ILLUSTRATION 18A

STRUCTURE

9230-V2-1P

GEOLOGY OF THE CANDEL DECKMG ET AL EAST MACKAY B-45 OIL DISCOVERY

MACKENZIE VALLEY PLAIN NORTHWEST TERRITORIES

DISCOVERY DATE : 1971

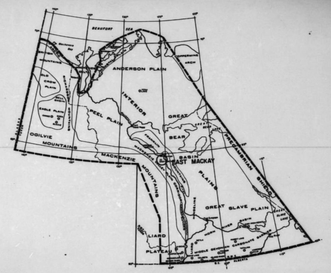
PREPARED BY

VEEZAY GEODATA (1977) LIMITED PARTNERSHIP

CALGARY, ALBERTA

1982

REGIONAL LOCATION MAP

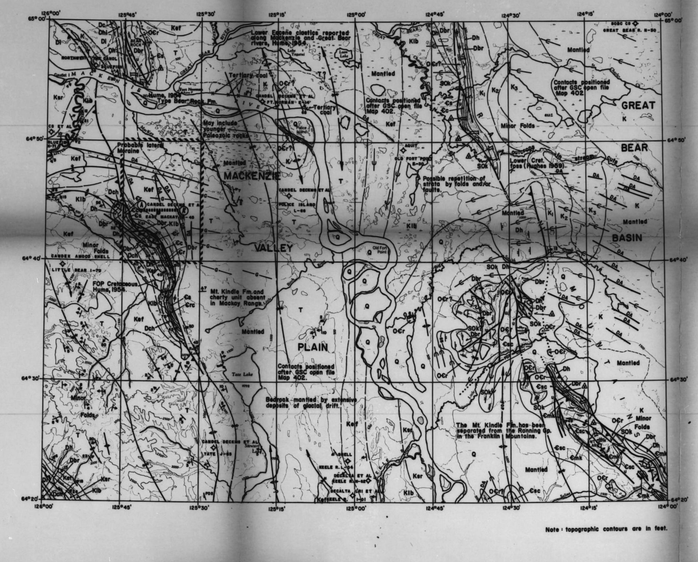


1982 MACKENZIE BASIN CANADA LANDS EXPLORATION PROGRAM

SEE ILLUSTRATION 18B FOR CANDEL DECKMG ET AL EAST MACKAY B-45 STRATIGRAPHIC ANALYSIS.

SURFACE AREAL GEOLOGY AND STRUCTURAL INTERPRETATION MAP OF THE MACKAY RANGE AREA IN THE MACKENZIE VALLEY PLAIN

SCALE 1:250,000



STRUCTURAL GEOLOGY of the MACKAY RANGE AREA

Mackay Range map area covers a portion of a structural and physiographic continuum refered to as the Mackenzie Valley Plain. The plain is a northerly to northwesterly trending, elongate structural basin situated between the Precambrian Shield to the east and the Mackenzie Mountains and Richardson Range to the west. The Mackay Range is an isolated structural element located in front of the Mackenzie Mountains in the plain. The main structural elements of the Mackay Range are a northerly plunging anticline, subsidiary anticlines, synclines, associated faulting and associated fracture improved upon the basic model by Laramide deformation. This occurs both structurally and in the nature of the sedimentary rocks which are much more competent than those from the Liard Platform to which north to the Peel Plain in the northwest. The Mackenzie Valley Plain is dissected by numerous east-west trending river valleys.

Within the map area, surface structure is fairly well exposed, especially in the Mt Kindle Fm. and cherty unit of the Franklin Mountain Formation, adjacent to the Mackenzie River. Outcrop tends to be obscured by glacial drift and alluvial deposits in the Mackay Range and in the Mackenzie Valley. Bedrock is mantled by extensive deposits of glacial drift, alluvial deposits and organic debris. Contours positioned on Geological Survey of Canada open file maps are based, mainly on bedrock outcrop. Contours positioned after Geological Survey of Canada open file maps are based on fly-by-night exploration with these three factors and are defined by dips centres from the cherty unit. Contours positioned over much of the Mackenzie Valley Plain are based on bedrock mantled by Quaternary and Tertiary sediment which are mainly unconsolidated.

