OCS G 3243
G-0043

In Reply Refer To: FO-2-3

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

State of Texas
Director of Budget and Planning
Attention: Mr. Roy Hogan
411 W. 13th Street
Austin, Texas 78701

Gentlemen:

In accordance with our letter of February 3, 1978, and 30 CFR 250.34-3(b)(2), revised January 27, 1978, enclosed are eight copies of a proposed Development/Production Plan and an addendum to the Environmental Report submitted by Transco Exploration Company, for lease OCS-G 3243, Block A-492, High Island Area. Transco acquired this lease in OCS Lease Sale No. 38A. Your office has received eight advance copies of the subject Environmental Report.

Pursuant to the regulations, the supervisor (USGS) shall not grant or deny approval for a proposed Development/Production Plan until written comments have been received from the Governor of each affected state, or until 60 days after each affected state receives a copy of the proposed plan and the accompanying Environmental Report.

Please refer to Control No. G-0043 in all communication and correspondence concerning the subject plan. Your cooperation in this matter is appreciated.

Sincerely yours,

(Orig. Sgd.) D. W. Solanas

D. W. Solanas
Oil and Gas Supervisor
Field Operations
Gulf of Mexico Area

Enclosure

cc: OCS-G 3243
CM-2-4 w/enclosure

LEHamby:djs:6/7/78

BEST AVAILABLE COPY

Transco Exploration Company
A Subsidiary of Transco Companies Inc.
2700 South Post Oak Road
P. O. Box 1396
Houston, Texas 77001
713-626-8100

United States Department of the Interior
Geological Survey
P. O. Box 2006
Freeport, Texas 77541

ATTN: Mr. Jack Sandridge

RE: Development and Production Plan
and Environmental Report
High Island Block 492
OCS-G- 3243

Gentlemen:

In accordance with the revised Oil and Gas Regulations for the Outer Continental Shelf, 30 CFR 250.34, effective January 27, 1978, Transco Exploration Company submits the subject Development and Production Plan and Environmental Report for your approval. As per the USGS interim guidelines dated March 7, 1978, attached are twenty-four copies of the Development and Production Plan, along with twenty-four copies of the Environmental Report. Seven of the Development and Production Plans contain proprietary data and have been noted "for USGS use only".

If you require any further information, please notify us immediately.

Yours very truly,

TRANSCO EXPLORATION COMPANY

Hal L. Bettis
Hal L. Bettis
Production Manager

HLB:vw

Development and Production Plan
High Island Block 492
OCS-G-3243

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* Note: Sections C and D shall be exempt from disclosure under the Freedom of Information Act (5.U.S.C. 552) and Implementing Regulations (43 CFR Part 2).

A. Development Plan and Schedule

Transco Exploration Company plans to develop High Island Block 492 from an 8-pile, 12 slot, self-contained drilling and production platform located at 5200' from the east line and 6400' from the north line of Block 492. All 12 wells will be drilled and completed from the "A" platform. Wells No. 1, 2, 3 and 4 were drilled as exploratory wells and plugged and abandoned. As shown on the enclosed plat, the 30" HIOS gas pipeline crosses Block 492 and from the southwest corner to the northeast corner. No subsea completions are planned for Block 492. Transco will not drill and produce simultaniously from Block 492. As shown by the development schedule, after all the wells are drilled and completed, the rig will be removed and the production equipment will be installed. The production facility design will be initiated after a few wells are drilled from the platform. High Island 492 production will consist of gas and condensate. Both gas and condensate will be piped from the platform in a single sales pipeline while the water will be dumped overboard at the platform site. Transcontinental Gas Pipeline Corporation will lay a gas sales line to the existing HIOS pipeline in Block 492. Transco's proposed schedule for development and production is as follows:

Activity	Date
Load-out and Install Platform "A"	10/78 - 11/78
Initiate Drilling Operations	11/1/78
Drill A-1 thru A-12	11/78 - 9/79
Complete A-1 thru A-12	9/79 - 3/80
Remove Rig & Install Production Equip	3/80 - 5/80

B. Platform and Rig Description

Transco Exploration Company plans to install one 12 well, 8-pile, self-contained drilling and production platform for High Island Block 492. The platform is currently under construction by Delta Fabrication in Houma, LA. Transco has contracted the use of Loffland Brothers Rig No. 79 for use at High Island 492. A detailed description of the rig is included as Exhibit III.

In accordance with 30 CFR 250.19 (a) and OCS Order No. 8, an application to install the "A" platform is submitted for approval as Exhibit II. A general description of the structure is as follows:

The 8-pile deck consists of a single cellar deck with the two major skid beams forming the base for the upper deck sections. Total overall dimensions are 80' x 164'. The top deck will consist of skid packaged units. The piles are 48" diameter x 1.50 w.t. at the mudline for the 8-pile structure with a penetration below the mudline of 296 feet. The soil boring tests for the platform was performed by Fugro Gulf, Inc. The structure was designed for 100 year storm as per A. H. Glenn and Associates. The cathodic protection for the jacket members have been designed from a minimum of 20-year life. The 8-pile self-contained platform has two (2) Whitaker Survival capsules, both on the main deck. A vent boom will be installed prior to the production phase. The platform will be equipped with fire-fighting equipment as per OCS Order No. 8. Both water and chemical will be utilized to provide the needed protection where production equipment is located. The living quarters, both temporary and permanent, will be equipped with portable fire extinguishers. The design and fabrication of these structures were in accordance with the following codes and/or regulations:

1) The piling, jackets, and bridge in accordance with API RP2A (latest edition) of the American Petroleum institute; 2) All structural steel members comprising the main decks were designed in accordance with the latest edition of the AISC Steel Construction Manual; 3) All welding and fabrication will be in accordance with the American Welding Society. Curbs, gutters, and drains will be installed in all deck areas along with drip pans under the production equipment. All contaminants and treated produced water will be piped to a sump which will automatically maintain the oil at a level sufficient to prevent the discharge of oil into Gulf waters, as per OCS Order No. 8.

Attached as Exhibit III is a schematic of a typical self-contained platform rig similar to the rig contracted for the development program. The rig will be equipped with pollution control equipment, including, but not limited to, deck drains, sumps, drip pans, and sewage treatment facilities. A list of typical mud additives is enclosed as Exhibit IV, as per the non-pollution requirements of OCS Order No. 2. Also attached as Exhibit V is a schematic description of the typical blowout prevention equipment and divertor system anticipated to be utilized for well control during the development program. The pressure control systems will conform to the requirements outlined in OCS Order No. 2.

E. Environmental Safeguards

Transco Exploration Company will adhere to those applicable environmental safeguards outlined in OCS Order No. 1 thru 14 regarding the drilling and production operations of the development wells. Transco Exploration Company is a member of Clean Gulf Associates and as such will utilize CGA manpower, equipment and expertise of Peterson Maritime Services, Inc. as well as other similarly knowledgeable companies in the industry as needed. A copy of Transco's approval Oil Spill Contingency Plan is included in Exhibit VII.

Transco will not dispose drilling mud containing free oil into the Gulf. Curbs, gutters, and drains will be installed in all deck areas along with drip pans under the production equipment. All contaminants and treated water will be piped to a sump which will automatically maintain the oil at a level sufficient to prevent the discharge of oil into Gulf Waters, as per OCS Order No. 8. Transco's personnel will be instructed in the techniques of equipment maintenance and operation for the prevention of pollution. Pollutiion inspections will be performed as per OCS Order No. 7. All solid waste will be disposed of as per OCS Order No. 7.

F. Safety Standards and Features

A description of the safety standards and features applicable to the High Island Block 492 production equipment and platform is outlined below:

Production Equipment

Transco's production facility, which will be designed after more geological data is obtained, will be located on High Island Block 492-"A". The facility will be protected by the following pneumatic and electric/electronic control systems: 1. A SCSSV Hydraulic Downhole Ball Valve Panel, 2. a well Pilot Panel, 3. and a Safety Control and Production Pilot Panel. The purpose of these control panels is to monitor the production from the wellhead until discharge from the facility. These panels will monitor the functions of the devices that are required by the OCS Orders and API RP 14C concerning safety and anti-pollution prevention control. All of the appropriate devices required by the OCS Orders and API RP 14C will be installed as per these documents.

All wells completed in Block 492 will be equipped with a subsurface safety device as specified in OCS Order No. 5. These devices will be periodically tested as prescribed by the Supervisor. The SCSSV panel will control the downhole ball valves that would shut-off the flow of production from the wellbore in the case of a major facility upset. The Well Pilot Panel will monitor the pressures of each well and in the case of an undesirable event will actuate the SSV's (Surface Safety Valves). The Safety Control and Production Pilot Panel will monitor the conditions of the production vessels, compressor(s), EDS stations, fusible plugs, and gas detectors. This panel will alarm, annuniciate, and actuate the appropriate device to alleviate or isolate any undesirable event. The production equipment is being designed to adhere to the following codes and regulations:

1. OCS Order No. 8, 2) API RP 14D, 3) API RP 14C, API RP 14E.

As soon as the production equipment design is complete, an application for approval will be submited to the USGS, as per OCS Order No. 8.

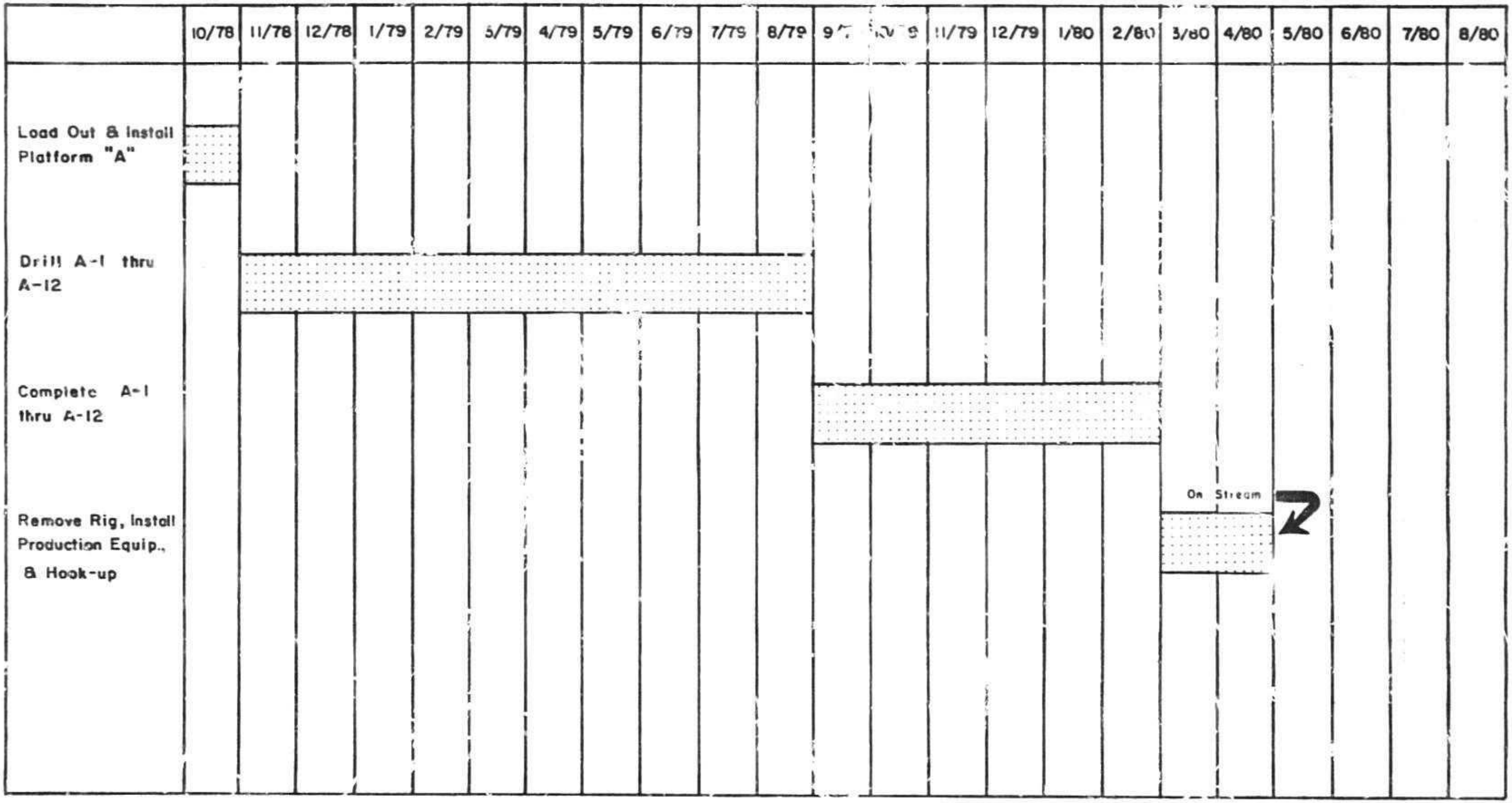
Platforms

The "A" structures were designed for 100-year storm as per A. H. Glenn and Associates. The cathodic protection for the jacket members have been designed for a minimum of 20-year life. The 8-pile self-contained platform has two Whitaker Survival Capsules, both on the main deck. The design and fabrication of the structure were in accordance with the following codes and/or regulations.

1) The piling, jackets, and bridge in accordance with API R edition) of the American Petroleum Institute; 2) All str members comprising the main decks were designed in acc the latest edition of the AISC Steel Construction Manual; elding and fabrication will be in accordance with the American ding Society. Curbs, gutters, and drains will be installed in all deck areas.

Exhibit I

Development Schedule
High Island Block No. 492



DEVELOPMENT SCHEDULE
HIGH ISLAND A-492

BEST AVAILABLE COPY

Exhibit II

Platform Design and Installation Application
High Island Block No. 492

a) Application

b) Location Plat

c) Platform Drawings

d) Soil Investigation

e) Hazard Survey

f) Pile Capacity Curves

g) Oceanographic Report

Transco
Exploration Company
A Subsidiary of Transco Companies Inc.
2700 South Post Oak Road
P. O. Box 1396
Houston, Texas 77001
713-626-8100

U. S. Department of the Interior
Geological Survey
P. O. Box 2006
Freeport, Texas 77541

Attention: Mr. Jack C. Sandridge

Reference: OCS-G-3243
High Island Block 492
Platform "A"

Gentlemen:

In accordance with 30 CFR 250.19(a), Transco Exploration Company herewith requests approval to install a self-contained eight-pile, twelve well drilling and production platform in the above referenced block. Transco is aware that formal approval of this permit cannot be granted until approval of the submitted plan of development is obtained. The precise location of the installation is as reflected by the location plat provided by John E. Chance and Associates, Inc. and attached hereto. According to current schedules, drilling operations should begin in November of this year and continue until the completion of twelve wells.

...ucture is composed of a template type jacket with deck structure ... on the attached sketches. It is anticipated that drilling operations will begin after the installation of the platform and should continue for approximately 1-1/2 years. The production equipment will be installed at the completion of drilling.

The attached packet of information is provided to comply with OCS Order 8 and to aid you in consideration of this application.

If we may provide any additional information, please do not hesitate to contact us.

Very truly yours,

TRANSCO EXPLORATION COMPANY

Hal L. Bettis
Production Manager

HLB/vw
Attachments: 1. Application

2. Location Plat
3. Platform Drawings
4. Hazard Survey
5. Soil & Foundation Investigation & Pile Capacity Curves
6. Oceanographic Report

Copies furnished:

District Engineer
Galveston District
Corps of Engineers
P. O. Box 1229
Galveston, Texas 77553

Commander, Eighth Coast Guard District
Hale Boggs Federal Bldg.
Room 1140
500 Camp St.
New Orleans, La. 70011

ATTACHMENT 1

APPLICATION

I. Platform Design

A. General Design. The structure has been designed in accordance with the American Petroleum Institute's API RP2A - Eighth Ed., April, 1977, Planning, Designing, and Constructing Fixed Offshore Platform. Environmental wind, wave and current, functional loading, structural weight, and site conditions have been accounted for in the design.

II. OCS Application

A. General Information

1) Platform identification is: Transco Exploration Company, High Island Block A-492, "A" Platform, OCS G-3243.

2) Location of platform is 6400 feet South of North Line, and 5200 feet East of West Line in High Island Block A-492. A location plat is attached.

3) Primary use of the platform is to be as a drilling platform for approximately 1½ years and then as a gas production platform.

4) Personnel facilities shall consist of a living quarters during the drilling phase, and facilities adequate to quarter the necessary personnel during the production phase. There are to be two boat landings on opposite sides and a heliport during drilling and production operations. Crane operated personnel nets are to be used during drilling and production operations.

5) Drawings illustrating essential parts of the platform are attached.

6) All areas of the platform above the water level are to be protected with an inorganic zinc coating system. All water exposed areas are to be protected by a cathodic protection system consisting of sacrificial magnesium alloy anodes with a 20 year design life.

B. Environmental Information

1) Pertinent environmental data that has a bearing on the installation, operation, or design of the platform is found in the attached platform drawings, Fugro Gulf Inc.'s Soil and Foundation Investigation and A.H. Glenn & Assoc. Wave Report.

2) Listing of total design functional loads and wind, wave and current forces is tabulated and attached.

C. Foundation

1) A soil and foundation investigation was conducted in High Island Block A492 by Fugro Gulf, Inc. during January, 1977 and their pile capacity curves are attached.

2) A report from Fairfield Industries which provides correlation of the foundation properties at the proposed platform location and the location of the actual soil boring in the Block is included with the attached hazard survey.

3) Description of foundation loads for environmental and functional forces are tabulated on attached platform drawings.

4) Block A-492 High Island Area is not susceptible to soil movement.

D. Installation

All installation recommendations in API RP 2A, November, 1977 are to be followed in the platform installation.

E. Exception to Supporting Design Information Submittal

1) A description of the critical design loading and design criteria, taking into consideration maximum environmental and operational loading conditions expected over the service life of the platform is on file in our office and shall be made available upon request.

2) A description of the materials, specifications, strength analysis, and allowable stresses over the service life is on file in this office and shall be made available upon request.

III. Certification

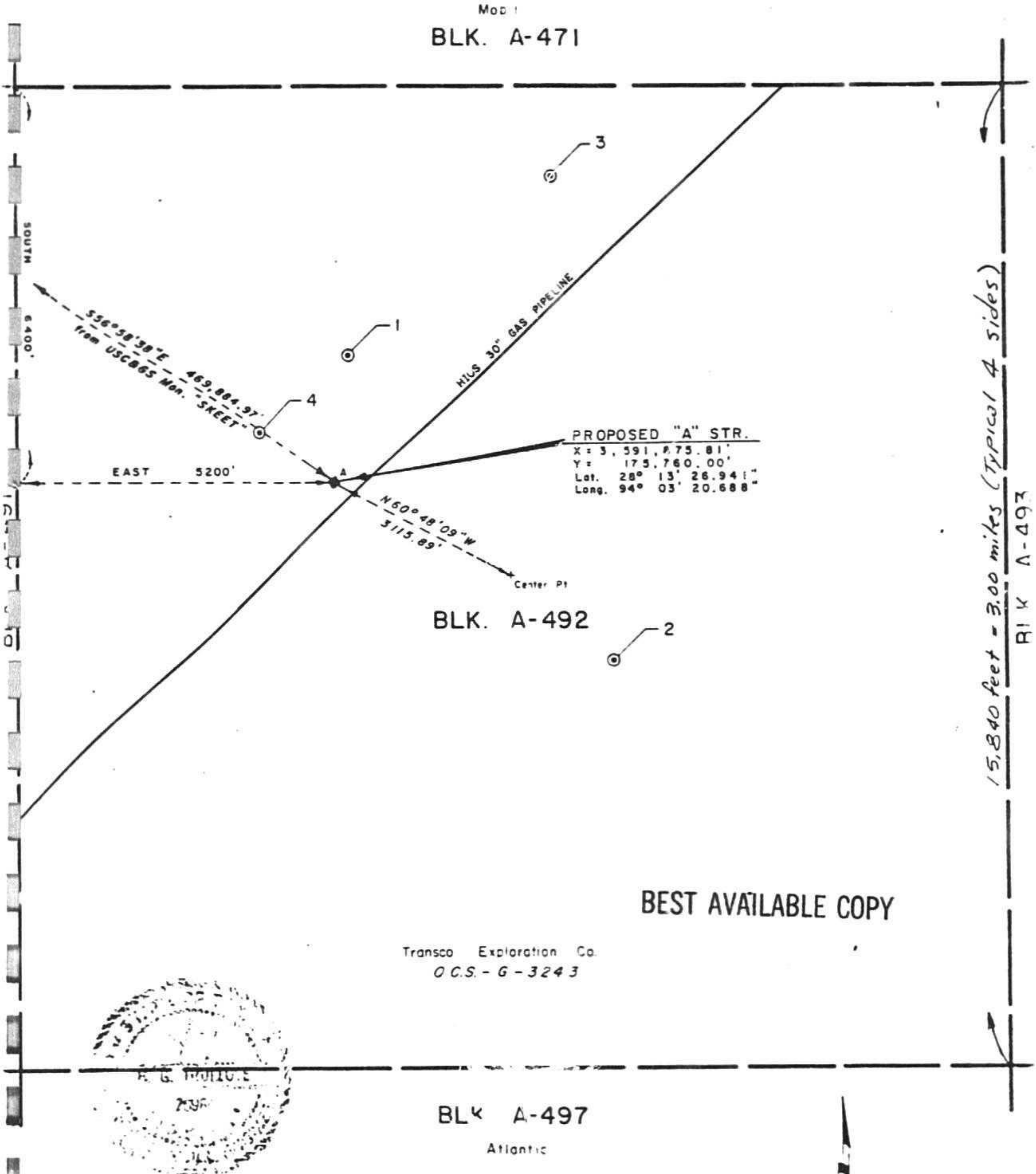
TRANSCO EXPLORATION COMPANY certifies that this platform has been certified by a Registered Professional Engineer and that the structure will be constructed, operated, and maintained as described in the application, and any approved modification thereof. Certified plans are on file at TRANSCO EXPLORATION COMPANY, 2700 South Post Oak Road, Houston, Texas. 77001.

TRANSCO EXPLORATION COMPANY further certifies that the mechanical and electrical systems of the facility will be designed and installed under the supervision of registered mechanical and electrical engineers. Maintenance of these systems will be by qualified personnel.

Myron Van Kirk
Manager - Project Engineering & Construction

ATTACHMENT 2

LOCATION PLAT



I hereby certify that the above proposed structure location is correct.

A G Truelove

Registered Professional Eng. No. 26984
State of Texas

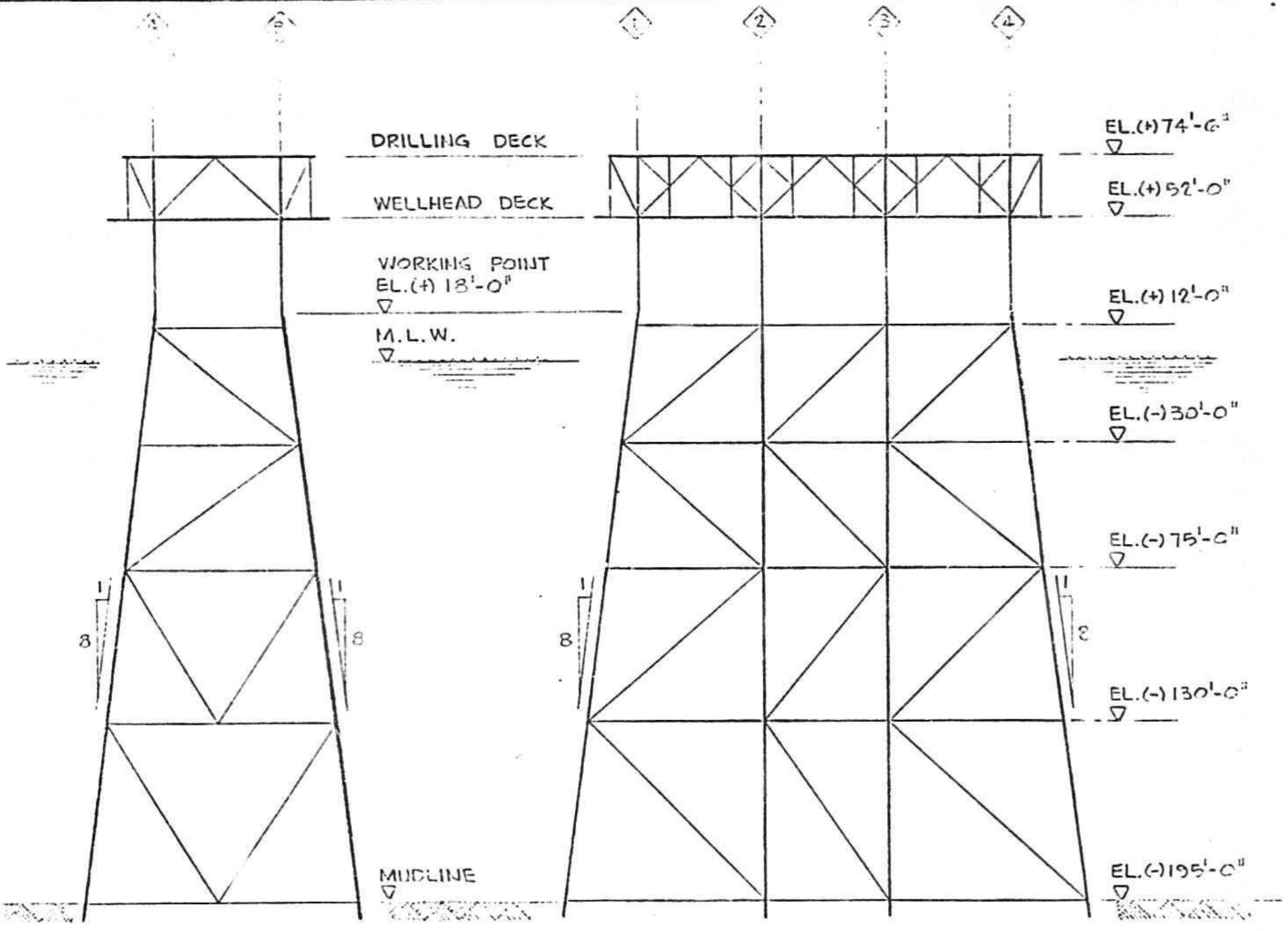
TRANSCO EXPLORATION COMPANY
OCS-G-3243 NO "A" STR.

PERMIT PLAT

HIGH ISLAND AREA
SOUTH ADDITION

ATTACHMENT 3

PLATFORM DRAWINGS



SOUTH ELEVATION

WEST ELEVATION

BEST AVAILABLE COPY

TRANSCO EXPLORATION CO.

