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PROGRAM NO. 9229-P033-001E

SEISMIC FINAL REPORT

CAMERON HILLS 3D GEOPHYSICAL SURVEY

CAMERON HILLS, N.W.T., CANADA

OPERATION COMMENCEMENT: FEBRUARY 25, 1993
OPERATION TERMINATION: MARCH 29, 1993

Primary Contractor Halliburton Geophysical Services

Operator: PARAMOUNT RESOURCES LTD.

Working Interest Partner: TARRAGON OIL AND GAS LTD. (now MARATHON CANADA LIMITED)

Submitted to: National Energy Board
Submitted by: Niclas Christoffersson P.Geoph.
Paramount Resources Ltd.

October 2, 2000

CONFIDENTIALITY

The information contained in this report is confidential and shall remain so, for the duration of the confidential term of the well data contained within the area of the existing significant discovery licenses in the Cameron Hills Area.

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1. Introduction

The Cameron Hills Three Dimensional Seismic program lies between latitude 60°2.20' and 60°4.40' north, and between longitude 117°28.0' and 117°31.15' west. The Cameron Hills Three Dimensional Seismic program (3-D) was acquired in the first quarter of 1993, at Cameron Hills, Northwest Territories. The 3-D was acquired to provide detailed mapping of the Middle Devonian in the vicinity of the HB Cameron A-05 and Paramount et al. Cameron M-73 wells. The 3-D survey area is approximately 53 kilometers southeast of the community of Kakisa, immediately north of the Alberta/Northwest Territories border. The 3-D covers an area of 13.43 square kilometers encompassing the following Significant Discovery Licenses; SDL 7, SDL 9 and SDL 103, as well as Production License 4 (Figure No. 1). The 3-D program was designed to yield subsurface coverage including and surrounding wells HB Cameron A-05 in grid area 60°10'N: 117°30'W, and Paramount et al. Cameron M-73 in grid area 60°10'N; 117°15'W. The program was acquired by Paramount Resources Limited and Tarragon Oil and Gas Ltd., now known as Marathon Canada Limited, with field work performed by Halliburton Geophysical Services. The total expenditure for the Cameron Hills 3-D program was $516 033.44, shared between Paramount Resources and Marathon Canada at 88% and 12% working interests respectively. The Cameron Hills 3-D was acquired to aid in the mapping of the Middle Devonian Carbonates targeted for hydrocarbon development, including the Slave Point, Sulphur Point and Keg River Formations, and the Muskeg-equivalent dolomite Zone.

2. Acquisition

2.1 Location Maps

Please see enclosed Figure No. 1, Figure No. 2 and Figure No. 3 for the location of the Cameron Hills 3-D program at a regional scale, local scale and detailed scale respectively.

2.2 Summary of Field Operations; Significant Dates, Weather and Operations

The Cameron Hills 3-D field work commenced on February 25, 1993, with the deployment of the survey and line clearing crews. The 3-D program was 4C fold vibroseis data acquired with source line spacing of 300m and receiver line spacing of 240m. These parameters generated 47.52 km of source lines and 57.00 km of receiver lines for a total of 104.52 linear kilometers. The surveying of the program, using WILD T16-T-1 and AGA-EDN equipment, lasted 14 days and was completed on March 10, 1993, (see Appendix No. 1 - Operations Report). With the subsequent processing of the survey data, two topographic maps were generated to illustrate the relief over the survey area and are displayed in Figure No. 4 and Figure No. 5. The survey data reveals a relative flat plateau on the top of the Cameron Hills, with only 30m of relief over the survey (see Appendix No. 2 – SEGP1 Survey Disc).

The recording crew was dispatched on March 21, 1993, and recorded data from March 22, 1993, to March 28, 1993, with a patch consisting of 720 channels. The sub-surface bins had dimensions of 30m by 20m. The crew recorded a total of 799 vibrator points with a DFS VII recording system averaging 114 vibrator points per day. The vibroseis sweep parameters were 8 sweeps per vibrator point with a sweep of 10-110HZ at +3dB. There were no significant weather systems that passed through the area and as a result no down days were encountered (see Appendix No. 1 - Operations Report).

There was also no down days due to mechanical failures from the 25 wheeled vehicles used on site. The Cameron Hills 3-D field data was delivered to Geco-Prakla in Calgary, Alberta, for seismic processing. The field seismic data was processed with an elevation datum of 800m above sea level and a replacement velocity of 2800 m/s (see Figure No. 6 - Processing Flow).

