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SEISMIC STUDIES IN AUSTIN-PLEASANT BAYOU
AND CUERO PROSPECTS--A SUMMARY OF
RESEARCH ACTIVITIES

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TECHNICAL REPORT

for the period

February 1, 1980 - October 31, 1980

by

R. A. Morton, C. D. Winker, and D. A. Garcia

Prepared for the U.S. Department of Energy,

Division of Geothermal Energy

Under Contract Number DE-AS05-76ET28461

Bureau of Economic Geology
The University of Texas at Austin
W. L. Fisher, Director

November 1980

EAB

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SEISMIC STUDIES IN AUSTIN-PLEASANT BAYOU AND CUERO
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February 1, 1980 - October 31, 1980

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PURPOSE AND SCOPE

Studies based partly on pre-existing or recently acquired seismic data are designed to confirm or improve the geological interpretation and resource assessment of geopressure geothermal prospect areas in Texas.

Other objectives are (1) to evaluate seismic signatures as indicators of lithologic properties, (2) to assist in projecting structural and stratigraphic information beyond the limits of well control, and (3) to investigate processing techniques that enhance data displays by improving signal-to-noise ratios and suppressing multiples in the deep objective section.

Two prospect areas with contrasting structural styles and geologic histories were selected for detailed investigations of sedimentation and structural development using available electric logs and geophysical surveys. In the first area, near Cuero, De Witt County, Texas, new seismic data acquired for the study were supplemented both with lines donated for research purposes and with data purchased commercially. Together these data provide optimum coverage across the objective fault blocks where lower Wilcox sediments are geopressured. The second study area includes the Austin Bayou Prospect, Brazoria County, Texas, where the Pleasant Bayou # 2 well was drilled and completed in the Frio Formation. Original plans called for new seismic shooting across the Austin Bayou Prospect; however, these plans were cancelled after delays in obtaining and processing the Cuero data were experienced by the subcontractor due to bad weather, permit problems, and personnel changes. Also contributing to the change in plans was the limited response to a request for bids sent to several geophysical contractors operating in the area.

Data Quality

Both prospect areas have good coverage by deep well control, providing substantial ground truth for interpreting seismic data (fig. 1, 2). Quality of seismic data is highly variable, particularly at the stratigraphic depths of interest (table 1); however, even lines designated as "poor" have proven to be useful for structural interpretation.

Austin Bayou

The Western lines (W-1 to W-5) are of particularly good quality in the deep Frio, apparently due to the long shot-receiver offset and high multiplicity (table 1). These lines have not been migrated because of the great variability of structural dip directions in this area, which makes proper migration difficult if not impossible. Nonetheless, they show a deep fault system within the reservoir fault block that could not have been detected from well control (fig. 3, 4). Otherwise, they show structural continuity of the producing sands, which has been confirmed by testing of the Pleasant Bayou well. The Western lines have also proven useful for shallow structural mapping in the Miocene - Pliocene section where well correlation is difficult. Shallow structure is of particular importance for assessing the environmental impact of reinjecting hot brines.

Cuero

The UT lines were contracted specifically for the purpose of overcoming the shortcomings of pre-existing data. Structural interpretation was improved by the new data, primarily due to the occurrence of deep fault-plane reflectors, which have been migrated into their proper positions (fig. 5).

Migration is straightforward in this area because the lines were laid out very close to true structural dip and the structure is essentially two-dimensional.

Unfortunately, data quality at the stratigraphic depth of interest is seriously affected by a "wipe-out" zone (fig. 5) which appears below faults cutting the top of Wilcox, a major velocity discontinuity (fig. 6). The "wipe-out" zone is characterized by low signal-to-noise and by velocity pull-down. Further processing should be attempted in order to improve the stack. The strike lines (UT-1 and 1A) trend along this zone and are particularly seriously affected.

