GRAVITY INTERPRETATION

HORN RIVER

R. B. Galeski

PROJECT NO. 19-2-4-70-1

OIL & GAS OPERATIONS
Oil and Mineral Division
MAR 19 1973
OTTAWA, CANADA
Dept. of Indian Affairs & Northern

GRAVITY INTERPRETATION

of the

Horn River Area (N. W. Block)

N.W.T.

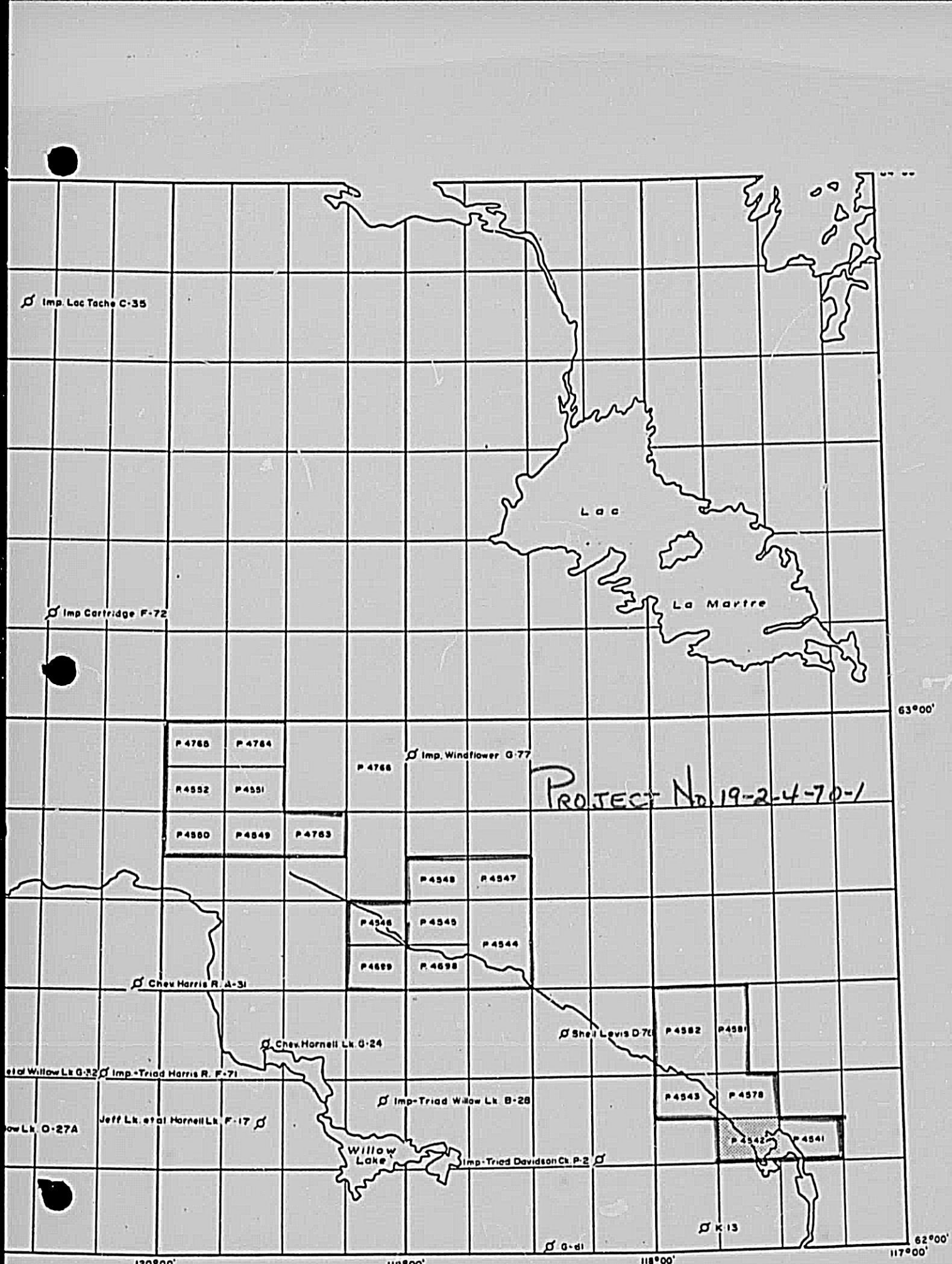
for

Western Decalta Petroleum Ltd.

by

R. B. Galeski Consulting

May, 1970


Imp. Lac Tache C-35
Imp Cartridge F-72
Lac
La Martre
63°00'
P 4765
P 4764
P 4766
Imp. Windflower G-77
PROJECT No. 19-2-4-70-1
R4552
P4551
P4550
P4549
P 4763
P 4548
P 4547
P 4546
P 4545
P 4544
P 4699
P 4698
Chev Harris R. A-31
Chev Hornell Lk. G-24
Shell Levis D-76
P 4582
P4581
et al Willow Lk G-32
Imp-Triad Harris R. F-71
Imp-Triad Willow Lk B-28
P 4543
P 4578
Jeff Lk. et al Hornell Lk F-17
ow Lk O-27A
P 4542
P 4541
Willow Lake
Imp-Triad Davidson Ck P-2
K-13
G-61
62°00'
120°00'
119°00'
118°00'
117°00'
SCALE 1 INCH = 16 MILES

INTRODUCTION

The Horn River Area (N.W. Block) lies between latitudes 62°-45' N. and 62°-55'N. and longitudes 119°-30'W. and 120°-00'W. in the Northwest Territories, about 180 miles west of the city of Yellowknife. The area is nearly flat, having only about 100' difference between highest and lowest elevations measured; and it is mostly covered by muskeg and lakes. Tree cover is relatively thin. Ground access is from Fort Providence to the south over 180 miles of extremely rough bush trail.

Airborne Geophysical Surveys undertook the basic contract to provide gravity coverage in the winter of 1969-70. Preliminary low level photography was done in January, 1970, of the acreage block and of two other blocks to the southeast. Actual field work, staged out of Hay River, was commenced the next month. With considerable difficulty trail was cleared into the area by bulldozers, and a camp and supplies were moved in. Helicopters and personnel followed.

Actual field work consisted of:

1. The setting in of control by helicopter (Hiller FH-1100) supported ABC method.
2. Metering of points (located on the large scale photographs) by suspending a remote-reading LaCoste and Romberg meter from a hovering helicopter. (Hiller 12E).

