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FINAL
GEOLOGICAL REPORT
ON
"THE DAWADUNI RIVER AREA"
N.W.T. (Canada)
IMPERIAL OIL LTD., CANOL PROJECT
Assignment No. 13

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Date submitted: February 26, 1944.

Read and accepted by: *W. A. Link*

Date: 3/3/44

Mr. Link
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Scale 1" = 200' |

FINAL GEOLOGICAL REPORT

ON

"THE DAHADINNI RIVER AREA"

ABSTRACT

A geologic survey was made of approximately eighty miles of area adjacent to the Dahadinni River, from a point in the Dahadinni mountains to the Mackenzie River. Several anticlinal folds were observed in the mountainous area where they make up the Dahadinni Anticlinorium. To the east of the mountainous area is the flat relief of the Synclinal region. Near the Mackenzie River are two potential structures, "Crescent Ridge" exposing Norman Series outcrops, and "Sandstone Ridge" exposing lower Cretaceous outcrops. A more detailed geologic survey is recommended for Crescent Ridge which warrants a wildcat location should the Bear Rock formation prove productive in the area to the southwest of Norman Wells. Seismic exploration along the Mackenzie River might prove or disprove the presence of a structure at Sandstone Ridge.

Chapter I

INTRODUCTION

A geologic survey was made of the Dahadinni River and adjoining areas, from a lake in the foothills of the Mackenzie Mountains, seventy miles downstream to where the Dahadinni River flows into the Mackenzie River. Party "J" for this Assignment No. 13 was composed of Lt. Gordon D. Bath, geologist; Steve S. Cosburn, assistant geologist; and James E. Baugh, helper.

The party was flown by Norseman pontoon airplane to "Big Mac" Lake, a long narrow lake in the rolling topography just east of the Dahadinni uplift. A five mile portage was made through the mountains from the lake to the Dahadinni River from where a small canoe and supplies were lined downstream to the Mackenzie River. The party was picked up at the mouth of the river by plane and returned to Norseman Wells. The party left July 15, 1943, and returned August 7, 1943.

Accessibility

The Dahadinni area can be reached by winter road, or should it prove advisable to drill, or otherwise develop the area, by a temporary summer road built in the river valley. The two most interesting structures are only a short distance from the Mackenzie River, "Sandstone Ridge" being three miles, and "Crescent Ridge" thirteen miles. Should a test be desired further west in the deeper part of the structural basin, a winter road could be built over the flat muskeg area where the only difficulty expected would be the crossing of small ravines and tributaries of the Dahadinni River.

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Acknowledgment

Reference is made to the Canadian Geological Survey Summary Report, 1923 B; Mackenzie River Area, District of Mackenzie, N.W.T., Dr. G. S. Hume.

Chapter II

TOPOGRAPHY

The source of the Dahadinni River is in the high mountains well back in the Mackenzie Mountains. In recent geological time the river has lost most of its watershed to the Redstone River. The headwaters of the Redstone have steadily advanced at the foot of these high mountains until they have intercepted much of the Dahadinni drainage.

A topography of rolling hills, with occasional northwest trending prominent ridges is found in the twenty miles between the high mountains and the Dahadinni anticlinorium. This anticlinorium is a relatively young uplift that forms a narrow mountainous belt ranging from 1500 to 2500 feet in elevation. The river finally cuts its way through the anticlinorium after paralleling the mountainous belt for over twenty miles.

Steep slopes are found on the northeast flank of the anticlinorium facing the Mackenzie River. With the exception of the rolling topography and high hills surrounding Big Mac Lake, there is an abrupt change in relief beyond the steep slopes. From here, thirty-five miles to the Mackenzie River, the valley is broad with gentle slopes and the river meanders in a flood plain, continually changing its course. The river is locally entrenched into a valley averaging more than one mile in width by reason of its steep gradient and regional uplift in Recent geological time.