Structure

Structure of both prospect areas is dominated by major down-to-the-basin growth faults which bound the potential geothermal reservoirs (figs. 7, 8). Structure in Brazoria County has been complicated substantially by overprinting by late (post-Frio) salt withdrawal and growth of Danbury Dome (fig. 9). Structural interpretation was based on a combination of seismic data and all available deep well control. Seismic data are particularly useful for resolving ambiguities of structural dip and fault throw in structurally complex areas (Danbury Dome and South Chocolate Bayou Field in Brazoria County) and for interpreting offstructure areas with little or no well control (salt withdrawal syncline in Brazoria County, downdip area in De Witt County).

Austin Bayou

The reservoir fault block is unusually large, averaging about 5 mi in width. Early structural development was dominated by rollover into

major growth faults, as indicated by the T4-T5 isopach map (fig. 10). Later salt withdrawal and growth of Danbury Dome added considerable relief to the structure within the fault block (fig. 9).

Cuero

Structure in this area is much simpler, with a series of narrow (1-2 mi) fault blocks with minor dip reversal (figs. 11, 12).

Reservoir Continuity

Extent of prospective reservoir sandstones was estimated by mapping the distribution of electric-log patterns believed to be associated with high transmissivity. The most favorable patterns are thick, blocky to fining-upward, without shale breaks (fig. 13). In the Cuero Prospect, these favorable sandstones cover an area approximately 4 mi². They have been interpreted as distributary sandstones laterally continuous with delta-front sandstones (fig. 14). In the Austin Bayou Prospect similar sandstones cover a much larger area, approximately 25 mi² (fig. 15).

Velocities

Velocities are of interest in this project primarily for two reasons: time-to-depth conversion for structure mapping, and detection of top of geopressure. Velocity surveys generally provide the most reliable data for time-depth conversion; a total of 11 have been acquired for the two areas. In the Cuero Prospect (fig. 16) they show a general decline in average velocities from updip to downdip, resulting in significant misties if a single

velocity function is used. Conversions based on velocity analyses can be seriously in error, and integrated sonics even worse. In the Austin Bayou prospect velocity surveys do not indicate major lateral velocity variations (fig. 17). However, comparison of time and depth structure maps for various Frio markers indicates the existence of significant misties.

Geopressure can theoretically be detected by an inversion in interval velocities. In the prospect areas, however, certain factors cast doubt on the reliability of this method. (1) In the Cuero Prospect area velocity inversions do occur in most wells. In the updip wells, however, the velocity inversion is due to Wilcox sandstone overlying Midway shale, all of which are normally pressured. (2) In the Austin Bayou area no velocity inversion is observed in the transition into geopressure. One possible explanation is that other factors of shale diagenesis are more significant than physical compaction in affecting velocities. Another possibility is that because shale velocities are more affected by geopressure than are sandstone velocities, geopressure may not show up on interval velocities in high-sand areas. Generally, geopressured zones tend to be low-sand areas so that the low shale velocities show up as low interval velocities. However, good geo-thermal prospects generally require a high sand percentage, which may invalidate interval velocities as a method for detecting geopressure in prospect areas.

SEISMIC DATA ACQUISITION, PROCESSING, AND RESULTS

Cuero Lines

The contract to shoot seismic lines in the Cuero prospect in DeWitt County was awarded to Geosource. Four lines were proposed: three dip lines and a strike line tying the dip lines. After running a noise study, an asymmetric, split spread array was chosen. The shot depth was to be 95 feet to penetrate the weathering layer.

A long spread length is desirable to improve the signal to noise ratio at greater depths. The near trace was 900 ft from the shot and the far trace was 11,400 ft away. The group interval was 300 ft with 10 geophones per string. Twenty pounds of dynamite were shot in each hole. Forty-eight channels were recorded with a maximum of 24 fold.

The asymmetric spread could not be perfectly realized in the field, thus in most cases the shooting array was not asymmetric. Line 1 is all on-line, but lines 2 and 3 are fairly close approximations of the asymmetric spread (figs. 18 to 22).

Obtaining permits for shooting lines on personal property posed another problem. In order to avoid no-permit areas, the proposed strike line was shot in two parts, and the north end of line 4 was substantially shortened. The final shot point map is shown in figure 23.

