

Liard Basin Petroleum Project: Shale Gas potential of Devono-Carboniferous Strata in Yukon, Northwest Territories and Northeast British Columbia

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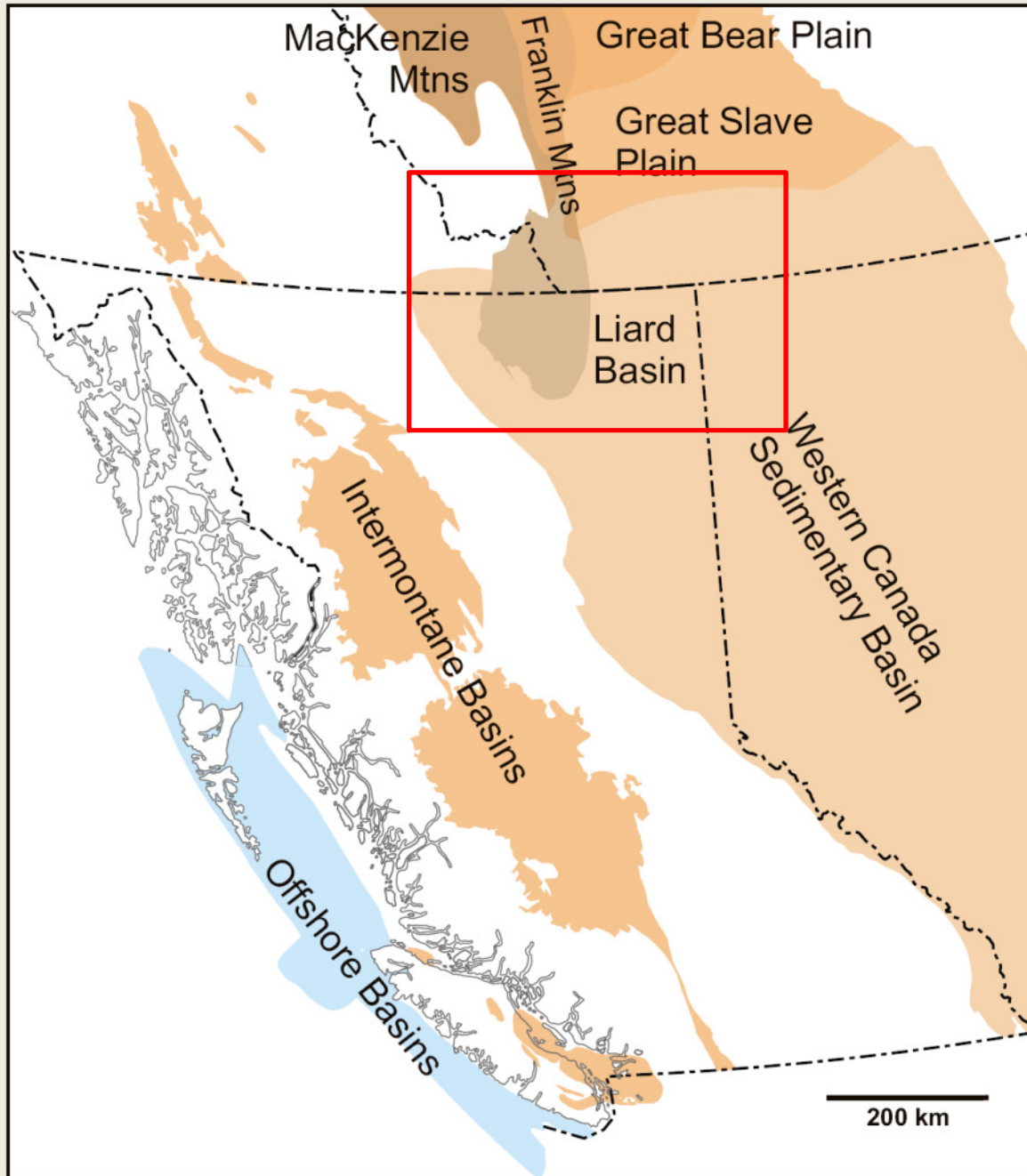
Natural Resources Canada

