

NEB Operation Identifier Number: 9237-H109-001E

Summit – Keele Field Work Report

Surface Geology Mapping

North West Territories

Lat. 63 50' to 64 50' and Long. 124 30' to 126 40'

June 24 to July 30th, 2006 and Sept. 5-11, 2006

**Husky Oil Operations Ltd. (operator)
Northrock Resources Ltd.
EOG Resources Ltd.
International Frontier Ltd.**

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July 5, 2007

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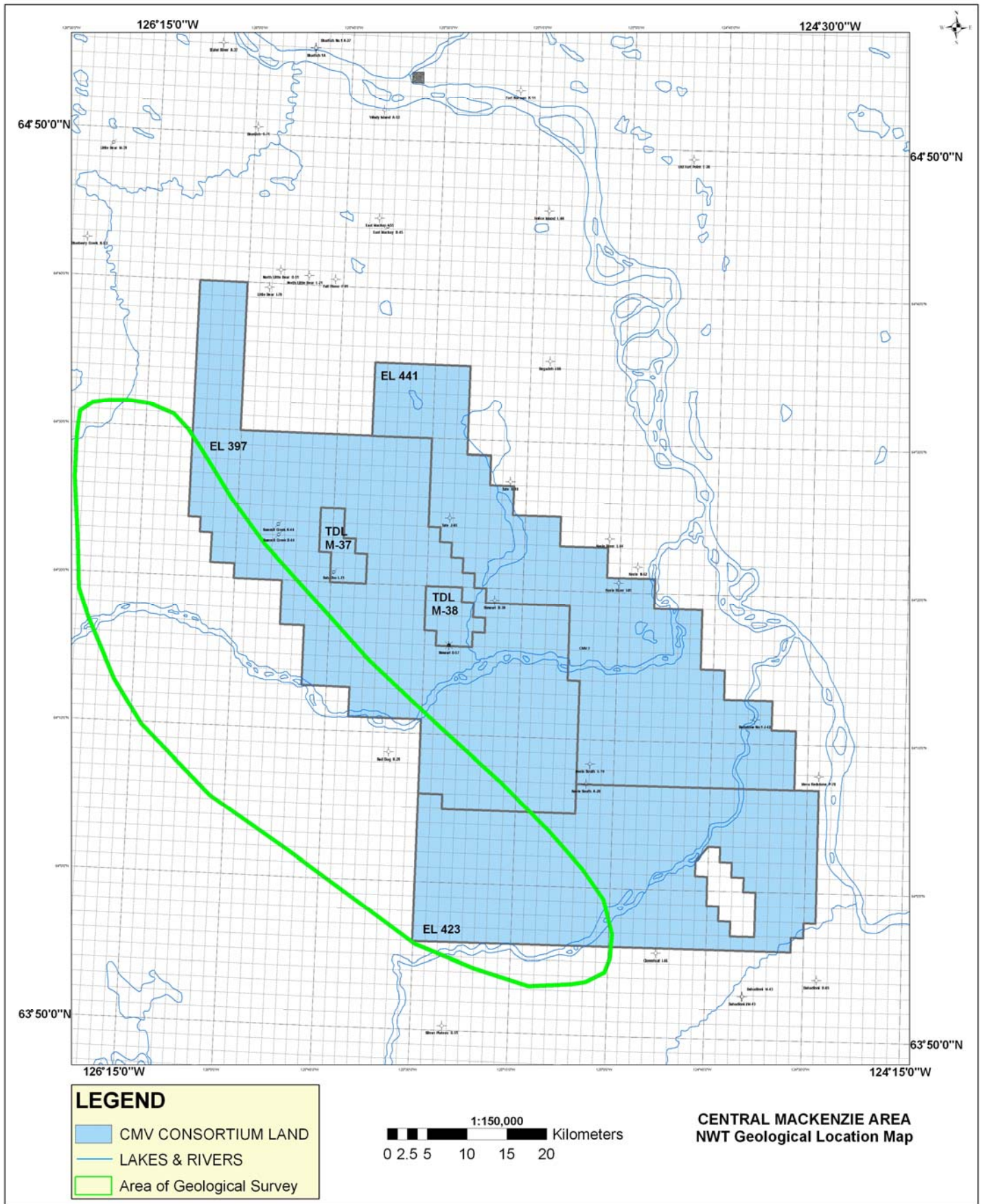
Abstract

SUMMIT KEELE FIELD WORK

Detailed structural and stratigraphic mapping was undertaken along the Summit Anticline, on the eastern flank of the Mackenzie Mountains. Geologic mapping at a regional scale was undertaken in the vicinity of the Summit Anticline to understand the structure and stratigraphy of the Central Mackenzie Valley and its relationship to formations outcropping on the Summit Anticline. The mapping program commenced on June 24, 2006 and finished on Sept. 10, 2006.

The geologic mapping completed in the area of the Summit Anticline will form the basis of a Masters Thesis in Geology by Adriana Taborda at the University of Calgary. The thesis will be completed in the first quarter of 2008.

Please note all UTM or lat/long coordinates are given in NAD 83 zone 10



Statistical Summary

Date: June 23 to June 28, 2006

Participants:

Husky Energy Inc.: Ken Hansen, Dr. John Weissenberger, Dr. Stuart Tye, Louise Klatzel-Mudry

University of Calgary: Adriana Taborda and field assistant

Wildlife Monitor: Joe Horassi

Program Summary:

June 23: travel day, orientation

June 24-27: orientation and review of stratigraphy on Summit Anticline and surrounding area. Stratigraphic sections of the Devonian Imperial, Canol, Hume, Headless, Landry, Arnica, Bear Rock, Delorme and Silurian Mt. Kindle Formations on Summit Anticline and adjacent area observed. Outcrops of Cretaceous Little Bear were also mapped.

June 28: travel day

Base of Operations: Norman Wells

Helicopter: Canadian Helicopters A-star based in Norman Wells

Field mapping: For field orientation and stratigraphy review, Geological Survey of Canada descriptions were reviewed and discussed; at new locations GPS coordinates, structural orientation and a stratigraphic description were recorded.

Date: June 28 to July 30, 2006

Participants:

University of Calgary: Adriana Taborda and field assistant

Wildlife Monitor: Joe Horassi

Program Summary:

June 28-July 30: Adriana Taborda mapped Summit Creek Anticline for Masters Thesis.

