

19-1-4-23

REPORT ON THE SURFACE GEOLOGY OF  
PERMITS 4541-4552, 4698 and 4699  
HORN MTN. AREA - N.W.T.

Western Decalta Petroleum Limited

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REPORT ON THE SURFACE GEOLOGY OF  
PERMITS 4541-4522, 4698 and 4699

HORN MOUNTAIN AREA  
NORTHWEST TERRITORIES



A.M. PATTERSON, P.Eng.

Western Decalta Petroleum Limited  
Calgary, Alberta  
June 1966

*A.M. Patterson*

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REPORT ON THE SURFACE GEOLOGY OF  
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HORN MTN. AREA - N.W.T.

This report embodies the results of field work conducted in the Horn Mountain area from May 21, to May 27, incl. From May 25 on, the writer was accompanied by Mr. Allan Warburton.

The major flight routes and stations are shown on Figure 1. Reference is made throughout the report to these station numbers.

STRATIGRAPHY

Detailed discussions of the stratigraphy are contained in the various Geological Survey of Canada publications covering the area. The discussions below are brief and pertain only to those facets which are pertinent to the properties and/or where the interpretation is at variance with previous work.

Pre-Cambrian

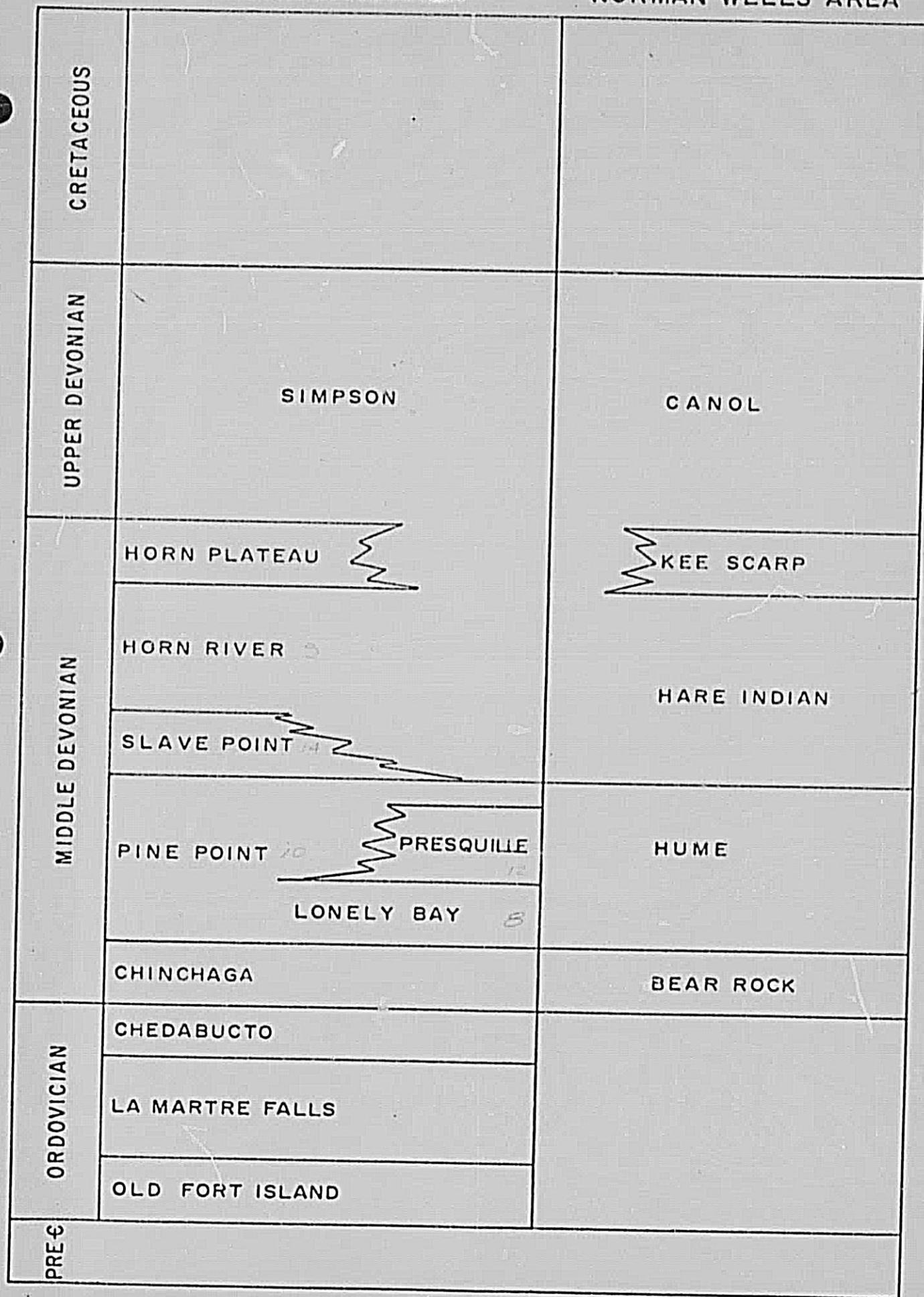
Pre-Cambrian granite and basic rocks were examined at Stations 18 and 19.

