LANDS 32-100

ASSESSMENT REPORTS

MAP No. 106F-15 TYPE OF WORK: Geology, Seismic Surveys

REPORT FILED UNDER	Northup Explorations Ltd.
DATE PERFORMED	DATE FILED: Dec, 1967
LOCATION – LAT.	66° 00' N Taylor Lake Area, Yukon-NWT
LONG.	133° 00' W
CLAIM Nos.	Permits 2447W, 2448, 2449
WORK DONE BY	Northup Explors L.
WORK DONE FOR	Northup Explors L.
REMARKS	Geology Map & Cross Section 1" - 16 mi.
	Structural Map 1" - 2 mi.
	~~2 Seismic Sections~~

APPENDIX "A"

GEOLOGICAL REPORT
TAYLOR LAKE AREA, YUKON - N.W.T.

SUMMARY

A large anticlinal structure located on Permits 2447W, 2448, and 2449 has been mapped by surface geology and preliminary seismic.

It is recommended that 25 miles of additional seismic be shot during the summer of 1968 and that a deep exploratory test be drilled in the winter of 1968-69. The cost of drilling to 9,000' to test the Lower Devonian and Siluro-Ordovician Carbonates is estimated at $1,200,000.

LOCATION

The Taylor Lake land holdings include permits 2447W, 2448, and 2449 with a total area of 130,765 acres located in the southwest corner of the Peel Plateau on the Yukon-Northwest Territories border at approximately latitude 66°, longitude 133°. (See Enclosure I).

TOPOGRAPHY, VEGETATION AND CLIMATE

The area is a plateau of gently rolling terrain into which the major stream valleys are sharply incised with a relief of several hundred feet. Within the major valleys there is fairly heavy vegetation including large spruce and poplar. On the plateau itself, however, there is little except stunted bushes and small black spruce. The area is poorly drained and shallow muskeg lakes are common. Winters are extremely cold with temperatures in the order of -60°F not uncommon.

ACCESS

Access to the area other than by float plane or helicopter is restricted to the winter months and even during the winter the area is of difficult access for wheeled or tracked vehicles because of difficulties in crossing the incised and steep-banked stream valleys. The Peel River is navigable by barge only as far upstream as the mouth of the Caribou River and then only in early summer during the period of high water.

STRATIGRAPHY

The Peel Plateau is underlain by gently westward dipping sedimentary rocks ranging in age from Cretaceous to Cambrian. (See cross-section, Enclosure I).

The oldest known rocks in the area are the Cambro-Pre Cambrian quartzites penetrated by the Atlantic Ontaratue H-34 test (Lat. 66-23-22.5N: Long. 132-05-51.5W) These rocks are very indurated and tightly cemented offering little hope in the way of reservoir development. Overlying the Cambro-Pre Cambrian unit are a series of limestones and dolomites including the Ronning Group of Siluro-Ordovician age and the Bear Rock and Hume formations of Lower to Middle Devonian age. The lower units of this carbonate sequence undergo a facies change westward from the Mackenzie Mountain and Central Peel Plateau to the Richardson Mountains where the whole sequence from Basal Devonian to Upper Cambrian is in a graptolitic facies of shale and argillaceous limestone.

In the Richardson Mountains the upper units of the sequence, the Hume and Upper Bear Rock as well as the Hare Indian shales and the Kee Scarp Limestone (producing formation at Norman Wells) are missing, truncated by the Pre-Upper Devonian unconformity.

The Basal unit of the Upper Devonian is the Canol formation, a black, pyritic, siliceous shale usually 100 to 200 feet thick but considerably thicker in parts of the Richardson Mountains. This unit grades upward into shales and sandstones of the Imperial formation which in turn grades upward into shales, sandstones and conglomerates of Mississippian age which contain abundant plant remains. In the Richardson Mountains the entire Upper Devonian-Mississippian sequence is probably in the order of 10,000 feet thick but thins rapidly to the eastward. This thinning is partially depositional, but in addition, the sequence is truncated by the Pre-Cretaceous unconformity so that at the Atlantic Ontaratue H-34 test only the lower part of the Imperial is preserved below the Cretaceous.

A few outliers of Triassic limestone are present along the east flank of the Richardson Mountains but have not been detected in the subsurface of the Peel Plateau.

The Cretaceous consists of marine shales and minor sandstones mostly of Lower Cretaceous age but with some Upper Cretaceous preserved along the north flank of the Mackenzie Mountains.

Tertiary rocks consisting of sandstone, shale and lignite (frequently burning in outcrop) are restricted to the basin of the Wind and Bonnet Plume Rivers.