July 31: travel day

Base of Operations: Little Smith Seismic Camp

Helicopter: Canadian Helicopters A-star based at seismic camp.

Field mapping: At each location GPS coordinates, structural orientation and a stratigraphic description were recorded.

Date: September 5-11, 2006

Participants:

Husky Energy Inc.: Ken Hansen, Dr. John Weissenberger, Dr. Stuart Tye, Ian Zapfe -Smith, Louise Klatzel-Mudry and David Acton

University of Calgary: Adriana Taborda

Wildlife Monitor: Peter Horassi

Program Summary:

September 5: Travel day and review of program objectives at Little Smith Camp.

September 6 and 7: Summit Creek Anticline review with Adriana Taborda for Masters Thesis. Features observed on the Summit Anticline were large and small scale structures and the stratigraphic sections of the Devonian Arnica, Bear Rock and Delorme Formations.

September 8, 9, 10: Regional Mapping of Cretaceous and Devonian Stratigraphy in Bracket Basin from Little Bear River (northern point) to the Redstone River (southern point).

September 11: travel day, left camp at 10:00am on North-Wright Twin Otter to Norman Wells, arrived Calgary at 11:00pm.

Base of Operations: Little Smith Seismic Camp

Helicopter: Canadian Helicopters A-star based at seismic camp.

Field mapping: At each location GPS coordinates, structural orientation and a stratigraphic description were recorded. Where exposures of significant Cretaceous strata were encountered, detailed measured sections were completed.

Production Data Summary

The summer of 2006 was spectacular in terms of weather and general working conditions in the Mackenzie Valley; only one day was lost in July due to bad weather. Snow and high water in creeks and rivers did not prohibit access to any areas despite commencing the field season in June. The 6 day review of the field area in September was remarkably successful due to the perfect warm summer weather that persisted the entire week.

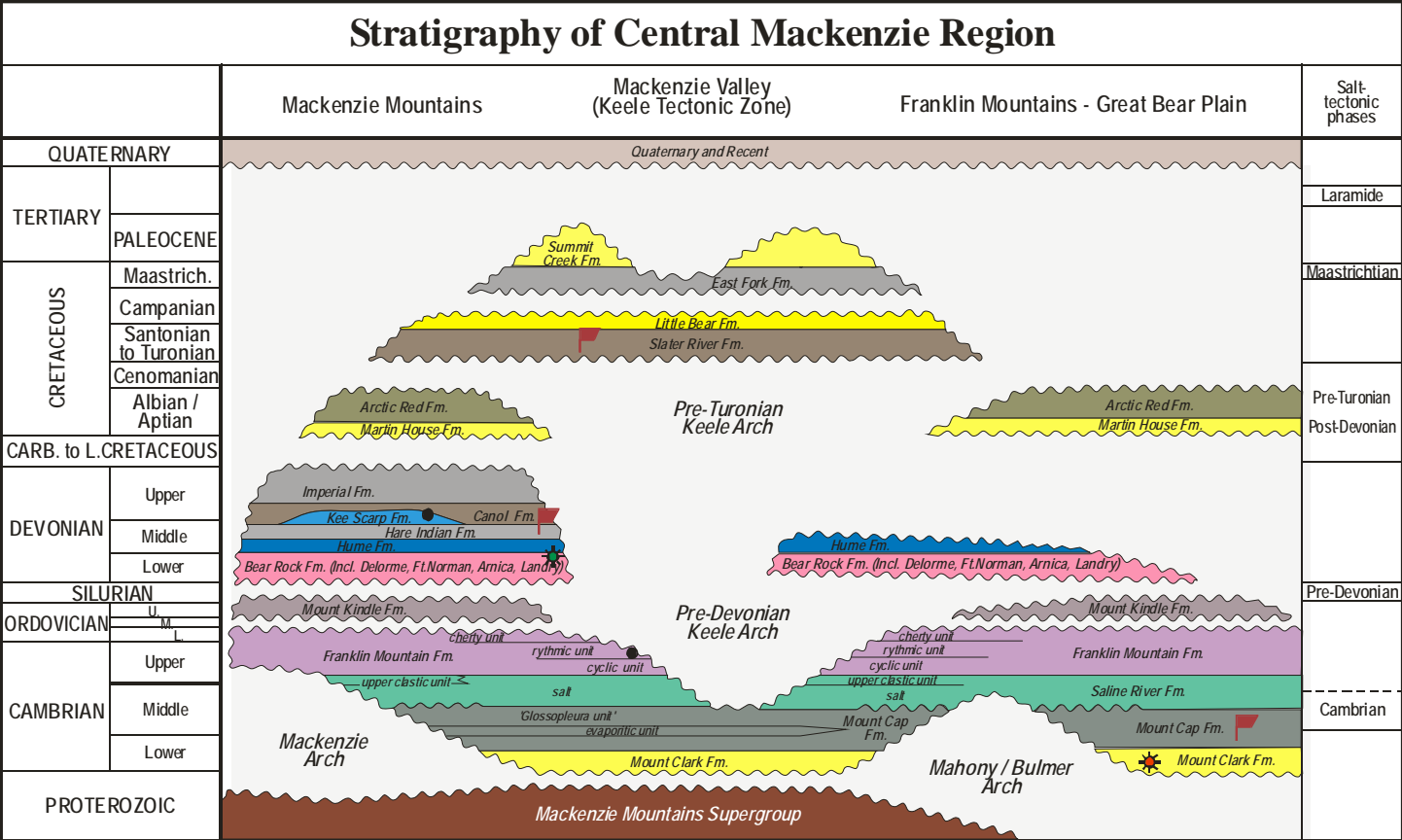
During the main mapping program in July, five field days were lost due to the unavailability of a helicopter to transport the field party or a wildlife monitor to accompany the field party. This time was used to compile field notes and maps in the office.

