

CANTERRA ENERGY LTD., CALGARY

1983 REFLECTION SEISMIC EXPLORATION SURVEY

LIARD, YUKON TERRITORIES

C.O.G.L.A. PROJECT NO. 9129-C55-1E

INDIAN AND NORTHERN AFFAIRS LAND USE
PERMIT NO. YA2B250

CO-ORDINATES

LATITUDE: 60°00' - 60°07'
LONGITUDE: 123°55' - 124°12'

PRIME CONTRACTOR - TELEDYNE EXPLORATION LTD., CALGARY

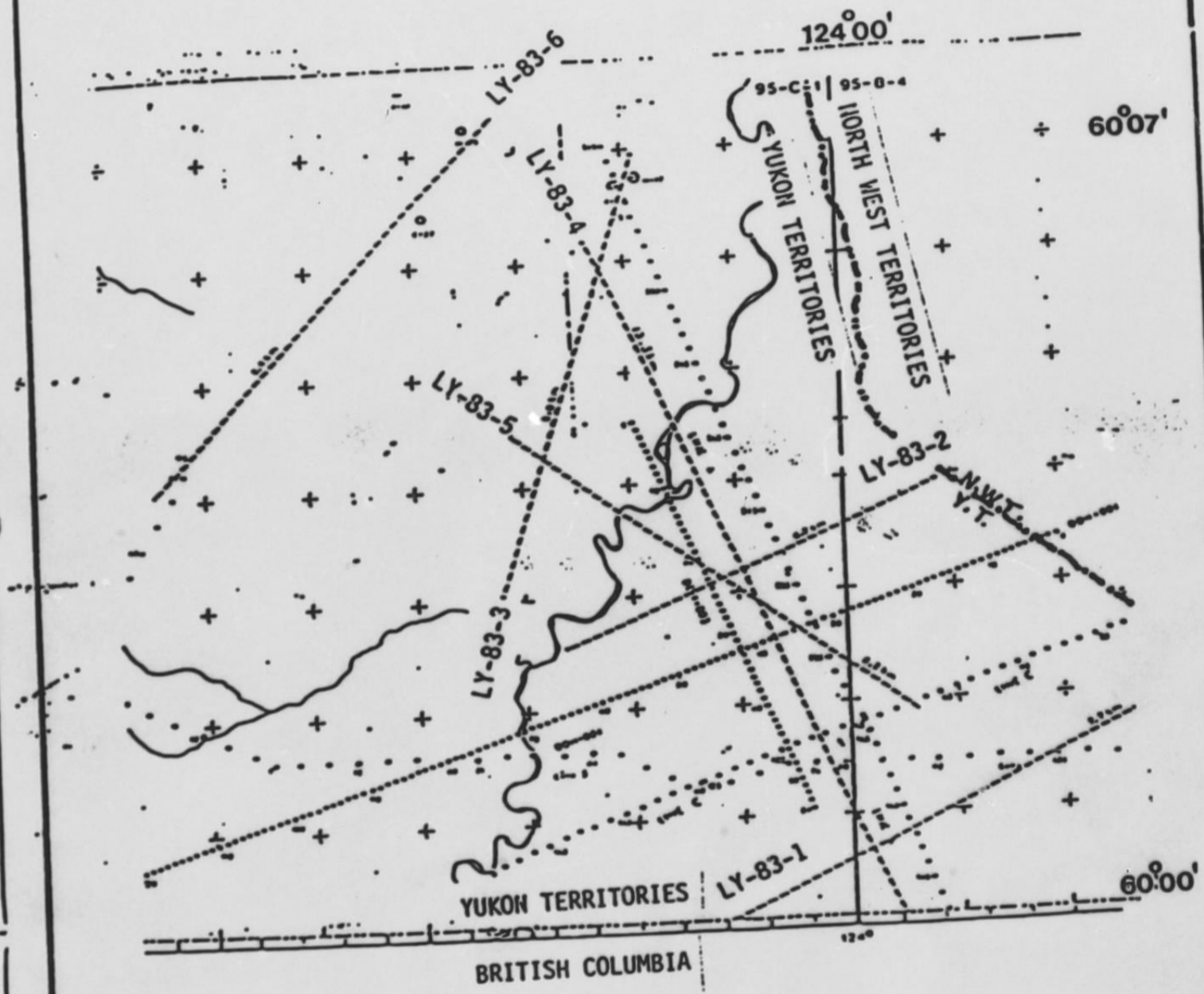
RESPECTFULLY SUBMITTED
BY
A. K. KUHME, P. GEOPH.
Supervisor, Northwest District

October 9, 1984

A handwritten signature in dark ink, appearing to read "A. K. Kuhme", written over a faint circular stamp.