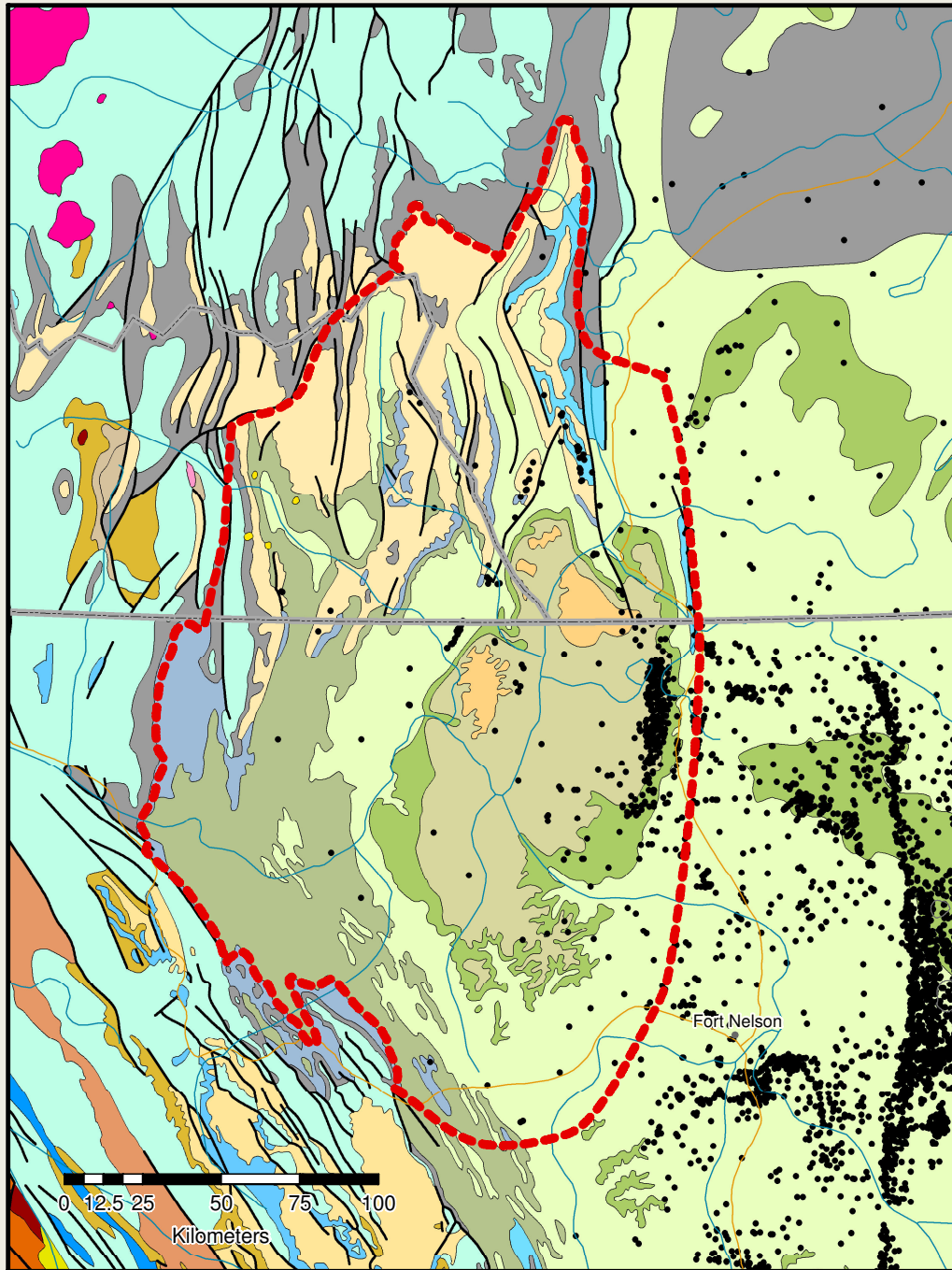
GEOLOGICAL SURVEY OF CANADA, CALGARY



Outline

- **Introduction**
- **Location**
- **Regional Geology**
- **Data Collection**
- **Results**
- **Future Work**