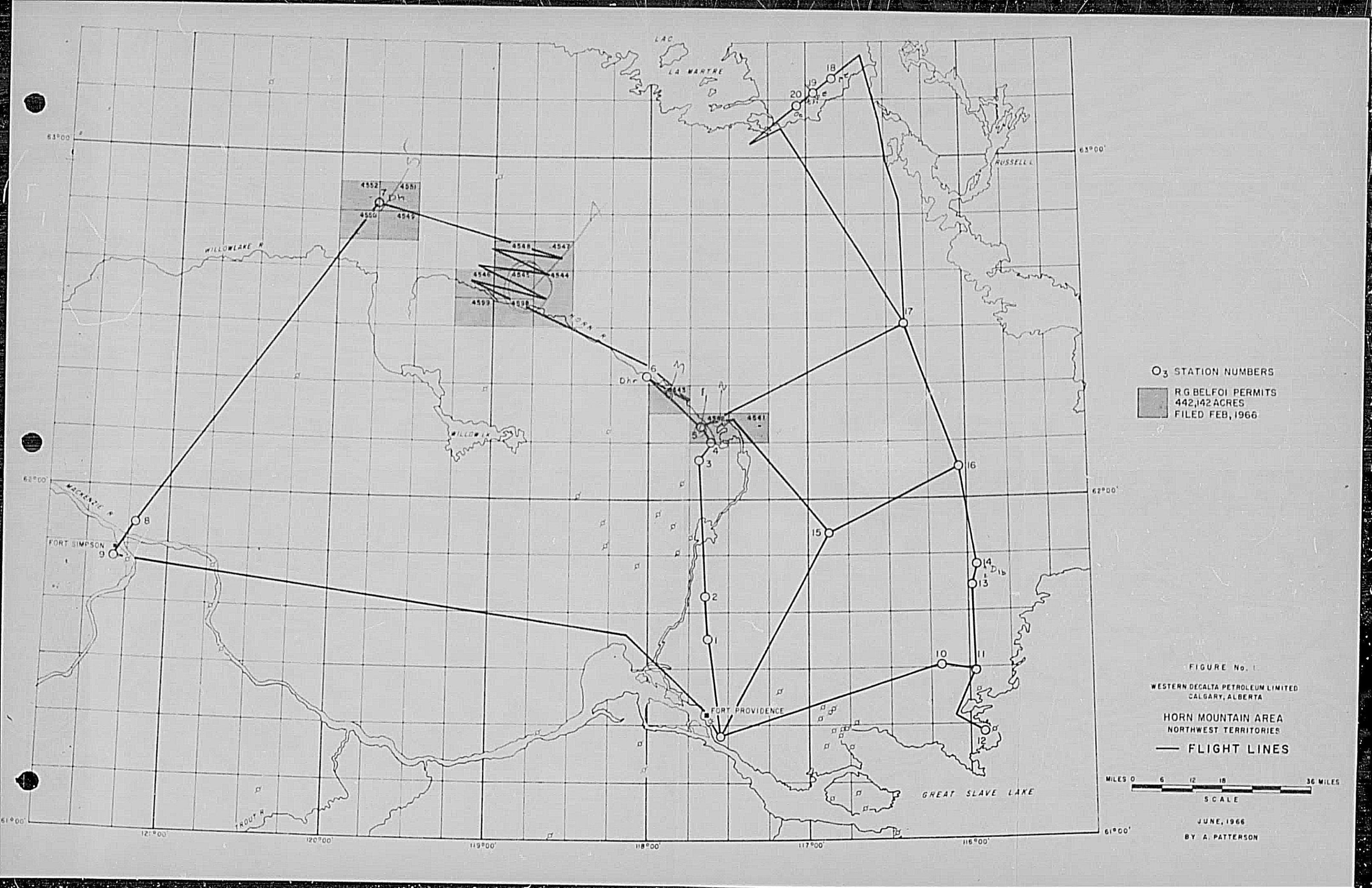
Ordovician ?

The Old Fort Island formation at Station 19 is composed of siliceous conglomeratic sandstone. Pebbles of granite up to one inch in diameter are in a matrix of poorly sorted, tight siliceous sandstone. The sand is well bedded in about two-inch beds. The beds being remarkably consistent despite the lack of sorting. The outcrop is on the side of a granite ridge and dips to the southeast at 20°.

## HORN MTN. AREA

## NORMAN WELLS AREA





### Ordovician

The Chedabucto formation at Station 20 was observed to dip to the southeast at about 5°.

### Middle Devonian Lonely Bay

Outcrops and near outcrops of Lonely Bay are common in the vicinity of Stations 13 and 14 where old beach lines are composed of angular fragments of fine-grained argillaceous limestone. Fossils from this limestone indicate early Pine Point age. This material is similar to the "reef base" at Windy Point and Prairie Lake.

### "Presquille"

The outcrops at Windy Bay and Prairie Lake were visited. These are the only outcrops of Presquille in the area. Cores from the various mining ventures at both areas were examined briefly. The outcrop is coarse-grained reefal dolomite; the cores are similar material, almost all oil stained. Oil seeps from the reef at Windy Bay. No mineralization was found except for some pyrite in the "reef base" (probably Lonely Bay) in Hole #E-23 at Prairie Lake. Some cored intervals were missing and none of the CM&S cores were on the site.

The glacial drift at Stations 1, 2 and 6 contained a high proportion of Presquille fragments and boulders. The original reef was obviously much more widespread than the present outcrop would indicate. See Figure 2. None of the Presquille glacial material showed mineralization, most fragments had a petroliferous odor when freshly broken.

### Slave Point

Fossils from the fine-grained limestone capping the west side of the Presquille at Prairie Lake indicated uppermost Pine Point to lowermost Slave Point age.