Later the photos were bridged, and horizontal and vertical values were determined for each metered position. Following this, Bouguer values were computed in the normal fashion and these were plotted in profile form and on a map of the area. An elevation map was also prepared.

The maps show a grid of coordinates in feet, east and north of a point marked on the ground on a small peninsula jutting into a large lake in the east-central part of the area. The reference point, labelled 100,000 N and 100,000 E, is about one mile east of the area.

GEOLOGIC SETTING

No wells have been drilled within the area. Closest one to the area is 16 miles ENE of the northeast corner. This well encountered Devonian lime (Pine Point? Keg River?) below 200' of Horn River shale. Precambrian basement was found at 1600'. Chinchaga evaporites (mostly anhydrite, but with some salt) exist throughout the region below the Keg River. Projection of regional dip on the basement, as it is known from the few scattered wells, indicates that basement should be expected at 1800'-1900' within the permit block. However, a reported exposure of lime rocks in the northern part would indicate basement depth no greater than 1400' in that portion, at least. Density contrasts may be expected at the following horizons:

1. Horn River - lime contact (0-500').
2. Anhydrite - salt contacts within the Chinchaga (250'-1600').
3. Top of basement (where basement rocks are basic - SW portion of the area) (1400'-1900').
4. Rock changes within the basement (1500'+).
5. Mineralized zones within the lime section, where it is near the surface.

INTERPRETATION

Aim of the interpretation is to remove deep effects of no economic interest and to evaluate the residual anomalies in terms of geolgic causative masses and their depth. Procedure is as follows:

1. Construct a map of the relative total gravitational field (Bouguer map).
2. Plot Bouguer values in profile form.
3. Draw smooth regionals on the profiles in a manner to approximate deep effects.
4. Plot and contour regional deep effects.
5. Extract residual values (Bouguer-regional), from the profiles.
6. Plot and contour residuals.

BOUGUER MAP

Dominant feature is a northward-plunging low. The very steep west flank indicates a change in basement rock type from acidic on the east to basic on the west. This change in rock type probably extends from basement surface to very great depth. A green line, marked "I", is the easternmost limit of the demarcation line between the two rock types. A gravity high in the southeast corner is probably caused by a local intrusion of more basic rocks in the basement granites of the area. A NE-SW trending fault (SE side up) possibly causes the local gradient near station 40 on line 2. It has been projected onto the residual map as a green line, marked "II". Most of the gravitational effect associated with this is due to intrabasement faulting. However, it is possible that there is a scarp at the top of the basement and that the overlying sediments are also faulted.

RESIDUAL MAP

The residual map shows a number of local positives emanating from depths varying from shallow intra-basement to very near surface. Computed maximum depths to each anomaly are indicated as feet below surface near the highest value or along the steepest flank. Residual values within 2000 feet of the extremities of the programme are questionable in value because of the poor regional control in these areas.

Except for anomalies labelled A, B, C, D, E, all of the residual positives may indicate local paleotopograhic highs on the basement surface or rock type changes that may result in such highs. Such old positive features would consititute locales for later development of reef on the Keg River (Pine Point) platform. Anomalies A, B, and C definitely emanate from within the sedimentary section. These may be directly related to reef development. Anomalies D and E are very sharp, and these probably have sources at the surface or very near it.

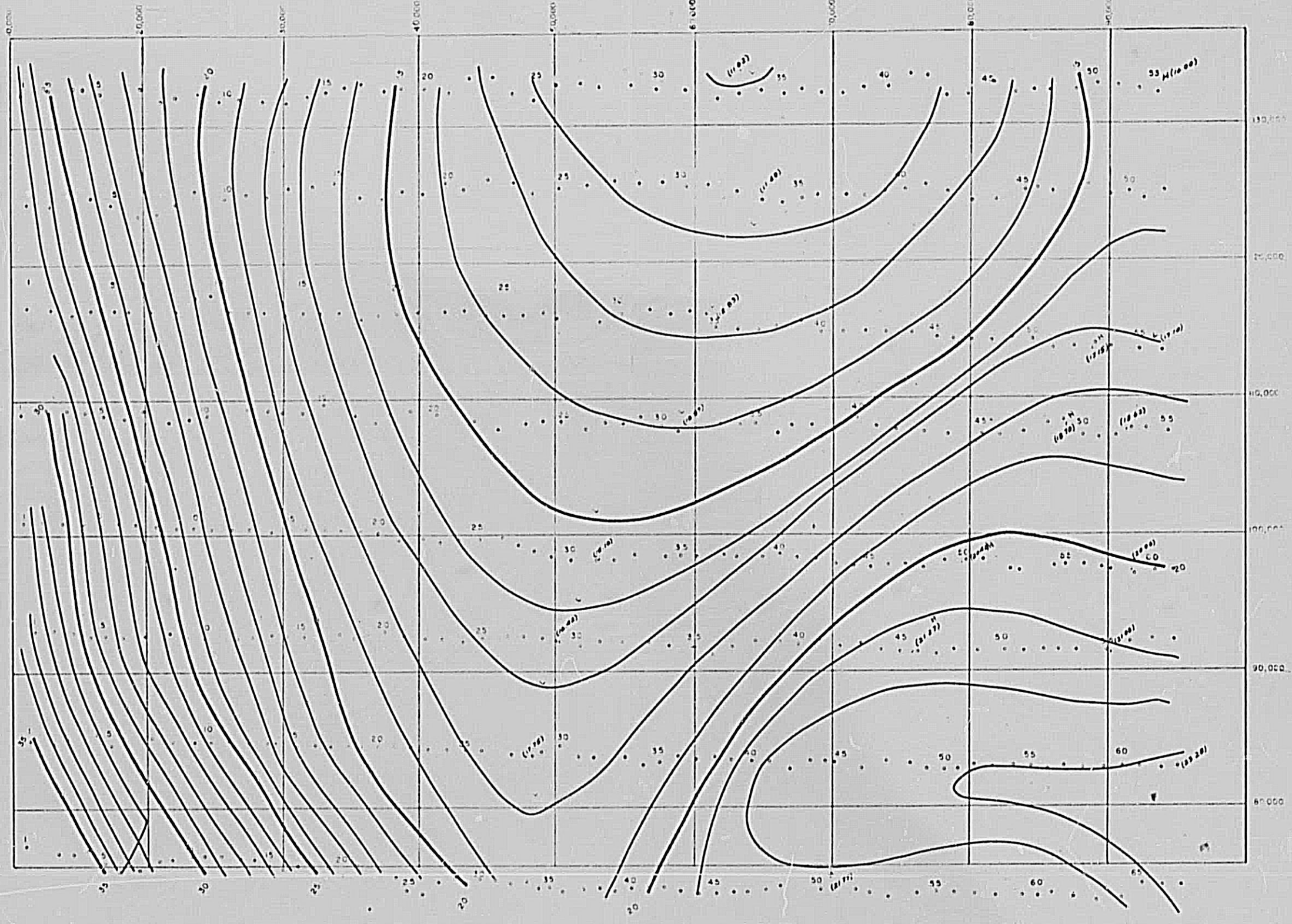
Besides D and E - which possibly indicated heavy mineral presence - five single point high gravity readings were obtained. Magnitude of these varies from 0.4 mgls. to 1.2 mgls. above regional. Some of these may be spurious, but any or all of them might represent near surface mineralization. Locations of these very local effects are circled on the Bouguer map.

