MAR 19680009: BOUNDARY LAKE

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GEOLOGICAL REPORT

ON

BOUNDARY LAKE SILVER PROSPECT

ALBERTA

PREPARED FOR

McGREGOR TELEPHONE AND POWER CONSTRUCTION CO.

BY:

[redacted]

Orhan Baykal, P. Eng. P. Geol.

GEOLOGICAL REPORT

ON

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INTRODUCTION:

This report outlines the geology of the Boundary Lake area, with particular emphasis to Township 86 Range 13 W6.

The purpose of this study was to investigate the occurence of silver in the cores of the Pan-Am 10E A-3 Willow 11-35 well, located in Lsd. 11-35-86-13 W6 Meridian, and to relate this occurence to the geology, structural pattern and tectonic framework of the area.

RECOMMENDATIONS:

The presence of silver at a depth of about 3900 ft. in the Pan-Am #11-35 well (86-13 W6), suggest a possible zone of mineralization along the Boundary Lake fault. The extent and the quality of mineralization should be ascertained by investigating either the trace of the fault or by studying the mineralization that may have taken place in wells cut by the fault in the Boundary Lake field.

The investigation of the fault trace could be done by geochemical and/or by drilling shallow test holes (200-300 ft. deep) in the vicinity of the fault zone. In addition to the above work a geomagnetic survey which will outline and define the fault trace can be recommended.

In order to ascertain the extent of mineralization that may be associated with this fault, it may also prove useful to study the wells that have been cut by this fault in the Boundary Lake field.

GEOLOGY:

The description of the full stratigraphic section of the area is beyond the scope of this study. However, the formation pertaining to the silver occurence will be outlined.

The Gething formation where the silver occurs, is 110 to 116 feet thick and is composed of interbedded sandstone and shale. (Figure 2). The shale is dark grey and silty and the sandstone is brownish-grey, medium to fine-grained, silty and argillaceous. The sandstone is composed of sub-angular quartz grains inbedded in quartzitic matrix.

This section was cored between 3880 and 3920 for a total of 40 feet. The cores were examined, and out of a cut length of 40 feet only a maximum of 20 feet of core were present in four $2\frac{1}{2}$ feet long core-boxes.

The following is a brief description of the cores:

Box #1- 3880-3890, 30% recovery:

3880-85: Shale, black, silty, carbonaceous.

3885-90: Sandstone, (only one foot was present), greyish, fine to medium grained, argillaceous, slightly oil stained. Fractures

filled with dried hyrocarbons. Very fine mineralization consisting of pyrite and possibly silver.

Box # 2- 3890-3900, 50% recovery:

3890-92: Shale, dark grey, silty, carbonaceous.

3892-93: Sandstone, greyish to brownish-grey, medium grained, grading to silty shale. Poor to fair porosity. Very fine mineralization.

3893-95: Sandstone, dark grey, fine grained carbonaceous, argillaceous, with some dried hyrocarbon residue present in fractures. The sandstone grades into silty dark grey carbonaceous shale. Mineralization consists of very finely disseminated silver that occurs also in clusters.

3895-3900: Shale, dark grey to black, conchoidal fractures.

Box # 3- 3900-3910, 50% recovery:

3900-03: Shale, dark grey to black, conchoidal fracture.

3903-10: Sandstone, brownish-grey, medium-grained consisting of sub-angular quartz grains, slightly argillaceous and oil stained, grades into poorly consolidated, easily crumbled rock. Porosity, medium to fair. Trace of very fine mineralization disseminated through the rock.

Box # 4- 3910-3920, 40% recovery-Fernie:

3910-17: Shale, dark brown,finely laminated and very heavily slickensided.

3917-20: Siltstone, grey, medium grained, with thin dried hyrocarbon residue injected along bedding plane. Very finely disseminated mineralization.

According to the core, the top of the Fernie can be placed 3910 feet. According to "E" log the top is at 3905 feet. Consequently there is a five foot difference between log and core.

On the basis of slickensides, the fault occurs either in the uppermost part of the Fernie formation or in the lower part of the Gething formation. Considering the cores and "E" log correlation the fault is thought to cut this well at a depth of 3904 feet. (Figure 2).