RESERVOIRS

Within these permits the best potential reservoirs are the Lower Devonian and Siluro-Ordovician carbonates. These rocks had porosity in several of the tests in the Peel Plateau, including the nearest test to penetrate these zones, Atlantic Ontaratue H-34. The possibility of good reservoir development in the Western Peel Plateau is enhanced by the carbonate-shale facies change which must occur somewhere in this area and which may result in porosity development along the carbonate edge.

Other possible reservoirs are the sandstones of the Cretaceous and Upper Devonian-Mississippian rocks. However, the Cretaceous is likely to be fresh-water bearing and the better sandstones in the upper part of the Mississippian-Devonian sequence are likely to be truncated by the pre-Cretaceous unconformity in this area.

STRUCTURE

All units show a gentle south-westward dip across the Peel Plateau into the folded and faulted areas of the Richardson and Mackenzie Mountains. Generally, the MacKenzie Mountains consist of a compressive belt of thrust-faulted anticlines and synclines trending east-west along the southern edge of the Peel Plateau with some elements trending north-east into the Richardson Mountains. The significance of the rather abrupt change from the north-west south-east trend of the structure

in the Richardsons to the east-west trend in the Mackenzies is not understood but may imply a different and possibly basement-controlled structural style in the Richardsons.

Within Permits 2447W, 2448 and 2449, an east-west trending anticline (Big Bend Anticline) has been mapped by surface geology from Cretaceous outcrops in the incised valley of the Snake River. (See Enclosure II). The width of this anticline is about 2 miles. As the areas of good outcrop (where dips can be measured) are confined to the main valleys, the length of this anticline is unknown. The presence of the structure, however, has been confirmed by one seismic line (see Enclosure III). The surface geology has been interpreted to indicate an asymmetrical anticline with the steep flank to the north, which would be consistent with the Big Bend Anticline being a compressional structure related to the Mackenzie Mountain front. This geological interpretation is essentially confirmed by the seismic which indicates approximately 750' of contra-regional north-east dip in the same locality where anomalous north-east dips were observed at the surface.

RECOMMENDED COURSE OF ACTION

SEISMIC

Before the structure can be drilled, further seismic is necessary to define closure and to locate the highest point on the structure. Although surface geology indicates that the structure has closure at shallow depth, the configuration may be different at deeper horizons (i.e. top carbonate).

It was previously recommended that a $300,000 seismic program be carried out prior to drilling. Further study has shown that the following course of action may be more practical.

An attempt will be made to obtain, through trade or purchase, existing seismic data which has been shot by competitors in this area. In addition it is planned to carry out a reduced seismic program consisting of about 25 miles of shooting along the Snake River. This shooting will be done by placing the geophones and cable on the river bank and shooting small charges in the river itself. This technique has been used successfully on the Prophet, Nelson and Muskwa Rivers in British Columbia, on the Peace River in Alberta and on Great Slave Lake in the Northwest Territories. The quality of data which has been obtained by this method is shown by Enclosure IV. This seismic method appears well suited to the Big Bend area as shooting around the bend of the river will result in two sections across the strike of the structure. It is also much less expensive than conventional seismic because no drilling is involved. The estimated cost of the proposed 25 mile program is $55,000.

DRILLING

Contingent upon seismic confirmation of a drillable structure, it is recommended that a deep exploratory wildcat be drilled in the winter of 1968-69. This test should be drilled to a minimum depth of 7500' to test the Bear Rock, and if any hydrocarbon shows are obtained, should be drilled to 9,000 feet to test the Siluro-Ordovician. (See attached prognosis). If, however, the Bear Rock should be water-bearing then it is questionable whether deeper drilling would be justified.