Most of the processing was left to the discretion of Geosource, but because the Bureau has velocity surveys in the area and because velocity appeared complex it was thought that we would benefit by interpreting the velocities ourselves. Line 2 (fig. 23) was processed first. We received

the stacked version of line 2 in March, 1980 (fig. 24). Above 2 seconds the section is very simple to interpret. Below 2 seconds (below the Wilcox), interpretation is more difficult. At the north end of the line, from depth points 1 to 70, the amplitude of events from 2 to 2.8 seconds decreases and cannot be correlated easily (fig. 24).

Below 3 seconds at depth point 90 the amplitude of events to the south decreases dramatically. The geologic explanation for this decrease is uncertain. There is no coincident change in uphole times in this area which eliminates the possibility of a large change in the weathering layer. This apparent amplitude change could not be adequately explained by changes in processing parameters across the line. Well logs in the area do not penetrate to these depths.

Velocities from the velocity analyses are consistently higher than the range between the 5 velocity surveys obtained by the Bureau. Depth point 80 is an exception; its analysis is within the range of the survey data (fig. 25).

Two types of velocity analysis programs were interpreted; constant velocity scans (Velscan plots) and contour velocity plots. A Velscan (fig. 26) is a group of traces that is stacked at a constant velocity with time. Velscan plots include several Velscans displayed side by side, each stacked with a different velocity. The optimum stacking velocity can be picked from the Velscan plots for each event at a particular depth point. Velocities are interpolated between Velscans.

The contoured velocity plots (fig. 27) show intensity of power as a function of velocity and time. The strongest events of increasing velocity are assumed to be primary events. These plots are especially useful in

identifying multiples. A comparison of the interpretations of both types of analyses shows very little discrepancy (fig. 25).

A large amount of time was spent on the processing of line 4 (fig. 28) partially due to a new processor at Geosource and also due to the relative importance of this line. The procedure used on line 2 for interpreting the velocity analyses was repeated on line 4, however the order of velocity analyses and deconvolution was reversed. The reversed order produced much clearer velocity analyses with virtually no multiples. The Velscan analyses on line 4 were run using a larger number of traces. This was advantageous for interpreting the fault plane reflections that are more apparent at the higher velocities. The dip of the faults was needed for migration.

Deconvolution of the signal was very successful in the Cuero prospect area. The velocity contour plots show that the multiples were nearly eliminated and the frequency response improvement was excellent.

With the assymetric spread, there are twice as many near traces as far traces, therefore the data should be biased toward the near traces, thus overriding the far trace signal. Twelve near traces were removed from the stack to eliminate the bias, but no significant improvement resulted (fig. 29). Using a 500 ms window for the automatic gain control improved the coherency of the reflections slightly (figs. 28 and 30).

Line 3 was processed similarly to line 4. All the dip lines were then stacked at high velocities to define the dipping fault plane reflections. A linearly increasing velocity function of 11,000 ft/sec at 0 sec to 14,000 ft/sec at 4 sec was used for stacking the lines. These high velocity stacks were then migrated. The original dip lines were also migrated (figs. 31 and 36).

The strike line (figs. 37 and 39) was separated into two intersecting lines, lines 1 and 1A (fig. 23) because of permit problems. The first 1.5 seconds of the first 20 records of line 1A were lost due to a hardware malfunction in the field. Hand correlation before processing was necessary because the time break was not recorded (fig. 37). The reflection events above and below the correlated reflectors do not seem to tie properly and are not laterally consistent (fig. 38). The two strike lines were processed using similar parameters to the dip lines, but these lines were not migrated because of their strike orientation (fig. 39).

Reprocessing of Line 5F

Seismic lines in Brazoria County were purchased from Teledyne Exploration. These lines were shot throughout Texas without change in array configuration or offset distances across the lines. The initial processing was done by Teledyne on a mass production basis with no particular zone of interest. For these reasons, we believed that reprocessing was necessary.