Canterra Energy Ltd.



LIARD (YUKON TERRITORIES) PROSPECT

1983

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ATTACHMENT I

ENCLOSURES

1. Mississippian Limestone Marker Time Structure: 3 paper prints
2. Top of Middle Devonian Time Structure: 3 paper prints
3. Structure and Migrated Structure Stacks, Normal and Reverse Lines LY83-1,2,3,4,5,6: 2 paper prints, 1 mylar
4. Shot Point Maps: 2 paper prints, 1 mylar

GEOPHYSICAL REPORT

1.0 INTRODUCTION

In January 1983, Canterra Energy Ltd., Calgary shot 51.3 km of 1200% seismic in the Liard-Tricorner prospect which is located at the southeast corner of the Yukon Territories. The prospect is bounded to the east by the Northwest Territories and to the south by British Columbia.

The geophysical survey was conducted for Canterra by Teledyne Exploration Co., party TXL-641, Calgary, under the joint supervision of Canterra and Teledyne.

The work period from starting of bulldozing to end of recording was January 23 to February 14, 1983.

Surface conditions were generally rolling tree covered terrain.

2.0 STATISTICAL SUMMARY

2.1 Mobilization

The seismic survey in the Liard-Tricorner prospect was conducted in conjunction with the other programs shot in Northeast British Columbia during the fall of 1982 and winter of 1983.

Mobilization of geophysical equipment, tracks and trucks were from Calgary. Bulldozers were from Rycroft Alberta, field camp from Edmonton and Fort Nelson, drills from Carbon, Alberta, first aid trailer and ambulance from Fort St. John.

2.2 Road Access

Access to the area was from Mile 319 on the Alaska Highway, north on the high grade Liard-Simpson Highway for approximately 60 miles, west on an existing cut line for 40 miles to the Liard River. An ice bridge was built across the Liard River near the mouth of the Sandy River during late December 1982 and early January 1983. On the west side of the Liard River, a line was bulldozed north to meet an existing road, built and operated by Columbia Gas Development Company which provided access to the prospect.

2.3 Work Period

Bulldozers commenced cutting new lines on January 23, 1983. Start of the recording was February 5, 1983. On commencement and completion of the operation, the Yukon and Federal Authorities were notified. Also during the operation, weekly progress reports were teletyped to C.O.G.L.A. in Ottawa. Several land use inspections were conducted by officers from Watson Lake, Yukon during and on completion of the operation. All aspects of land use, including brush disposal, erosion control and pollution prevention were found to be acceptable.

Line cutting was completed on February 8, drilling on February 11 and recording on February 14, 1983.

2.4 Shot-Hole Drilling

Two wheeled and two tracked top drive drills, assisted by two water trucks were used in shot-hole drilling.

An in-line two hole pattern for each shot point was used in the survey. The holes were drilled to a depth of 15 metres and preloaded with 5 kg of geogel per hole.

Formations encountered by the drilling were generally sand or sandy loam at the surface, boulder and clay at depths.

No flowing hole was encountered.

2.5 Surveying

Two Wild T16 theodolite survey instruments were used for horizontal and vertical control. Shot points and geophone group distances were measured by Surveyor Steel Chain.

The surveying and chaining crews each had a GMC 3/4 Ton 4 x 4 truck for transportation.

New cut line locations were derived from existing lines, trails, well sites, sun shots and topographic features. Preliminary checks on the elevation and the horizontal location ties were done in the field. Final computations and plotting were done in Calgary by computer, and presented in U.T.M. mode. All surveying data records were in metric.