RECOMMENDATIONS

1. Take gravity readings at 50' intervals over distances of 2000' to straddle anomalously high gravity readings indicated.
2. Take gravity readings at 100' intervals for 6000' over the D anomaly.
3. Take gravity readings at 100' intervals for 4000' over the E anomaly.
4. If any of the above anomalies are confirmed as near surface with mineral potential, consider a staking programme followed by delineation with gravity and trenching or drilling.
5. If there is interest in the reef prospects of the area, consider a reconnaissance seismic programme over selected residual positives - with particular emphasis on anomalies A, B, and C.

Respectfully submitted,

R. B. Galeski, P. Geoph.



WESTERN DECALTA PETROLEUM LTD

HORN RIVER PLATEAU AREA, N.W.T.

(N.W. BLOCK)

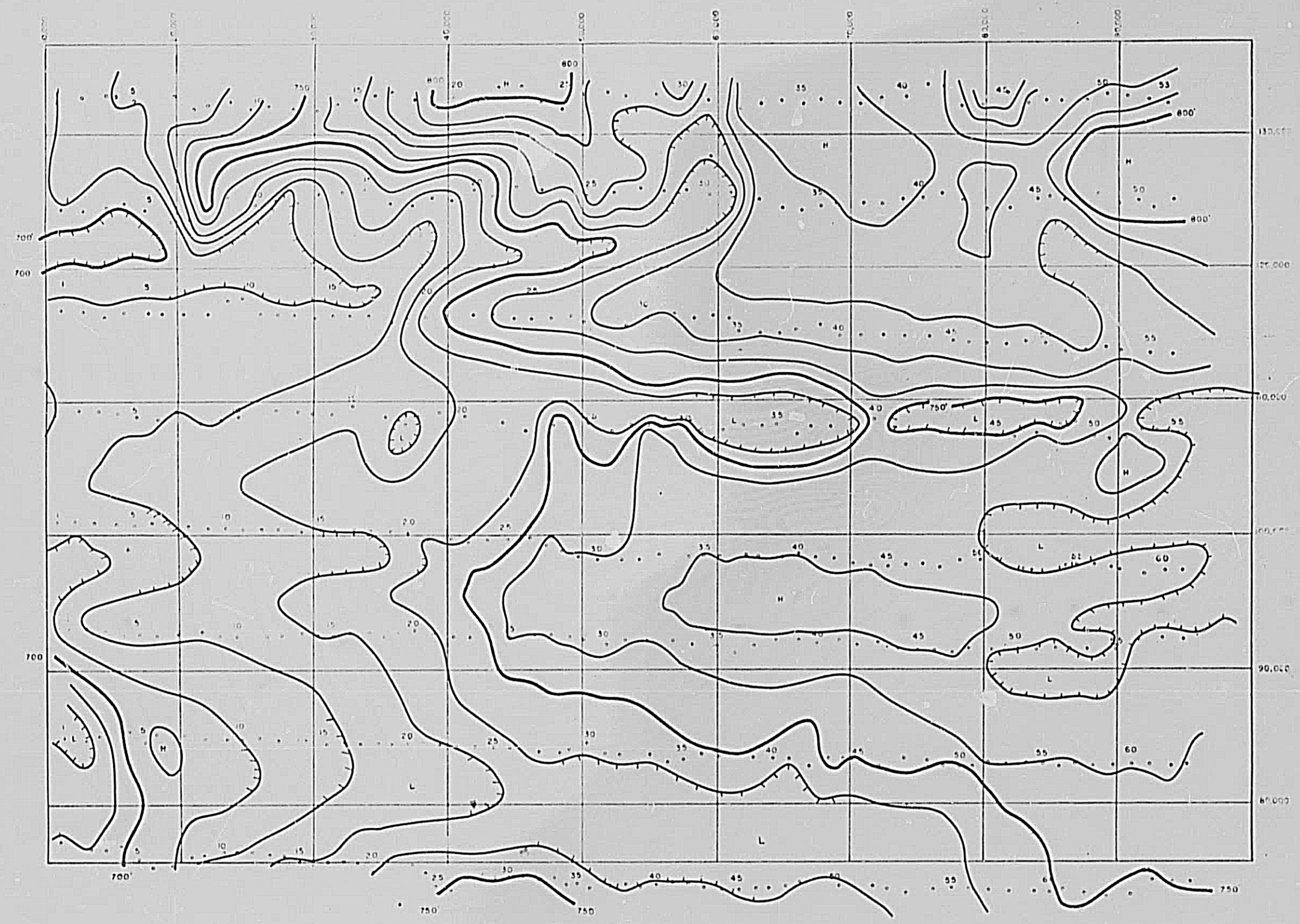
REGIONAL GRAVITY

SCALE 0 4000' 8000 FEET

Scale 1" = 4000'

APRIL, 1970

H.B. GALESKI CONSULTING



WESTERN DECALTA PETROLEUM LTD.

HORN RIVER PLATEAU AREA, N.W.T.

(N.W. BLOCK)

ELEVATIONS

Scale

APRIL, 1970

GALESKI CONSULTING

WESTERN DECALTA PETROLEUM LTD

HORN RIVER PLATEAU AREA, N.W.T.