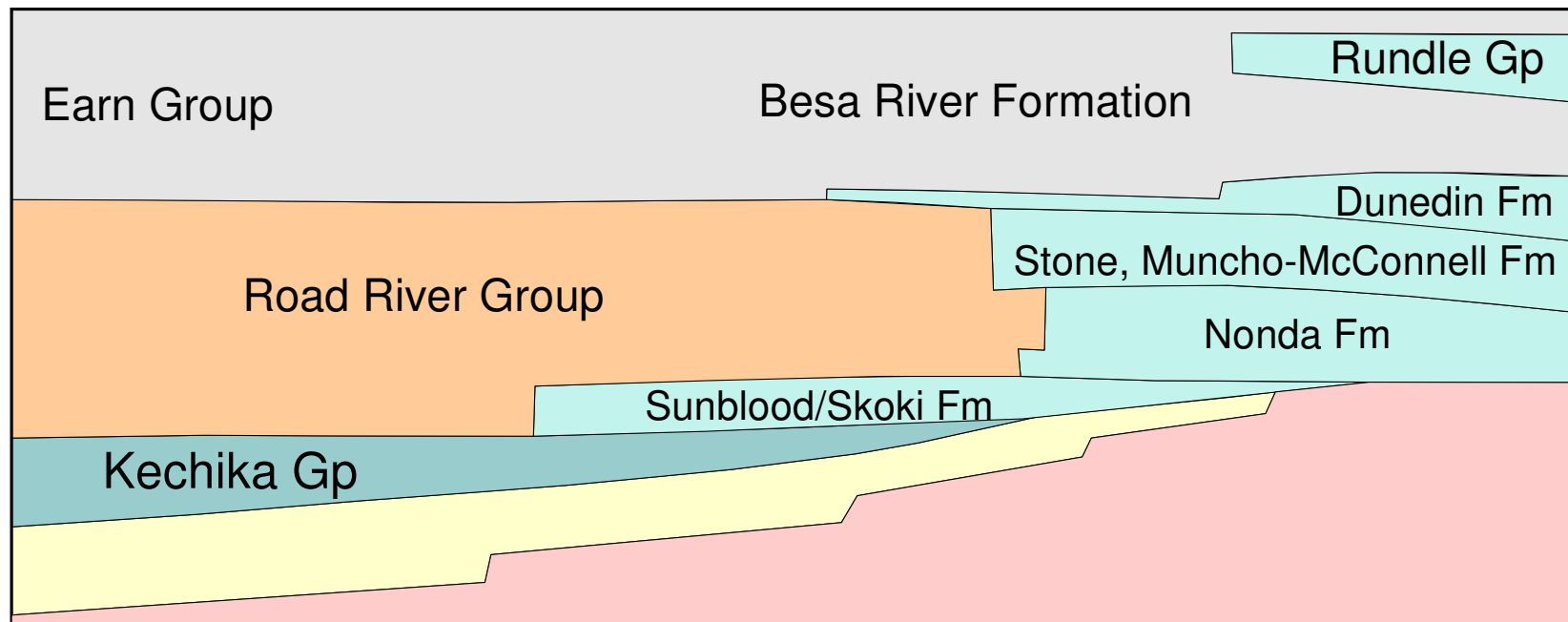


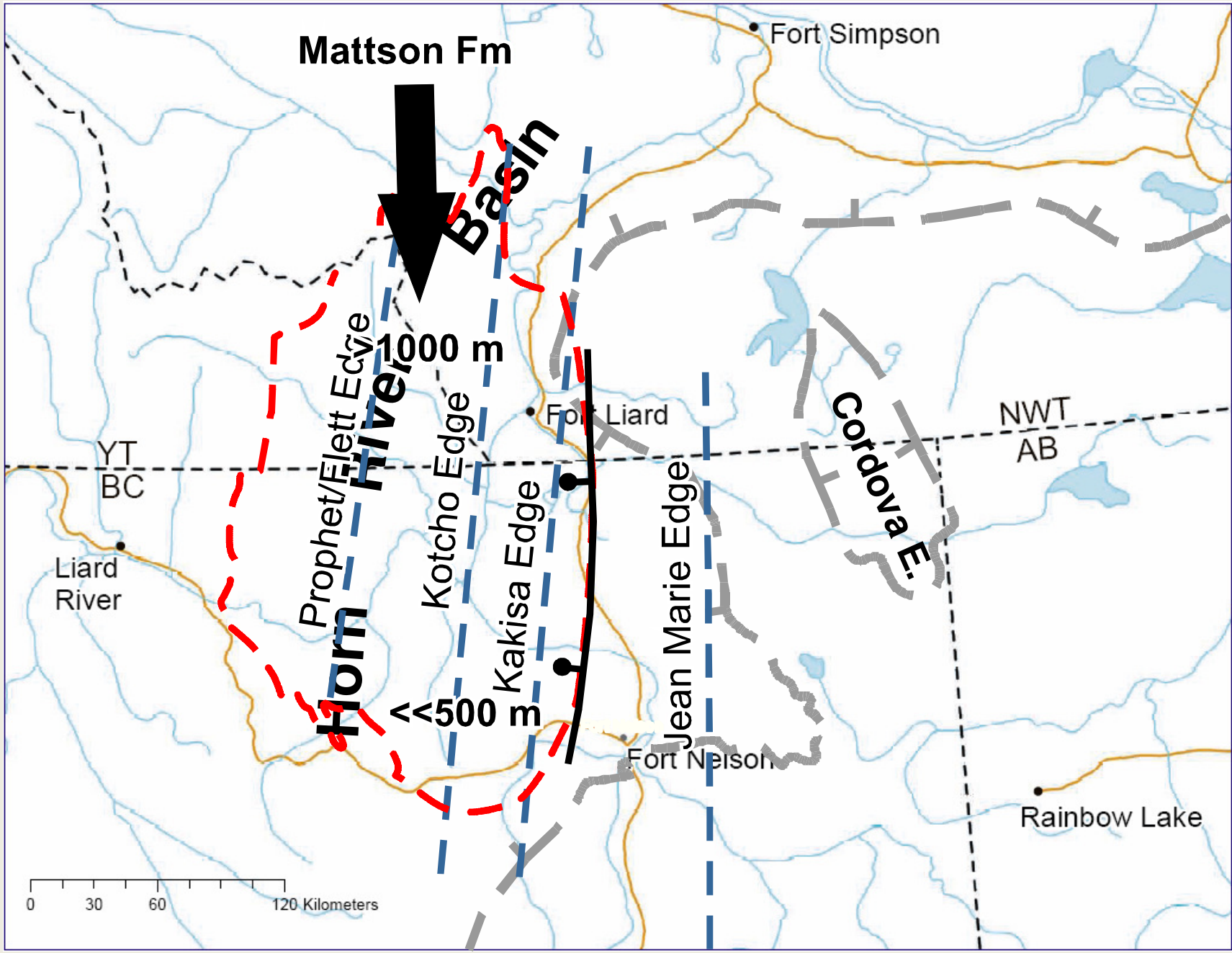
- Tertiary**
- U. Cretaceous**
-
- L. and Upper Cretaceous**
- L. to Upper Triassic**
- Pennsylvanian and Permian Mississippian**
- Mattson Formation**
- Devonian to Mississippian**
- Besa River Formation**
- Earn Group**
- Flett, Prophet formations**
- Cambrian to Devonian**
- L. to M. Cambrian**
- U. Proterozoic to L. Cambrian**
-
- M. Proterozoic**
- INTRUSIVE ROCKS**
-

