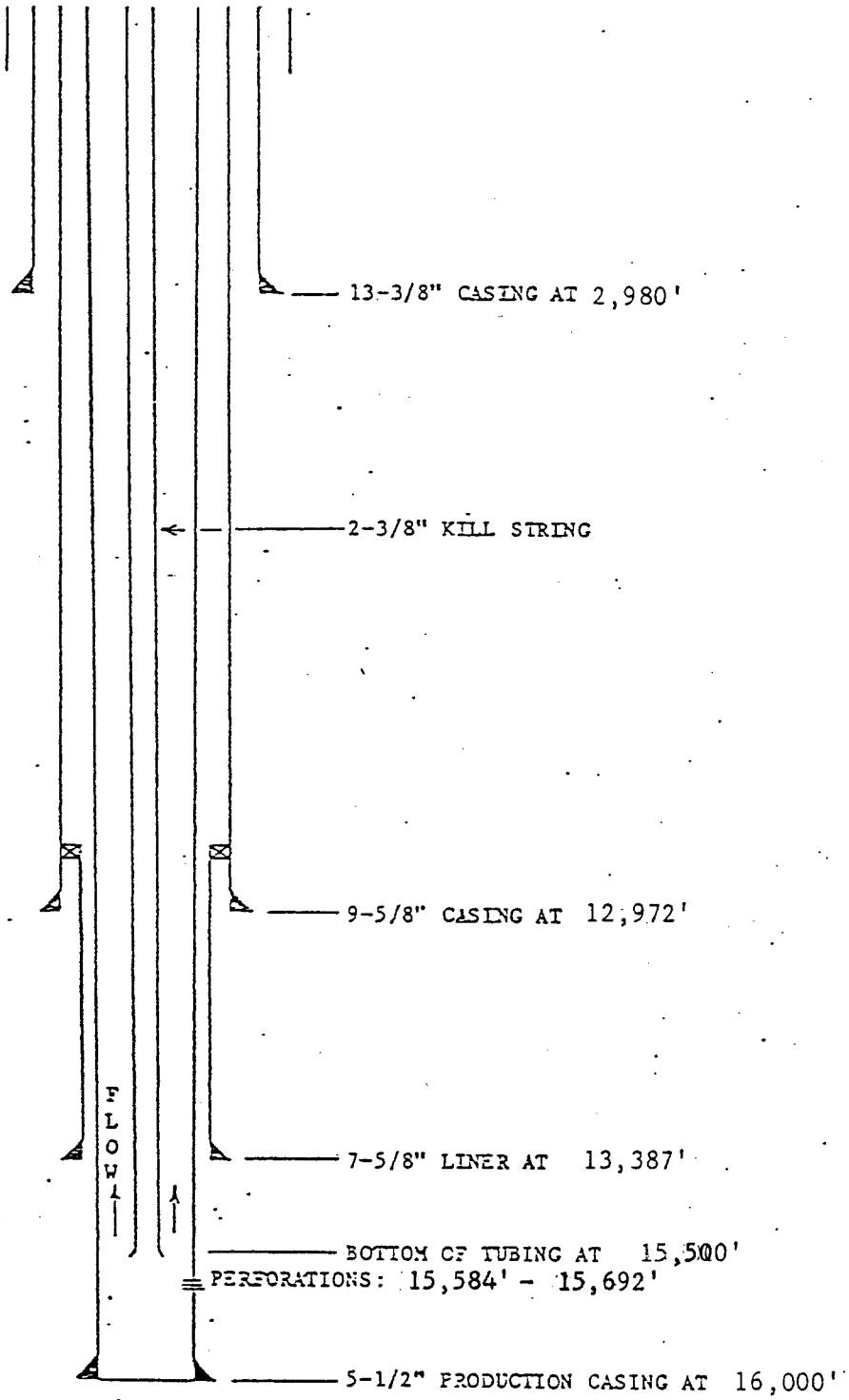


FIGURE 8-2

The temperature calculations are shown below:

Assume surface temperature is $70^{\circ}F$.

Bottom hole temperature is 298° at 15,640'.

Assume surface temperature is 250° during flow.

Assume cement top is at 12,000'.

Assume temperature of uncemented portion of casing before flow is:

$$(298^{\circ} - 70^{\circ}) \div 15{,}640 \times \frac{12{,}000}{2} + 70^{\circ} = 157^{\circ}$$

Average temperature of uncemented portion of casing during flow is:

$$(298^{\circ} - 250^{\circ}) \div 15{,}640 \times \frac{12{,}000}{2} + 250^{\circ} = 268^{\circ}$$

$$\Delta t = 268^{\circ} - 157^{\circ} = 111^{\circ}$$

Change in length of 5-1/2" casing due to temperature is:

$$L_t = LB\Delta t = 12{,}000 \times .0000069 \times 111^{\circ} = 9.2'$$

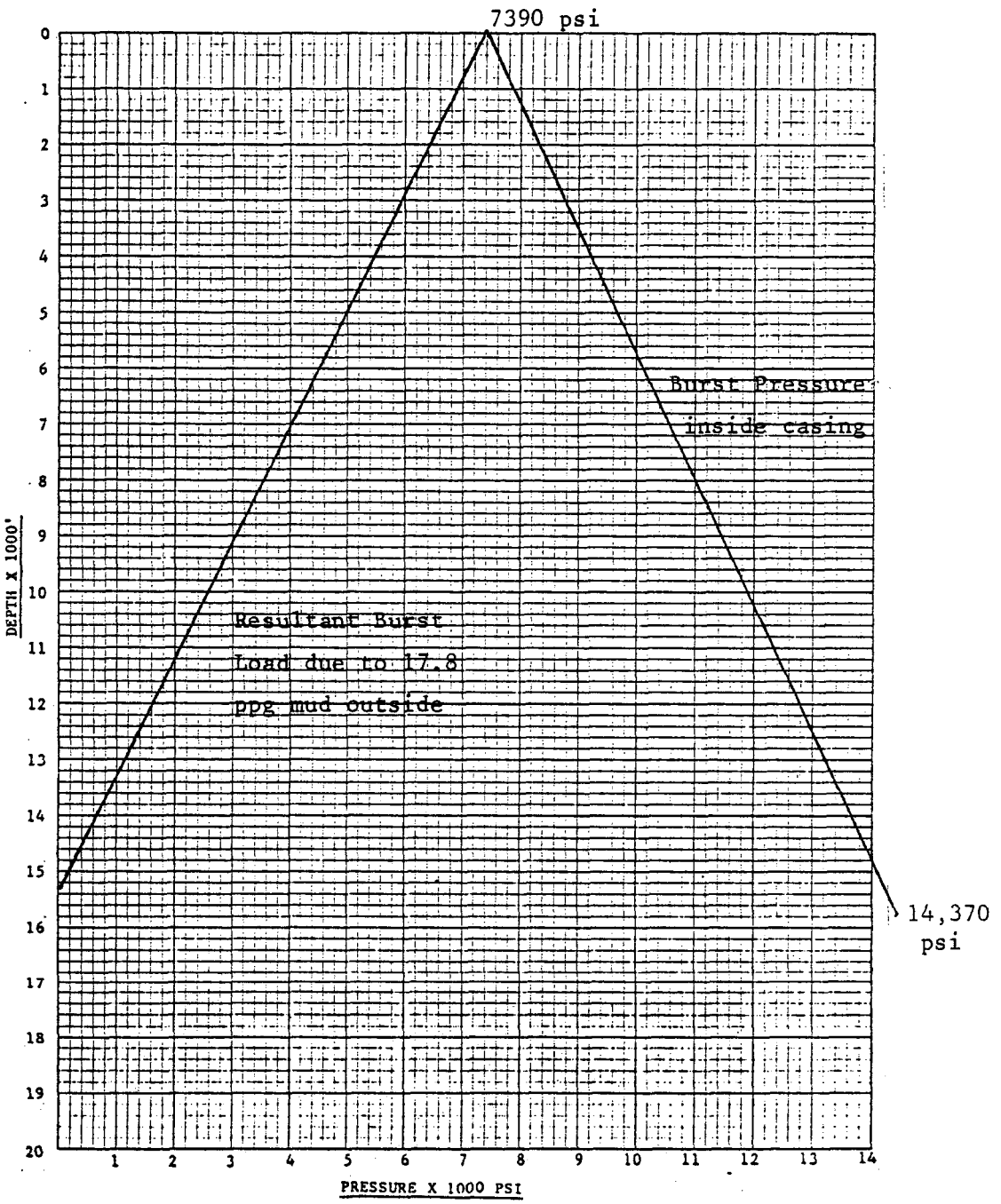
Change in wellhead load due to temperature is:

Average weight of casing above 12,000' is 20#/ft.

From equation on Cox nomograph wellhead load is:

$$W_2 = -59.8\ W\Delta t = (-59.8)(20)(111) = -133{,}000 \text{ lbs.}$$

GODCHAUX WELL NO. 1

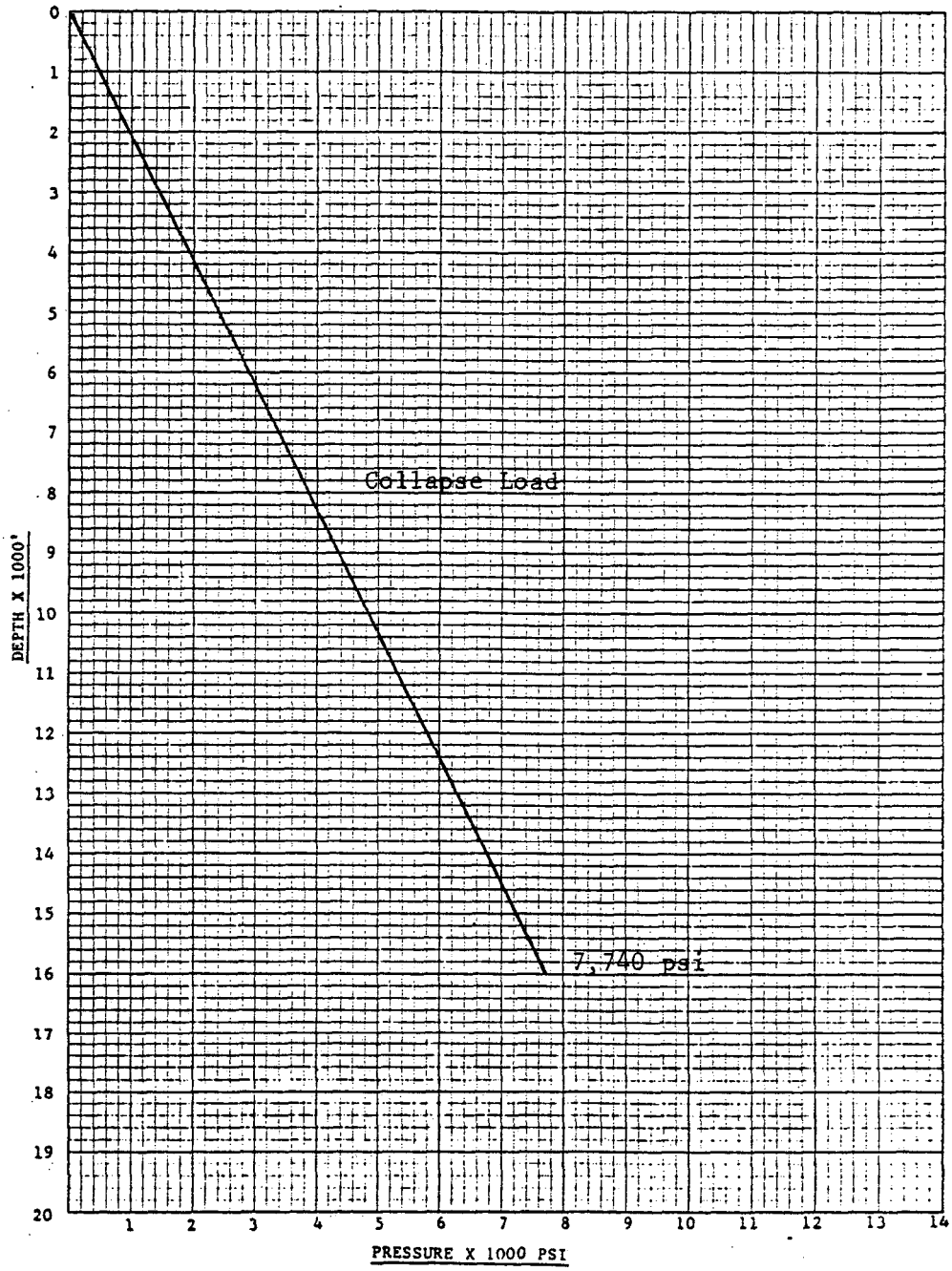


BURST CALCULATIONS: 5-1/2" Casing

Assume casing is set in 17.8 ppg mud and casing is full of 8.5 ppg salt water. Assume bottom hole pressure is equal to 17.5 ppg. Assume zone is at 15,790'. Maximum surface pressure = (17.5 - 8.5) x 0.052 x 15,790 = 7,390 psi.

FIGURE 8-3

GODCHAUX WELL NO. 1

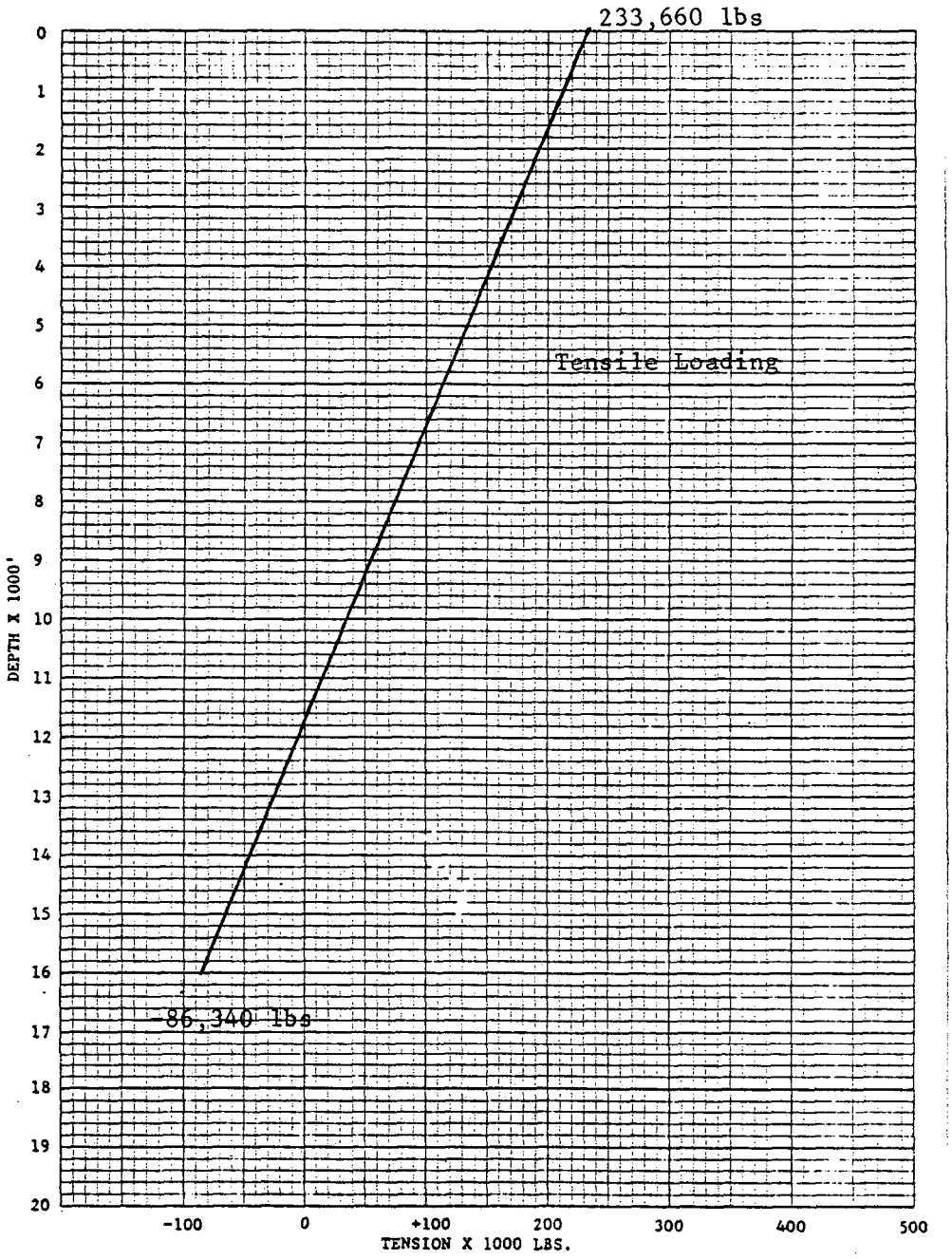


COLLAPSE CALCULATIONS: 5-1/2" Casing

Assume casing is set in 17.8 ppg mud and full of 8.5 ppg salt water with no surface pressure. Collapse load at 16,000' = (17.8 - 8.5) x 0.052 x 16,000 = 7,740 psi.

FIGURE 8-4

GODCHAUX WELL NO. 1



TENSION CALCULATIONS: 5-1/2" Casing

Buoyancy force = Hydrostatic pressure x cross sectional area. At 16,000'
BF = 17.8 x .052 x 16,000 x 5.83 = -86,340 lbs.
Tension at surface = (20 x 16,000) - 86,340 = 233,660 lbs.

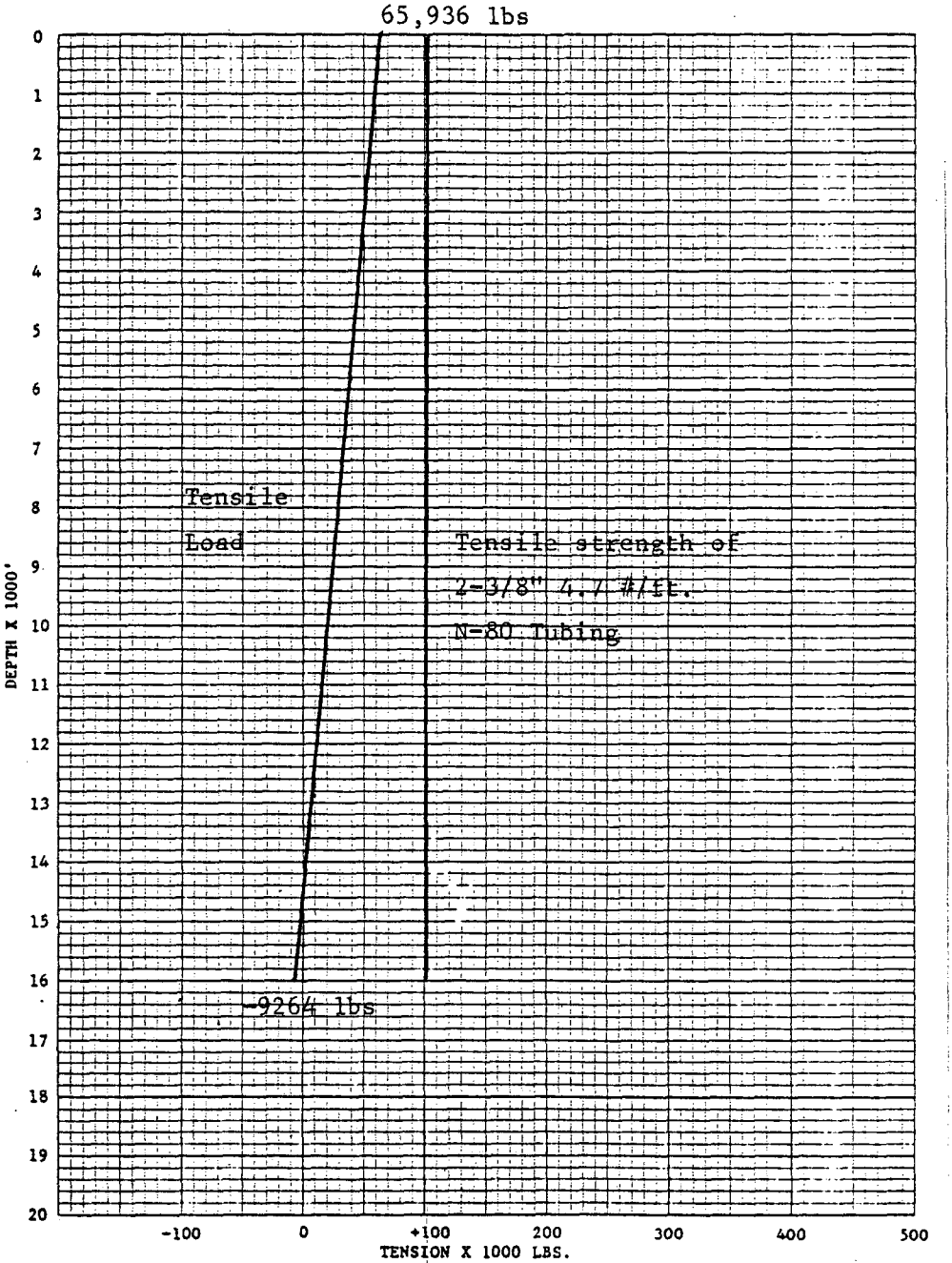
FIGURE 8-5

The 2-3/8" tubing will not be set on a packer because the well will be flowed up the annulus between the casing and the tubing. The burst and collapse pressures on the tubing will, therefore, not be significant because pressure forces inside and outside the tubing will be essentially the same. The tension design curve is based on the buoyancy of salt water as illustrated on Figure 8-6.

Table 1 shows the specifications for the tubular goods installed or planned for use in the test well, as well as hole size, auxiliary casing equipment, design safety factors and minimum test pressures.

There is a possibility that a leak may develop in the 5-1/2" casing resulting in pressure on the 9-5/8" intermediate casing. Figure 8-7 illustrates the burst loading that may occur on the 9-5/8" casing and indicates that the pipe would burst if the surface pressure was allowed to reach 4,400 psi. Pressure on the 9-5/8" casing will be controlled by installing a kill line on one outlet of the 9-5/8" casing head and a flow line to the pit on the other outlet of the casing head. Flow through the pit line will be controlled by a remote power operated Swaco choke.

GODCHAUX WELL NO. 1



TENSION CALCULATIONS: 2-3/8" Tubing

Buoyancy force = Hydrostatic pressure x cross sectional area. At 16,000' BF = 8.5 x .052 x 16,000 x 1.31 sq. in. = -9264 lbs.
Tension at top = (4.7 x 16,000) - 9,264 = 65,936 lbs.

FIGURE 8-6

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

TABLE 8-1
C & K - FRANK GODCHAUX, III, WELL NO. 1
TUBULAR GOODS SUMMARY

Tubular	O.D. Size (in.)	Depth From (Ft.)	Depth To (Ft.)	Weight lbs/Ft.	Minimum Drift (in.)	Casing Description Grade	Casing Description Thread	Casing Design Factors Burst	Casing Design Factors Collapse	Casing Design Factors Tension
Conductor Pipe	20	0	134	0.375 W.T.	-	-	-	-	-	-
Surface Casing	13-3/8	0	2,980	68.0	12.259	K-55	STC	*	*	*
Intermediate Casing	9-5/8	0	3,371	53.5	8.500	P-110	BUT	(1)	**	*
		3,371	8,108	47.0	8.525	N-80	BUT	(1)	**	*
		8,108	9,364	53.5	8.500	N-80	LTC	(1)	**	*
		9,364	10,948	53.5	8.500	P-110	LTC	(1)	**	*
		10,948	12,930	53.5	8.500	S-95	LTC	(1)	**	*
Drilling Liner	7-5/8	12,656	13,387	33.7	6.640	P-110	SFJ	(1)	**	*
Production Casing	5-1/2	0	7,000	20.0	4.653	P-110	LTC(MOD)	1.50	**	2.34
		7,000	12,000	20.0	4.653	S-95	LTC(MOD)	2.66	1.83	5.07
		12,000	16,000	20.0	4.653	P-110	FJP	**	1.43	**
Tubing	2-3/8	0	15,500	4.7	1.995	N-80	8RD	**	**	1.58

Casing	Size (in.)	O.D. Hole Size (in.)	CEMENTING SUMMARY
Surface	13-3/8	17-1/2	Cemented with 2330 sx. TLW + 3% salt and 500 sx. class H + 3% salt. Had cement returns to surface.
Intermediate	9-5/8	12-1/4	Cemented with 2575 sx., 12.0 ppg cement and 500 sx. class B, 16.2 ppg cement. Had pump failure. Squeezed shoe with cement several times.
Liner	7-5/8	8-1/2	Cemented with 150 sx. class H + 35% SF + 0.75% CFR-2 + 0.6% Halad 22-A + 0.10% HR-5. Tested liner lap with 3000 psi. Squeezed shoe with 462 sx.
Production	5-1/2	6-1/2	To be cemented from 16,000' to 12,000'. Cement to be determined.