"Crescent Ridge," located thirteen miles from the Mackenzie River, is a local topographic high rising to over 1200 feet above the adjacent river level. The ridge extends a few miles to the southeast, but does not continue to the northwest beyond the Dahadinni River. A positive area, which includes a prominent ridge, can be seen at a point eight to

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twelve miles to the northwest that may possibly be related in age to
Crescent Ridge.

Chapter III

STRATIGRAPHY

Very few rock outcrops were found along the Dahadinni River in the region from the mountainous area to the Mackenzie River. Only one outcrop of Cretaceous sandstone was found between the mountainous area and the Norman Series limestone outcrops of Crescent Ridge. Lower Cretaceous sandstones and shales were found between Crescent Ridge and the Mackenzie River.

Outcrops of Silurian and Devonian age were found in the mountainous area. It was necessary to make a portage through a pass in the mountains which afforded an opportunity to study these older rocks for the presence of reservoir beds and possible producing horizons.

The following is an abridged stratigraphic table of formations found in this area:

Age	Formation	Thickness (feet)	General Description
Cretaceous	Slater River	1100 plus	Basal conglomeratic sandstones and interbedded shales underlying dark green shales.
	(Norman Series	1000 (estimated)	20 feet greenish grey limestone overlying grey shale is only outcrop seen.
	(Fort Creek	1000 (± 150')	Soft grey shales overlying dark to black carbonaceous shales.
Devonian	(Beavertail	100	No "Kee Scarp" limestone horizon. Massive, dark grey limestone.
	(Ramparts	925	Grey to black limestones and dolomitic limestones, and interbedded grey shale.
	(Bear Rock	420 plus	Brecciated, grey to black dolomite.
Silurian		330 plus	Bedded grey to black dolomites and limestones and interbedded thin, black shale beds.

SILURIAN

The top of the Silurian was taken at the first appearance of bedding in the lower section of the brecciated Bear Rock dolomites. Only 330 feet of dolomitic limestones and limestones were observed. No evidence of porosity could be found. Occasional beds of black, banded dolomite and interbedded thin, black shale beds with calcite and anhydrite along fractures were observed.

DEVONIAN

The Bear Rock Formation consists of brecciated, porous, gray to black dolomite and limestones with secondary calcite and anhydrite. Bitumen is found in various horizons throughout the formation, and rocks from these horizons emit a strong odor of hydrogen sulphide.

The Ramparts Formation consists of 925 feet of interbedded limestones and shales. The massive, dark grey, fossiliferous limestones of the upper section grade into the black, crystalline, dolomitic limestones of the lower part of the formation. Thin limestone beds are persistent throughout the nonresistant, interbedded shale series. A resistant 60 foot bed of dark grey, dense limestone with characteristic upper Ramparts fossils is persistent throughout the mountainous area traversed.

The Beavertail Formation was seen in only two places, and consists of 100 feet of dark grey massive limestone, sparsely fossiliferous with coral predominating.

The Fort Creek Formation, approximately 1000 feet thick, was found to consist of two separate lithologic units, the upper soft, grey shales and the more resistant lower carbonaceous, dark grey to black shales. No "Reef" limestones were found in this formation.

Chapter IV

STRUCTURE

General

The Dahadinni Mountains are formed by the presence of a large anticlinorium whose axis strikes essentially north-south. The anticlinorium contains three large asymmetrical anticlines and several smaller folds and regions of more local disturbances. Most of these structures plunge to the north.

To the east of the Dahadinni Mountains is the synclinal region indicated by the steep eastern flank of the anticlinorium. No outcrops are present showing possible irregularities or structures in this region. The resistant outcrops of Crescent Ridge, and the regional dip of the basal Cretaceous sandstones of Sandstone Ridge, form structures to the east of the synclinal region.