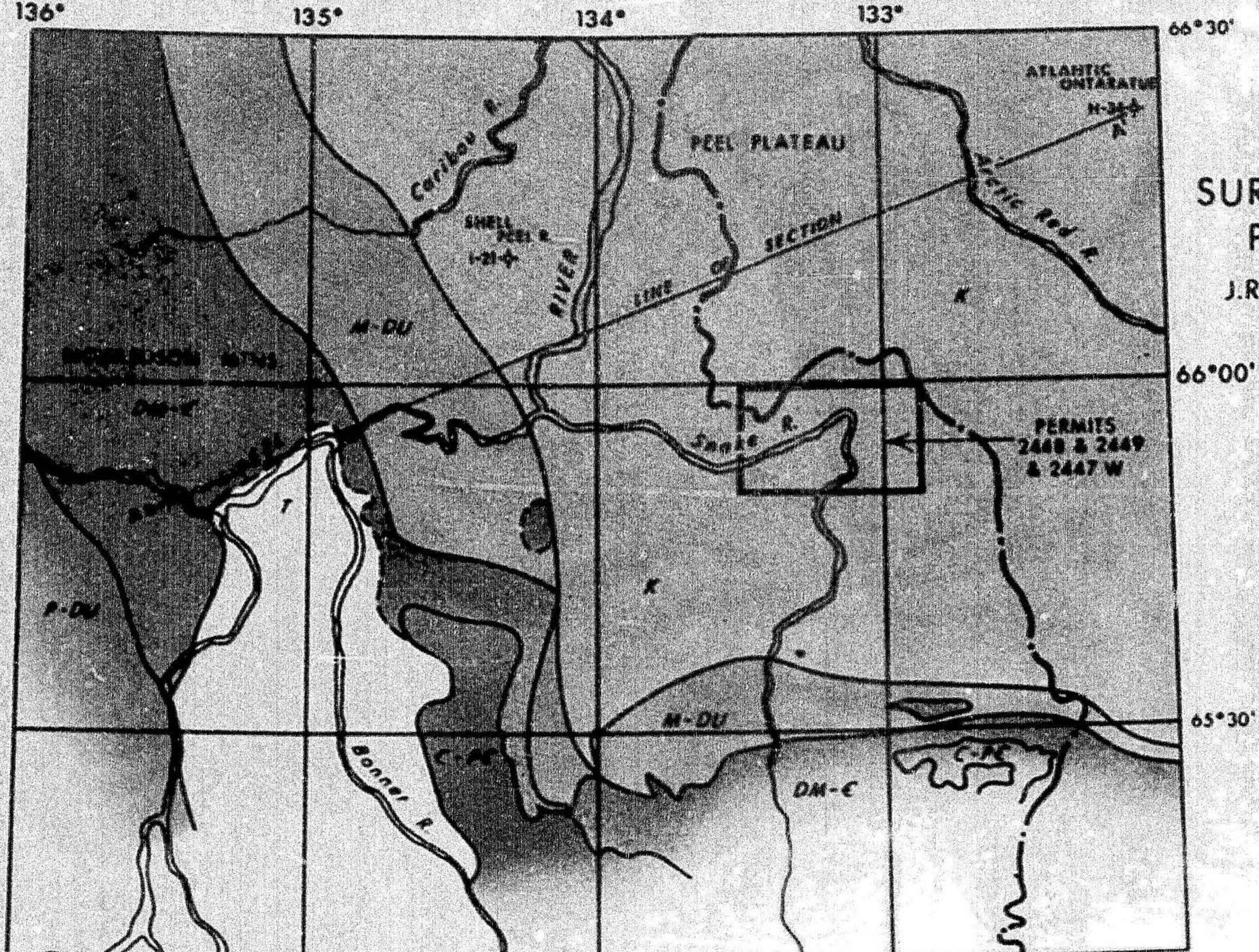
Previous experience in the Peel Plateau has indicated that adequate seismic records can be obtained by summer helicopter work provided shot holes are drilled to about 50 ft. and that care is taken to plant the geophones firmly in the soil (or permafrost) below the thin layer of moss usually found in this area.

FUTURE PLANS

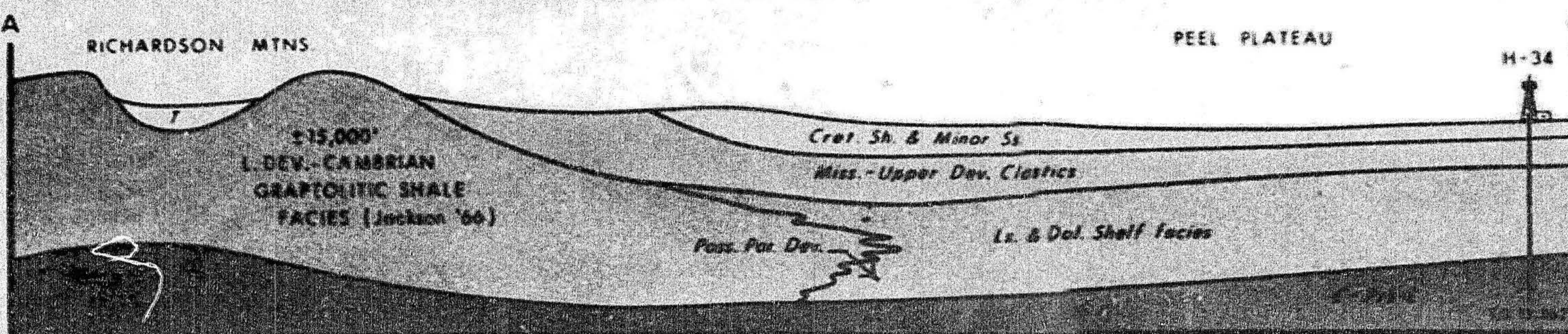
If the above seismic program does in fact indicate a closed structure at depth, of sufficient size to provide a commercial accumulation of oil or gas then a 10,000 ft. exploratory wildcat involving an expenditure in excess of $1,000,000 would be considered.