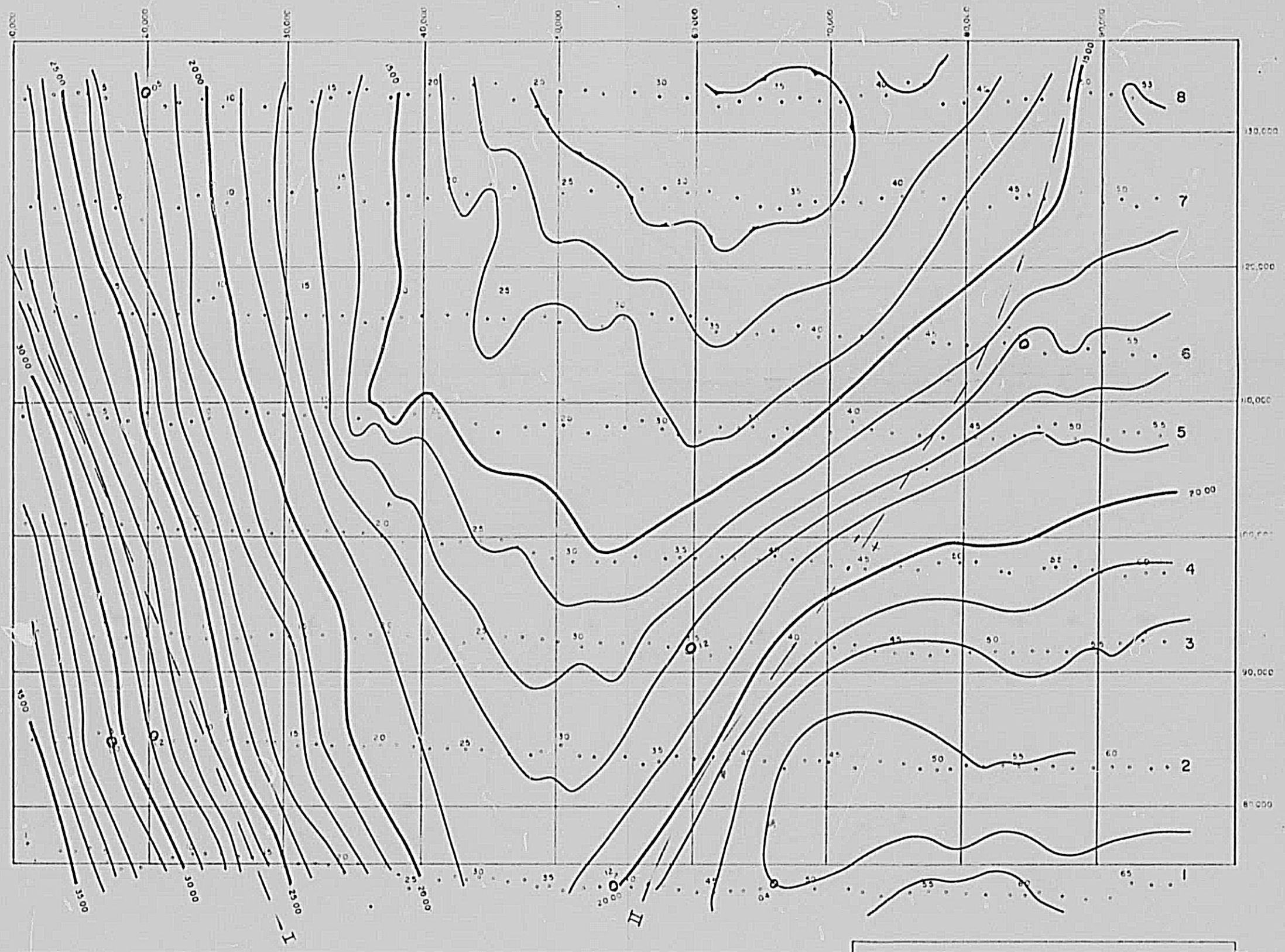
(N.W. BLOCK)

RESIDUAL GRAVITY

SCALE 0 4000' 8000' FEET

Scale 1" = 4000'
C.I. 0.2 mgal

APRIL, 1970
H.S. GALESKI CONSULTING



WESTERN DECALTA PETROLEUM LTD

HORN RIVER PLATEAU AREA, N.W.T.

(N W BLOCK)

BOUGUER GRAVITY

SCALE 0 4000 8000 FEET

Scale 1" =

C.I.

APRIL, 1970

R.B. GALESKI CONSULTING

FLUID ANALYSES

FOR

WESTERN DECALTA PETROLEUM LIMITED

HORN R. DECALTA ET AL TROUT D-66
TROUT LAKE AREA
NORTHWEST TERRITORIES

CORE LABORATORIES - CANADA LTD.
Petroleum Reservoir Engineering
CALGARY - EDMONTON - REGINA

CORE LABORATORIES – CANADA LTD.

PETROLEUM RESERVOIR ENGINEERING

WATER ANALYSIS

File 933-1309 Page 1 of 3

Company Western Decalta Petroleum Limited

Well Horn R. Decalta et al Trout D-66 K.B. ____ Grd. 790'

Location 61 35'04.00 N.L. 119 58'02.00 W.L. Field Trout Lake Area Province N.W.T.

Formation Horn Plateau Reef Interval 1511' - 1565'

Sampled from DST #1 (Bottom of Recovery) by Lynes United Services

Date sampled Feb. 27/71 Date analyzed Mar. 18/71 Analyst AH

Recovery 800' Salt Water

____ Mud type ____ Water cushion ____

Resistivity 0.048 Ohm-meters @ 67 °F

Specific gravity 1.1434 @ 60°F

pH 6.45 H_2S Absent

Refractive Index 1.369 @ 67°F

Total Solids:

Calculated 206,355 mg/liter

By evaporation @ 110°C - mg/liter

By evaporation @ 180°C - mg/liter

At ignition - mg/liter

MILLIGRAMS PER LITER

Na + K	Ca	Mg	Fe	Ba	Br	I	Cl	HCO_3	SO_4	CO_3	OH
65051	9878	3466	Pres.	-	-	-	127744	176	40	Nil	Nil