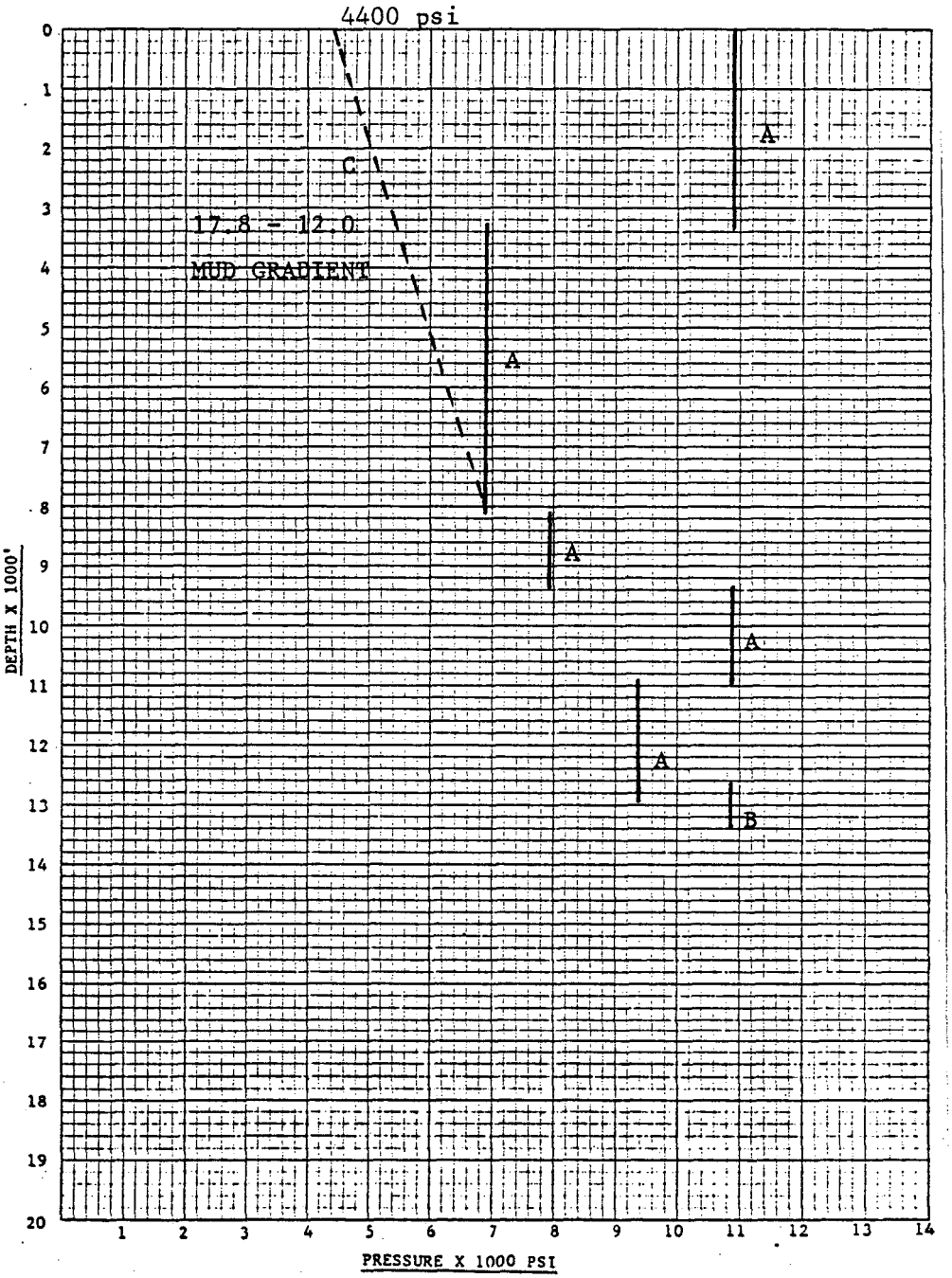
Note: All casing except 5-1/2" was cemented by operator. The 5-1/2" casing will be pressure tested to 1,500 psi with 17.8 mud and later to 7,500 psi with brine water.

* Tubulars in place and no longer exposed to well bore conditions.

** Safety factors very high.

(1) See discussion in Section 8.3

GODCHAUX WELL NO. 1



CASING BURST ANALYSIS: 9-5/8" Casing and 7-5/8" Liner

A. Burst strength of new 9-5/8" casing presently in hole.

B. Burst strength of new 7-5/8" liner presently in hole.

C. Maximum allowable burst load on 9-5/8" casing assuming 17.8 ppg mud inside and 12.0 ppg mud outside of pipe.

FIGURE 8-7

8.4 Recording Instruments

The rig will be equipped with the following items.

A. Pit level recorder.

B. Mud pimp pressure recording gauge.

C. Mud pump stroke counter and mud volume totalizer.

D. Mud return line activity recorder.

E. Gas detector with alarm.

F. Rotary table torque indicator.

G. Tong tubular makeup torque indicator.

8.5 Well Control

A typical program for hookup, test procedures and maintenance of blowout prevention equipment is outlined below. Routine blowout preventer drills will be conducted at specified intervals when out of the hole. There will also be unsheduled drills to check the reaction time of the crews and to keep them alert as to possible blowout conditions. A trip tank will be installed and monitored during critical operations. A power operated Swaco Super Choke will be installed as part of the main blowout preventer equipment.

A. Blowout Prevention Equipment - It is the policy of EOC to always have adequate blowout prevention equipment at each well location. The policy is also to have this equipment in first class operating condition with frequent testing required.

The following section lists the general requirements for the selection, use, and testing of blowout prevention systems to be used on all EOC wells while drilling.

1. Selection and Specification - will be given in the well program. Selection by the drilling engineer is based on the following:
   a. Burst rating of casing
   b. Test pressure of casing shoe
   c. Maximum possible surface pressure
2. Installation and Use - selection is the easy part, installation and use is what counts.
   a. Installation is the complete responsibility of drilling foreman.
   b. Installation should comply with the drawings and specifications detailed in this section.
   c. Use of the BOP equipment should consider the selection criteria above, especially (1) burst pressure and (2) shoe pressure.
3. Classification - Two preferred systems can be used on this well.
   a. High Pressure
      1. one hydril "GK", 5000 psi or equivalent.
      2. One blind ram type preventer, hydraulically operated.

TYPICAL BLOWOUT PREVENTER INSTALLATION

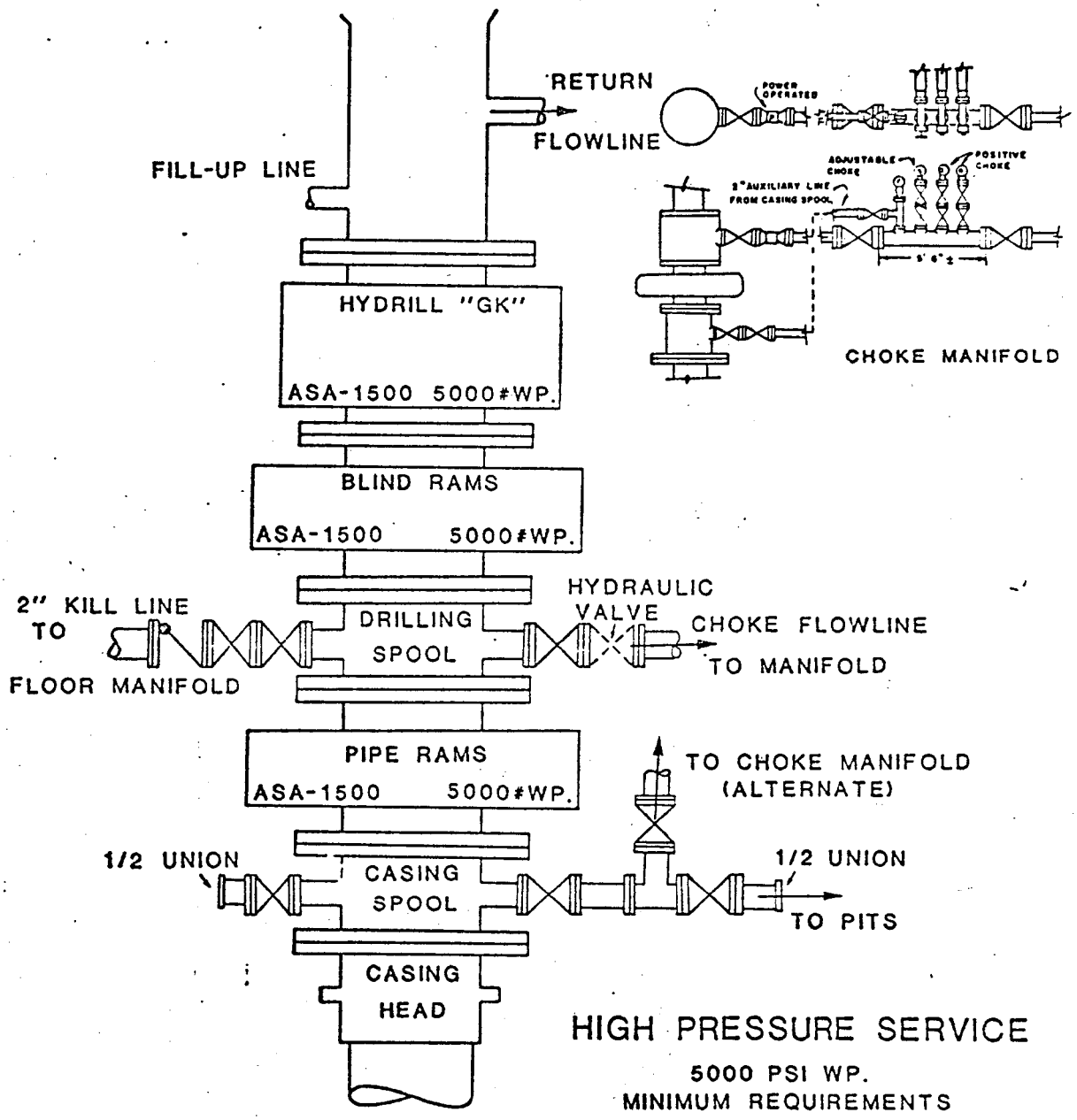


FIGURE 8-8

3. One drilling spool with choke and kill lines as indicated on Figure 8-8. Note dual gate valves on kill lines.

4. One pipe ram type preventer, hydraulically operated.

5. Nippled up on casing spool.

6. Alternate kill and relief lines may be connected to either the casing spool or to flanged outlets of bottom ram preventer.

7. Extra pipe or casing rams as needed.

8. Choke manifold as Figure 8-8.

b. Abnormal High Pressure

1. One hydril "GK" (either 5000 psi or 10,000 psi as noted in well program) or equivalent.

2. One pipe ram preventer, hydraulically operated.

3. One blind ram type preventer, hyraulically operated.

4. One drilling spool with choke and kill lines as indicated on Figure 8-9. Note dual gate valves on kill lines.

5. One pipe ram type preventer, hydraulically operated.

6. Nippled up on casing spool.

7. Alternate kill and relief line may be connected to either casing spool or to flanged outlets of bottom ram preventers.

8. Choke manifold as in Figure 8-9.

9. Extra pipe or casing rams as needed.

4. Auxiliary and Associated Equipment

a. Drilling Spools - shall be forged steel, full opening, with one 4-inch and one 2-inch flanged (or preferably studded) side outlets.

TYPICAL BLOWOUT INSTALLATION

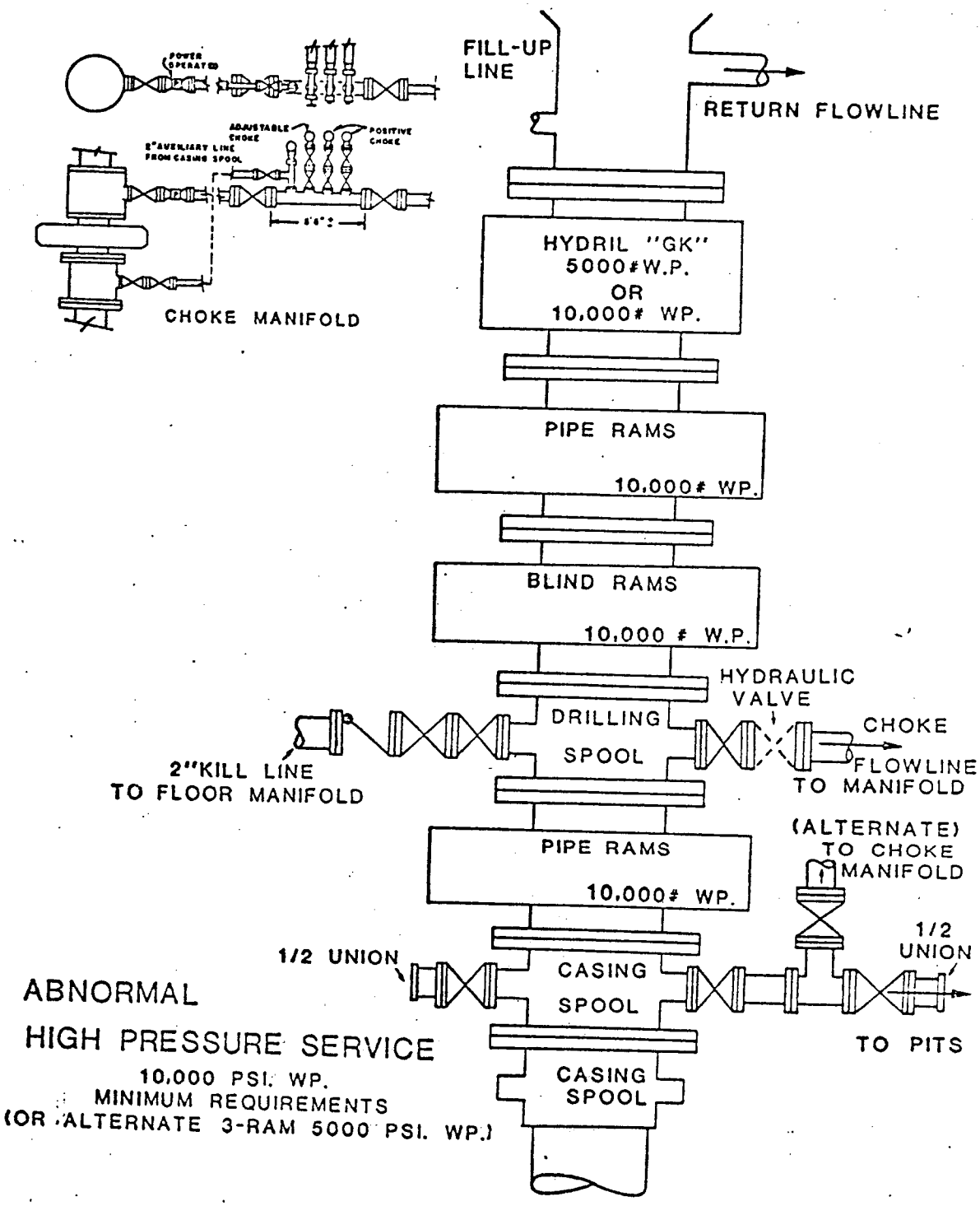


FIGURE 8-9

b. Choke and Kill Valves

1. All steel, flanged valves.
2. Valves should correspond in size to the flanged of the drilling spool.
3. No adapters to be used in nippling up valves.
4. Valves must be for both gas and fluid service, therefore valves with rubber seats are not approved.
5. Valves adjacent to spool should be kept open and only used for emergency.

c. Accumulator and Control Equipment

1. Koomey or Payne, 3000 psi W.P. with regulator valves to 1500 psi maximum for hydril and rams.
2. Capacity to close, open, and close again the hydril and one ram without recharging accumulator.
3. Both primary and alternate power sources to fluid pumps.
4. Compressors for air pumps must be a minimum of 100 feet from rig floor.

d. Control Piping -- steel piping with Chiksan joints or high pressure hoses (3000 psi W.P.) are acceptable.

e. BOP Control Station - two control stations clearly marked showing open and closed position for each BOP function and the pressure operated choke line valve.

1. One control station near driller, other station at safe distance from well.

2. Blind ram control to have easy to remove locking or protective cover system to prevent accidental operation.

f. Adapter Spools/Flanges - although sometimes necessary in connecting BOP's to the casing head, they are not desirable in that this would constitute another joint that might leak.

g. Choke Manifold - A preferred manifold is included in the drawing of each type BOP stack.

1. In an easily accessible location.
2. Working pressure equal or greater than BOP equipment.
3. Avoid stiff connections to wellhead.
4. Preferred choke flowline of 3-1/16" ID.
5. All right angle turns to be made of bull plugged tees or crosses where flow direction is change.
6. Pressure sensor for hydraulic adjustable choke should be near wellhead.

h. Upper Kelly Cock - (left-hand Kelly Cock) on top of Kelly. Requires frequent greasing and testing.

i. Lower Kelly Cock - (right-hand Kelly Cock) - two (2) hydril type lower Kelly Cocks for each size of drill pipe in hole shall be on the rig.

j. Test Sub - for testing the Kelly cocks from the bottom side shall be on the rig floor.

k. Kelly Saver Sub - installed below Kelly with a proper size rubber casing protection.

l. Cross-over Subs - drill pipe box by drill collar pin, to use if kick occurs while handling collars.

m. Rotating Type Circulating Head - a 3" 5000 psi head with proper bottom subs for drill pipe.

n. Inside BOP - Gray, TIW, or Shaffer with proper subs should be at driller's console for immediate use.

5. Recommended Practices and Procedures

a. Screwed valves and fittings shall not be utilized in the BOP-Manifold system.

b. Kill line shall not be used for routine fill-up operations.

c. Casing head outlets shall not be used for choke or kill purposes except in emergency.

d. Pump through choke and kill lines on each trip.

e. Use hole cover when pipe is out of hole.

f. Open and close pipe rams each trip or daily.

g. Open and close kelly cocks each trip.

h. Check and record on IADC report accumulator pressure each tour.

i. Check hydril rubber position prior to running new bit.

j. Check for (1) kelly cock wrench, and (2) inside BOP at driller's console each tour.

k. Choke and kill valves immediately adjacent to spool or casing head should be kept in open position and only used in emergencies.

l. All valves should be equipped with handwheels and ready for immediate use.

m. Replace mud in choke and kill lines with anti-freeze during freezing conditions.

n. Casing rams will be installed for running 9-5/8" and smaller casing.

o. Casing and pipe rams will be installed in a 3-ram BOP prior to running a liner. If BOP is of the 2-ram type, rams to fit the liner will not be installed, but a drill pipe by casing swedge will be on the floor.

6. Testing Practices

a. Frequency - the entire BOP system including manifold, flow lines, kelly cocks, swivel standpipe, and rotary hose will be tested:

1. Upon initial installation
2. Each 7 days thereafter
3. Prior to drilling into a known abnormal pressure zone.

b. Test Pressure - all components of the BOP system with the exception of the hydril shall be tested to its full rated working pressure. The hydril (annular) preventer will be tested to 70% of its rated working pressure.

c. Plug-Type Tester - shall be used to test the BOP system and well head components.

1. Water shall be used for testing after having displaced the mud to a point just below the casing head or spool.
2. Open valve on spool below test plug to prevent pressurizing the casing should the plug leak.
3. Blind rams shall be tested by converting the plug to a blind plug and backing out the drill pipe. Note: Be sure valve or

spool side outlet is opened.

d. Test Sub - should be used to test kelly cocks, kelly and swivel from bottom side.

e. Casing - will be tested.

1. Prior to drilling out

2. Each 7 days after drilling out, utilizing a cup-type plug tester set at ± 150'

f. Test Procedures - BOP's, choke manifold, kelly cocks, swivel hose, and standpipe. The object is to test each valve and BOP ram in both the open and closed position. We not only want to know if the flanges on either side of a valve are good, but we need to know if the valve or ram will hold its rated working pressure when closed with atmospheric pressure on the other side.

Step 1. Drain mud from manifold, lines, and BOP's. Refill with fresh water.

Step 2. Pick up and run plug type tester and ported sub, open casing head valve or auxiliary valve below test plug. Open all valves (and HCR) from BOP to choke line and back to manifold. Close all chokes or outer valves leaving manifold. Close Hydril on drill pipe and pressure test entire stack, lines, and manifold to 70% of Hydril working pressure.

Step 3. Close uppermost pipe rams and open Hydril. Increase pressure to full working pressure of BOP. (Repeat test if stack has a second set of pipe rams.)

Step 4. Close manifold valve inside of choke and open choke. Re-pressure entire system to full working pressure.

Step 5. Close HCR valve, open manifold valve, and bleed pressure off manifold and lines. Re-pressure and test HCR valve.

Step 6. Close inside valve between stack and HCR valve. Open HCR valve. Pressure test inside valve. (If double valves are on any line, test each valve separately.)

Step 7. Test valve and check valve on kill line.

Step 8. Test valves on auxiliary choke line. Pull test plug.

Step 9. Pick up kelly with kelly cock in closed position. Test both upper and lower kelly cocks from underside.

Step 10. Open kelly cocks and close stand pipe valve. Test swivel, hose, and standpipe from underside.

Step 11. ONLY if casing shoe has not been drilled out. With nothing in the BOP, close the blind rams and pressure test below blinds to the lesser of either.

a. 80% of casing burst rating or

b. rated working pressure of BOP.

B. Kick Control and Blowout Prevention - Since the problem of blowouts and well kicks continues to be the most expensive problem one finds in drilling oil and gas wells, it is of great concern to EOC. For this reason, EOC requires that all drilling supervisors be familiar with EOC's preferred methods in killing a well kick.

1. EOC will use one of the following two methods in most killing operations.

   a. Driller's Method

      1. Circulate the kick with existing weight mud.

      2. Build kill weight mud.

      3. Circulate well with kill weight mud.

      4. Advantages:

         Easiest to perform.

         Allows time for building kill weight mud.

      5. Disadvantages:

         Results in highest surface pressures.

         Results in highest equivalent mud weight at casing seat.

         Requires several circulations.

   b. Wait and Weight Method

      1. Leave well shut in while building mud weight.

      2. Circulate well with kill weight mud.

      3. Advantages:

         Lowest surface pressures, and especially desirable with gas kicks.

         Removes kick and kills well in one circulation.

         Probably fastest overall method if not too long acquiring kill weight mud.

      4. Disadvantage:

         Most rigs don't have rig capacity to build a complete displacement volume at kill weight.

2. Suggestions for the Use of Pit Level Recording Instruments

a. Know total capacity of active mud system.

1. Indicator

a. Know how to use reference pointer. Always set reference pointer before making trip or circulating drilling break. Know what amount of mud is required to displace drill pipe and make sure this amount is indicated.

b. Indicator should be in front of driller, eye-level, and within arm's reach.

c. Know that recorder and indicator are recording and indicating same volume of mud.

d. Any changes in pit level or pen movement on indicator that occur, make sure same change occurs on recorder and make penciled notation on chart as to what the change represents, such as jetting pits, starting or stopping degasser, connection, etc.

2. Recorder

a. Know what each chart division represents.

b. Know how to set alarm. When coming on tour, make sure alarm is turned on and check to determine that the alarm span is close to present pit volume.

c. Determine what has caused any pit level change and note on the chart what has caused the change.

3. Transmitter

a. Make sure that no obstruction has been placed over floats that would prevent full travel (1-arm transmitter)

b. Keep floats on upright transmitters clean. Clean mud off of float and rings on the side of the float each tour. Check float movement by raising and lowering float each tour and always before making a trip. After moving floats, make sure an indication is noted on chart and indicator.