2.6 Bulldozing and Line Cutting

Four D7G LGP 34" and two D6C LGP 36" bulldozers were used in the line cutting. Support vehicles consisted of one D7G narrow pad bulldozer and one 4 wheel drive tractor with blade and winch to smooth out access lines for better driving conditions.

The 6 lines shot in this survey are all new cut. They are designated as LY-83-1,2,3,4,5,6 as indicated on the location plat.

The bulldozing crew was provided with a self-sufficient camp, to enable them to move independently of the recording crew.

2.7 Personnel

Normally 52 persons were involved in all phases of the field operation. In this survey all were Canadian citizens. The personnel list is as follows:

- 5 -

1 Supervisor	4 Drillers
1 Party Manager	4 Drill Helpers
1 Field Clerk	2 Water Truck Drivers
1 Observer	1 Drill Push
1 Jr. Observer	1 Powder Custodian
1 Shooter	1 Cat Foreman
1 Asst. Shooter	7 Cat Skinners
3 Line Truck Drivers	5 Line Slashers
6 Recording Helpers	1 Cook
1 Mechanic	1 Cook's Helper
1 Mechanic's Helper	1 Camp Attendant
2 Surveyors	1 First Aid Attendant
2 Survey Rodmen	
1 Advance Surveyor	

TOTAL - 52

2.8 Weather Conditions

The weather conditions were very good and there was no lost time.

3.0 DATA ACQUISITION

3.1 Recording

The survey was designed for a 1200% subsurface coverage with a split-spread configuration. The recording instrument used was a DFS V. The field parameters were as follows.

3.2 Spread Layout

Number of Traces = 96
Group Interval = 50 m
Source Interval = 200 m
Near Offset = 50 m
Far Offset = 2400 m
Geophones per Group = 9
Geophones Array = 9 @ 5 km
Geophone Type = Mark L-15 14 Hz

3.3 Spread Diagram

TR96 TR49 SP TR48 TR1

 x x

 | <-50 m-> |

 | <-50m-> | <-50m-> |

 | <-----2400m-----> | <-----2400m-----> |

3.4 Source Parameters

Energy source = Dynamite
Number of holes per
 shot point = 2 over 50 m
Charge size = 5 kg per hole
Hole depth = 15 m

3.5 Recording Parameters

Low cut filter	= 8 Hz
High cut filter	= 128 Hz
Notch filter	= NIL
Sample interval	= 2 ms
Record length	= 4 seconds

3.6 Seismic Processing

The data was processed for Canterra by Seismograph Service Corporation, Calgary. Datum elevation, near surface weathering and the regular suite of processing sequences as indicated on the section legends (Attachment I) were applied to the data. The final sections were produced in the form of structure and migrated structure stacks each with normal and reverse polarity display.

4.0 INTERPRETATION

The target horizon in the area is the Middle Devonian Carbonate which produces from fracture porosity in the nearby known gas fields at Amoco Beaver River to the southwest and at Columbia Kotaneelee to the north.

Earlier work in the area by Canterra indicated the presence of an anticline which is known as the Tricorner anticline.

The main objectives of the 1983 seismic survey were: to map the lateral extent of the Tricorner anticline at the Middle Devonian Carbonate level and to determine if this structure is separate from the Kotaneelee field.

Seismic reflection correlation ties were obtained from the I-27, E-37, H-38 wells in the Kotaneelee field and also from wells in the Amoco Beaver River field.

For interpretation purposes two time structure maps were constructed from seismic sections with conventional processing and normal polarity:

1. Mississippian Limestone Marker
2. Top of Middle Devonian Carbonate.

5.0 DISCUSSIONS

Seismic indicates the presence of major folds and thrust faults of the Laramide orogeny.

The Mississippian Limestone Marker Time Structure map indicates less extensive faulting than the Middle Devonian Carbonate Time Structure map. The dominant structural features on both maps tend to parallel one another.

The Middle Devonian Carbonate Time Structure map indicates four prominent structural highs.

1. The Amoco Beaver River gas field to the southwest,
2. The Columbia Kotaneelee gas field to the north,
3. A small closure on the northwest at the south end of Line LY-83-6,
4. The Liard-Tricorner structure to the southeast.