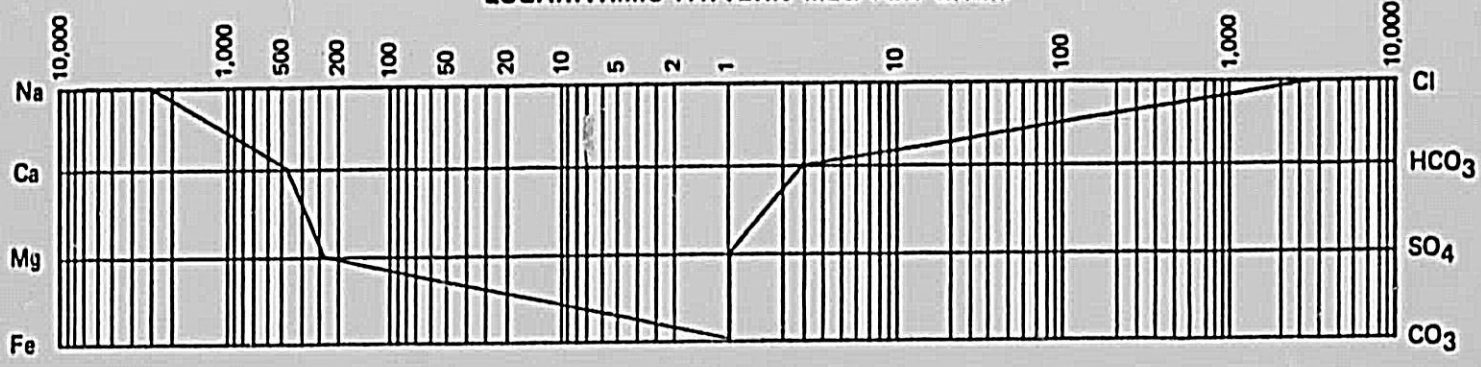
PER CENT CALCULATED SOLIDS

31.5	4.8	1.7	Pres.	-	-	-	61.9	.1	.0	.0	.0

MEQ PER LITER

2828.3	492.9	284.9	Pres.	-	-	-	3602.4	2.9	.8	.0	.0

LOGARITHMIC PATTERN MEQ PER LITER



209179. 65051.0

CORE LABORATORIES – CANADA LTD.

PETROLEUM RESERVOIR ENGINEERING

WATER ANALYSIS

Company: Western Decalta Petroleum Limited

Well: Horn R. Decalta et al Trout D-66 K.B. — Grd. 790'

Location: 61 35'04.00 N.L. 119 58'02.00 W.L. Field: Trout Lake Area Province: N.W.T.

Formation: Horn Plateau Reef Interval: 1481' - 1513'

Sampled from: DST #2 (Bottom of Recovery) by: Lynes United Services

Date sampled: Mar. 4/71 Date analyzed: Mar. 18/71 Analyst: AH

Recovery: 1200' Liquid

Mud type: — Water cushion: —

Resistivity: 0.157 Ohm-meters @ 67 °F

Specific gravity: 1.0358 @ 60°F

pH: 7.30 H_2S: Absent

Refractive Index: 1.342 @ 67°F

Total Solids:

Calculated: 48,718 mg/liter

By evaporation @ 110°C: - mg/liter

By evaporation @ 180°C: - mg/liter

At ignition: - mg/liter

MILLIGRAMS PER LITER

Na + K	Ca	Mg	Fe	Ba	Br	I	Cl	HCO_3	SO_4	CO_3	OH
14405	2900	818	Pres.	Abs.	-	-	27398	205	2992	Nil	Nil

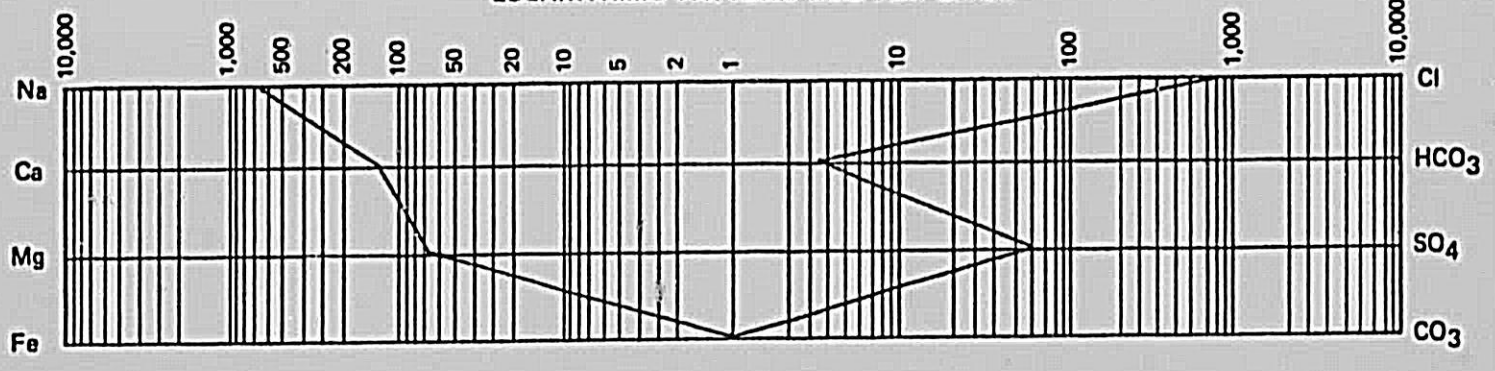
PER CENT CALCULATED SOLIDS

29.6	6.0	1.7	Pres.	Abs.	-	-	56.2	.4	6.1	.0	.0

MEQ PER LITER

626.3	144.7	67.2	Pres.	Abs.	-	-	772.6	3.4	62.2	.0	.0

LOGARITHMIC PATTERN MEQ PER LITER



47745. 14405.0

CORE LABORATORIES – CANADA LTD.

PETROLEUM RESERVOIR ENGINEERING

WATER ANALYSIS

Company: Western Decalta Petroleum Limited

Well: Horn R. Decalta et al Trout D-66 K.B. — Grd. 790'

Location: 61 35'04.00 N.L. 119 58'02.00 W.L. Field: Trout Lake Area Province: N.W.T.