HIGH ISLAND BLOCK A492

PLATFORM 'A'

U.S.G.S. PERMIT DATA

LAWRENCE-ALLISON & ASSOCIATES

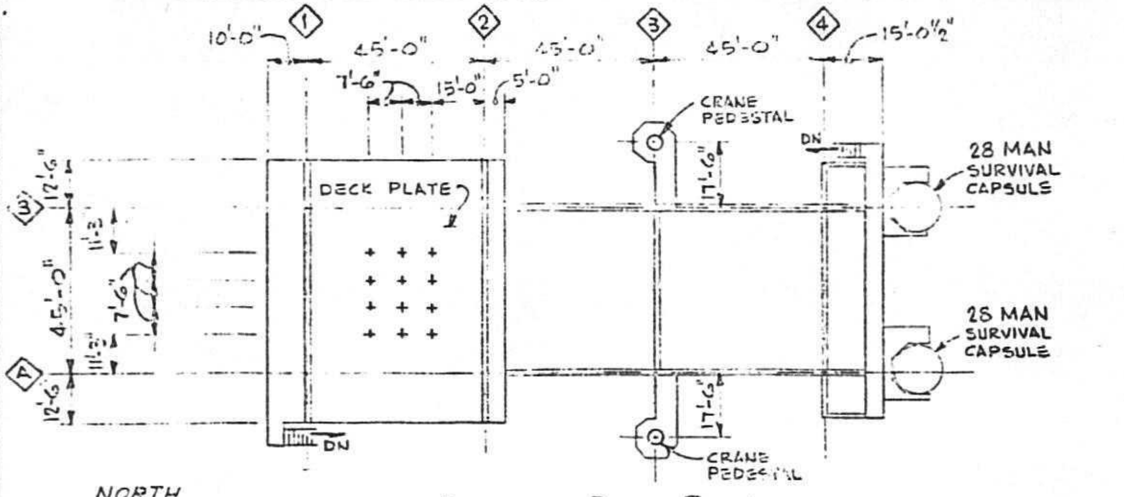
P.O. BOX 22627

HOUSTON, TEXAS 77027

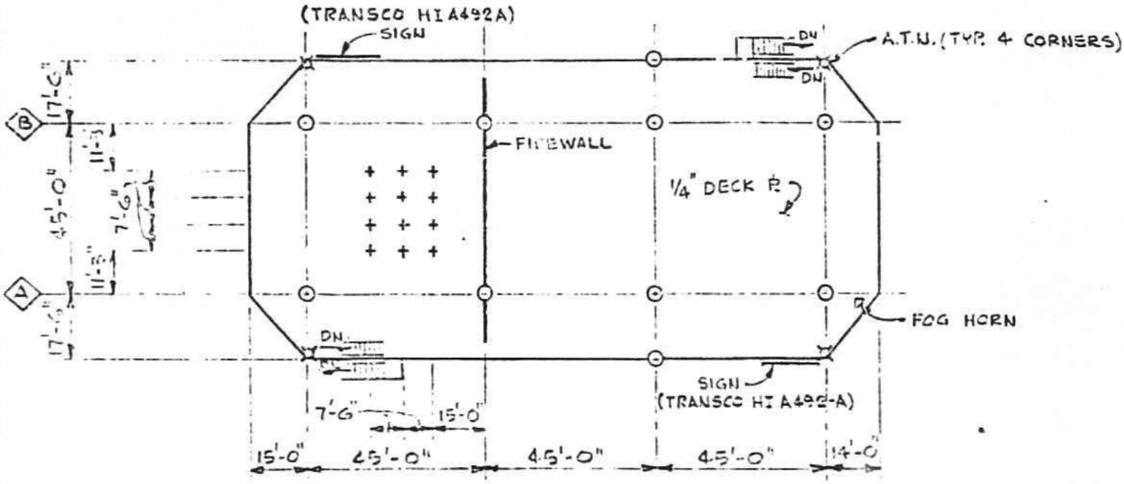
LDD / JWB

30 MAR. 78

51-2076-07-OCS-1



DRILLING DECK PLAN



WELLHEAD DECK PLAN

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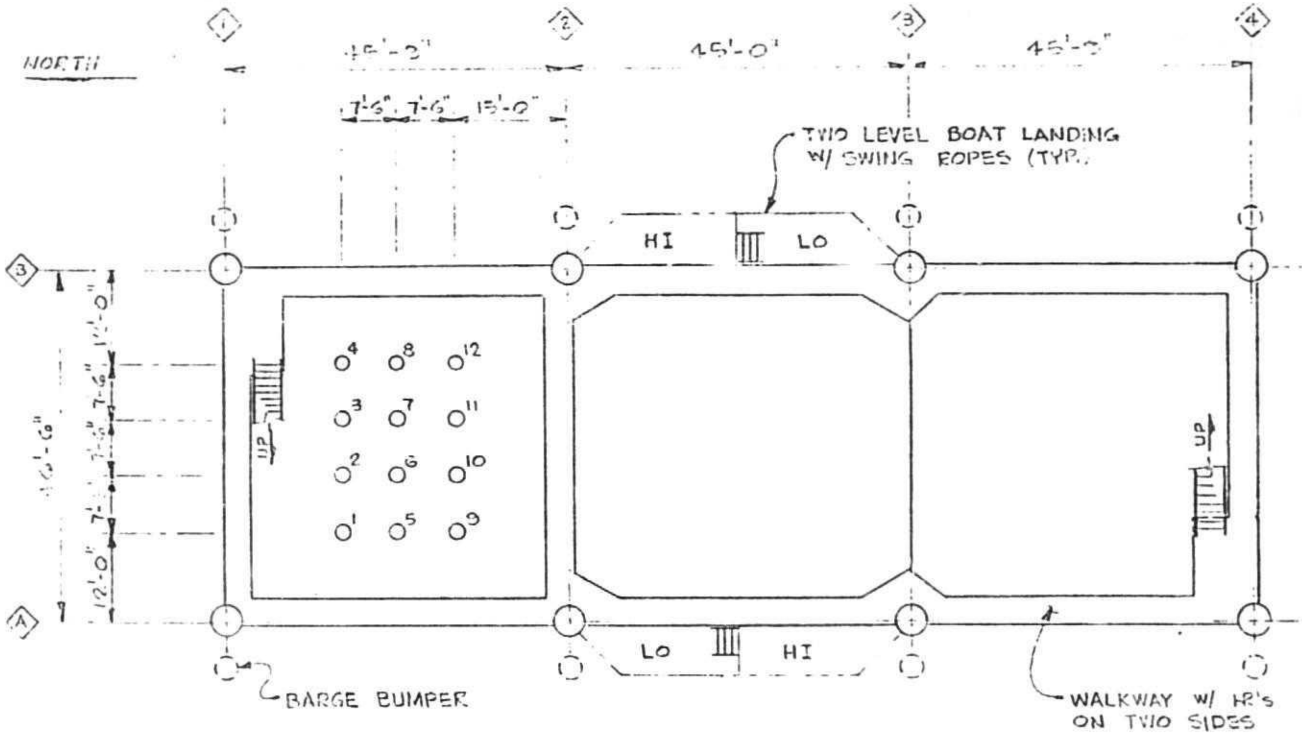
DESIGN FEATURES

NUMBER OF WELLS 12
JACKET LEG DIAMETER .... 51 1/4 IN. ~ 54 IN.
JACKET LEG WALL THICKNESS .... 0.625 IN. ~ 1.75 IN.
DECK COLUMN DIAMETER .... 48 IN.
DECK COLUMN WALL THICKNESS ...... 1.250 IN ~ 1.75 IN

TRANSCO EXPLORATION CO.		LAWRENCE-ALLISON & ASSOCIATES	
HIGH ISLAND BLOCK A492	PLATFORM A	P.O. BOX 22627	HOUSTON, TEXAS 77027
U.S.G.S. PERMIT DATA		LDD/JWB	30MAR 7[illegible] 31-2076-07-OCS-2



JACKET WALKWAY PLAN @ EL.(+)12'-0"

BEST AVAILABLE COPY

TRANSCO EXPLORATION CO.

HIGH ISLAND BLOCK A492 PLATFORM A

U.S.G.S. PERMIT DATA

LAWRENCE - ALLISC & ASSOCIATES

P.O. BOX 22627 HOUSTON, TEXAS 77027

LDD / JWB	30 MAR 78	51-2076-07-OCS-3

STRUCTURAL DESIGN LOADS

JACKET AND PILES

LOAD DESCRIPTION	VERTICAL	SHEAR		MOMENT @ MUDLINE	
		LONG.	TRANS.	LONG.	TRANS.
	KIPS	KIPS	KIPS	FT-KIPS	FT-KIPS
OPERATING WIND					
LONGITUDINAL	—	127	—	57690	—
TRANSVERSE	—	—	162	—	46470
DIAGONAL	—	62	142	18272	40643
STORM WIND					
LONGITUDINAL	—	527	—	155600	—
TRANSVERSE	—	—	656	—	198200
DIAGONAL	—	256	609	75455	173346
OPERATING WAVE + CURRENT					
LONGITUDINAL	—	1129	—	178856	—
TRANSVERSE	—	—	1470	—	240610
DIAGONAL	—	592	1212	94431	219522
STORM WAVE + CURRENT					
LONGITUDINAL	—	3390	—	497597	—
TRANSVERSE	—	—	3828	—	574836
DIAGONAL	—	1649	3234	243270	485261
EQUIPMENT + SUPPLIES					
OPERATING	11410	—	—	—	—
STORM	9000	—	—	—	—
STRUCTURAL DEAD WT.	6270	(JKT., DECK & PILES)			
BOUYANCY	2030	(JKT. LEGS	FLOODED –	WATER AT	M.L.W.)

BEST AVAILABLE COPY

TRANSCO EXPLORATION CO. HIGH ISLAND BLOCK A492 PLATFORM 'A'	LAWRENCE-ALLISON & ASSOCIATES P.O. BOX 22627 HOUSTON, TEXAS 77027		
U.S.G.S. PERMIT DATA	LDD/JWB	30 MAR. 78	51-2076-07-OCS-4

FOUNDATION CRITERIA

	CORNER PILES	INTERIOR PILES
MAXIMUM BEARING LOAD	3977 KIPS	3712 KIPS
MAXIMUM LATERAL LOAD	331 KIPS	422 KIPS
MAXIMUM TENSILE LOAD	1316 KIPS	790 KIPS
PILE DIAMETER	48.0 IN.	48.0 IN.
MUDLINE WALL THICKNESS	1.5 IN.	1.5 IN.
MINIMUM WALL THICKNESS	1.0 IN.	1.0 IN.
DESIGN PENETRATION	300 FT.	300 FT.
NUMBER OF PILES	4	4

ENVIRONMENTAL CRITERIA FOR PILE & JACKET DESIGN

		OPERATING	STORM
WATER DEPTH (M.L.W)	(FEET)	195.0	195.0
TOTAL TIDE	(FEET)	3.6	5.8
SURFACE CURRENT	(FPS)	2.0	3.3
WAVE HEIGHT	(FEET)	36.1	55.8
WAVE PERIOD	(SEC)	11.0	16.0
WIND VELOCITY	(MPH)	63.0	138.0

BEST AVAILABLE COPY

TRANSCO EXPLORATION CO. HIGH ISLAND BLOCK A492 PLATFORM A	LAWRENCE-ALLISON & ASSOCIATES P.O. BOX 22627 HOUSTON, TEXAS 77027
U.S.G.S PERMIT DATA	LDD/JWB | 30 MAR. 78 | 51-2076-07-OCS-5

ATTACHMENT 4

HAZARD SURVEY

REPORT ON
HIGH RESOLUTION GEOPHYSICAL SURVEY
OFFSHORE TEXAS
HIGH ISLAND, SOUTH ADDITION
BLOCK A-492

FOR

TRANSCO EXPLORATION COMPANY

BY

AQUATRONICS INTERNATIONAL, INC.

Houston, Texas

November 1975

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    Thickness of Unconsolidated Sediments . . . . Page 11

Appendix: Data Processing Sequence

ILLUSTRATIONS

Figure 1 Index Map
Figure 2 Streamer Configuration
Figure 3 Generalized Time-Depth Curve

Map No. 1 Anomaly Map
Map No. 2 Bathymetry
Map No. 3 Thickness of Unconsolidated Sediments

INTRODUCTION

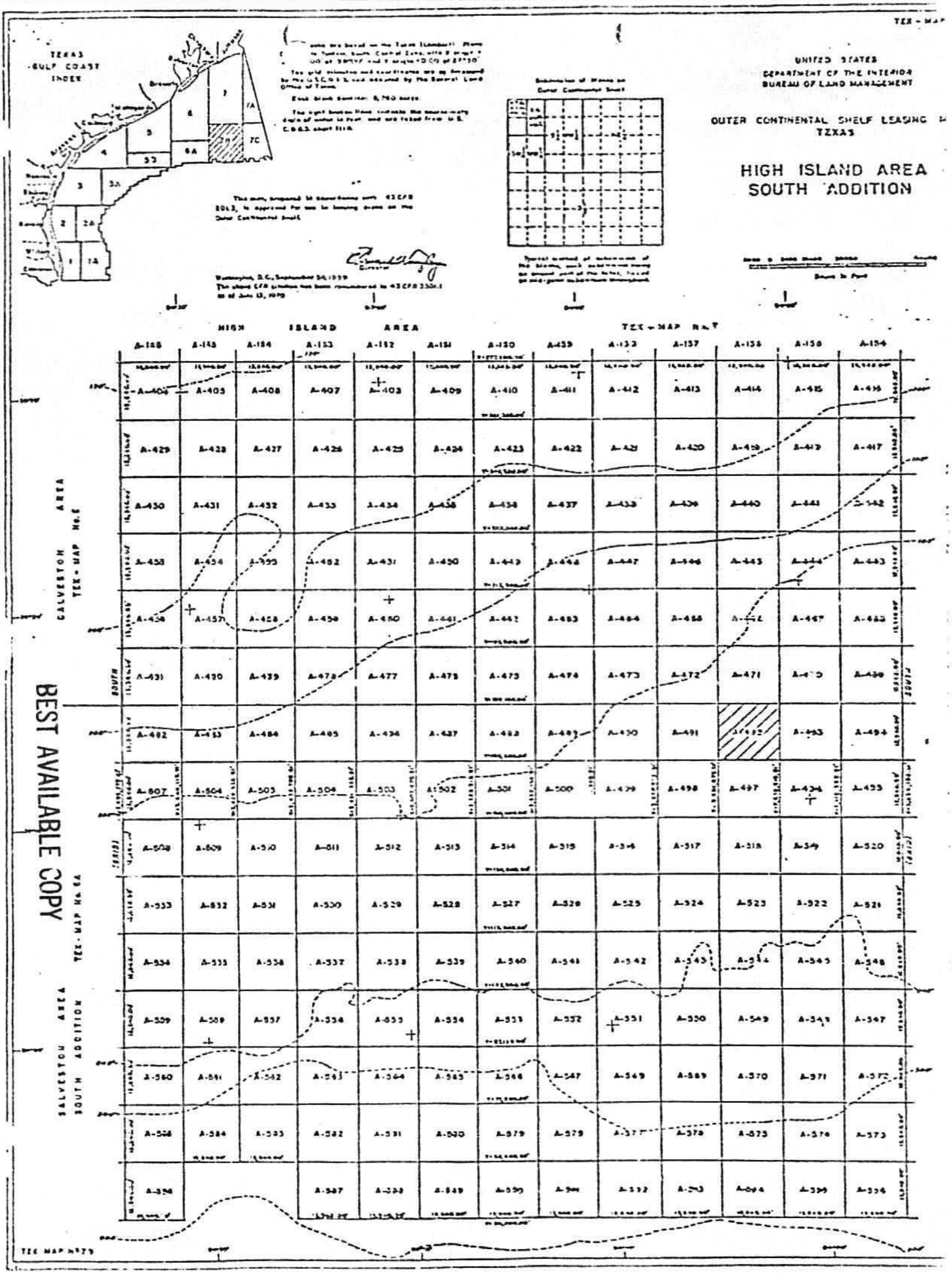
At the request of Transco Exploration Company, Aquatronics International, Inc., conducted a marine engineering geophysical survey during the period from September 20 to September 21 and October 16 to October 19, 1975, on High Island South Addition, Block A-492.

Field work was performed utilizing the multiple geophysical systems available on the M/V STATE RACE. The area surveyed is indicated on the Index Map (Figure 1).

The purpose of the survey was to provide shallow geological information in order to assess seafloor and subsurface conditions for forward planning of engineering requirements.

The multisensor systems employed investigated the seafloor and shallow geology from the same vessel, thus assuring precise integration of data from all sensors. Reliability and usefulness will increase with incorporation of additional data, whether from special borings or exploration wells.

The report is a summary of the positioning, sounding, and seismic methods employed, together with a full description of the integrated interpretation of results.


TEX - MAP
UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
OUTER CONTINENTAL SHELF LEASING MAP
TEXAS
HIGH ISLAND AREA
SOUTH ADDITION
TEXAS
GULF COAST
INDEX
HIGH ISLAND AREA
GALVESTON AREA
TEX - MAP No. 6
GALVESTON AREA
SOUTH ADDITION
TEX MAP No.

GEOPHYSICAL RECORDING SYSTEMS

The following equipment was operated simultaneously along each traverse:

Geologic Information

The Aquatronics' 12-fold CDP SUPERSPARKER shows details of stratification and structures to depths of 5000 feet below the seafloor. It is useful in projecting foundation stratification information obtained in borings. The relative amplitude presentation is invaluable in detecting gas hydrocarbon saturation zones.

The Aquatronics' CDP SUPERSPARKER system employs one 15,000 Joule sparker source firing at 2.25 second intervals producing a 10 millisecond pulse of energy.

Returning seismic energy was received on an Aquatronics' 12-trace streamer with a trace separation of 150 feet, each section containing 32 hydrophones in a 42-foot binomial array.

The analog signal from the trace nearest the boat was displayed on an EPC 19" dry paper recorder after filtering 90 to 300 Hz and amplification.

Signals from all twelve traces were filtered 50 to 300 Hz, sampled at one millisecond and digitized to 2.0 seconds of data. Recordings were made at constant gain; preserving the amplitude relationships. Three consecutive source discharges ("pops") were summed in the field using a sum 3 and drop 1 scheme. The vessel speed was maintained at 5 knots to give the resulting composited traces an effective shot interval of 75 feet. The near and far offset distances were 250 feet and 1900 feet, respectively.

The energy source and streamer were towed at a depth of 10 feet, the streamer depth being maintained by cable depth controllers.

Shallow Subbottom Conditions

A 7 kHz miniprofiler was used to obtain data in areas of soft subbottom conditions. A 7 kHz, 8 KW signal was transmitted using a 1 ms pulse width. Data were displayed on an EPC 19" dry paper recorder.

Surface Geology and Obstructions

A side scan sonar was used to record a plan view of the area 200 meters (656 feet) on either side of a towed vehicle. The unit operates at a frequency of 105 kHz.

Bathymetric

A Raytheon Echo Sounder with a resolution of two feet of water depth.

Magnetic

A Geometrics' single-channel marine proton precession magnetometer with a sensitivity of on ma was used to detect magnetic anomalies.

SURVEY GRID AND POSITIONING

The survey consisted of 123 line miles over High Island South Addition, Block A-492.

nine north-south tie lines are numbered from 492-50 in the west to
8 in the east with spacing between lines being approximately 1500 fe. 00 m).

The thirty-three east-west lines are numbered from 492-1 in the north to 492-33 in the south, with spacing between lines being approximately 500 feet (150 m).

Positioning was provided by Lorac Service Corporation.

Postplotted positioning fixmarks commence with 101 on the north or east end of the lines. Fix numbers increase by intervals of 1 to the south or west. The fixmark interval is nominally 750 feet. Three additional fixes were taken at the end of each line in order to pass the entire recording configuration off-line.

All positioning fixes on the accompanying maps are referenced to the position of the antenna.

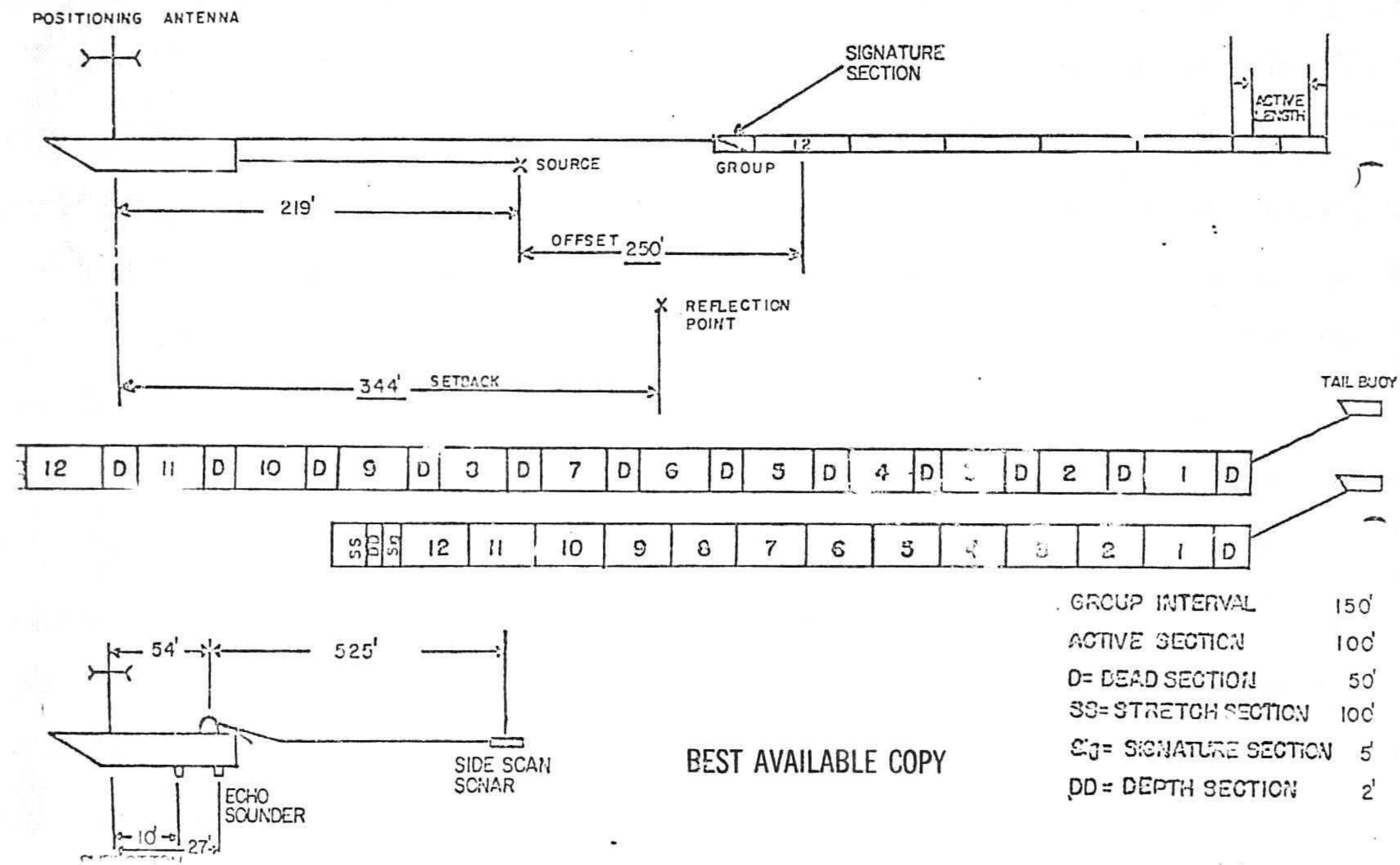
The recording configuration is indicated on Figure 2. The setback correction has been applied to the posted fixmarks on the CDP SUPERSPARKER sections and, therefore, datums can be mapped directly. Data from the Echo Sounder and Subbottom Profiler require negligible horizontal corrections. The corrections for the magnetometer and side scan are indicated and must be applied to the data before posting information on the shotpoint maps. The correction can be made by shifting the fixmark event on the records an appropriate distance in the direction of the ship's traverse.

DATA PROCESSING

The digital CDP SUPERSPARKER data were processed through conventional relative amplitude and automatic gain processing by Aquatronics' Data Processing Center in Houston. Each digital trace represents a composite of three successive "pops" over a shot interval of 75 feet. Normal moveout corrections to the twelve traces with common depth points were applied and the data were stacked 12-fold. Therefore, each recorded trace represents a 36-fold enhancement in energy over a single trace analog record and a theoretical improvement in signal-to-random noise by a factor of six. The details of the data processing sequence may be found in Appendix I.

TRACE CABLE

STREAMER CONFIGURATION



DIRECT DETECTION OF HYDROCARBONS

The high resolution 12-fold CDP SUPERSPARKER sections in the relative amplitude display mode can identify hydrocarbon accumulations based on the reflection amplitude and frequency content of the processed reflection arrivals. The presence of gas, and to a lesser extent liquid hydrocarbons, lowers the density, and hence interval velocity, of aquifers at depths investigated by the digital SUPERSPARKER system. Velocity analyses, generated in the processing sequence are used as diagnostic aids in evaluating the extent of hydrocarbon saturation and presence of superhydrostatic pressure. Subsurface gas pockets represent potential hazards to proposed development. Occasionally, the accumulations are large enough and deep enough to be of economic importance.

INTERPRETATION

The original field records were reproduced by xerography and the reproductions properly orientated and annotated. Interpretation was carried out on reproductions and processed records.

A package of three interpretation maps were prepared at a scale of 1 inch to 1000 feet. Reductions to 45 percent of the original scale are provided at the end of this report. Seafloor and subsurface features that may be hazardous in the emplacement of engineering structures and in drilling are shown on the Anomaly Map (Map No. 1).

A Bathymetry Map (Map No. 2) indicates water depths in feet below sea level as a contoured surface. No tidal corrections were applied.

The thicknesses of recent surface accumulations, as indicated from subbottom profiler records, are presented as a separate map (Map No. 3).

DISCUSSION OF MAPS

Map No. 1; Anomaly

Numerous anomalous events relating to cultural and geological sources were detected on all recording systems and are presented on the map.

Although all sparker data were recorded digitally on magnetic tape, for the purposes of this investigation, only the following lines were processed:

Entire line 492-4, -9, -10, -16, -22, -32, -50, -52, -54, -56, -58.

Part of line (fix 106-113) 492-14, -15.

Part of line (fix 107-114) 492-55.

The shotpoints which have 12-fold CDP coverage are indicated as solid circles.

Seven separate and distinct amplitude anomalies indicated on the Relative Amplitude processed sections have been outlined using both CDP and Analog Sparker coverage. These features are in general flat-lying, high in reflection amplitude, and thin. They have a single wavelet response pattern and, therefore, do not reveal a distinct top and bottom as would be indicative of a high volume gas sand. The onset of the event is very abrupt and illustrates polarity reversal. No dramatic shift to lower frequencies could be observed on the data. The degree of overpressurization within the gas sands, if any, could be assessed utilizing specially adapted velocity analyses.

The amplitude anomalies are presented in outline form together with the corresponding two-way travel time and computed depth referenced to seabed. A composite average velocity function was computed from standard velocity analyses used to stack the CDP sparker data. For reference, a generalized time-depth curve is presented on Figure 3. The features mapped vary in depth from a minimum of 550 feet to a maximum of 2295 ft below seabed.

The anomaly in the north-central part of the block at 780 feet below seabed ties a known overpressurized gas sand. The event at 1155 feet below seabed dips slightly to the southeast and is best seen on lines 492-22 and 492-50.

A brightening of the near-surface sediments in the vicinity of the

GENERALIZED TIME-DEPTH CURV

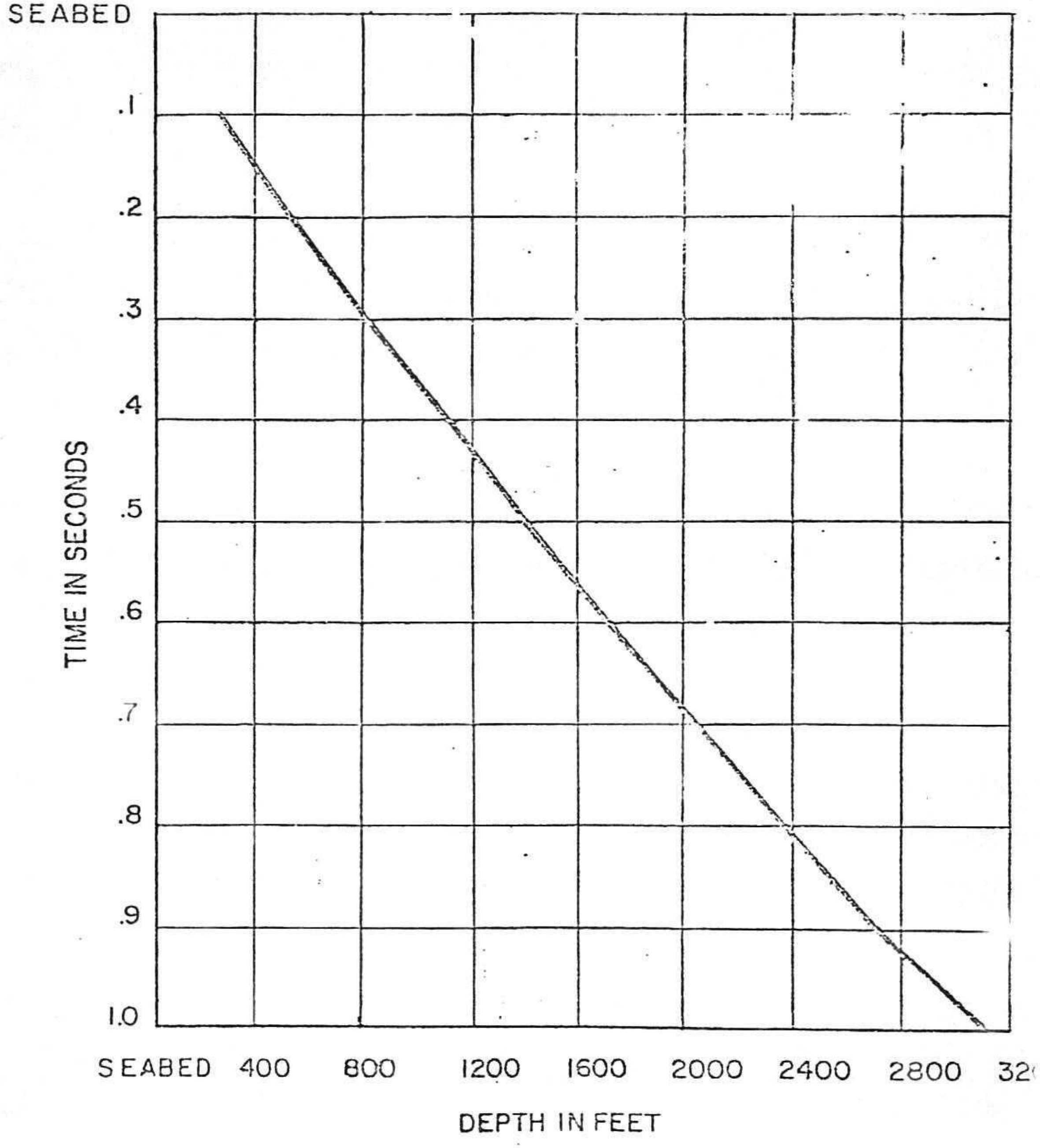


Figure 3

fault mapped in the western third of the area indicates that some reservoir hydrocarbons may be leaking upward through the fault zone to the surface. No gas seeps were directly over the fault; however, several seeps have been located within 1000 feet of the faults near-surface trace.

The numerous gas seeps mapped throughout the area are coincidental with the major "bright spots." The vents were found to occur through shallow holes in the seafloor. These will be discussed further in the next section.

The major structural feature is a north-south trending active normal fault which transects the western third of the survey grid. The fault continues upward from the deepest recorded reflection to the seafloor. The surface expression varies from a one-half to one foot high escarpment to a two foot deep trough on the Echo Sounder records. An acous-change was also noted on Side Scan Sonar.

The fault plane dips at about a 45° angle and is downthrown to the east. A relief fault runs parallel to the primary normal fault and evidences localized displacement along the southern portion. Gravity-type structures should not straddle any of the faults indicated as differential movement across the structures may result.

The shallow gas blankout zones which occur in extensive patches on the upthrown side of the fault and in localized areas away from the fault represent a dramatic change in the acoustic properties of the surficial sediments. The vertical coincidence with certain subsurface amplitude anomalies may or may not be significant. No data blankout was observed on sparker data. The mechanical properties of the sediments within the data blankout zones need to be determined through direct sampling prior to drilling in these regions. Even at low gas saturation percentages, the volume of gas could be large enough to present a hazard to semi-submersible drilling equipment working over the outlined areas. As mapped, most of the blankout zones occur beneath the unconsolidated layer, indicating a degree of pressure differential must exist.

Map No. 2; Bathymetry

The seafloor slopes gently to the southeast at less than 0.5 degree angle. It is generally flat and featureless with the exception of numerous small, localized holes which are scattered throughout the entire block. These holes are too small to be evident at the five foot contour interval of this map. They can be quite readily observed on the side scan sonar records and appear to be on the average 2-3 feet deep and about 25 feet in diameter. The holes have been termed "pockmarks" and are quite frequently found in areas of soft bottom sediments where shallow gas occurs. Oftentimes gas can be observed venting through "pockmarks" and these gas seeps have been indicated on the Anomaly Map. A small escarpment on the order of one foot displacement occurs along the primary normal fault mentioned previously.

Map No. 3; Thickness (Isopach) of Unconsolidated Sediments

Based on the acoustic character and structural factors observed on the subbottom profiler recording, an interface interpreted to represent the base of unconsolidated layered silts with a sand or clay layer was selected. This map presents the thickness of unconsolidated sediments as measured from the seafloor using a seismic velocity of 5000 ft/sec.

The primary normal fault marks the demarcation line between two separate basal layers. East of the fault (i.e., downthrown block), silts and fine sands overlie a coarser sand layer. On the upthrown side of the fault, silts and fine sands overlie a thick, indurated clay unit composed of many layers. The basal clay layer is naturally assumed to be older than the basal sand sequence. The thin 10-15 foot cover of fines extends across the fault boundary.

The shallow gas blankout conditions mentioned previously penetrate as shallow as the base of the silt layer.