Crescent Ridge

The uplifted area forming Crescent Ridge is irregular with steep slopes; the resistant nature of the limestone cap having protected the underlying softer sediments from rapid erosion. There was not sufficient field evidence to determine if the uplift came as the result of a fold or a fault. A detailed map, with 100 foot surface contours, has been prepared from aerial photos of Crescent Ridge and is included in this report.

The most probable structural interpretation of Crescent Ridge is that of a fold whose axis strikes and plunges to the northwest. No evidence of closure to the southeast of such a possible structure was found. The second solution is a fault striking more to the north, the faulted-down side being to the west.

Had it been possible for the party to have been equipped with a plane table, a survey of a more detailed nature could have been made of the structure, particularly of the region to the southeast.

Sandstone Ridge

The gentle regional west dips of Cretaceous sandstone outcrops near the Mackenzie River suggest a structure in this vicinity. To the east the resistant sandstone bed has been removed by erosion, and no evidence of reversal could be found; the area being covered with thick Recent sediments.

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Chapter V

CONCLUSIONS AND RECOMMENDATIONS

Crescent Ridge is a structure worthy of consideration as a possible oil structure. Should the Bear Rock formation prove productive in the area to the southeast of Korean Wells, Crescent Ridge would warrant a wildcat location. It is regrettable that outcrops could not be found to the west of the structure which might clarify the question of the southeast flank of a possible fold. Further information may be gained by working the structure with a plane table, or by extending to the southwest the topographic map in this report by using oblique photographs of the tri-metric flights. Seismic reflection work might also throw more light on the problem.

Sandstone Ridge

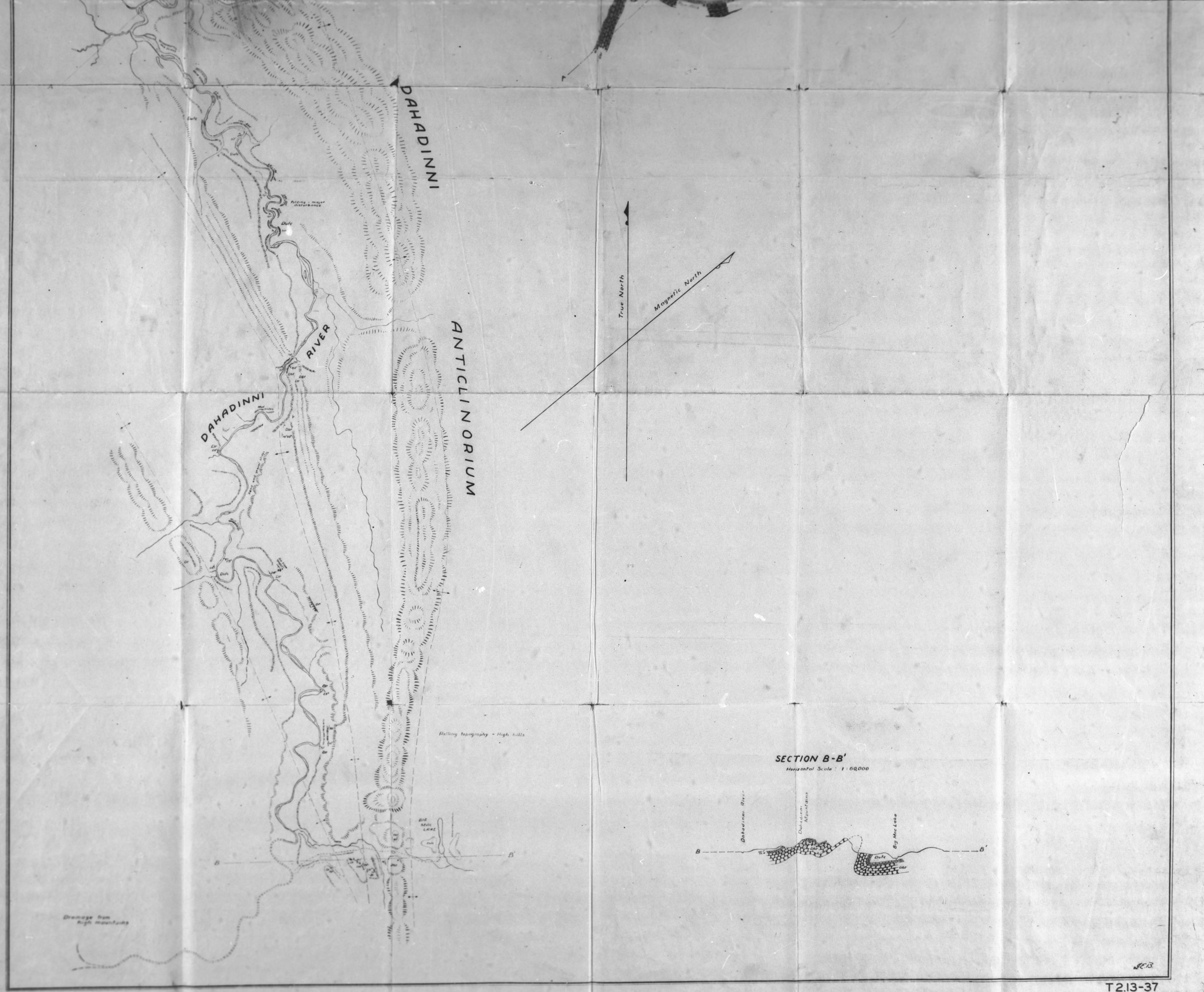
It is believed that Sandstone Ridge warrants seismic exploration. The shooting of a few holes from a point three miles up the Dahadinni River, down the Dahadinni, and up the Mackenzie River to the Blackwater River, should prove or disprove the presence of a structure. The thick deposits of Recent gravels may make it difficult to obtain seismic reflections, and will also probably hamper seismic reflection work.