The dominant structural element in this part of the Mackenzie Valley Plain is a broad northerly trending anticlinal positive structural feature which underwent Laramide deformation. This structure is mantled by a thick sequence of Tertiary and Quaternary deposits. The name is derived from the Dene tribe where subsurface geologic information was first obtained in the Mackay Range area. The Mackay Range is a part of a trend which subsequently proved to be near the central part of the arch. The Bayle Arch extends northwest from here approximately 200 miles to Lac du Bois Lake. Structure in the Mackay Range area is a complex one and structures may have existed as early as Middle or Late Cambrian time but not subsequently established as a dominant tectonic feature during the Caledonian Orogeny. Structural development continued in the Devonian and possibly during several subsequent early Mesozoic and Tertiary times and during the early part of the Laramide orogeny in late Cretaceous time. In the Mackay Range area, the Devonian Canol and Hare Indian Formations are marine clastics and argillites of in area not affected during the Laramide deformation. The arch is not apparent at the surface but locate surrounding rocks. The side wall was extensively deformed and slumped in Devonian and later time.

Seismic data show the crest of the field at the East Mackay location to be at a depth of about 1000 m. Structural contours are based on the structural cross sections. Such fields may contribute to the trapping mechanism at this discovery, in concert with the pressure of the prominent structural feature underneath. The Mt Kindle Fm. was not encountered drilled at the discovery well in about 600 m., but the amount of closure is uncertain due to lack of data. The closure shown on the structural contour map is based on seismic data. The Mt Kindle Fm. is a major aquifer of structural significance with the Bayle Arch in this part of the Mackenzie Plain. Where present, the cherty unit displays variable porosity and permeability. Hydrocarbon accumulations in structures in the Mackenzie oil and gas accumulations to and around the periphery of the Bayle Arch can be visualized.

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WELL DATA SUMMARY OF DISCOVERY WELL

Candel DECKMG et al East Mackay B-45

LOCATION:	Lat. 64° 47' 29" N., Long. 125° 36' 18" W., Mackenzie Plain N.W.T.
ELEVATION:	KB: 811' (250.4 m) GL: 823' (250.5 m)
SPUDDED:	February 7, 1971
COMPLETED:	March 30, 1971
STATUS:	Suspended Oil Well
TOTAL DEPTH:	5280' (1,612 m)
LOGS RUN:	Dual Induction Laterlog (DILL), Borehole - Compensated Sonic (BHC-S), Sidewall Neutron Porosity (SNP), Formation Density Log (FDL), Continuous Dipmeter (CDM).
CORED INTERVALS:	5284' - 5285' (1611.0 m - 1611.3 m) cores available
DRILL STEM TESTS:	1. 2990'-4062' (912.0 m - 1237.8 m) Franklin Mountain "cherty unit"; Rec. 1810' (551.2 m) oil, 180' (54.9 m) mud, IFP 1-1/2", FFP 2-1/2", ISIP 1-1/2" (0.1
	2. 4062' - 4280' (1238.0 m - 1304.0 m) Franklin Mountain "cherty unit"; Rec. 120' (36.6 m) mud cut water, 2400' (730.8 m) sulphurous salt water.