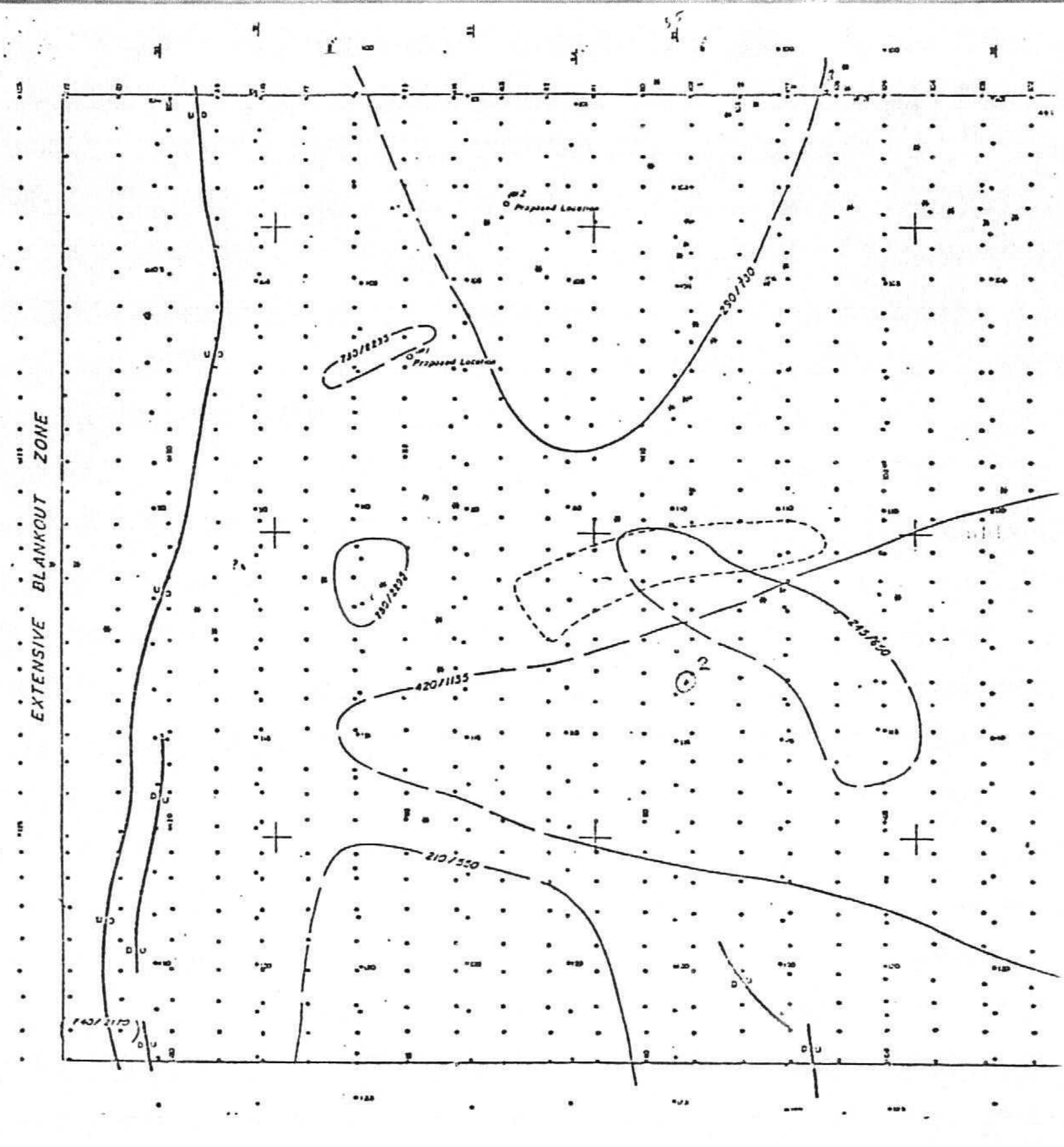
Values average 35-40 feet throughout most of the eastern portion of the block and thicken dramatically towards the major fault, reaching 70 feet near the northwest corner. On the upthrown block, isopachs increase away from the fault from a minimum of 20 feet in the southwest corner of the block.

Aquatronics appreciates the opportunity of providing the above services to Transco Exploration Company. The entire staff is available for future discussion regarding the survey, data processing, and interpretation. Should the need for additional site evaluations arise, please do not hesitate to call.

Respectfully submitted,

AQUATRONICS INTERNATIONAL, INC.

Mark Dee, Director of Interpretation



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Normal Fault

Shallow Gas ... Zone Below Recent Sediment Cover

? Unidentified Non-Magnetic Sonar Anomalies

Shot Point Location of CDP Super Sparker Processed Data

Shot Point Location of Unprocessed Super Sparker Coverage

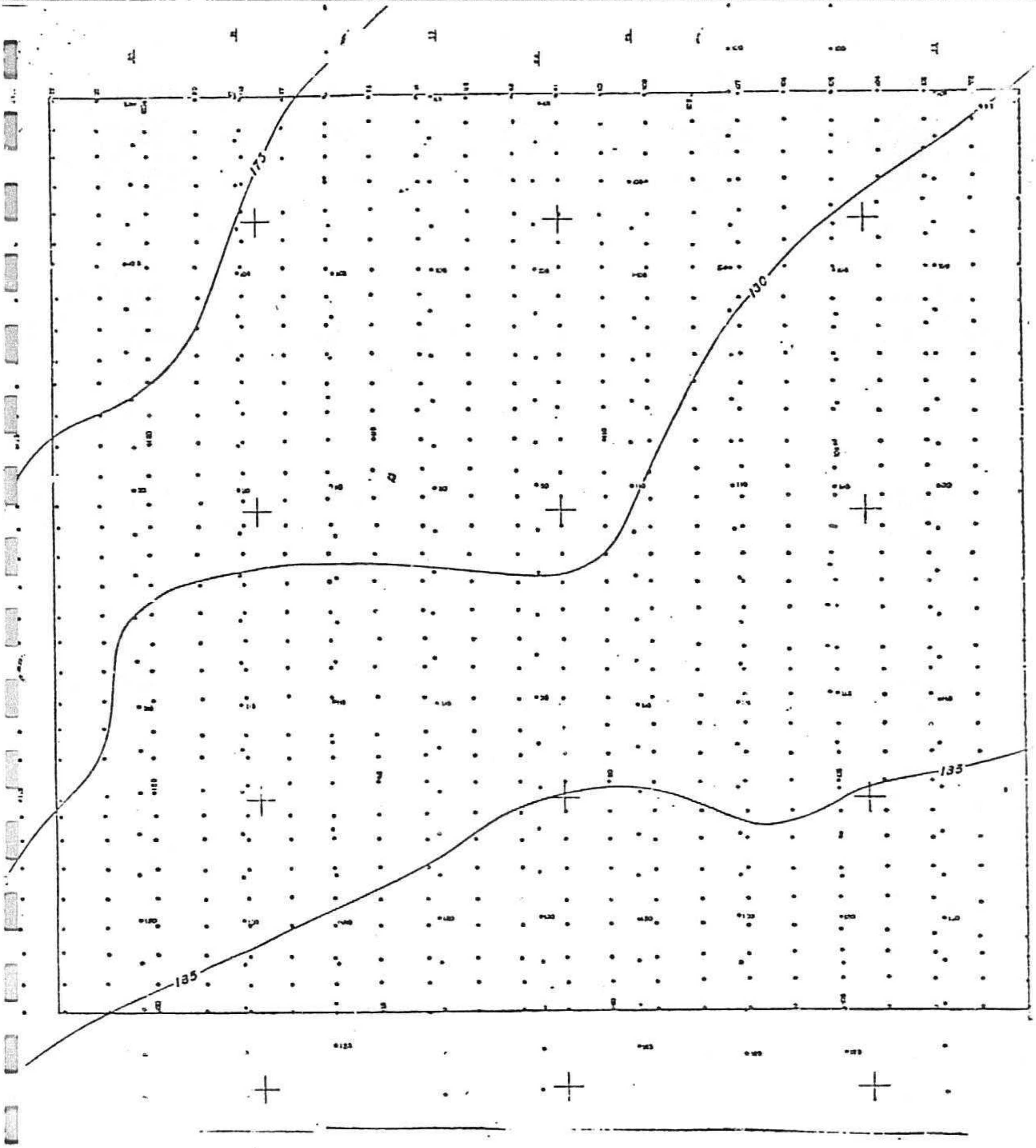
Outline of Extensive Areas of High Amplitude Reflection Events, 2 way Time in Milliseconds and Depth in Feet referenced to Sea Bed Dashed Where Interpreted From Analog Data

Gas Seep

TRANSCO EXPLORATIO

ENGINEERING GEOPHYSICAL SURVEY
GULF OF MEXICO - TEXAS
HIGH ISLAND AREA, BLOCK

MAP No. 1
ANOMALY MAP



TRANSCO EXPLORATION

ENGINEERING GEOPHYSICAL SURVEY

GULF OF MEXICO - TEXAS

HIGH ISLAND AREA, BLOCK A

MAP No. 2

BATHYMETRY

CONTOUR INTERVAL 5 FEET

NO TIDAL CORRECTION

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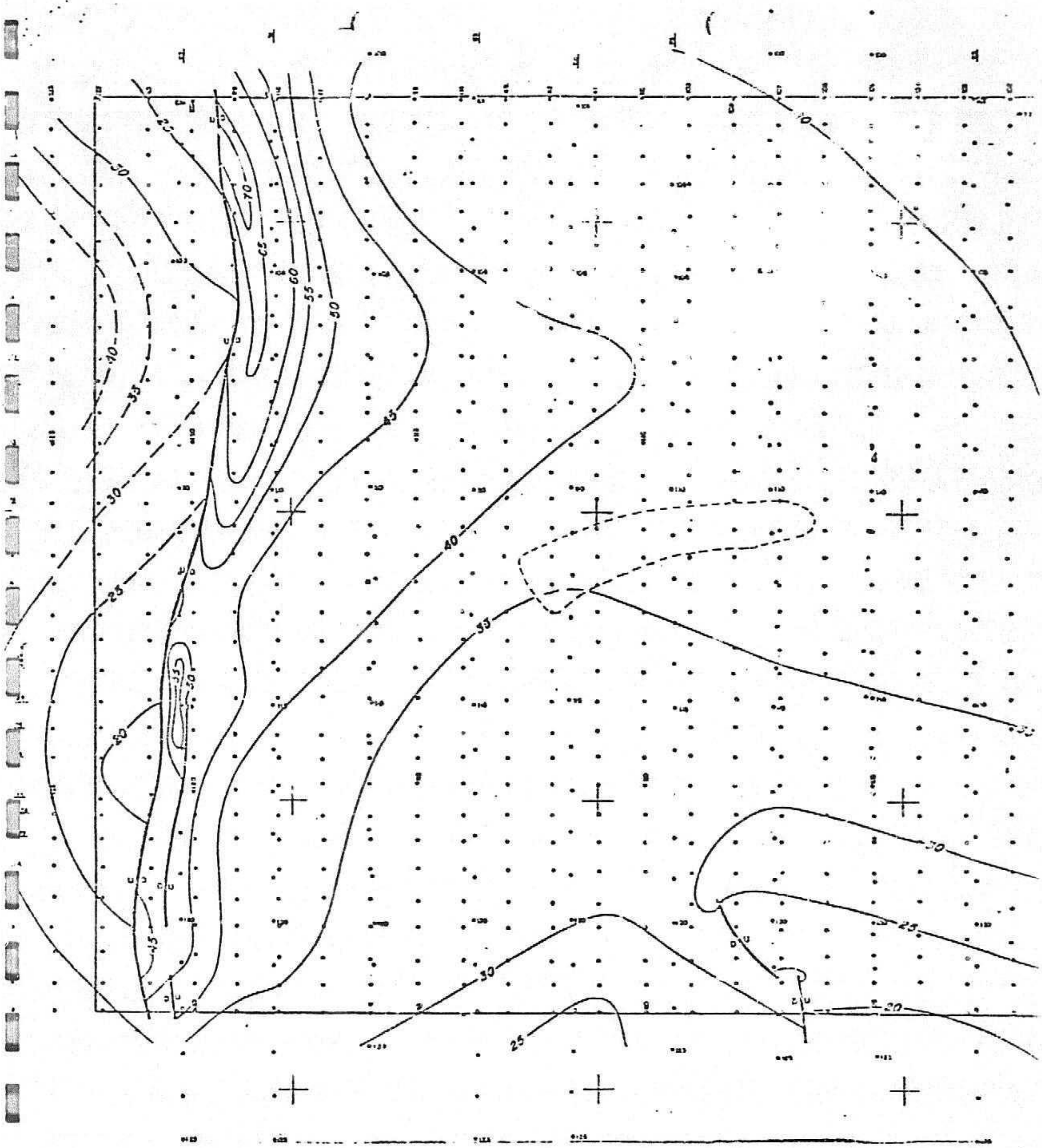
Surveyed By AQUATRONICS INT'L, INC

Positioning By LOMAC SERVICE CORP



TRANSCO EXPLORATION CO

ENGINEERING GEOPHYSICAL SURVEY
GULF OF MEXICO - TEXAS

HIGH ISLAND AREA, BLOCK A492

Shallow Gas Blow-Out Zone Below Recent Sediment Cover

MAP No. 3

THICKNESS (ISOPACH) OF UNCONSOLIDATED SEDIMENT

CONTOUR INTERVAL 5 FEET

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Surveyed By: AQUATRONICS INT'L, INC
Positioning By: LUMAC SERVICE CORP

APPENDIX

DATA PROCESSING SEQUENCE

Field Data

Recorded in 15-bit fixed gain trace sequential DFR 720 format at 1 ms sample rate, sum 3/drop 1 composited traces recorded to 2.0 seconds.

Reformat

Edit and reformat raw field data to processor's format, apply spherical divergence correction. Plot near-trace monitor section for quality control and location of velocity analysis. Display selected 12-trace records for quality control and determination of mute schedule.

Velocity Analysis

Select four adjacent common depth points for velocity determination, except in areas of steep dip where no more than two CDP's are used; perform second zero-crossing deconvolution, bandpass filter, and time variant gain to prepare gathered traces; perform VA with window length and shift increment appropriate to frequency content of data.

Stack

Apply NMO correction and stack data 12-fold.

Deconvolution

Run autocorrellograms on selected stacked traces, design gapped predictive operator for removal of waterbottom multiples.

Deconvolve stacked data, using 50 ms operator and predictive distance which is varied to follow waterbottom.

Filter

Perform frequency tests to determine bandpass filter, apply filter. The following are the -6 db response points of the high and low cut filters used:

High Cut		Low Cut	
t = 0-0.3	310 Hz	t = 0.0 - 0.2	55 Hz
= 0.3 - 0.7	238 Hz	0.0 - 0.8	60 Hz
= 0.7 - 2.0	238 Hz	0.8 - 2.0	60 Hz

The filters are varied linearly in the transition zone.

Amplitude Control

Output amplitude diagnostics and determine scaling function necessary to compensate for energy losses due to geometrical and wave transmission factors (background noise level should be uniform across entire trace).

Apply scaling functio: ·duce final controlled gain (relative amplitude) section.

Apply AGC to controlled gain data using a 200 ms operator to produce final AGC sections.

Display

Output final RAP (Relative Amplitude) and AGC sections to plotter simultaneously. Display parameters for 2.0 second records with 75 foot shot interval are 5 inches/sec and 24 traces/inch.

"SPEEDCAP" DRILLSITE ASSESSMENT
FROM AQUATRONICS ENGINEERING GEOPHYSICAL DATA

CLIENT TRANSCO EXPLORATION COMPANY	DATE 10/28/75
BLOCK/AREA 492 High Island South Addition	
LOC. CO-ORDS 4000' FNL, 6000' FWL	
AQUATRONICS SURVEY NO. 782 Reviewed by: Mark [illegible]	

SURVEY DATES	START 9/20/75	COMPLETE 9/21/75

CLIENT USE

ASSESSMENT DERIVED ONSITE FROM: 12 Fold Digital SUPERSPARKER
Microprofiler
Side Scan Sonar
Echo Sounder

SEABED DEPTH 178 feet	N/A - L.A.T.	N/A - M.S.L.	N/A TIDAL RANGE

HAZARD ANALYSIS: Drillsite Porosity/Pressure Analysis (Gasified Zones)	Amplitude anomaly occurs at 290 ms. (approx. 750') below seabed, 500 ft. to E. This known overpressured zone will be avoided by the vertically drilled hole.
SEAFLOOR SLOPE	Negligible DOWN TO SE
SEAFLOOR CONDITIONS	Smooth and featureless
SEAFLOOR OBSTRUCTIONS	None observed at time of survey.
SHALLOW ZONE	10 feet of recent water saturated sediments (silts), 20 feet of layered fine sands, coarser sands, underlain by thick (> 50 ft) clay sequence observed on upthrown side of fault located 3500 feet W.
FOUNDATION ZONE	250 feet of uniform layered sequence of sands and clays which is underlain by good bearing strength layer.
DRILLING AND ENGINEERING CONDITIONS	Only amplitude anomaly detected located 500 feet E of surface location.
OTHER OBSERVATIONS	No near surface faulting observed within vicinity of drill site.

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AQUATRONICS

"SPEEDCAP" DRILLSITE ASSESSMENT
FROM AQUATRONICS ENGINEERING GEOPHYSICAL DATA

CLIENT TRANSCO EXPLORATION COMPANY	DATE 11/4/75
BLOCK/AREA 492 High Island South Addition	
LOC. CO-ORDS 4300 ft FNL, 5400 ft FWL	
AQUATRONICS SURVEY NO. 782	Reviewed by: Mark Dee

SURVEY DATES	START 9/20/75	COMPLETE 9/21/75

CLIENT USE

ASSESSMENT DERIVED ONSITE FROM: 12 Fold Digital SUPERSPARKER
Microprofiler
Side Scan Sonar
Echo Sounder

SEABED DEPTH 177 ft	- L.A.T.	- M.S.L.	TIDAL - RANGE

HAZARD ANALYSIS: Drillsite Porosity/Pressure Analysis (Gasified Zones)	Amplitude anomaly occurs at 290 ms (approx. 750 ft) below seabed, 1000 ft to NE. This known overpressure zone will be avoided by the vertically drilled hole.
SEAFLOOR SLOPE	Negligible DOWN TO SE
SEAFLOOR CONDITIONS	Smooth and featureless
SEAFLOOR OBSTRUCTIONS	None observed at time of survey.
SHALLOW ZONE	12 feet of recent water saturated sediments (silts), 35 feet of layered fine sands underlain by thick (>75 ft) clay sequence observed on upthrown side of fault located 3000 feet WNW.
FOUNDATION ZONE	250 feet of uniform layered sequence of sands and clays which is underlain by good bearing strength layer.
DRILLING AND ENGINEERING CONDITIONS	Normal marine section exists below foundation zone. Drill path will closely parallel and probably cut from down to upthrown block of normal fault.
OTHER OBSERVATIONS	No near surface faulting observed within vicinity of drill site.

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"SPEEDCAP" DRILLSITE ASSESSMENT
FROM AQUATRONICS ENGINEERING GEOPHYSICAL DATA

CLIENT TRANSCO EXPLORATION COMPANY	DATE 11/4/75
BLOCK/AREA	492 High Island South Addition
LOC. CO-ORDS	1800 ft FNL, 6950 ft FWL
AQUATRONICS SURVEY NO. 782	Reviewed by: Mark Dee
SURVEY DATES	START 9/20/75 COMPLETE 9/21/75
CLIENT USE	
ASSESSMENT DERIVED ONSITE FROM:	12 Fold Digital SUPERSPARKER Microprofiler Side Scan Sonar Echo Sounder
SEABED DEPTH 177 ft	- L.A.T. / - M.S.L. / TIDAL - RANGE
HAZARD ANALYSIS: Drillsite Porosity/Pressure Analysis (Gasified Zones)	Amplitude anomaly observed on relative amplitude processed sections at a 2-way time of 360 ms (954 ft) below sea level or 777 ft below seabed directly below the drillsite.
SEAFLOOR SLOPE	Negligible DOWN TO SE
SEAFLOOR CONDITIONS	Smooth, no features observed within 500 ft of drillsite.
SEAFLOOR OBSTRUCTIONS	None observed at time of survey.
SHALLOW ZONE	15 feet of recent water saturated sediments (silts), 22 feet of layered fine sands underlain by thick (>75 feet) consolidated clay sequence observed on upthrown side of fault 4800 feet due W.
FOUNDATION ZONE	250 feet of uniform layered sequence of sands and clays which is underlain by good bearing strength layer.
DRILLING AND ENGINEERING CONDITIONS	Normal marine section exists below foundation zone. Drill path will closely parallel and probably cut from down to upthrown block of normal fault.
OTHER OBSERVATIONS	No near surface faulting observed within vicinity of drill site.

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"SPEEDCA" DRILLSITE ASSESSMENT
FROM AQUATRONICS ENGINEERING GEOPHYSICAL DATA

CLIENT TRANSCO EXPLORATION COMPANY					DATE 10/28/75
BLOCK, AREA 263 East Cameron					
LOC. CO-ORDS 3500' FWL, 4250' FNL					
AQUATRONICS SURVEY NO. 782			Reviewed by: Mark [illegible]		
SURVEY DATES	START 8/30/75			COMPLETE 8/31/75	
CLIENT USE					
ASSESSMENT DERIVED ONSITE FROM: 6 Fold Digital SUPERSPARKER Magnetometer / Microprofiler / Side Scan Sonar / Echo Sounder					
SEABED DEPTH 149 feet	N/A - L.A.T.		N/A - M.S.L.		N/A - TIDAL RANGE
HAZARD ANALYSIS: Drillsite Porosity/Pressure Analysis (Gasified Zones)	Drillsite is located 400 ft. SE of the south edge of a 1000 ft. wide EW trending shallow gas blankout zone observed on profiler records which is confined to a sand layer overlain by 30-35 feet of recent sediments. Drillsite is located 350 ft. SW of flat lying high amplitude reflection at 60[illegible] ms. 2 way travel time (1500 ft. below seabed).				
SEAFLOOR SLOPE	Less than 0.5 degree DOWN TO Southeast				
SEAFLOOR CONDITIONS	Numerous shallow holes (2'-3' x 20') scattered throughout block, otherwise bottom appears smooth.				
SEAFLOOR OBSTRUCTIONS	Site is located 500 ft. W of exposed 2000' section of non-magnetic linear object. No other potential obstruction no[illegible]				
SHALLOW ZONE	0-28 ft. layered unconsolidated water saturated sediment 28-76 ft. layered sequence of above only apparently more indurated. 76-limit of penetration - more indurated layer sequence of same as above.				
FOUNDATION ZONE	125 ft. approx. to top of first sand layer below uniform flat-lying layered sediments.				
DRILLING AND ENGINEERING CONDITIONS	Site is situated 350' SW of a localised bright spot anomaly at approx. 1500 ft. below seabed. Site is situated above lower amplitude anomaly at approx. 1800 ft. below seabed. This refl. event may be a lithologic boundary of high acoustic impedance contrast.				
OTHER OBSERVATIONS	No near surface faulting or channels observed. All directional wells should be drilled vertically 2000 ft. below seabed [illegible] as a precaution, it is recommended that increased [illegible] [illegible] be used between 1500' and 1800' below seabed.				

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SPEEDCAP
Platform Assessment
Engineering Geophysical Data

Fairfield Industries
3410 Mercer Street
Houston, Texas 77027

1a.	PROJECT: 801
1b.	OPERATOR: Transco Exploration Co.
1.1	Platform Location: High Island Area; South Addition Block A492: 5200 FWL, 6400 FNL
1.2	Data Acquired From: Sept. 20-21, Oct. 16-19, 1975

[X] 12trace digital sparker [X] side scan sonar [X] subbottom profiler

[X] fathometer [ ] magnetometer [X] other Single channel sparker; Soil Boring Report

2. POTENTIAL TROUBLE SPOTS:

The site is located a sufficient distance from all potential hazards in the block (see Anomalies Map) to not be affected.

3. SEAFLOOR CONDITIONS: (See Bathymetry Map)

3.1	Water Depth: 193 feet		Tidal Range: ±1 foot
3.2a	Gradient: negligible	3.2b	Downslope: south
3.3	Description: smooth and featureless		
3.4	Obstructions: None within 3000 feet of site.		

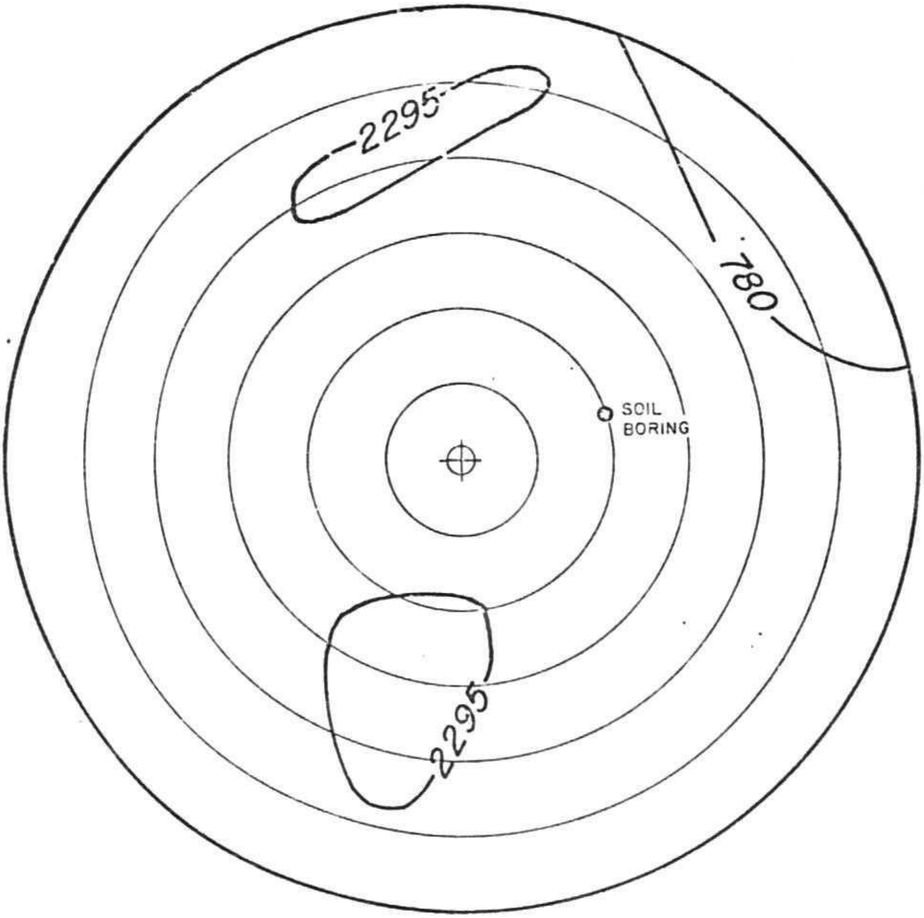
4. ANTICIPATED SHALLOW SOIL CONDITIONS: (see contour maps & cross-section

4.1	Estimated Depth to top of dense sand layer 286 feet BML
4.2	Anchor Support Conditions: Adequate for installation equipment
4.3	Comments: All stratigraphic units identified in soils report from boring 1000 feet E are laterally continuous throughout the area of investigation. Units thicken W of location in the vicinity of active growth fault. Fault displacement at level of dense sand layer is approximately 20 feet.

5. DRILLING CONDITIONS: (see Anomaly Map)

No shallow gas zones indicated within 1000 feet of surface location. Fault intersection for vertical wells projected at 3000 feet BML.

6. ASSESSMENT BY: Mark Dee [signature] DATE: Feb. 17, 1978



780 SHALLOW GAS ZONE DEPTH IN FEET BELOW SEA

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TRANSCO EXPLORATION COMPANY
GULF OF MEXICO-HIGH ISLAND, S.A.
BLOCK A-492

ANOMALIES

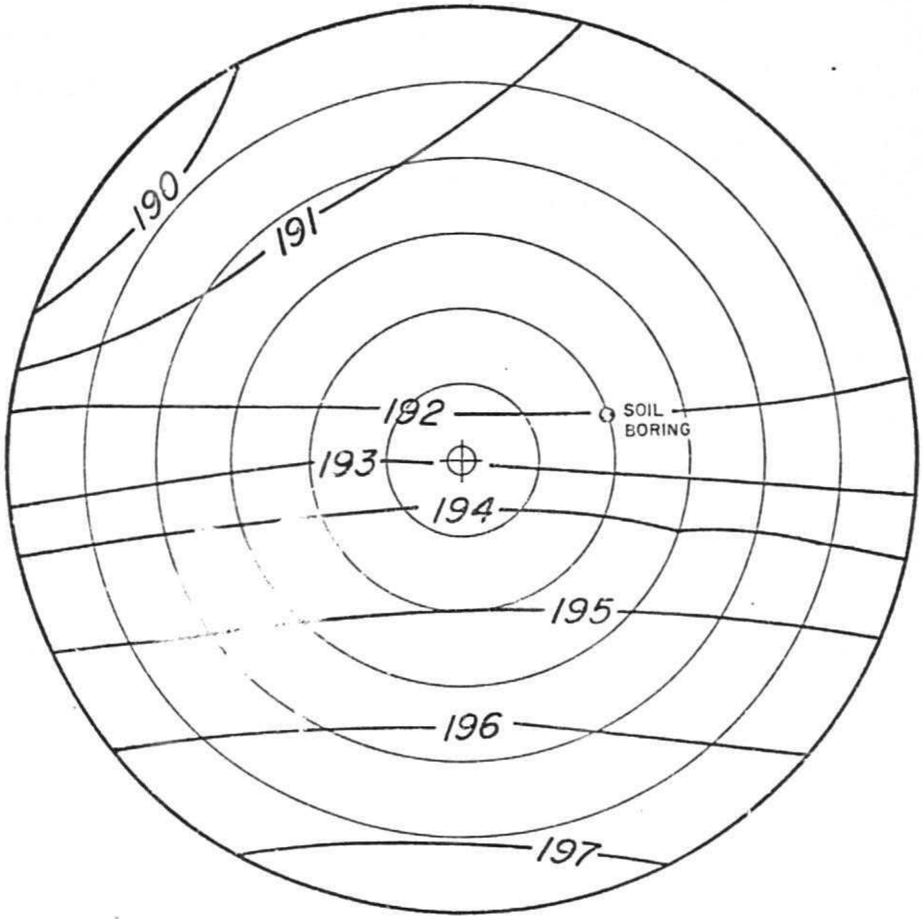
CONTOUR INTERVAL RADIUS 3000 FEET INTERPRETATION BY M.D.