STRUCTURAL GEOLOGY:

To depict and trace the faults that are present in this area, the Triassic Baldonnel formation (found about 200 feet below the Fernie formation) was used and structural contour lines were drawn on top of this horizon. (Figure 1). In order to have a clear conception of the fault trace, the Boundary Lake field was studied and the fault line drawn

through it in accordance with well date. Furthermore, the logs of all wells in Township 86-13 W6 have been studied, compared and the formational tops recorded in Figure 3.

Two major normal faults appear to be present in this area. The Northern fault, called the Worsley fault, extends in an East-Northeasterly direction and has a throw of about 50 feet, and dips 60-70° to the North. (Figure 1). The second fault, the Boundary Lake fault, cuts across the Boundary Lake field and extends through Township 86 Range 13 W6, in a Northeasterly direction, and dips 60-70° to the Northwest. The throw of this normal fault varies along the strike. In the Southwestern portion of the map-area (figure 1); the throw is almost 100 feet. However, in the Southwestern corner of Township 86 Range 13 W6, the throw is about 30 to 40 feet and in the vicinity of the Pan-Am 11-35 well (86-13 W6) the throw is approximately 50 feet. Along this fault, the downthrown block is Northwest of the fault line.

This fault cuts both the Pan-Am 11-35 and 6-27 (86-13 W6) wells. In the Pan-Am 11-35 well, where the basal portion of the Gething appears to be missing. The fault cuts the well at a depth of about 3904 feet just above the Fernie, and at the base of the Gething formation causing this formation to have a shortened section (figure 3) by about 30 feet. In the Pan-Am 6-27 well, the fault appears

to occur within the Notikewin Formation. The fault has shortened this section by about 23 feet. (Figure 3).

ECONOMIC GEOLOGY:

Mineralization consisting of very finely disseminated silver and pyrite can be seen in the cores of the Pan-Am #11-35 well. This mineralization is directly related to the fault which occurs in this well at a depth of about 3904 feet.

The faults present in this area appear to be deep seated, probably cutting the basement. The mineralized solutions have moved along these fracture planes causing deposition of minerals along the faults. Consequently, in the Pan-Am #11-35 well, the unfaulted section above the Gething has little possibility of being mineralized.

With a dip of about 60° to 70° to the northwest the surface trace of the fault can be expected to occur approximately 1500 to 2300 feet southeast of the well. If this venture is to be pursued further it may be advantageous to attempt to locate the fault trace and test for mineralization.

SUMMARY AND CONCLUSION:

Mineralization has been accountered in the core of the Pan-Am #11-35 well located in 11-35-86-13 W6. This mineralization consists mostly of silver with minor amount of pyrite.

The mineralization is related to faulting and it is thought that the Boundary Lake fault is responible for the mineral occurance in the Pan-Am # 11-35 well.

The extent of mineralization along the strike and and the dip of the fault is not known. This will have to be determined either by drilling or by studying the wells located along the strike of the fault in the Boundary Lake field.

Respectfully Submitted

[redacted]

Orhan Baykal, P. Eng., P. Geol.