3. Suggestions for the Use of Flow Measuring Devices

a. Understand Flow Measuring Instruments and Their Components

1. Indicator

a. Know the circulating rate of the mud pump(s).

b. Understand the alarm settings.

c. Understand how to operate the pump stroke counter. Know how many pump strokes and the amount of mud to displace drill pipe.

d. Any changes in flow rate or pen movement on indicator that occur, make sure the same change occurs on recorder and make penciled notations on chart as to what the change represents.

2. Recorder

   a. Know what each chart division represents.

   b. Know how to set alarm. When coming on tour, make sure alarm is turned on and check to determine that the alarm span is close to present circulating rate.

3. Transmitters

   a. Make sure that no obstructions have lodged in the transmitter or under the "flapper".

   b. Make sure that all lines are connected to the transmitter.

   c. Understand any calibration procedures recommended by supplier.

Drilling foremen are to hold pit drills at least once weekly to train personnel to man their stations and do their jobs. This routine must be repeated until the crews can properly shut a well in with no more than a 10-barrel pit gain. Once the crews know what to do properly, repeat the drill for each crew once weekly. At least once each tour the mud pump should be slowed to half speed and the stand pipe pressure recorded as well as the SPM. This will be the low stroke drill pipe pressure used to circulate out a kick. CAUTION: Do not allow speed to overrule shutting the well in properly.

4. Shut-in Procedure

The following procedure for shutting in a kicking well can and will be used on all EOC wells. When a kick is detected, well is flowing, and pits are gaining mud, the following step-by-step procedure will be followed:

Step 1. Shut down mud pumps.

Step 2. Pick Kelly up out of rotary bushing.

Step 3. Open HCR valve and kill choke all the way open.

Step 4. Close Hydril (Later adjust pressure so that the well is under control but the drill pipe can be reciprocated with only a slight leak around drill pipe for lubrication.)

Step 5. Slowly close kill choke.

Step 6. Record:

a. Shut in drill pipe pressure

b. Shut in casing pressure

c. Pit volume gain

Step 7. If time permits, contact EOC's Houston office.

Step 8. Carefully select and plan the method of killing the well.

Step 9. Once the kill is started, the drilling supervisor is not to leave the choke controls.

5. Killing a Kicking Well

a. Immediately after a kick is detected and the well has been properly closed in, the following information should be known:

1. Depth of well (true vertical depth)
2. Mud weight when well kicked
3. Volume gained from kick
4. Shut-in casing pressure

b. Prior to the well kicking, the following should always be known and written down:

1. Casing data, especially the latest shoe test and 80% of maximum burst pressure.
2. Drill pipe data, size and capacity
3. Drill collars, size and capacity
4. Pump capacity, bbls/stroke, or strokes/bbl
5. Hole annular capacity around drill pipe
6. Low stroke constant circulating pressure (usually at 1/2 of drilling SPM)

Recording the above six pieces of information prior to a kick is considered a must by EOC.

With the preceding information, one can then carefully fill out the well kill work sheets and have the well kill planned properly.

8.6 Logging Program

A casing inspection log will be run on the 9-5/8" casing from 12,656' to the surface.

After the 5-1/2" casing is cemented in place, a gamma ray-cement bond log will be run from bottom to the top of the cement at about 12,000'.

8.7 Christmas Tree Design

Figure 8-10 is a line drawing of the proposed christmas tree. The fluids will flow up the casing-tubing annulus and will exit through two outlets in the tubing head. Two flow lines will be used to balance forces imposed on the tree and to reduce friction losses. The ends of the flow lines will tie together at the flow manifold as described in Section 11.

Figure 8-11 is a drawing of the 9-5/8" casing head showing the kill line and the flow line with choke control.

8.8 Friction Losses in Annulus

Figure 8-12 illustrates the calculated annular friction losses versus production rates for the test well. Friction losses should not significantly affect the flow capacity of the well in the 10,000 to 20,000 barrels of water per day range.

CHRISTMAS TREE SCHEMATIC

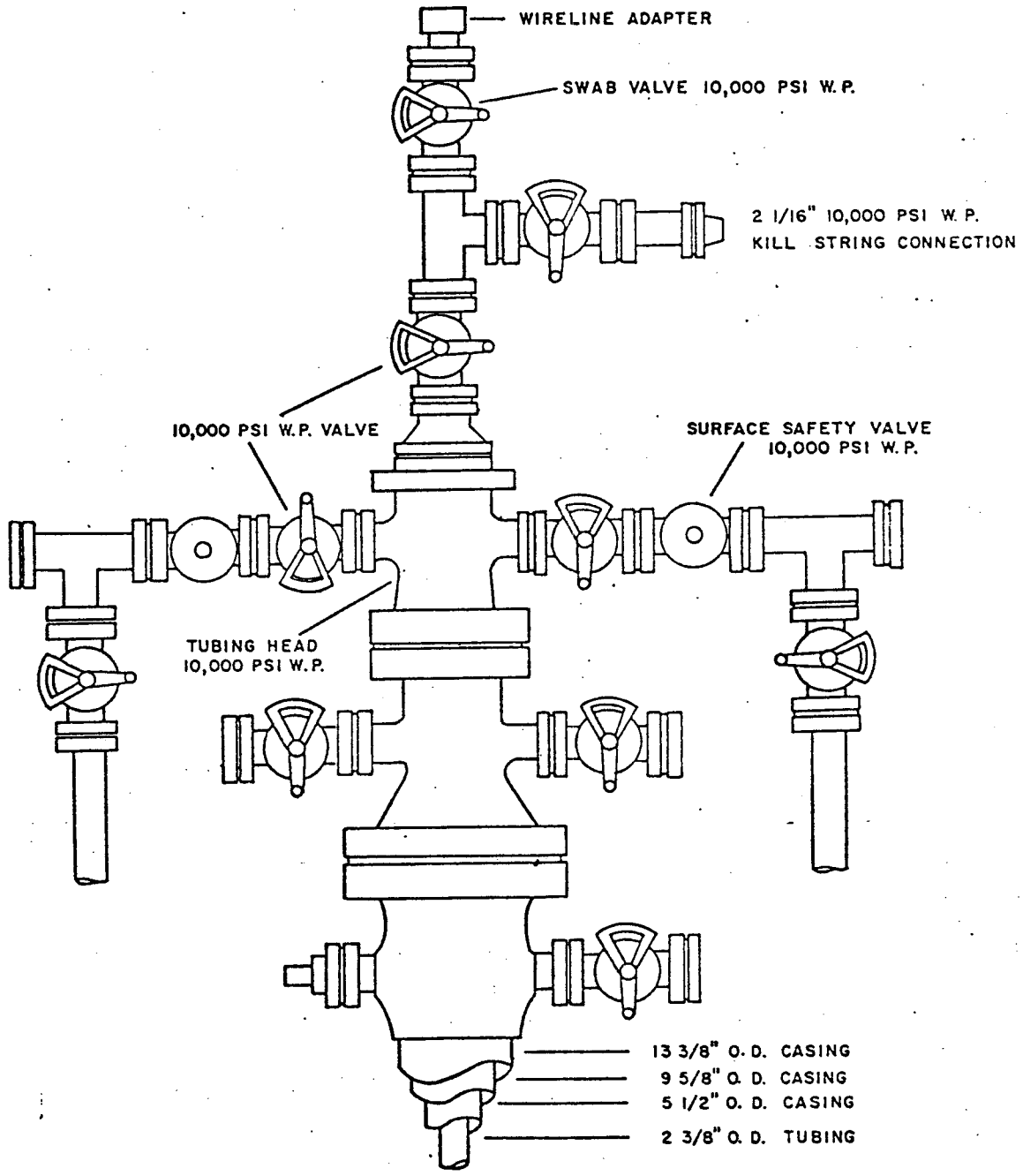
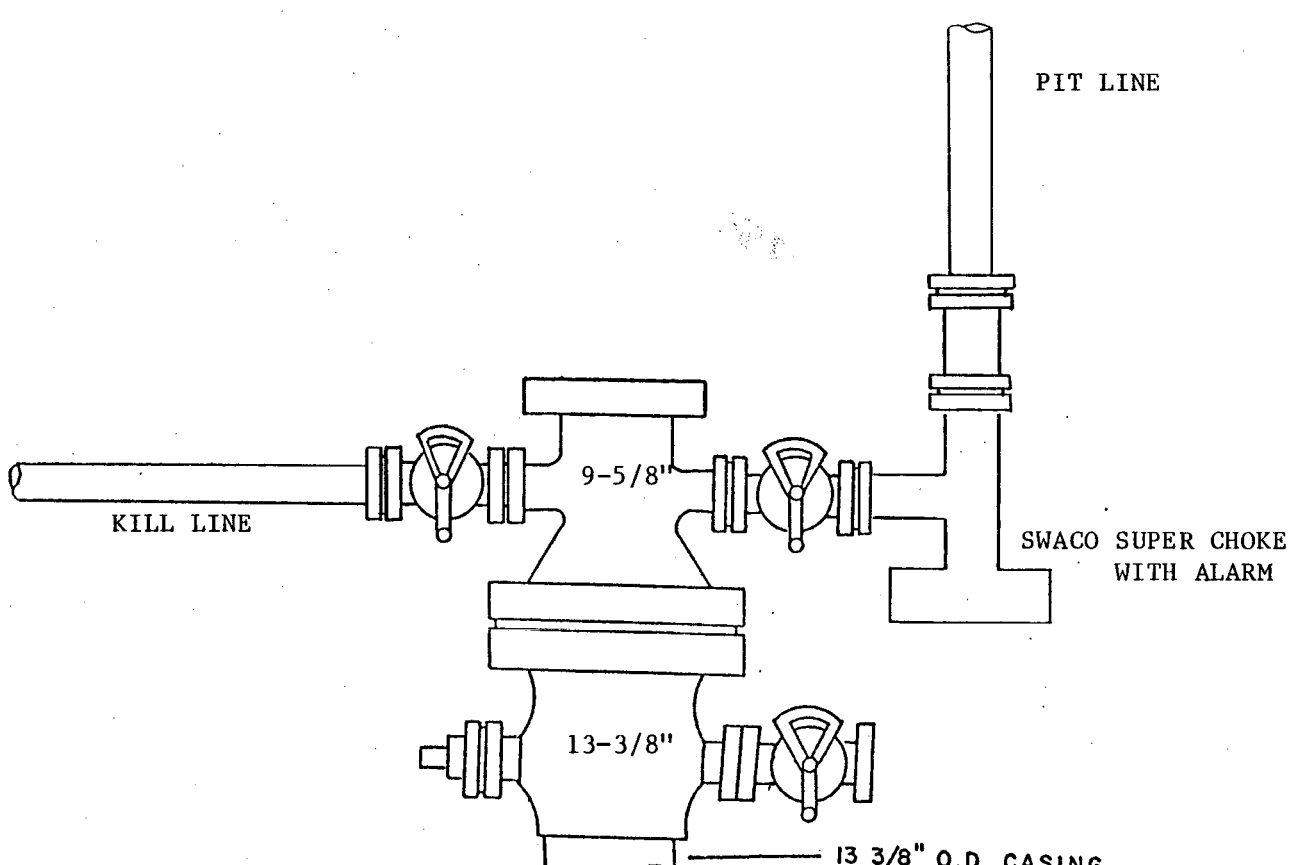


FIGURE 8-10

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764



PRESSURE CONTROL HOOKUP FOR 9-5/8" CASING

FIGURE 8-11

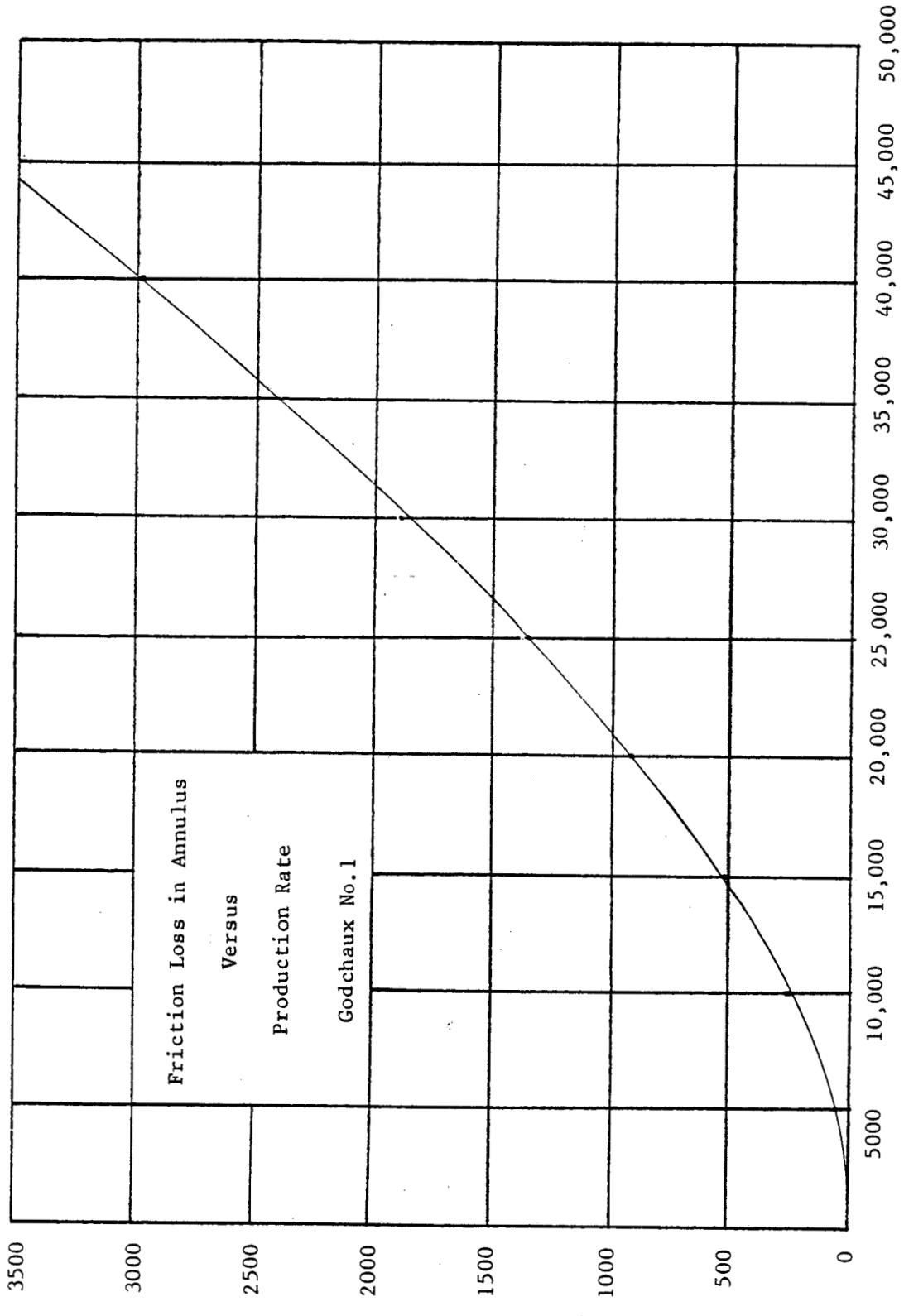


FIGURE 8-12

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

8.9 Bit Program

The general bit program for drilling the existing cement plug and cement retainer within the well and for entry into the open hole is as follows:

Pipe Size (O.D.)	Minimum Drift Diameter	Type Bit
7-5/8" Liner	6.640"	Rock Bit

8.10 Perforating

Perforating of the test zone will be accomplished with a 1-11/16" through-tubing jet perforating gun with eight shots per foot and zero degree phasing. This hollow carrier gun will provide the maximum possible penetration for the existing conditions considering the gun's size. The well will be perforated with the annulus completely filled with salt water and with sufficient surface pressure so that the differential pressure into the well bore will be about 2,000 psi. Perforating in a clean fluid will help minimize sand face damage and assist in obtaining maximum productivity.

8.11 Re-Entry and Completion Prognosis

The completion prognosis for the test well follows, and the estimated costs for the operations are included in Table 8-2.

Day No.	Procedure
1	Complete moving in rig and rigging up equipment. Start intalling blowout preventers. Install trip tank and pit volume totalizer system.

Day No.	Procedure
2	Finish installing blowout preventers. Test blowout preventers according to Eaton procedures.
3	Pick up bottom hole assembly consisting of 6-1/2" rock bit or cement mill, 18 4-3/4" drill collars with 3-1/2" IF connections, 4-3/4" DOT drilling jars, 5 4-3/4" drill collars, 7,500' of 3-1/2" IF, 13.30#/FT Grade E drill pipe followed by 8,000' of 3-1/2" IF, 13.30#/FT grade G-105 or S-135 drill pipe.
4	Finish picking up drilling assembly and drill pipe.
5	Circulate and condition mud at 13,148' (top of cement plug) to 17.8 ppg. Test casing to 1,000 psi, pull out of hole and run mechanical type casing inspection log from top of liner at 12,656' to surface.
6	Go in hole and drill cement from 13,148' to top of cement retainer at 13,278'. Drill up retainer and drill to about 13,665'.
7	After cement is drilled up, pull out of hole to pick up a new rock bit. Go in hole with new bit. Install 6-1/2" stabilizers at 60', 150', 240', 390' and 540' above bit. Go in hole to 16,000' washing and reaming as necessary.

Day No.	Procedure
8	Rig up lay down machine and extra work crew and pull out of hole laying down drill pipe. It is important that this operation be performed as quickly as possible.
9	Rig up casing and torque turn crew and run 5-1/2" casing as follows:

Depth	Type Pipe	Optimum Make-up Torque
0'- 7,000	20# P-110 LTC (MOD)	5,690 Ft.-lbs
7,000'-12,000'	20# S-95 LTC (MOD)	4,950 Ft.-lbs
12,000'-16,000'	20# P-110 FJ-P	4,500 Ft.-lbs

Install down jet float shoe on bottom followed by two joints of casing and then conventional float collar. Install Gemoco double-bow liner type centralizer on each joint from bottom to 14,500' and then on every third joint from 14,500' to 13,000' (total of 51). Install cable type wipers spaced 20' apart from 15,640' to 15,840' and from 14,850' to 15,050' (total of 20).

10	Cement casing with enough cement to bring top of cement to 12,000'. Reciprocate casing while cementing if possible.
11	Set 5-1/2" casing on slips with 234,000 lbs. plus block weight. No extra pull or slack off is planned.

Day No.	Procedure
12-13	Install tubing head on 5-1/2" casing. Install 10,000 psi working pressure blowout preventers and test them according to Eaton procedures. Run gamma ray-cement bond log from bottom to top of cement. Run bond after 48 hours of setting time and run bond under 1500 psi pressure.
14	Go in hole to bottom with 2-3/8" tubing. Displace 17.8 ppg mud with 9.0 ppg salt water. Install wireline guide on tubing.
15	Pull tubing up to 100' above proposed top of perforations. Install christmas tree.
16	Pressure test casing and christmas tree to 7,500 psi. Rig down equipment and begin to move out rig.
	After rig has been moved out, perforate well from 15,584 to 15,692 feet with 1-11/16" hollow carrier gun, 8 holes per foot. Pressure casing up to 5,900 psi prior to first perforating job. Estimated surface pressure with 9.0 ppg water is 6,900 psi.

TABLE 8-2
ESTIMATED COST TO RE-ENTER AND
COMPLETE TEST WELL
C&K - FRANK GODCHAUX, III, WELL NO.1

Accounting Code	Item	Original Estimate
02	Field Labor	$ 28,000
09	Site	89,000
10	Drilling	247,000
11	Tangibles	742,000
12	Expandables	109,000
13	Cementing	77,000
14	Perf., Acid	99,000
15	Equipment Rental	113,000
16	Contract Serv.	55,000
17	Freight & Trans.	25,000
18	Other	11,000
19	Insurance	33,000
20	Consultants	-0-
21	Land Use	110,000
24	Testing	-0-
	TOTAL	$1,738,000

DISPOSAL WELL

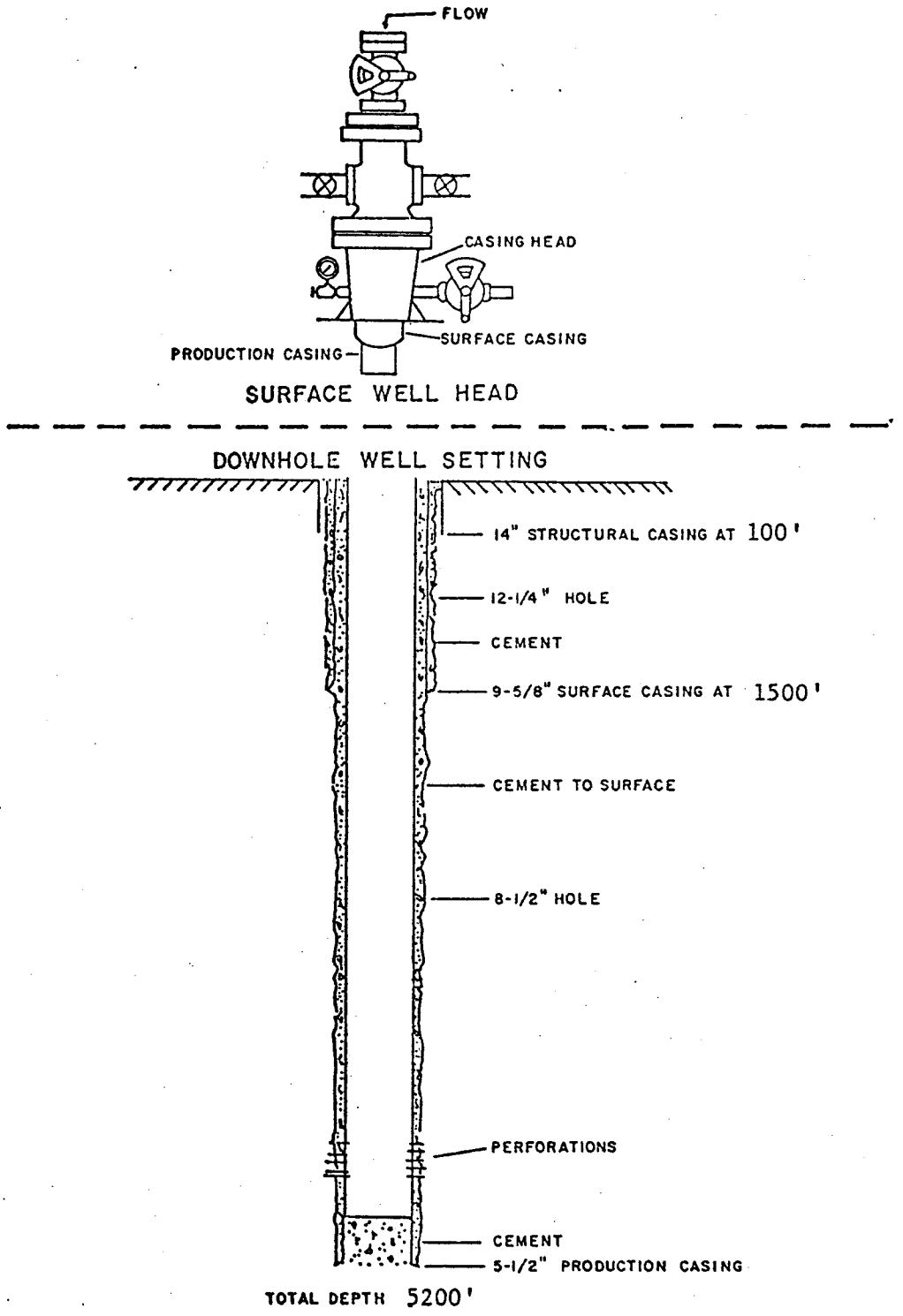


FIGURE 9-1

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO
DE-AC08-80ET-27081

Day No.	Procedure
2,3	Drill 12-1/4" hole to 1,500' with low solids mud and minimum mud weight. Run and cement 9-5/8", 36#/FT K-55 LTC casing at 1,500'. Cement casing with 1,000 cubic feet of light weight cement and 300 sacks of Class H neat cement. Use downjet float shoe and conventional float collar two joints up from shoe. Space out 5 centralizers on the bottom 3 joints. Should cement not circulate to surface, perform top job using small tubing at 100'. Hold full tension on 9-5/8" casing until cement sets.
4	Remove diverter, install 9-5/8" x 2,000 psi casing head with base plate resting firmly on 14" structural casing. Install double ram type and annular blowout preventer.
5,6,7,8	Drill 8-1/2" hole to 4,600'.
9	Run induction, gamma-ray, density log with caliper from total depth back to 9-5/8" casing shoe. Evaluate proposed interval for injection. Obtain concurrence of Louisiana Office of Conservation.
10	Run and cement 5-1/2", 15.5#/FT, K-55, LTC casing. Cement casing with 2,000 cubic feet of light cement and 500 sacks of Class H neat cement. Use downjet float shoe and conventional float collar 2 joints up from shoe. Space out 4

Day No.	Procedure
10 (Cont'd)	centralizers on bottom two joints and one on each joint for the next 75 joints. Will position 24 cable wipers on basis of log. Reciprocate casing while cementing. Hang casing in full tension. Pump wiper plug down with 9.5 ppg salt water.
11	Run gamma-ray cement bond log from total depth to 2,000' above total depth. Install disposal well tree and release rig.
12	Move out rig.
	After rig moves off location, rig up wireline unit and perforate well using 3-1/8" casing gun, four holes per foot. Perform injectivity tests and acidize if necessary. For acid, use 5000 gal. of FE acid with 250 gal. of OWG diverter followed by 10,000 gal. of regular HF acid.