Stratigraphy

			Liard Basin	Horn River Basin	Platform		
Devonian	Middle	Givetian	Besa River Formation	Horn River	Slave Point Fm		
					Watt Mtn Fm		
		Otter Park Fm	Sulphur Point Fm	Muskeg Fm			
			Upper Keg River Fm				
			Evie Formation	Lower Keg	River Formation		
	Ei	Dunedin Fm/ Nahanni Fm	Chinchaga Formation				
		Em	Stone Fm				
	Upper	Frasnian	Besa River Formation	Horn River	Fort Simpson Formation	Red Knife	Upper Mbr Jean Marie
					Kotcho, Tetcho, Trout River, Kakisa Fms		
		Exshaw Formation					
Banff Formation							
Rundle/ Flett		Rundle Group					
Mississippian	M	Besa River Formation	Horn River	Golata Fm			
	U			Mattson Formaiton			

Stratigraphy





Mattson Fm

Fort Simpson

Horn River Basin

Horn River Basin

1000 m

500 m

Prophet/Flett Edge

Kotcho Edge

Fort Liard

Jean Marie Edge

Cordova Edge

NWT AB

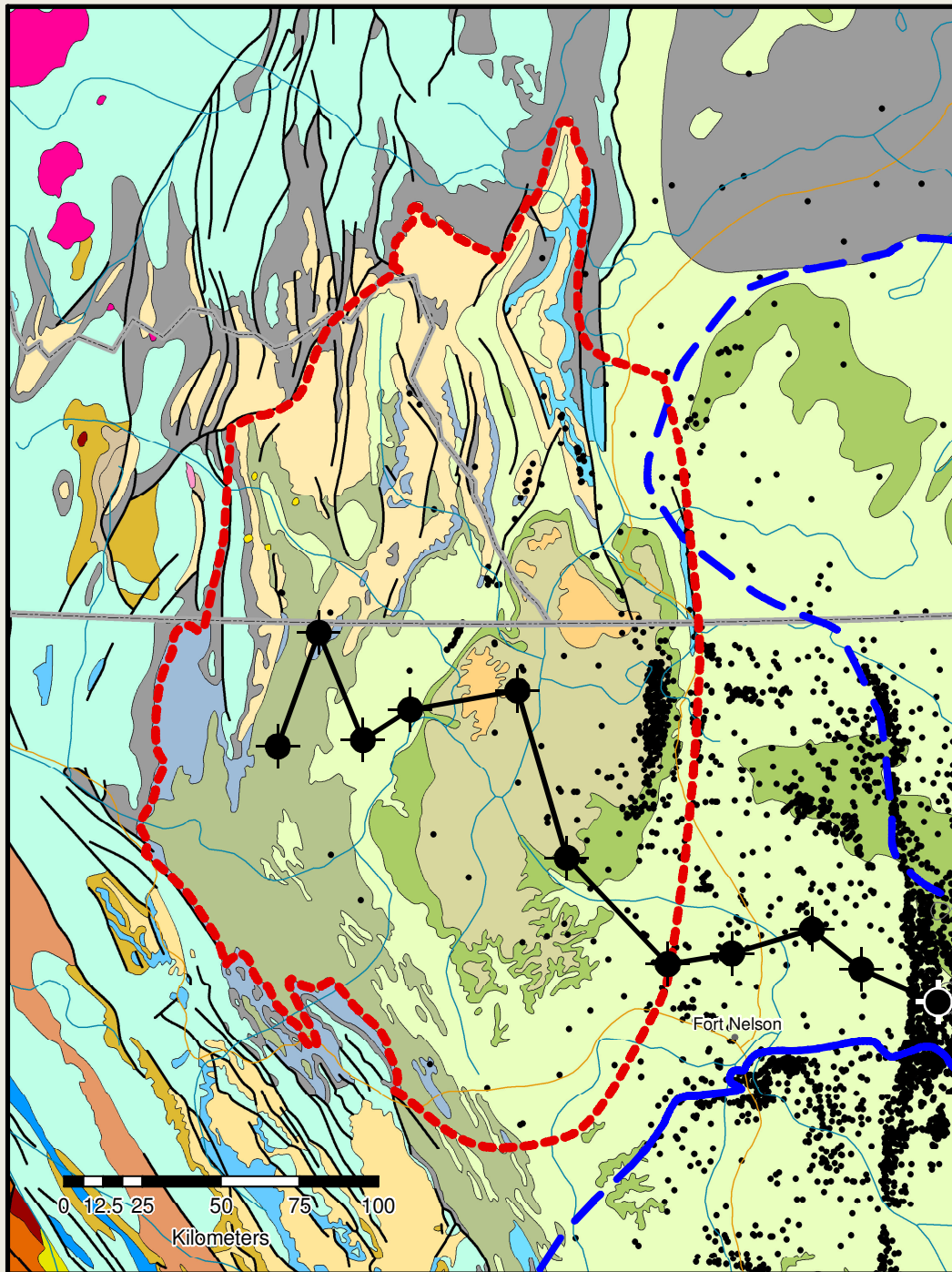
YT BC

Liard River

Fort Neison

Rainbow Lake

0 30 60 120 Kilometers



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0 12.5 25 50 75 100
Kilometers