RESERVOIR DATA

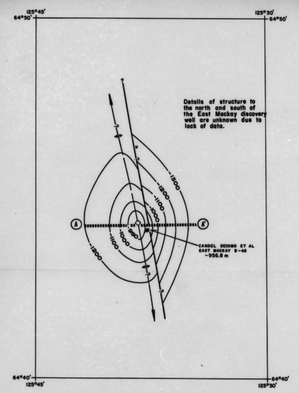
STRATIGRAPHIC HOSTING RESERVOIR:	Franklin Mountain Formation "cherty unit" of Lower Ordovician age.
RESERVOIR ROCK:	Microcrystalline to finely crystalline dolomite.
TRAP TYPE:	Probable combination structural and stratigraphic trap.
ORIGINAL PRODUCTIVE INTERVAL:	2990' - 4062' (912.0 m - 1232.8 m)
RESERVOIR CHARACTERISTICS:	Net Pay Thickness: 27' (8.2m) Porosity Average: 2.5% Pour Point: 10F (-12.2°C) Crude Gravity (°API): 20.4 (931.5 ± 2.1)

STRUCTURAL CONTOUR MAP OF THE EAST MACKAY ANTICLINE

STRUCTURAL DATUM : TOP OF THE FRANKLIN MOUNTAIN FORMATION CHERTY UNIT OF LOWER ORDOVICIAN AGE.

CONTOUR INTERVAL : 100 METERS

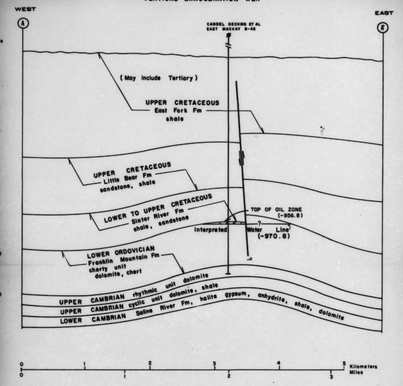
SCALE 1:100,000



Surface bedrock is comprised by Cretaceous clastics which unconformably overly the Franklin Mountain Formation. Bedrock is mantled by glacial drift and surface structure is obscured on air photographs. The interpretation shown is based on seismic data.

DIAGRAMMATIC STRUCTURAL CROSS SECTION ACROSS EAST MACKAY B-45 DISCOVERY WELL

HORIZONTAL SCALE 1:25,000
VERTICAL SCALE 1:12,000
VERTICAL EXAGGERATION X2.1



LEGEND

AGE	SYMBOL	FORMATION	
QUATERNARY	Q	Alluvium and glacial drift	
TERTIARY	T	ss, sgl, sh, coal	
CRETACEOUS	Kaf	East Fork Fm; sh	
	Kib	Little Bear Fm; ss, sh.	
	Ksr	Slater River Fm; sh, bent-sh, slst	
	Di	Imperial Fm; slst sh (May include Canol and Hare Indian formations locally.	
DEVONIAN	Dc	Canol Fm ; sh	
	Dhi	Hare Indian Fm ; sh	
	Dh	Hume Fm; ls, shly-ls	
	Dbr	Bear Rock Fm; carb-breccia, anhy, red beds, cgl	
SILURIAN and ORDOVICIAN	SOs	Mt. Kindle Fm; dol, shly-dol	
ORDOVICIAN and CAMBRIAN	OCc	Cherty unit; dol, slst	
	Cr	Rhythmic unit ; dol	
	Cc	Cyclic unit; shly-dol, dol, sh	
CAMBRIAN	Cs	Saline River Fm; sh,ss, sslt, anhy, dol	
	Cmc	Mt. Cap Fm; sh,ss	
	Cmh	Mt. Clark Fm; ss	

K — Cretaceous rocks undivided: K_3 shale; K_2 sandstone; K_1 shale

Dch — Canol and Hare Indian Fms; sh

OCr — "Running Group" dol, shly-dol,sh

Crc — Rhythmic and Cyclic units

Csc — Saline River and Mt Cap Fms.