The Amoco Beaver River gas field structure essentially is a horst bounded by a west-dipping thrust fault and an east dipping tension release fault. The other three structural highs are formed by a combination of thrust faulting and folding.

A major NW-SE trending thrust fault separates the Columbia Kotaneelee gas field from the LY-83-6 structure and the Liard-Tricorner structure.

AREA

LIARD

YUKON TERRITORIES

SEISMOGRAPH SERVICE CORPORATION
OF CANADA

PROCESSING SEQUENCE

- | | |
|----------------------------|--------------------------------------|
| <u>1</u> DEMULTIPLEX | <u>9</u> SORT INTO CDP ORDER |
| <u>2</u> GAIN RECOVERY | <u>10</u> SURFACE CONSISTENT STATICS |
| <u>3</u> TRACE EDITING | <u>11</u> VELOCITY ANALYSIS: CVS |
| <u>4</u> BAND PASS FILTER | <u>12</u> NORMAL MOVEOUT/MUTE |
| <u>5</u> TRACE BALANCE | <u>13</u> AUTOMATIC TRIM STATICS |
| <u>6</u> DECONVOLUTION | <u>14</u> STACK |
| <u>7</u> DATUM STATICS | <u>15</u> SCALING |
| <u>8</u> DRIFT CORRECTIONS | <u>16</u> FINAL FILTER |
| | <u>17</u> MIGRATION |

DATE PROCESSED APRIL 1983

SYSTEM: PHOENIX '1'

DATUM STATICS

DATUM 457 M VELOCITY 3048 M/SEC

BAND PASS FILTER

TIME	LOW CUT	HIGH CUT	OVERLAP
<u>0 MS</u>	<u>14/18</u>	<u>45/50</u>	<u>80 MS</u>
<u>1450 MS</u>	<u>8/12</u>	<u>45/50</u>	

DECONVOLUTION

 OPERATOR TYPE SPIKING OPER. LENGTH/W. NOISE 64 MS/2 %
 WINDOW AT MIN./MAX. OFFSETS 1000-3000/2200-3000 MS

MUTE

DISTANCE / MUTE TIME	DISTANCE / MUTE TIME
<u>500 M/650 MS</u>	<u>2400 M/1700 MS</u>

AUTOMATIC STATICS

PROGRAM	WINDOW	STATIC PASSES	PILOT
<u>1STAT</u>	<u>1400-2700 MS</u>	<u>30 MS</u>	<u>2</u>
<u>CSTAT</u>	<u>300-3250 MS</u>	<u>30 MS</u>	<u>3</u>

FINAL FILTER

TIME	LOW CUT	HIGH CUT	OVERLAP
<u>0 MS</u>	<u>8/12</u>	<u>45/50</u>	

RECORDING PARAMETERS

RECORDED BY	<u>TELEDYNE EX</u>	PARTY	<u>641</u>
SHOT INTERVAL	<u>200 M</u>	DATE RECORDED	<u>FEB 1983</u>
GROUP INTERVAL	<u>50 M</u>	INSTRUMENT TYPE	<u>DFS V</u>
NEAR OFFSET	<u>50 M</u>	TAPE FORMAT	<u>SEG B</u>
FAR OFFSET	<u>2400 M</u>	RECORDING FILTER	<u>OUT-128 HZ</u>
TRACES/RECORD	<u>96</u>	RECORD LENGTH	<u>4 SEC</u>
CONFIGURATION	<u>SPLIT SPREAD</u>	SAMPLE RATE	<u>2 MS</u>
TYPE GEOPHONE	<u>MARK L15 14HZ</u>	ENERGY SOURCE	<u>DYNAMITE</u>
GEOPHONE ARRAY	<u>INLINE</u>	CHARGE DEPTH/SIZE	<u>2X 15M/5KG</u>
GEOPHONES/TR.	<u>9 @ 5 M</u>	SHOT PATTERN	<u>2 HOLES @ 50M</u>
TR. 1 LOCATION	<u>NW</u>		
LINE DIRECTION	<u>SE-NW</u>		



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PROD. NO.