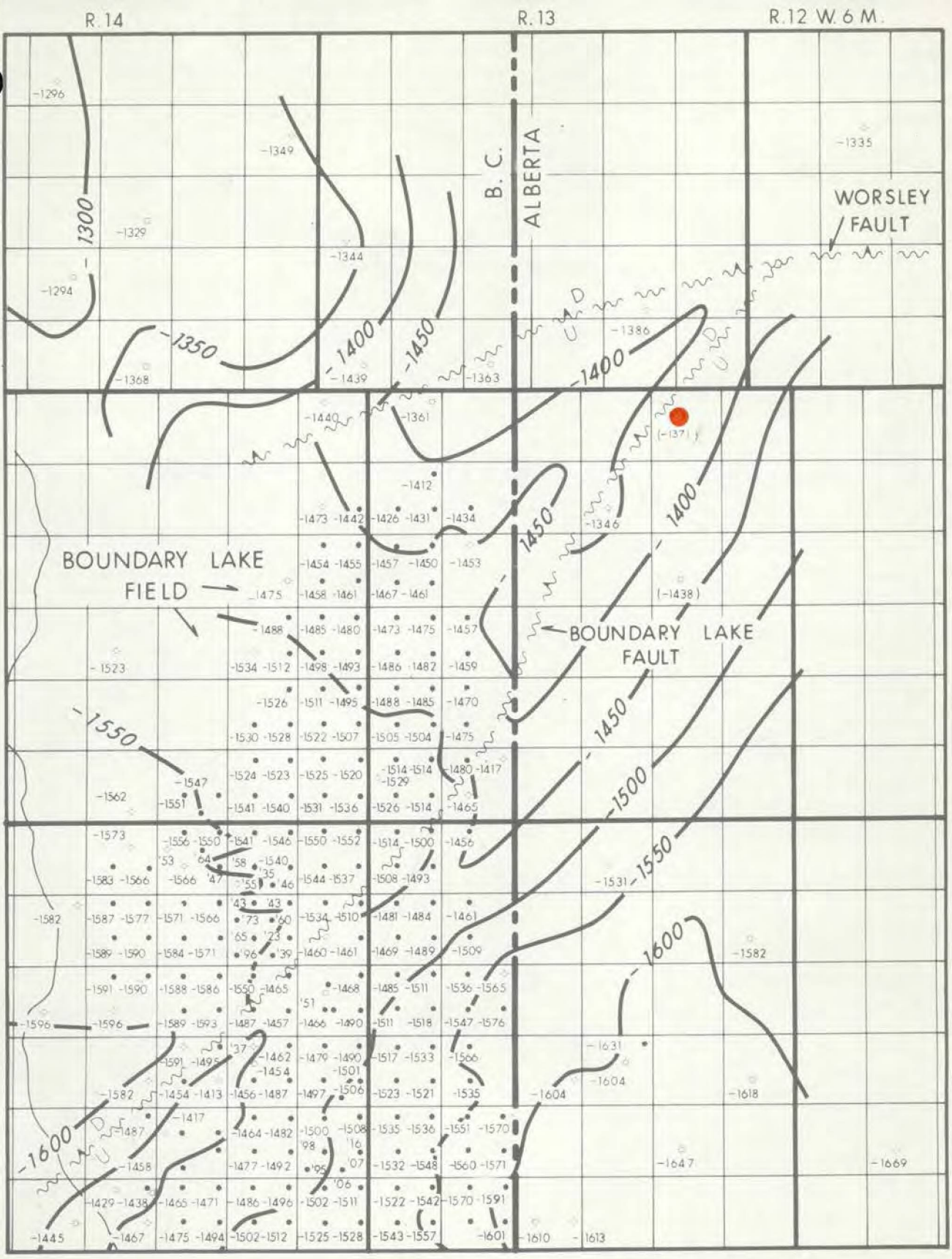


FIGURE 1

STRUCTURE OF THE BALDONNEL

LEGEND

Fault Line
Arrow pointing to direction of dip.