The Bureau has contracted most of the reprocessing to Houston Processors Inc. A very small amount of the data was reprocessed on the Phoenix 704 minicomputer by Bureau personnel. Because the cost of computer time on the Phoenix is relatively low, experimentation on the Phoenix is often advantageous.

There are several reasons why the reprocessing was contracted. The main reason is a lack of time and personnel at the Bureau available to do processing. The second reason is the very slow computation time of the

Phoenix. Minimum computer time to reprocess a 400 CDP, 5 fold line is 39 hours. The Phoenix software is also about 15 years old. Therefore, we would expect to see better results from an outside processing house.

Teledyne line 5F was chosen to assess the amount of improvement that could be expected over original Teledyne processing. The 6-fold data were shot in 1969 with an in-line spread of 1,350 ft to 8,250 ft offsets. The shotpoint interval was 600 feet. Ten pounds of dynamite at a depth of about 55 ft were used for each shot. Twenty-four channels were recorded per shot. The sampling rate was 2 milliseconds and 7 seconds of data was recorded.

Teledyne data processing utilized minimal velocity analyses with spacings of approximately 3 miles across the line. In this study, we increased the number of velocity analyses using a spacing of one per mile. Teledyne also used a wide, 3 second gate for deconvolution using a 100 ms operator length.

We used the same processing steps as Teledyne, only the number of analyses was increased. The zone of interest on this section is relatively deep, between 3 and 4 seconds. The short spread length used in shooting the line inhibits the signal to noise ratio increasingly with depth and therefore significant improvement with additional processing at later times is unlikely.

After sorting and applying weathering and elevation statics, frequency content was examined. A noise study (fig.40) shot by General Crude in the area shows the major source of noise is low frequency ground roll. Coherent source generated noise is also present, but its frequency is within signal range. The high frequencies are approximately 30 hz. Most of the low frequency noise was eliminated at 8 hz.

The next step in the processing sequence was deconvolution. The autocorrelation function was derived across the line using 3 time windows at each lateral position (figs. 41 and 42). The initial peak period is less than 50 ms, so a relatively short operator length and three 500 ms derivation windows were chosen. Each deconvolution used a 25 ms operator length with a 4 ms predictive gap and added 2 percent white noise.

A velocity analysis was computed for every mile. Each was computer picked and hand edited, using velocity contour displays and constant velocity stacks. Below about 1.5 seconds the velocity varies appreciably across the line (fig. 43).

Although gross structures are easily interpreted on both sections, features such as rollover into faults and positions of faults are much easier to interpret on the reprocessed section. Compare figure 44, the Teledyne processed Line 5F with figure 45, the Phoenix processed version. The most apparent improvements occur below 3 seconds. This may be due in part to the relatively deep window chosen for computing the automatic statics as well as greater velocity changes with depth. Transparent zones directly below the faults were not significantly improved by the increased velocity.

Table 1. Seismic lines acquired for the evaluation of two geothermal prospect areas.

Prospect/ County	Line	Shot by	Date	Fold (Nominal)	Maximum Shot- Recv. Offset (ft)	Length (mi)	Data Quality at Depth of Interest	Reprocess- ing in Progress	Migrated	Orien- tation
Cuero/ De Witt	7F-2	Arco	7/68	5	5,500	15.4	Poor	x		Dip
	14W-F	Teledyne	9/70	6	8,250	20.5	Fair	x		Dip
	UT-1	Geosource	5/80	24	10,800	3.1	Poor			Strike
	UT-1A	(for Univ. Tx.)	5/80	24	10,800	2.3	Poor			Strike
	UT-2	"	11/79	24	10,800	6.0	Good		x	Dip
	UT-3	"	3/80	24	10,800	7.4	Fair		x	Dip
	UT-4	"	4/80	24	10,800	6.3	Fair		x	Dip
Austin Bayou/ Brazoria	4F	Teledyne	5/69	6	8,250	19.9	Fair			Dip
	5F	Teledyne	4/69	6	8,250	16.2	Poor		x	Dip
	6F	Teledyne	8/69	6	8,250	18.0	Fair			Strike
	GUS-11	G.U.S.	6/72	12	9,000	6.3	Fair		x	Dip
	GUS-18		8/72	12	9,000	4.4	Poor		x	Strike
	W-1	Western (for Gen. Crude)	10/74	12	15,840	5.9	Good	x		Oblique
	W-2	"	11/74	12	15,840	8.4	Good	x		Oblique
	W-3	"	11/74	12	15,840	6.6	Good			Oblique
	W-4	"	11/74	12	15,840	6.6	Good	x		Oblique
	W-5(EN)	"	12/74	12	15,840	8.4	Good	x		Oblique
	W-5(NS)	"	12/74	12	15,840	3.6	Fair			Dip
	W-6	"	12/74	12	15,840	4.4	Poor			Strike
	CB-1	P.G.I. (for Mobil)	11/78	12	10,780	11.0	Fair	x	x	Dip
	CB-2	"	11/78	12	10,780	3.1	Fair		x	Dip
	CB-3	"	11/78	12	10,780	2.7	Fair		x	Oblique
	CB-18	"	9/78	12	10,780	3.7	Good	x	x	Oblique