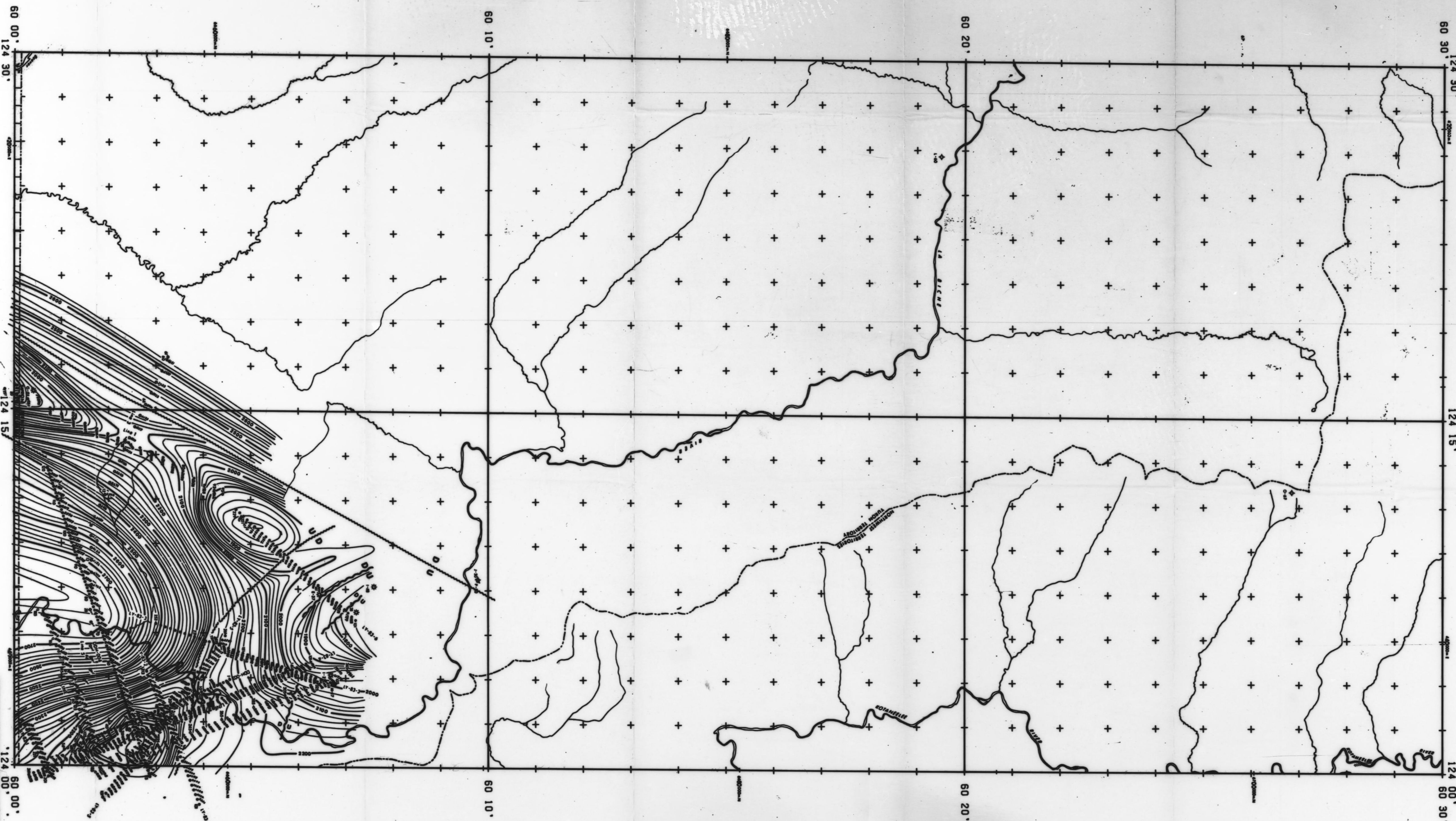
0129-655-1E

LINE NO. A P

PART NO.

OF

R.R. 10X



Geological	
LARD YT	
STRUCTURE IN TIME	
TOP OF MIDDLE DEVONIAN	
CARBONATE	
DATE	1985
BY	1000
SCALE	1:1000
REVISION	

0129-655-1E