Contour Interval : 50 Feet

Scale : 1" to 2 miles

O. BAYKAL, P. Eng., P. Geol. Oct. 1967

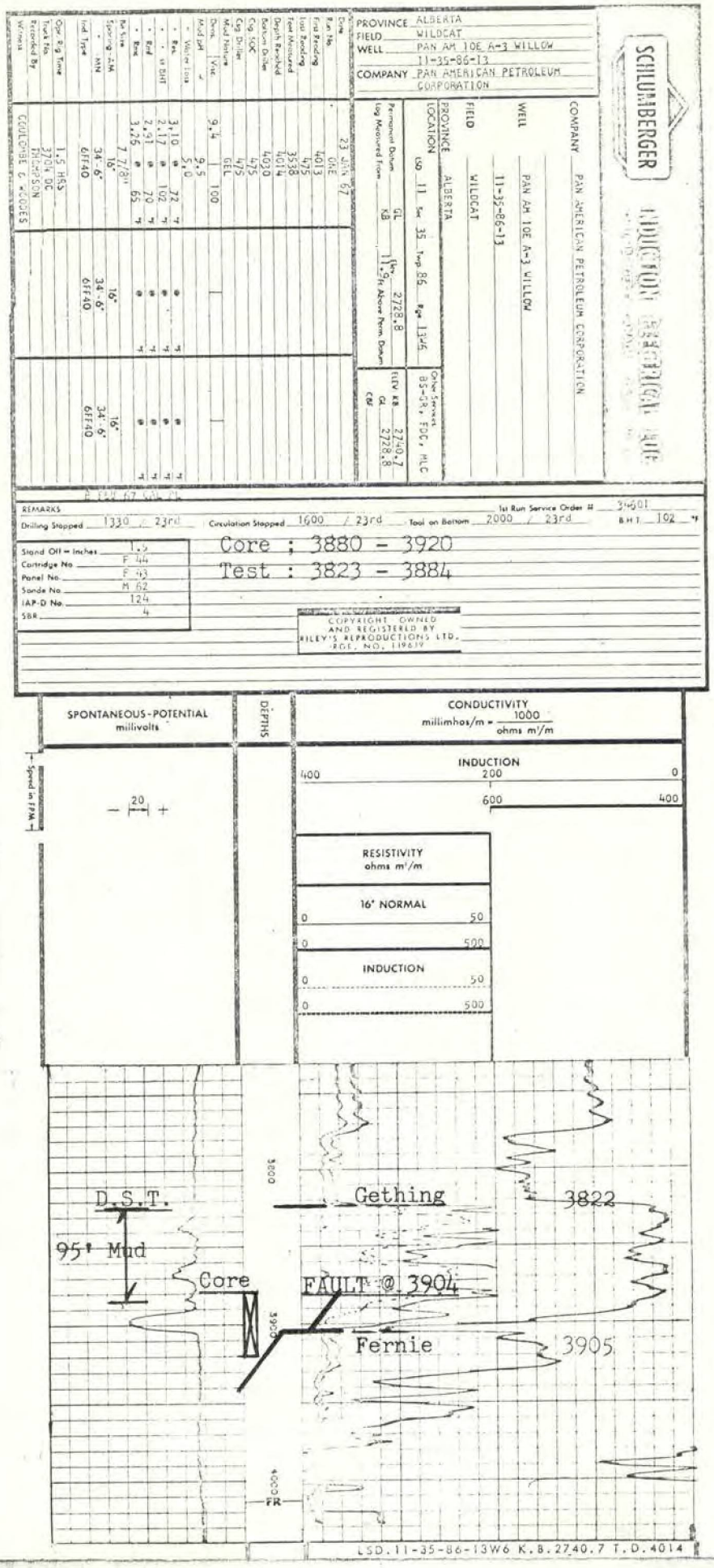

SCHLUMBERGER
INDUCTION ELECTRICAL LOG
PROVINCE ALBERTA
FIELD WILDCAT
WELL PAN AM IOE A-3 WILLOW
11-35-86-13
COMPANY PAN AMERICAN PETROLEUM CORPORATION
COMPANY PAN AMERICAN PETROLEUM CORPORATION
WELL PAN AM IOE A-3 WILLOW
11-35-86-13
FIELD WILDCAT
PROVINCE ALBERTA
LOCATION LSD 11 Sec 35 Twp 86 Rge 13W6
Permanent Datum GL KB
Log Measured from KB 11.9 Ft Above Perm Datum
2728.8
ELEV KB 2740.7
GL 2728.8
Other Services BS-GR, FDC, MLC
Date 23 JAN 67
Run No ONE
Depth-Driller 4013
Depth-Logger 4015
Bottom Logged Interval 4014
Top Logged Interval 3538
Type Fluid in Hole GEL
Salinity, PPM Cl 475
Density 9.4
Level FULL
Max. Rec. Temp. Deg. F 100
Operating Rig Time 1.5 HRS
Recorded By THOMPSON
Witnessed By COULOMBE & MOORES
REMARKS
Drilling Started 1330 / 23rd
Circulation Stopped 1600 / 23rd
Tool on Bottom 2000 / 23rd
1st Run Service Order # 34601
BHT 102 °F
Stand Off = Inches 1.5
Cartridge No. F 44
Panel No. F 43
Sonde No. M 62
IAP-D No. 124
SBR 4
Core : 3880 - 3920
Test : 3823 - 3884
COPYRIGHT OWNED AND REGISTERED BY RILEY'S REPRODUCTIONS LTD. REG. NO. 119619
SPONTANEOUS-POTENTIAL millivolts
DEPTHS
CONDUCTIVITY millimhos/m = 1000 / ohms m²/m
INDUCTION
RESISTIVITY ohms m²/m
16" NORMAL
INDUCTION
D.S.T.
95' Mud
Core
Gething
3822
FAULT @ 3904
Fernie
3905
LSD.11-35-86-13W6 K.B.2740.7 T.D.4014