Description of field Procedures

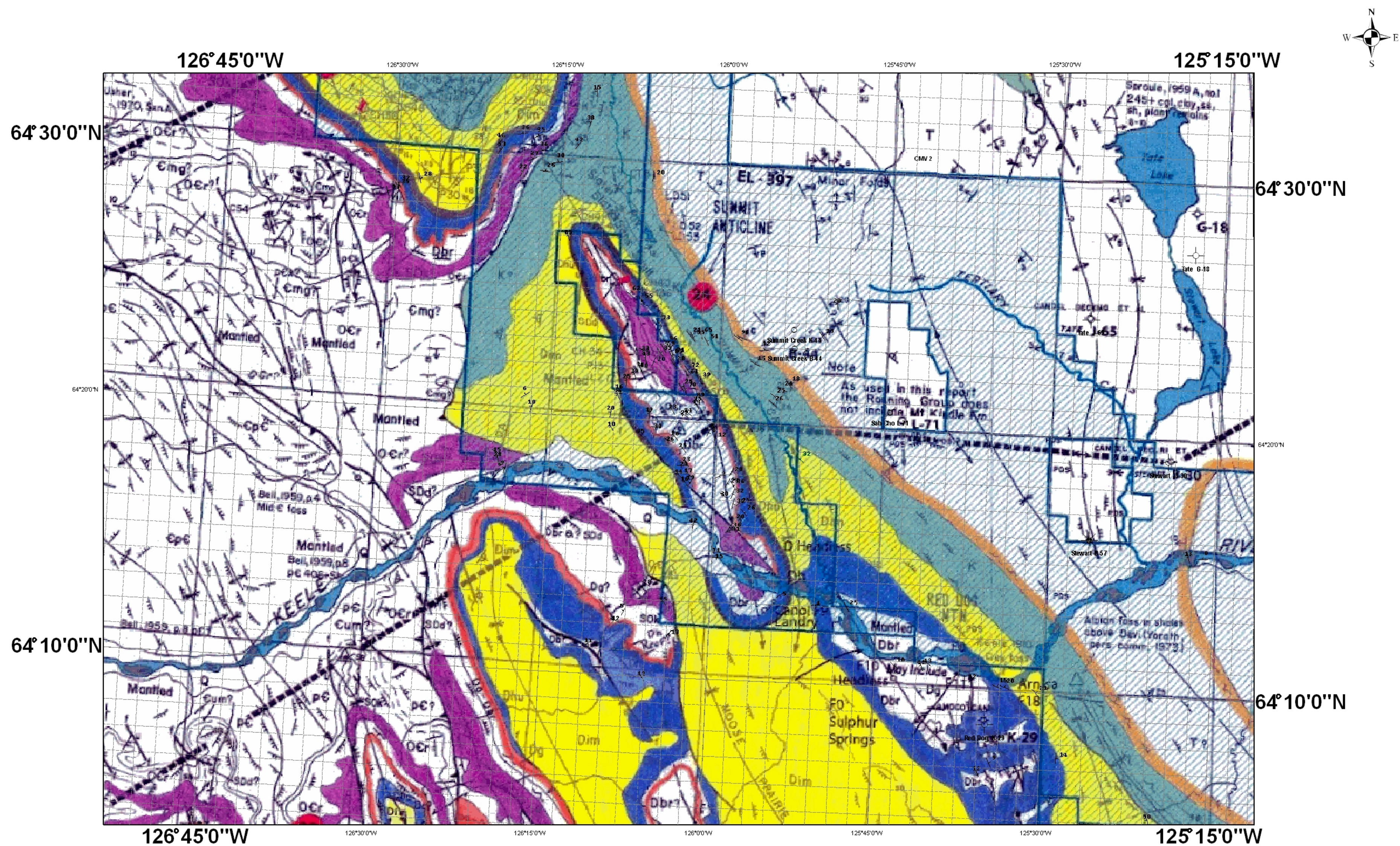
Each field day started with a Safety meeting. This included a review of helicopter safety, wildlife sightings, hazards that might be encountered by field parties and a review of emergency procedures.

The field mapping program was designed to collect data as the basis for scientific research to complete a Masters thesis in structural geology. In the field, rock outcroppings were described in terms of lithology and structural features; structural orientations were taken and a GPS location was recorded. Photos were commonly taken and rock samples were occasionally taken. Traverses were made along the geologic feature known as the Summit Anticline and in the surrounding areas to correlate the stratigraphy and structure.


Full descriptions and correlations of the geology will be published in the Master's Thesis by Adriana Taborda in early 2008, at the University of Calgary.



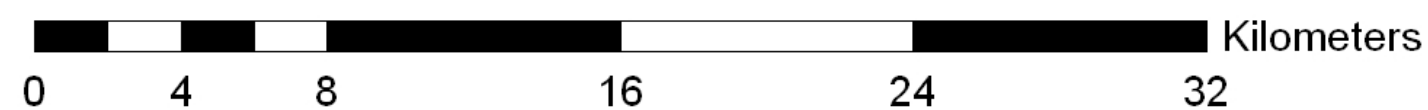
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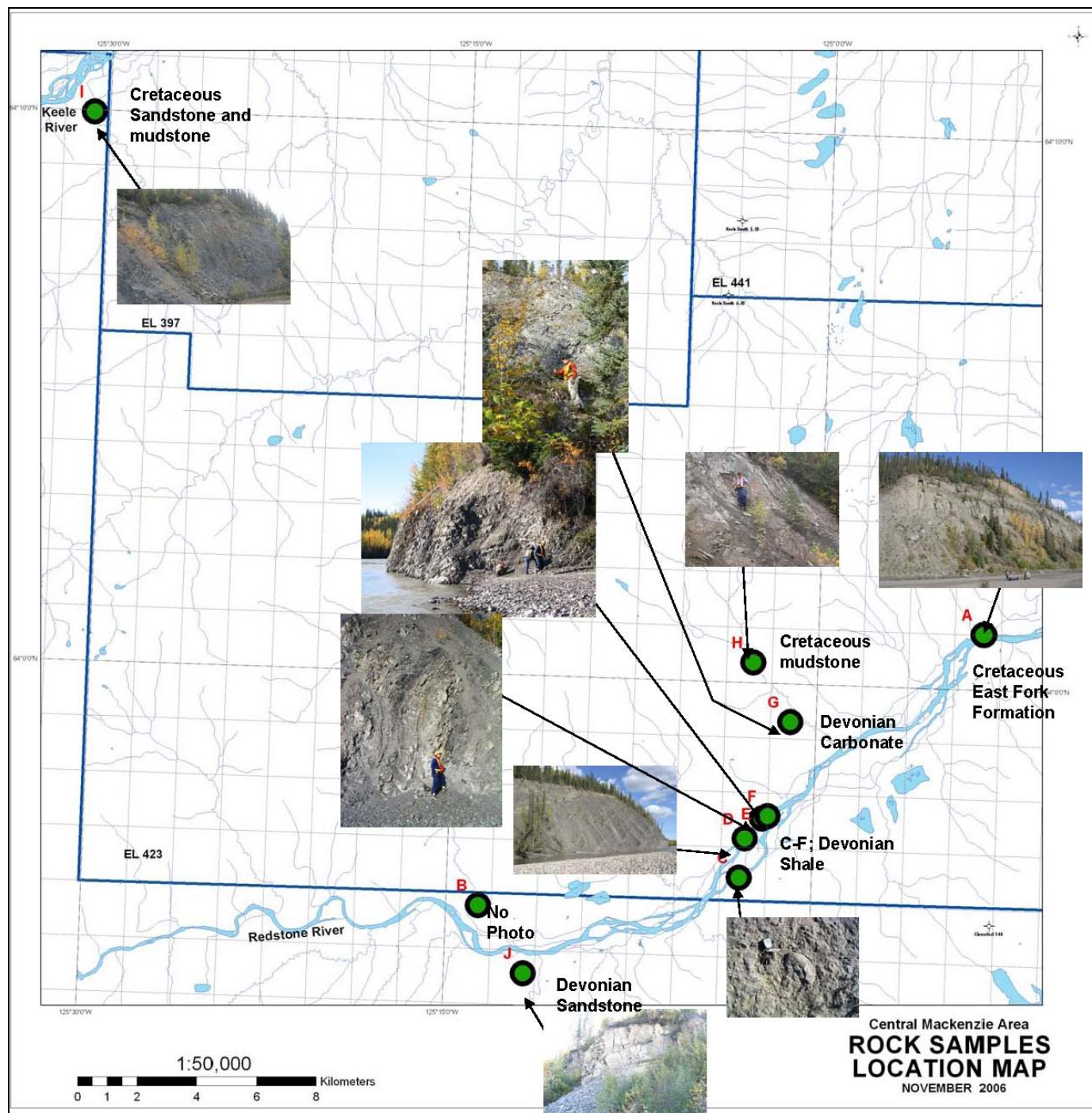
LEGEND