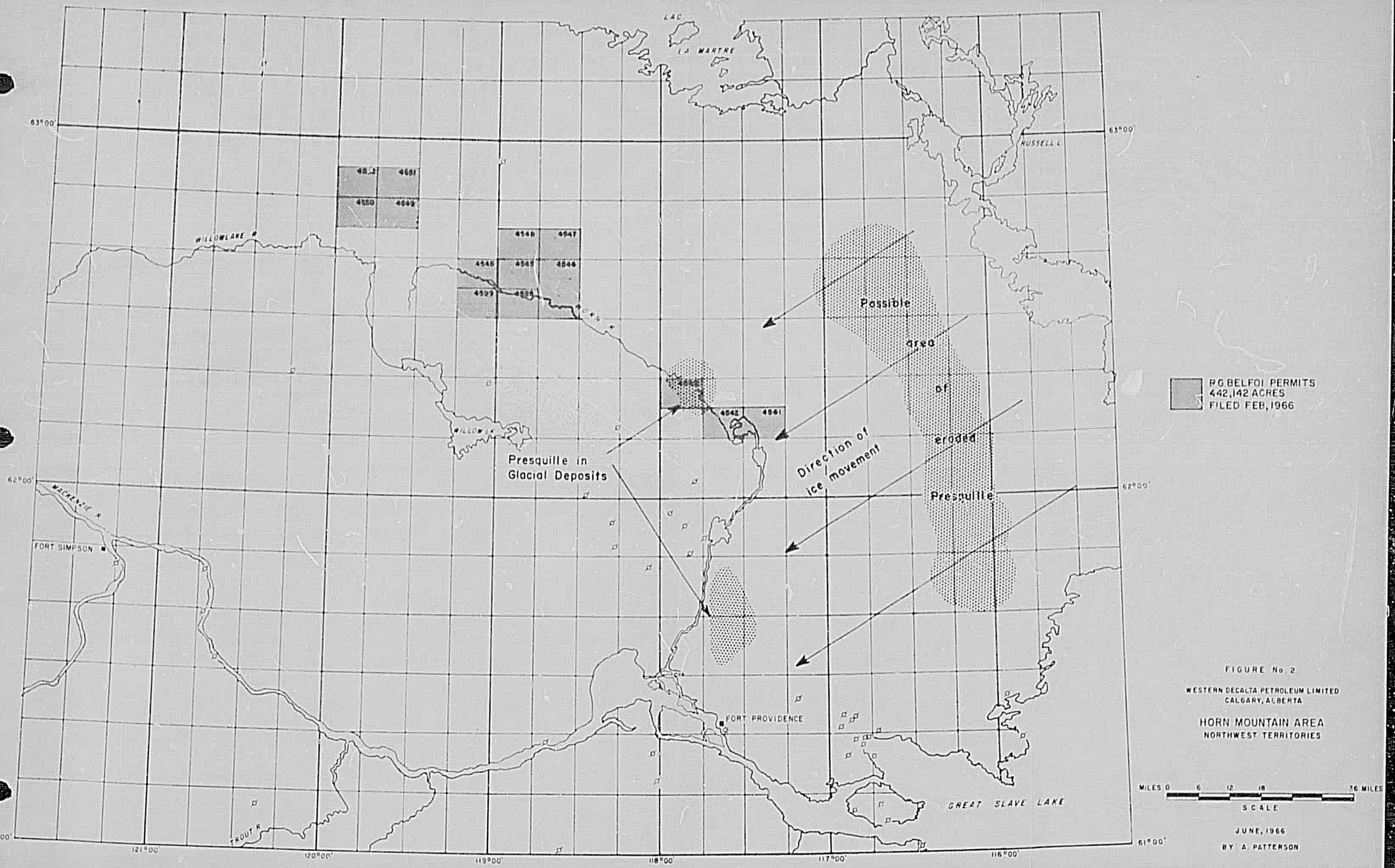




Plate I

Porous Presquille dolomite  
Windy Bay Station 12

Hume

An undulating outcrop of very fossiliferous limestone is exposed on Cline River at Station 7. About 20 feet of section are exposed. Fossils from this limestone indicate uppermost Hume age.

Horn River

Outcrops of the Horn River were examined at Station 6. About 50 feet of section are exposed. The shale is dark gray to black, rusty weathering, fissile to slaty. There are some thin interbeds of very fossiliferous, dark gray limestone having a very petroliferous odor when broken. The shale undulates with dips up to  $10^{\circ}$ . See Figure 6.

Horn Plateau

The Horn Plateau formation was examined at Station 3. It is a coarse-grained, porous coquina of corals and brachiopods with occasional trilobites. The dips reported by the G.S.C. were measured on outlying stacks of limestone, appearing to the writer as being slumped. The lack of valid dips



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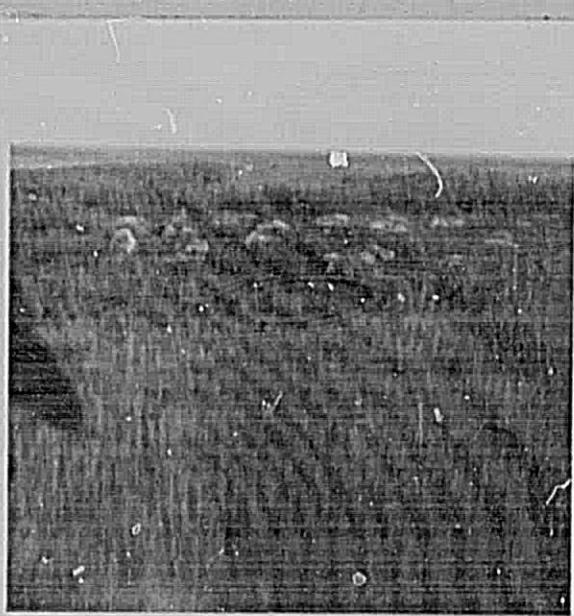


Plate II

Horn Plateau outcrop

Station 3

#### ACREAGE BLOCKS

##### Permits 4541, 4542 and 4543

These permits have taken on more than considerable interest as a result of the work done. Sulphur springs occur on Permits 4541 and 4542. See Figure 3. These springs are cold. They deposit a calcareous sinter, a gypsum deposit and a salty deposit along with a fair amount of sulphur precipitate. Samples from the westernmost two springs were taken for analyses along with samples of the salt, gypsum and sinter. Two samples of the water from these springs gave geochemical analyses as follows:

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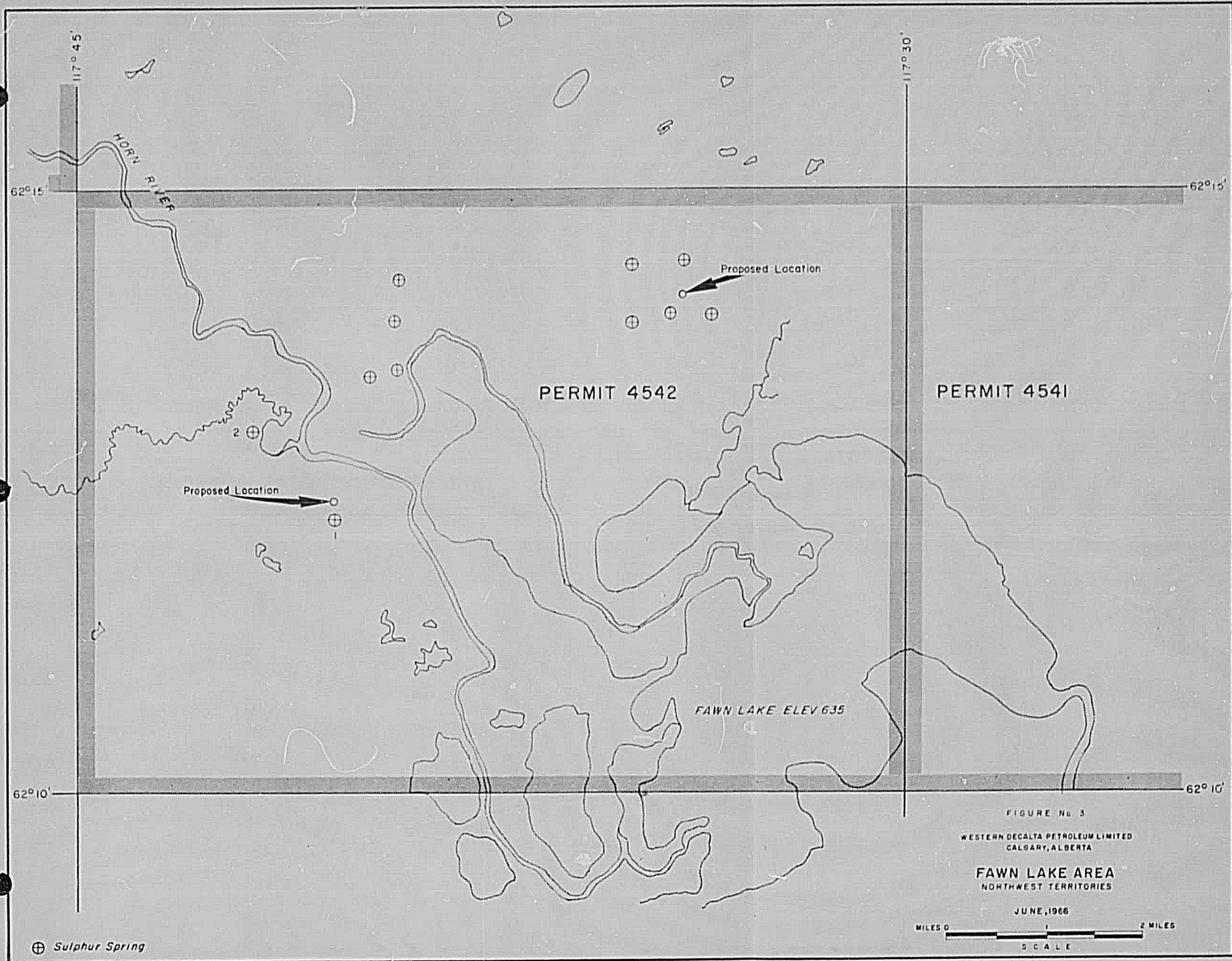


FIGURE NO. 3

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CALGARY, ALBERTA

FAWN LAKE AREA  
NORTHWEST TERRITORIES

JUNE, 1966

⊕ Sulphur Spring

Spring No. 1:

	<u>Sample 1</u>	<u>Sample 2</u>
Zn	0.15 PPM	0.06 PPM
Pb	0.06 PPM	0.06 PPM

Spring No. 2:

Zn	0.06 PPM	0.06 PPM
Pb	0.20 PPM	0.13 PPM

Solid samples from Spring No. 1 gave analyses as follows:

"Salt" sample: Zn 25.0 PPM  
Pb 25.0 PPM

Gypsum sample: Zn 15.0 PPM  
Pb 25.0 PPM

Calcareous sinter:

	<u>Sample 1</u>	<u>Sample 2</u>
Zn	50.0 PPM	20.0 PPM
Pb	25.0 PPM	25.0 PPM

These analyses are interpreted as indicating readings in the "high background" vicinity.



Plate III

Sulphur Spring No. 1 Station 4  
(White deposit in background is "salt" deposit.)

Spring No. 1:

	<u>Sample 1</u>	<u>Sample 2</u>
Zn	0.15 PPM	0.06 PPM
Pb	0.06 PPM	0.06 PPM

Spring No. 2:

**Zn** 0.06 PPM **Pb** 0.13 PPM

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"Salt" sample: Zn 25.0 PPM  
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Gypsum sample: Zn 15.0 PPM  
Pb 25.0 PPM

### Calcareous sinter:

<u>Sample 1</u>	<u>Sample 2</u>
Zn 50.0 PPM	20.0 PPM
Pb 25.0 PPM	25.0 PPM

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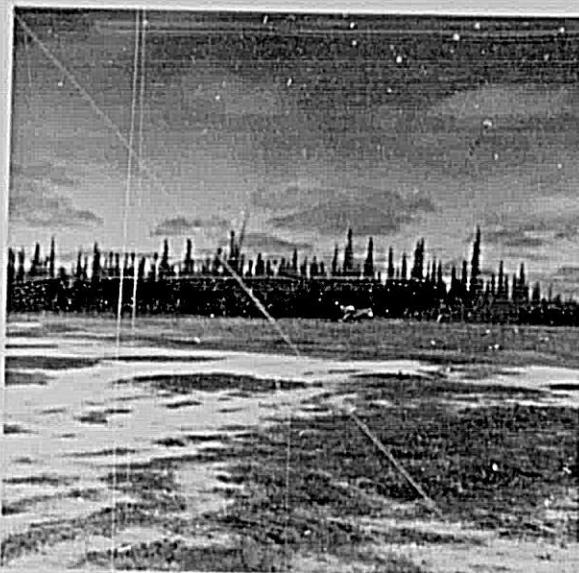


Plate III

Sulphur Spring No. 1 Station 4  
(White deposit in background is "salt" deposit.)