SURFACE GEOLOGY
PEEL PLATEAU

J.R.L. Dec. 1967



1" = 16 MILES

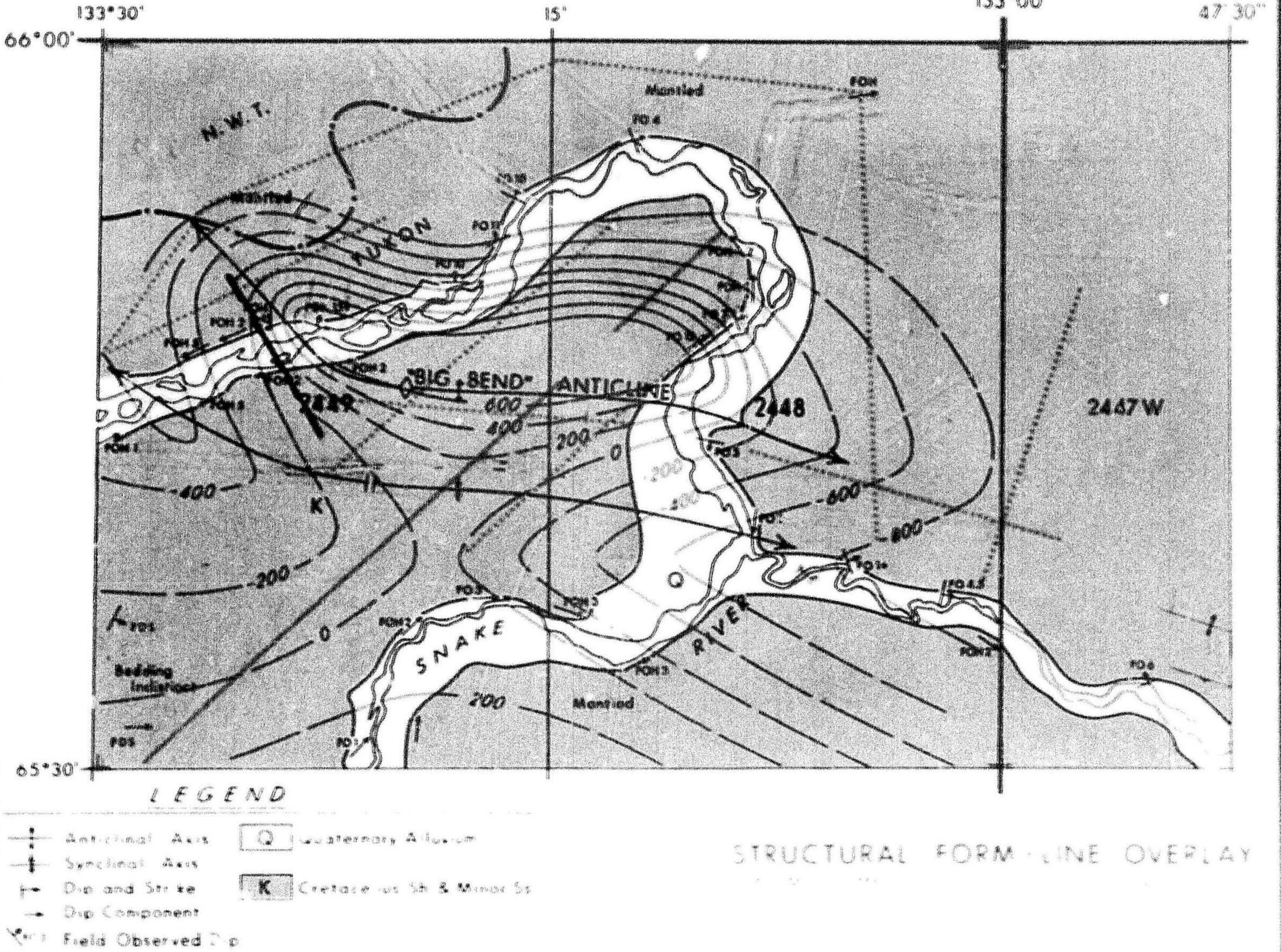


SCHEMATIC CROSS-SECTION A-A'