-  CMV CONSORTIUM LAND
 LAKES & RIVERS
 STRUCTURAL ORIENTATION:
 Strike and Dip

1:150,000



Sample Locations South of the Summit Anticline



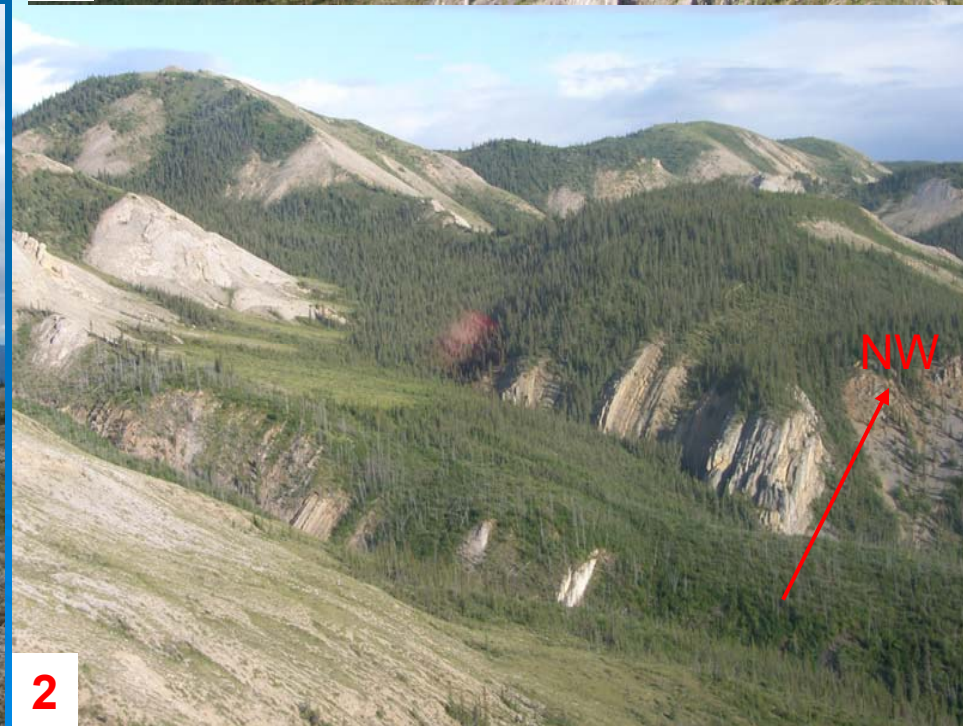
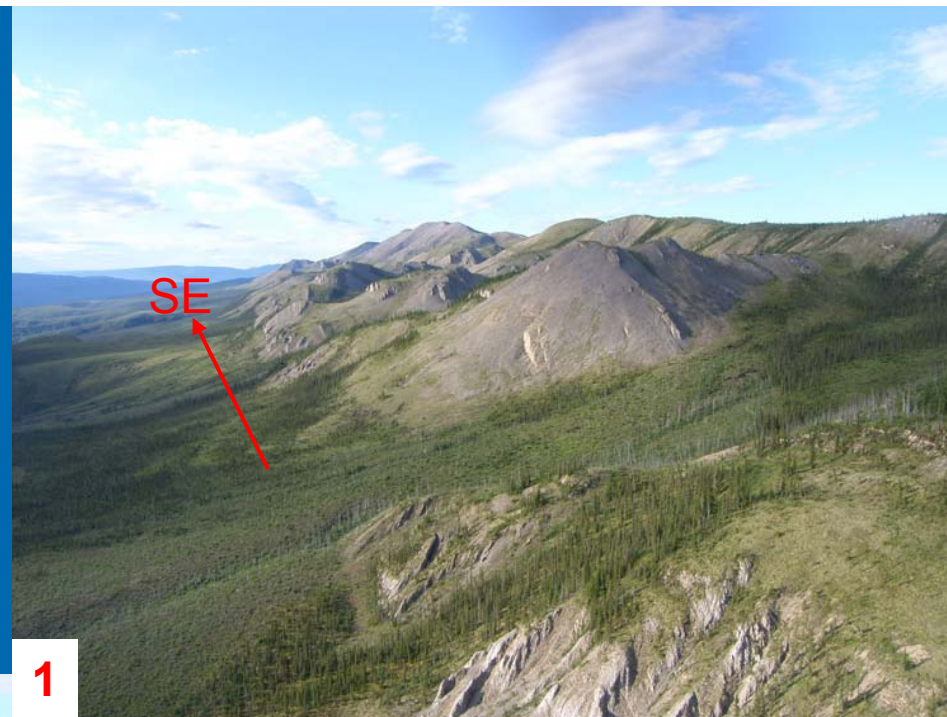
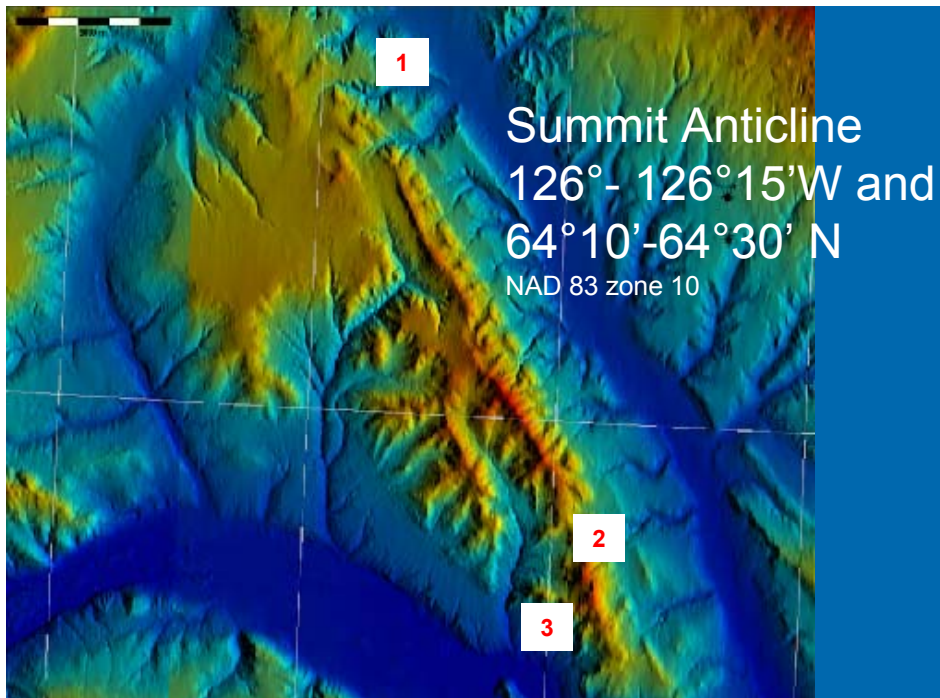
LIST OF ROCK SAMPLE LOCATIONS