TABLE 9-1
ESTIMATED COST TO DRILL
AND COMPLETE DISPOSAL WELL
C&K - FRANK GODCHAUX, III, WELL NO. 1

Accounting Code	Item	Original Estimate
02	Field Labor	$ 15,000
09	Site	26,000
10	Drilling	85,000
11	Tangibles	75,000
12	Expendables	52,000
13	Cementing	24,000
14	Perf., Acid	55,000
15	Equipment Rental	12,000
16	Contract Serv.	26,000
17	Freight & Trans.	13,000
18	Other	17,000
19	Insurance	6,000
20	Consultants	-0-
21	Land Use	-0-
24	Testing	-0-
	TOTAL	$ 406,000

10.0 SURFACE PRODUCTION AND TEST FACILITIES

The surface test facilities are designed to produce and inject the well effluent continuously and to obtain the data as described in Section 11.0 of this book. The design incorporates the necessary safety, corrosion, and environmental protection features. Design criteria are:

- Wellhead Working Pressure — 10,000 PSI
- Flow Line Shut-In Pressure — 7,100 PSI
- Temperature — 300°F
- Well Effluent — 20,000 BWPD
- Natural Gas Content — 44 SCF/BBL
- H_2S — None
- CO_2 — Trace
- Salinity — 75,000 PPM

The pressure relief and bypass lines will discharge either to the reserve pit or to steel holding tanks. A pilot-operated gas flare will be located a safe distance from the wells and facilities. The piping, valves and vessels will be designed in accordance with applicable codes, standards and regulations.

10.1 Main Process Equipment

Figure 10-1 is a schematic diagram of the surface test equipment. The well stream will enter the flow line at a point where the two flow loops connect. The flow rate, pressure, and temperature will be measured before the well stream enters the choke manifold. Fluid samples can be obtained ahead of the choke manifold and before the primary chemical inhibitor injection point.

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

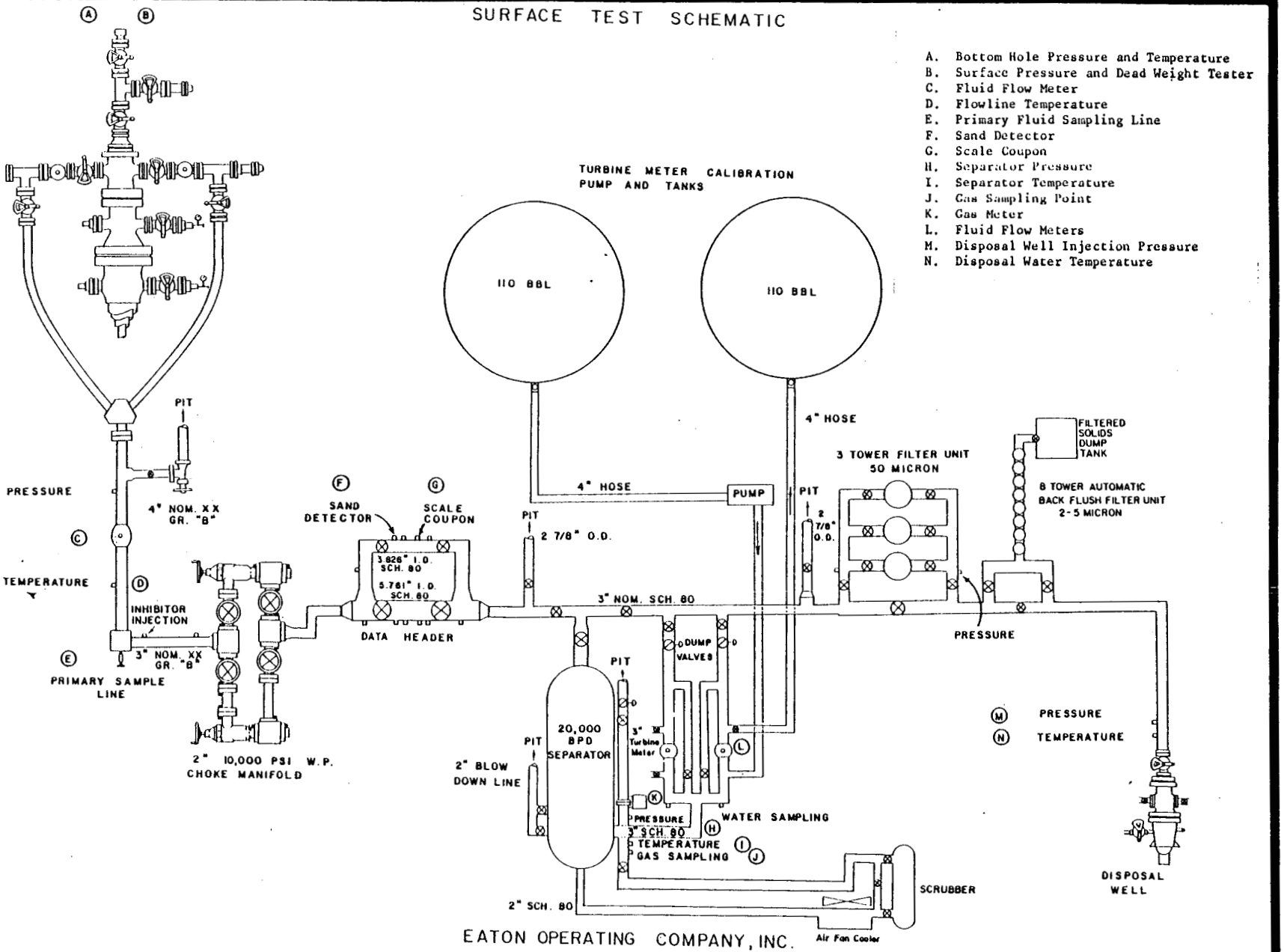


FIGURE 10-1

The separator will be a conventional well test separator. The gas will be flared. The brine will pass through a flow meter manifold and a filtering system before entering the disposal well.

The separator, filters and chemical pumps will be taken from D.O.E. stock for an estimated reduction in rental cost of $69,500 for the anticipated 21 day test period. This equipment will also be utilized on future tests in lieu of rental equipment to obtain additional cost reductions.

In addition, a rental air fan cooler and scrubber will be utilized on the separator gas discharge line and a rental automatic back flushing filter unit will be utilized in series with the existing filter system.

10.2 Safety Considerations

The test well christmas tree will be equipped with two fail safe closing pneumatic safety gate valves. The safety valves will close should pressures in the production system reach pre-set values. The pneumatic system can also be manually activated at a safe distance from the test well. The 9-5/8" casing pressure will be controlled with a kill line and a choke line. An active mud system will be installed on location so that mud can be pumped down the tubing string to kill the well if necessary.

All test equipment will be pressure tested prior to flow. There will be several relief and by-pass lines to the pit. Caution signs will be posted to warn visitors of the high pressure, high temperature pipes and vessels. Personnel will be required to wear hard hats.

10.3 Sand Considerations

Sand production could cause erosion in the wellhead, process lines, chokes, control valves, and partial plugging of other equipment. A sand detector probe will be installed to monitor sand production and the well stream will be diverted to the pit if sand production is significant.

10.4 Corrosion and Scaling

The well stream is expected to be of low salinity and scaling should not be a major problem. A scale inhibitor can be placed into the flow system at the wellhead and/or ahead of the choke manifold.

Carbonic acid (from CO_2) can cause corrosion which can be inhibited by the use of various water-soluble corrosion inhibitors. A corrosion inhibitor can be placed into the flow stream at the wellhead and/or ahead of the choke manifold.

The entire flow system will be closed in order to eliminate aeration and subsequent oxidation in the surface equipment.

10.5 Contingency Plan

The contingency plan for the test equipment is shown in Figure 10-2 followed by a narrative of the plan.

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

EATON OPERATING COMPANY, INC.

FAULT TREE ANALYSIS
OF START UP OF PRODUCTION TEST EQUIPMENT

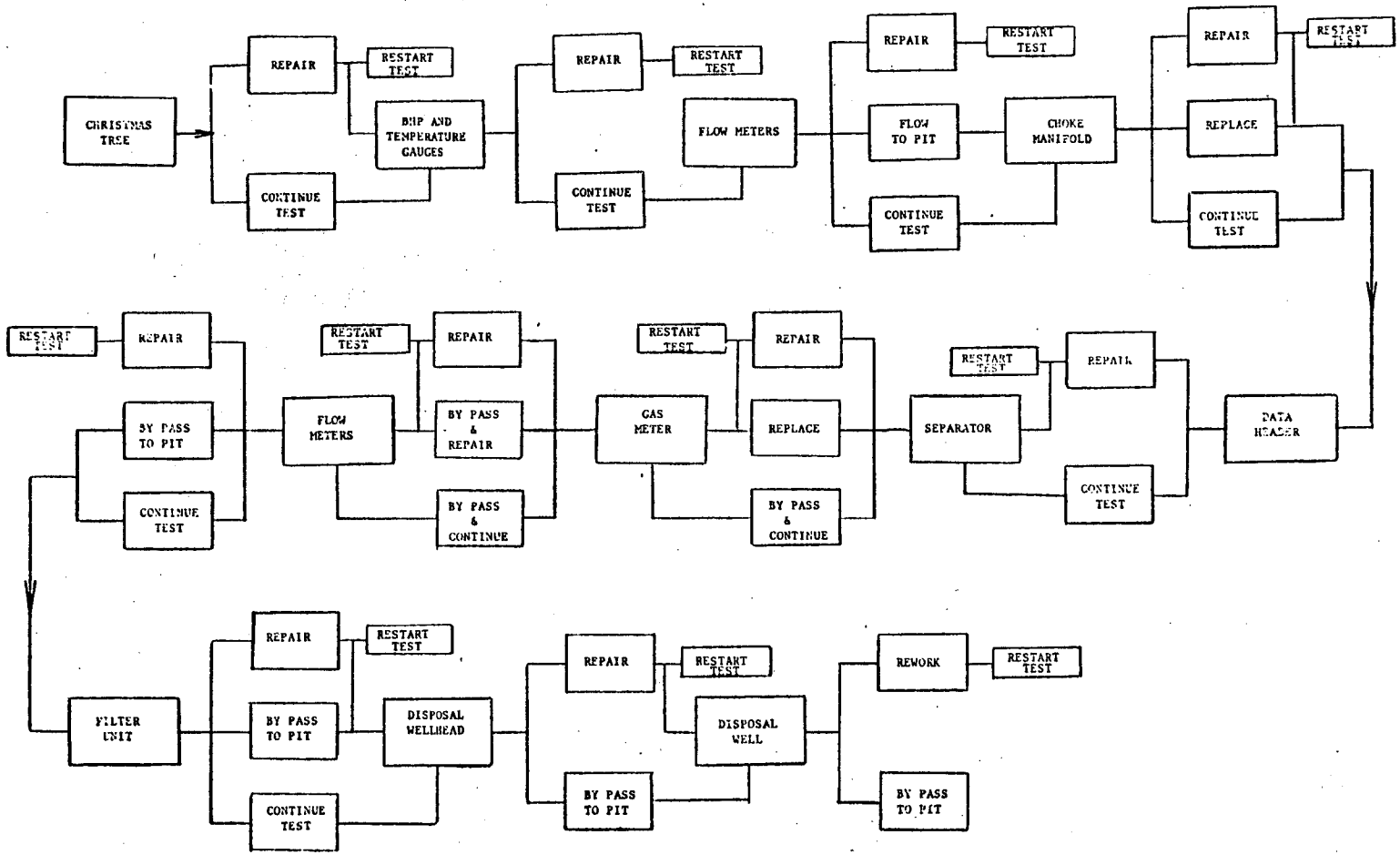


FIGURE 10-2

CONTINGENCY PLAN

The solutions to possible failures or problems listed below depend on the particular phase of each portion of the test at the time the problem occurs.

Critical Test Equipment

Problem	Solution
1. Christmas Tree	A. Flow through opposite side until repairs made.
	B. Shut-in well, make repairs, restart test.
2. Flow Meter	A. Continue test and rely on other two flow meters.
	B. Flow to pit and repair.
	C. Shut-in well, make repairs, restart test, or continue test.
3. Choke Manifold	A. Continue test through alternate loop.
	B. Repair and switch flow back from alternate loop.
	C. Shut-in well, make repairs, restart test or continue test.
4. Data Header	A. Continue test through alternate loop.
	B. Shut-in well, repair, restart or continue test.
5. Separator	A. By-pass separator to filter or pit and continue test, can measure all fluids except gas volume.
	B. Shut-in or by-pass separator to pit or filter, repair, continue or restart test.
	C. Replace separator and continue or restart test.

Problem		Solution
6.	Gas Meter	A. By-pass and repair.
		B. By-pass and continue test.
		C. Shut-in, repair and restart or continue test.
7.	Flow Meters (Calibration Manifold)	A. Continue test through alternate meter while repairing.
		B. Shut-in well, repair and restart or continue test.
		C. By-pass to pit and continue test.
8.	Filter Unit	A. Continue test through alternate loop.
		B. Shut-in well, repair and restart or continue test.
		C. By-pass to pit and continue test.
9.	Salt Water Disposal Wellhead	A. Shut-in well, repair and restart or continue test.
		B. By-pass to pit and continue test.
10.	Salt Water Disposal Well	A. Shut-in test well, perform remedial work on disposal well, restart or continue test.
		B. By-pass to pit and continue test.
11.	Subsurface Bottom Hole Pressure and Temperature Gauges	A. Shut-in well, replace and restart test.
		B. Continue test.

NON-CRITICAL TEST EQUIPMENT

The following list covers non-critical test equipment the loss of which should not cause shut-down of the test. These items could be repaired/ replaced during actual testing or during a scheduled shut-in period. The complete loss for an extended time or through a particular phase of the test should not adversely affect the overall test.

1. Dead Weight Tester at Wellhead of Test Well.
2. Primary Sample Line.
3. Primary Inhibitor Injection Point.
4. Sand Detector.
5. Surface Sample and Gauge Points.
6. Various Valves.
7. Calibration Tanks.
8. Calibration Pump.
9. Salt Water Disposal Well Pressure Recorder.

10.6 Typical Equipment

A cutaway drawing of a typical gate valve utilized on a christmas tree is shown in Figure 10-3. Surface safety system diagrams and equipment drawings are shown in Figure 10-4.

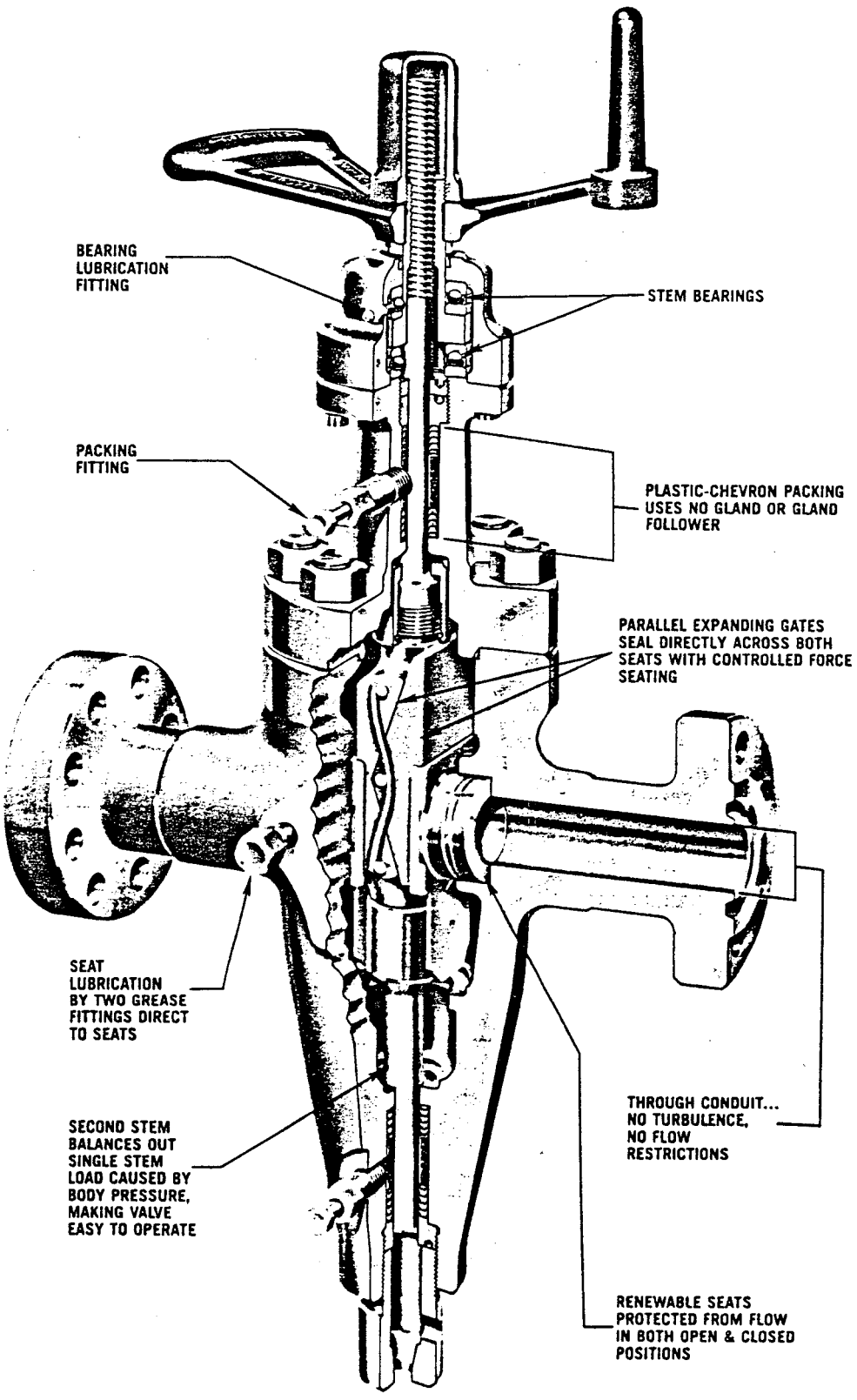


FIGURE 10-3

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

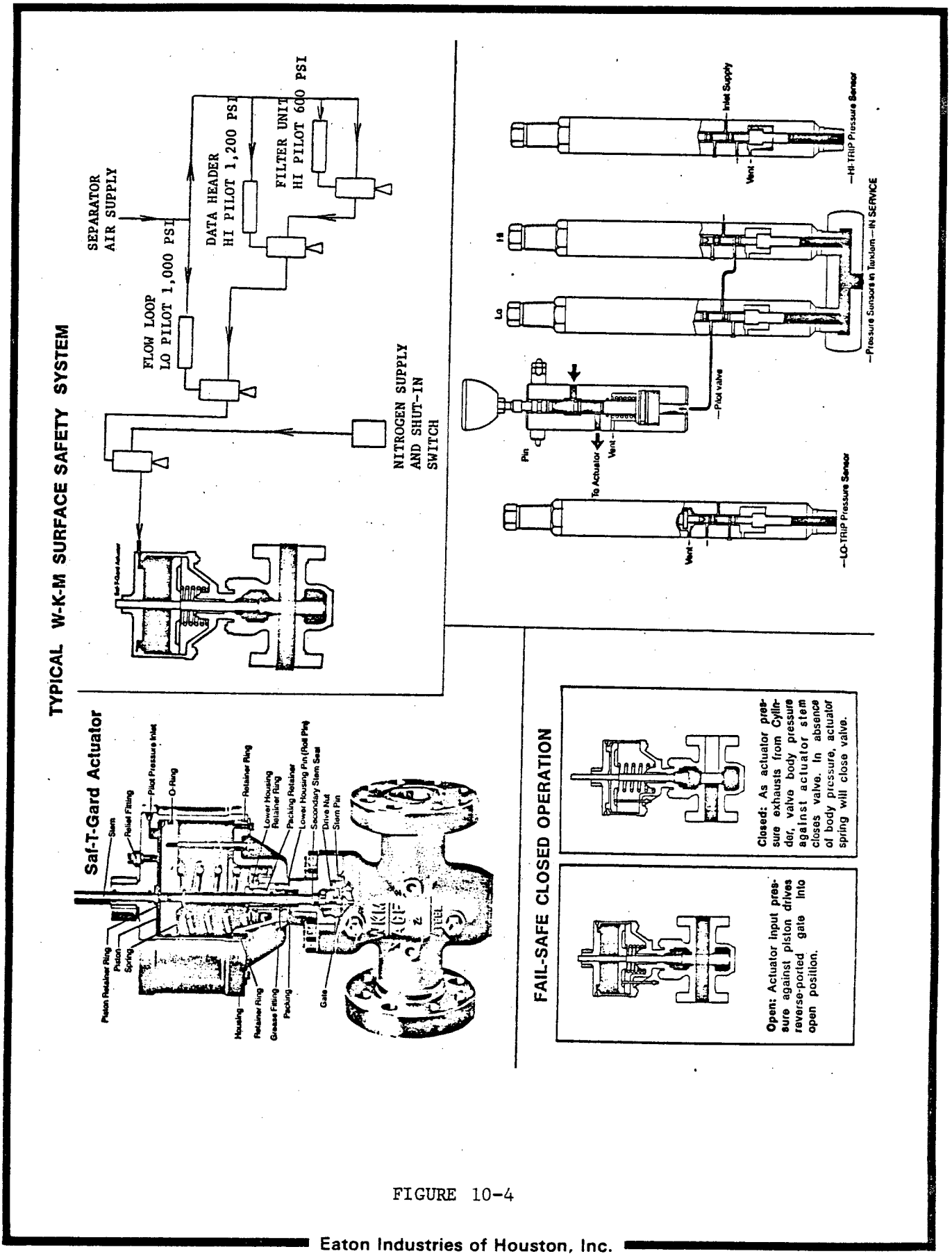


FIGURE 10-4

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

11.0 WELL TEST

11.1 Test Procedure

The test operation will commence when the surface test equipment is installed as shown in Figure 10-1 and made operational. Both the tubing and casing will be full of brine. The test will then proceed as outlined below if early interpretations so indicate as determined by the on-site reservoir engineer. Minor adjustments to the procedure may be deemed necessary, however.

A. Run Hewlett-Packard pressure and temperature transmitter to middle of perforations at approximately 15,740 feet. Obtain pressure and temperature measurement every 1000 feet while going in hole. After reaching depth, wait for pressure and temperature readings to stabilize and pull transmitter into tubing. Switch to pressure transmitter only in tubing at a depth of approximately 15,590 feet and commence production tests. Surface recording pressure and temperature gauges to be in operation continuously.

B. Open well at uniform rate over a 30 second period to a production rate of 2400 B/d. Separator will be bypassed, as necessary, until the sand detector indicates that the flow stream in free of sand and completion debris.

C. Commence flow through the separator and maintain constant production rate of 2400 B/d until radial flow in the reservoir has been definitely established as determined by analysis of the pressure decline data by the reservoir engineer on location.

D. Shut in well for pressure build up test for approximately 48 hours or until reservoir pressure build up is essentially complete, whichever is shorter.

E. Begin next flow test by opening choke over 30 second period to a constant flow rate of 5,000 B/d. Bypass separator when produced volume is near the annular volume and continue to bypass the separator until the sand detector indicates the flow stream to be free of sand or debris. Then resume flow through the separator. Flow the well at a constant rate of 5,000 B/d for approximately 5 days. Progress of the test will be closely monitored by the reservoir engineer conducting the test.