Formation: Horn Plateau Reef Interval: 1481' - 1509'

Sampled from: DST #3 (Bottom of Recovery) by: Lynes United Services

Date sampled: Mar. 5/71 Date analyzed: Mar. 18/71 Analyst: AH

Recovery: 1250' Salt Water

Mud type: — Water cushion: —

Resistivity: 0.114 Ohm-meters @ 67 °F

Specific gravity: 1.0526 @ 60°F

pH: 6.80 H_2S: Absent

Refractive Index: 1.348 @ 67°F

Total Solids:

Calculated: 73,699 mg/liter

By evaporation @ 110°C: - mg/liter

By evaporation @ 180°C: - mg/liter

At ignition: - mg/liter

MILLIGRAMS PER LITER

Na + K	Ca	Mg	Fe	Ba	Br	I	Cl	HCO_3	SO_4	CO_3	OH
22080	4206	1237	Pres.	Abs.	-	-	42210	259	3707	Nil	Nil

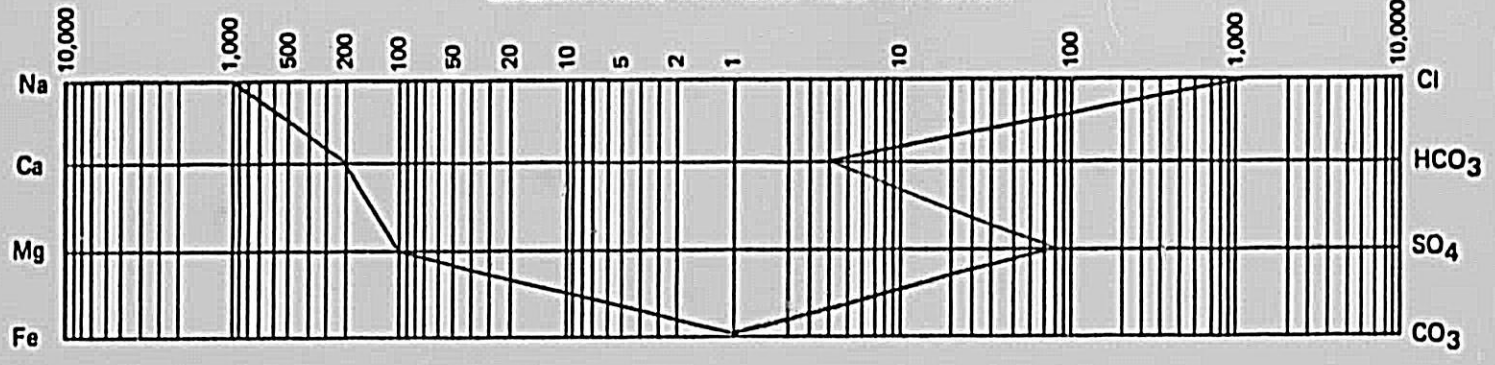
PER CENT CALCULATED SOLIDS

30.0	5.7	1.7	Pres.	Abs.	-	-	57.3	.4	5.0	.0	.0

MEQ PER LITER

960.0	209.9	101.7	Pres.	Abs.	-	-	1190.3	4.2	77.1	.0	.0

LOGARITHMIC PATTERN MEQ PER LITER



72684. 22080.0

McCullough®

BAROID

GAMMA RAY-NEUTRON LOG

FILING NO.

COMPANY WESTERN DECALTA PETROLEUM LIMITED

WELL HORN R. DECALTA ET AL TROUT RD-66

FIELD WILDCAT

PROVINCE NORTHWEST TERRITORIES

LOCATION: LSD. SEC. TWP. RGE.

OTHER SERVICES:

PERMANENT DATUM	GROUND LEVEL	ELEV. 790
LOG MEASURED FROM	KB 10' ABOVE GROUND LEVEL	
DRILLING MEASURED FROM	KB	

ELEVATIONS: KB. 800 DF. GL. 790

DATE	MARCH 16/71	
RUN NO.	ONE	
TYPE LOG	GAMMA-RAY	NEUTRON CORRELATION
DEPTH—DRILLER	-	-
DEPTH—LOGGER	1614	1614
BOTTOM LOGGED INTERVAL	1608	1612
TOP LOGGED INTERVAL	1350	1350
TYPE FLUID IN HOLE	WATER	
SALINITY PPM CL.	-	
DENSITY LB./GAL.	-	
LEVEL	1245'	
MAX. REC. TEMP. DEG. F	-	
OPR. RIG TIME	1 HOUR	
RECORDED BY	G. OLIVER	
WITNESSED BY	A. TESAN	

RUN NO.	BORE HOLE RECORD BIT	FROM	TO	CASING RECORD SIZE	WGT.	FROM	TO
				4 1/2	9.5	SURF	T.D.

FOLD HERE

THIS HEADING AND LOG CONFORMS TO API RECOMMENDED STANDARD PRACTICE RP-33

EQUIPMENT DATA

NEUTRON	
RUN NO.	ONE
LOG TYPE	IMPROVED
TOOL MODEL NO.	N-3.5-D
DIAM.	3 1/2
DETECT. MODEL NO.	232
TYPE	SCINT
LENGTH	3"
SOURCE MODEL NO.	-
SERIAL NO.	-
SPACING	-
TYPE	AM/BE
STRENGTH	4.5C

GAMMA RAY	
RUN NO.	ONE
TOOL MODEL NO.	G-3.5-C
DIAM.	3 1/2
DETECT. MODEL NO.	132
TYPE	SCINT
LENGTH	3"
DIST. TO N. SOURCE	92"