Location	X NAD83 zone10	Y NAD83 zone10	Lithologic Description
A	407773	7100269	Sandstone very fine grained
B	390674	7089508	shale, silty, medium grey
C	398693	7091468	Shale, silty, medium to dark grey
D	399726	7093462	Shale, silty, medium to dark grey
E/F	400512	7094167	Shale, medium to dark grey
G	400461	7097365	Limestone, grey, wackstone to packstone, crinods, rare corals
H	400033	7099351	Shale, brown, weathered
I	377926	7117948	very fine grained sandstone with calcite and dolomite cement
J	392168	7089508	Sandstone, fine grained
Summit Anticline and Vicinity			
Little Bear Fm	346517	7161205	Sandstone, very fine to medium grained
Arnica Fm	356106	7133791	Dolostone
Arnica Fm	356241	7132322	Dolostone
Bear Rock Fm	356170	7132296	Limestone breccia

Summit Anticline (looking north)

approximately 126° W and $64^{\circ}10'$ N, NAD 83 zone 10





Bear Rock Formation Outcropping on Summit Anticline (looking south to Keele River)





Bear Rock Fm

1. Bear Rock – on flank of Summit Anticline looking north
2. Bear Rock – Arnica contact, SE plunge Summit Anticline
3. Bear Rock “hunchback” topography