The detailed geographical coordinates of the Cameron Hills 3-D are shown in Figure No. 2, with the subsurface bin map for the survey illustrated in Figure No. 3. Final migrated seismic sections are displayed at 5 inches to the second and 64 traces to the inch. Every fourth inline is shown in Appendix No. 3. Interpretation maps are enclosed in Appendix No. 5. It should be noted that the scale of the seismic displays in Appendix No. 3 allows for a 1:1 comparison with the 1:50 000 scale maps in Appendix No. 5.

SURFACE ELEVATIONS

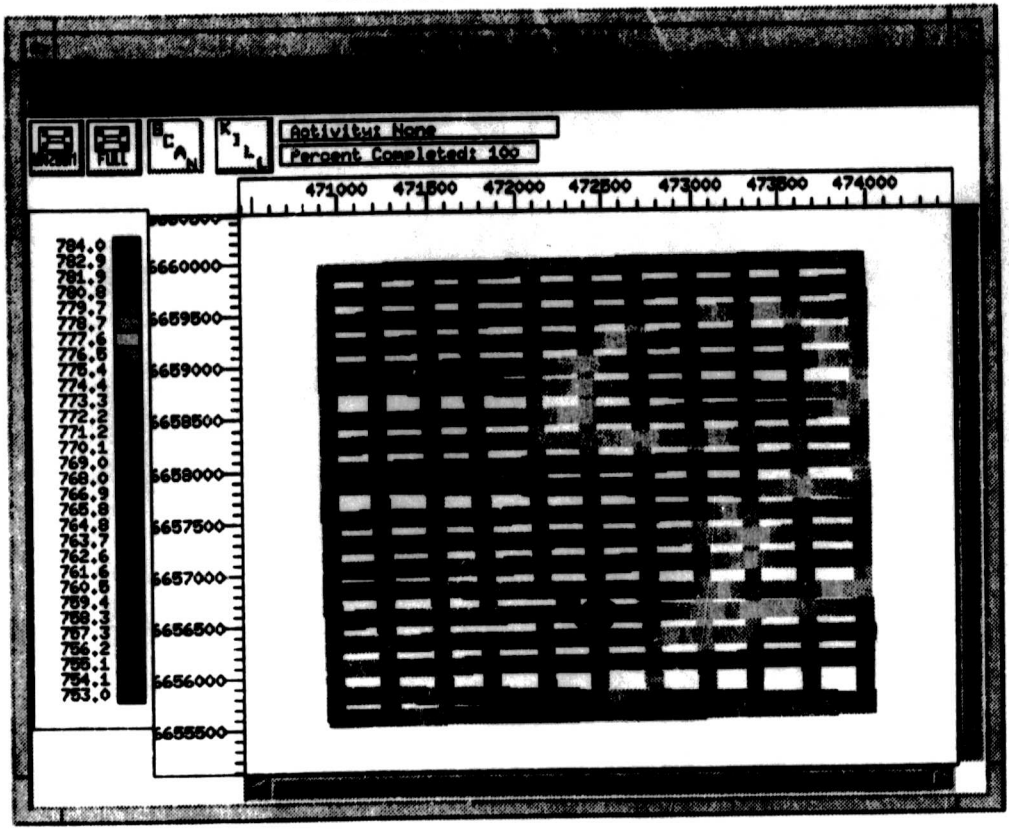

Figure No. 5

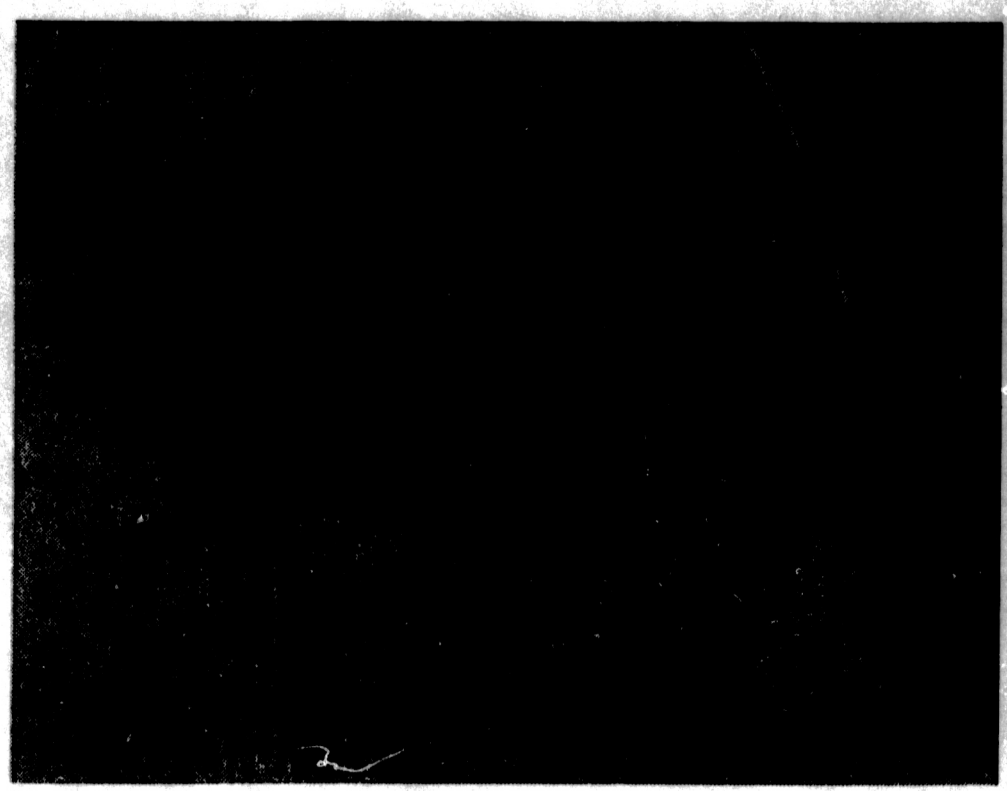

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Figure No. 6

CAMERON HILLS, N.W.T. 3-D
MIGRATED STACK
NORMAL POLARITY

ROWS (N - S LINES) 1-146
COLS (E - W LINES) 1-153 BY 10
LOCATION: CAMERON HILLS
EASTING 471000 - 474000
NORTHING 6855500 - 6860000
DATUM: 800 M ASL
REPL. VEL. 2800 M/S

NORTH

PROCESSED BY
GECO-PRAKLA
A DIVISION OF SCHLUMBERGER CANADA LTD.

ACQUISITION

SHOT BY: G.S.D. INC. DATE: [illegible]
SHOT FOR: PARAMOUNT RESOURCES LTD
SOURCE
- MODEL
- SWEEP
- SWEEP LENGTH
- NUMBER OF SWEEPS
- NUMBER OF TAPS
- SOURCE LINE INTERVAL
- SOURCE INTERVAL
- NUMBER SHOT LINES

CABLE
- GEOPHONE TYPE
- GEOPHONES PER GROUP
- RECEIVER LINE INTERVAL
- STATION INTERVAL
- NUMBER OF RECEIVER LINES

INSTRUMENTS
- RECORDING INSTRUMENT
- FORMAT
- RECORD LENGTH
- SAMPLE RATE
- HIGH CUT FILTER
- LOW CUT FILTER
- NOTCH FILTER
- GAIN
- PREAMP GAIN SETTING

PROCESSING SEQUENCE

PROCESSED BY : GECO-PRAKLA DATE: [illegible]
SEG-D REFORMAT
3D GEOMETRY ASSIGNMENT
3D SURVEY DEMUX
3D REFRACTION STATICS
SPHERICAL DIVERGENCE CORRECTION
PHASE COMPENSATION