Figure 1. Base map for Austin Bayou Prospect, Brazoria County.

Figure 2. Base map for Cuero Prospect, De Witt County.

Figure 3. Seismic Section W-2 (unmigrated), Austin Bayou Prospect.

Figure 4. Seismic Section W-4 (unmigrated), Austin Bayou Prospect. GCO/DOE No. 2, Pleasant Bayou (Geothermal Test Well) is just off the right side of the line.

Figure 5. Seismic Section UT-4 (migrated), Cuero Prospect. Proposed geothermal test site was in the left fault block. Note "wipe-out" zones below faults cutting top of Wilcox.

Figure 6. Interval velocities from five wells in the Cuero Prospect area. See figure 2 for well locations. Note that well 1, which is normally pressured, shows a velocity inversion similar to the other wells, which are geopressedured.

Figure 7. Seismic Section CB-1 (migrated), Austin Bayou Prospect.

Figure 8. Seismic Section 14W-F (unmigrated), Cuero Prospect.

Figure 9. Structure on T5 marker (*Anomalina bilateralis*), Lower Frio, Austin Bayou Prospect. The producing sandstone ("C" sand) is just below the T5 marker.

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Figure 15. Distribution of favorable reservoir sandstones below T5 marker, Austin Bayou Prospect, as interpreted from electric-log patterns. The "C" sand is currently being produced.

Figure 16. Time-depth conversion for Cuero Prospect area, as interpreted from various sources of velocity data.

Figure 17. Time-depth conversion for Austin Bayou Prospect area, based on velocity surveys.

Figure 18. Shot and geophone locations for Line 1, a strike line. Both the shots and geophones are in-line.

Figure 19. Shot and geophone locations for Line 1A, a strike line. Geophones are all on the line. Shot locations are represented by circles. Midpoints are also shown.

Figure 20. Shot and geophone locations for Line 2, a dip line. Geophones are on the lines. Shot locations are represented by circles. Midpoints are also shown.

BLBERT

Figure 21. Shot and geophone locations for Line 3, a dip line. Geophones are on the line. Shot locations are represented by circles. Midpoints are also shown.

1 1 12000

SLGORT

Figure 22. Shot and geophone locations for Line 4, a dip line. Geophones are on the line. Shot locations are represented by circles. Midpoints are also shown.

1 1 12000

Figure 23. Final shotpoint map of Cuero Prospect.

Figure 25. Comparison of RMS velocities from Velscans, contour velocity plots, and velocity surveys.

Figure 26. Velscan example for Depth Point 116. Velocities vary from 6,500 ft/sec to 11,000 ft/sec.

VELOCITY ANALYSIS DISPLAY

LEFT - VELOCITY ANALYSIS ATTEMPT

SCAN NO. 4

D.P. 100 TO D.P. 109

S.P. 52 TO S.P. 54

53/105

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

50%

Figure 27. Velocity Analysis using velocity contour plot display.