F. Shut in well for approximately 24 hours to get an initial build up test. It is not necessary that the bottom hole pressure return close to original pressure for this test.

G. Open the choke over a 30 second period to flow rate of 10,000 B/d. Again bypass separator when bottoms come up until the sand detector indicates the flow stream to be free of sand and debris.

H. If well bore mechanics and reservoir are capable of producing at a constant rate above 10,000 B/d then open choke to the higher rate from the 10,000 B/d rate without shutting in the well. Once the flow has stabilized at this rate and radial flow has been established then flow at this constant rate for approximately 24 hours.

RESERVOIR LIMIT TEST

RESERVOIR DRAWDOWN TEST

FOR

GEOTHERMAL-GEOPRESSURED WELL

Test Date:_____ Type Test:_____ Lease and Well No._____

Producing Formation:_____ Field:_____

Hole Size:_____ Casing Size:_____ Tubing Size:_____ State:_____

Cumulative Production:_____ Gas Gravity:_____, Z:_____

Constant Rate Production:_____(Bbls./Day) Water Salinity:_____PPM Total Solids

Total Production Life:_____Days Porosity, ϕ :_____Gas-Water Ratio_____Ft^3/Bbl.

Reservoir Temperature:_____^oF Net Pay:_____ft. Perfs:_____ft.

μ_g_____cps μ_w_____cps Bw_____R.B./B Bg_____R.B./MCF

C_T_____ $X10^{-6}$ C_g_____$X10^{-6}$ C_w_____$X10^{-6}$ C_r_____ $X10^{-6}$

m_____psi/cycle P at 1 hour _____Sg_____Sw_____Pi_____

Calculation of kh (md-ft) and k (md):

$kh = 162.6(Q)(B)(\mu)/(m)$

kh = 162.6 ( ) ( ) ( )/( ) = _____md-ft

k = ( )md-ft/( ) ft = _____mds

$Bg = (Pb)(Tf)(Z)(1000)/(5.61)(520)(P_R)$ =

Bg = ( )( )( ) .34279/( ) = _____ Res. Bbl./MCF

Calculation of Skin effect, s; and Pressure Loss Due to Skin, ΔP skin

$$s = 1.151\left[\left(\frac{P_i - P_{1hr}}{m}\right) - \log\left(\frac{K}{\phi\mu C_t r_w^2}\right) + 3.23\right]$$

$$s = 1.151\left[\left(\frac{(\quad)-(\quad)}{(\quad)}\right) - \log\left(\frac{(\quad)}{(\quad)(\quad)(\quad)(\quad)}\right) + 3.23\right] = \_\_\_\_\_$$

ΔP skin = (0.87)(s)(m) = psi

ΔP skin = (0.87)( )( ) = _____psi

Diffusivity, η

$\eta = .006328\ (k)/\phi\mu C_T$ =

η = .006328 ( )/( )( )( ) = _____ft^2/day

Calculation of Productivity Index (B/D-psi) and Completion Efficiency, CE

$$J\ (actual) = \frac{Q_w}{P_i - P_f} = \frac{(\quad)}{(\quad - \quad)} = \_\_\_\_\_ \text{Bbls./D-psi}$$

$$J\ (ideal) = \frac{Q_w}{(P_i - P_f) - \Delta P\ skin} = \frac{(\quad)}{(\quad - \quad) - (\quad)} = \_\_\_\_\_ \text{Bbls./D-psi}$$

$$CE = \frac{J\ (actual)}{J\ (ideal)} = \frac{(\quad)}{(\quad)} = \_\_\_\_\_ \quad OR \quad \_\_\_\_\_ \%$$

Distance to Barriers or Discontinuities, d $d = 2\sqrt{t}$

$d = 2\sqrt{(\quad)}\ x\sqrt{t} = (\quad)\sqrt{t}$

t time, days	$\sqrt{t}$	d, ft.	m (psi/cycle)	Flow Angle	Jones Y Function	Bbls. of Aquifer Explored or tested

FIGURE 11-1

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

I. Shut in well from high flow by gradually closing the choke over a 30 second period. Continue to measure bottom hole pressure build up for at least 24 hours.

J. Remove Hewlett Packard gauge from well. If conditions warrant, make pressure and temperature measurements on even 1000 feet interval while coming out of the well. When the Hewlett Packard guage is at the wellhead, make a cross check with the wellhead pressure gauge. This completes the test.

11.2 Test Analysis Methods

The basic test analysis to be conducted by the reservoir engineer on location will consist of plotting the bottom hole pressure as a function of the logarithm of time. On this type of plot, radial flow in the reservoir is indicated by a straight line plot on the graph. Different straight line segments and breaks in the slope and offsets are then interpreted by the reservoir engineer as to their significance. For data that follow usual flow rate reservoir mechanics, the permeability and reservoir limits can be evaluated by performing the calculations on the form shown in Figure 11-1. Should unusual or unexpected flow behavior be observed, then more detailed or different analysis may be necessary.

Some preliminary production calculations were made using a radial flow reservoir simulator. Figure 11-3 is a print out of one of the calculations. These calculations indicate that the well should be able to

GODCHAUX III #1

Radial Flow
Reservoir
Simulator
Calculations

WELLBORE RADIUS (FT)	0.300
EFFECTIVE RESERVOIR RADIUS (FT)	5160.0
INITIAL RESERVOIR PRESSURE (PSI)	14755.0
PERMEABILITY (DARCYS)	0.1440
POROSITY (FRACTION)	0.2700
RESERVOIR THICKNESS (FT)	360.0000
ROCK PV COMPRESSIBILITY (1/PSI)	3.5000E-006
FLUID COMPRESSIBILITY (1/PSI)	3.0000E-006
FLUID VISCOSITY (CP)	0.2500
FLUID DENSITY (LBS/CU FT)	63.0000
SKIN FACTOR (DIMENSIONLESS)	2.0000

PRODUCTION PIPE (TUBING) PARAMETERS

SECTION	LENGTH (FT)	DIAMETER (FT)	SURFACE FINISH
1	15443.00	0.28307	AVERAGE

INITIAL AMOUNT OF WATER IN PLACE	1446094175 BBLS
TIME TO SEMI STEADY STATE IS	3.24 DAYS
HYDROSTATIC PRESSURE IS	6939.14 PSI
INITIAL WELL HEAD PRESSURE IS	7815.86 PSI
MAXIMUM ALLOWABLE FLOW RATE	35000.00BBLS/DAY
MINIMUM ALLOWABLE WELL HEAD PRESSURE	500.00 PSI
MINIMUM ALLOWABLE FLOW RATE	1000.00BBLS/DAY

TIME (DAYS)	FLOW (BBLS/DAY)	BOTTOM (PSI)	FRICTION (PSI)	WELL HEAD (PSI)	SKIN EFF. (PSI)	CUM (BBLS)
0.0	35000.00	14755.00	7021.31	737.87	56.68	0
1.0	35000.00	14543.25	7021.31	526.13	56.68	35000
2.0	35000.00	14534.99	7021.31	517.86	56.68	70000
3.0	35000.00	14530.16	7021.31	513.03	56.68	105000
3.2	35000.00	14529.22	7021.31	512.09	56.68	113575
4.0	35000.00	14525.50	7021.31	508.38	56.68	140000
5.0	35000.00	14521.78	7021.31	504.66	56.68	175000
6.0	35000.00	14518.07	7021.31	500.94	56.68	210000
7.0	34965.00	14514.57	7008.10	510.71	56.62	244965
8.0	34965.00	14510.85	7008.10	507.00	56.62	279930
9.0	34965.00	14507.14	7008.10	503.28	56.62	314895
10.0	34930.04	14503.64	6994.91	513.03	56.56	349825
11.0	34930.04	14499.93	6994.91	509.32	56.56	384755
12.0	34930.04	14496.22	6994.91	505.61	56.56	419685
13.0	34930.04	14492.51	6994.91	501.90	56.56	454615
14.0	34895.10	14489.02	6981.75	511.63	56.51	489510
15.0	34895.10	14485.31	6981.75	507.92	56.51	524405
16.0	34895.10	14481.60	6981.75	504.21	56.51	559300
17.0	34895.10	14477.90	6981.75	500.50	56.51	594196
18.0	34860.21	14474.41	6968.61	510.21	56.45	629056
19.0	34860.21	14470.70	6968.61	506.51	56.45	663916
20.0	34860.21	14467.00	6968.61	502.80	56.45	698776

FIGURE 11-2

flow at 35,000 BWPD assuming good well completion efficiency and a permeability of a least 144 md.

11.3 Data Acquisition

Data collection points are indicated on Figure 10-1 by circled letters and are listed below.

Data Point	Description
A.	Bottom Hole Pressure and Temperature (Hewlett Packard Quartz Crystal Pressure Gauge)
B.	Surface Pressure Gauges and Dead Weight Tester (Panex 0 - 5000 psi Gauge) (Gould 0 - 5000 psi Transmitter)
C.	Fluid Flow Meter (3" Camco Turbine Meter)
D.	Fluid Flowing Temperature (Foxborrough 0 - 400°F Transmitter)
E.	Primary Fluid Sampling Line (1/4" NPT Threads)
F.	Fluid Sand Content Detector (OIC Sand Systems Sonic Sand Detector)
G.	Scale-Corrosion Coupon (Baroid Standard Coupon)

H. Separator Pressure
(Gould 0 - 2000 psi Transmitter)

I. Separator Temperature
(Foxborrough 0 - 400°F Transmitter)

J. Gas Sample Point
(1/4" NPT Threads)

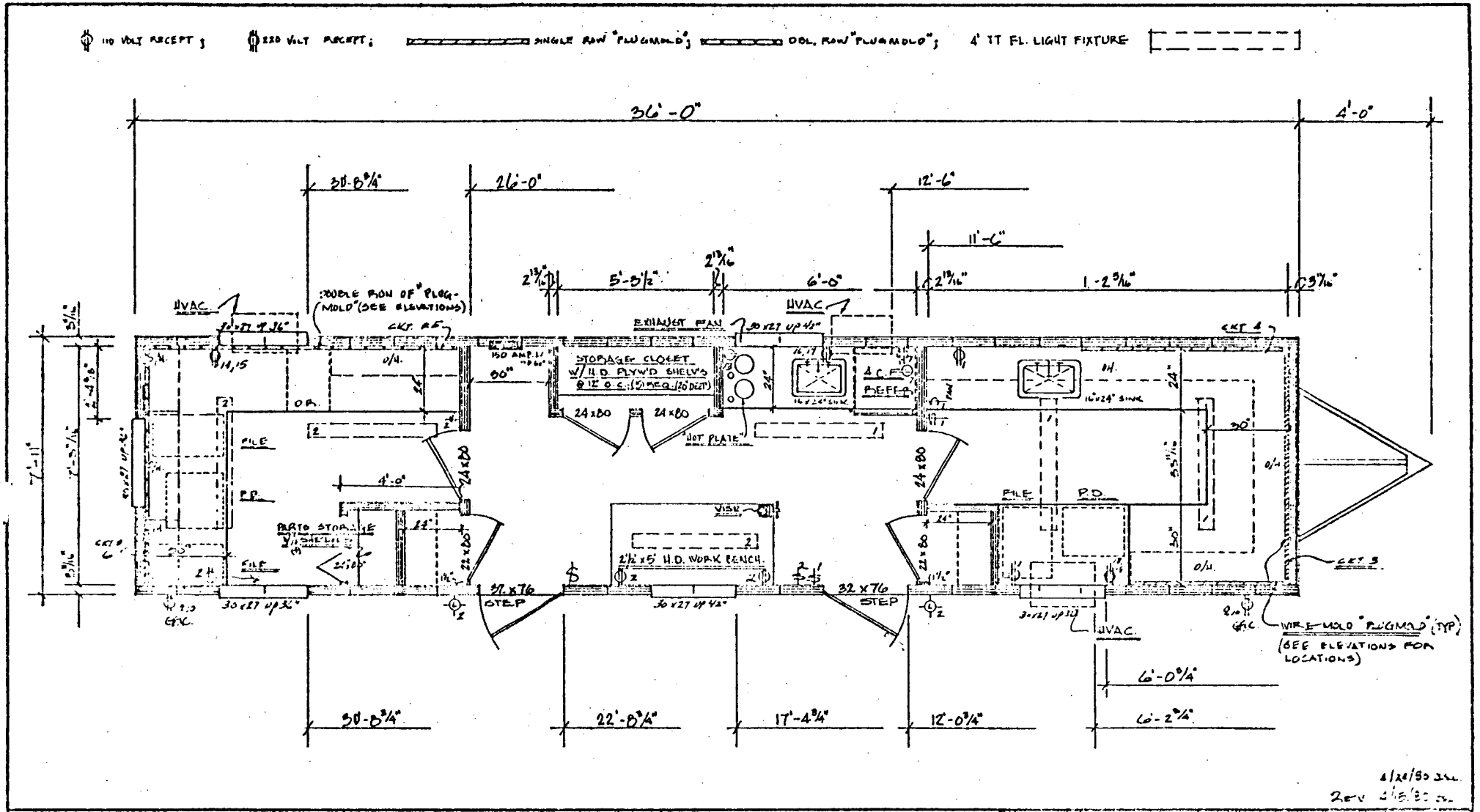
K. Gas Orfice Meter ΔP
(Gould 0 - 400" H_2O Transmitter)

L. Fluid Flow Meters
(3" Halliburton Turbine Meters)

M. Disposal Well Injection Pressure
(Gould 0 - 5000 psi Transmitter)

N. Disposal Well Water Temperature
(Foxborrough 0 - 400°F Transmitter)

Figure 11-3 is a copy of the floor plan of the IGT mobile trailer. The front end contains the on-site chemical laboratory. The mid-section is a work area and the rear section is the electronic data gathering system. The



frame type 0" JA. I BEAM	sidewalls 2x4 @16" o.c., R-11 INSUL.	main sewer drop 17½" & WATER INLET (¾")	
hitch TABLE EXTENDED	paneling 5/32" LAUAN		
ctr. of axles 2'-6"	windows (6) 30x27	NOTE TO ELECTRICIAN: RUN (2) SETS OF "PLUGMOLD" IN REAR OFFICE - BOTTOM RUNS TO GO TO MAIN L.C. CKT #5&6 - RUN TOP SETS TO 'J'-BOX (4x4) BELOW L.C. AND 24" ABOVE FLOOR.	scale 3/8"=1'-0" | date 3/15/80 | drawn by J LINDSEY
floor type 2x4 TRANSVERSE @16" O.C. / R-7	ext. doors (2) 32x76		dealer/client AMERICAN MOBILE OFFICE
floor deck ⅝" PLYWOOD UNDERLAYMENT	ceiling ⅜" GYP.		
floor cover VINYL ROLL GOODS	electrical serv. 150 AMP 240/110-VOLT		
floor registers NONE	air conditioning (3) 9600 BTU "G.E." W/HEAT	all datum dimensions are from front and left edge of floor.	model F-8x40
heat duct LINE	charge lines NONE		quotation no. 2499-R production no. 1698
heat [illegible] A.C. COMBO	floor lights (6) 4' TWIN TUBE F'L.		

IGT MOBILE TEST TRAILER

FIGURE 11-3

new chemical equipment, the pressure and temperature sensors for the surface equipment and the strip chart recorders have all been field tested on the Girouard well test and are working satisfactorily.

A schematic of the overall data acquisition system is shown in Figure 11-4. The system is a computer based digital system with some analog back up. The system also operates via the IEEE-488 (HPIB) communications bus so that it will be compatible with Hewlett Packard equipment and other digital systems that use this same standard. It has the capability of performing some data reduction and analysis in the field. Since the bottom hole pressure and temperature will be obtained from the service company in the same format, it greatly facilitates the data acquisition and reporting.

11.4 Chemical Analysis

A. Sample Collection

The brine samples from the well will be collected in three Teflon-lined stainless steel cylinders of 500-ml capacity. For sampling, the cylinders will be linked in series to the sampling port. An

DATA ACQUISITION SYSTEM

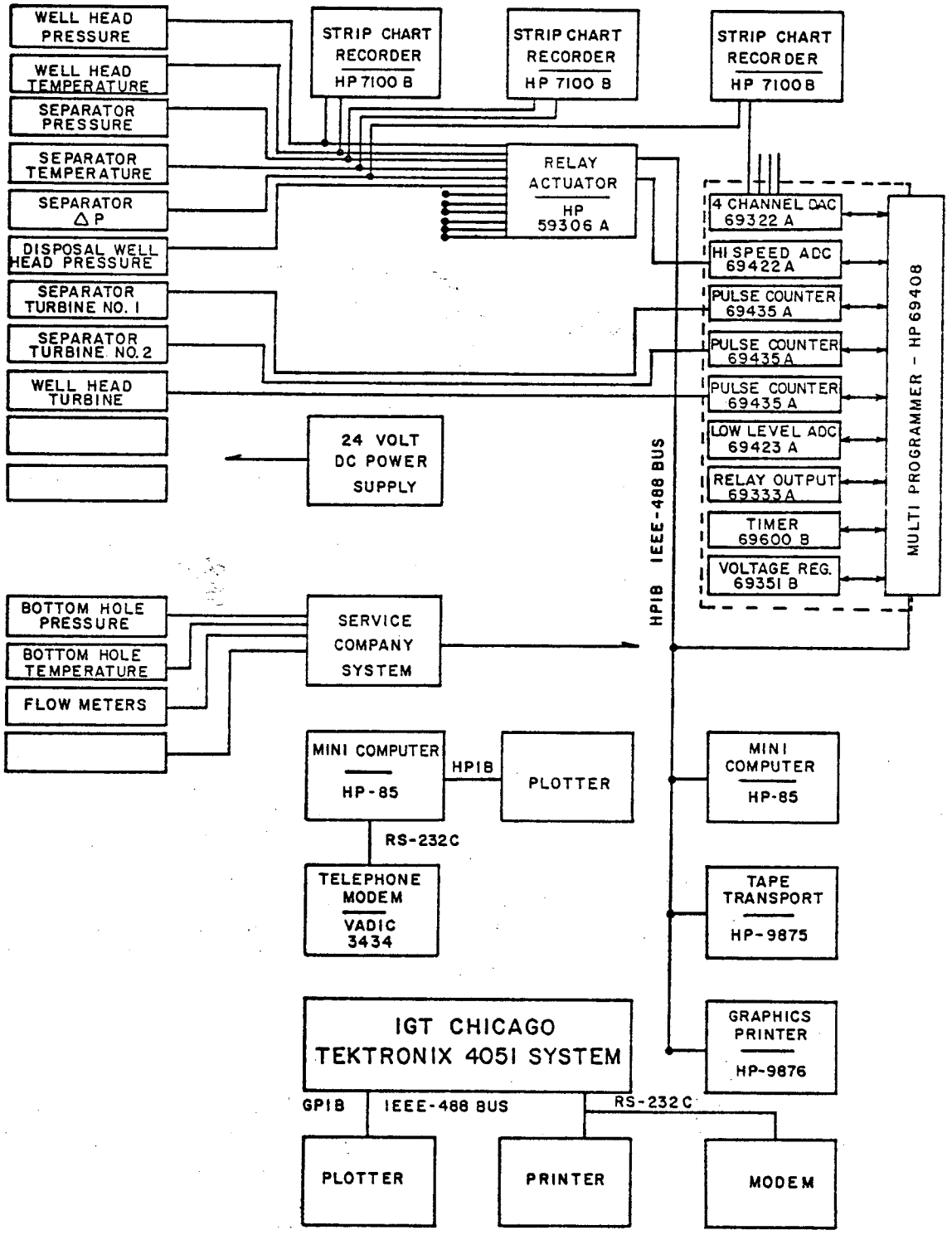


FIGURE 11-4

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3100 Edloe
Houston, Texas 77027
(713) 627-9764

DOE CONTRACT NO.
DE-AC08-80ET-27081

alternative method would be to collect brine in one cylinder at a time. The cylinders will be flushed with several volumes of brine to purge the air from the cylinders before the sample is taken. The valves on the cylinders will be closed, outlet first, inlet last, to trap and seal the sample under pressure. The sample cylinders will be cooled to near ambient temperature before analysis. The pressure in each cylinder will be maintained until the sample is ready for analysis.

The three steel cylinders, (A, B, and C), of RU brine are to be used for pH and specific conductance (Cylinder A), alkalinity (Cylinder B), and for gas analysis, total dissolved CO_2, including carbonate and bicarbonate species, and sulfide (Cylinder C).

Brine samples are also to be collected in plastic bottles cleaned first with dilute HNO_3(1:5) and rinsed four times with deionized water. Brine collected in these containers will first be passed through a loose plug of glass wool to reduce or remove oily matter. The samples in these bottles will be used for temperature measurements and for tests requiring raw acidified (RA), filtered untreated (FU), and filtered acidified (FA) samples.

Treatment	Tests
RU (Raw, untreated)	ph, Temperature, Total Dissolved CO_2, Alkalinity, Specific Conductance, Suspended Solids, Sulfide, Gas Analysis
RA (Raw, acidified with 3 ml HNO_3/liter)	Radioactivity
FU (Filtered through 0.45 m membrane, untreated)	Dissolved Solids, B, Cl^-, F^-, NH_3, SiO_2
FA (Filtered through 0.45 m membrane, acidified with 1:1 HNO_3 to a pH of 1.5. Note the amount of acid used)	As, Ba, Ca, Cd, Cl^-, Cr, Cu, Fe, K, Mg, Mn, Na, Pb, SO_4, Sr, Zn

B. TEST PROCEDURES FOR LIQUID SAMPLES

1. pH

Use a pH meter with automatic temperature compensation. Calibrate the pH meter with pH buffers of 7.0 and 4.0. Drain a portion of the sample from Cylinder A into a beaker and record the pH immediately. Do not stir the sample. The pH may drift down, then up, as the solution exsolves CO_2; record the lowest pH reading.

2. Temperature

Record the flowing brine temperature and measure the temperature of the brine in a freshly filled bottle or container.

3. Specific Conductance

Use a commerical instrument that has been calibrated with KCl at various temperatures for specific conductance. Record the temperature of the brine and the specific conductance in mhos/cm.

4. Suspended Solids

Weigh a piece of 0.45 um membrane filter, then filter a measured volume of sample through the membrane. Dry the filter at 110°C and report suspended solids in mg/l. Save the material for possible x-ray diffraction or emission spectrographic analysis.

5a. Alkalinity

Pipet 50.00 ml of the sample brine from Cylinder B into a 250 ml beaker. Place the electrodes of a calibrated pH meter into the sample and titrate with 0.02 N H_2SO_4. Add the standard acid in increments of 1 to 2 ml at the beginning of the titration and change the increments to 0.25 to 0.50 ml at pH = 5.0. The incremental volumes should be determined by the actual titration and the speed with which the pH is changing. Titrate the solution until the pH is 2.0. Tabulate values of pH and ml and determine the end point graphically from a plot of pH versus ml.

Calculate and report the alkalinity as mg HCO_3/liter. This procedure determines the total alkalinity, including the portion attributable to organic anions.

5b. Total CO_2

The brine in Cylinder C is used to determine total dissolved CO_2 (dissolved CO_2 and HCO_3) after the gas has been flashed off for GC analysis. The brine is drained from the steel cylinder into a volumetric cylinder to determine the brine volume for the gas to brine ratio. After measuring the volume, the brine is immediately

made alkaline to phenolphthalein with drops of 10 M NaOH (40 g NaOH to about 100 ml). Transfer 50 ml of this solution to the carbonate train. Add about 30 ml of water, acidify with 30 to 40 ml of 1:1 HCl, and purge the CO_2 into the tared Nesbitt bulb with nitrogen for 1 hour. Reweigh the Nesbitt bulb for the weight gain due to CO_2. Report as mg CO_2/liter.

6. Chloride

Pipet 1.00 ml of the sample (FU for on-site analysis immediately after collection of FA-HNO_3 for later analysis) into a 125 ml Erlenmeyer flask and dilute to approximately 50 ml. Add 10 drops of K_2CrO_4 indicator solution (5 g K_2CrO_4/100 ml deionized water) and titrate with 0.1 N $AgNO_3$ or equivalent until the end point persists. Report as mg Cl^-/l.