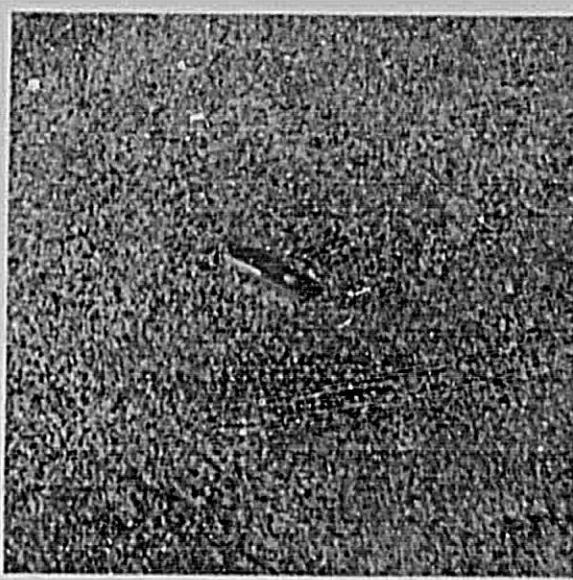


Plate IV

Gypsum crystals at Sulphur Spring #1  
Station 4

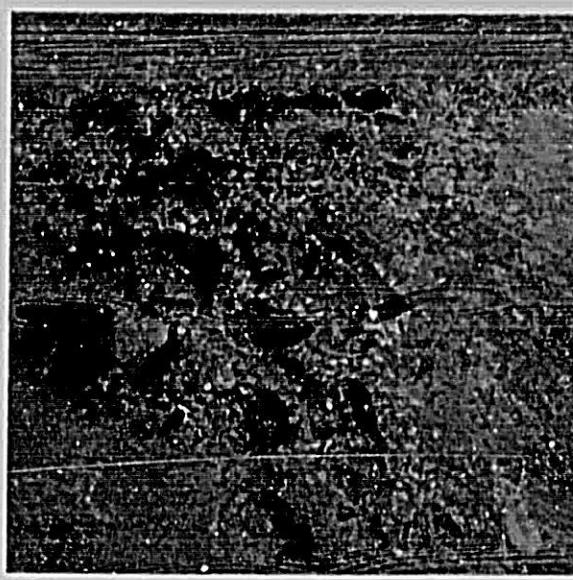


Plate V

Calcareous sinter at Sulphur Spring #1  
Station 4

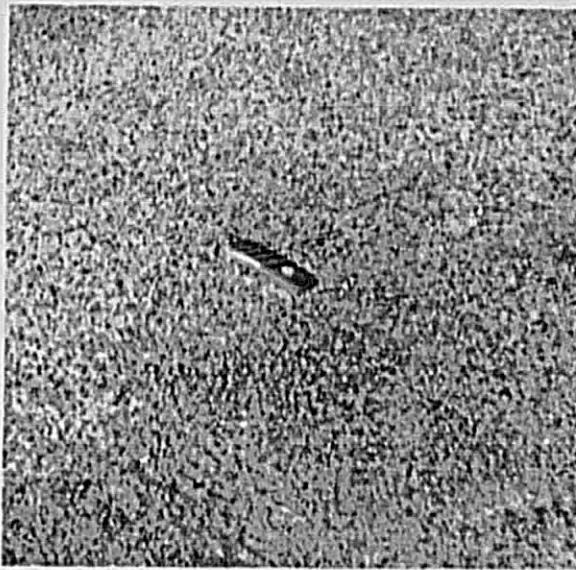


Plate IV

Gypsum crystals at Sulphur Spring #1  
Station 4

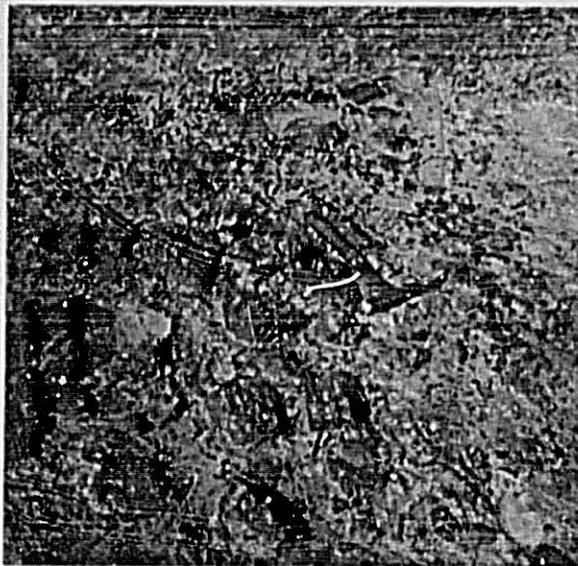


Plate V

Calcareous sinter at Sulphur Spring #1  
Station 4

These springs indicate the presence of a porous horizon in the shallow subsurface. The general trend of the springs being in a northeast direction, they may also indicate a fault. The porous horizon would presumably be a reef developed within the Horn River shale. It could possibly be a Presquille reef but present information would indicate that the Presquille would be too deep to yield cold water springs. The presence of a younger reef could, of course, be an indication that a deeper reef could indeed exist. If it did, the oil prospects in it would be excellent. The presence of the Horn Plateau reef, the presence of and the suggested lineal aspect to the sulphur springs and the fairly strong lineaments trending southwest on the air photos in the Fawn Lake area all may be indications of basement faulting.



Plate VI

Horn River shales at Station 6.  
Photo taken looking east, note south dip.