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FOSSIL IDENTIFICATION - DAHADINNI RIVER

Lt. G.D. Nair

<u>Site</u>	<u>Location</u>	<u>Fossil</u>	<u>Accession No.</u>	<u>Age</u>
Rock fall	Dahadinni Rvr.	Chonetes	42974	Devonian
		Alveolites	42975	"
		Crinoidal ls	42976	"
Loose Ridge Cliff float	Dahadinni Rvr.	Atrypa reticularis	42997	"
		Syringopora	42998	"
		Cladopora	42999	"
Ridge limestone	Dahadinni Rvr.	Hypothyridina	41046	Very Devonian
		suboides		
		Stromatoporeid	41047	"
		Atrypa reticularis	41048	"
		Gastropod	41049	"



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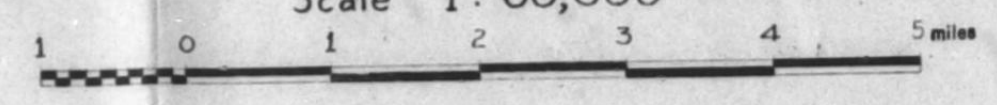
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AREAL GEOLOGY DAHADINNI RIVER

PARTY . . . J
Lt. GDBath
Steve S Cosburn
James E. Baugh
15 AUGUST 1943
Scale 1:60,000