GENERAL	
HOIST TRUCK NO.	2233
INST. TRUCK NO.	2233
TOOL SERIAL NO.	
LOG TICKET NO.	C31759

LOGGING DATA

GAMMA RAY

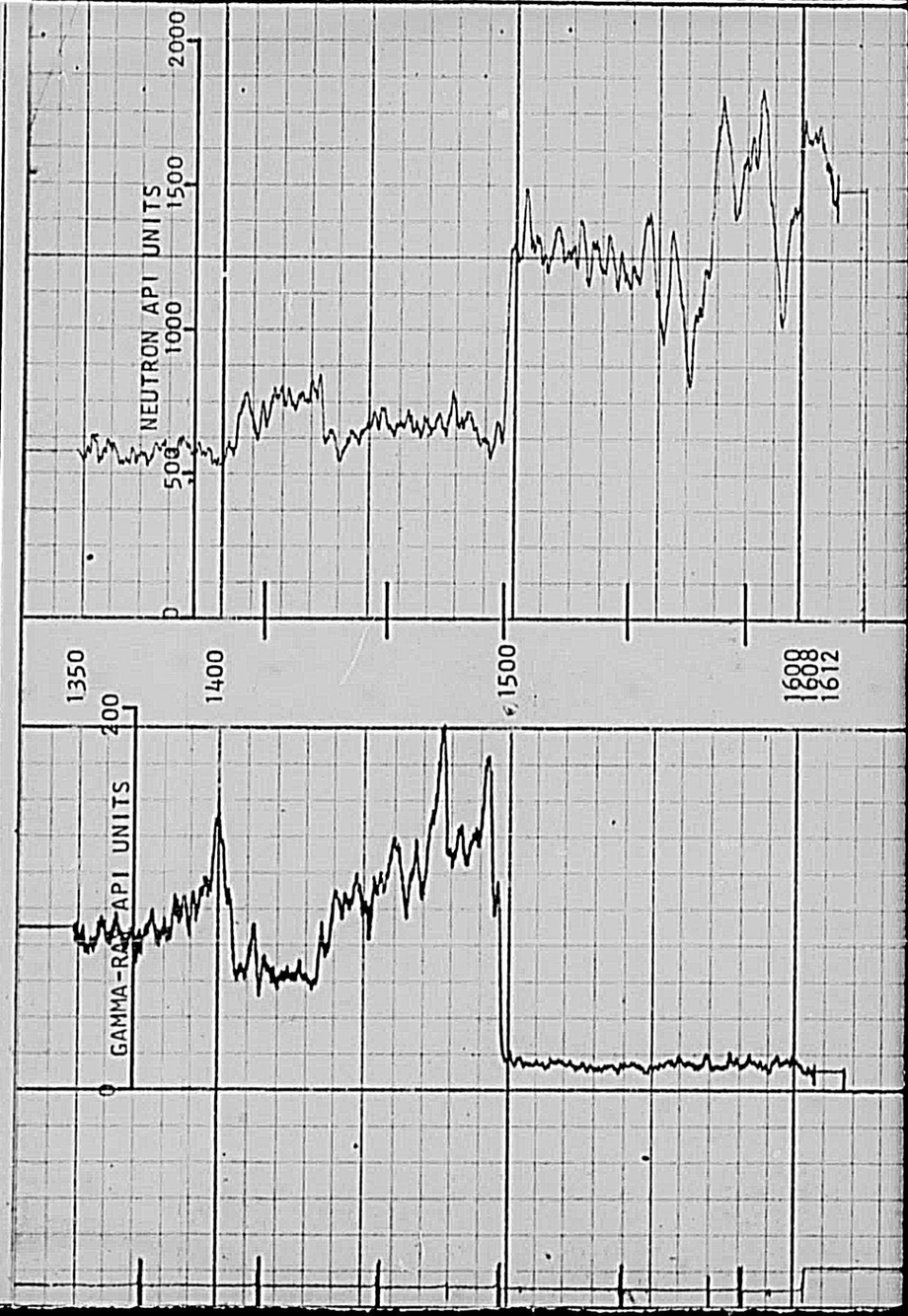
RUN NO.	DEPTHS FROM	DEPTHS TO	SPEED FT./MIN.	T.C. SEC.	SENS. SETTINGS	ZERO DIV. L. OR R.	API G.R. UNITS PER LOG DIV.
ONE	1612	1350	20	1.8	G-139	0	19.1
					D-240		
					R7A		

NEUTRON

T.C. SEC.	SENS. SETTINGS	ZERO DIV. L. OR R.	API N. UNITS PER LOG DIV.
1.4	G-100	0	125
	D-277		
	R9A		

REFERENCE LITERATURE:

PERFORATED INTERVAL: 1503 TO 1497 WITH 1 11/16" TORNADO JETS AT 3 HOLES PER FOOT -- TOTAL SHOTS 19.



1of


NEUTRON API UNITS
500
1000
1500
2000
1608
1612
1350
1400
1500
1600
1608
1612
1400
GAMMA-RAY API UNITS
0
200
PERFORATION RECORD

2 of


1500
1600
1608
1612
1400
1500
PERFORATION RECORD
WESTERN DECALTA PETROLEUM LIMITED
HORN R. DECALTA ET AL TROUT RD-66

19-7-4-44 off

AREOMAGNETIC INTERPRETATION

HORN RIVER

R. B. GALESKI

PROJECT NO. 19-2-4-70-1

Airborne Gravity & Seismic Services Ltd.
Calgary Alberta

#311, 330 - 9TH AVE. S.W.
CALGARY 2, ALBERTA
PHONE 403 - 264-3434

December 16th, 1970

Mr. A. Patterson,
Western Decalta Petroleum Ltd.,
630 - 6th Ave. S. W.,
Calgary, Alta.

Art:

I have reviewed the magnetic profiles run in the Fawn Lake area of the Northwest Territories. Those in the southeast portion were examined in detail, and depth computations were made where possible. Profiles in the northwest were spot-checked, and depth computations were made on two of the more prominent features.

The field work appeared to be good in quality, and flight altitude was maintained quite rigidly. However, the scale of the profiles was 1 cm. = 100 gammas. Therefore, it was not practical to analyze anomalies less than 100 gammas in amplitude. Nearly all the depth points refer to prominent anomalies which can be readily seen on the map of contoured total intensity. Depth points are in feet below surface.

Few of the individual depth points can be considered "good" in quality, so they are not graded for quality. It was necessary to correct most for angularity between anomaly orientation and flight direction. Where this angularity was 60° to 90°, no grade is indicated. Where this is 50° to 60°, the grade is "P"; where less than 50°, it is "VP". Many of the anomalies analyzed are considered to be basement surface effects. Some are probably intra-basement effects.

An effort to analyze the results follows:

1. Two parallel southeast trending positives can be seen in the northwest portion. Three depth computations on the northeast of these are 1300', 1300' and 1350'. Four computations on the southwestern one are 1125', 1400', 1500' and 1500'. The amplitudes of both features are within the range of basement paleotopographic features. Were they dikes within the basement I would expect greater amplitude and

greater depth. It is my opinion that these are "hogbacks" in the old basement surface. Note that the southwestern one - regionally downdip - is 100' to 200' deeper than the northeastern one. Also note that the northeastern positive trend extends into the southeastern area.