FIGURE 2

LOCATION	KB	Fm. Base Fish scale			Fm. Cadotte			Fm. Notikewin			Fm. Gething			Fm. Fernie		
		top	elev.	isop.	top	elev.	isop.	top	elev.	isop.	top	elev.	isop.	top	elev.	isop.
11-35-86-13 W6	2741	1974	+767	706	2680	+61	186	2866	-125	956	3822	-1081	83*	3905	-1164	
6-27-86-13 W6	2686	~~1890~~	+796	705	2595	+91	187	2782	-96	941*	3723	-1037	110	3833	-1147	
6-23-86-13 W6	2562	1815	+747	697	2512	+50	196	2708	-146	964	3672	-1110	116	3788	-1226	

Form 110 Geological Data Sheet.

FIGURE 3

19680009

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

14240 - 115 Avenue, Edmonton 42, Alberta.

November 8, 1968

Mr. M. Curcio
McGregor Telephone & Power Construction Co. Ltd.,
P.O. Box 4505,
Edmonton, Alberta.

Re: Laboratory Report Number: C68-4202
C68-4202-1-A (Small rock)
C68-4202-2-A (Large rock)

Dear Sir:

As per your request, we assayed the two samples described above for silver but as you will note from the following assays they are very low.

Sample #	Silver Content in oz./ton
1A (small rock)	< 0.03
2A (large rock)	< 0.03

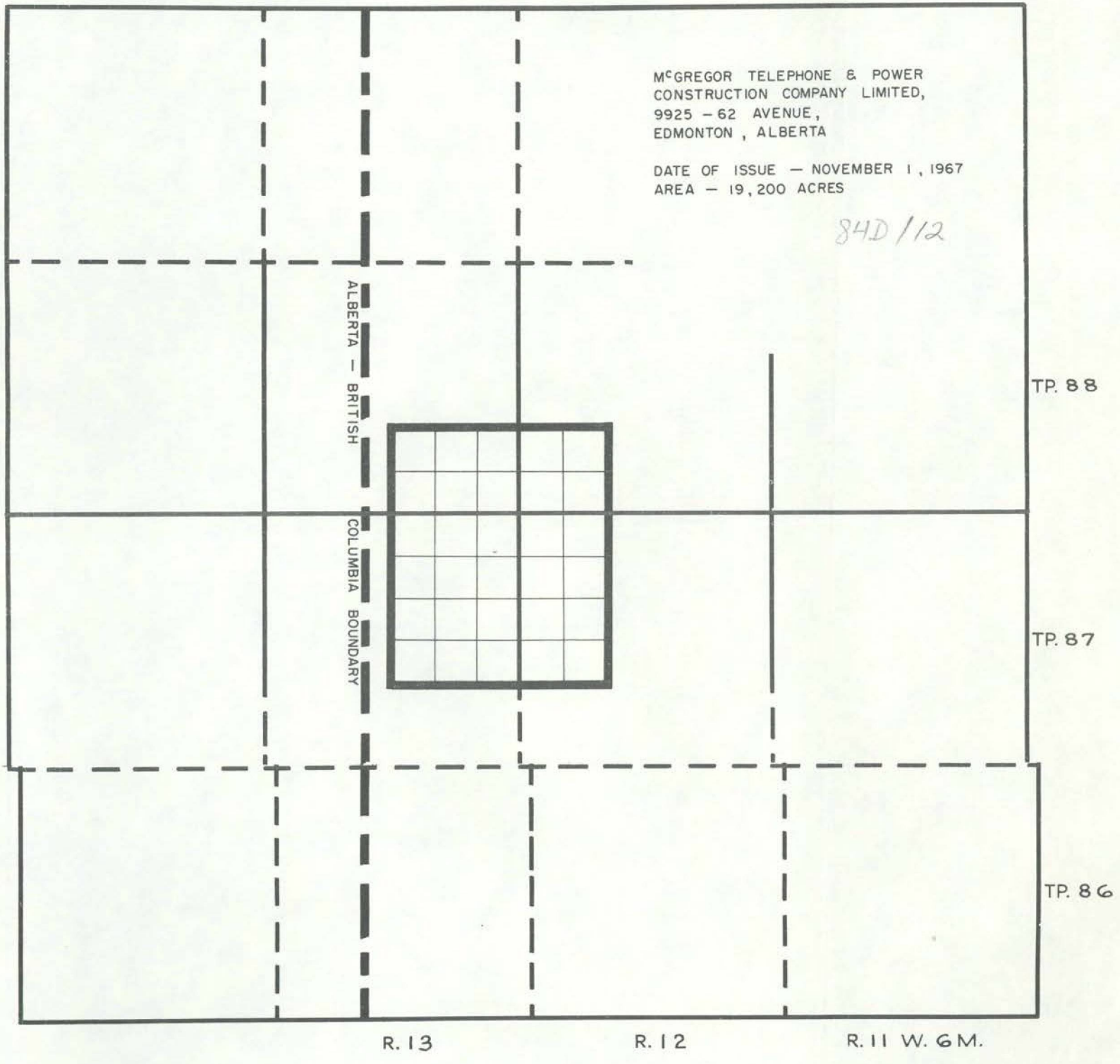
Yours truly,

CHEMICAL & GEOLOGICAL LABORATORIES LTD.

[redacted]

W.M. Morrison

QUARTZ MINERAL EXPLORATION PERMIT No. 35



19680009 #1

LSD. 6-27-86-13W6 K.B.2686 T.D.4567

A Riley's REPRODUCTION