SCALE 1" = 1000'

0 500 1000 2000 3000 FEET

DRILLSITE COORDINATES 5200' FWL, 6400' FNL

FAIRFIELD INDUSTRIES
MARINE DIVISION



TRANSCO EXPLORATION COMPANY
GULF OF MEXICO – HIGH ISLAND, S.A.
BLOCK A-492

BATHYMETRY

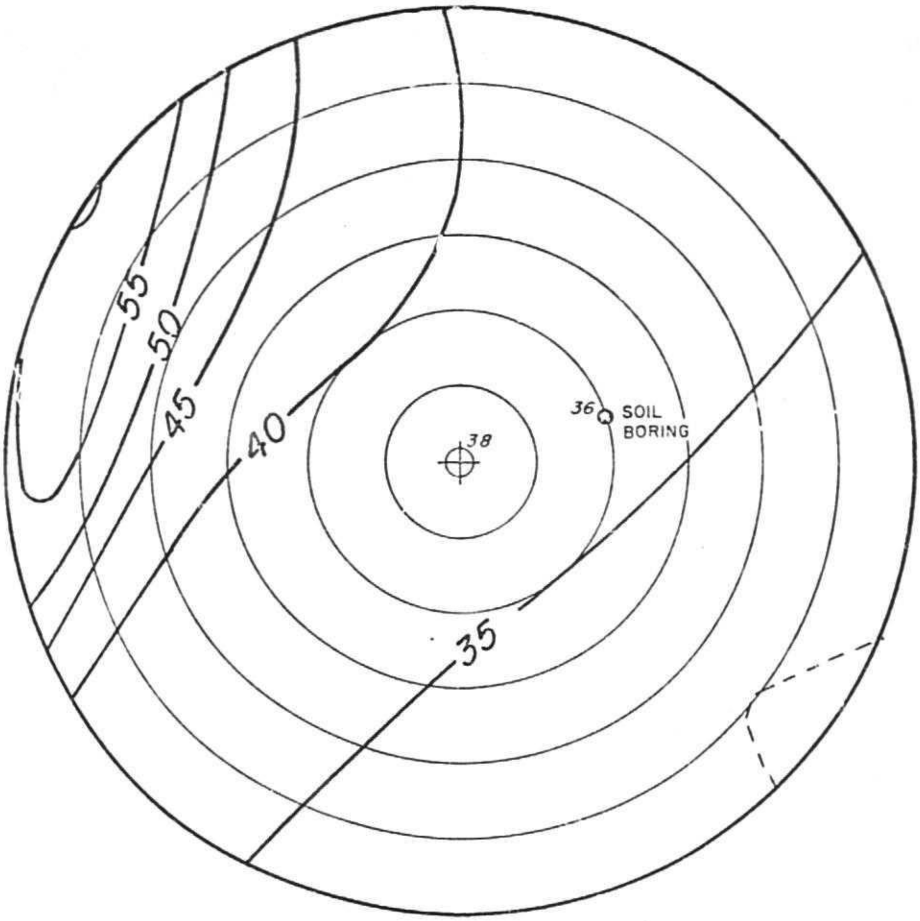
CONTOUR INTERVAL 1 FOOT   RADIUS 3000 FEET   INTERPRETATION BY M.D.

SCALE 1" = 1000'

0 500 1000 2000 3000 FEET

DRILLSITE COORDINATES 5200' FWL, 6400' FNL

FAIRFIELD INDUSTRIES
MARINE DIVISION



SHOLLOW GAS BLANK-OUT ZONE

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TRANSCO EXPLORATION COMPANY
GULF OF MEXICO - HIGH ISLAND, S.A.
BLOCK A-492

SURFICIAL ISOPACH

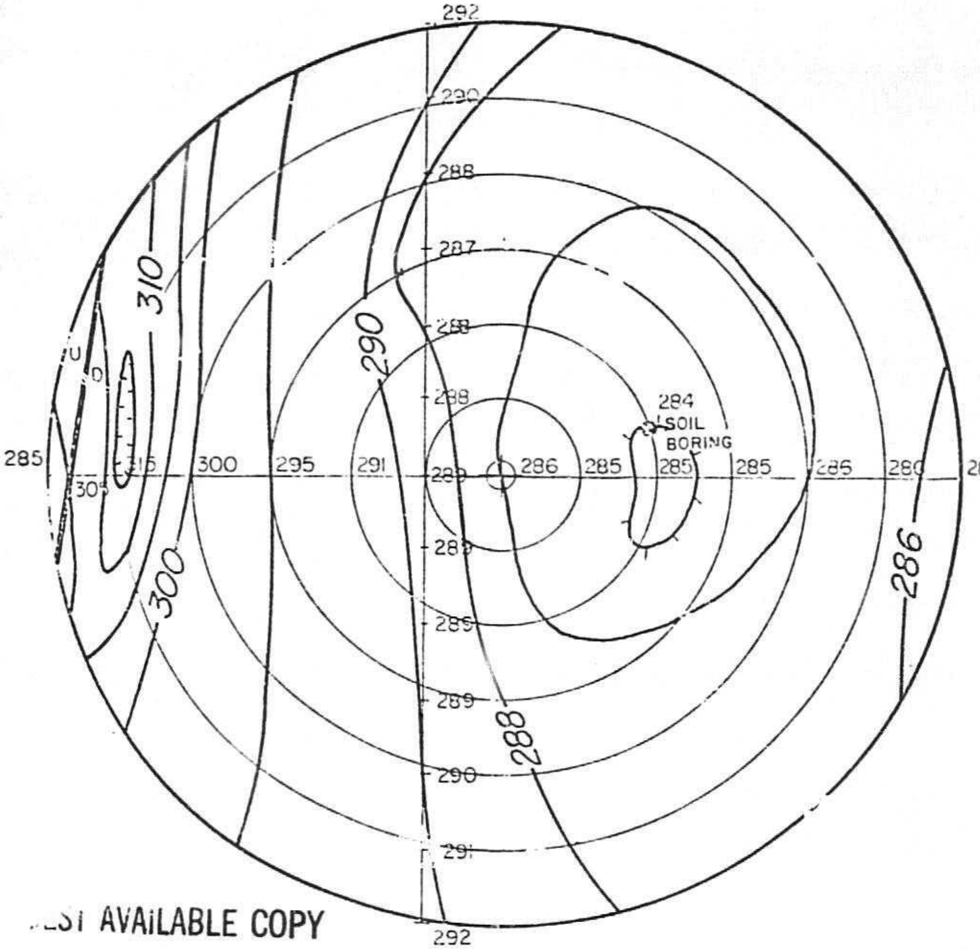
CONTOUR INTERVAL 5 FEET   RADIUS 3000 FEET   INTERPRETATION BY M.D.

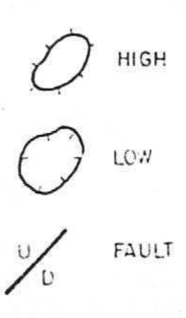
SCALE 1" = 1000'

0   500   1000   2000   3000 FEET

DRILLSITE COORDINATES 5200' FWL, 6400' FNL

FAIRFIELD INDUSTRIES
MARINE DIVISION





TRANSCO EXPLORATION COMPANY

GULF OF MEXICO – HIGH ISLAND, S.A.
BLOCK A-492

DEPTH BELOW SEABED TO TOP OF VERY DENSE FINE SAND LAYER

CONTOUR INTERVAL 2 + 5 FT   RADIUS 3000 FEET   INTERPRETATION BY M.D.

SCALE 1" = 1000'

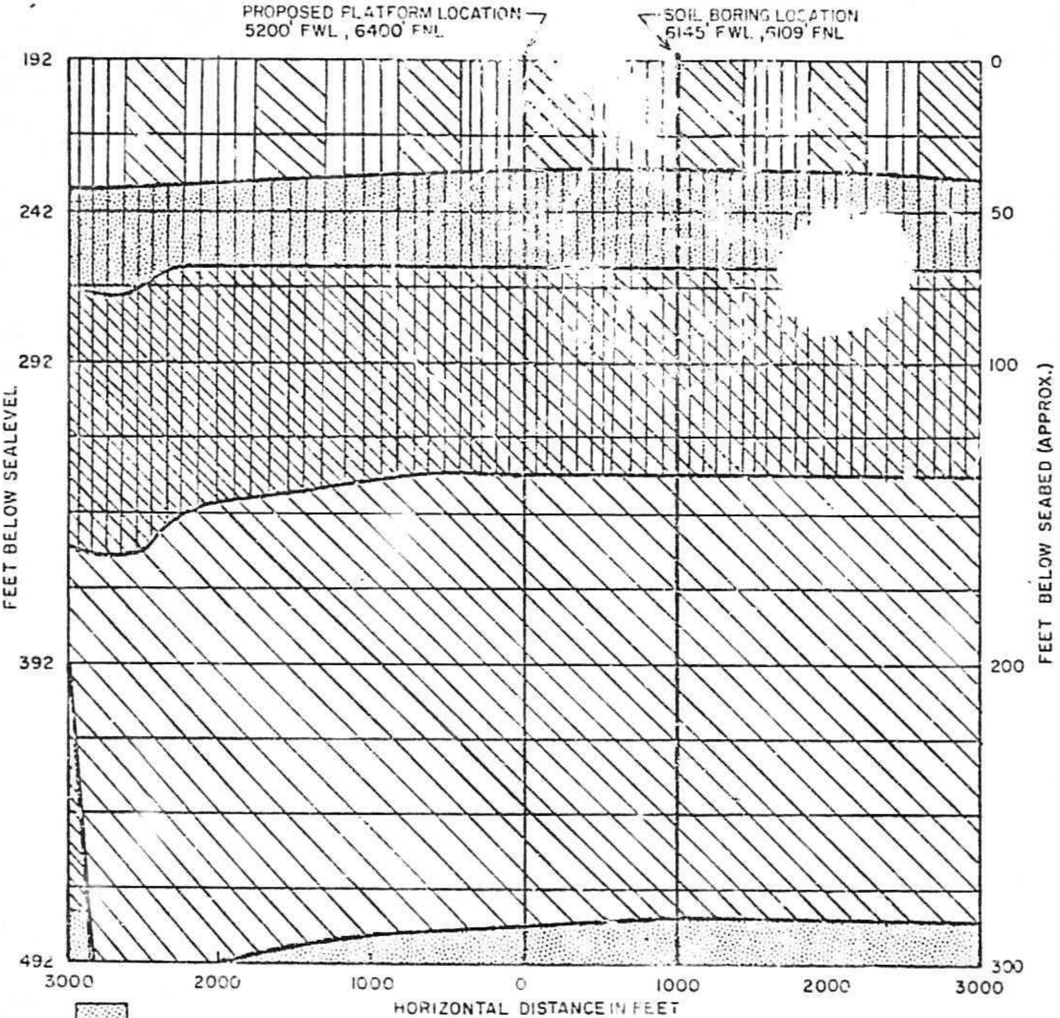
0 500 1000 2000 3000 FEET

DRILLSITE COORDINATES 5200' FWL, 6400' FNL

FAIRFIELD INDUSTRIES
MARINE DIVISION

ANTICIPATED FOUNDATION CONDITIONS

EAST—WEST CROSS SECTION



SAND

CLAY

SILT

BEST AVAILABLE COPY

TRANSCO EXPLORATION COMPANY

HIGH ISLAND AREA, S. ADD.

BLOCK A-492

FAIRFIELD INDUSTRIES

MARINE DIVISION

ATTACHMENT 5

SOIL & FOUNDATION INVESTIGATION

SOIL AND FOUNDATION INVESTIGATION

BLOCK A-4[illegible]2, HIGH ISLAND AREA

GULF OF MEXICO

REPORT NO. 77-001

* * *

Report

to

TRANSCO EXPLORATION COMPANY
Houston, Texas

* * *

By

FUGRO GULF, INC.
Houston, Texas

March, 1977

FUGRO

FUGRO

FUGRO GULF, INC. / CONSULTING ENGINEERS AND GEOLOGISTS

Jack J. Schoustra, President
Berry R. Grubbs, Vice President
Wayne B. Ingram, Vice President

Report No. 77-001
March 10, 1977

Transco Exploration Company
2700 South Post Oak
Houston, Texas 77056

Attn: Mr. G. L. Drenner, Jr.

SOIL AND FOUNDATION INVESTIGATION
BLOCK A-492, HIGH ISLAND AREA
GULF OF MEXICO

Gentlemen:

Presented herein is our study of the soil and foundation conditions at the porposed location of an offshore platform in Block A-492 of the High Island Area. The boring was located 6109.1 feet from the North line and 6145.5 feet from the West line of Block A-492. This study was authorized December 27, 1976 by Mr. J. P. Morgan of Hemisphere Corporation.

Preliminary copies of the boring log and pile capacity curves for 42-inch OD pipe piles were transmitted to Mr. Harry A. Berkey of Hemisphere Corporation upon completion of the field investigation on January 19, 1977. Preliminary copies of pile capacity curves for 48-inch OD pipe piles were transmitted to Mr. Berkey on January 27, 1977, and advance final pile capacity curves and p-y data were transmitted on February 17, 1977. Final design information is included here in greater detail.

We appreciate this opportunity to be of service to you. Please call upon Fugro Gulf when we can be of further assistance.

Very truly yours,
FUGRO GULF, INC.

George D. Cozart
Staff Engineer

Wayne B. Ingram, Ph.D., P.E.
Vice President

GDC/WBI:pa
Copies Submitted: (1) Transco Exploration Company

(5) Hemisphere Corporation
11211 Katy Fwy.
Houston, Texas 77079
Attn: Mr. J. P. Morgan

8181 Commerce Park Drive, Suite 712, Houston, Texas 77036
Telephone: (713) 777-2641 Telex: 775-494

A subsidiary of FUGRO Inc. Long Beach, California

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APPENDIX A - Laboratory and Field Tests

APPENDIX B - Method for Predicting Pile Capacities

SUMMARY

An investigation was conducted to determine soil and foundation conditions at the site of a proposed platform in Block 492 of the High Island Area, Gulf of Mexico. Soil conditions were determined by drilling one boring to a depth of 350 feet below the seafloor and performing tests to determine pertinent physical properties of the foundation soils. Findings and conclusions of this study are as follows:

1. At the time of field investigation, the water depth at the site was 192 feet. The generalized soil stratigraphy at the boring location is given below:

Stratum	Depth, Ft From - To	Soil Description
I	0 - 36	Interbedded Soft to Firm Gray Clay & Dense Gray Sandy Silt
II	36 - 70	Medium Dense to Dense Gray Sandy Silt
III	70 - 138	Stiff Gray Silty Clay
IV	138 - 284	Stiff to Very Stiff Gray Clay
V	284 - 350	Very Dense Gray Fine Sand

2. Ultimate compressive and tensile capacities were computed for 48-inch OD pipe piles driven open-ended to various penetrations below the seafloor. For an ultimate compression load of 3000 tons, the 48-inch diameter piles should penetrate to 300 feet below the seafloor.

3. Soil resistance-pile deflection (p-y) data for 48-inch OD pipe piles were computed and are presented in this report for use in performing lateral load analyses.

4. After consideration of the factors influencing scour potential at this site, it is estimated that the depth of scour for 48-inch piles would be about four feet.

INTRODUCTION

The investigation reported herein was performed for Transco Exploration Company at a proposed offshore platform site in Block A-492 of the High Island , in the Gulf of Mexico. The boring site was located 6109.1 feet from the North line and 6145.5 feet from the West line of Block A-492. The Texas Coordinates at this site are x = 3,592,821.3 and y = 176,050.9.

Principal objectives of the study were to determine subsurface conditions at the proposed offshore platform site, and to develop criteria and recommendations for design and construction of a pile foundation based upon an ultimate compressive load of 3000 tons using 48-inch OD pipe piles. These objectives were accomplished as follows:

1. A boring was drilled to determine soil stratigraphy at the location;
2. Laboratory tests were performed to define the pertinent physical characteristics of the soil; and
3. Engineering analyses of the field information and laboratory test data were made to develop criteria and recommendations for design and construction of 48-inch OD pipe pile foundations.

Subsequent sections of this report contain brief descriptions of the field exploration and laboratory testing programs, general soil conditions at the site and recommendations related to axial pile capacities, factors of safety, pile penetration, lateral soil resistance and scour potential.

FIELD INVESTIGATION

The field exploration program consisted of one boring drilled to a depth of 350 feet below the seafloor at the approximate location of the proposed platform structure. Drilling and soil sampling operations were conducted from the drilling vessel, M/V LIVINGSTON. The measured water depth at the time of field investigation was 192 feet.

The boring was drilled through an open well, fabricated through the deck and hull of the M/V LIVINGSTON, with a conventional skid-mounted drilling rig, using 3-1/2-inch OD IF drill pipe with an open-ended bit. Samples were taken almost continuously to a depth of 45 feet, at 5-foot intervals from 45 feet to 60 feet, and at 10-foot intervals thereafter to termination depth at 350 feet. Soil samples were obtained with a 2-1/2-inch OD thin-walled tube sampler in cohesive soils and a 2-inch standard split-spoon in cohesionless soils, each driven with a 165-lb sliding hammer fabricated in the head of the sampling apparatus. The sampling unit was lowered through the opening in the drill string and operated with a wire line. The hammer was raised with the wire line and dropped approximately five feet a sufficient number of times to obtain 18 to 24 inches of sample penetration, or until driving resistance became excessive. The actual length of each sample was measured after retrieval of the sampler, and this value was used to compute the average number of blows per foot of penetration required to advance the sampler at that depth.

The soil samples were extruded from the sampler, examined and visually classified by a soils engineer and technician onboard the drilling vessel. A part of each cohesive sample was tested in the laboratory onboard the M/V LIVINGSTON to determine soil shear strength and unit weight. Remaining portions of the cohesive samples and a part of each cohesionless soil sample were then sealed in moisture-tight containers for transportation to the laboratory in Houston.

Descriptions of the soils encountered in the boring are given on the left-hand portion of the boring log, Plate 1, along with a graphical symbol for the various types of soil, sample numbers and depths, and sampler blowcount information. A Key to Soil Classification and Symbols used on the log is presented on Plate 2.

A brief chronological summary of field activities at this location is given on Plate 3.

FIELD AND LABORATORY TESTS

The field and laboratory testing program was designed to evaluate the pertinent physical properties of the foundation soils encountered at the boring location. This was performed in two main phases: (1) field strength and unit weight tests were run on cohesive soils in the laboratory onboard the drilling vessel for use in computing axial load capacity of the proposed pile foundation as drilling proceeded, and (2) soil identification-classification tests and additional strength tests were performed in the laboratory in Houston to gain more detailed information concerning the pertinent physical properties of all foundation soils encountered within the limits of exploration.

Strength tests conducted on cohesive soils onboard the drilling vessel consisted of miniature vane shear tests run prior to extruding samples from the thin-walled tube sampler, and unconfined compression tests on selected specimen after removal from the sample tube. Strength tests were also performed using a pocket penetrometer and a Torvane device. The detailed laboratory strength testing program included unconfined compression tests, consolidated-undrained [illegible] ted-undrained and consolidated-drained compression tests [illegible] ated-drained direct shear tests.

The following tabulati[illegible]s the type and total number of strength tests performed for [illegible]dy:

Type of Test	No. of Tests
Torvane	21
Pocket Penetrometer	29
Miniature Vane Shear	
Undisturbed Specimen	21
Remolded Specimen	2

Type of Test (Cont.)	No. of Tests
Unconfined Compression	
Undisturbed Specimen	9
Remolded Specimen	6
Unconsolidated-Undrained Triaxial Compression	
Undisturbed Specimen	2
Remolded Specimen	5
Consolidated-Undrained Triaxial Compression	
Undisturbed Specimen	7
Consolidated-Drained	
Triaxial Compression-Multiple-Stage ...	2
Direct Shear-Multiple-Specimen	3

Moisture content and unit weight determinations were made as a part of each compression test. Additional moisture content tests, liquid and plastic limit tests, and grain size analyses were also run; a listing of these tests is given as follows:

Type of Test	No. of Tests
Moisture Content	22
Liquid and Plastic Limits	29
Sieve Analysis	5
Mechanical Analysis, Including Hydrometer and Sieve	9

The laboratory test results are presented graphically on the right side of the boring log, Plate 1, and a tabulation of numerical test values is given in the Summary of Test Results in Appendix A. Procedures for all the tests are described in greater detail in Appendix A; triaxial test data and stress-strain curves for the clays are also presented graphically in Appendix A.

GENERAL SUBSURFACE CONDITIONS

Soil Stratification

A detailed description and summary of test results for the soils encountered within the limits of exploration at this site are shown on the boring log, Plate 1. Considering these data, the foundation soils can be divided into five generalized strata as follows:

Stratum	Depth, Ft From To	Soil Description
I	0 - 36	Interbedded Soft to Firm Gray Clay & Dense Gray Sandy Silt
II	36 - 70	Medium Dense to Dense Gray Sandy Silt
III	70 - 138	Stiff Gray Silty Clay
IV	138 - 284	Stiff to Very Stiff Gray Clay
V	284 - 350	Very Dense Gray Fine Sand

Minor textural and color variations and inclusions of other types of soil within each generalized layer are noted on the boring log, Plate 1.

Soil Properties

Stratum I (seafloor to 36-foot penetration) consists primarily of alternating layers of soft to firm gray clay and dense sandy silt and is thus described as being interbedded. The shear strength used for design purposes (indicated on the boring log for each strata of cohesive soil) was interpreted from tests performed on cohesive portions of the samples recovered in this stratum. Below this upper interbedded zone there exists a medium dense to dense gray sandy silt to a depth of 70 feet (Stratum II). Within Stratum II, evidence of silty clay and fine sand was present at

43 and 58 feet, respectively. The angle of internal friction selected for design purposes for the sandy silt of this stratum was somewhat lower than the measured values due to the possibility of excessive densification of the test specimens during remolding. Stratum III (70 - 138 ft) is composed of silty clay exhibiting fairly constant shear strength and plasticity. From 138 to 284 feet (Stratum IV) there exists stiff to very stiff gray clay. The shear strength of the clay increases with depth throughout the strata with a reduction in strength at 220 feet. Below this depth, the clay possesses a flocculated structure as indicated by reduced strength and unit weight. At 284 feet a very dense sand was encountered. With the exception of a sandy silt zone at 289 feet and a silty sand zone at 350 feet, this stratum is composed of fine sand as indicated by the grain size distribution curves on Plates A-10 and A-11. The angle of internal friction of this sand was taken as 35 degrees from interpretation of consolidated-drained triaxial test results.

ANALYSES AND RECOMMENDATIONS

Method of Analyses

The ultimate compressive (axial) load capacity, Q, of a pile for a given penetration is the sum of the skin frictional capacity, Q_s, and the end bearing capacity, Q_p:

$$Q = Q_s + Q_p = fA_s + qA_p$$

A_s and A_p represent the embedded pile (skin) surface area and pile end (total cross-sectional) area, respectively; f and q are the unit skin friction and unit end bearing resistance, respectively. The end bearing term in the equation is neglected when computing ultimate tensile (pull-out) load capacity of a pile. The "λ" Method was utilized in computing axial pile capacities and is described in some detail in Appendix B.

Axial Pile Capacities

The soil stratigraphy, interpreted strength parameters and effective unit weight are presented on Plate 4. These data were input into a computer program for axial pile capacity, based on the "λ" Method.

The "λ" Method predicts total frictional capacity in cohesive soils, rather than computing frictional capacity based on a specified distribution of unit skin friction with depth. However, the computer program generates unit skin friction values based on the frictional capacity between depths specified in the program. These values in cohesive material, shown on Plate 4, thus represent average values between the noted depth increments. Unit skin friction values, shown on Plate 4, for the granular materials are actual values computed in accordance with the equations shown in Appendix B.

The program utilizes the expression presented in Appendix B for computing the values of unit end bearing at specified points. If, at any depth, the end bearing capacity exceeds the cumulative frictional capacity, the total capacity at that depth is limited to twice the frictional capacity (i.e., friction along the outside of the pile plus the component along the internal plug). Circumstances leading to this situation are generally due to the presence of granular strata at shallow depths. If such conditions prevail, an equivalent unit end bearing is computed, based on end bearing capacity equal to frictional capacity.

The results of the pile capacity analyses for 48-inch OD pipe piles, specified by Hemisphere Corporation, are presented in the form of pile capacity versus pile penetration on Plates 5 and 6.

Pile Penetration

Ultimate compression load, also specified by Hemisphere Corporation, using a 48-inch OD pipe pile at this location was 3000 tons. For this ultimate compression load, it is recommended that the 48-inch OD pipe piles penetrate to 300 feet below the seafloor. This recommendation is based on our estimate of pile penetration into Stratum V required to mobilize adequate end bearing capacity.

Factors of Safety

The magnitude of the factor of safety to be used with the ultimate pile capacity provided on Plates 5 and 6 should be selected after giving consideration to several factors, including storm frequency, wave and current forces, economic importance of the structure, methods used in determining subsurface conditions and predetermining pile capacities and sensitivity of the structure to vertical movement. A value of 1.5 is recommended for maximum storm loading and is considered consistent with the degree of reliability of the soils data. Recommended pile capacity curves, using a safety factor of 1.5, are provided on Plates 5 and 6. Actual capacity in tension may be slightly higher than the capabilities shown on Plate 6, since the weight of the pile and the soil plug are neglected in computing pile capacity.

Lateral Soils Resistance

Analysis of the foundation piles subjected to lateral and overturning loads will be evaluated with a computer program in which the lateral soil resistance, p, pounds per linear inch, is expressed as a nonlinear function of pile deflection, y, in inches. The relationship of these parameters is a function of the soil stress-strain characteristics defined by the triaxial tests, depth, pile diameter and soils shear strength. Criteria for development of the p-y values recommended in this report was based on Matlock's [(1)] Criteria for clays and a modified version of Reese's Method [(2)] for cohesionless deposits.

The above referenced criteria were utilized to develop p-y values for 48-inch OD pipe piles at this site. The p-y values presented on

---

(1) Matlock, Hudson, "Correlations for Design of Laterally Loaded Piles in Soft Clay," Presented at the Second Annual Offshore Technology Conference, Houston, Texas, 1970.

(2) Reese, Lymon C., William R. Cox, and Francis D. Koop, "Analysis of Laterally Loaded Piles in Sand," Presented at the Sixth Annual Offshore Technology Conference, Houston, Texas, 1974.

Plate 7 are for the soil strata encountered within the upper 100 feet of the boring at this site. These data, presented on Plate 7 are given in tabular form to facilitate input into a computer program.

It is recommended that the flexural capacity of piles subjected to lateral loads be computed after allowing for the load transfer from the pile to the soil. This can be accomplished by assuming that the axial compressive load on the pile at any depth is equal to the axial load at the seafloor minus the cumulative skin friction in compression at that depth. The cumulative skin friction in compression at any depth can be obtained from Plate 8.

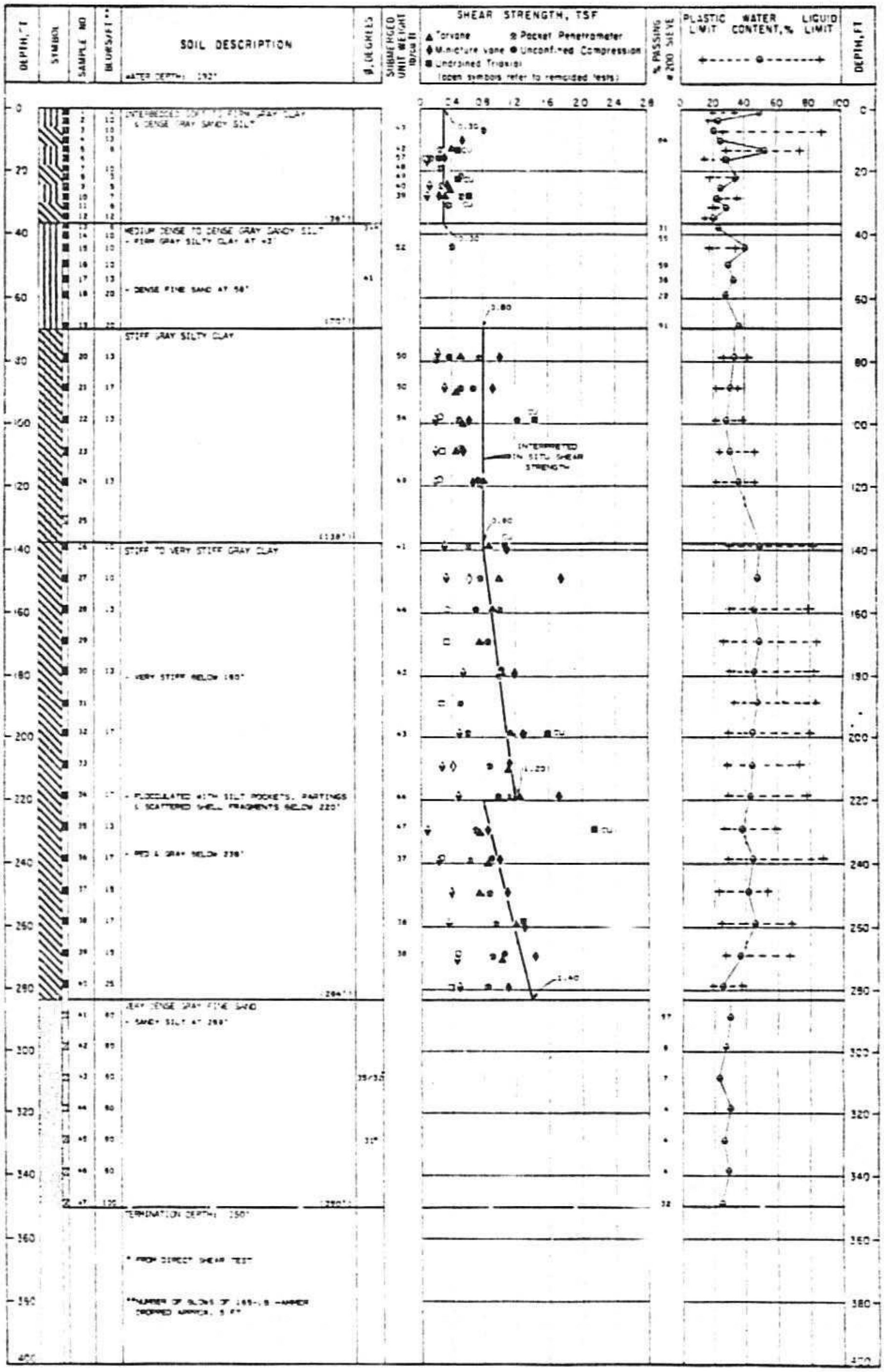
Scour Potential

The potential of scour at a site would depend on the pile size, the grain size distribution of the surficial clay and silt deposits and its relative density, the current velocity, direction of flow and the water depth.