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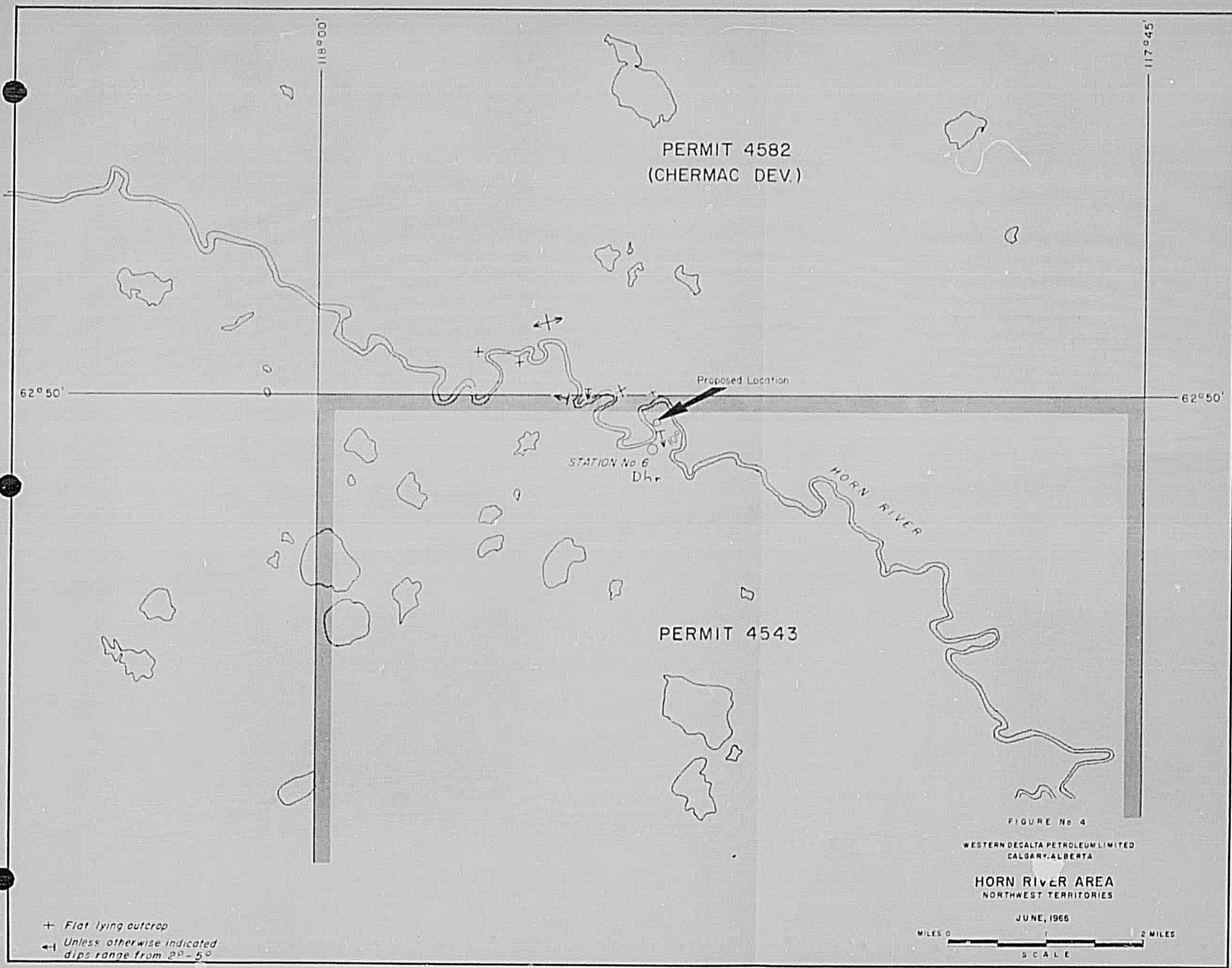
Horn River shales at Station 6.  
Photo taken looking east, note south dip.

The anomalous undulations in the Horn River shale outcrop on Permit 4543 (see Figure 4) have always been ascribed to crumpling as a result of glacial movement. The writer is not convinced of this. These undulations could very well be the result of drape over reefs. If such is the case, then excellent prospects for oil or minerals could exist under these permits. The lack of springs in the latter area could mean that the reef has not been breached in any way, thus enhancing the oil prospects. Before any drilling on this permit takes place, some sort of option should be made with Chermack Development on Permit 4582, lying north of our Permit 4543.

Permits 4544, 4548, 4698 and 4699

These permits were traversed in detail looking for outcrop. No outcrop exists on these permits. These permits were originally obtained along the possible extension of the "Lac la Matre" fault which occurs on the shield and can be traced by magnetometer into the sedimentary area. A flight was made to the fault east of the south end of Lac la Matre. The fault is marked by a series of elongate southwest trending granite ridges protruding through the sedimentary cover. (Stations 18 and 19.) The center of the easternmost of these hills is cut by a basic dike with some quartz veining with some specular hematite. The westernmost ridge (Station 19) is flanked by the Old Fort formation dipping away from the ridge at 20°.

Having regard to the nature of the bedding of the formation, the lack of sorting and the relatively steep slope, it is very difficult to ascribe this dip to an original sedimentary dip on the flank of this ridge. The dip is almost certain to be the result of post-sedimentary movement of the fault. Further west and south, the Chedabucto formation was observed to dip at about 5° to the southeast away from the magnetometer trend. No Pre-Cambrian exposures



+ Flat lying outcrop

← Unless otherwise indicated  
dips range from 2°-5°

JUNE, 1966

MILES 0 1 2  
SCALE

were seen in this area. The reasonable conclusion is that movement took place on the fault at least as late as post Ordovician time. The extension along trend of this fault must then be regarded as excellent hunting ground for both oil and minerals.



Plate VII

Looking southwest along granite ridge at Station 19. Note dip of Old Fort formation to southeast off the granite ridge.

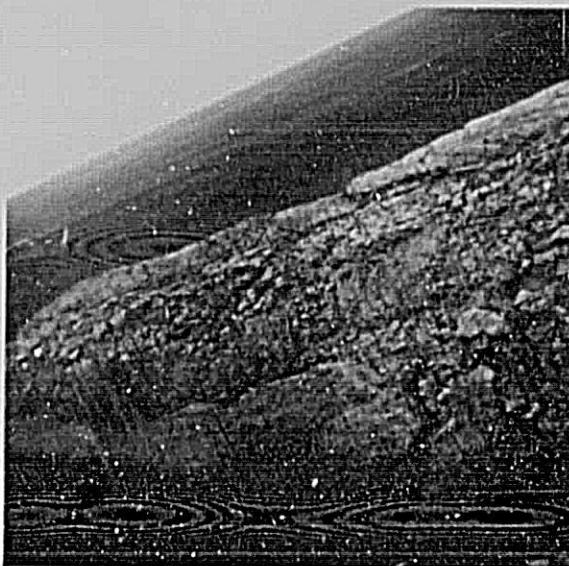


Plate VIII

Looking northwest across granite ridge at Station 19. Note Old Fort formation in the foreground dipping toward camera.