CATALOGUE NO.: 83160 E-B

SCHLUMBERGER INDUCTION ELECTRICAL LOG

SCHLUMBERGER OF CANADA — Calgary, Alberta

PROVINCE: ALBERTA
FIELD: WILDCAT
PAN AM I.O.E. A-1
WILLOW 6-27-86-13
COMPANY: PAN AMERICAN PETROLEUM CORPORATION

COMPANY: PAN AMERICAN PETROLEUM CORPORATION
WELL: PAN AM I.O.E. A-1 WILLOW 6-27-86-13
FIELD: WILDCAT
PROVINCE: ALBERTA
LOCATION: LSD 6 Sec. 27 Twp. 86 Rge. 13W6
Permanent Datum: GL
Log Measured From: KB — Ft. Above Perm. Datum
Other Services: SGR-C
ELEV. KB 2686
GL
DF

Date	25MAR64
Run No.	ONE
First reading	4566
Last reading	522
Feet measured	4044
Depth reached	4567
Bottom Driller	4565
Csg. Driller	522
Csg. SOC	523
Mud Nature	GEL-CHEM
Dens. / Visc.	9.9 / 100
Mud pH	9.5
Water Loss	13.0
Rm	.98 @ 80 °F
Rm @ BHT	.74 @ 106 °F
Rmf	.68 @ 80 °F
Rmc	1.58 @ 78 °F
Bit Size	7 7/8"
Spacing - AM	16"
Spacing - MN	34'6"
Ind. Type	6FF40
Opr. Rig Time	2 HOURS
Truck No.	3704 - DC
Recorded By	ARMBRUSTER
Witness	MCILHARGEY

AV/31/3/64/DC JMH

REMARKS — B.H.T. ___ °F Measured ___

Stand Off = 1.5 Inches
Cartridge No. F-93
Panel No. F-241
Sonde No. M-53
IAP D No. 267
SBR 4

SPONTANEOUS-POTENTIAL millivolts	DEPTHS	CONDUCTIVITY millimhos/m = 1000 / ohms m²/m
20 (− +)		INDUCTION: 400 — 200 — 0; 600 — 400
		RESISTIVITY — ohms m²/m. 16" NORMAL: 0 — 50; 0 — 500. INDUCTION: 0 — 50; 0 — 500