LINE INTERSECTION STATIONS

Petty-Ray

UNIVERSITY OF TEXAS

LINE UT-2
STATION 1-122
CUERO TEXAS

INPUT FILE, HEADER INFORMATION

DATA NAME	UT-2	DATE	10-10-68
PROJECT NAME	UT-2	TIME	10:00
FILE NAME	UT-2	FILE	UT-2
FILE TYPE	UT-2	FILE	UT-2
FILE NAME	UT-2	FILE	UT-2
FILE NAME	UT-2	FILE	UT-2

FIELD INFORMATION

FIELD NAME	UT-2	DATE	10-10-68
FIELD NAME	UT-2	DATE	10-10-68
FIELD NAME	UT-2	DATE	10-10-68
FIELD NAME	UT-2	DATE	10-10-68
FIELD NAME	UT-2	DATE	10-10-68

PROCESSING SEQUENCE

PROCESSED BY: GEOPHYSICIST

1. DATA FILE
2. DATA FILE
3. DATA FILE
4. DATA FILE
5. DATA FILE
6. DATA FILE
7. DATA FILE
8. DATA FILE
9. DATA FILE
10. DATA FILE

PROCESSING SEQUENCE

PROCESSED BY: GEOPHYSICIST

1. DATA FILE

2. DATA FILE

3. DATA FILE

4. DATA FILE

5. DATA FILE

6. DATA FILE

7. DATA FILE

8. DATA FILE

9. DATA FILE

10. DATA FILE

Figure 31. High velocity stacks of Line 2.

VELOCITY FUNCTION

DIRECTION

LINE INTERSECTION

STATIONS

Petty-Ray

UNIVERSITY OF TEXAS

LINE UT-2
STATION 1-122
CCERO TEXAS

SEISMIC RECORD INFORMATION

REEL NUMBER 100
DATE RECORDED 04/17/72
RECORD LENGTH 1000
RECORDING RATE 1000
RECORDING TIME 10:10
RECORDING LOCATION
RECORDING METHOD

FIELD INFORMATION

FIELD NAME 100
DATE 04/17/72
TIME 10:10
RECORDING RATE 1000
RECORDING TIME 10:10
RECORDING LOCATION
RECORDING METHOD

PROCESSING SEQUENCE

PROCESSED BY SEISMIC UNIT
1. DATA ENTRY
2. DATA REFORMAT
3. DATA REFORMAT
4. DATA REFORMAT
5. DATA REFORMAT
6. DATA REFORMAT
7. DATA REFORMAT
8. DATA REFORMAT
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98. DATA REFORMAT
99. DATA REFORMAT
100. DATA REFORMAT

SEISMIC RECORD INFORMATION
REEL NUMBER 100
DATE RECORDED 04/17/72
RECORD LENGTH 1000
RECORDING RATE 1000
RECORDING TIME 10:10
RECORDING LOCATION
RECORDING METHOD

TRACE SUPPRESSION

T.V. FILTER

Figure 32. Migrated high velocity stack of Line 2.

LINE DIRECTION
D.

LINE INTERSECT

STATIONS

Petty-Ray

UNIVERSITY OF TEXAS

LINE UT-4
STATION 127-16
CUERO TEXAS

PROJECT AREA INFORMATION

DATE SURVEYED 01/73
DATE DATA ACQUIRED 06/73
DATE DATA REDUCED 1/73
DATE DATA PLOTTED 1/73
DATE DATA PRINTED 1/73

FIELD INFORMATION

FIELD CAMP 4700
CAMP TYPE 4700
CAMP DATE 1/73
CAMP TIME 10:00
CAMP LOCATION 4700
CAMP ELEVATION 4700
CAMP LENGTH 4700
CAMP WIDTH 4700
CAMP AREA 4700

PROCESSING SEQUENCE

DESCRIPTION OF SEISMIC SECTION

1. SEISMIC SECTION
2. SEISMIC SECTION
3. SEISMIC SECTION
4. SEISMIC SECTION
5. SEISMIC SECTION
6. SEISMIC SECTION
7. SEISMIC SECTION
8. SEISMIC SECTION
9. SEISMIC SECTION
10. SEISMIC SECTION

SEISMIC SECTION INFORMATION

SEISMIC SECTION 10,000
SEISMIC SECTION 10,000
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Figure 34. High velocity stack of Line 4.