SPIKING DECONVOLUTION
3D VELOCITY ANALYSIS
SURFACE CONSISTENT RESIDUAL STATICS
3D VELOCITY ANALYSIS
SURFACE CONSISTENT RESIDUAL STATICS
NORMAL MOVEOUT CORRECTION
MUTE
TRIM STATICS
TRACE EQUALIZATION
3D STACK
SPECTRAL BALANCE
F-X DECONVOLUTION
3D MIGRATION
BANDPASS FILTER
BALANCE
POLARITY
ALL TIMES REFERENCED TO DATUM
G.C. PROCESSOR

DISPLAY DATA

TRACES PER INCH 10.00
INCHES PER SECOND 2.0

9229 P33-1E

3. Discussion

3.1 Background Information

A sum of 172, 2-D seismic lines, totalling some 1701 linear kilometers, and the new 13.43 square kilometers of 3-D data constitute the seismic coverage Paramount Resources have in the Cameron Hills Area of the Northwest Territories. The Paramount 2-D seismic data base is comprised of industry trade data, all acquired by third parties. The original field acquisition of the seismic data was accomplished during seven different field programs starting back in 1967. Subsequent programs were then acquired in 1968, two in 1984, 1985 and finishing with the Cameron Hills 3-D in 1993. The early seismic data was acquired with field geometry that yielded 600% and 800% coverage, while the later data shot for the 1993 Cameron Hills 3-D reached 4000% coverage. The data quality is fair to very good depending on the vintage of the seismic data. The majority of the seismic programs were acquired using dynamite as the energy source, except for one of the early programs and the Cameron Hills 3-D, which utilized vibrosels as the energy source. In general, the correlation of significant seismic reflections is possible through out the area and the existing 2-D data sets acted as a guide for the lay out of the newly acquired 3-D.