Dominant lithology is limestone breccia



2



3

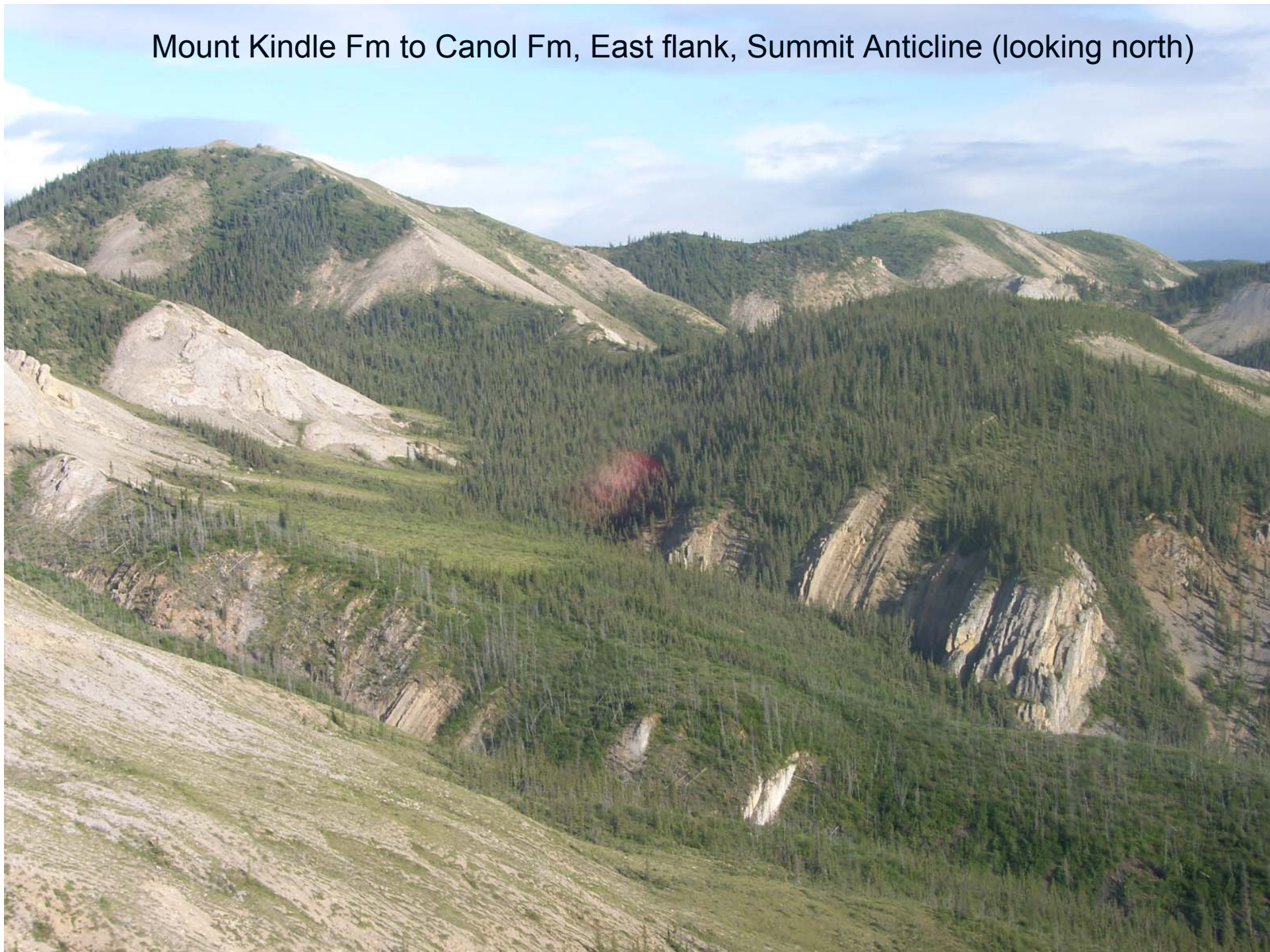
Bear Rock Breccias



Arnica Deformation Summit



Mount Kindle Fm to Canol Fm, East flank, Summit Anticline (looking north)



Keele River Tributary

Location I; UTM: 377926.58 7117948.44

NAD 83 zone 10



Lower Little Bear Formation

Depositional environment interpreted shallow marine deposits, stacked pro delta and delta front facies.

Porosity (5%) in sandstones

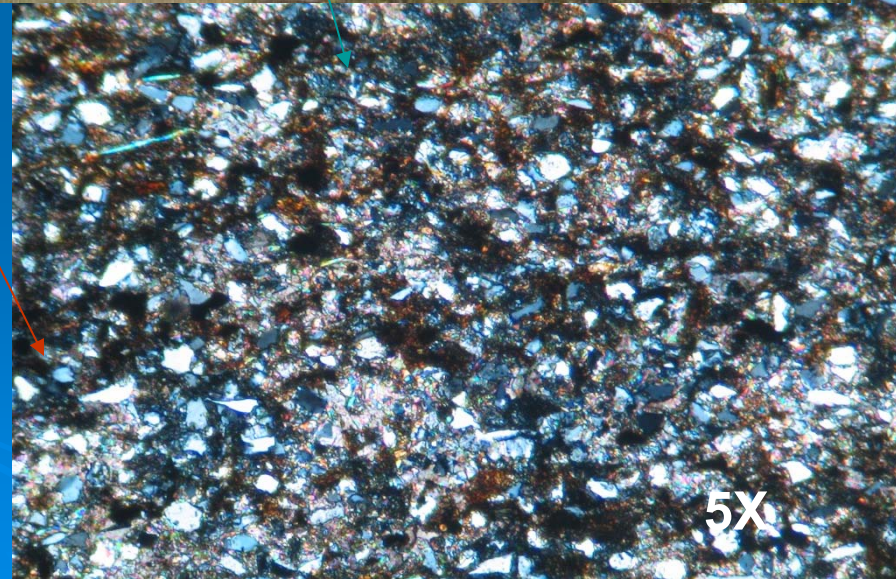
Strike and dip 320/25

Keele River Tributary

Cretaceous Lower Little Bear Fm.

UTM: 377926.58 7117948.44 NAD 83 zone 10

Very fine grained sandstone
Qtz grains vary in size 3-5mm.
Calcite and dolomite cement.
5% porosity



West Flank Summit Creek

Cretaceous Little Bear Formation

UTM: 346517.64 7161205.08

Structural orientation: $180^{\circ} / 15^{\circ}\text{W}$



very fine grained to medium grained sandstone.



Cretaceous is poorly exposed and difficult to access due to heavy forest cover.



Upper fine grained to medium grained, sandstone;

trace fossils, macaronichnus and diplocraterion (U –shaped burrows), indicate shallow ($\leq 1\text{m}$ water) marine (fore shore) environment.

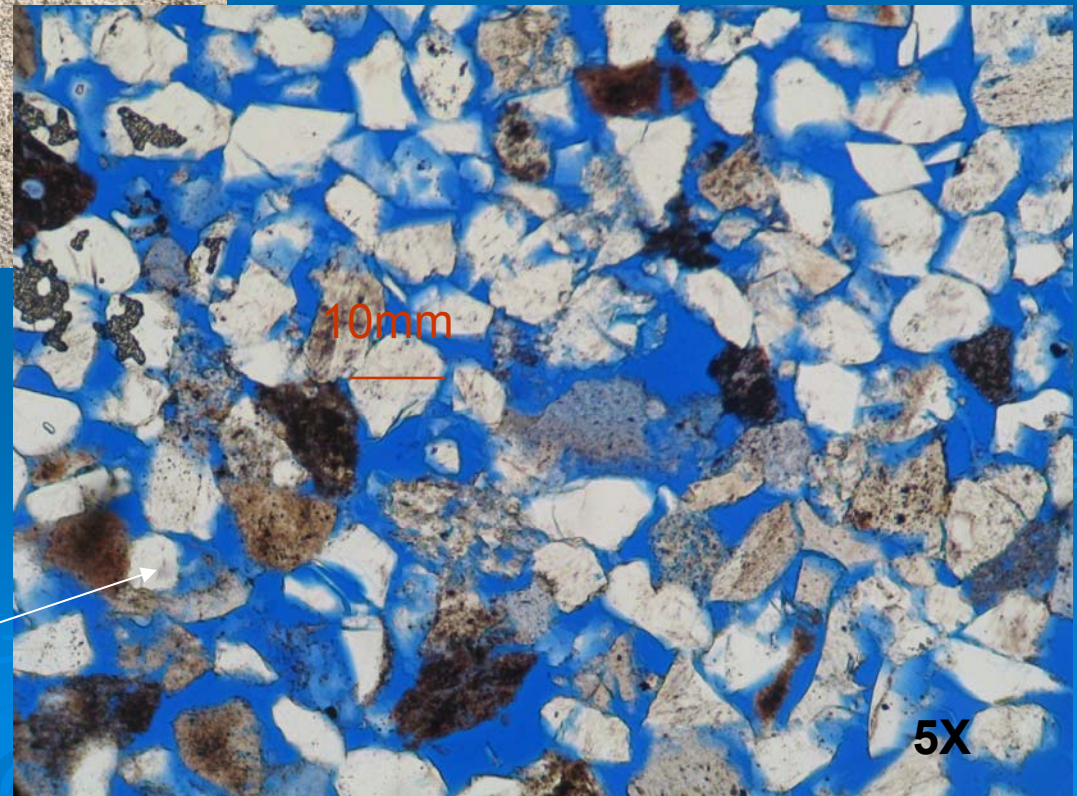
Small conglomeratic lens between sand units also suggests fore shore to upper fore shore marine environment probably proximal to fluvial environment.