GEOLOGIC SYMBOLS

Faults, fold axes and contours are dashed where their position is indefinite, questioned where inferred, and dotted where concealed by post-orogenic bedrock

- Bedding appears horizontal on air photographs
- Trace of bedding in stream cut appears horizontal May represent flat-lying beds or strike.
- Recognizable dip 1° or less
- Dip group 1, 1° to 3°
- Dip group 2, 3° to 10°
- Dip group 3, 10° to 25°
- Dip group 4, 25° to 45°
- Dip group 5, 45° to nearly vertical
- Bedding appears nearly vertical on air photographs.
- Overturned bedding
- General dip of beds having subordinate folds
- Dip and strike. Amount of dip cannot be estimated on air photographs
- Dip component
- Strike and dip interpreted from geomorphic evidence
- Possible dip slope

— Photo— estimated

- Strike line of prominent ridge or bedding. Direction of dip cannot be determined on air photographs
- Field observed information
- Field observed published or open file information
- Field observed dip from published or open file source
- Dip measured photogrammetrically
- Cleavage (inclined, vertical)
- Contact
- Apparent unconformable contact
- Key bed
- Stratigraphic break
- Equivalent formations
- Correlative key beds
- Outcrop area
- Fracture or joint
- Distinctive alignment, possible structural significance
- High-angle fault. U denotes upthrown side
- Strike-slip fault showing direction of relative movement
- High-angle gravity fault. Solid circles on downthrown side.
- Thrust fault, triangles on overthrust sheet. Dotted where concealed by younger deposits.
- Anticline, arrow denotes plunge. Diamond denotes approximate position of apex.
- Syncline, arrow denotes plunge. Brush and cross bars denote approximate position of high point
- Anticline and syncline overturned. Arrows denote direction of dip of limbs and are on side of normal dip
- Axis of anticline appears to coincide with fault trace
- Axis of syncline appears to coincide with fault trace
- Structural terrace
- Monocline
- Prominent scarp, steep slope or morainal ridge
- Dike (d) or sill (s)
- Glacial lineation showing direction of ice movement
- Facies and/or nomenclature change
- Location of Veezay field-measured stratigraphic section
- Fault, anticline and syncline based on published or open file seismic information.
- Fault based on published or open file information

STRUCTURAL CONTOUR SYMBOLS

- Outline of detailed structural contour area.
- 352 — Datum elevation in meters from bore hole information.
- 100 — Stratigraphic thickness in meters measured photogrammetrically.
- 183 — Structure datum elevation calculated in meters and derived from structural elevation measured with a Kern PG 2 stereoplotter. Control points on beds lying above or below datum have been projected to datum using quantitative information derived photogrammetrically.
- 200 — Structure contour in meters dashed where inferred.
- 5° — Dip measured photogrammetrically.

GEOMORPHIC SYMBOLS

- Linear stream segment, interpreted as strike controlled.
- Curvilinear stream segment, interpreted as structurally controlled.
- Strike and dip interpreted from geomorphic evidence
- Anticline and syncline based on geomorphic evidence. Arrow indicates direction of plunge.

Geomorphic drainage is surface features defined by geomorphic evidence and interpreted to have possible structural and/or stratigraphic significance.

- II — Radial Drainage Anomaly.
- A — Annular Drainage Anomaly.
- P — Photogrammetric Trend Anomaly.
- RA — Radial-Annular Drainage Anomaly
- T — Topographic Anomaly
- I — very well defined by geomorphic evidence.
- II — well defined by geomorphic evidence
- III — moderately defined by geomorphic evidence.

DCA — Drainage Course Anomaly a meaningful change in the nature and character of a stream or its valley which may have structural and/or stratigraphic significance.

- Trend of geomorphic anomalies which may reflect an individual feature.
- Glacial lineation
- Dune or wind-aligned ridge or furrow. Arrow indicates predominant wind direction.
- Glacial meltwater channel.

WELL SYMBOLS

- Location or drilling
- Dry and abandoned.
- Oil well.
- Gas well
- Oil and gas well.
- Capped gas well.
- Capped oil well.
- Suspended well

WELL INFORMATION AS OF JANUARY, 1983.

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PART NO. 1 OF 1

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