SPONTANEOUS-POTENTIAL millivolts	DEPTHS	CONDUCTIVITY millimhos/m = 1000 / ohms m²/m
20		16" NORMAL: 0 — 50; 0 — 500. INDUCTION: 0 — 50; 0 — 500. RESISTIVITY — ohms m²/m
		INDUCTION: 400 — 200 — 0; 600 — 400

DETAIL LOG
5" = 100'

SPONTANEOUS-POTENTIAL millivolts	DEPTHS	CONDUCTIVITY millimhos/m = 1000 / ohms m²/m
20		INDUCTION: 400 — 200 — 0; 600 — 400

RESISTIVITY

1966000009 #2

LSD.6-23-86-13W6 K.B.2562 T.D.3947

DATA SECTION INFORMATION NOT AVAILABLE AT TIME OF LOG RELEASE

A RILEY'S REPRODUCTION

CATALOGUE NO.: 87317 G-B

SCHLUMBERGER INDUCTION ELECTRICAL LOG

SCHLUMBERGER OF CANADA Calgary, Alberta

PROVINCE ALBERTA
FIELD WILDCAT
WELL PAN AM IOE A-2 WILLOW 6-23-86-13
COMPANY PAN AMERICAN PETROLEUM CORPORATION

COMPANY PAN AMERICAN PETROLEUM CORPORATION
WELL PAN AM IOE A-2 WILLOW 6-23-86-13
FIELD WILDCAT
PROVINCE ALBERTA
LOCATION LSD 6 Sec. 23 Twp. 86 Rge. 13W6
Other Services: SGR-C
Permanent Datum G.L. Elev. 2549
Log Measured From K.B. 13 Ft. Above Perm. Datum
ELEV. KB 2562
GL 2549
CBF

Date	NOV 21/64		
Run No.	ONE		
First reading	3946		
Last reading	468		
Feet measured	3478		
Depth reached	3947		
Bottom Driller	3950		
Csg. SOC	468		
Csg. Driller	468		
Mud Nature	GEL CHEM		
Dens. / Visc.	9.9 / 80		
Mud pH	9.0		
Water Loss	8.8		
" Res.	* @ * °F	@ °F	@ °F
" " @ BHT	* @ * °F	@ °F	@ °F
" Rmf	2.10 @ 70 °F	@ °F	@ °F
" Rmc	2.90 @ 70 °F	@ °F	@ °F
Bit Size	7 7/8"		
Spacing - AM	16"	16"	16"
- MN	34'6"		
Ind. Type	6FF40		
Opr. Rig Time	4 HRS. BRIDGED TWICE		
Truck No.	3703 DC		
Recorded By	MILLS		
Witness	SAMIS		

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NOV 27/64 CAL EH

REMARKS

1st Run Service Order # 24419

Drilling Stopped 12:00 Hrs. Circulation Stopped 15:30 & 21:30 & 04:30 Hrs. Tool on Bottom 17:30 & 24:00 & 07:00 Hrs. B.H.T. 120 °F

Stand Off = 1½ Inches
Cartridge No. G-392
Panel No. F-160
Sonde No. K-286
IAP-D No. 204
SBR 4

RM @ ½ HR CIRC = 3.01 @ 65°;= 1.63 @ BHT
RM @ 1 HR CIRC =2.35 @ 69°;= 1.35 @ BHT
RM @ 1½ HR CIRC = 2.53 @ 67°;= 1.41 @ BHT

DST #1 RTF = 0.551 @ 69°F (MIDDLE)
= 0.463 @ 70°F (BOTTOM)

SPONTANEOUS-POTENTIAL millivolts | DEPTHS | CONDUCTIVITY millimhos/m = 1000/ohms m²/m

− 10 +

INDUCTION 400 200 0; 600 400

RESISTIVITY − ohms m²/m

16" NORMAL 0 50; 0 500

INDUCTION 0 50; 0 500

LSD.6-23-86-13W6 K.B.2562

16" NORMAL 0 50; 0 500

INDUCTION 0 50; 0 500

RESISTIVITY − ohms m²/m

INDUCTION 400 200 0; 600 400

10 − +

SPONTANEOUS-POTENTIAL millivolts | DEPTHS | CONDUCTIVITY millimhos/m = 1000/ohms m²/m