Fine to medium grained sandstone. Planar and cross bedded laminations



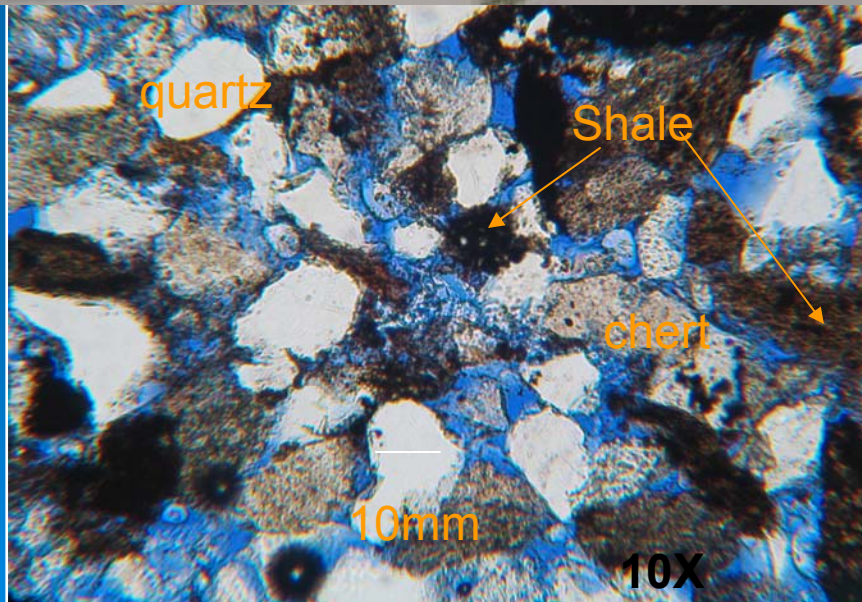
Thin section:
Avg. grain size 10mm
25% visual porosity,
angular to subrounded
quartz and chert grains,
angular argillaceous
fragments.



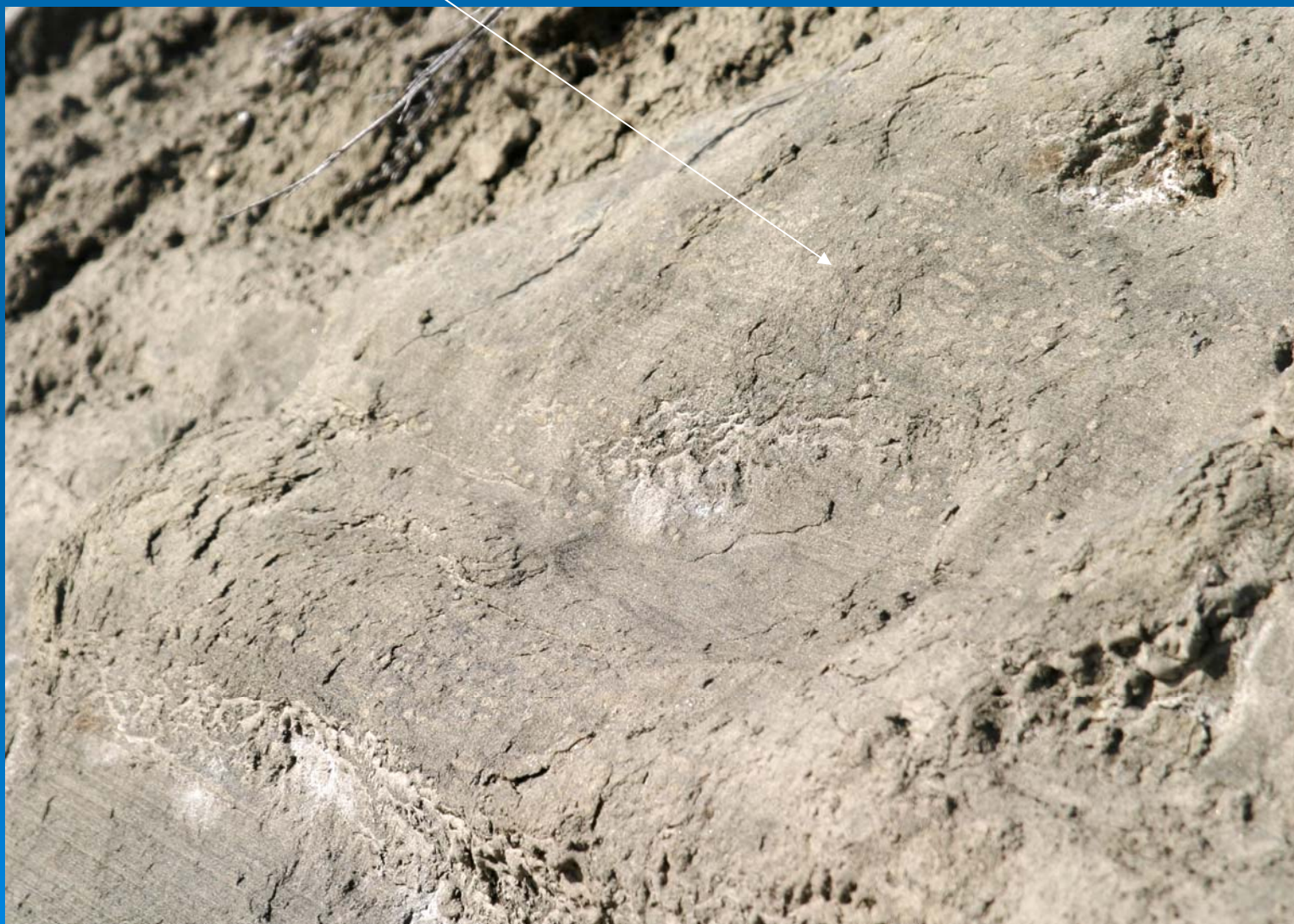
East Fork Fm. Upper Cretaceous Location A Redstone River