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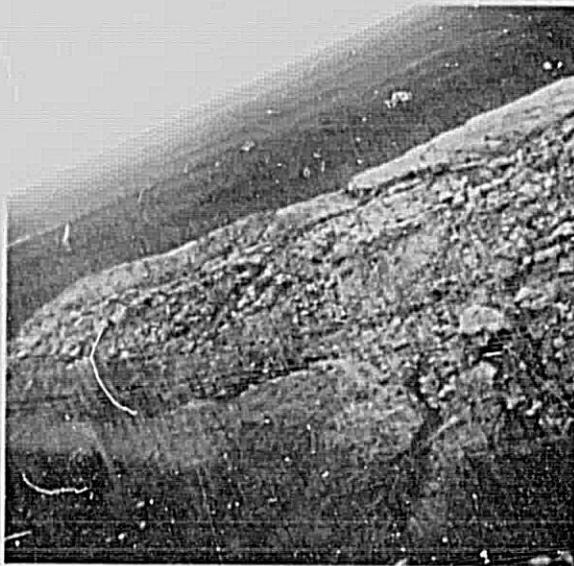


Plate VIII

Looking northwest across granite ridge at Station 19. Note Old Fort formation in the foreground dipping toward camera.



Plate IX

Old Fort formation      Station 19  
Note regular bedding.

Permits 4549 to 4522  
Clive River Area

Undulating outcrops of a very fossiliferous limestone occur on this block. Fossils from the limestone indicate uppermost Hume age. The outcrop itself gives the appearance of being a dome in that no scarp is formed by the limestone up or down stream, nor is any scarp formed in the area. The limestone is sufficiently competent that a scarp could be reasonably expected. The outcrop undulates as shown in Figure 5. Because of the competency of the limestone it is most improbable that the undulation could be the result of glacial action. Figure 6 illustrates the structurally high position of the Hume in this area.

The undulating nature of the outcrop, the structurally high position, the occurrence of sphalerite in the Hume in the Ebbutt d-50 well to the west, the porosity of the Hume at the Cartridge, Willowlake and Windflower wells