3.2 Interpretation

A series of six regionally correlatable seismic reflections were interpreted on all the 2-D seismic lines in the application area to help in the positioning of the 3-D. The seismic reflections events interpreted were a near Devonian Twin Falls, Devonian Slave Point, Devonian Watt Mountain, near top Devonian Muskeg, peak above Granite Wash or weathered quartzite event, and Granite Wash or quartzite event. On the 3-D, eight correlatable seismic reflections were interpreted. The eight horizons from the top down were the Devonian Wabamun, near Devonian Twin Falls, Devonian "Z-marker",

Devonian Slave Point, Devonian Watt Mountain, near top Devonian Sulphur Point, Devonian Muskeg and Devonian Chinchaga. The above mentioned horizons are illustrated in the synthetics generated for the M-73 and A-05 wellbores, which tie the Cameron Hills 3-D (Appendix No. 4 - Well Synthetics). The interpreted events were smoothed to remove the trace to trace jitter that existed with some of the horizons in the 3-D seismic volume. From the smoothed seismic horizons, travel time structure maps were created and isochron maps were generated between a number of the different horizons and are included in Appendix No. 4 - Interpreted Maps. To generate the desired Sulphur Point dolomite structure map, required for the evaluation of further development drilling locations, a number of isochron and isopach maps were utilized. The work flow followed to generate the Sulphur Point dolomite structure map begun with the posting of the Twin Falls depth values from well control in the area. The contouring and gridding of the Twin Falls structure surface was done with bias from the Devonian Twin Falls time structure. This methodology utilized the regional trends from the well control and local detail variations from the seismic time structure. The next step was to calculate the Twin Falls to Sulphur Point isopach values from the well control on the 3-D. Then calibrating this value, with the Twin Falls to Sulphur Point isochron from the 3-D seismic, yielded interval velocities for each of the wells on the 3-D. The interval velocities were then contoured and gridded generating an interval velocity map from which further mathematical manipulations could be made. The resulting product of the interval velocity grid and the Twin Falls to Sulphur Point isochron grid was the Twin Falls to Sulphur Point isopach grid. This isopach grid was then subsequently contoured at a contour interval of 2.5m, to yield a new surface to interpret. At this stage, a Sulphur Point structure map could be generated by subtracting the Twin Falls to Sulphur Point isopach grid from the Twin Falls structure map. The Sulphur Point structure map was then also contoured with a 2.5m contour interval. In order to obtain the Sulphur Point dolomite structure map, a Sulphur point limestone isopach map must first be generated. This was accomplished in much the same way as the Twin Falls structure map was created, where variations to the regional isopach derived from well control was biased in contouring and gridding with the Slave

Point to Sulphur Point isochron derived from the 3-D seismic volume. The larger Slave Point to Sulphur Point isochron values represent areas that have been potentially cut by limestone eroding channels leaving thinner limestone isopachs. The Sulphur Point limestone isopach was then subtracted from the Sulphur Point structure map to generate the Sulphur Point dolomite structure map. From this surface, the structural relief of the Sulphur Point reservoir was evident, resulting in the identification of oil development locations.

4.0 SUMMARY

A successful 3-D seismic program was acquired at Cameron Hills, N.W.T, during the winter of 1993. The 3-D program covered an area of 13.43 square kilometers and was situated approximately 53 km south of the community of Kakisa, N.W.T.. The 3-D program was acquired by Paramount Resources Ltd. and Tarragon Oil and Gas to aid in the mapping of the Middle Devonian Carbonates for future hydrocarbon development drilling.

HGS INCORPORATED
2720 5 AVE. N.E.
CALGARY, ALBERTA T2A 4V4
PH. (403) 272-6784

OPERATIONS REPORT

Program Name: CAMERON HILLS - 3D

Government File Number:

Contractor: H.G.S.

Recording

Commencement Date: MARCH 22. 93

Completion Date: MARCH. 28. 93

Actual Number of Days Worked: 7 DAYS.