**UTM: 407773 7100269 NAD
83 zone 10**

**Very fine grained sandstone,
well rounded to subangular
quartz grains, abundant shale
frags, poorly cemented.**

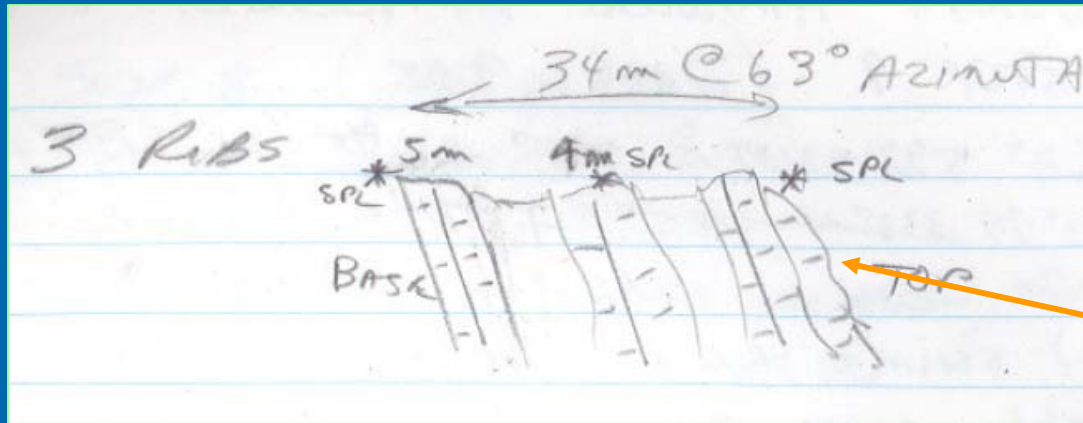


Abundant , well preserved macaronichnus trace fossils indicate shallow ($\leq 1\text{m}$ water) marine environment (foreshore).



Devonian Carbonate Outcrop

Location G UTM:400460.59 7097365.38 NAD 83 zone 10



3 distinct ribs of limestone with interbedded mudstone beds. Resistive limestones vary from grainstone to muddy limestone. Top rib is coarse grainstone with abundant colonial (thamnopora) and solitary corals, crinoids, mollusks and broken bivalve shells

Structural orientation: $319^{\circ}/8^{\circ}\text{N}$, $308^{\circ}/70^{\circ}\text{N}$

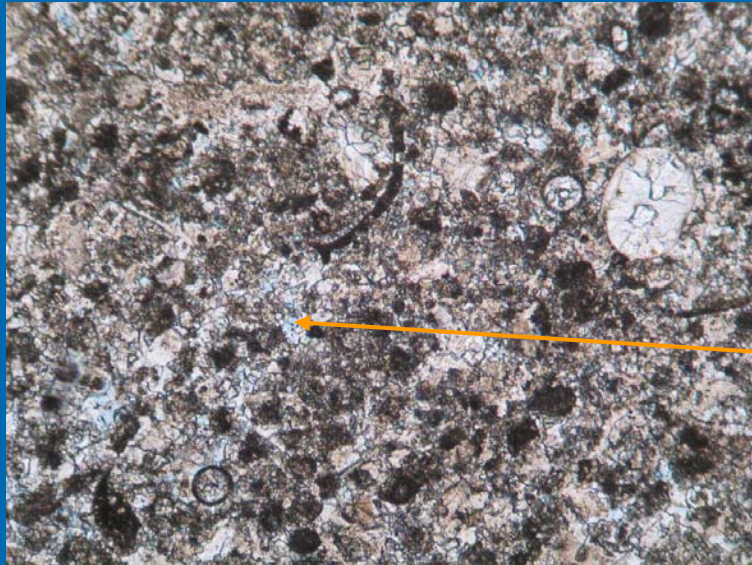
Calcite fractures: $260^{\circ}/73\text{N}^{\circ}$



Steeply dipping
bedding plane surface

Devonian Carbonate outcrop

Fossiliferous limestone

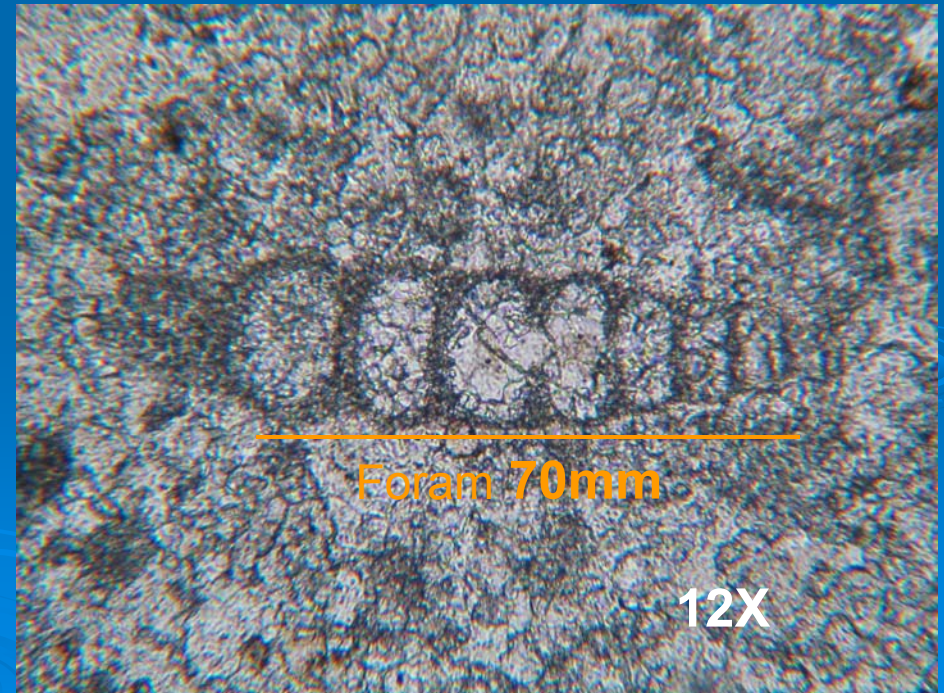


Dolomite cement
is light blue stain



Crinoid
75mm

5X



Foram 70mm

12X

Devonian Carbonate Outcrop ^{3 of 3}

Colonial (Thamnopora) Coral