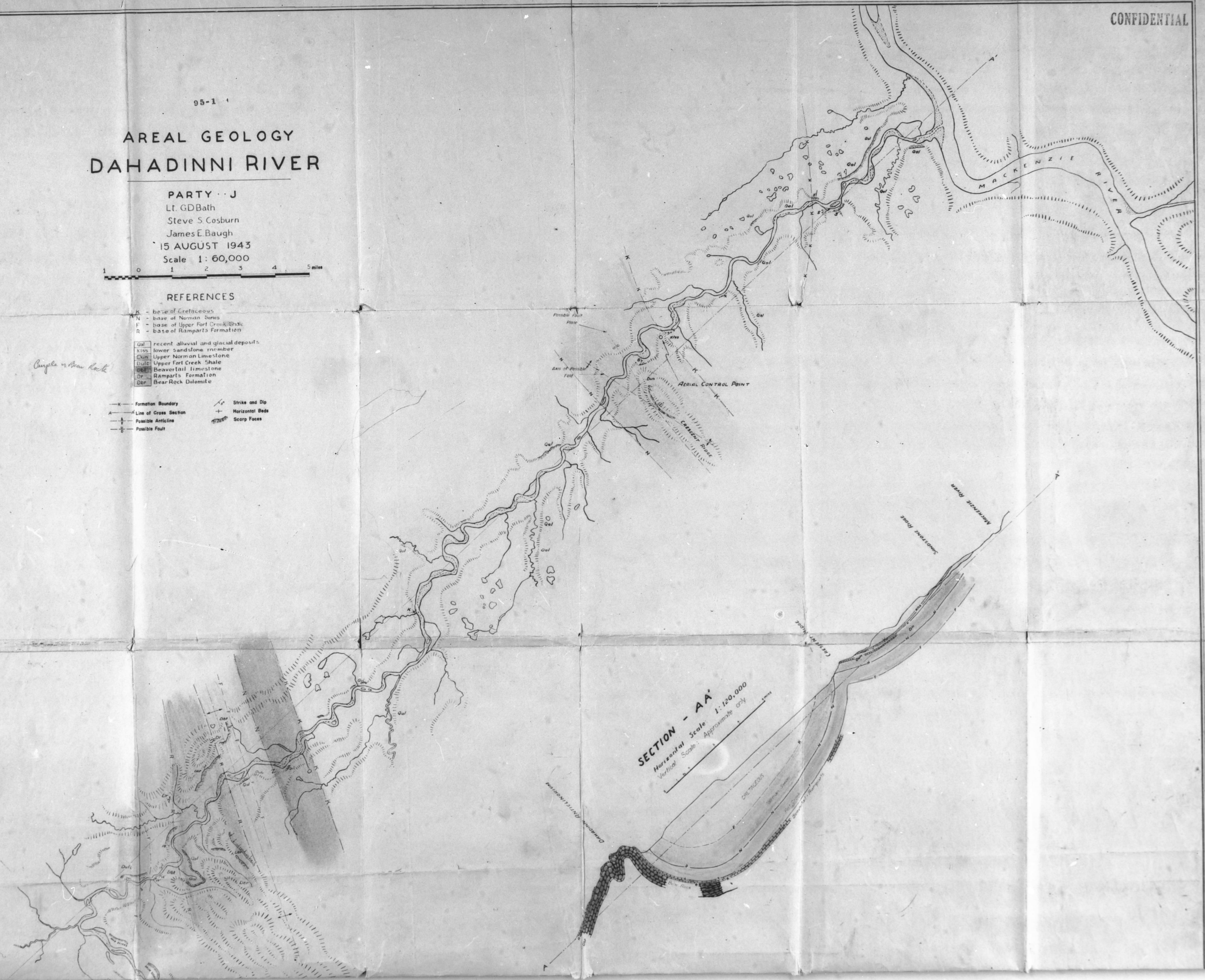


REFERENCES

- K - base of Cretaceous
- N - base of Norman Series
- F - base of Upper Fort Creek Shale
- R - base of Ramparts Formation
- Qa - recent alluvial and glacial deposits
- Nss - lower sandstone member
- Ulm - Upper Norman Limestone
- Dulc - Upper Fort Creek Shale
- Bea - Beaverhill Limestone
- Ramp - Ramparts Formation
- Dr - Bear Rock Dolomite

- Formation Boundary
- Line of Cross Section
- Possible Anticline
- Possible Fault
- Strike and Dip
- Horizontal Beds
- Scarp Faces