Line Cutting & Surveying

Commencement Date: SURVEYING FEB. 25. 93

Completion Date: SURVEYING MAR. 10. 93

Actual Number of Days Worked: SURV. 14 DAYS

Drilling

Commencement Date: N/A

Completion Date: N/A

Actual Number of Days Worked: N/A

PROJECT REPORT

PROJECT NAME: CAMERON HILLS 3D. CREW: 1460

PROJECT NO: _____ CONTRACTOR'S GEOPH LIC OR PERMIT # 62

LOCATION: CAMERON HILLS BASE: PARAMOUNT CAMP

TWP: _____ RANGE _____ WEST _____

A. DATES OF OPERATION:

		Total Days
1. Surveyors commenced on FEB 25.93	Finished on MAR 10.93	14
2. Drills commenced on N/A	Finished on N/A	N/A
3. Recorders left base on MAR 21.93		
4. Recording commenced on MAR 22.93	Finished on MAR 28.93	7
5. Recording suspended on N/A		
6. Recording recommenced on N/A		N/A
7. Recording completed on MAR 28.93		N/A
8. Vehicles released on MAR 29.93		

B. PRODUCTION:

1. Number of kms shot 49.52
2. Number of lines 11.
3. Number of shots taken 799.
4. Number of stations 1,425
5. Number of recording days 7
6. Average daily production:
   a) kilometres shot 6.80 KM.
   b) SP /VP recorded 114 V.P.
7. Days lost due to weather condtions 0
8. Days lost due to equipment failure 0

RECORDING

a. Instruments DFS VII
b. Number of Traces 1,425
c. C.D.P. Coverage 4000
d. Detectors Type & Hz./Damping SENSOR SM-7 14 Hz 70% DAMPING.
e. Number of Cables Used/Type (No. pairs) 100 (FIBER OPTIC)
f. Length of Each Cable 660 m
g. No. of Detector Strings 1,425
h. No. of Detector Strings/Station 1
i. Detector Spacing 2.5m
j. Distance Geophones Spread Over 9 over 20m
k. Distance Between Stations 40M.
l. Field Filters Used Hi-CUT FILTER 180.%
m. Spread Configuration 3D
n. Distance Between Shot Points 60m
o. Average Charge Size N/A
p. Total Explosives Used N/A
q. Average Hole Depth N/A
r. Total Km. Drilled N/A
s. No. of Shot Points/Km. 17
t. Vibrating Source Pattern See attached
u. Number of Sweeps 8
v. Sweep Frequency/db Boost START FREQUENCY - 10, STOP FREQUENCY 110
w. Sweep Length 8 SEC.
x. Sample Rate 2.00 msec
y. Record Length 2048 msec
z. Sweep Taper COSINE TAPER-200, LINEAR TAPER-100
aa. Ground Force, Amp/Phase Lock HIGH THRESHOLD 100% LOW THRESHOLD 60%

RECORD PROCEDURES

1. Recommended Procedures: (Reflection OR Refraction)
REFLECTION.

2. Deployment of vehicles, aircraft, dozers (i.e. where based, support, production, etc.)
1 - P.M UNIT - (F150-4X4)
1 - RECORDER - (CHEV 7000 4X4 - 5 TON)
1 - MECHANIC UNIT (F350-4X4)
1 - VIB TECH UNIT (F350-4X4)
4 - D.A.U TRUCKS (F350-4X4)
3 - LINE TRUCKS (F350-4X4)
2 - LINE TRUCKS (F600-4X4)
3 - UTILITY UNITS (F250-4X4)
3 - SUPPORT UNITS (5 TON TANDOM)
5 - VIBRATOR UNITS (WHEELED) - TRK (X3)
1 - CAT PUSH UNIT - (F250-4X4)
3 - SURVEY UNITS - (F250-4X4).

EQUIPMENT

1. Full description of all vehicles (include and name sub-contractors):
   (a) Number of Wheeled Vehicles: 25
   (b) Number of Tracked Vehicles: 2
   (c) Make & Model No. of Tracked Vehicles:

2. Full Description of All Aircraft/Dozers/Camp, etc.:
   PARAMOUNT CLOSED CAMP, LOCATED IN THE CAMERON HILLS AREA. N.W.T. CAMP CONSISTING OF ONE MAIN ENCLOSED TRAILER AND 2 OUTSIDE TRAILERS

SURVEYING

1. Equipment Used in Surveying: WILD T16 - T-1
   AGA - EDM

2. Method used to locate lines and stations by EDM, Chainage, etc. (vertical and horizontal datum used):

CONDITIONS (list all pertinent meteorological, topographic and other working conditions affecting the survey, radio liaison, etc. Include kms of existing line, new cut line, access and distance description from nearest locality or town to camp or program).

COMPILED BY: Judy Hollesback

PARTY MANAGER: _____