After review of all the pertinent data on scour potential at this site, it is estimated that for 48-inch OD pipe piles, the depth of scour would be about four feet around the piles.

ILLUSTRATIONS

FUGRO GULF, INC.
Consulting Engineers and Geologists



LOG OF BORING AND TEST RESULTS
BLOCK 492, HIGH ISLAND AREA

PLATE 1

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KEY TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPE

(Shown in Symbol Column)

SAMPLE TYPE

(Shown in Samples Column)

Predominant type shown heavy

TERMS DESCRIBING CONSISTENCY OR CONDITION

COARSE GRAINED SOILS (Major Portion Retained on No. 200 Sieve)

Includes (1) clean gravels & sand described as fine, medium or coarse, depending on distribution of grain sizes & (2) silty or clayey gravels & sands (3) fine grained low plasticity soils (PI $<$ 10) such as sandy silts. Condition is rated according to relative density, as determined by lab tests or estimated from resistance to sampler penetration.

Descriptive Term	Penetration Resistance *	Relative Density
Loose	0 – 10	0 to 40 %
Medium Dense	10 – 30	40 to 70 %
Dense	30 – 50	70 to 90 %
Very Dense	Over 50	90 to 100 %

**Blows/Ft., 140# hammer, 30" drop*

FINE GRAINED SOILS (Major Portion Passing No. 200 Sieve)

Includes (1) inorganic & organic silts & clays, (2) sandy, gravelly or silty clays, & (3) clayey silts. Consistency is rated according to shearing strength, as indicated by penetrometer readings or by unconfined compression tests for soils with PI $\geq$ 10

Descriptive Term	Cohesive Shear Strength Tons/Sq. Ft.
Very Soft	Less Than 0.125
Soft	0.125 to 0.25
Firm	0.25 to 0.50
Stiff	0.50 to 1.00
Very Stiff	1.00 to 2.00
Hard	2.00 and Higher

NOTE: SLICKENSIDED AND FISSURED CLAY MAY HAVE LOWER UNCONFINED COMPRESSIVE STRENGTHS THAN SHOWN ABOVE, BECAUSE OF PLANES OF WEAKNESS OR SHRINKAGE CRACKS; CONSISTENCY RATINGS OF SUCH SOILS ARE BASED ON HAND PENETROMETER READINGS

TERMS CHARACTERIZING SOIL STRUCTURE

Parting: paper thin in size

Seam: 1/8"–3" thick

Layer: greater than 3"

Fissured: containing shrinkage cracks, frequently filled with fine sand or silt; usually more or less vertical

Sensitive: pertaining to cohesive soils that are subject to appreciable loss of strength when remolded

Interbedded: composed of alternate layers of different [illegible]

Laminated composed of thin layers of varying color and texture

Calcareous containing appreciable quanities of calcium carbonate

Well Graded: having wide range in grain sizes and substantial amounts of all intermediate particle sizes

Poorly Graded: predominately of one grain size, or having a range of sizes with some intermediate size missing

Flocculated: pertaining to cohesive soils that exhibit a loose knit or flakey structure

Slickensided: having inclined planes of weakness that are slick and glossy in appearance

DEGREE OF SLICKENSIDED DEVELOPMENT

Slightly Slickensided: slickensides present at intervals of 1'-2'; soil does not easily break along these planes

Moderately Slickensided: slickensides spaced at intervals of 1'-2'; soil breaks easily along these planes

Extremely Slickensided: continuous and interconnected slickensides spaced at intervals of 4"–12"; soil breaks along the slickensides into pieces 3"–6" in size

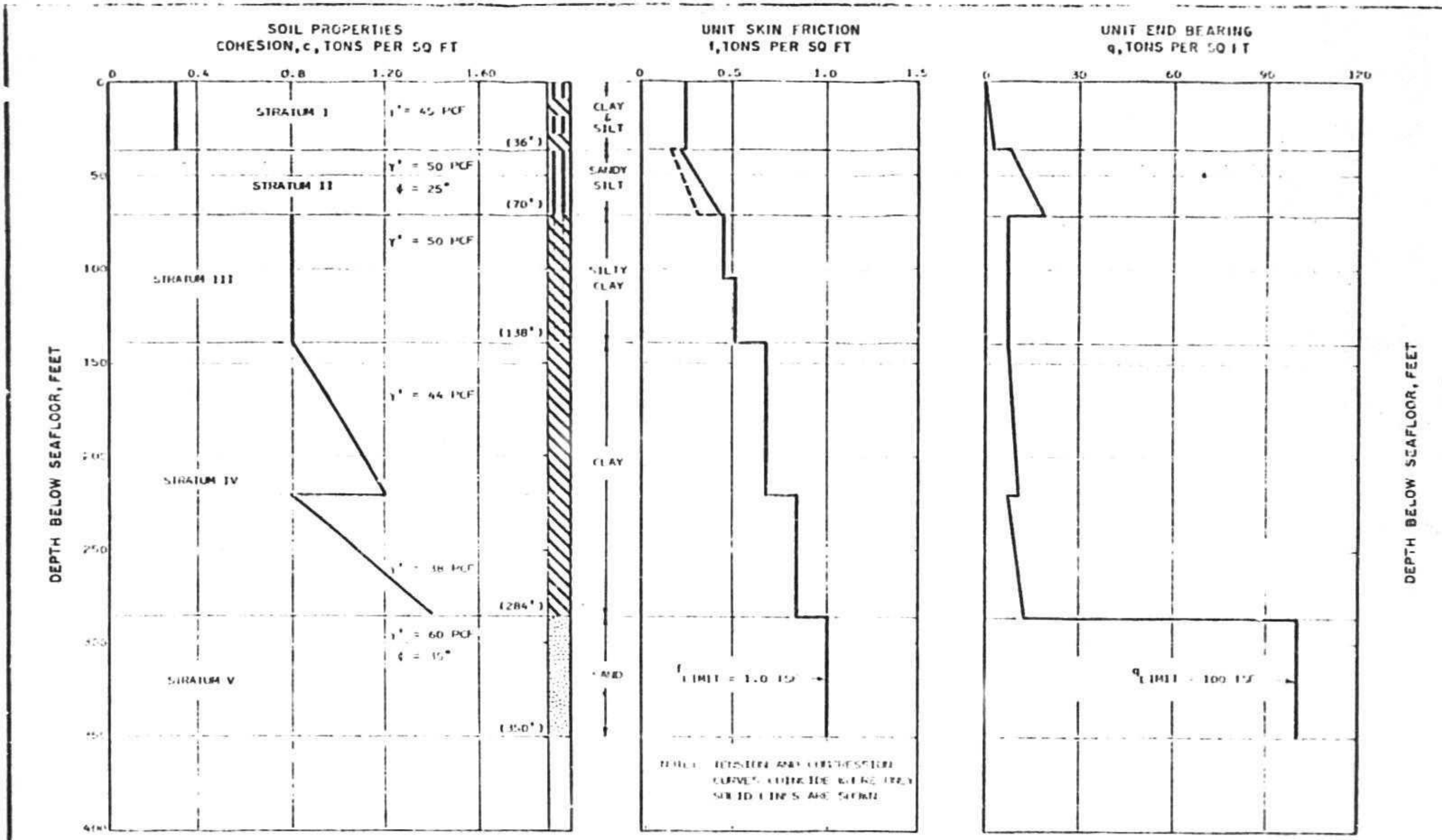
Intensely Slickensided: slickensides spaced at intervals of less than 4", continuous in all directions; soil breaks down along planes into nodules 1/4"–2" in size

SUMMARY OF FIELD ACTIVITIES

BLOCK 492 HIGH ISLAND

GULF OF MEXICO

DATE	TIME FROM	TIME TO	DESCRIPTION OF ACTIVITY
1/11/77	06:00	14:00	Fugro crew travel from Houston, Texas to Morgan City, Louisiana.
	14:00	24:00	Awaiting rigging up of mooring system on M/V LIVINGSTON by Tide Water Contractors.
1/11/77	00:00	24:00	Rigging M/V LIVINGSTON and loading drilling, sampling and testing equipment onto M/V LIVINGSTON.
1/13/77	00:00	05:30	Rigging up for drilling, sampling and testing operations.
	05:30	06:00	Moving to Milchem dock to load drilling mud.
	06:00	11:00	Loading salt water gel and weight. Delay due to crane breakdown.
	11:00	24:00	Enroute to High Island Block 492.
1/14/77	00:00	10:30	Enroute to High Island Block 492.
	10:30	14:00	Setting anchors. Final position 26 feet Northeast of specified location.
	14:00	14:30	Preparing for drilling and sampling operations and measuring water depth (192 ft.).
	14:30	15:15	Lowering drill pipe to seafloor.
	15:15	24:00	Drilling and sampling.
1/15/77	00:00	06:30	Drilling and sampling. Termination depth, 350 feet.
	06:30	09:00	Pulling drill pipe.
	09:00	11:00	Picking up anchors and preparing for travel to next location.



SOIL PROPERTIES AND PILE CAPACITY DATA
BLOCK 492, HIGH ISLAND AREA
GULF OF MEXICO

FUGRO GULF INC
Consulting Engineers and Geologists

PLATE 4

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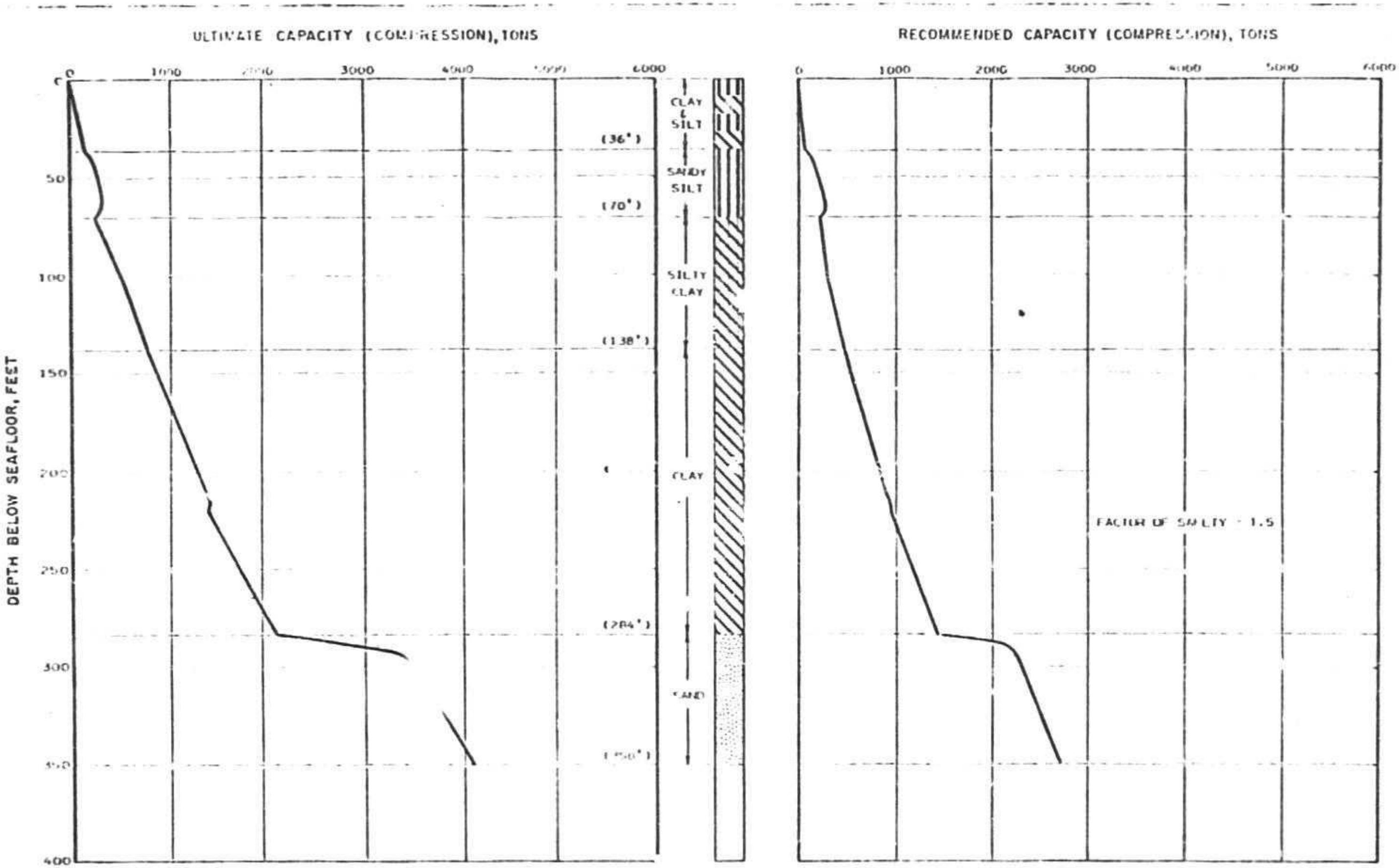

PILE CAPACITY CURVES (COMPRESSION)
BLOCK 492, HIGH ISLAND AREA
48-IN O.D. PIPE PILE

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Consulting Engineers and Geologists

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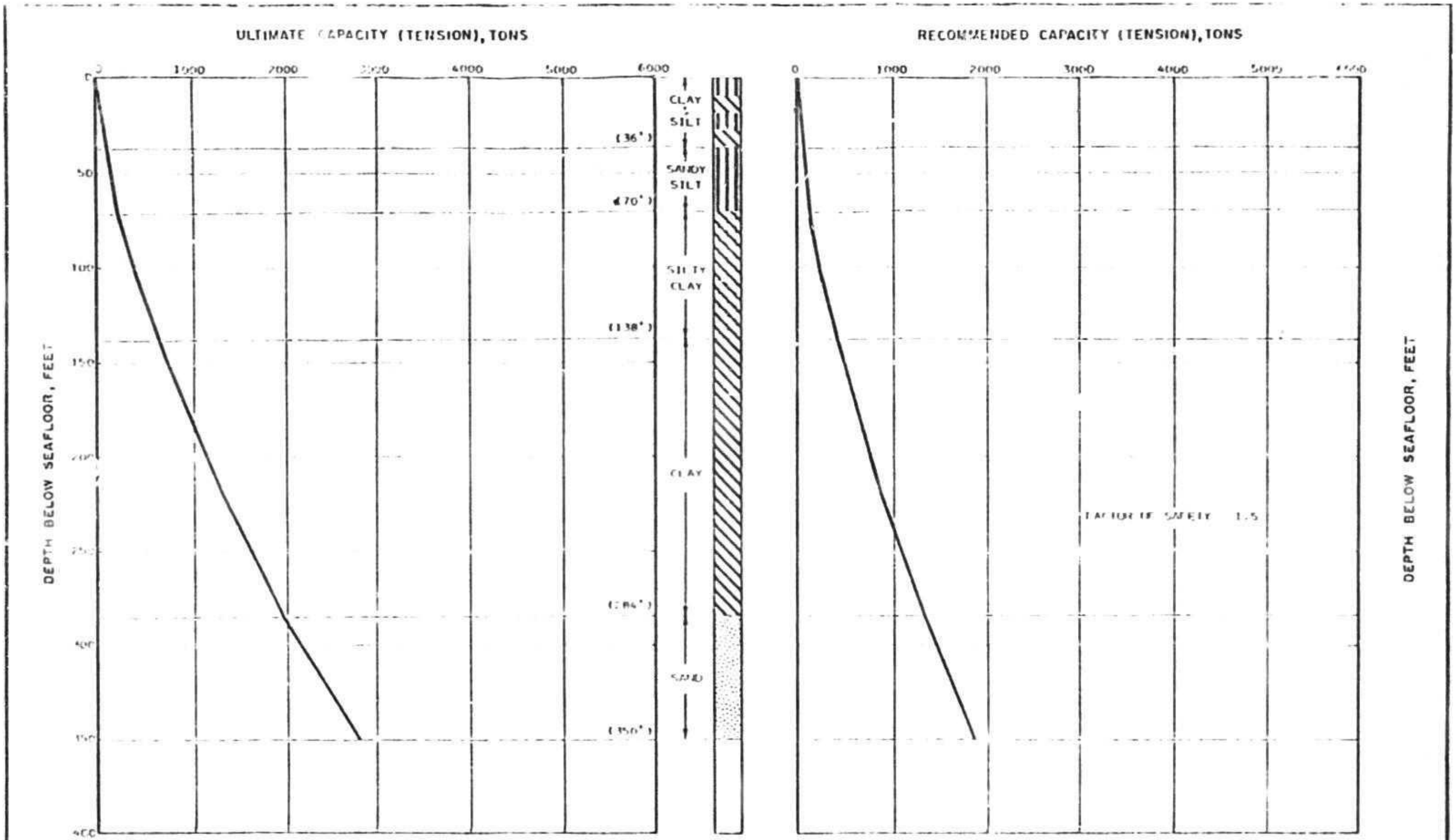

PILE CAPACITY CURVES (TENSION)
BLOCK 492, HIGH ISLAND AREA
48 IN O.D. PIPE PILE

FUGRO GULF, INC.
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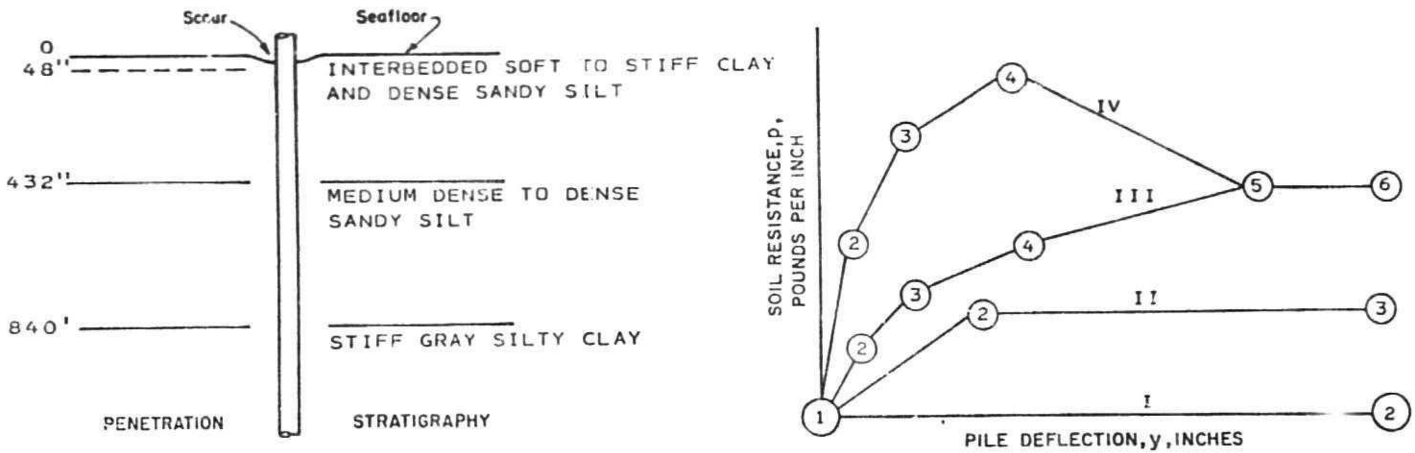
PENETRATION IN INCHES	TYPICAL CURVE	COORDINATES OF CURVE POINTS															
		y_1	p_1	y_2	p_2	y_3	p_3	y_4	p_4	y_5	p_5	y_6	p_6	y_7	p_7	y_8	p_8
48	I	0	0	48.0	0.0												
49	III	0	0	0.36	99	1.20	150	3.60	216	18.0	300	48.0	300				
144	III	0	0	0.[illegible]	2[illegible]7	0.60	450	1.80	648	9.0	900	48.0	900				
432	IV	0	0	[illegible]6	59[illegible]	0.120	900	0.360	1296	1.80	900	48.0	900				
433	II	0	0	[illegible]	3420	48.0	3420										
840	II	0	0	0.67	6870	48.0	6870										
841	IV	0	0	0.29	1584	0.96	2400	2.88	3456	14.40	2400	48.0	2400				



SOIL RESISTANCE - PILE DEFLECTION (p-y) DATA

48- IN. DIAMETER PILE
BLOCK 492, HIGH ISLAND AREA

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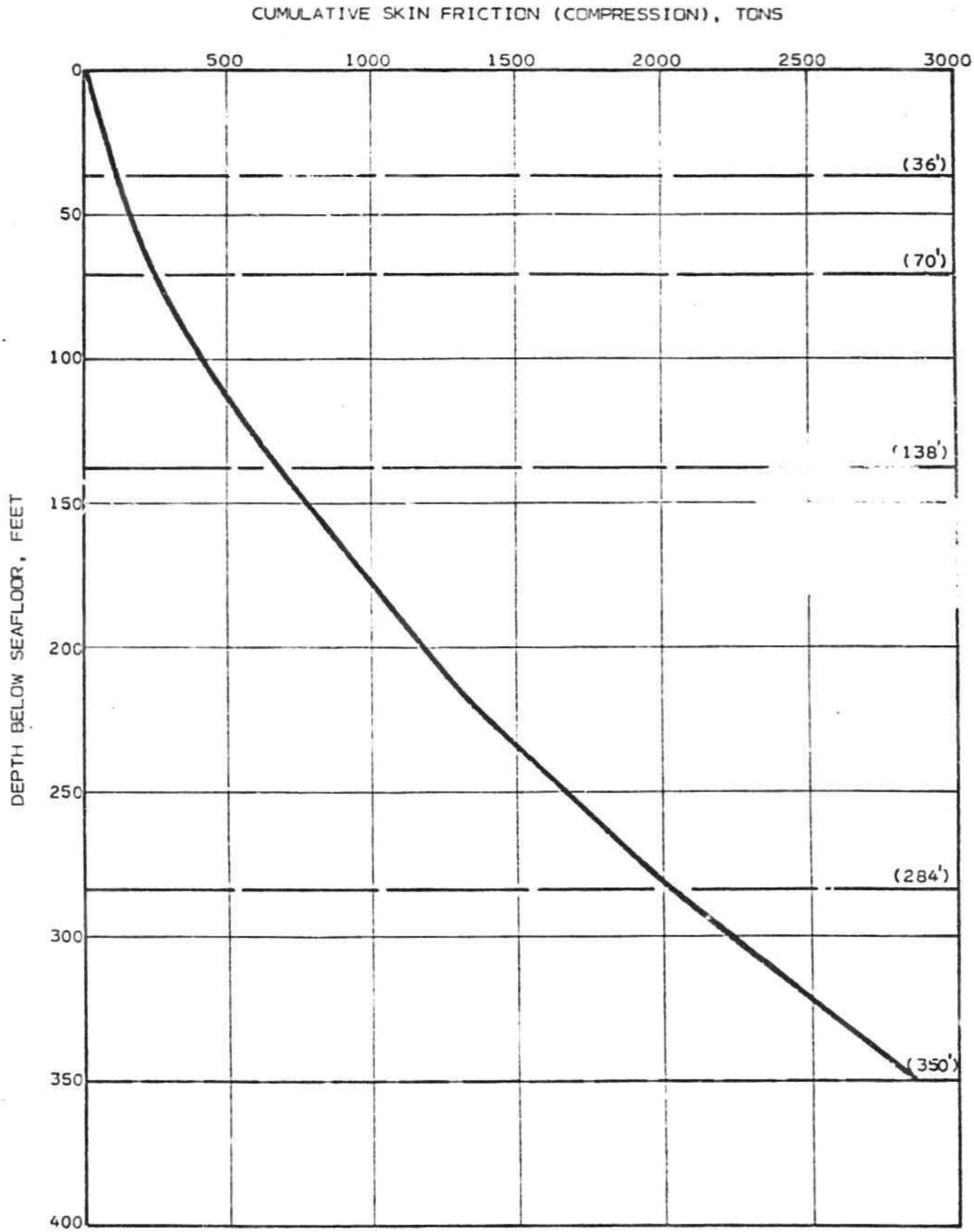

CUMULATIVE SKIN FRICTION CURVE
48-INCH OD PIPE PILE
BLOCK 492, HIGH ISLAND AREA

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APPENDIX A

LABORATORY AND FIELD TESTS

APPENDIX A

LABORATORY AND FIELD TESTS

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together with the strength tests, provide useful tool in selection of soil strength (angle of friction, Ø, value) for determination of pile capacities. Results of these tests are shown by gradation curves following the text of this Appendix.

STRENGTH TESTS

Miniature Vane

This test is usually performed in the field on a cohesive sample prior to its removal from the sampling tube. Any disturbed soil in the bottom of the tube is removed, and a small 4-bladed vane is inserted into the undisturbed soil. Torque is applied to the vane through a calibrated coil spring activated by an electric motor, causing it to rotate slowly until soil shear failure occurs. The undisturbed shear strength of the sample is computed from the observed angular displacement of the calibrated spring. After initial or undisturbed failure, the vane is rotated back to zero and the test repeated to define the residual. The cohesive sample is then remolded and tested in the same manner as the undisturbed sample. Undisturbed values are shown by the solid symbol, residual values by the half-open symbol and remolded values by the open symbol in the strength graph on the log, and are tabulated in the summary of test results presented in this Appendix.

The miniature vane provides an accurate determination of soil shear strength for very soft to firm soils. The shear strength of soils in the stiff to very stiff consistency range is more accurately determined by the unconfined or triaxial compression test. The vane is particularly useful for tests on soft to very soft soils that will not form an unsupported cylinder for unconfined tests.

CLASSIFICATION TESTS

Moisture and Plasticity

Field classification and uniformity of strength was verified by natural moisture content, and liquid and plastic limit tests performed in accordance with ASTM Procedures D2216-66 and D424-65, respectively. The liquid limit represents the moisture content of the soil at the time of deposition when the soil is in essentially a liquid condition. The plastic limit defines the moisture content at which the soil behaves as semi-solid; soil is plastic at moisture contents between the liquid and plastic limits. Recent sediments exhibit moisture contents equal to or greater than the liquid limit and preconsolidated soils will have moisture contents approaching the plastic limit. The relative position of natural moisture content with respect to these limits is thus indicative of geologic history, and, soil strength and compressibility characteristics. These data provide the soils engineer with a qualitative "feel" for the soil type and the depositional process. Thus, indirectly, these data provide a useful tool in the soils investigation.

Results of the moisture and plasticity tests are plotted as a function of depth below the mudline on the log, presented in the main body of illustrations and are tabulated in the summary of test results in this Appendix.

Grain Size Analysis

Grain size analyses were performed on representative samples of the granular soils in accordance with ASTM Procedure D422-63. These data, Torvane

Shear strength of cohesive samples was also determined in the field using a small hand device known as a Torvane. This device consists of a metal disk with thin radial vanes projecting from one face and a torsional spring attached to the other face. This disk is pressed against the flat surface of an undisturbed specimen until the vane is fully embedded. The disk is then rotated until the soil enclosed within the vanes is sheared from the sample. The torsional spring is calibrated to indicate directly the shear strength of the soil. Shear strengths determined by Torvane tests are plotted on the boring log, and are also presented in this Appendix.

Unconfined Compression

In an unconfined compression test, a cylindrical soil specimen is loaded axially to failure at a constant rate of strain. Axial load is measured by a calibrated proving ring, and sample deformation is measured by a dial indicator. Cohesive shear strength is computed as one-half of the observed compressive strength of the specimen. Shear strengths determined from the unconfined compression tests are plotted on the log, and are presented with other test data in this Appendix.

This test is the simplest and quickest laboratory method commonly used to measure the shear strength of a cohesive soil. This test is believed to more closely represent the in-situ strength for firm to stiff clays as compared to results of miniature vane tests in the same strength range. This difference is perhaps related to the relatively higher strain rate in the vane test and possibly the effect of confinement in the sample tube.

Triaxial Compression

Unconsolidated-Undrained. In this test, commonly designated as the quick or "Q" test, the soil specimen is enclosed in a thin rubber membrane and is subjected to a confining pressure approximately equal to the overburden pressure at sample depth. The specimen is then loaded axially to failure at a constant rate of strain without allowing any drainage from the sample. Shear strengths obtained by this procedure are plotted on the boring log, and are also tabulated on the summary of test results presented in this Appendix.

This test provides an alternate to the unconfined compression test for very soft to soft soils that will not form an unsupported cylinder in the unconfined test. The application of lateral pressure together with enclosure in a rubber membrane permits tests on samples that would be unsatisfactory for unconfined tests. The results of the test provides additional data for evaluation of in-situ shear strength and strain data for lateral soil resistance-pile deflection (p-y) curves.

Consolidated-Undrained. This test, referred to as a "Qu" test, was also performed on representative samples on the cohesive stata to define in-situ strength and stress-strain characteristics. Stress-strain data determined from this type of test is believed to represent the most accurate determination of in-situ stress-strain behavior and is used for development of p-y values. In this test, the undisturbed specimen is enclosed in a rubber membrane and subjected to a lateral confining pressure equal to overburden pressure at the sample depth. The specimen is permitted to drain or reach an equilibrium volume condition then subjected to axial loading without further change in moisture content. Soil shear strength, defined as the ultimate compressive load, divided by two, is shown in the strength graph (marked "cu") on the log, and tabulated in the summary of test results presented in this Appendix. Stress-strain values for the consolidated-undrained triaxial tests are presented graphically following the text of this Appendix.