7. Silica

Silica may be determined directly from FU samples on-site if the determination is made soon after collection. Some precipitation of silica may occur if too much time elapses between collection and analysis. To prevent precipitation of silica, collect two FU samples diluted 1:1 and 1:4 with distilled water. The amount of silica should be determined in both dilutions; agreement between the two dilutions is evidence that no precipitation of silica occurred.

Volumes in the following procedure are based on the determination of silica in the undiluted FU samples. Some adjustments must be made for the determination in the diluted samples.

a. Pipet 1.00 ml of sample into a beaker. Add 10 ml of deionized water.

b. Pipet 1.00 ml of each standard into a beaker. Add 10 ml of NaCl solution (same concentration as sample) to each beaker containing standards.

c. Prepare a blank by adding 11.00 ml of NaCl solution in a beaker.

d. Pipet into each of the beakers in steps 1-3:

   1. 5.00 ml of 1.0 N HCl
   2. 5.00 ml of Na_2EDTA solution (10 g/1)
   3. 5.00 ml of ammonium molybdate solution (52 g $(NH_4)_6Mo_7O_{24}\cdot 4H_2O$ in deionized water, adjust pH to 7-8 with 10 M NaOH, dilute to 1 L with deionized water. Filter through 0.45 um membrane filter if necessary.

e. Wait 5 minutes and add 500 ml of $H_2C_4H_4O_6$ (tartaric acid) solution (100 g/1) to each beaker. Mix.

f. Wait 2 minutes and add 10.00 ml of Na_2SO_3 solution (170 g/1) to each beaker. Mix.

g. Wait 30 minutes and read the absorbance of the contents of each beaker at 700 nm in 1 cm. Use the blank as a reference.

h. Plot the data and graphically determine the SiO_2 concentration.

i. Report mg SiO_2/1.

8. Dissolved Solids

Pipet a volume of sample containing <200 mg dissolved solids into a pre-weighed container. Evaporate the liquid over a steam bath or in an oven (~80°C), then dry at 180°C for two hours or until constant weight is obtained. Report dissolved solids as mg dissolved solids/l.

Alernatively, the dissolved solids content may be calculated by adding the concentrations found for the cations and anions. Convert (HCO_3^-) to ($CO_3^=$) for calculation.

9. Boron

Pipet 2.00 ml of sample into a 30 ml Teflon (or plastic but not glass) beaker. Prepare a blank by pipetting 1.8 ml of deionized water into a Teflon beaker. Prepare standard boron solutions, of 0.01 and 0.025 mg B/1. To blank and standard solutions, add 0.2 ml of silica standard (same concentration as sample). Adjust the volume of the standards of 2.00 ml. To blank, standards, and samples, add two drops of concentrated HCl and two drops of concentrated H_2SO_4. Allow to cool, add 10.00 ml carmine solution (0.5 g carmine/liter of concentrated H_2SO_4) to blank, standards, and sample. Allow to stand for 1 hour. Set spectrophotometer to 600 nm. Use a 1 inch cell and read the absorbance of each sample with the blank as a reference. Determine boron graphically and report as mg B/1.

10. Sulfide

The remaining alkaline brine solution from Cylinder C is used for the sulfide determination. Use a specific ion electrode and follow the manufacturer's instructions.

11. Flouride

Use a specific ion electrode and follow the manufacturer's instructions.

12. Iron

Determine directly by atomic absorption spectrometry.

13. Barium

Measure with atomic absorption.

14. Sulfate

Prepare a chromatographic column as follows: Wash 80-200 mesh chromatographic grade alumina with deionized water. Allow alumina to settle, decant the supernatant liquid, and repeat the washing procedure until the supernatant liquid is clear. Transfer the alumina to a chromatographic column, wash with 50 ml of 1 M ammonium hydroxide, several 5 ml portions of 0.1 M ammonium hydroxide, and 50 ml of deionized water. Wash with 10 ml of 1 M HCl for the final wash.

Acidify the sample with 30% HCl to pH=0.5-1.0. Run the sample through the previously prepared chromatographic column, wash with 10 ml of 1 M HCl followed with a total of 25 ml of deionized water added in several portions. Elute the sulfate from the column by adding 5 ml of 1 M ammonium hydroxide followed by 20 ml of 0.1 M ammonium hydroxide. Add an additional 20 ml of 0.1 M ammonium hydroxide in 5 ml portions.

Wash with 25 ml of deionized water. Do not allow the column to become dry. Neutralize the eluted sample with dilute HCl and add 1 ml dilute HCl in excess, then dilute to approximately 200 ml with deionized water. Treat with 0.25 M $BaCl_2$ solution. Digest the precipitate for two hours, cool, filter, ash the paper, and heat in a muffle furnace (1000°C) until constant weight is attained. Report as mg $SO_4^=$/l.

15. Strontium

Determine directly by atomic absorption spectrometry. Use 1.00 ml of a La_2O_3-KCl mixture (117.3 g La_2O_3 dissolved in minimum amount of dilute HCl + 19.1 g KCl and add deionized water to 1000 ml) for each 10.00 ml sample or standard. Report as mg Sr/l.

16. Sodium

Determine directly by flame emission or atomic absorption spectrometry. Add ~1000 mg K/l to swamp potassium interference.

17. Potassium

Determine directly by flame emission or atomic absorption spectrometry. Swamp sodium interference by making the standards with 2000 mg Na/l. This may be done by adding 40 ml of a NaCl solution (5000 mg NaCl/l) to each 100 Ml K standard. Alternatively, use the actual concentration found in the samples for the potassium standards.

18. Calcium

Determine directly by atomic absorption spectrometry. Use 1.00 ml of La_2O_3 dissolved in small portions in 250 ml concentrated HCl (CAUTION) and diluted to 500 ml with deionized water) for each 10.00 ml sample or standard. Report as mg Ca/l.

19. Cadmium

Determine directly by atomic absorption spectrometry. Report as mg Cd/l.

20. Magnesium

See calcium determination. Report as mg Mg/l.

21. Ammonia

Collect a separate sample for this determination. Follow manufacturer's directions for specific ion electrode. Report as mg NH_3/l.

22. Zinc

Determine directly by atomic absorption spectrometry. Report as mg Zn/l.

23. Maganese

Trace amounts of maganese may be determined by atomic absorption spectrometry following an extraction procedure.

24. Arsenic

Arsenic may be determined by atomic absorption spectrometry after converting the metal to arsine. Care should be exercised

to prevent the absorption of radiation at the arsenic wavelengths by organic vapors.

25. Copper, Chromium, and/or Lead

Pipet a 100.00 ml sample into a 250 ml volumetric flask. Prepare a blank similarly and a standard containing 0.1 mg M^{++}/L in the extracted medium. Add two drops of bromphenol blue solution (0.1 g bromphenol blue dissolved in 100 ml of 50 percent ethanol) to each flask. Adjust the pH by adding 2.5 M NaOH (10 g NaOH in 1 L solution) dropwise until the blue color persists, then add 0.23 M HCl (25 ml concentrated HCl in deionized water and diluted to 1 l) until the blue color just disappears. Add 2.00 mL of 0.3 M HCl in excess. Add 5.00 mL of APDC solution (1 g ammonium pyrrolidine dithiocarbamate in deionized water diluted to 100 ml. Prepare fresh daily) and mix. Add 10.00 ml MIBK (methyl isobutyl ketone) and shake the flask and contents for three minutes. Allow the layers to separate and add deionized water until the MIBK layer is in the neck of the flask. Cu, Cr, and/or Pb will be determined on the MIBK extract by atomic absorption spectrometry.

26. Mercury

Mercury may be determined by flameless atomic absorption spectrometry.

27. Radioactivity

Samples to be submitted to the USGS for measurements of gross alpha, gross beta and gross gamma.

28. X-Ray Diffraction

The suspended solids collected on the filter should be subjected to x-ray diffraction techniques such that clays and minerals will be identified. A semi-quantitative determination of each material identified is desirable.

C. Test Procedures for Gas Samples

1. Standard Hydrocarbons

Use a gas chromatograph to determine C_1 - C_6 and C_{6+}. The standard analysis usually determines CO_2, N_2 and O_2 simultaneously. Report as mole percent of each element or compound.

2. Hydrogen, Ammonia, Hydrogen Sulfide, Helium

These gases should be determined by standard gas chromatography. Use the proper column, carrier gas, etc. to obtain the correct determination. Report as mole percent of each element or compound. Ammonia and H_2S will be estimated on-site using Draeger apparatus.

3. Radon-222

Evacuate the alpha counting chamber and admit a known amount of gas sample into the chamber. Count the Rn-222 and report as $pCi^{222}Rn/l$. This measurement will be made by USGS with gas samples provided by IGT.

4. Mass Spectrometry

Subject a gas sample to mass spectrometry (from Z-1 to Z-400 and report the gases present. This determination is to be made on one sample only.)

D. On-Site Laboratory

The following determinations must be made at an on-site laboratory before precipitation occurs in the sample (within 30 minutes of the time the sample is collected): pH, T, specific conductance, dissolved solids (gravimetric), suspended solids, HCO_3 -, $CO_3^{=}$, Cl^{-} (FU samples), $S^{=}$, NH_3, SiO_2 (FU samples not diluted). Other determinations will be made later and in IGT's Chicago lab facilities. SiO_2 to be determined later, dilute one FU sample 1:1 with deionized water and dilute another FU sample 1:4 with deionized water. Determine SiO_2 on both samples. Collect separate samples for $S^{=}$ and NH_3. Gas analyses for C_1-C_6 hydrocarbons and CO_2 will be performed on-site using a gas chromatograph containing a thermal conductivity detector. CO_2 and H_2S will be estimated on-site using a Draeger apparatus.

Produced gas/water ratios will be calculated on-site using values of meter output corrected for actual composition of flow streams. Gas flows will be corrected for C_1-C_6, CO_2 and H_2O content. Liquid flows will be corrected for gas content determined by on-site flashing plus analysis of liberated gas.

E. Sampling Schedule

1. When the test schedule is known, advance phone calls will be made to the following organizations to alert them should they desire to take their own samples.

   - McNeese State University
   - USGS - Menlo Park & Bay St. Louis
   - Univeristy of Texas
   - L.S.U.

   All third party sampling must be approved and supervised by the Eaton Engineer in charge to insure proper safety and operational procedures. IGT will maintain a log of such samples and maintain contact for companies of lab results, resolution of any discrepanies and supporting of results obtained by third parties.

2. When the well has flowed 2400 BPD for several hours after bottoms up (step 2 of operating procedure), brine and gas samples will be collected. Wellhead pressure samples will be flashed to atmospheric pressure at location for gas/water ratio determination. Two samples each of brine and gas will be taken at separator pressure for laboratory analysis. In addition, raw and acidified brine samples will be collected from separator outputs at atmospheric pressure using procedure described above. Samples for radioactivity analysis will be provided to the USGS.

3. During the 96 hour build up, surface lines will be examined for scale formation and examples of any scale found will be shipped to IGT for analysis.

4. During the stepwise increase in flow rate, sample collection and analysis at each rate will be as follows:

    - At least twice daily, collect wellhead pressure samples and flash to determine gas/H_2O ratio until it is clear that consistent and more accurate data is being obtained from corrected gas and liquid flow meter readings.
    - Perform daily on-site analyses of samples from the separator using procedures previously described.
    - On the first, third and fifth day at each flow rate, collect samples from the separator gas and liquid output for subsequent lab analysis using procedures previously described.

5. During the last day of flow through the separator, additional separator pressure gas and liquid samples will be collected to be retained for up to one year for future analyses to resolve unanticipated issues. A few gallons of raw and acidified brine will also be stored at atmospheric pressure.

6. During disassembly of the testing equipment, it will be examined for any evidence of scale or corrosion. Observations will be documented and samples of any scale found will be shipped to IGT for analysis.

TABLE 11-1
ESTIMATED COST TO PERFORM
GEOPRESSURED - GEOTHERMAL TEST
C&K - FRANK GODCHAUX, III, WELL NO. 1

Accounting Code	Item	Original Estimate
02	Field Labor	$ 20,000
09	Site	-0-
10	Drilling	-0-
11	Tangibles	-0-
12	Expandables	12,000
13	Cementing	-0-
14	Perf., Acid	-0-
15	Equipment Rental	-0-
16	Contract Serv.	-0-
17	Freight & Trans.	23,000
18	Other	25,000
19	Insurance	-0-
20	Consultants	22,000
21	Land Use	-0-
24	Testing	305,000
	TOTAL	$407,000

12.0 PLUG AND ABANDONMENT OPERATIONS - TEST WELL

When the test well evaluation has been completed, the test well and the saltwater disposal well will be plugged and abandoned in accordance with the regulations of the Louisiana Office of Conservation. All salvable materials and supplies from the wells will be preserved and placed in storage. The well sites will be cleared and the locations restored to the satisfaction of all concerned parties.

12.1 Procedure for Plug and Abandonment

After a permit is obtained from the Louisiana Office of Conservation, a workover rig will be moved on location. The well will be killed by pumping 17.8 ppg mud down the tubing and up the casing prior to moving the rig on location.

The plug and abandonment procedure for the test well follows and the estimated costs for the operation are included in Table 12-1.

Day No.	Procedure
1	Finish moving in rig and installing equipment.
2	Remove christmas tree and install 10,000 psi working pressure blowout preventers and test them according to Eaton specifications.
3	Pull out of hole with 2-3/8 inch tubing. Pick up EZSV cement retainer and go in hole with retainer on tubing.

Day No.	Procedure
4	Set retainer at 15,450 feet and squeeze perforations with 200 sacks of cement. Final squeeze pressure should be 5,000 psi. Spot 25 sacks of cement on top of retainer.
5	Pull out of hole with tubing.
6	Remove blowout preventers and 5-1/2 inch tubing head. Install blowout preventers on 9-5/8 inch casing. Test blowout preventers.
7	Set a wireline bridge plug at approximately 12,000 feet. Run freepoint indicator in 5-1/2 inch casing and cut casing at freepoint at approximately 12,000 (estimated top of cement).
8	Pull out of hole laying down 5-1/2 inch casing.
9	Set cement retainer above cut casing at about 11,900 feet and spot 100 feet cement plug on top of retainer. Spot 100 feet cement plug at the surface inside the 9-5/8 inch casing.
10	Remove blowout preventers and 9-5/8 inch casing head. Cut all casing strings at least 4 feet below ground level and weld steel plate on the pipe stub.
11	Rig down equipment and move out rig.

TABLE 12-1
ESTIMATED COST TO PLUG AND
ABANDON TEST WELL
C&K - FRANK GODCHAUX, III, WELL NO. 1

Accounting Code	Item	Original Estimate
02	Field Labor	$ 10,000
09	Site	51,000
10	Drilling	79,000
11	Tangible	-0-
12	Expendables	23,000
13	Cementing	33,000
14	Perf., Acid	-0-
15	Equip. Rental	9,000
16	Contract Serv.	63,000
17	Freight & Trans.	16,000
18	Other	3,000
19	Insurance	-0-
20	Consultants	-0-
21	Land Use	-0-
24	Testing	-0-
	TOTAL	$287,000

13.0 PLUG AND ABANDONMENT OPERATIONS - DISPOSAL WELL

Wellhead equipment will be the only salvageable material on this well. The plug and abandonment procedure for the disposal well follows and the estimated costs for the operation are included in Table 13-1.

13.1 Procedure for Plug and Abandonment

A. Rig up cementing truck and establish pump-in rate.

B. Fill 5-1/2 inch casing with cement from the bottom perforation to the surface. This will require about 560 cubic feet of light weight cement.

C. Allow cement to set up. Cut all casing strings at least 4 feet below ground level and weld steel plate on top of pipe stub.

TABLE 13-1
ESTIMATED COST TO PLUG AND
ABANDON DISPOSAL WELL
C&K - FRANK GODCHAUX, III, WELL NO. 1

Accounting Code	Item	Original Estimate
02	Field Labor	-0-
09	Site	2,000
10	Drilling	-0-
11	Tangible	-0-
12	Expendables	-0-
13	Cementing	6,000
14	Perf., Acid	-0-
15	Equip. Rental	-0-
16	Contract Serv.	-0-
17	Freight & Trans.	-0-
18	Other	-0-
19	Insurance	-0-
20	Consultants	-0-
21	Land Use	-0-
24	Testing	-0-
	TOTAL	$8,000

14.0 COST SUMMARY AND TIME SCHEDULE

Included here is a summary of the cost estimates found in this book. Detailed cost estimates are included in this section.

The estimated cost for this project is as follows:

• Complete Test Well	$ 1,738,000
• Drill and Complete Disposal Well	406,000
• Testing Costs	407,000
• Plug and Abandon Test Well	287,000
• Plug and Abandon Disposal Well	8,000
• Eaton Operating Company Test Fee	113,000
	$ 2,959,000

Figure 14-1 is a time schedule graph indicating the estimated time for the various operations.

DOE CONTRACT NO.
DE-AC08-80ET-27081

Eaton Industries of Houston, Inc.
Eaton Operating Co., Inc.
3104 Edloe, Suite 200
Houston, Texas 77027
(713) 627-9764

Detailed Milestone Schedule

Frank Godchaux Well No. 1

ACTIVITIES

1. Re-enter and complete test well.
2. Move rig to disposal site and install equipment.
3. Drill, complete and perforate disposal well.
4. Install production and data acquisition equipment.
5. Run pressure and temperature gradients and place H.P. pressure gauge in tubing.
6. Flow well for initial 24 hour test period.
7. Shut well in for 48 hour build-up test.
8. Test well at higher rate for 5 days.
9. Shut well in for 24 hours.
10. Test well at various flow rates up to maximum of 20,000 BWPD.
11. Shut well in. Take bottom hole pressure for 24 hours. Remove H. P. pressure gauge from tubing.
12. Disconnect and move out test equipment.
13. Move in rig and plug and abandon test well and disposal well.
14. Restore site.

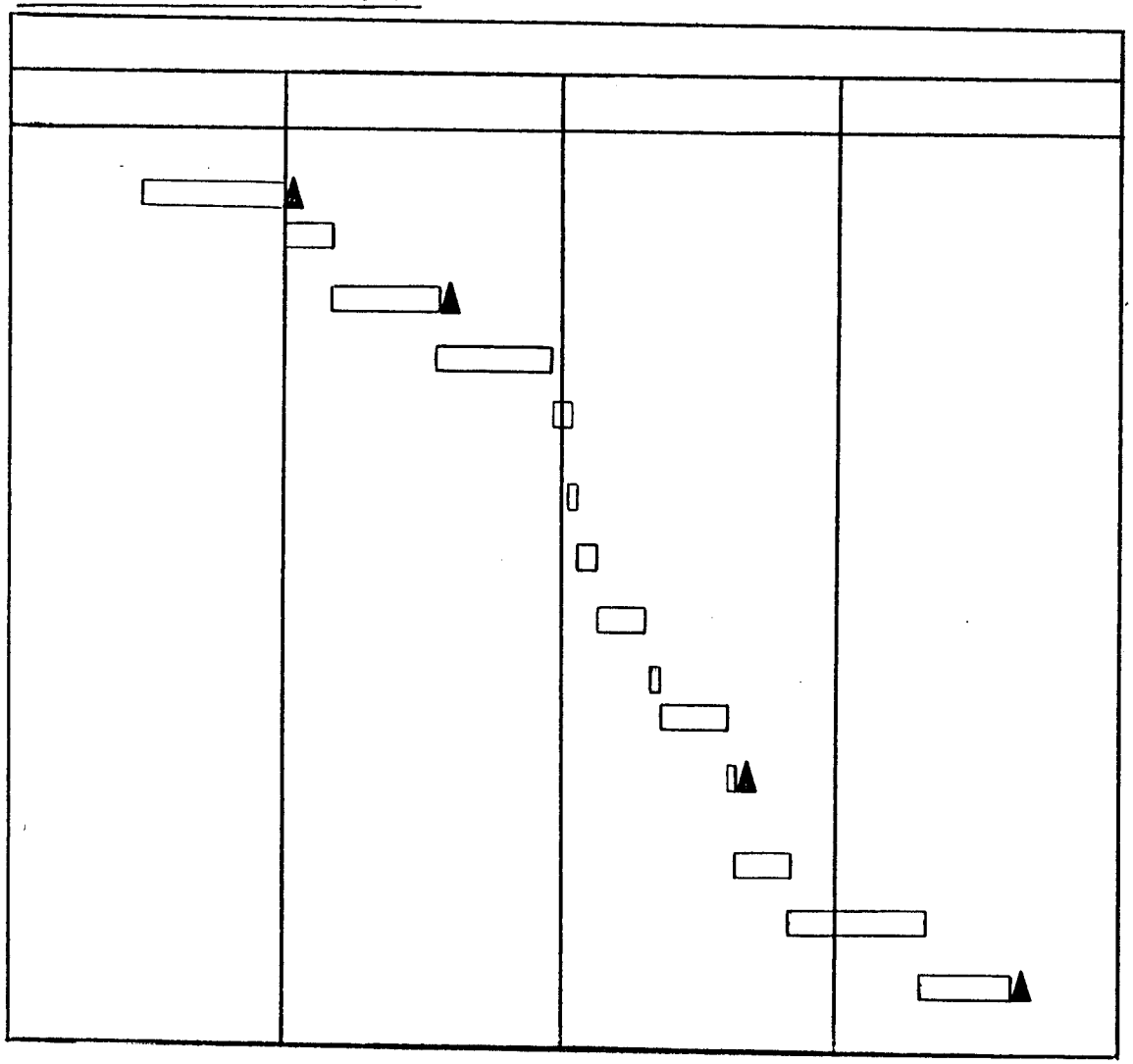


FIGURE 14-1

EATON OPERATING COMPANY, INC.
DETAILED COST ESTIMATE

LEASE & WELL Frank Godchaux #1 | DATE 6/12/81 | BY D.W. Garrett
PROSPECT WOO Test Well | WILDCAT X | DEVELOPMENT
LOCATION Vermilion Parish, LA. | LAND X | WATER
FIELD Live Oak | T.D. 16,000' | COMPL ZONES One

Total estimated cost of project
(6 pages)

	Accounting Code	Completed Well Cost
DRILLING EXPENSE		
a. Move In & Move Out		73
b. Footage: ____ ft. at $____/Ft.		
c. Drilling DW w DP: ____ days at $____/day.		
d. Drilling DW wo DP: ____ days at $____/day.		
e. Testing DW w DP: ____ days at $____/day.		
f. Testing DW w ____ days at $____/day.		
g. Completion DW w DP: ____ days at $____/day.		
h. Completion DW wo DP: ____ days at $____/day.		
i. Completion Rig ____ days at $____/day.		299
j. Other		
TOTAL	10	372
LOCATION EXPENSE		
a. Permits		2
b. Surveyor		3
c. Build Road & Locn		80
d. Dredging		
e. Damages		
f. Clean Up		62
g. Other		10
TOTAL	09	157
MUD & COMPLETION FLUID EXPENSE		
a. Mud, Chemicals, Oil		71
b. Mud Engineer ____ days at $____/day.		
c. Completion Fluid		
d. Other		5
TOTAL	12	76
BITS - DRILLING & COMPLETION		
a. No. ____ - ____ Size at $____ each.		2
b. No. ____ - ____ Size at $____ each.		2
c. No. ____ - ____ Size at $____ each.		
d. No. ____ - ____ Size at $____ each.		
e. No. ____ - ____ Size at $____ each.		
f. Other		
TOTAL	12	4

CEMENTING SERVICE & EQUIPMENT

	Cement	Service	Float Eq.	Cent & Scratch	
a. Cond.					
b. Surf					9
c. Inter					
d. Prod.					53
e. Liner					
f. Other					
g. Squeeze Work					30
h. P&A Charges					36
i. Other					
TOTAL					128