Change in Base Rock



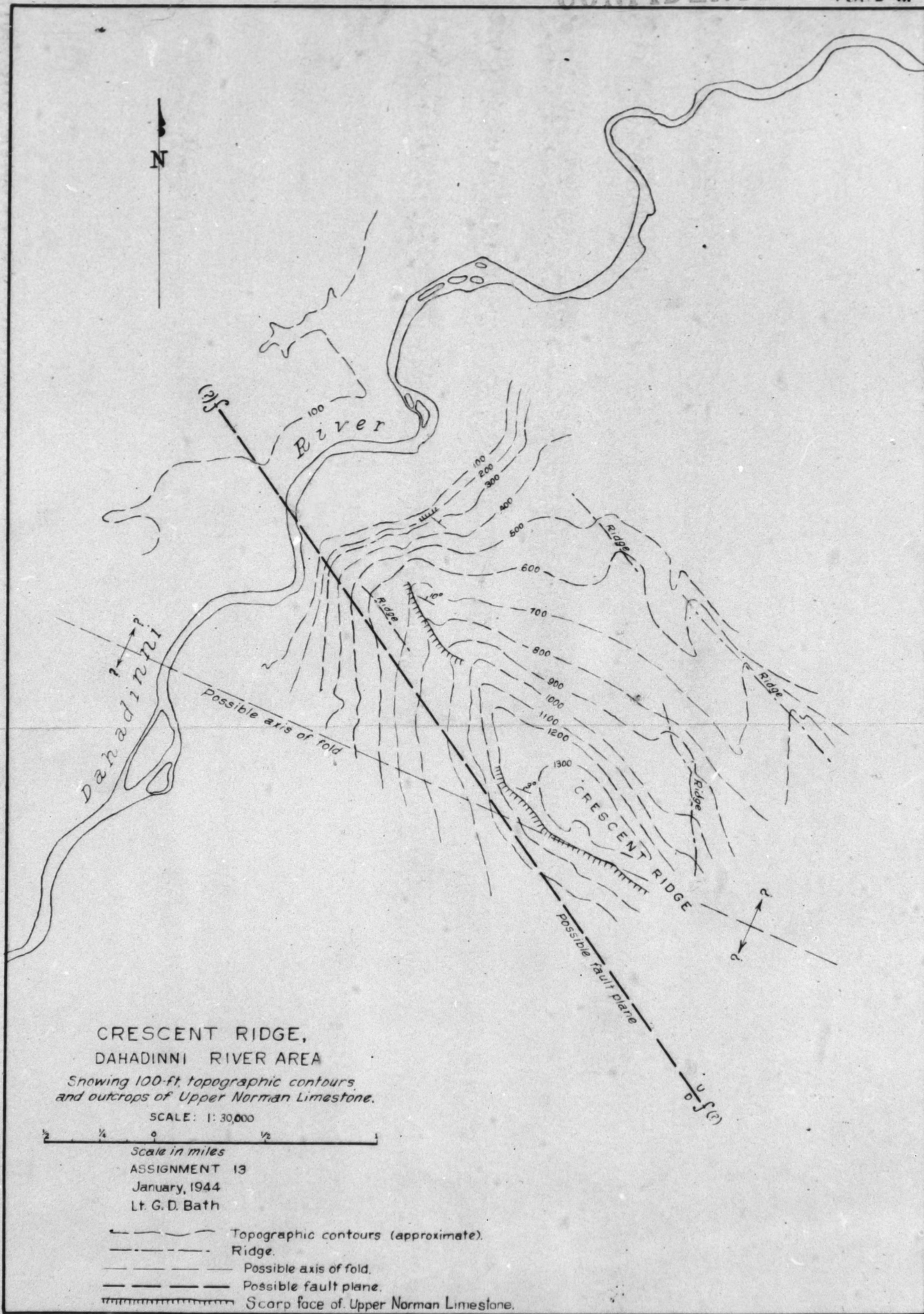
SECTION - AA'
Horizontal Scale 1:120,000
Vertical Scale Approximate only



30x

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PLATE III



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