DETAIL LOG 5" = 100'

SPONTANEOUS-POTENTIAL millivolts | DEPTHS | CONDUCTIVITY millimhos/m = 1000/ohms m²/m

10 − +

INDUCTION 400 200 0; 600 400

RESISTIVITY − ohms m²/m

16" NORMAL 0 50; 0 500

INDUCTION 0 50

LSD. 11-35-86-13W6 K.B. 2740.7 T.D. 4014

A 19680009 #3 REPRODUCTION

CATALOGUE NO.: 107290 E(B)

SCHLUMBERGER INDUCTION ELECTRICAL LOG

SCHLUMBERGER OF CANADA Calgary, Alberta

PROVINCE ALBERTA
FIELD WILDCAT
WELL PAN AM 10E A-3 WILLOW 11-35-86-13
COMPANY PAN AMERICAN PETROLEUM CORPORATION

COMPANY PAN AMERICAN PETROLEUM CORPORATION
WELL PAN AM 10E A-3 WILLOW 11-35-86-13
FIELD WILDCAT
PROVINCE ALBERTA
LOCATION LSD 11 Sec 35 Twp 86 Rge 13W6
Other Services: BS-GR, FDC, MLC
Permanent Datum GL Elev. 2728.8
Log Measured From KB 11.9 Ft. Above Perm. Datum
ELEV KB 2740.7
GL 2728.8
DF

Date	23 JAN 67		
Run No.	ONE		
First Reading	4013		
Last Reading	475		
Feet Measured	3538		
Depth Reached	4014		
Bottom Driller	4030		
Csg. SOC	475		
Csg. Driller	475		
Mud Nature	GEL		
Dens. / Visc.	9.4 / 100		
Mud pH	9.5		
Water Loss	5.0		
Res.	3.10 @ 72 °F	@ °F	@ °F
Res. @ BHT	2.17 @ 102 °F	@ °F	@ °F
Rmf	2.91 @ 70 °F	@ °F	@ °F
Rmc	3.26 @ 65 °F	@ °F	@ °F
Bit Size	7 7/8"		
Spacing - AM	16"	16"	16"
- MN	34'-6"	34'-6"	34'-6"
Ind. Type	6FF40	6FF40	6FF40
Opr. Rig Time	1.5 HRS		
Truck No.	3704 DC		
Recorded By	THOMPSON		
Witness	COULOMBE & WOODES		

8 FEB 67 CAL PL

REMARKS

Drilling Stopped 1330 / 23rd ; Circulation Stopped 1600 / 23rd ; Tool on Bottom 2000 / 23rd ; 1st Run Service Order # 34601 B.H.T. 102 °F

Stand Off – Inches	1.5
Cartridge No.	F 44
Panel No.	F 43
Sonde No.	M 62
IAP-D No.	124
SBR	4

SPONTANEOUS-POTENTIAL millivolts — 20 +
Speed in FPM
DEPTHS
CONDUCTIVITY millimhos/m = 1000 / ohms m²/m
INDUCTION 400 200 0; 600 400
RESISTIVITY ohms m²/m
16" NORMAL 0 50; 0 500
INDUCTION 0 50; 0 500

LSD. 11-35-86-13W6 K.B. 2740.7 T.D. 4014

INDUCTION 0 50; 0 500
16" NORMAL 0 50; 0 500
RESISTIVITY ohms m²/m
INDUCTION 400 200 0; 600 400
SPONTANEOUS-POTENTIAL millivolts — 20 +
DEPTHS
CONDUCTIVITY millimhos/m = 1000 / ohms m²/m

DETAIL LOG 5" = 100' → (B)

SPONTANEOUS-POTENTIAL millivolts — 20 +
Speed in FPM
DEPTHS
CONDUCTIVITY millimhos/m = 1000 / ohms m²/m
INDUCTION 400 200 0; 600 400
RESISTIVITY ohms m²/m
16" NORMAL 0 50; 0 500
INDUCTION 0 50; 0 500