A

COST ESTIMATE: WELL: Frank Godchaux #1

Total Project

	Accounting Code	
CONTRACT SERVICES		
a. Drive Pipe: Hammer, Operator, Welder, etc.		5
b. Conductor Casing: Tools, Tongs, Operator, Crews, etc.		
c. Surface Casing: Tools, Tongs, Operator, Crews, etc.		5
d. Intermediate Casing: Tools, Tongs, Operator, Crews, etc		10
e. Production Casing: Tools, Tongs, Operator, Crews, etc.		27
f. Liner Casing: Tools, Tongs, Operator, Crews, etc.		
g. Mud Logger: _____ days at $_____/day.		
h. Wireline Work: Set BP, Storm Chokes, BPV, etc.		20
i. Tubing Make Up: Tongs, Crews, Computer, etc.		
j. Other:		25
		20
TOTAL	16	112
PROFESSIONAL SERVICES		
a. Consultant: Office Work		
b. Consultant: Wellsite Supervision		
Drilling: _____ days at $_____/day.		38
Completion: _____ days at $_____/day.		
c. Other		10
TOTAL	02	48
EQUIPMENT RENTAL		
a. Surface Equipment:		
Desilter _____ days at $_____/day.		
Centrifuge _____ days at $_____/day.		
Degasser _____ days at $_____/day.		
Shaker _____ days at $_____/day.		
Geolograph _____ days at $_____/day.		2
Pit Level _____ days at $_____/day.		7
Adj. Choke _____ days at $_____/day.		4
Other _____ days at $_____/day.		13
b. Downhole Drilling Equipment (DP, DC, Stab, etc.) _____ days at $_____/day.		63
c. Completion Equipments(BOP, Tubing tools, etc.) _____ days at $_____/day.		30
d. Other		3
TOTAL	15	122
ELECTRIC LOGGING & PERFORATING		
a. Log Type _____ Interval _____		10
b. Log Type _____ Interval _____		
c. Log Type _____ Interval _____		
d. Log Type _____ Interval _____		
e. Cement Bond		18
f. GR/Correlation		12
g. Set WL Packers		
h. Perf		75
i. Perf		
j. Other		10
TOTAL	14	125
CORING SERVICE & ANALYSIS		
a. Conventional Core 3rd Party Charges		
b. SWC: No. _____ Cores at $_____/Core.		
c. Core Analysis		
d. Other		
TOTAL	14	

COST ESTIMATE: WELL: Frank Godchaux #1

Total Project

	Accounting Code	
WELL STIMULATION SERVICES		
a. Swab Unit: _____ days at $_____/day.		
b. Nitrogen Service		
c. Acidize		15
d. Acidize		
e. Acidize		
f. Frac		
g. Frac		
h. Other		
TOTAL	14	15
TESTING SERVICES		
a. DST: No _____ at $_____/Test.		
b. Wireline FT Tests: No _____ at $_____/Test.		
c. Production Test Equipment & Service		
d. Casing Inspection		16
e. Tubing Inspection		
f. Tubing Pressure Testing		
g. Other		
TOTAL	16	16
DIRECTIONAL DRILLING EXPENSE		
a. Directional Tools & Services: _____ days at $_____/day		
b. Directional Surveys		1
c. Other		
TOTAL	16	1
TRANSPORTATION		
a.		24
b.		24
c.		2
d.		
TOTAL	17	50
SALARIED PERSONNEL		
a.		
b.		
c.		
TOTAL	12	
FUEL, POWER, WATER		
a. Fuel:	12	49
b. Water:	12	8
c. Power:	12	30
d. Other:	18	28
	18	
TOTAL		115
OTHER INTANGIBLE EXPENSES		
a. Operator Fee	21	75
b. Landowner Fee	21	25
c. Insurance	19	35
d. Unanticipated Costs		221
TOTAL		356

C

COST ESTIMATE: WELL: Frank Godchaux #1

Total Project

	Accounting Code	
CASING, LINERS, SETTING SERVICES		
a. Drive Pipe:		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		3
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
b. Surface Casing:		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		23
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
c. Intermediate Casing:		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
d. Production Casing:		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		512
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
e. Liner Casing:		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
_____Ft. ____OD ____# ____Gr____Thd $_____/Ft.		
f. Other		2
TOTAL	11	540

TUBING		
a. Tubing Strings Required:		
_____ Ft. ____OD____#____Gr____Thd $_____/Ft.		79
_____ Ft. ____OD____#____Gr____Thd $_____/Ft.		
_____ Ft. ____OD____#____Gr____Thd $_____/Ft.		
_____ Ft. ____OD____#____Gr____Thd $_____/Ft.		
b. Internal Coating:		
c. Other		
TOTAL	11	79

DOWNHOLE EQUIPMENT		
a. Packers		
b. Nipples		
c. Flow Cplgs.		
d. Blast Joints		
e. Other		3
TOTAL	11	3

WELLHEAD EQUIPMENT		
a. Bradenhead: (___in____WP BTM) (___in____WP TOP)		
b. Casinghead: (___in____WP BTM) (___in____WP TOP)		
c. Casinghead: (___in____WP BTM) (___in____WP TOP)		
d. Tubinghead: (___in____WP BTM) (___in____WP TOP)		15
e. Casing & Tubing Hangers		
f. Xmas Tree: Single_____ Dual_____ Triple_____		
No. _____ Valves with _____ WP _____		60
g. Other		45
TOTAL	11	120

D

TESTING COST ESTIMATE: WELL: Frank Godchaux #1

		Total Project	Accounting Code	
SURFACE EQUIPMENT & PRESSURE VESSELS				
a.	Separators:			-
b.	Tanks:			1
c.	Filters:			10
d.	Meters:			2
e.	Pumps:			4
f.	Compressors:			1
g.	Dead Weight Tester:			1
h.	Scrubbers:			-
i.	Dehydrators:			-
j.	Gas Coolers:			-
k.	Water Coolers:			-
	TOTAL		24	19
PIPING, FITTINGS, FLANGES				
a.	Pit Lines			10
b.	Kill Line			2
c.	Kill Line			2
d.	Flange			1
e.				
f.				
	TOTAL		24	15
FOUNDATIONS				
a.	Crews			10
b.	Board Road			20
c.	Location			5
d.	Signs			1
e.				
	TOTAL		24	36
WIRELINE SERVICE				
a.	1 Unit			53
b.				
c.				
	TOTAL		24	53
CHEMICAL INHIBITOR COSTS				
a.	Chemical			3
b.	Service			3
c.	U of H			5
	TOTAL		12	11
LABOR				
a.	Supervisor			18
b.	4 Testers			36
c.	Susistance			3
	TOTAL		24	57

E

TESTING COST ESTIMATE: WELL: Frank Godchaux #1

Total Project

	Accounting Code	
LIGHTING, POWER, LIVING FACILITIES		
a. Living Quarters, etc.		10
b. Water		3
c. Power		10
TOTAL	18	23
TRANSPORTATION		
a. Day Rate		11
b. Extra Hauling		10
TOTAL	17	21
SUPERVISION		
a. 3 Men		14
b. Susistance		4
TOTAL	02	18
CONTRACT SAMPLING & ANALYSIS	24	80
OTHER TESTING COSTS		
a. Sand Detector		2
b. Choke		3
c. Pilot Light		1
d. Swaco Choke		1
e. Reconditioning		10
f.		
g.		
h.		
i.		
j.		
k.		
l.		
m.		
TOTAL	24	17
OUTSIDE CONSULTANTS	20	20
UNANTICIPATED TESTING COSTS		37
EOC FIXED FEES		113
GRAND TOTAL		2,959,000

F

EATON OPERATING COMPANY, INC.
DETAILED COST ESTIMATE

LEASE & WELL Frank Godchaux #1 | DATE 6/12/81 | BY D.W. Garrett
PROSPECT WOO Test Well | WILDCAT X | DEVELOPMENT
LOCATION Vermilion Parish, LA. | LAND X | WATER
FIELD Live Oak | T.D. 16,000' | COMPL ZONES One

Cost to Complete Test Well
(4 pages)

	Accounting Code	Completed Well Cost
DRILLING EXPENSE		
a. Move In & Move Out		25
b. Footage: ft. at $ /Ft.		
c. Drilling DW w DP: days at $ /day.		
d. Drilling DW wo DP: days at $ /day.		
e. Testing DW w DP: days at $ /day.		
f. Testing DW w days at $ /day.		
g. Completion DW w DP: days at $ /day.		
h. Completion DW wo DP: days at $ /day.		
i. Completion Rig 25 days at $8,000 /day.		200
j. Other		
TOTAL	10	225
LOCATION EXPENSE		
a. Permits		1
b. Surveyor		
c. Build Road & Locn Shells and board rental		60
d. Dredging		
e. Damages		
f. Clean Up Prior to moving in.		10
g. Other Roustabout crews		10
TOTAL	09	81
MUD & COMPLETION FLUID EXPENSE		
a. Mud, Chemicals, Oil		40
b. Mud Engineer days at $ /day.		
c. Completion Fluid		
d. Other Transportation and storage		5
TOTAL	12	45
BITS - DRILLING & COMPLETION		
a. No. 2 - 6-3/4" Size at $ 500 each.		1
b. No. - Size at $ each.		
c. No. - Size at $ each.		
d. No. - Size at $ each.		
e. No. - Size at $ each.		
f. Other		
TOTAL	12	1

CEMENTING SERVICE & EQUIPMENT

	Cement	Service	Float Eq.	Cent & Scratch		
a. Cond.						
b. Surf						
c. Inter						
d. Prod.	20	10	5	5		40
e. Liner						
f. Other						
g. Squeeze Work	2 squeeze jobs					30
h. P&A Charges						
i. Other						
TOTAL					13	70

G

COST ESTIMATE: WELL: Frank Godchaux #1

Completion Cost

	Accounting Code	
CONTRACT SERVICES		
a. Drive Pipe: Hammer, Operator, Welder, etc.		
b. Conductor Casing: Tools, Tongs, Operator, Crews, etc.		
c. Surface Casing: Tools, Tongs, Operator, Crews, etc.		
d. Intermediate Casing: Tools, Tongs, Operator, Crews, etc		10
e. Production Casing: Tools, Tongs, Operator, Crews, etc.		
f. Liner Casing: Tools, Tongs, Operator, Crews, etc.		
g. Mud Logger: _____ days at $_____/day.		
h. Wireline Work: Set BP, Storm Chokes, BPV, etc.		10
i. Tubing Make Up: Tongs, Crews, Computer, etc.		
j. Other: Casing pressure test		10
Casing torque turn		10
TOTAL	16	40
PROFESSIONAL SERVICES		
a. Consultant: Office Work		
b. Consultant: Wellsite Supervision		
Drilling: _____ days at $_____/day.		
Completion: 3 men 30 days at $ 660 /day.		20
c. Other 3 men at $50/day food and travel		5
TOTAL	02	25
EQUIPMENT RENTAL		
a. Surface Equipment:		
Desilter _____ days at $_____/day.		
Centrifuge _____ days at $_____/day.		
Degasser _____ days at $_____/day.		
Shaker _____ days at $_____/day.		
Geolograph 25 days at $ 30 /day.		1
Pit Level 25 days at $ 150 /day.		4
Adj. Choke 25 days at $ 80 /day.		2
Other 25 days at $ 300 /day.		8
b. Downhole Drilling Equipment (DP, DC, Stab, etc.)		
25 days at $ 2,500 /day.		63
c. Completion Equipments(BOP, Tubing tools, etc.)		
25 days at $ 1,000 /day.		25
d. Other		
TOTAL	15	103
ELECTRIC LOGGING & PERFORATING		
a. Log Type _____ Interval _____		
b. Log Type _____ Interval _____		
c. Log Type _____ Interval _____		
d. Log Type _____ Interval _____		
e. Cement Bond		10
f. GR/Correlation		10
g. Set WL Packers		
h. Perf		60
i. Perf		
j. Other Casing Caliper		10
TOTAL	14	90
CORING SERVICE & ANALYSIS		
a. Conventional Core 3rd Party Charges		
b. SWC: No. _____ Cores at $_____/Core.		
c. Core Analysis		
d. Other		
TOTAL	14	

H

COST ESTIMATE: WELL: Frank Godchaux #1

Completion Cost

	Accounting Code	
WELL STIMULATION SERVICES		
a. Swab Unit: _____ days at $_____/day.		
b. Nitrogen Service		
c. Acidize		
d. Acidize		
e. Acidize		
f. Frac		
g. Frac		
h. Other		
TOTAL	14	
TESTING SERVICES		
a. DST: No _____ at $_____/Test.		
b. Wireline FT Tests: No _____ at $_____/Test.		
c. Production Test Equipment & Service		
d. Casing Inspection		10
e. Tubing Inspection		
f. Tubing Pressure Testing		
g. Other		
TOTAL	16	10
DIRECTIONAL DRILLING EXPENSE		
a. Directional Tools & Services: _____ days at $_____/day		
b. Directional Surveys		
c. Other		
TOTAL	16	
TRANSPORTATION		
a. 500 x 25		13.
b. Special hauling		10
c.		
d.		
TOTAL	17	23
SALARIED PERSONNEL		
a.		
b.		
c.		
TOTAL	12	
FUEL, POWER, WATER		
a. Fuel: 1000 x 25 x 1.10	12	28
b. Water: Drilling and drinking	12	5
c. Power: Generator rental	12	20
d. Other: Telephone, trailers, septic tanks	18	10
	18	
TOTAL		63
OTHER INTANGIBLE EXPENSES		
a. Operator Fee	21	75
b. Landowner Fee	21	25
c. Insurance	19	30
d. Unanticipated Costs		158
I TOTAL		288

COST ESTIMATE: WELL: Frank Godchaux #1

Completion Cost

		Accounting Code	
CASING, LINERS, SETTING SERVICES			
a. Drive Pipe:			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
b. Surface Casing:			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
c. Intermediate Casing:			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
d. Production Casing: S-95			
12500 Ft. 5½ OD 20 # P-110 Gr LT&C Thd $ 30.00 /Ft.			375
3200 Ft. 5½ OD 20 # P-110 Gr FJ Thd $ 27.00 /Ft.			86
500 Ft. 5½ OD 20 # P-110 Gr FJSP Thd $ 27.84 /Ft.			14
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
e. Liner Casing:			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
f. Other Crossovers			2
TOTAL		11	477
TUBING			
a. Tubing Strings Required:			
16,000 Ft. 2-3/8 OD 4.70 # N80 Gr 8RD Thd $ 4.89 /Ft.			79
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
_____ Ft. _____ OD _____ # ____ Gr ____ Thd $_____ /Ft.			
b. Internal Coating:			
c. Other			
TOTAL		11	79
DOWNHOLE EQUIPMENT			
a. Packers			
b. Nipples			
c. Flow Cplgs.			
d. Blast Joints			
e. Other Misc.			3
TOTAL		11	3
WELLHEAD EQUIPMENT			
a. Bradenhead: (___in_____WP BTM) (___in_____WP TOP)			
b. Casinghead: (___in_____WP BTM) (___in_____WP TOP)			
c. Casinghead: (___in_____WP BTM) (___in_____WP TOP)			
d. Tubinghead: (___in_____WP BTM) (___in_____WP TOP)			15
e. Casing & Tubing Hangers			
f. Xmas Tree: Single_____ Dual_____ Triple_____			
No. _____ Valves with _____ WP _____			60
g. Other Flow Loops			40
TOTAL		11	115
		SUBTOTAL	$1,738,000

EATON OPERATING COMPANY, INC.
DETAILED COST ESTIMATE

LEASE & WELL Frank Godchaux #1 | DATE 6/12/81 | BY D.W. Garrett
PROSPECT Disposal Well | WILDCAT | DEVELOPMENT
LOCATION Vermilion Parish, LA. | LAND X | WATER
FIELD Live Oak | T.D. 4,600 | COMPL ZONES One

Estimated cost to Drill and Complete Disposal Well (4 pages).

	Accounting Code	Completed Well Cost
DRILLING EXPENSE		
a. Move In & Move Out 5 days at 4500		23
b. Footage: ft. at $ /Ft.		
c. Drilling DW w DP: days at $ /day.		
d. Drilling DW wo DP: days at $ /day.		
e. Testing DW w DP: days at $ /day.		
f. Testing DW w days at $ /day.		
g. Completion DW w DP: days at $ /day.		
h. Completion DW wo DP: days at $ /day.		
i. Completion Rig 12 days at $ 4500 /day.		54
j. Other		
TOTAL	10	77
LOCATION EXPENSE		
a. Permits		1
b. Surveyor		3
c. Build Road & Locn		20
d. Dredging		
e. Damages		
f. Clean Up		
g. Other		
TOTAL	09	24
MUD & COMPLETION FLUID EXPENSE		
a. Mud, Chemicals, Oil		16
b. Mud Engineer days at $ /day.		
c. Completion Fluid		
d. Other		
TOTAL	12	16
BITS - DRILLING & COMPLETION		
a. No. 1 - 12-1/4 Size at $ 1000 each.		1
b. No. 2 - 8-3/4 Size at $ 700 each.		2
c. No. - Size at $ each.		
d. No. - Size at $ each.		
e. No. - Size at $ each.		
f. Other		
TOTAL	12	3

CEMENTING SERVICE & EQUIPMENT

	Cement	Service	Float Eq.	Cent & Scratch	
a. Cond.					
b. Surf	5500	1000	1500	500	9
c. Inter					
d. Prod.	9000	1500	1000	1000	13
e. Liner					
f. Other					
g. Squeeze Work					
h. P&A Charges					
i. Other					
TOTAL				13	22

K

COST ESTIMATE: WELL: Frank Godchaux #1

Disposal Well Drilling

	Accounting Code	
CONTRACT SERVICES		
a. Drive Pipe: Hammer, Operator, Welder, etc.		5
b. Conductor Casing: Tools, Tongs, Operator, Crews, etc.		
c. Surface Casing: Tools, Tongs, Operator, Crews, etc.		5
d. Intermediate Casing: Tools, Tongs, Operator, Crews, etc		
e. Production Casing: Tools, Tongs, Operator, Crews, etc.		7
f. Liner Casing: Tools, Tongs, Operator, Crews, etc.		
g. Mud Logger: _____ days at $_____/day.		
h. Wireline Work: Set BP, Storm Chokes, BPV, etc.		
i. Tubing Make Up: Tongs, Crews, Computer, etc.		
j. Other:		
TOTAL	16	17
PROFESSIONAL SERVICES		
a. Consultant: Office Work		
b. Consultant: Wellsite Supervision		
Drilling: 3 men 16 days at $ 660 /day.		11
Completion: _____ days at $_____/day.		
c. Other 3 men at $50/day food and travel		3
TOTAL	02	14
EQUIPMENT RENTAL		
a. Surface Equipment:		
Desilter _____ days at $_____/day.		
Centrifuge _____ days at $_____/day.		
Degasser _____ days at $_____/day.		
Shaker _____ days at $_____/day.		
Geolograph 16 days at $ 30 /day.		1
Pit Level 16 days at $ 150 /day.		3
Adj. Choke 16 days at $ 80 /day.		2
Other 10 days at $ 300 /day.		3
b. Downhole Drilling Equipment (DP, DC, Stab, etc.)		
_____ days at $_____/day.		
c. Completion Equipments(BOP, Tubing tools, etc.)		
4 days at $ 500 /day.		2
d. Other		
TOTAL	15	11
ELECTRIC LOGGING & PERFORATING		
a. Log Type IND-GR-DEN-CAL Interval 4600-1500		10
b. Log Type _____ Interval _____		
c. Log Type _____ Interval _____		
d. Log Type _____ Interval _____		
e. Cement Bond 4600-1500		8
f. GR/Correlation		2
g. Set WL Packers		
h. Perf 100' 4HPF		15
i. Perf		
j. Other		
TOTAL	14	35
CORING SERVICE & ANALYSIS		
a. Conventional Core 3rd Party Charges		
b. SWC: No. _____ Cores at $_____/Core.		
c. Core Analysis		
d. Other		
TOTAL	14	

L

COST ESTIMATE: WELL: Frank Godchaux #1

Disposal Well Drilling

		Accounting Code	
WELL STIMULATION SERVICES			
a.	Swab Unit: _____ days at $_____/day.		
b.	Nitrogen Service		
c.	Acidize		15
d.	Acidize		
e.	Acidize		
f.	Frac		
g.	Frac		
h.	Other		
	TOTAL	14	15
TESTING SERVICES			
a.	DST: No _____ at $_____/Test.		
b.	Wireline FT Tests: No _____ at $_____/Test.		
c.	Production Test Equipment & Service		
d.	Casing Inspection 1.00/Ft		6
e.	Tubing Inspection		
f.	Tubing Pressure Testing		
g.	Other		
	TOTAL	16	6
DIRECTIONAL DRILLING EXPENSE			
a.	Directional Tools & Services: _____ days at $_____/day		
b.	Directional Surveys		1
c.	Other		
	TOTAL	16	1
TRANSPORTATION			
a.	Casing		6
b.	Vacuum Trucks		4
c.	Misc. Equipt.		2
d.			
	TOTAL	17	12
SALARIED PERSONNEL			
a.			
b.			
c.			
	TOTAL	12	
FUEL, POWER, WATER			
a.	Fuel: 1000 x 14 x 1.10	12	16
b.	Water: Drinking	12	2
c.	Power: Generators	12	10
d.	Other: Telephones, Trailers, Septic Tanks	18	15
		18	
	TOTAL		43
OTHER INTANGIBLE EXPENSES			
a.	Operator Fee	21	-0-
b.	Landowner Fee	21	-0-
c.	Insurance	19	5
d.	Unanticipated Costs		37
	TOTAL		42

M

COST ESTIMATE: WELL: Frank Godchaux #1

Disposal Well Drilling

CASING, LINERS, SETTING SERVICES	Accounting Code	
a. Drive Pipe:		
100 Ft. 14 OD ___ # ___ Gr ___ Thd $ 26 /Ft.		3
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
b. Surface Casing:		
1500 Ft. 9-5/8 OD 36 # K-55 Gr LT&C Thd $ 15 /Ft.		23
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
c. Intermediate Casing:		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
d. Production Casing:		
4600 Ft. 5-1/2 OD 15.5 # K-55 Gr LT&C Thd $ 8 /Ft.		37
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
e. Liner Casing:		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
f. Other ___		
TOTAL	11	63

TUBING		
a. Tubing Strings Required: ___		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
___ Ft. ___ OD ___ # ___ Gr ___ Thd $ ___ /Ft.		
b. Internal Coating: ___		
c. Other ___		
TOTAL	11	

DOWNHOLE EQUIPMENT		
a. Packers ___		
b. Nipples ___		
c. Flow Cplgs. ___		
d. Blast Joints ___		
e. Other ___		
TOTAL	11	

WELLHEAD EQUIPMENT		
a. Bradenhead: (___in___WP BTM) (___in___WP TOP)		
b. Casinghead: (___in___WP BTM) (___in___WP TOP)		
c. Casinghead: (___in___WP BTM) (___in___WP TOP)		
d. Tubinghead: (___in___WP BTM) (___in___WP TOP)		
e. Casing & Tubing Hangers ___		
f. Xmas Tree: Single___ Dual___ Triple___		
No. ___ Valves with ___ WP ___		
g. Other Restore used equipment ___		5
TOTAL	11	5
	SUBTOTAL	$406,000

TESTING COST ESTIMATE: WELL: Frank Godchaux #1

(2 pages) Testing

			Accounting Code	
SURFACE EQUIPMENT & PRESSURE VESSELS				
a.	Separators:	DOE Equipment		1
b.	Tanks:	2-100 Bbl Calibration Tanks @ $40		10
c.	Filters:	1-8 Tower Automatic Back Flush @ 335/day		2
d.	Meters:	4 Howco LCD Readouts @ $60		4
e.	Pumps:	Meter Calibration Pump @ $150		1
f.	Compressors:	Instrument air supply @ $35		1
g.	Dead Weight Tester:	Manifold @ $35		
h.	Scrubbers:			
i.	Dehydrators:			
j.	Gas Coolers:			
k.	Water Coolers:			
		TOTAL	24	19
PIPING, FITTINGS, FLANGES				
a.	Pit lines @ $480			10
b.	Casing Kill Line @ $100			2
c.	Tubing Kill Line @ $100			2
d.	10,000 psi flange @ $20			1
e.				
f.				
		TOTAL	24	15
FOUNDATIONS				
a.	Roustabout Crews			10
b.	Board road upkeep and rental			20
c.	Other location costs			5
d.	Signs			1
e.				
		TOTAL	24	36
WIRELINE SERVICE				
a.	1 Unit @ $2500/day			53
b.				
c.				
		TOTAL	24	53
CHEMICAL INHIBITOR COSTS				
a.	Scale Chemical			3
b.	Service Cost			3
c.	University of Houston Costs			5
		TOTAL	12	11
LABOR				
a.	Supervisor @ $840			18
b.	4 Testers @ $1680			36
c.	Susistance @ $25 ea			3
		TOTAL	24	57