Enclosure No. 1

SURFACE GEOLOGY OF PERMIT AREAS 2447 W, 2448 & 2449

Scale 1": 2 miles JRL December, 1967



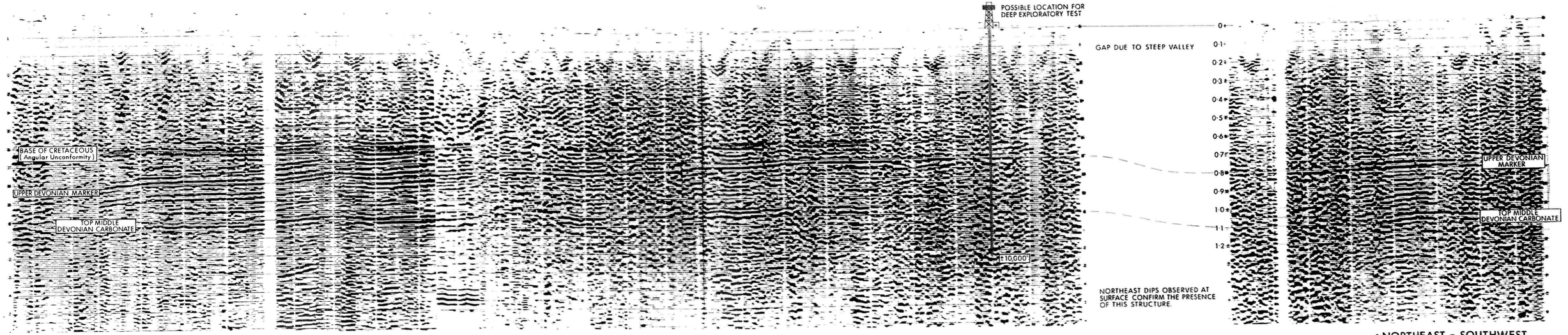
LEGEND

STRUCTURAL FORM-LINE OVERLAY

Enclosure No. 2

SOUTHWEST

NORTHEAST

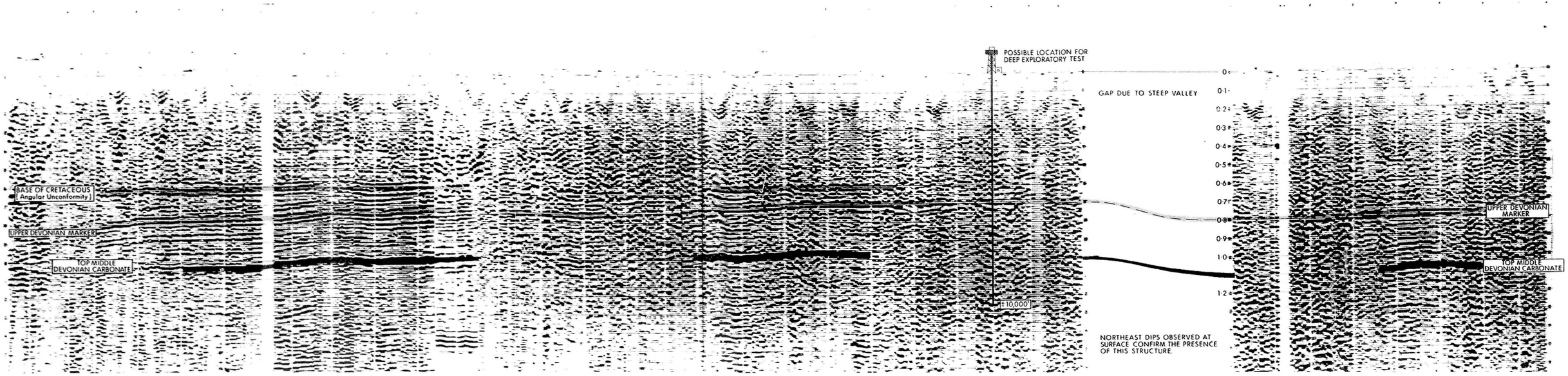


· NORTHEAST - SOUTHWEST

SEISMIC SECTION

across

BIG BEND ANTICLINE



NORTHEAST - SOUTHWEST

SEISMIC SECTION

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BIG BEND ANTICLINE