DIRECTION
LINE INTERSECTION
STATIONS

Petty-Ray

UNIVERSITY OF TEXAS

LINE UT-4
STATION 127-16
CUERO TEXAS

INPUT DATA INFORMATION
DATE: 10/10/70
TIME: 10:00
PROJECT: UT-4
STATION: 127-16
LINE: UT-4
SHEET: 10

FIELD INFORMATION

FIELD NO: 4240
DATE: 10/10/70
TIME: 10:00
PROJECT: UT-4
STATION: 127-16
LINE: UT-4
SHEET: 10

PROCESSING SEQUENCE

PROCESSING BY: R. J. HARRIS
1. DECONVOLUTION
2. GAIN
3. GAIN
4. GAIN
5. GAIN
6. GAIN
7. GAIN
8. GAIN
9. GAIN
10. GAIN

PROCESSING SEQUENCE
1. DECONVOLUTION
2. GAIN
3. GAIN
4. GAIN
5. GAIN
6. GAIN
7. GAIN
8. GAIN
9. GAIN
10. GAIN

Figure 36. Line 4 after migration.

[illegible]

FOLD X

USE DIRECTION

VELOCITY FUNCTION
1945/1963

DIRECTION

LINE INTERSECTION

STATISTICS

GEOSOURCE

UNIVERSITY OF TEXAS

LINE UT-1A STA 52-14
CURRO PROSPECT
DEWITT COUNTY, TEXAS
FINAL STACK

IMPLET WELL NUMBER AND DEPTH (FEET)

WELL NUMBER	247-26
IMPLET DEPTH	07/27/79
WELL NAME	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26

FIELD INFORMATION

WELL NAME	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26

PROCESSING SEQUENCE

WELL NAME	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26

***** FILING PRODUCTION *****

WELL NAME	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26
WELL TYPE	247-26
WELL STATUS	247-26
WELL LOCATION	247-26
WELL DEPTH	247-26

UT-1A STA 52-14
CURRO PROSPECT
DEWITT COUNTY, TEXAS
FINAL STACK

THE UNIVERSITY OF CHICAGO

T. V. PILLAY

Figure 37. Line 1A.

LINE UT-1

LINE DIRECTION

VELOCITY FUNCTION

DIRECTION

LINE INTERSECTION

STATIONS

GEOSOURCE

UNIVERSITY OF TEXAS

LINE UT-1A STA 50-14
CLARK BASIN
DENTON COUNTY, TEXAS
FINAL STACK

ONLY FOR REPORT INFORMATION

DATE: 10/1/78
TIME: 10:00 AM
PROJECT: CLARK BASIN
WELL: 50-14
STATION: 14
DEPTH: 1000 FT
SPECS: 1000 FT

FIELD INFORMATION

NO. OF STATIONS: 14
DATE: 10/1/78
TIME: 10:00 AM
PROJECT: CLARK BASIN
WELL: 50-14
STATION: 14
DEPTH: 1000 FT
SPECS: 1000 FT

PROCESSING SEQUENCE

SEQUENCE OF OPERATIONS:
1. DATA ACQUISITION
2. DATA CHECKING
3. DATA EDITING
4. DATA SORTING
5. DATA STACKING
6. DATA FILTERING
7. DATA CORRELATION
8. DATA PRINTING

TIME SUPPRESSION

Figure 38. Correlation of Lines 1 and 1A. Event near 2 sec. used for hand correlation.