TESTING COST ESTIMATE: WELL: Frank Godchaux #1

Testing

	Accounting Code	
LIGHTING, POWER, LIVING FACILITIES		
a. Living Quarters, telephone, etc.		10
b. Water		3
c. Power & Lights		10
TOTAL	18	23
TRANSPORTATION		
a. $500/day		11
b. Extra Hauling		10
TOTAL	17	21
SUPERVISION		
a. 3 men @ $660		14
b. 3 men @ $50 each living and travel		4
TOTAL	02	18
CONTRACT SAMPLING & ANALYSIS	24	80
OTHER TESTING COSTS		
a. Sand detector @ $70		2
b. Flow Line Bypass Choke @ $105		3
c. Pilot light for flare @ $30		1
d. Swaco choke for casing @ $20		1
e. Reconditioning expense		10
f.		
g.		
h.		
i.		
j.		
k.		
l.		
m.		
TOTAL	24	17
OUTSIDE CONSULTANTS	20	20
UNANTICIPATED TESTING COSTS (10%)		37
EOC FIXED FEES		
SUBTOTAL		$407,000

EATON OPERATING COMPANY, INC.
DETAILED COST ESTIMATE

LEASE & WELL Frank Godchaux #1 | DATE 6/12/81 | BY D.W. Garrett
PROSPECT WOO Test Well | WILDCAT X | DEVELOPMENT
LOCATION Vermilion Parish, LA. | LAND X | WATER
FIELD Live Oak | T.D. 16,000' | COMPL ZONES One

Estimated Cost to Plug and Abandon Test Well (3 pages)

	Accounting Code	Completed Well Cost
DRILLING EXPENSE		
a. Move In & Move Out		25
b. Footage: ____ ft. at $____/Ft.		
c. Drilling DW w DP: ____ days at $____/day.		
d. Drilling DW wo DP: ____ days at $____/day.		
e. Testing DW w DP: ____ days at $____/day.		
f. Testing DW w ____ days at $____/day.		
g. Completion DW w DP: ____ days at $____/day.		
h. Completion DW wo DP: ____ days at $____/day.		
i. Completion Rig 10 days at $4500 /day.		45
j. Other		
TOTAL	10	70
LOCATION EXPENSE		
a. Permits		
b. Surveyor		
c. Build Road & Locn		
d. Dredging		
e. Damages		
f. Clean Up		50
g. Other		
TOTAL	09	50
MUD & COMPLETION FLUID EXPENSE		
a. Mud, Chemicals, Oil		15
b. Mud Engineer ____ days at $____/day.		
c. Completion Fluid		
d. Other		
TOTAL	12	15
BITS - DRILLING & COMPLETION		
a. No. ____ - ____ Size at $____ each.		
b. No. ____ - ____ Size at $____ each.		
c. No. ____ - ____ Size at $____ each.		
d. No. ____ - ____ Size at $____ each.		
e. No. ____ - ____ Size at $____ each.		
f. Other		
TOTAL	12	

CEMENTING SERVICE & EQUIPMENT

	Cement	Service	Float Eq.	Cent & Scratch		
a. Cond.						
b. Surf						
c. Inter						
d. Prod.						
e. Liner						
f. Other						
g. Squeeze Work						
h. P&A Charges						30
i. Other						
TOTAL					13	30

Q

COST ESTIMATE: WELL: Frank Godchaux #1

P&A of Test Well

		Accounting Code	
CONTRACT SERVICES			
a.	Drive Pipe: Hammer, Operator, Welder, etc.		
b.	Conductor Casing: Tools, Tongs, Operator, Crews, etc.		
c.	Surface Casing: Tools, Tongs, Operator, Crews, etc.		
d.	Intermediate Casing: Tools, Tongs, Operator, Crews, etc		10
e.	Production Casing: Tools, Tongs, Operator, Crews, etc.		10
f.	Liner Casing: Tools, Tongs, Operator, Crews, etc.		
g.	Mud Logger: _____ days at $_____/day.		
h.	Wireline Work: Set BP, Storm Chokes, BPV, etc.		10
i.	Tubing Make Up: Tongs, Crews, Computer, etc.		
j.	Other: Casing Lay Down Service		15
	Bridge Plugs		10
	TOTAL	16	55
PROFESSIONAL SERVICES			
a.	Consultant: Office Work		
b.	Consultant: Wellsite Supervision		
	Drilling: 3 men 10 days at $ 660 /day.		7
	Completion: _____ days at $_____/day.		
c.	Other 3 men at $50/day each food and travel		2
	TOTAL	02	9
EQUIPMENT RENTAL			
a.	Surface Equipment:		
	Desilter _____ days at $_____/day.		
	Centrifuge _____ days at $_____/day.		
	Degasser _____ days at $_____/day.		
	Shaker _____ days at $_____/day.		
	Geolograph _____ days at $_____/day.		
	Pit Level _____ days at $_____/day.		
	Adj. Choke _____ days at $_____/day.		
	Other 10 days at $ 200 /day.		2
b.	Downhole Drilling Equipment (DP, DC, Stab, etc.)		
	_____ days at $_____/day.		
c.	Completion Equipments(BOP, Tubing tools, etc.)		
	10 days at $ 300 /day.		3
d.	Other 10 300		3
	TOTAL	15	8
ELECTRIC LOGGING & PERFORATING			
a.	Log Type _____ Interval _____		
b.	Log Type _____ Interval _____		
c.	Log Type _____ Interval _____		
d.	Log Type _____ Interval _____		
e.	Cement Bond		
f.	GR/Correlation		
g.	Set WL Packers		
h.	Perf		
i.	Perf		
j.	Other		
	TOTAL	14	
CORING SERVICE & ANALYSIS			
a.	Conventional Core 3rd Party Charges		
b.	SWC: No. _____ Cores at $_____/Core.		
c.	Core Analysis		
d.	Other		
	TOTAL	14	

R

COST ESTIMATE: WELL: Frank Godchaux #1

P&A of Test Well

	Accounting Code	
WELL STIMULATION SERVICES		
a. Swab Unit: _____ days at $_____/day.		
b. Nitrogen Service		
c. Acidize		
d. Acidize		
e. Acidize		
f. Frac		
g. Frac		
h. Other		
TOTAL	14	
TESTING SERVICES		
a. DST: No _____ at $_____/Test.		
b. Wireline FT Tests: No _____ at $_____/Test.		
c. Production Test Equipment & Service		
d. Casing Inspection		
e. Tubing Inspection		
f. Tubing Pressure Testing		
g. Other		
TOTAL	16	
DIRECTIONAL DRILLING EXPENSE		
a. Directional Tools & Services: _____ days at $_____/day		
b. Directional Surveys		
c. Other		
TOTAL	16	
TRANSPORTATION		
a. $500/day		5
b. Haul to storage		10
c.		
d.		
TOTAL	17	15
SALARIED PERSONNEL		
a.		
b.		
c.		
TOTAL	12	
FUEL, POWER, WATER		
a. Fuel: $500/day	12	5
b. Water:	12	1
c. Power:	12	
d. Other:	18	3
	18	
TOTAL		9
OTHER INTANGIBLE EXPENSES		
a. Operator Fee	21	-0-
b. Landowner Fee	21	-0-
c. Insurance	19	-0-
d. Unanticipated Costs		26
TOTAL	SUBTOTAL	$287,000

EATON OPERATING COMPANY, INC.
DETAILED COST ESTIMATE

LEASE & WELL Frank Godchaux #1 | DATE 6/12/81 | BY D.W. Garrett
PROSPECT Disposal Well | WILDCAT | DEVELOPMENT
LOCATION Vermilion Parish, LA. | LAND | WATER
FIELD Live Oak | T.D. 4,600' | COMPL. ZONES One

Estimated Cost to Plug and Abandon Disposal Well (1 page)

	Accounting Code	Completed Well Cost
DRILLING EXPENSE		
a. Move In & Move Out		
b. Footage: ft. at $ /Ft.		
c. Drilling DW w DP: days at $ /day.		
d. Drilling DW wo DP: days at $ /day.		
e. Testing DW w DP: days at $ /day.		
f. Testing DW w days at $ /day.		
g. Completion DW w DP: days at $ /day.		
h. Completion DW wo DP: days at $ /day.		
i. Completion Rig days at $ /day.		
j. Other		
TOTAL	10	
LOCATION EXPENSE		
a. Permits		
b. Surveyor		
c. Build Road & Locn		
d. Dredging		
e. Damages		
f. Clean Up		2
g. Other		
TOTAL	09	2
MUD & COMPLETION FLUID EXPENSE		
a. Mud, Chemicals, Oil		
b. Mud Engineer days at $ /day.		
c. Completion Fluid		
d. Other		
TOTAL	12	
BITS - DRILLING & COMPLETION		
a. No. - Size at $ each.		
b. No. - Size at $ each.		
c. No. - Size at $ each.		
d. No. - Size at $ each.		
e. No. - Size at $ each.		
f. Other		
TOTAL	12	

CEMENTING SERVICE & EQUIPMENT

	Cement	Service	Float Eq.	Cent & Scratch		
a. Cond.						
b. Surf						
c. Inter						
d. Prod.						
e. Liner						
f. Other						
g. Squeeze Work						
h. P&A Charges						6
i. Other						
TOTAL					13	6
T					SUBTOTAL	8

EATON OPERATING COMPANY, INC.
DETAILED COST ESTIMATE

LEASE & WELL Frank Godchaux No. 1 | DATE 6/19/81 | BY D.W. Garrett
PROSPECT WOO Test Well | WILDCAT x | DEVELOPMENT
LOCATION Vermilion Parish, LA | LAND x | WATER
FIELD Live Oak | T.D. 16,000' | COMPL. ZONES One

Optional Test	Accounting Code	Completed Well Cost
DRILLING EXPENSE		
a. Move In & Move Out		10
b. Footage: ____ ft. at $____/Ft.		
c. Drilling DW w DP: ____ days at $____/day.		
d. Drilling DW wo DP: ____ days at $____/day.		
e. Testing DW w DP: ____ days at $____/day.		
f. Testing DW w ____ days at $____/day.		
g. Completion DW w DP: ____ days at $____/day.		
h. Completion DW wo DP: ____ days at $____/day.		
i. Completion Rig 10 days at $ 6000 /day.		60
j. Other		
TOTAL	10	70
LOCATION EXPENSE		
a. Permits		
b. Surveyor		
c. Build Road & Locn Board Rental		5
d. Dredging		
e. Damages		
f. Clean Up		10
g. Other		
TOTAL	09	15
MUD & COMPLETION FLUID EXPENSE		
a. Mud, Chemicals, Oil		20
b. Mud Engineer ____ days at $____/day.		
c. Completion Fluid		
d. Other		
TOTAL	12	20
BITS - DRILLING & COMPLETION		
a. No. ____ - ____ Size at $____ each.		
b. No. ____ - ____ Size at $____ each.		
c. No. ____ - ____ Size at $____ each.		
d. No. ____ - ____ Size at $____ each.		
e. No. ____ - ____ Size at $____ each.		
f. Other		
TOTAL	12	

CEMENTING SERVICE & EQUIPMENT

	Cement	Service	Float Eq.	Cent & Scratch	
a. Cond.					
b. Surf					
c. Inter					
d. Prod.					
e. Liner					
f. Other					
g. Squeeze Work					
h. P&A Charges Spot Plug					25
i. Other					
TOTAL					25
				13	

COST ESTIMATE: WELL: Frank Godchaux No. 1

Optional Test

		Accounting Code	
CONTRACT SERVICES			
a.	Drive Pipe: Hammer, Operator, Welder, etc.		
b.	Conductor Casing: Tools, Tongs, Operator, Crews, etc.		
c.	Surface Casing: Tools, Tongs, Operator, Crews, etc.		
d.	Intermediate Casing: Tools, Tongs, Operator, Crews, etc		
e.	Production Casing: Tools, Tongs, Operator, Crews, etc.		
f.	Liner Casing: Tools, Tongs, Operator, Crews, etc.		
g.	Mud Logger: _____ days at $_____/day.		
h.	Wireline Work: Set BP, Storm Chokes, BPV, etc.		10
i.	Tubing Make Up: Tongs, Crews, Computer, etc.		
j.	Other:		
	TOTAL	16	10
PROFESSIONAL SERVICES			
a.	Consultant: Office Work		
b.	Consultant: Wellsite Supervision		
	Drilling: _____ days at $_____/day.		
	Completion: 4 men 10 days at $875 /day.		9
c.	Other 4 men x $50/day x 10 days Living and Travel		2
	TOTAL	02	11
EQUIPMENT RENTAL			
a.	Surface Equipment:		
	Desilter _____ days at $_____/day.		
	Centrifuge _____ days at $_____/day.		
	Degasser _____ days at $_____/day.		
	Shaker _____ days at $_____/day.		
	Geolograph _____ days at $_____/day.		
	Pit Level _____ days at $_____/day.		
	Adj. Choke _____ days at $_____/day.		
	Other 10 days at $200 /day.		2
b.	Downhole Drilling Equipment (DP, DC, Stab, etc.) 10 days at $ 300 /day.		3
c.	Completion Equipments(BOP, Tubing tools, etc.) 10 days at $ 300 /day.		3
d.	Other		
	TOTAL	15	8
ELECTRIC LOGGING & PERFORATING			
a.	Log Type _____ Interval _____		
b.	Log Type _____ Interval _____		
c.	Log Type _____ Interval _____		
d.	Log Type _____ Interval _____		
e.	Cement Bond		
f.	GR/Correlation		
g.	Set WL Packers		
h.	Perf		50
i.	Perf		
j.	Other		
	TOTAL	14	50
CORING SERVICE & ANALYSIS			
a.	Conventional Core 3rd Party Charges		
b.	SWC: No. _____ Cores at $_____/Core.		
c.	Core Analysis		
d.	Other		
	TOTAL	14	

COST ESTIMATE: WELL: Frank Godchaux, No.1
Optional Test

	Accounting Code	
WELL STIMULATION SERVICES		
a. Swab Unit: _____ days at $_____/day.		
b. Nitrogen Service		
c. Acidize		
d. Acidize		
e. Acidize		
f. Frac		
g. Frac		
h. Other		
TOTAL	14	
TESTING SERVICES		
a. DST: No _____ at $_____/Test.		
b. Wireline FT Tests: No _____ at $_____/Test.		
c. Production Test Equipment & Service		
d. Casing Inspection		
e. Tubing Inspection		
f. Tubing Pressure Testing		
g. Other		
TOTAL	16	
DIRECTIONAL DRILLING EXPENSE		
a. Directional Tools & Services: _____ days at $_____/day		
b. Directional Surveys		
c. Other		
TOTAL	16	
TRANSPORTATION		
a. 500/day		5
b. Haul to storage		10
c.		
d.		
TOTAL	17	15
SALARIED PERSONNEL		
a.		
b.		
c.		
TOTAL	12	
FUEL, POWER, WATER		
a. Fuel: 1000/day	12	10
b. Water: 100/day	12	1
c. Power: 50/day	12	1
d. Other: Living Facilities, telephones	18	3
TOTAL		15
OTHER INTANGIBLE EXPENSES		
a. Operator Fee	21	0
b. Landowner Fee	21	0
c. Insurance	19	0
d. Unanticipated Costs		19
TOTAL		19

COST ESTIMATE: WELL: Frank Godchaux, No. 1

Optional Test

	Accounting Code	
CASING, LINERS, SETTING SERVICES		
a. Drive Pipe:		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
b. Surface Casing:		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
c. Intermediate Casing:		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
d. Production Casing:		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
e. Liner Casing:		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
_____Ft. _____OD _____# ____Gr____Thd $_____/Ft.		
f. Other_____		
_____		
TOTAL	11	
TUBING		
a. Tubing Strings Required: _____		
_____ Ft. _____OD_____# ____Gr____Thd $_____/Ft.		
_____ Ft. _____OD_____# ____Gr____Thd $_____/Ft.		
_____ Ft. _____OD_____# ____Gr____Thd $_____/Ft.		
_____ Ft. _____OD_____# ____Gr____Thd $_____/Ft.		
b. Internal Coating:_____		
c. Other_____		
_____		
TOTAL	11	
DOWNHOLE EQUIPMENT		
a. Packers Cement Retainer		5
b. Nipples_____		
c. Flow Cplgs._____		
d. Blast Joints_____		
e. Other_____		
_____		
TOTAL	11	
WELLHEAD EQUIPMENT		
a. Bradenhead: (___in_____WP BTM) (___in_____WP TOP)		
b. Casinghead: (___in_____WP BTM) (___in_____WP TOP)		
c. Casinghead: (___in_____WP BTM) (___in_____WP TOP)		
d. Tubinghead: (___in_____WP BTM) (___in_____WP TOP)		
e. Casing & Tubing Hangers_____		
f. Xmas Tree: Single_____ Dual_____ Triple_____		
No. _____ Valves with _____ WP _____		
g. Other_____		
_____		
TOTAL	11	
	SUBTOTAL	263,000

X

TESTING COST ESTIMATE: WELL: Frank Godchaux, No. 1

Optional Test

		Accounting Code	
SURFACE EQUIPMENT & PRESSURE VESSELS			
a. Separators:	DOE Equipment		-
b. Tanks:	2-100 bbl calibration tanks @ $40		1
c. Filters:	Back Flushing Filter @ $300		7
d. Meters:	4 Howco LCD Readouts @ $60		2
e. Pumps:	Meter Calibration Pump @ $150		4
f. Compressors:	Instrument air supply @ $35		1
g. Dead Weight Tester:	Manifold @ $35		1
h. Scrubbers:			
i. Dehydrators:			
j. Gas Coolers:			
k. Water Coolers:			
	TOTAL	24	16
PIPING, FITTINGS, FLANGES			
a.	Pit Lines @ $480		10
b.	Casing Kill Line @ $100		2
c.	Tubing Kill Line @ $100		2
d.	Flange @ $20		1
e.			
f.			
	TOTAL	24	15
FOUNDATIONS			
a.	Roustabout Crews		10
b.	Board Road Upkeep and Rental		25
c.	Other location costs		5
d.			
e.			
	TOTAL	24	40
WIRELINE SERVICE			
a.	Gearheart Industries BH Sampling		10
b.	Wireline BHP Recording @ 3100/day		70
c.			
	TOTAL	24	80
CHEMICAL INHIBITOR COSTS			
a.	Scale Chemical		3
b.	Corrosion Chemical		3
c.	Service Cost		5
	TOTAL	12	11
LABOR			
a.	Supervisor @ $840/day		18
b.	4 Testers @ 1680/day		36
c.	Susistence @ $25 each		3
	TOTAL	24	57

Y

TESTING COST ESTIMATE: WELL: Frank Godchaux No. 1

Optional Test

	Accounting Code	
LIGHTING, POWER, LIVING FACILITIES		
a. Living Quarters, Telephone, etc.		10
b. Power and lights		10
c. Water		3
TOTAL	18	23
TRANSPORTATION		
a. 500/day		11
b. Extra hauling		10
TOTAL	17	21
SUPERVISION		
a. 3 men @ $660/day		13
b. 3 men @ $150/day susistence		3
TOTAL	02	16
CONTRACT SAMPLING & ANALYSIS - I.G.T.	24	80
OTHER TESTING COSTS		
a. 440 bbl mud kill system @ 800/day		17
b. Flowline by-pass choke @ $105		2
c. Pilot light for flare @ $30		1
d. Swaco choke for casing @ $20		1
e. Sand detector @ $70		2
f.		
g.		
h.		
i.		
j.		
k.		
l.		
m.		
TOTAL	24	23
OUTSIDE CONSULTANTS	20	5
UNANTICIPATED TESTING COSTS		39
EOC FIXED FEES		-0-
SUBTOTAL		426
GRAND TOTAL FOR OPTIONAL TEST		689

15.0 OPTION TO TEST ADDITIONAL SAND

After testing of the zone from 15,584 feet to 15,692 feet is completed and upon approval of all concerned parties, the well could be plugged back to a second zone and tested through perforations 14,905 feet to 15,006 feet.

15.1 Plug Back Procedure

A workover rig will have to be moved on location to perform the plug back. The well should be killed with 17.8 ppg oil based mud prior to moving in the rig. The workover procedure for the plug back follows:

Day No.	Procedure
1	Finish moving in rig and rigging up
2	Nipple down christmas tree and nipple up blowout preventer. Test blowout preventers according to EOC specifications.
3	Pull out of hole with tubing.
4	Go in hole with cement retainer on tubing and set it at 15,500 feet. Squeeze perforations 15,584 feet to 15,692 feet with 200 sacks of cement and spot 100 feet cement plug on top of retainer.
5	Pull out of hole with tubing and install wireline guide on tubing. Go in hole with tubing.
6	Displace 17.8 ppg mud with 9.0 ppg saltwater. Pull tubing up to 14,800 feet.
7	Nipple down blowout preventers and nipple up christmas tree.
8	Pressure test casing and christmas tree to 7,500 psi. Rig down equipment and move out rig.

Day No.	Procedure
9	After rig has moved out, perforate well from 14,905 feet to 15,006 feet with 1-11/16 inch hollow carrier gun, 8 holes per foot. Pressure casing up to 5,700 psi prior to first perforating job.

15.2 Testing of Second Zone

The surface production and test facilities and the well test procedure are expected to be similar to the test on the first zone. Reference is made to Sections 10.0 and 11.0 in this book for test facilities and procedures.

Plug back and testing costs are shown in Tables 15-1 and 15-2 respectively.

TABLE 15-1

ESTIMATED COST TO COMPLETE

OPTIONAL SAND

C & K - FRANK GODCHAUX, III, WELL NO. 1

Accounting Code	Item	Original Estimate
02	Field Labor	$ 12,000
09	Site	16,000
10	Drilling	75,000
11	Tangible	6,000
12	Expendables	34,000
13	Cementing	27,000
14	Perf., Acid	54,000
15	Equip. Rental	9,000
16	Contract Service	10,000
17	Freight & Trans.	16,000
18	Other	3,000
19	Insurance	-0-
20	Consultants	-0-
21	Land Use	-0-
24	Testing	-0-
	TOTAL	$ 263,000

TABLE 15-2

ESTIMATED COST TO PERFORM OPTIONAL

GEOPRESSURED-GEOTHERMAL TEST

C & K - FRANK GODCHAUX, III, WELL NO. 1

Accounting Code	Item	Original Estimate
02	Field Labor	$ 18,000
09	Site	-0-
10	Drilling	-0-
11	Tangible	-0-
12	Expendables	12,000
13	Cementing	-0-
14	Perf., Acid	-0-
15	Equip. Rental	-0-
16	Contract Serv.	-0-
17	Freight & Trans.	23,000
18	Other	25,000
19	Insurance	-0-
20	Consultants	6,000
21	Land Use	-0-
24	Testing	342,000
	TOTAL	$ 426,000

SITE-SPECIFIC ENVIRONMENTAL INFORMATION CHECKLIST

GEOPRESSURED-GEOTHERMAL WELL TEST PROGRAM

WELL FRANK A. GODCHAUX,III, WELL NO. 1

LOCATION VERMILION 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_____ No X If no, explain.
Applications not approved as of this printing.

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.

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_____ No X If yes, describe.

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. Location is covered with wooden boards - low lying farmland.

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.

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__X__ No_____ If no, explain.

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__X__ No_____ If no, explain.

4 Is the temperature of produced geopressured fluid expected to be 260° F 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.

Under certain conditions, lower working pressure blowout preventers may be used.

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

   Yes_____ No X If no, explain.
   Pressures are not expected to be greater than 7,000 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.

    C & K surveyed the well to 16,000'.

11. Will a lined pond be used to hold all liquid effluents and production fluids that are not injected? Yes_____ No X

    If no, explain. Reserve pit in place. State of Louisiana has no problems with it as is.

12. Has an injection permit been obtained? Yes_____ No X

    If no, explain. Permit applied for, but not approved at time of this printing.

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

    If no, explain.
    No H_2S expected.

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_____

    No X If no, explain. No H_2S expected.

16. Will high-pressure engineering and mud logging personnel be on site during production will drilling operations? Yes_____ No__X__ If no, explain. No drilling will be ocnducted on the the test well. Will install gas monitor and other safety equipment.