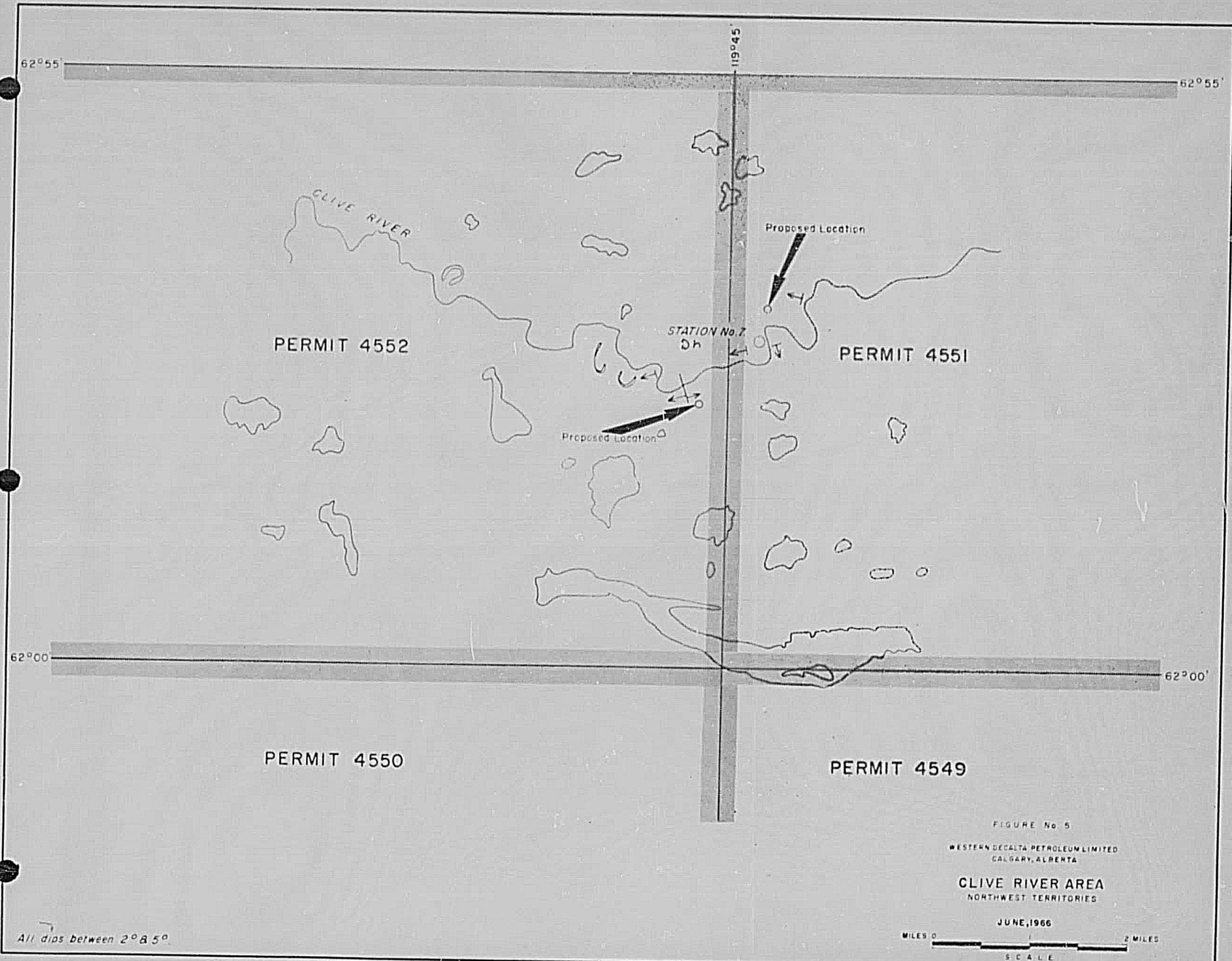
Plate IX

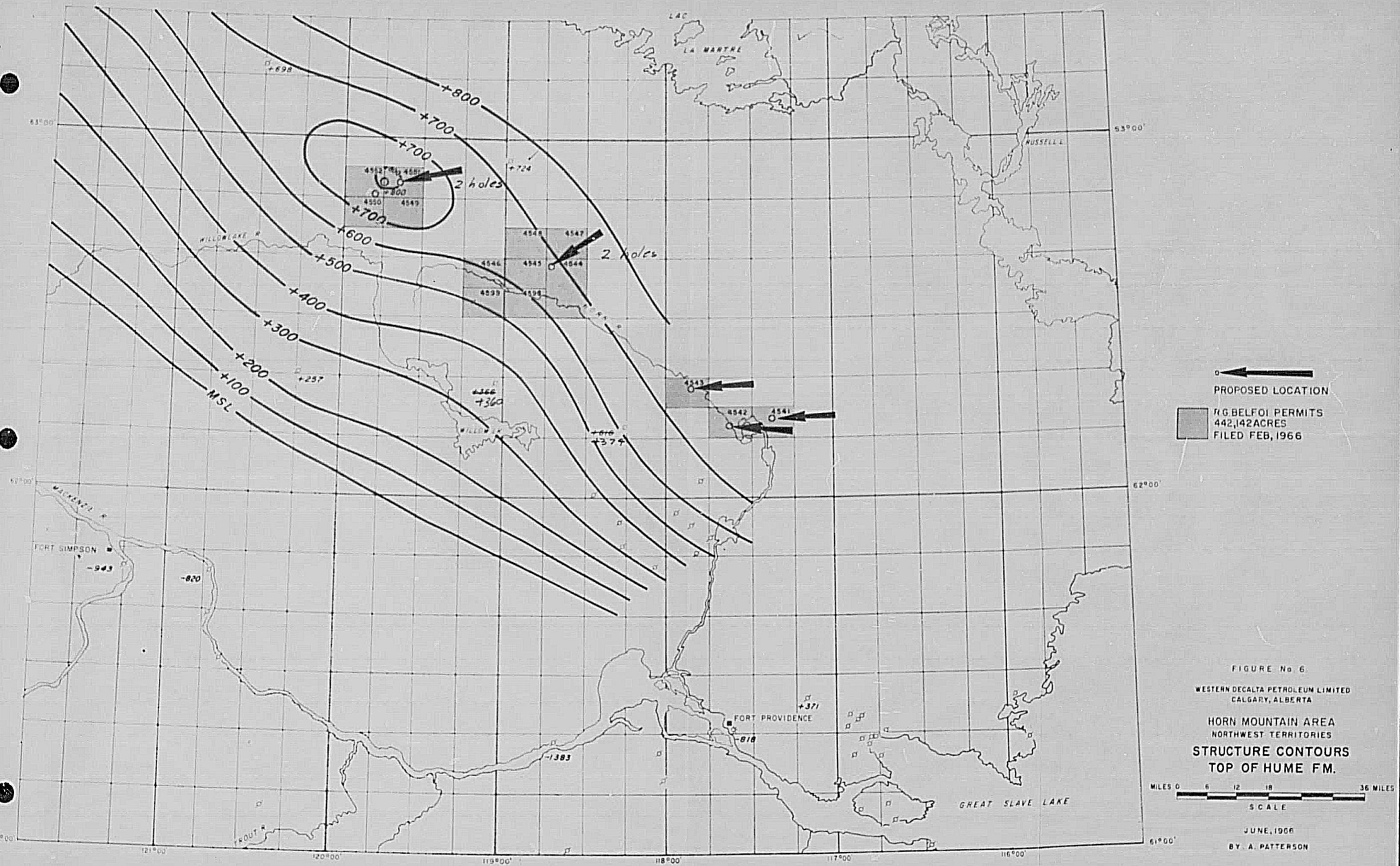
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The undulating nature of the outcrop, the structurally high position, the occurrence of sphalerite in the Hume in the Ebbutt d-50 well to the west, the porosity of the Hume at the Cartridge, Willowlake and Windflower wells





all make this block extremely prospective, not only from a petroleum point of view but also from a mineral point of view.



Plate X

Outcrop of Hume formation Station 7  
Photo taken looking south. Note how  
outcrops dip down to south.

#### SUMMARY AND CONCLUSIONS

The Horn River permits, 4541, 4542 and 4533, are indicated to have structure and would appear to be underlain at a shallow depth by a porous horizon yielding interesting geochemical values from sulphur springs.

The Upper Horn River permits, 4544, 4548 and 4598 and 4599, are on the projected extension of a basement fault which can be reasonably assumed to have had post Ordovician movement.

The Clive River permits, 4549 to 4952, are situated on a structural high that probably brings the horizon that shows mineralization at the Ebbutt d-50 well to within 250 feet of the surface.

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Photo taken looking south. Note how  
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The Clive River permits, 4549 to 4952, are situated on a structural high that probably brings the horizon that shows mineralization at the Ebbutt d-50 well to within 250 feet of the surface.

All three permit blocks warrant further exploration from both an oil and a mineral point of view.

RECOMMENDATIONS

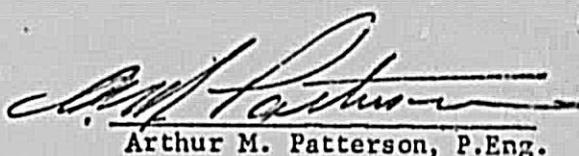
Shallow (300' to 400') structure and stratigraphic test holes should be drilled on all three blocks. On the Horn River permits, two structure test holes should be drilled in the vicinity of the sulphur springs. See Figure 3.

On Permit 4543, a structure test hole should be drilled on the structural high. See Figure 4.

On the North Horn River permits, one structure test hole should be drilled in a central area with access being a determining factor as to location.

On the Clive River permits, one or two tests should be drilled on the structural high. See Figure 5.

These tests can best be drilled using a "Heli-drill" of Big Indian Drilling and a Bell 204B and Beaver aircraft for support. Six structure tests could be drilled on these permits for a cost of \$30,000 to \$35,000.



Arthur M. Patterson, P.Eng.