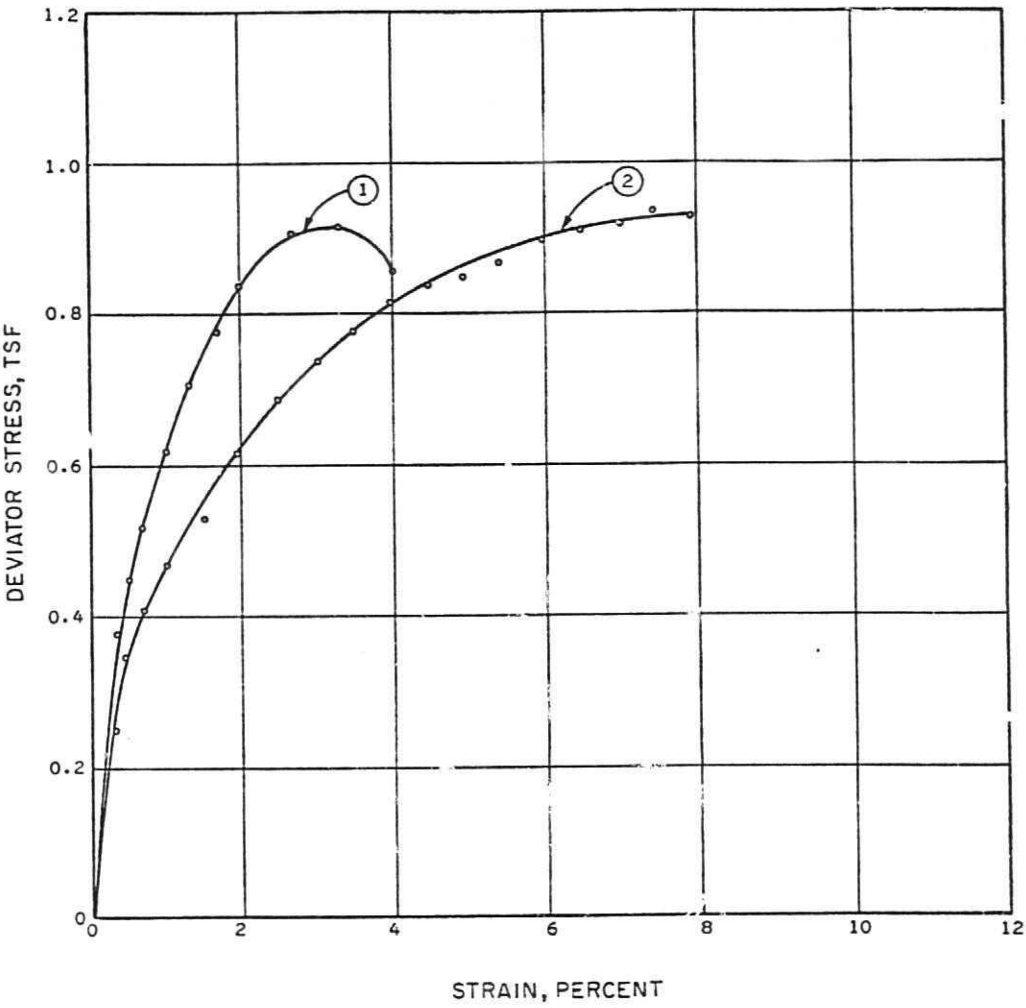
Consolidated-Drained. This triaxial test designated as the slow or "S" test is normally performed on representative samples of cohesionless strata. The soil specimen is placed in a rubber membrane and consolidated at the computed value of overburden pressure; sample drainage or volume change is permitted under this lateral pressure. Axial loading is then applied at a sufficiently slow rate to permit sample drainage during the shearing phase. For two or more specimens subjected to different values of confining pressure, a plot of the results in accordance with the Mohr criterion of shearing failure will define the angle of friction, ϕ, or strength increase with pressure, and, cohesion, c, strength at zero lateral pressure. The results are shown graphically following the text of this Appendix.

Multiple-Stage. Multiple-stage triaxial tests are normally performed by the consolidated-undrained or consolidated-drained procedure on representative portions of cohesionless strata. In this test, the soil specimen is placed in a rubber membrane and the single specimen subjected to three different values of lateral confining pressure. Generally, lateral pressures correspond to one-half, one, and one and one-half the computed overburden pressure. Axial loading is applied to a point of incipient failure and then reduced to zero prior to an increase in lateral pressure. The incre[illegible] strength as a function of confining pressure, Ø, or angle of shear, [illegible] the cohesion, c, strength at zero lateral pressure are then defined by a plot of the test results in accordance with the Mohr criterion of shearing failure. The results are shown graphically following the text of this Appendix.

Direct Shear

Consolidated-Drained. In the direct shear test, a cylindrical soil sample is enclosed in a metal ring, divided horizontally into two sections and a vertical (normal) load is applied at the top of the specimen. The consolidated-drained test is performed by allowing the sample to consolidate under the normal stress and then shearing the sample by applying a horizontal force, thus creating relative movement between the upper and lower halves of the sample. The sample is sheared at a constant rate of strain which is slow enough to allow complete dissipation of pore pressure during the shearing process. Since the normal and shear stresses can be measured directly, the failure envelope can be obtained by performing several tests at different levels of normal stress on specimens of the same soil. Once the envelope is developed, the effective shear strength parameters, Ø' and c' can be determined.

Consolidated-Undrained. This type of direct shear test is performed on samples of cohesive soil. The sample is consolidated unde normal stress equal to the effective overburden pressure at the sample depth. At the end of consolidation, the sample is sheared at a constant, rapid rate to prevent drainage (volume change) during the shearing process. The consolidated-undrained shear strength, c_u, is defined as the maximum shear stress corresponding to a normal stress equal to the effective overburden pressure.



CURVE NO.	SAMPLE NO.	DEPTH, FT.	CONFINING PRESSURE, TSF	MATERIAL
1	5	13'	0.18	FIRM GRAY CLAY WITH SILT PARTINGS AND SHELL FRAGMENTS
2	8	22'	0.32	FIRM GRAY SANDY CLAY WITH SAND SEAMS, POCKETS AND SHELL FRAGMENTS

STRESS-STRAIN CURVES
TRIAXIAL COMPRESSION TEST
CONSOLIDATED-UNDRAINED

77-001

Sample No.	Depth, ft	Blows/Foot	Classification Tests: Liquid Limit	Plastic Limit	Water Content, %	Submerged Unit Weight lb/cu ft	% Passing #200 Sieve	Shear Strength, tons/sq ft: Penetrometer	Torvane	Miniature Vane: Undisturbed	Miniature Vane: Residual / Remolded	Unconfined Compression: Undisturbed	Unconfined Compression: Remolded	Triaxial Compression: Unconsolidated Undrained: Undisturbed	Unconsolidated Undrained: Remolded	Consolidated Undrained	φ, Degrees
1	1	2	33	20	49												
2	4	10	21	17	23												
3	7	10	86	27	20	49		0.80									
4	10	13			24		24			0.53							
5	13	8	74	27	52	42		0.25	0.40							0.46	
6	16		27	15	28	57		0.10		0.30	0.09			0.22	0.06		
7	19	10				48		0.25									
8	22	5	34	18	34	49		0.50								0.47	
9	25	5			24	40		0.25	0.37	0.33	0.11						
10	28	7	35	23	22	39		0.50	0.30	0.25	0.08					0.60	
11	31	6	21	20	28			0.35									
12	34	12	19	15	20												
13	37	6			23		31							DIRECT SHEAR, φ = 39°			
14	40	10					55										
15	44	10	34	17	40	52		0.40									
16	49	10			29		59										
17	54	13			33		36										41
18	59	20			27		22										
19	69	20			36		91										
20	79	13	41	25	33	50		0.75	0.51	1.00	0.21	0.36	0.20				
21	89	17	36	22	30	50		0.50	0.45	0.92	0.31	0.56					
22	99	13	39	21	28	54		0.50	0.54	0.62	0.12	1.22	0.25			1.44	
23	109		46	24	29			0.50	0.45	0.54	0.19				0.27		
24	119	13	45	21	35	49		0.75	0.80	0.66	0.19	0.74	0.24				
25	129	N/R															
26	139	10	82	30	48	41		0.60	0.85	1.09	0.30					1.07	
27	149	10						0.74	0.97	1.74	0.32 / 0.51						
28	159	13	79	30	45	44		1.00	0.90			0.70	0.33				
29	169		83	25	47			0.85	0.75						0.32		
30	179	13	83	30	45	43		1.00	1.05	1.18	0.53	1.02					
31	189		83	33	47			0.50							0.26		
32	199	17	80	29	45	43		0.60	1.13	1.29	0.49					1.59	
33	209		73	28	44			0.88	1.13	1.14	0.29 / 0.41						
34	219	17	79	29	43	44		1.00	1.25	1.72	0.49	0.95					
35	229	13	58	27	37	47		0.70	0.75	0.86	0.09					2.15	
36	239	17	88	30	44	37		0.63	0.85	1.00	0.23	0.90	0.27				
37	249	15	52	22	41			0.88	0.75	1.09	0.33						
38	259	17	69	25	46	36		0.95	1.20	1.31	0.35			1.28			
39	269	15	67	27	37	38		0.90	1.03	1.42	0.46	1.05	0.47				
40	279	25	36	19	25			0.84		1.09	0.49				0.38		
41	289	80			30		57										
42	299	80			27		8										
43	309	60			23		7							DIRECT SHEAR, φ = 32°			35°
44	319	80			30		4										
45	329	80			26		4							DIRECT SHEAR, φ = 31°			
46	339	80			29		4										
47	349	100			24		32										

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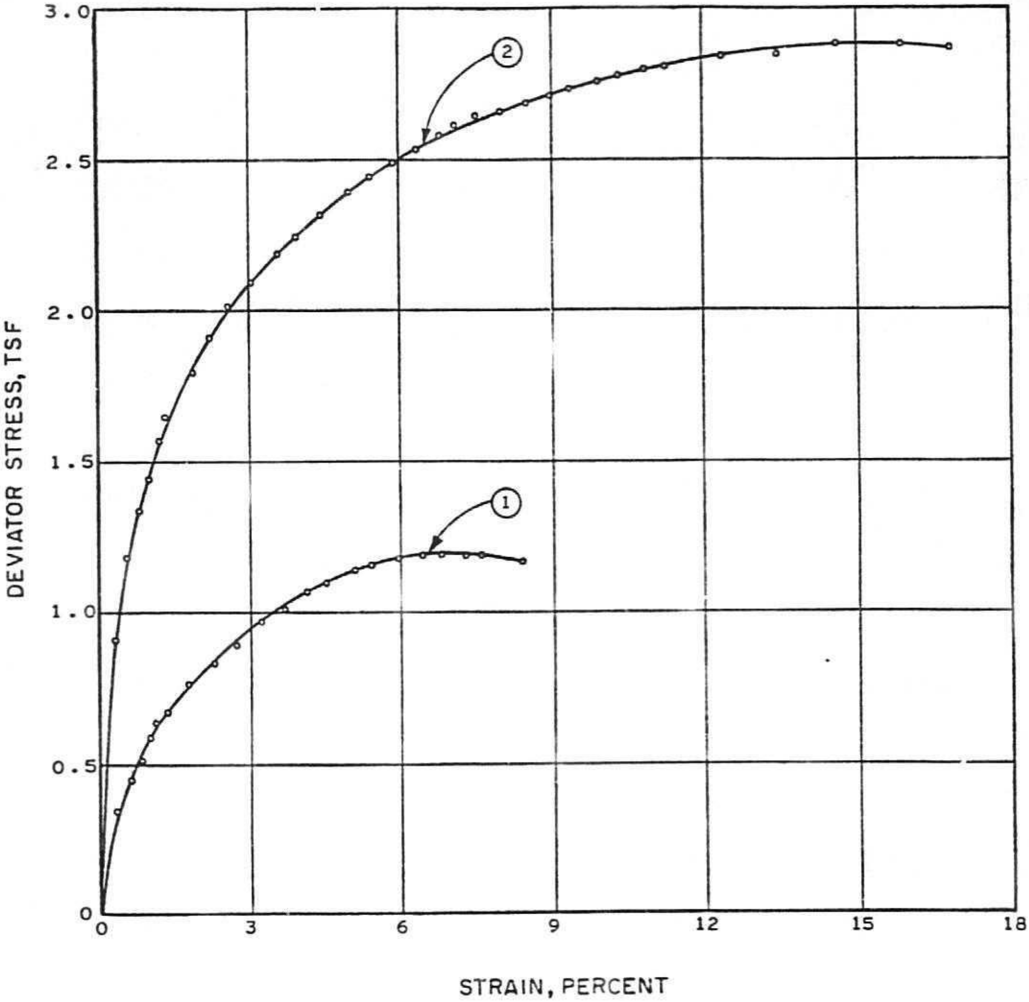
SUMMARY OF TEST RESULTS

APPENDIX A

LABORATORY AND FIELD TESTS

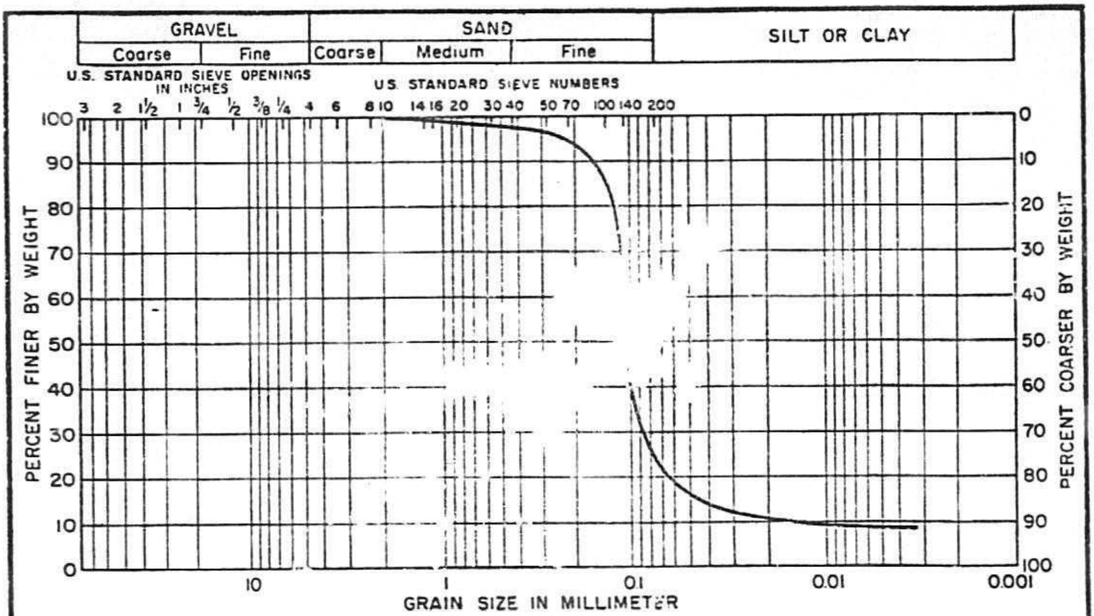
ILLUSTRATIONS

	Plate
Summary of Test Results	A-1
Stress-Strain Curves	A-2 and A-3
Triaxial Test Results	A-4 thru A-6
Direct Shear Test Results	A-7 thru A-9
Grain Size Distribution Curves	A-10 thru A-11



CURVE NO.	SAMPLE NO.	DEPTH, FT.	CONFINING PRESSURE, TSF	MATERIAL
1	10	28'	0.40	STIFF GRAY CLAYEY SILT WITH CLAY SEAMS, FINE SAND PARTINGS AND POCKETS AND SHELL FRAGMENTS
2	22	98.5'	1.69	VERY STIFF GRAY SILTY CLAY

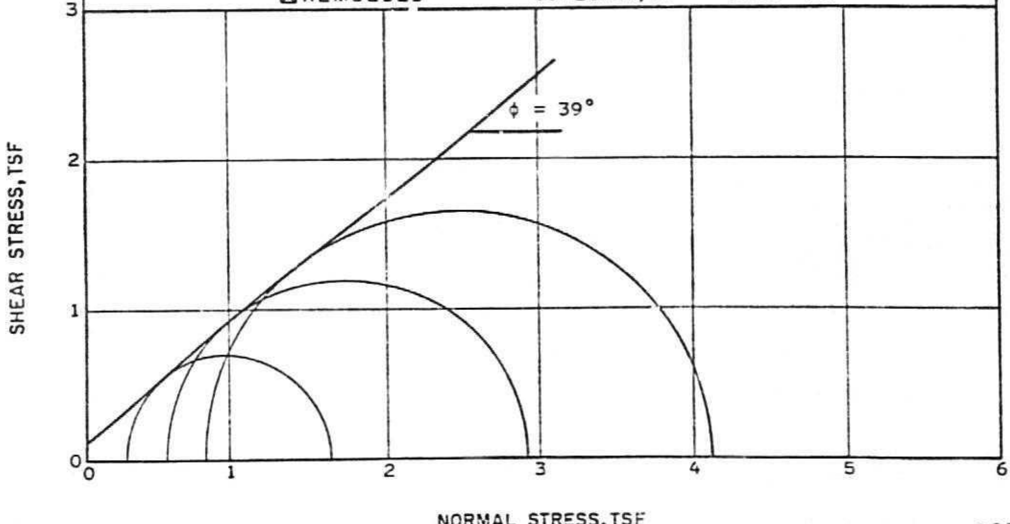
STRESS-STRAIN CURVES
TRIAXIAL COMPRESSION TEST
CONSOLIDATED-UNDRAINED



GRAIN SIZE CURVE

BORING NO: 1
SAMPLE NO: 13
DEPTH, FT: 38
DESCRIPTION: GRAY SILTY FINE SAND WITH SHELL FRAGMENTS
SAMPLE TYPE: ☐ UNDISTURBED
☒ REMOLDED

UNIT DRY WEIGHT: 100 PCF
WATER CONTENT: INITIAL 23%
ANGLE OF SHEAR, ø: 39°
COHESION, c: 0.15 TSF



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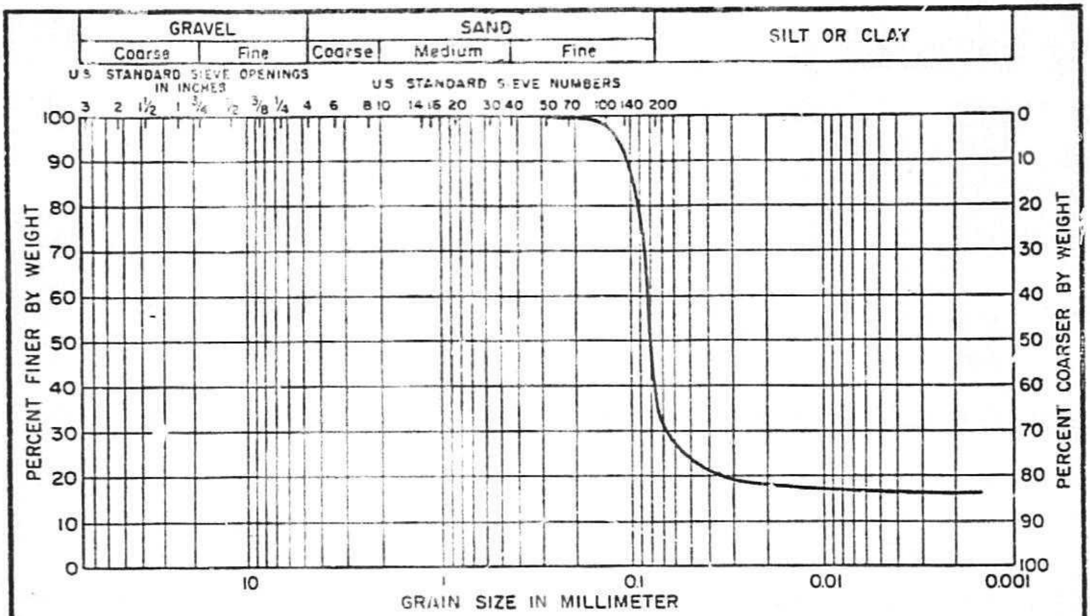
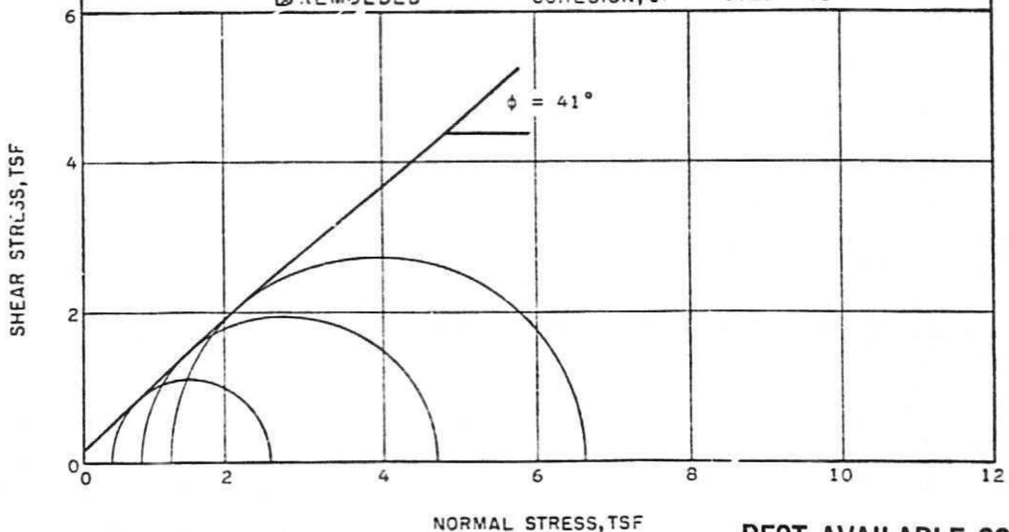
TRIAXIAL TEST RESULTS
CONSOLIDATED-DRAINED MULTI-STAGE



GRAIN SIZE CURVE

BORING NO: 1	UNIT DRY WEIGHT: 99 PCF
SAMPLE NO: 17	WATER CONTENT: INITIAL 33%
DEPTH, FT: 54.5	
DESCRIPTION: GRAY SILTY FINE SAND WITH SHELL FRAGMENTS	
SAMPLE TYPE: ☐ UNDISTURBED ☒ REMOLDED	ANGLE OF SHEAR, Ø: 41°
	COHESION, c: 0.20 TSF



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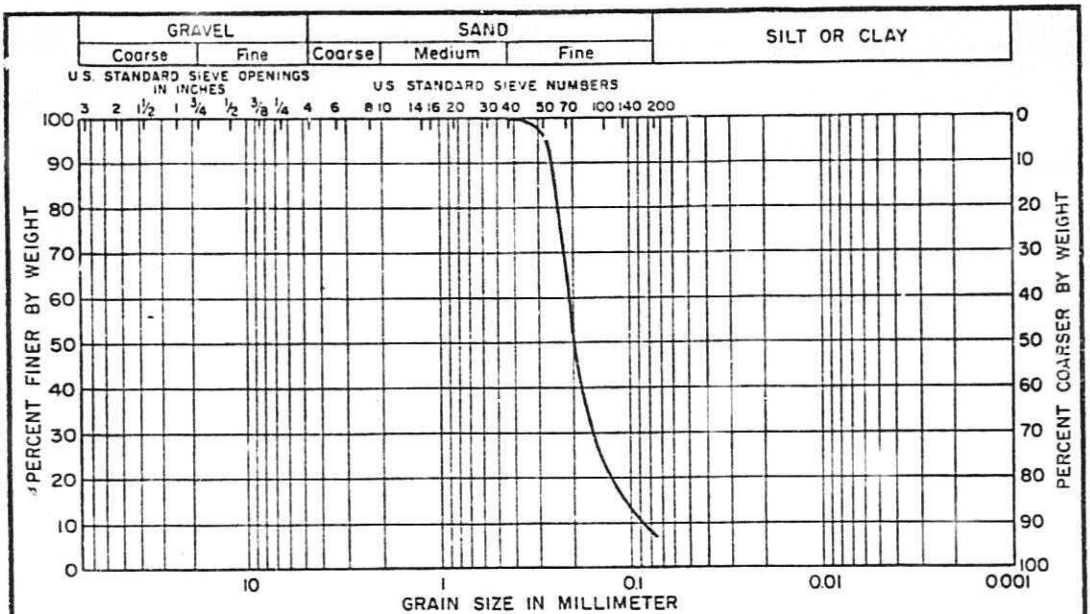
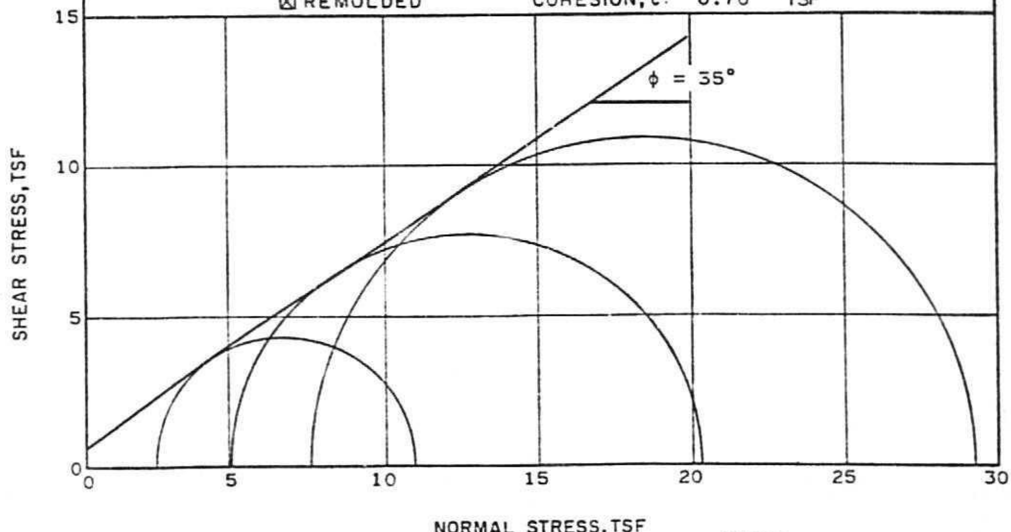
TRIAXIAL TEST RESULTS
CONSOLIDATED-DRAINED MULTI-STAGE



GRAIN SIZE CURVE

BORING NO: 1
SAMPLE NO: 43
DEPTH, FT: 308.5
DESCRIPTION: GRAY FINE SAND WITH SHELL FRAGMENTS
SAMPLE TYPE: ☐ UNDISTURBED ☒ REMOLDED

UNIT DRY WEIGHT: 97 PCF
WATER CONTENT: INITIAL 23%
ANGLE OF SHEAR, ø: 35°
COHESION, c: 0.70 TSF



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TRIAXIAL TEST RESULTS
CONSOLIDATED-DRAINED MULTI-STAGE

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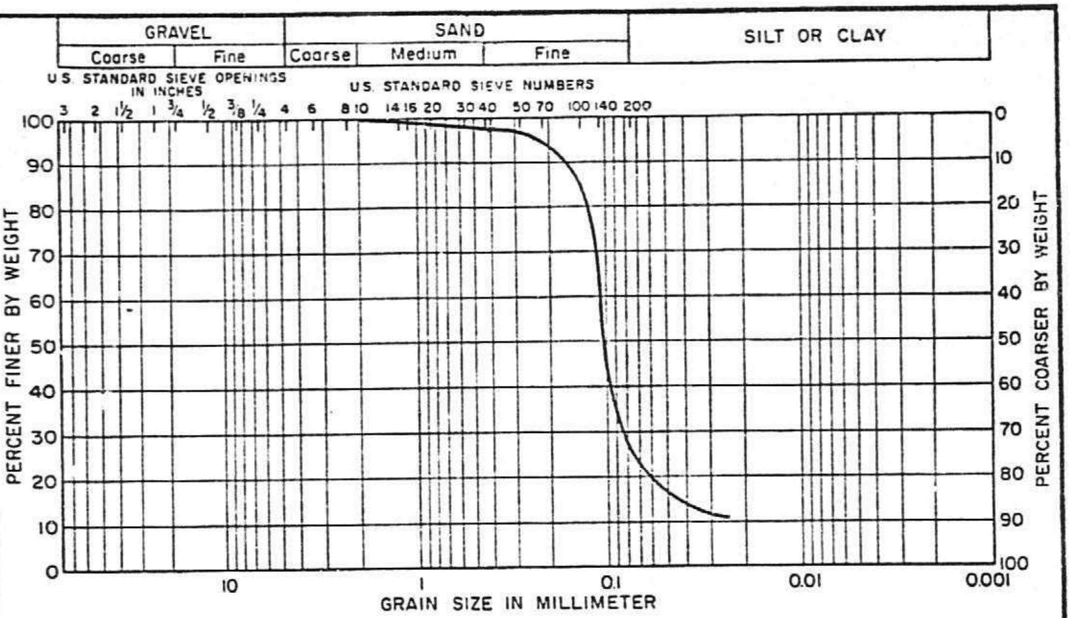
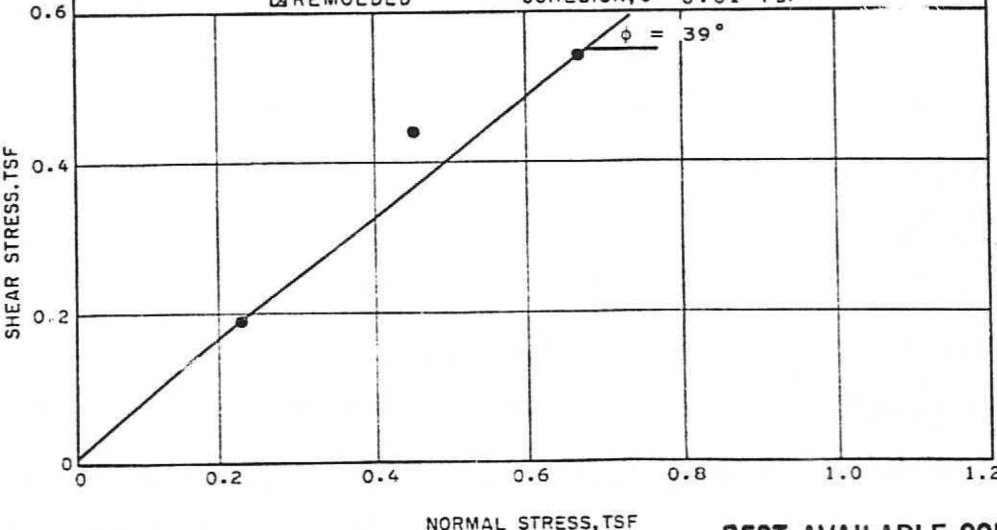
Consulting Engineers and Geologists



GRAIN SIZE CURVE

BORING NO: 1
SAMPLE NO: 13
DEPTH, FT: 38
DESCRIPTION: GRAY SILTY FINE SAND WITH SHELL FRAGMENTS
SAMPLE TYPE: ☐ UNDISTURBED ☒ REMOLDED