2. The above mentioned extension has five separate closures in the southeastern area. Two of these have computed depths of 800' and 1000' - indicating considerable local relief on the basement surface.

3. The strong magnetic positive in the north-central part of the southeastern area is an intra-basement effect -- probably a basic intrusion. However, there is at least partial coincidence of a basement high (or highs). Of many depth calculations on portions of this feature, a significant number are less than 800' below surface. In fact one is only 400'. At least 80% are less than projected regional basement depth. The few deeper values may be related to local intra-basement changes. In summation, my conclusions regarding this feature are that a basic intrusion occurred within the basement rocks, that a topographic high (of perhaps 1000') was left here before deposition of paleozoic rocks, and that this high was disected to some extent before such depostion took place.

4. Because of lack of instrument sensitivity small topographic highs which might exist on the basement surface east of the strong feature mentioned above cannot be delineated. The basement is probably fairly uniform in this region, and has no large surface features. We cannot compute depths to the basement top, nor can we compute depths to the intra-basement, east-west trending features, as the flight lines do not cross them on significant slopes. Two possible exceptions are northeast trending positives in the northern portion. Depth estimates to these are inconsistent, and their origins are questionable.

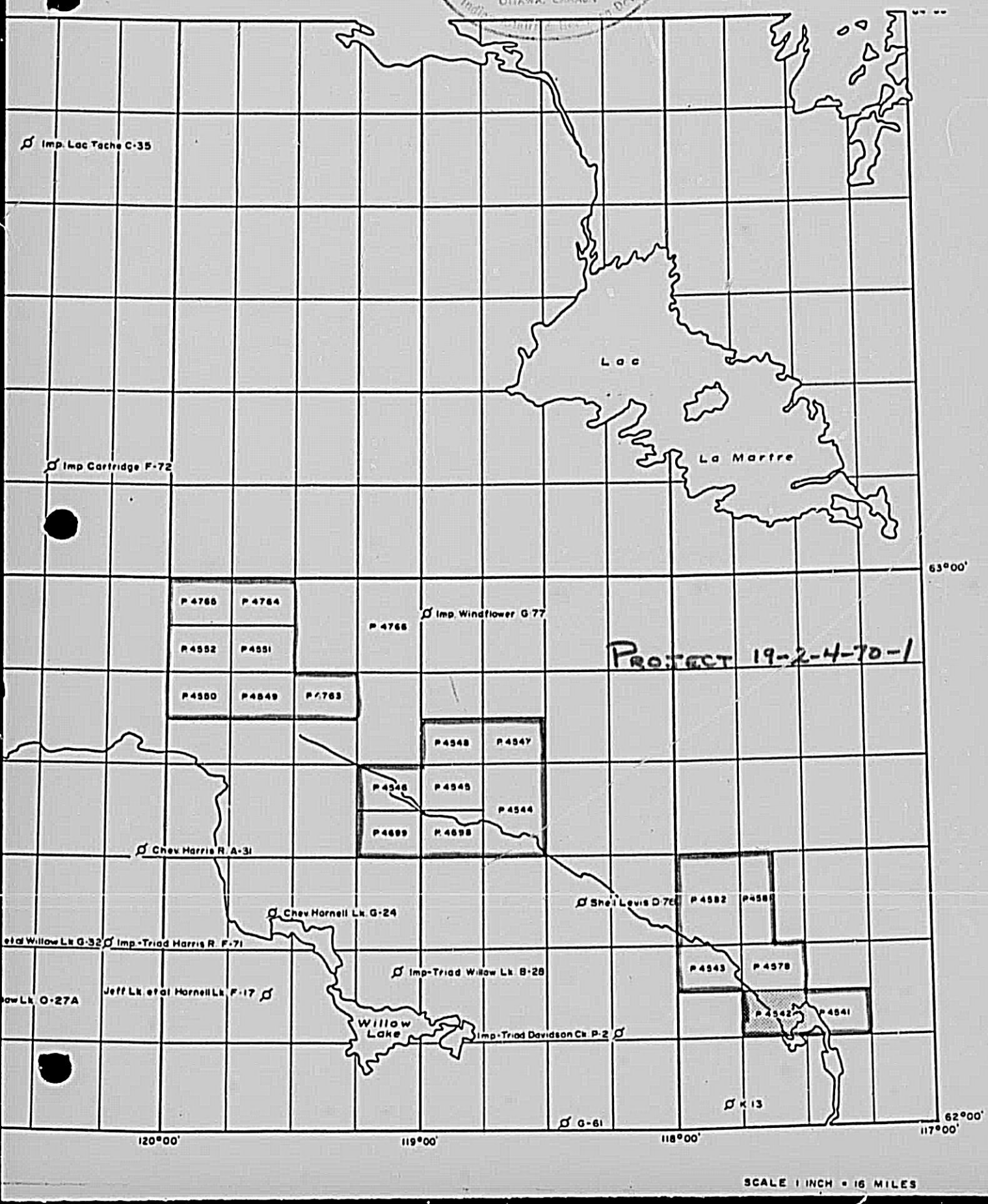
Geologically the picture is consistent with that of a reasonably uniform southwest-dipping basement surface interrupted by two strike-ridges of slightly harder rocks and by an erosional remanent of hard, basic basement rock which had been intruded into the surrounding more acidic rocks.

There is no strong evidence of significant faulting. As you know, there is no information bearing on the sedimentary rocks to be gained from a magnetic survey of this sensitivity.

Yours very truly,

R. B. Galeski, P. Geoph.

OIL & GAS OPERATIONS UNIT
Oil and Mineral Division
MAR 19 1973
OTTAWA, CANADA
Dept. of Indian Affairs and Northern Development



SCALE 1 INCH = 16 MILES

Book Copy

Permit No. 4542

lot

Work Copy

ermit No. 4542

Permit No. 4541

117°30'

117°15'

62°15'

62°10'

117°30'

117°15'

2100

1800

1350

1300

2250

2400

1160

1300

1910

800

1515

1570

1750

WESTERN DECALTA PETROLEUM LTD.

MAGNETIC DEPTH POINTS (OVERLAY)

FAWN LAKE AREA

SCALE 1" = 2640 DECEMBER 1970

AIRBORNE
GRAVITY & SEISMIC SERVICES LTD.

2 of 2