LINE UT-1

LINE DIRECTION
DIRECTION

LINE INTERSECTION

STATIONS

GEOSOURCE	
UNIVERSITY OF TEXAS	
LINE UT-1 STATION 66 - 13 CLERO TEXAS	
ONLY FIELD INFORMATION DATE: 01/01/71 TIME: 10:00 LOCATION: 1000 SURVEY: 1000 PROJECT: 1000	
FIELD INFORMATION DATE: 01/01/71 TIME: 10:00 LOCATION: 1000 SURVEY: 1000 PROJECT: 1000	
PROCESSING SEQUENCE 1. DATA ENTRY 2. DATA CHECK 3. DATA SORT 4. DATA EDIT 5. DATA PRINT 6. DATA STORE 7. DATA RECALL 8. DATA DELETE 9. DATA COPY 10. DATA PASTE	
PRINTING SEQUENCE 1. DATA ENTRY 2. DATA CHECK 3. DATA SORT 4. DATA EDIT 5. DATA PRINT 6. DATA STORE 7. DATA RECALL 8. DATA DELETE 9. DATA COPY 10. DATA PASTE	

Figure 39. Final stack of Line 1.

3724 45 14 40 0000 1 1400 202105 21-2012
3812 45 14 40 0000 1 1400 202105 21-2012

GENERAL CRUDE OIL COMPANY		WESTERN GEOPHYSICAL	
AREA CHIEF, ALBUQUERQUE		CITY OF ALBUQUERQUE	
PROPERTY NO.		DATE	
NO. OF PLOTS & AC.		SECTION	
MIDDLE 200' OF N. 1/4, S. 1/4, T. 15N., R. 16E., S. 10E.		T. 15N., R. 16E., S. 10E.	
CITY OF ALBUQUERQUE		COUNTY OF BERNALILLO	
STATE OF NEW MEXICO		U.S. DEPT. OF THE INTERIOR	
BUREAU OF LAND MANAGEMENT		ALBUQUERQUE, N.M.	

WAVE TEST

Figure 40. Noise study of Chocolate Bayou Prospect.

CDP NO. 50 DISTANCE 4050 START TIME 400
WINDOW NO. 1 END TIME 1400

AUTOCORRELOGRAM

TIME - MS

POWER SPECTRUM

FREQUENCY - HERTZ

INPUT DATA TRACE WINDOW

TIME - SOMS/GRID

CDP NO. 50 DISTANCE 4050 START TIME 2000
WINDOW NO. 2 END TIME 3000

AUTOCORRELOGRAM

TIME - MS

POWER SPECTRUM

FREQUENCY - HERTZ

INPUT DATA TRACE WINDOW

TIME - SOMS/GRID

CDP NO. 50 DISTANCE 4050 START TIME 3000
WINDOW NO. 3 END TIME 4000

AUTOCORRELOGRAM

TIME - MS

POWER SPECTRUM

FREQUENCY - HERTZ

INPUT DATA TRACE WINDOW

TIME - SOMS/GRID

Figure 41. Autocorrelogram and power spectrum before deconvolution.

CDP NO. 50 DISTANCE 4050 START TIME 400
WINDOW NO. 1 END TIME 1400

AUTOCORRELOGRAM

TIME - MS

POWER SPECTRUM

FREQUENCY - HERTZ

INPUT DATA TRACE WINDOW

TIME - SOMS/GRID

CDP NO. 50 DISTANCE 4050 START TIME 2000
WINDOW NO. 2 END TIME 3000

AUTOCORRELOGRAM

TIME - MS

POWER SPECTRUM

FREQUENCY - HERTZ

INPUT DATA TRACE WINDOW

TIME - SOMS/GRID

CDP NO. 50 DISTANCE 4050 START TIME 3000
WINDOW NO. 3 END TIME 4000

AUTOCORRELOGRAM

TIME - MS

POWER SPECTRUM

FREQUENCY - HERTZ

INPUT DATA TRACE WINDOW

TIME - SOMS/GRID

Figure 42. Atocorrelogram and power spectrum after deconvolution.

Figure 43. Isovelocity contour plot of RMS velocity vs. position across Line 5.

Figure 44. Line 5F processed by Teledyne.

Figure 45. Line 5F reprocessed on the Phoenix.