UNIT DRY WEIGHT: 106 PCF
WATER CONTENT: INITIAL 17%
ANGLE OF SHEAR, ø: 39°
COHESION, c: 0.01 TSF



DIRECT SHEAR TEST RESULTS
CONSOLIDATED-DRAINED MULTI-SPECIMEN

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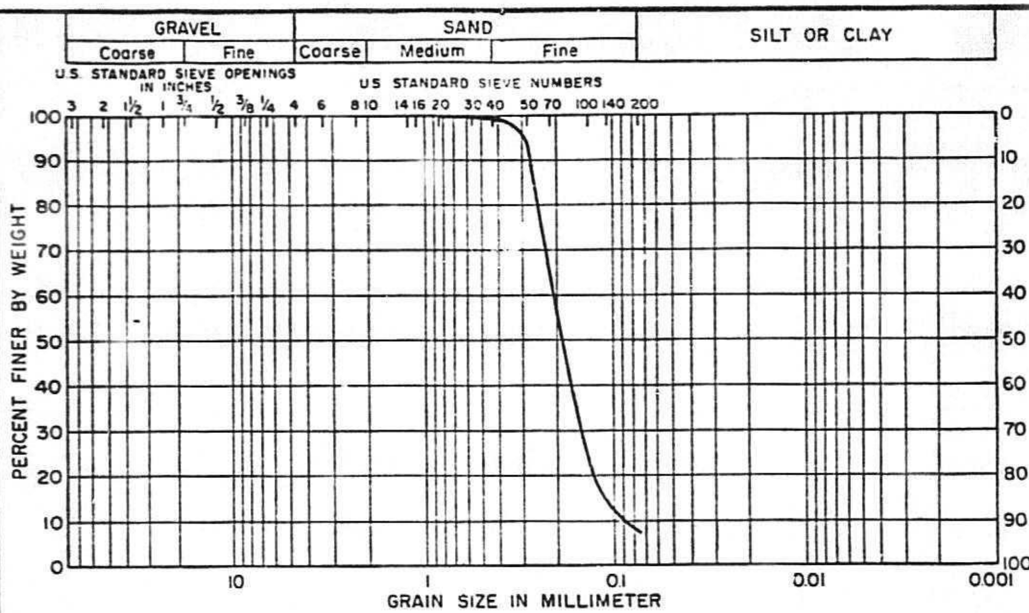
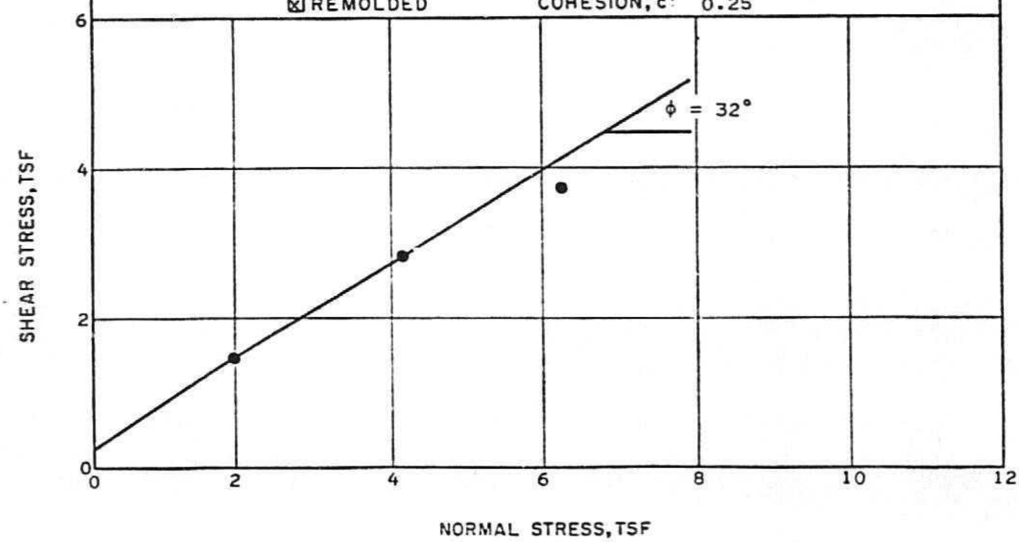


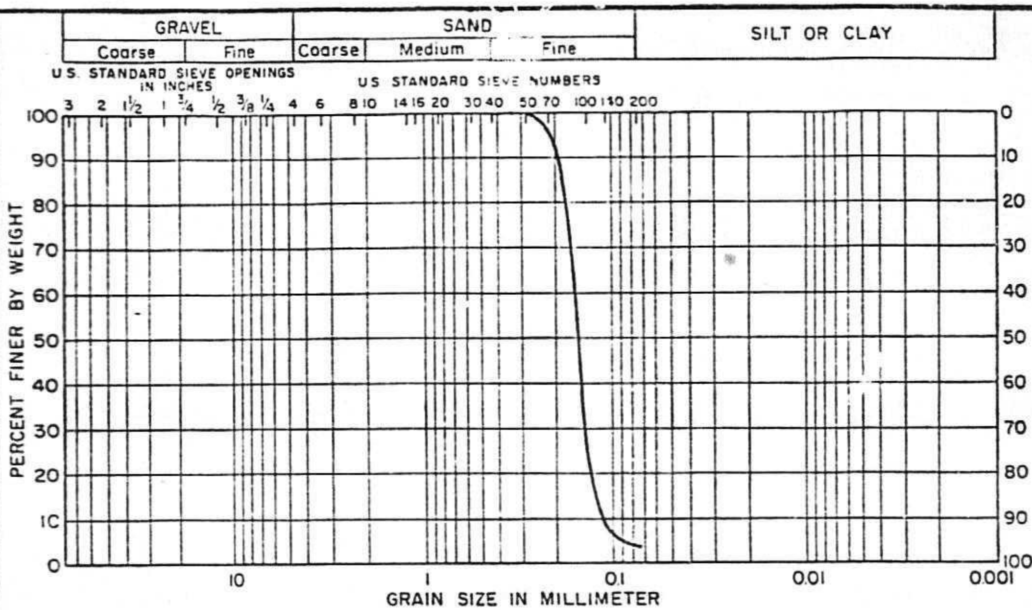
GRAIN SIZE CURVE

BORING NO: 1
SAMPLE NO: 43
DEPTH, FT: 308.5
DESCRIPTION: GRAY FINE SAND WITH SHELL FRAGMENTS
SAMPLE TYPE: ☐ UNDISTURBED
☒ REMOLDED

UNIT DRY WEIGHT: 101 PCF
WATER CONTENT: INITIAL 12%
ANGLE OF SHEAR, Ø: 32°
COHESION, c: 0.25



DIRECT SHEAR TEST RESULTS
CONSOLIDATED-DRAINED MULTI-SPECIMEN



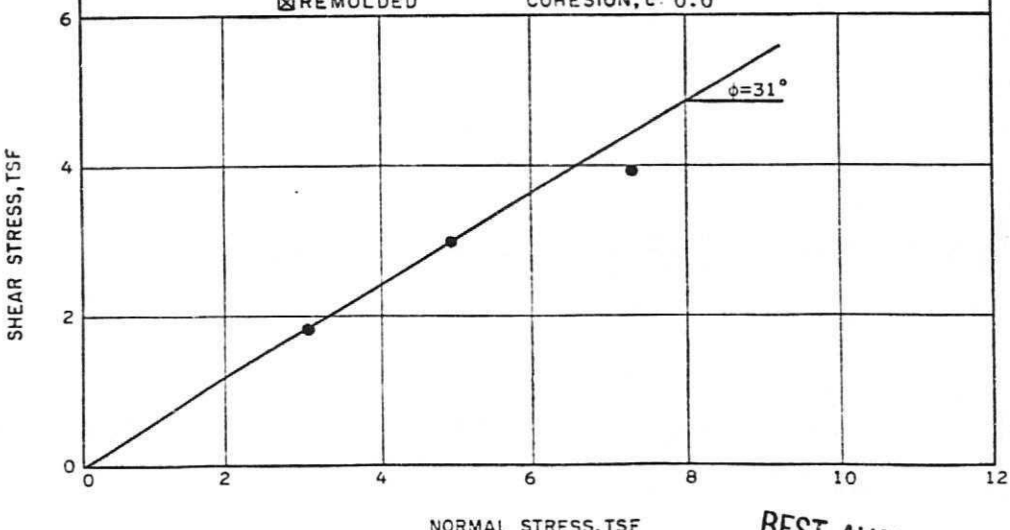
GRAIN SIZE CURVE

BORING NO: 1
SAMPLE NO: 45
DEPTH, FT: 329
DESCRIPTION: GRAY FINE SAND

UNIT DRY WEIGHT: 101 PCF
WATER CONTENT: INITIAL 15%

SAMPLE TYPE: ☐ UNDISTURBED
☒ REMOLDED

ANGLE OF SHEAR, ø: 31°
COHESION, c: 0.0



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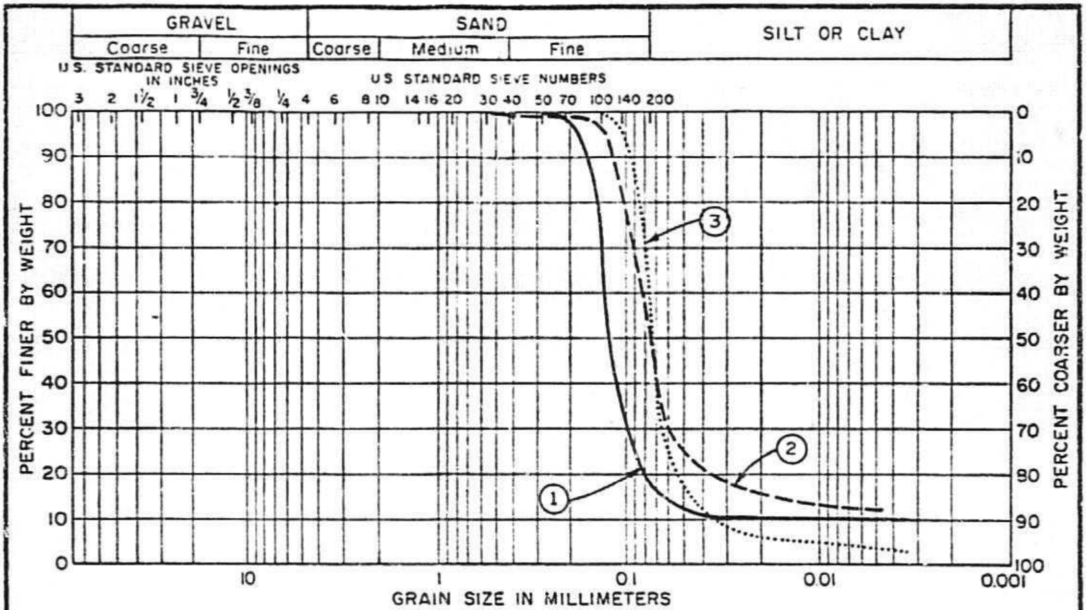
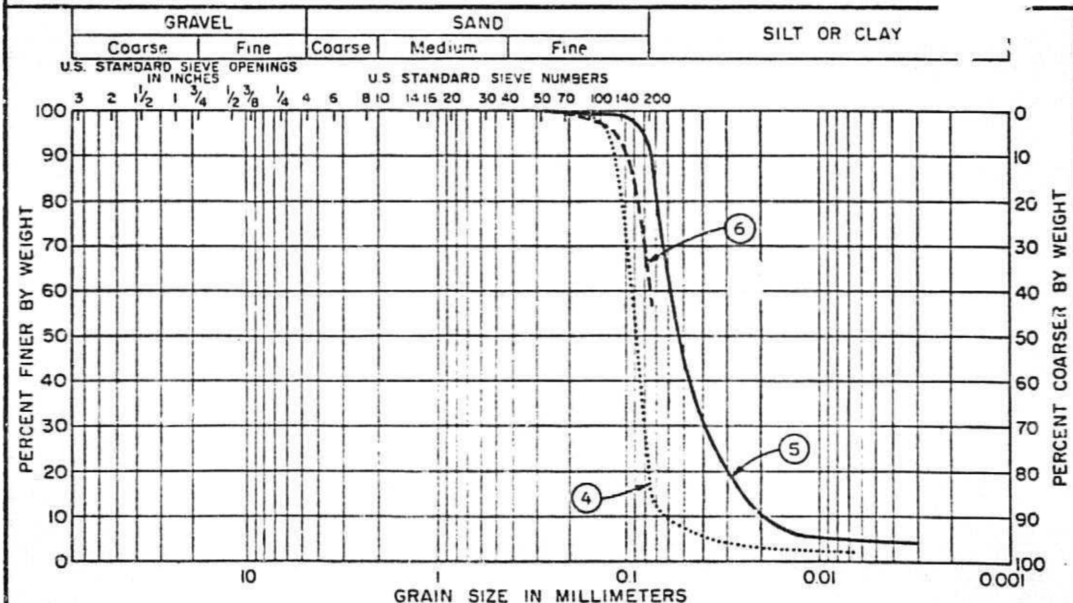
DIRECT SHEAR TEST RESULTS
CONSOLIDATED-DRAINED MULTI-SPECI...

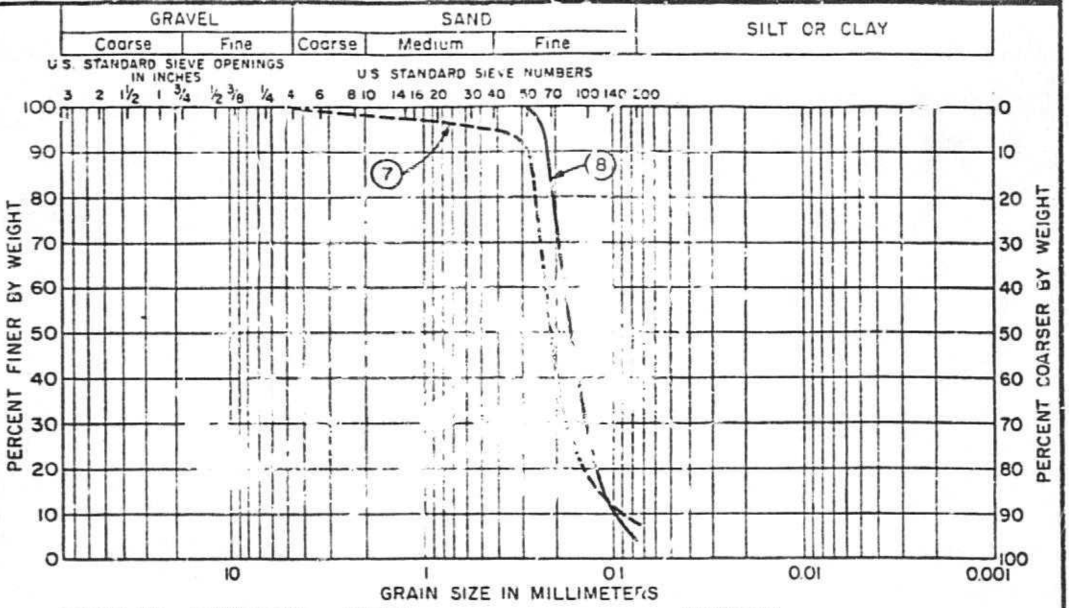


CURVE NO.	SAMPLE NO.	DEPTH	MATERIAL
1	4	9.5	GRAY SILTY FINE SAND
2	14	40.5	GRAY SANDY SILT
3	16	48.5	GRAY SANDY SILT

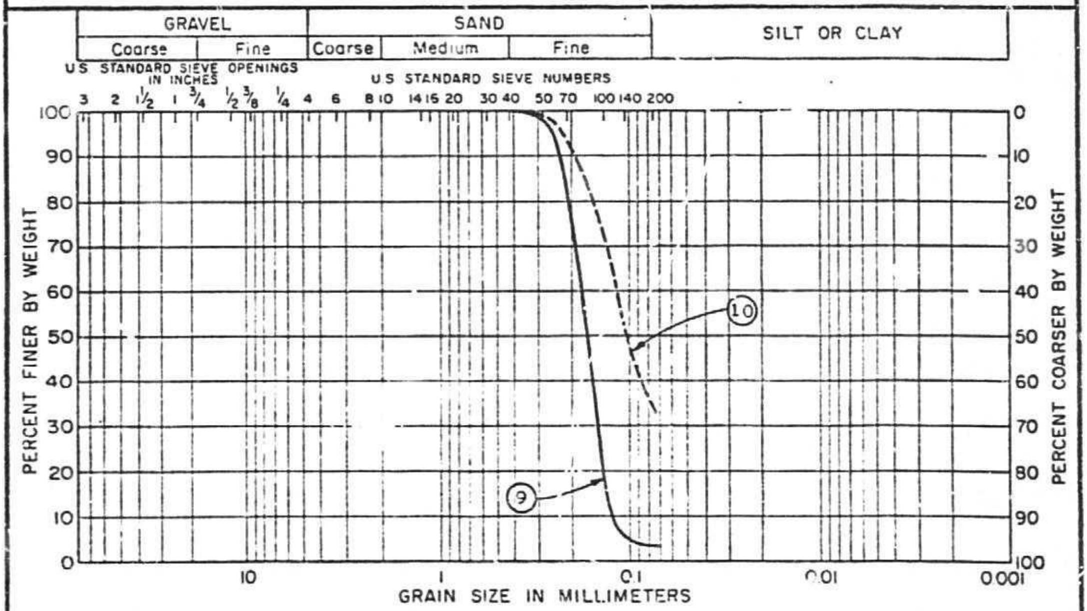


CURVE NO.	SAMPLE NO.	DEPTH	MATERIAL
4	18	59.0	GRAY FINE SAND
5	19	69.0	GRAY CLAYEY SAND
6	41	289.0	GRAY SANDY SILT

GRAIN SIZE DISTRIBUTION CURVES



CURVE NO.	SAMPLE NO.	DEPTH	MATERIAL
7	42	299.0	GRAY FINE SAND WITH SHELL FRAGMENTS
8	44	318.5	GRAY FINE SAND



CURVE NO.	SAMPLE NO.	DEPTH	MATERIAL
9	46	339.0	GRAY FINE SAND
10	47	349.0	GRAY SILTY FINE SAND

GRAIN SIZE DISTRIBUTION CURVES

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Consulting Engineers and Geologists

APPENDIX B

METHOD FOR PREDICTING PILE CAPACITIES

APPENDIX B

METHOD FOR PREDICTING PILE CAPACITIES

CONTENTS

	Page
Cohesive Soils	i
Granular Soils	ii

METHOD FOR PREDICTING PILE CAPACITIES

Predetermination of the ultimate axial capacity of piles is defined using the static method of analysis. In this method, the ultimate compressive capacity, Q, for a given penetration is taken as the sum of the skin frictional capacity, Q_s, and the end bearing capacity, Q_p, so that

$$Q = Q_s + Q_p = fA_s + qA_p$$

where A_s and A_p represent, respectively, the embedded pile surface area and the pile tip area; f and q represent, respectively, the unit skin friction and the unit end bearing. When computing ultimate tensile capacity, the second term of this equation is neglected.

Cohesive Soils

In cohesive soils, the frictional capacity, Q_s, of a pile at a particular penetration is a function of both effective vertical stress and undrained shear strength, expressed as

$$Q_s = \lambda\ (\bar{\sigma}_m + 2c_m)\ A_s$$

where: λ = dimensionless coefficient (function of pile penetration)

$\bar{\sigma}_m$ = mean effective vertical stress between the ground surface and the pile tip

c_m = mean undrained cohesive shear strength along the pile length

A_s = surface area of the pile.

The values of c_m and $\bar{\sigma}_m$ for various penetrations in the clay strata are computed from the in-situ strength and the submerged unit weight values;

values of λ are obtained from Fig. 1 of the paper presenting this procedure.[1]

Unit end bearing in clay is estimated using the expression

$$q = cN'_c$$

where: c = undrained cohesive shear strength

N'_c = a dimensionless bearing capacity factor (N'_c = 9 for deep footings).

Granular Soils

The frictional capacity contribution developed in granular soils are determined using the following equation

$$f = K\bar{\sigma}_v \tan \delta$$

where: K = coefficient of lateral earth pressure

$\bar{\sigma}_v$ = effective vertical stress

δ = angle of friction between foundation soil and steel pile.

The value of K is taken as 0.7 for compressive loads and 0.5 for tensile loads. Effective vertical stress is computed from the submerged unit weight values.

---

(1) Vijayvergiya, V.N. and Focht, J.A., Jr., "A New Way to Predict the Capacity of Piles in Clay", Proceedings, Fourth Annual Offshore Technology Conference, 1972, Vol. 2, pp. 865-874.

Unit end bearing, q, for piles installed in granular soils is computed using the following equation

$$q = \bar{\sigma}_v N'_q$$

where: $\bar{\sigma}_v$ = effective vertical stress

N'_q = a dimensionless bearing capacity factor which is a function of Ø, the angle of internal friction of the soil.

The computed values of f and q are not allowed to exceed certain values [2] given in the table below:

Soil Type	Ø	δ	f_{max} ksf	N'_q	q_{max} ksf
Clean Sand	35°	30°	2.0	40	200
Silty Sand	30°	25°	1.7	20	100
Sandy Silt	25°	20°	1.4	12	60
Silt	20°	15°	1.0	8	40

(2) "Planning, Designing and Constructing Fixed Offshore Platforms", A Recommended Practice by American Petroleum Institute, API RP 2A, October, 1969.

ATTACHMENT 6

OCEANOGRAPHIC REPORT

A. H. GLENN AND ASSOCIATES
Meteorologists • Oceanographers • Engineers
NEW ORLEANS LAKEFRONT AIRPORT • PHONE 504-241-2222 • TELEX 58-7445 • TWX 504-822-6335
MAILING ADDRESS: P. O. BOX 26337, NEW ORLEANS, LOUISIANA 70126, U.S.A.
CABLE ADDRESS: GLENN, NEW ORLEANS

January 24, 1977

Mr. J. P. Morgan
Hemisphere Corporation
11211 Katy Freeway
Houston, Texas 77079

Dear Mr. Morgan:

The attached Tables 1 through 4 summarize results of analysis of 100 year and 25 year hurricane season storm wind, tide, wave, and current conditions at the 192 foot Mean Low Water depth location in High Island Block A492, offshore Texas. It is suggested that large deck members clear the calculated crest elevation of the 100 year hurricane season wave by at least 10% of the wave height (6.0 ft. in this case). This is to allow for wave runup, etc.

Yours very truly,

/C.K.P.

A. H. GLENN
Certified Consulting Meteorologis[illegible]
Registered Professional Engineer [illegible] #889)

AHG/ffg

TABLE 1: 100 YEAR HURRICANE SEASON STORM WIND, TIDE, AND WAVE CHARACTERISTICS: HIGH ISLAND BLOCK A492: 192 FOOT MEAN LOW WATER DEPTH: OFFSHORE TEXAS

Chart Depth (Mean Low Water Depth)	192.0 Ft.
Highest Astronomical Tide	2.5 Ft.
Storm Tide	3.3 Ft.
Total Tide	5.8 Ft.
Still Water Depth	197.8 Ft.
Height Of Maximum Wave	55.8 Ft.
Period Of Maximum Wave	16.0 Sec.
Crest Elevation of Maximum Wave Above Still Water Level	32.9 Ft.
Crest Elevation Of Maximum Wave Above Chart Datum	38.7 Ft.
Crest Elevation of Maximum Wave Above Bottom	230.7 Ft.
Length Of Maximum Wave	1110.3 Ft.
1 Hour Wind	131 Mph
0.5 Hour Wind	138 Mph
5 Minute Wind	152 Mph
1 Minute Wind	166 Mph
Maximum Instantaneous Gust	200 Mph

TABLE 2: 100 YEAR HURRICANE SEASON COMBINED WIND DRIFT, DENSITY, AND TIDAL CURRENT VERSUS PERCENT OF DEPTH: HIGH ISLAND BLOCK A492: 192 FOOT MEAN LOW WATER DEPTH: OFFSHORE TEXAS

Percent Of Depth	Current Speed (Ft/Sec)
0%	3.3
10%	3.0
20%	2.8
30%	2.6
40%	2.4
50%	2.2
60%	2.0
70%	1.8
80%	1.5
90%	1.1
100%	0.4

TABLE 3: 25 YEAR HURRICANE SEASON STORM WIND, TIDE, AND WAVE CHARACTERISTICS: HIGH ISLAND BLOCK A492: 192 FOOT MEAN LOW WATER DEPTH: OFFSHORE TEXAS

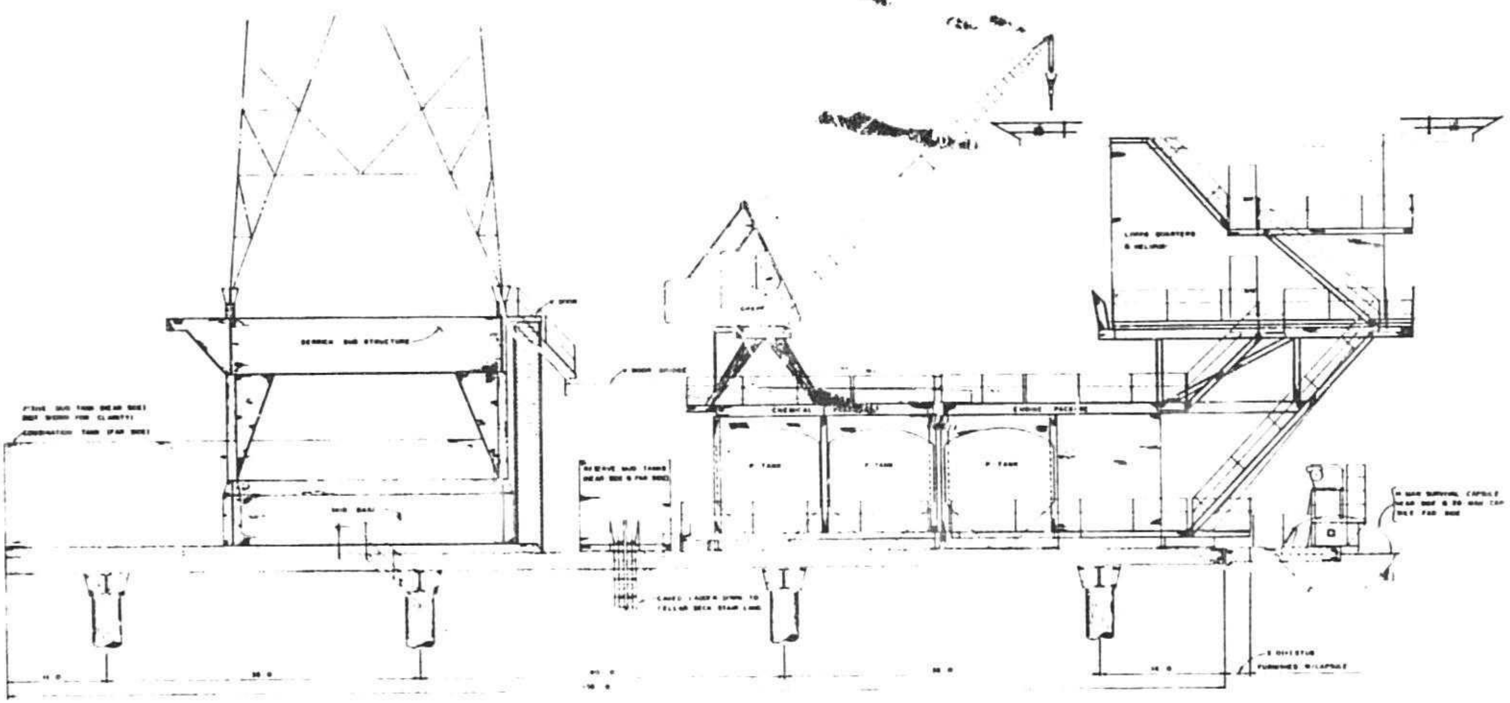
Chart Depth (Mean Low Water Depth)	192.0 Ft.
Highest Astronomical Tide	2.5 Ft.
Storm Tide	2.0 Ft.
Total Tide	4.5 Ft.
Still Water Depth	196.5 Ft.
Height Of Maximum Wave	47.6 Ft.
Period Of Maximum Wave	14.0 Sec.
Crest Elevation of Maximum Wave Above Still Water Level	26.8 Ft.
Crest Elevation Of Maximum Wave Above Chart Datum	31.3 Ft.
Crest Elevation of Maximum Wave Above Bottom	223.3 Ft.
Length Of Maximum Wave	910.9 Ft.
1 Hour Wind	108 Mph
0.5 Hour Wind	113 Mph
5 Minute Wind	125 Mph
1 Minute Wind	136 Mph
Maximum Instantaneous Gust	164 Mph

TABLE 4: 25 YEAR HURRICANE SEASON COMBINED WIND DRIFT, DENSITY, AND TIDAL CURRENT VERSUS PERCENT OF DEPTH: HIGH ISLAND BLOCK A492: 192 FOOT MEAN LOW WATER DEPTH: OFFSHORE TEXAS

Percent Of Depth	Current Speed (Ft/Sec)
0%	2.6
10%	2.4
20%	2.3
30%	2.1
40%	1.9
50%	1.8
60%	1.6
70%	1.5
80%	1.3
90%	1.0
100%	0.4

Exhibit III

Drilling Rig Description
Loffland Bros. Rig No. 79
High Island Block No. 492



ELEVATION

BEST AVAILABLE COPY

Transco Exploration Company

MINIMUM SELF-CONTAINED DRILLING PLATFORM

EXHIBIT III

EQUIPMENT INVENTORY
RIG 79

DRAWWORKS:	Midco 1220 - 2000 input horsepower drawworks, complete with sandreel, rotary countershaft, electric input drive assembly, crown-o-matic and coasta sandline guide.
DRAWWORKS DRIVE:	Drawworks drive assembly with 2 Westinghouse DC motors.
DRAWWORKS BRAKE:	Model 7838 Elmagco brake.
DERRICK:	Derricks, Inc. Dynamic Derrick 30' x 30' x 147' standard, 1,000,000 GNC bolted derrick with a 130 MPH wind load capacit with 15,000' of 4-1/2" OD drill pipe racked. Equipped with an adjustable stabbing board.
SUBSTRUCTURE:	24' high by 30' base, welded substructure with a casing capacity of 1,000,000# and a setback capacity of 750,000#. Substructure complete with cantilevers and platforms to accommodate drawworks, logging unit, choke manifold, shale shaker, desander, desilter, degasser, sandtrap, BOP closing unit, brake cooling and air volume tank. Rig floor area enclosed with wind walls and sheds to cover drawworks, choke manifold and logging cantilever. Drip pans and drains under the drawworks and rotary.
CROWN:	525 Ton crown block with 7 - 60" sheaves grooved for 1-1/2" wireline.
TRAVELING BLOCK:	525 Ton with 6 - 60" sheaves grooved for 1-1/2" wireline.
HOOK:	500 Ton with automatic positioner.
SWIVEL:	500 Ton.
ELEVATOR LINKS:	2-3/4" x 132" 350 ton capacity.
KELLY SPINNER:	Varco heavy-duty power sub with right and left rotation.
KELLY VALVES:	2 - 5,000 PSI W.P. lower kelly valves.

KELLY COCKS:	1 - 10,000 PSI upper kelly valve.
KELLY:	5-1/4" Hexagonal Range 2 kelly.
KELLY BUSHING & DRIVE:	Varco hinged pin drive master bushing with a roller kelly bushing for a 37-1/2 rotary table.
ROTARY:	37-1/2 with a rotating load capacity of 434 tons and a dead load capacity of 700 tons.
ROTARY DRIVE UNIT:	Westinghouse DC motor driving into a two speed gear box, complete with air back brake and emergency sprocket for drawworks drive.
SPINNING WRENCH:	Varco air-operated drill pipe spinning wrench.
MOUSEHOLE TONGS:	Automatic mousehole tongs.
RECORDING EQUIPMENT:	Recording Pit Volume Totalizer and Mud Flow Rate Recorder.
AUTOMATIC SLIPS:	Varco drill pipe power slips.
AIR HOISTS:	2 - 7000# pull rig floor mounted air hoist. 1 - 1000# pull stabbing board mounted air hoist.
STANDPIPES:	Dual 5" standpipes with 2 - 10,000 PSI rotary hoses.
INDICATING DRILLING INSTRUMENTS:	Martin Decker drilling instrument control center complete with weight indicator, tong torque gauge, 2 mud pump pressure gauges, rotary RPM indicator, 2 pump stroke indicators and a rotary torque indicator.
DRILLERS CONSOLE:	Drillers control console including synchronizing panel, AMP meters, pump controls, drawworks controls, rotary controls and speed control.
BRAKE COOLING:	1 - Closed drawworks brake cooling system complete with dual pumps and heat exchangers. 2 - 2 x 3 Centrifugal Pumps, 10 HP.

AUTOMATIC DRILLER:	Satellite Automatic Driller
SURVEY INSTRUMENT REEL:	Electric power reel assembly complete with 15 HP AC motor, transmission and 17,000' of 0.092" diameter line.
SHALE SHAKER:	Milchem dual high speed shaker.
DESANDER:	Pioneer 2 - 12" cone desander.
DESILTER:	Pioneer 16 cone desilter.
DESANDING - DESILTING PUMPS:	2 - 6 x 8 Centrifugal desanding, desilting and degassing pumps each driven by 100 HP AC motors.
SANDTRAP:	1 - 276 BBL, 3 compartment sandtrap.
BOP CLOSING UNIT:	Koomey 3000 PSI, 280 gallon, 6 station, 12 outlet air-electric closing unit with test and skid outlets and two 6 station remote BOP closing units.
BLOWOUT PREVENTER EQUIPMENT:	1 - 20" MSP 2000 PSI Hydril with 21 - 1/4" vertical bore.
	1 - 13-5/8" 5000 PSI GK Hydril preventer.
	1 - 13-5/8" Cameron Type U, 5000 PSI single preventer flanged, with 2 flanged 4" outlets.
	1 - 13-5/8" Cameron Type U, 5000 PSI double preventer flanged with 4" flanged outlets below each preventer and ample space between the rams to allow tool joint stripping.
	2 - 3" 5000 PSI Cameron Type "F" hydraulic operated gate valves with manual overrides.
	1 - 2" 5000 PSI Cameron flanged check valve.
SPACER SPOOL:	1 - 13-5/8" flanged spacer spool.(24') 1 - 13-5/8" flanged spacer spool.(2')

BLOWOUT PREVENTER EQUIPMENT: (CONTINUED)	Rams for 4-1/2" drill pipe, 3-1/2" drill pipe, 2-7/8" tubing, 2-3/8" tubing, 10-3/4" casing, 9-5/8" casing, 7-5/8" casing, 7" casing and 5-1/2" casing.
	1 - Inside BOP with drill pipe connections.
	1 - Drill pipe circulating head.
BOP HOISTS:	2 - Electric BOP hoists.
CHOKE MANIFOLD:	1 - Rig-floor located, 2-1/16"/3" 5000 PSI choke manifold with 2 adjustable chokes, and two outlets for automatic chokes. Manifold has 2 straight outlets and 2 kill line outlets. The manifold feeds into 2 - 9" buffer logs with 5000 PSI valves between the manifold and the buffer logs. The buffer logs discharge into the Lofco mud-gas separator.
MUD-GAS SEPARATOR:	1 - Lofco mud-gas-separator, 30" diameter x 30' long with 1 - 10" vent.
JACKING SYSTEM:	4 - 200 Ton hydraulic jacks (2 - gripper type, 2 - claw base type, complete with brackets, and jacking console to skid substructure on skid base and to skid on platform beams.
SKID BASE:	1 - 8'-4" high by 32' wide by 47' long plate girder skid base with built-in drill water tanks and drill line spool bracket.
PUMP PACKAGE:	1 Welded beam type pump package 33' wide, 22' high and 70' long, complete with walkways, pipe rack beams, crane bases, active mud pits, mud pumps, cement unit, sack storage, mud mixing pumps, ventilation fans, drains, gutters, coamings and drill water storage.
MUD PUMPS:	2 - 1600 HP triplex pumps complete with pulsation dampeners, dual 5" discharge lines and charging pumps.

MUD PUMP DRIVE:	2 - Westinghouse DC motors mounted on each triplex pump.
MUD MIXING - CHARGING PUMPS:	4 - 6 x 8 Centrifugal mud mixing and charging pumps for the triplex pumps. Each 6 x 8 pump is driven by a 100 HP AC motor.
AGITATORS:	6 - 10 HP electric driven mud agitators. Two in each active pit, and two in the slugging-prehydration tank.
JET HOPPERS:	1 Weight material low pressure jet hopper. 1 Chemical-gel low pressure jet hopper.
SURGE TANKS:	1 - 45 cu. ft. weight material surge tank. 1 - 70 cu. ft. cement surge tank.
CRANES:	2 - 30 Ton Link Belt cranes with 75 foot booms complete with weight indicator, boom lights, PA system, and flashing red alert light on each cab to let helicopters know crane is in operation. Cranes are rated at 30 tons at a 12' radius and 14,400 pounds at a 30' radius.
ENGINE PACKAGE:	1 - Welded beam type engine package, 33' wide, 22' high and 70' long complete with quarters support structure, pipe rack beams, walkways, stairs, drains, gutters, coamings, ventilation fans, and climatized AC control room, potable water and drill water storage.
PRIME MOVERS:	3 - EMD 12-645E1 engines, each rated at 1650 HP continuous or a total continuous HP of 4950 for drilling and auxiliary power. Each engine heat exchanger cooled with a special provision to cool one engine with a radiator for initial platform start-up and emergencies.

AC GENERATORS: 3 - 900 RPM, 2625 KVA, 600 volt, 3 phase 60 cycle AC generators.

SCR SYSTEM: 1 - 7 Module SCR unit converting AC to DC to power the four 1600 triplex pump motors, the two drawworks motors, and the rotary motor.

AC-SCR PANEL: 1 - AC-SCR control panel containing AC switch gear, SCR controls, modules and engine synchronizing controls.

TRANSFORMERS: 3 - 600 volt to 480 volt transformers.

3 - 480 volt to 120 volt transformers.

AUXILIARY PUMPS: 1 - 3 x 4 Centrifugal drill water pumps in the pump package.

1 - 3 x 4 Centrifugal drill water pump in the Engine Package.

1 - 6 x 8 Centrifugal transfer/mixing mud pump in the reserve mud-diesel tank package.

2 - 1-1/2"x2" Centrifugal fuel pumps in the reserve mud & diesel tank packag

1 - Sanitary water set on engine package.

1 - Potable water pressure set complete with chlorinator in the engine package.

2 - 3" x 4" Centrifugal salt water pumps for washdown and fire.

2 - 40 HP 8" submersible deep well pumps complete with check valves and discharge column for engine cooling.

1 - 3 x 4 Centrifugal drill water pump in the skid base.

AIR COMPRESSORS: 3 - Rig air compressors each rated at 232 CFM at 125 PSI electric driven-screw type.

AIR COMPRESSORS: (CONTINUED)	1 - Cold start unit with a compressor rated at 60 CFM at 125 PSI for engine start-up.
	1 - 316 CFM @ 40 PSI electric driven bulk air compressor for the P-tank system.
CONTROL ROOM:	1 - Air-conditioned control room in the engine package with wire encased glass window for engine and equipment observation. Control room houses AC-SCR Panel, electrical workshop, and parts storage area for electrical supplies.
WELDING MACHINES:	2 - 300 AMP welding machines with outlets on the substructure, in the pump package, in the engine package, on top of the engine package and on top of the pump package.
TANKAGE:	675 BBL Fuel
	600 BBL Potable Water
	2800 BBL drill water depending on allowable platform loading.
	500 BBL Active Mud
	100 BBL Slug-Prehydration Tank
	276 BBL Sand Trap
	500 BBL Reserve Mud
	58 BBL Day Tank
SACK STORAGE:	1500 Sack storage area in the pump package for sack chemicals, gels, weight and cement.
LIGHTING:	Explosion proof on the rig floor, shale shaker area, beneath the substructure and over the active mud pit area.
	Vapor proof lighting in all non-hazardous areas.

COMMUNICATION:

1 - Intra-rig telephone system with Hear-Here booths in high noise level areas.

1 - Intercom system

1 - FM radio system

1 - Marine radio system

FIRE AND SAFETY:

Portable dry chemical and CO2 extinguishers and a permanent system for the active mud pit area, and pump room.

1 - Permanent fire system with remotes.

1 - Intra-rig fire and abandon platform system.

1 - Blowout alert alarm system.
Life rafts, ring buoys, life jackets, first aid supplies and Stokes litters.
1 - Brucker Survival Capsule.

QUARTERS:

1 - 2 story, 50 man quarters complete with heliport, heliport lights, walkways, stairs, galley, dining room, recreation room, laundry room, bathrooms, private bedroom for Customer's representative, private office for Customer's representative, private bedroom and office for Rig Superintendent. All bedrooms furnished with double bunks. Customer's and Rig Superintendent's offices face the rig floor to allow full view of pipe rack and rig floor area.

SEWAGE PLANT:

1 - USGS approved sewage treatment plant.

DRILL STRING:

260 Joints of 4-1/2", 16.6#/foot, "E", Range 2.

140 Joints of 4-1/2", 16.6#/foot, "G-105", Range 2.

30 Joints 4-1/2", Range 2 Drilco Heviwate.

12 7-1/4" OD spiral drill collars with slip recess.

DRILL STRING: (CONTINUED)	12 6-1/4" OD spiral drill collars with slip recess.
	All drill collars and subs will be inspected to magna-glow standard inspection specifications prior to being sent to location.
DRILL STRING TOOLS:	2 Sets of 4-1/2" drill pipe slips.
	2 Sets of 4-1/2" drill pipe elevators.
	1 Set of 6-3/4" to 8-1/4" drill collar slips.
	1 Set of 6-1/4" drill collar elevators.
	1 - Drill collar clamp.
	2 Sets of drill pipe tongs.
	2 Kelly saver subs.
	2 Bit subs.
	2 Crossover subs.
	Overshots for 4-1/2" drill pipe and 7-1/4" or 6-1/4" drill collars.
RESERVE-FUEL TANK PACKAGE:	1 - 66' long x 10' wide x 12' high tank package for fuel and reserve mud storage.
P-TANK PACKAGE:	1 - 73'-6" long x 12'-6" wide P-tank frame to accommodate 6 - 1020 cu. ft. P-tanks.
ADDITIONAL EQUIPMENT:	15,000 PSI cementing and circulating hose.
	Personnel and cargo baskets.
	Oxygen and acetylene.
	Welding and cutting equipment.
	Engine exhausts with water type spark arrestors - exhausts extended below production deck level.

ADDITIONAL EQUIPMENT:
(CONTINUED)

Service lines to derrick substructure fabricated in spools and hoses to minimize skidding time.

Elevated catwalk with pipe dragway area and personnel walkway, sectionalized to minimize skidding time.

Burning basket.

Howco HT 400 Cementing Unit

Logging Unit

One Welco Degasser

One 100 KW auxiliary generator

Equipment Inventory)
Item II

STORAGE CAPACITIES

1. 675 BBL Fuel

2. 600 BBL Potable Water

3. 100 BBL Slug Tank

4. 500 BBL Active Mud

5. 276 BBL Sand Trap

6. 500 BBL Reserve Mud

7. Drill Water

A.	Pump Package	1200 BBL
B.	Skid Base	1000 BBL
C.	Engine Package	600 BBL
	TOTAL =	2800 BBL

Exhibit IV

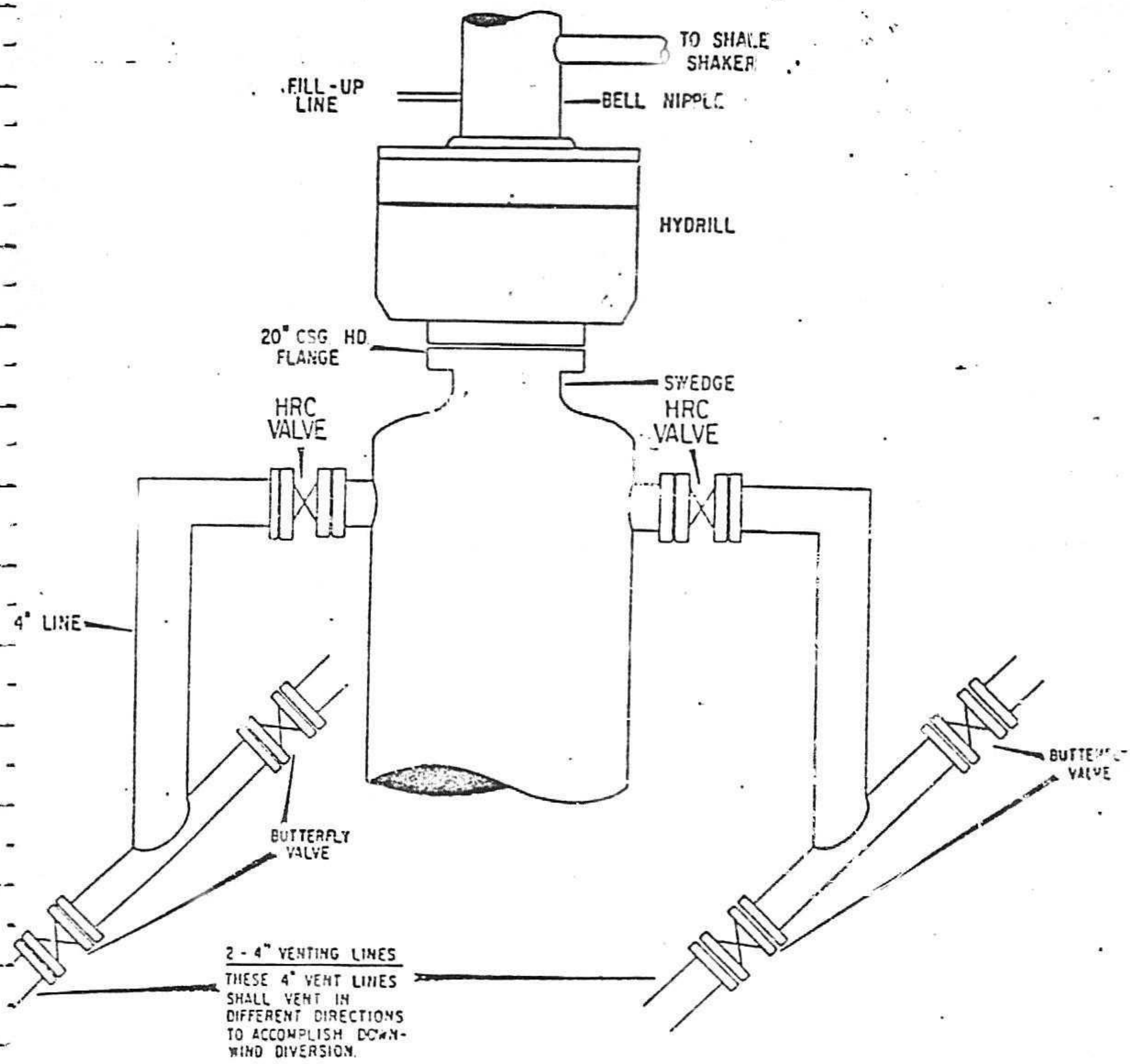
Drilling Mud Components
High Island Block No 492

DRILLING MUD COMPONENTS
GULF OF MEXICO

Category	Composition
Gelling Agent	Wyoming Bentonite Clay
	Attapulgite
Weight Material	Barium Sulfate
	Barite
Thinner	Sodium Acid Pyrophosphate
	Leonardite
	Phosphate
	Lignite
	Resin Soaps
	Sodium Tetraphosphate
	Ferrochrome Lignosulfonate
	Chrome Lignosulfonate
	Polymeric Lignosulfonate
	Aluminum Chrome Lignosulfonate
	Calcium Lignosulfonate
	Hemlock Bark Extract
	Gilsonite
	Quebracho
Viscosifier	Starct
	Carboxymethyl Cellulose
	Sodium Hexametaphosphate
	Pelletized Asbestos
Lost Circulation Material	Cellophane
	Mica Flakes
	Ground Nut Hulls
	Expanded Perlite
	Diatomaceous Earth
	Shredded Leather
	Rick Hulls
Corrosion Inhibitor	Filming Amine
ph Control	Potassium Hydrate
	Caustic Soda
Lubricants	Detergent
	Castor Oil
	Alcohol
Various Chemicals	$CaCl_2$
	$CaCo_3$

Exhibit V

Blowout Prevention Equipment
High Island Block No. 492



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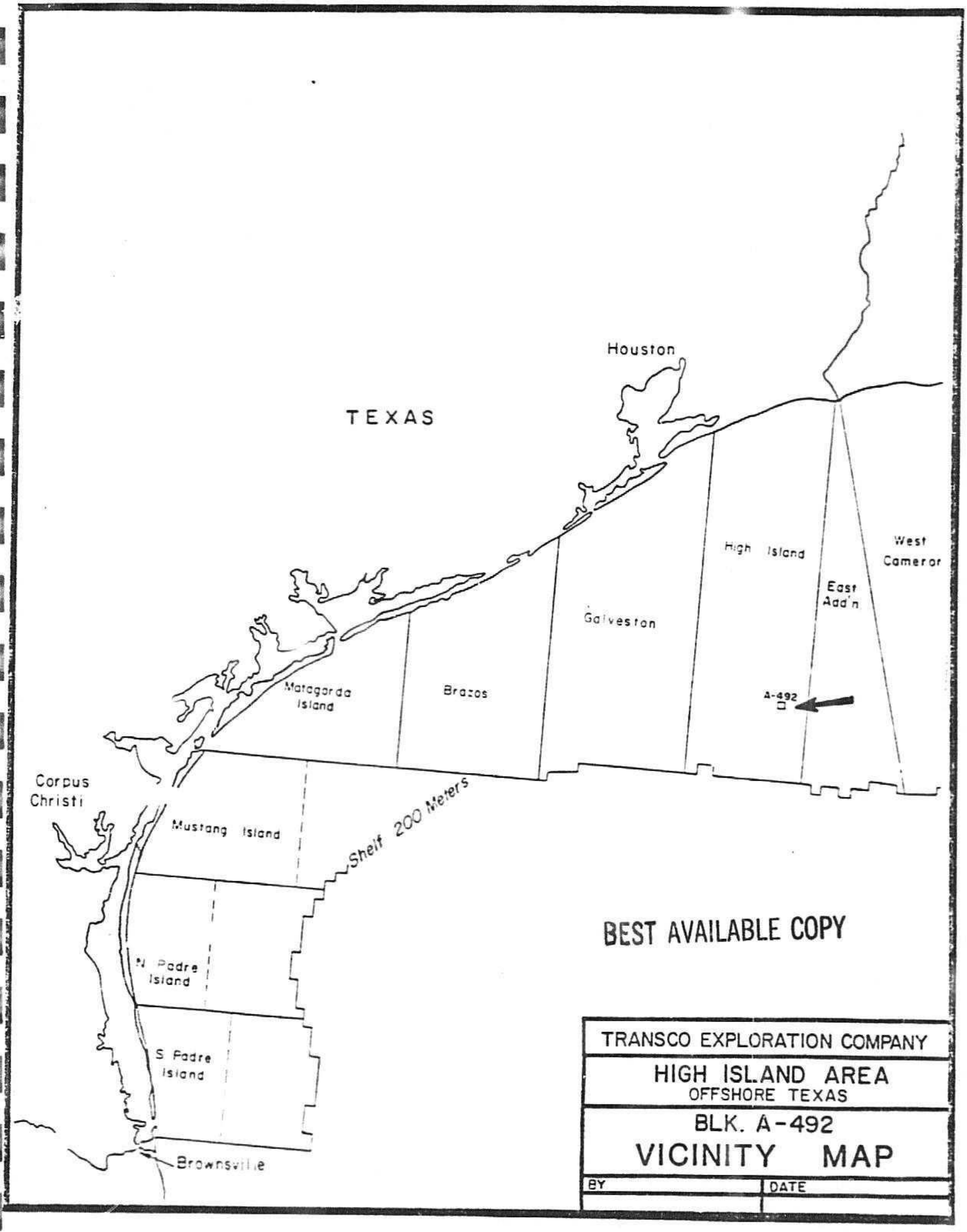
TYPICAL DIVERTE

Exhibit VI

Vicinity .p
High Island Bl .k No. 492



Houston
TEXAS
High Island
West Cameron
East Add'n
Galveston
A-492
Matagorda Island
Brazos
Corpus Christi
Mustang Island
Shelf 200 Meters
N Padre Island
S Padre Island
Brownsville
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TRANSCO EXPLORATION COMPANY
HIGH ISLAND AREA
OFFSHORE TEXAS
BLK. A-492
VICINITY MAP
BY
DATE

Exhibit VII

Oil Spill Contingency Plan

TRANSCO EXPLORATION COMPANY

OIL SPILL CONTINGENCY PLAN

REVISED: DECEMBER, 1977

TRANSCO EXPLORATION COMPANY

Oil Spill Contingency Plan

Introduction

It cannot be over-emphasized that the best way to handle oil spills is to prevent their occurrence by every means possible but chiefly through good housekeeping, adequate equipment, and proper operation of that equipment. However, in the event an oil spill should occur, in spite of maximum safety precautions, Transco Exploration Company will place into effect immediately an emergency plan to help prevent, as far as practicable, any damage to property, wildlife, or ecology. Our membership in the Clean Gulf Associates will lend us accessability to all available oil spill clean up equipment along the Texas and Louisiana Gulf Coast. We propose to incorporate the use of this equipment along with all necessary third party services to counteract any possible pollution due to oil spillage resulting from a blowout during drilling operations.

Alert Procedure

This Alert Procedure will become effective immediately upon the observance of any major emergency, such as an oil spill, fire, blow-out from an installation of any kind which could possibly endanger life, cause damage to property, or pollute shore lines, coastal or inland waters, or the open sea, or endanger any property or wildlife onshore or offshore.

Internal Alert Procedure

1. Any Company employee observing an oil spill, fire or blow-out must immediately notify his supervisor or in his absence, any Company supervisor in his area of operation.
2. The supervisor will help confirm the disaster, its location, cause and basic nature, number of people involved, known loss of life and pollution problem from wind, tides and sea condition. He will, in turn notify the DISASTER COORDINATOR, or in his absence, one of the other men listed as follows:

	TELEPHONE NUMBERS	
NAME	OFFICE	HOME
Hal Bettis	713/626-8100	713/440-9575
Jeff Tagert	713/626-8100	713/774-6993
G. I. Drenner, Jr.	713/626-8100	713/342-8501

The above named person will immediately notify the appropriate U.S. Geological Survey District Supervisor and the U.S. Coast Guard.

3. The DISASTER COORDINATOR will make a preliminary determination of the seriousness of the disaster and alert the following senior executives of the Company as warranted by the severity of the disaster.

NAME & TITLE	TELEPHONE NUMBERS OFFICE	HOME
G. L. Drenner, Jr. - V.P. Production	713/626-8100	713/342-8501
Bruce B. Dice - V.P. Offshore Exploration	713/626-8100	713/444-3063
A. R. Stern - President	713/626-8100	713/629-0737
G. B. Haeckel - Executive V.P.	713/626-8100	713/629-1117
W. J. Bowen - Chairman & Chief Executive Officer	713/626-8100	713/626-0009

Task Force

All phases of the disaster efforts such as task force operations, public announcements, legal counsel and major decisions should be coordinated and channeled through the Disaster Coordinator. He will alert [illegible] Force Officers as follows:

TASK FORCE OFFICERS		TELEPHONE NUMBERS OFFICE	HOME
G. L. Drenner, Jr.	Director	713/626-8100	713/342-8501
Hal Bettis	Disaster Coord.	713/626-8100	713/440-9575
Jeff Tagert	Operations	713/626-8100	713/774-6993
James L. Eager	Public Relations	713/626-8100	713/688-0805
R. V. Loftin, Jr.	Legal Counsel	713/626-8100	713/522-0006
Billy B. Aven	Insurance	713/626-8100	713/946-5660
Thomas W. Spencer	Employee Relations	713/626-8100	713/723-7314
C. L. Robbins	Transportation	713/626-8100	713/465-7092
G. E. Ammons	Clerical	713/626-8100	713/960-9668

External Alert Procedure

After the Internal Alert Procedure has been completed, the Disaster Task Force Director will delegate the authority to a Task Force Officer to notify all Local, State and Federal Agencies of a disaster when it occurs within their jurisdiction.

FEDERAL AGENCIES

Coast Guard

Coast Guard (toll free, 24 hr number)	800-424-8802
Coast Guard - New Orleans (East of Long. 92.40° West)	504/589-7101
Coast Guard - Sabine (West of Long. 92.40° West)	713/983-1621

U.S. Department of the Interior Geological Survey

New Orleans District
P. O. Box 7944, Metairie, LA 70011 — 504/837-4720
Residence telephone numbers after office hrs:
Charles B. Mullin, Dist. Engr., Covington, LA — 504/892-5165

Lafayette District
P. O. Box 52289, Lafayette, LA 70501 — 318/232-6037
Residence telephone numbers after office hrs:
Elmo Hubble, Dist. Supervisor — 318/837-6652

Lake Charles District
P. O. Box 6088, Lake Charles, LA 70601 — 318/478-6440
Residence telephone numbers after office hrs:
Robert H. Darrow, District Supervisor — 318/477-0671

Freeport District
P. O. Box 2006, Freeport, TX 77541
Jack Sandridge — 713/233-2604

Regional Office
P. O. Box 7944, Metairie, LA 70011 — 504/837-4720
Residence telephone numbers after office hrs:
Don Solanas, Oil & Gas Supervisor — 504/892-2668
Daniel J. Burgeois, Asst. Operations Chief — 504/885-3592

Environmental Protection Agency
Federal Water Quality Administration
351 Elm, First National Bank Building
Dallas, Texas 75201 — 214/749-1983

STATE AGENCIES

Louisiana Wildlife and Fisheries - New Orleans, LA — 504/288-4217

A. J. Prechae	New Orleans	504/527-8126
R. A. LaFleur	Baton Rouge	504/389-5309
L. S. St. Amant	Hammond	504/527-8420
Burton Angelle	New Orleans	504/527-5237

Louisiana Stream Control Commission - Baton Rouge, LA — 504/389-5309
Nights and holidays - Mr. Rene L. Bourriague in
Lafayette, LA — 318/984-7885

Department of Conservation - Main Office — 504/389-5161
Houma District — 504/873-7791
Henry Hoffman, Dist. Manager (home) — 504/785-2567

Lafayette District	318/235-1581
F. J. Fava, Dist. Manager (home)	318/984-4442
Jadwin De Blanc, Dist. Engr. (home)	318/234-3350
Lake Charles District	318/433-3688
William Wilhite, Dist. Manager (home)	318/478-3892
H. E. Walker, Dist. Engr. (home)	318/478-5668
New Orleans District	504/527-8404
B. F. Walsh, Dist. Manager (home)	504/367-1340
Wm. J. Clark III, Dist. Engr. (home)	504/887-6507
Texas Railroad Commission Austin, Texas	512/475-3003
Texas Water Quality Board Austin, Texas	512/475-2275
General Land Office Austin, Texas	512/475-3064

Personnel and Equipment

Transco Exploration Company is a member of Clean Gulf Associates and as such will utilize Clean Gulf's manpower, expertise, communication equipment and oil spill equipment on oil spills as deemed necessary.

In addition to Clean Gulf Associates, Transco will utilize the additional manpower, equipment and expertise of Peterson Maritime Services, Inc., as well as other similarly knowledgeable companies in the industry as needed.

Clean Gulf Associates Call Halliburton Services, Harvey, LA	504/366-1735
Peterson Maritime Services, Inc. 2431 Decatur Street, New Orleans, LA 70117	504/949-7534

TWX 81... ...1-5328 TWENTY-FO... HOUR SERVICE ...: PETMAR

PETERSON MA...ITIME SERVICES, inc.

2431 DECATUR STREET NEW ORLEANS, LA ...117
(504) 949-7534

104 ELMIRA STREET MOBILE, ALA 36603
(205) 432-1824

Consultan... Contractors & Specialists in:

Chemically cleaning and conve...ing Tankers, Freighters, Deep Tanks, for carriage of Grain, Edible Oils, Solvents, Water Whites, and Critical Cargoes – Oil Pollution Control – Cleanup – Helicopter and Fixed Wing Services.

HAROLD J. PECUNIA
President

DEC 2 8 197

December 22, 1977

Transco Exploration Company
P. O. Box 13...
Houston, Texas

ATTN: Mr. Hal Bettis

RE. Oil Spill Control.
Retention & ...

Dear Mr. Bettis,

Relative to our telephone conversation, Peterson Maritime Services, Inc. will guarantee to Transco Exploration Company that we will respond on a twenty-four per day basis to any oil spill as directed by Transco with sufficient men, equipment and materials to handle both minor and major spills. We also guarantee that in the event Transco wishes to activate equipment from Clean Gulf Associates, Peterson will provide the necessary trained personnel to operate all of the now existing Clean Gulf Associates equipment. Rates charged for these services will be based on Peterson's latest published rate schedule, of which you already have in your possession.

Also enclosed is a Certificate of Insurance made to Transco Exploration Company.

Yours very truly,

J. W. Latiolais
Vice-President

JWL/ltl

enclosure

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Installation of Hose Boxes and Sounding Pipes • Storing • Deodorizing • ...ip Shifting • Two-Way Radio Dispatched • Insured • All Equipment Approved

Distributors of Universal Oil Contain... • Boom • ...