Fort Nelson

d-16-A
 94-N-15

d-95-F
 94-N-11

b-67-I
 94-N-14

d-98-F
 94-N-10

a-67-D
 94-O-13

c-86-B
 94-O-5

a-5-K
 94-O-3

a-37-F
 94-O-2

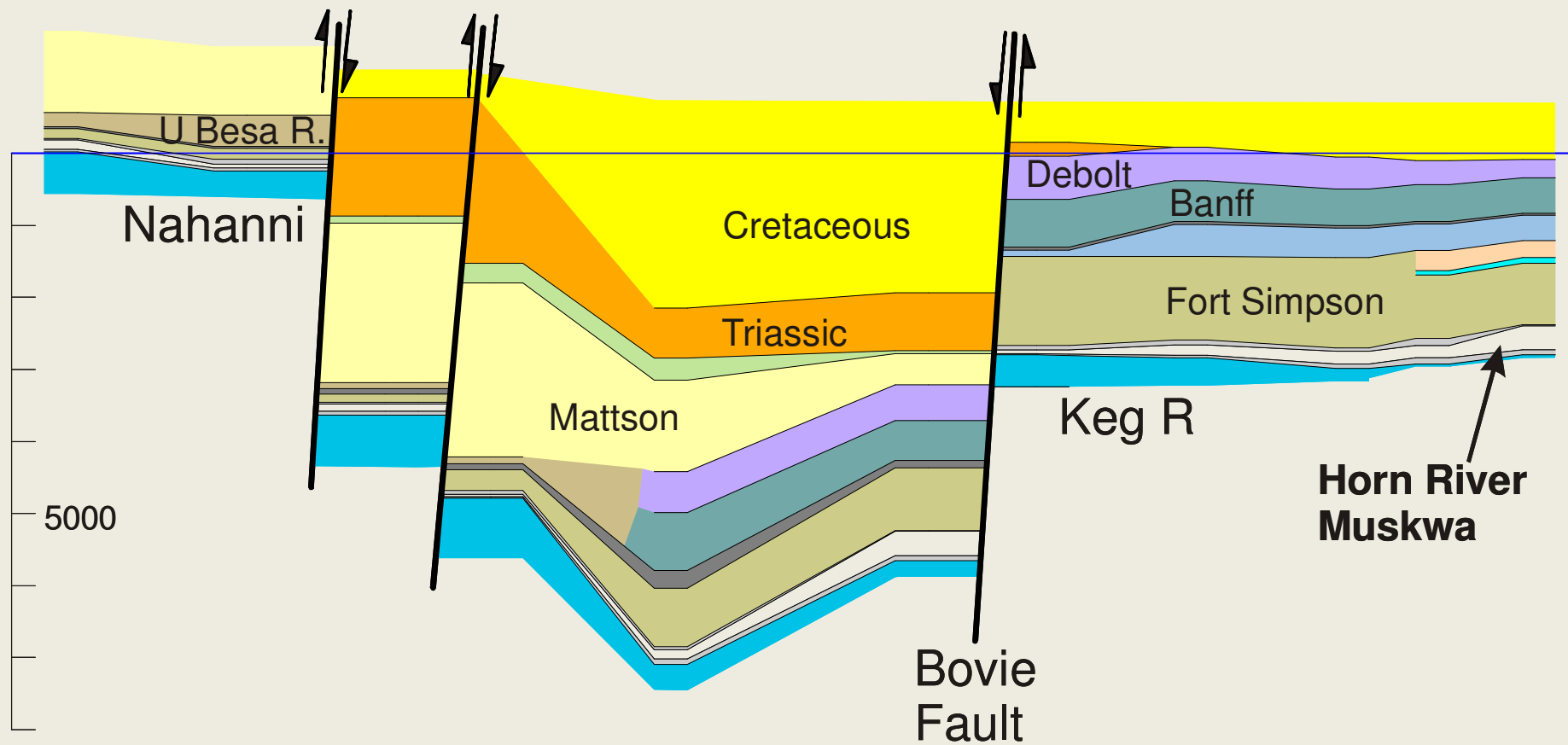
b-72-K
 94-O-1

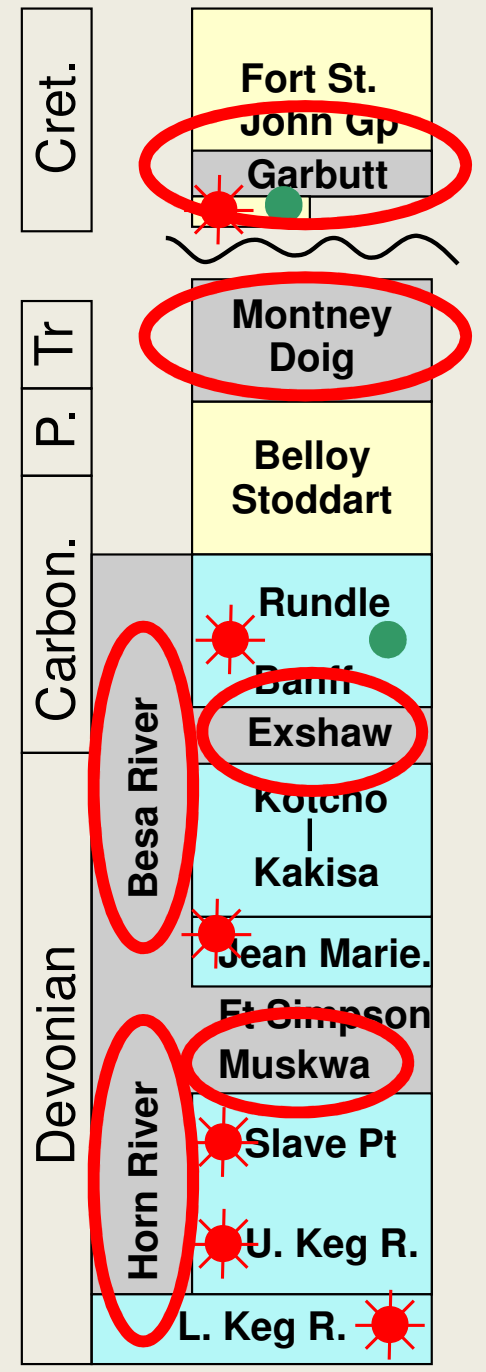
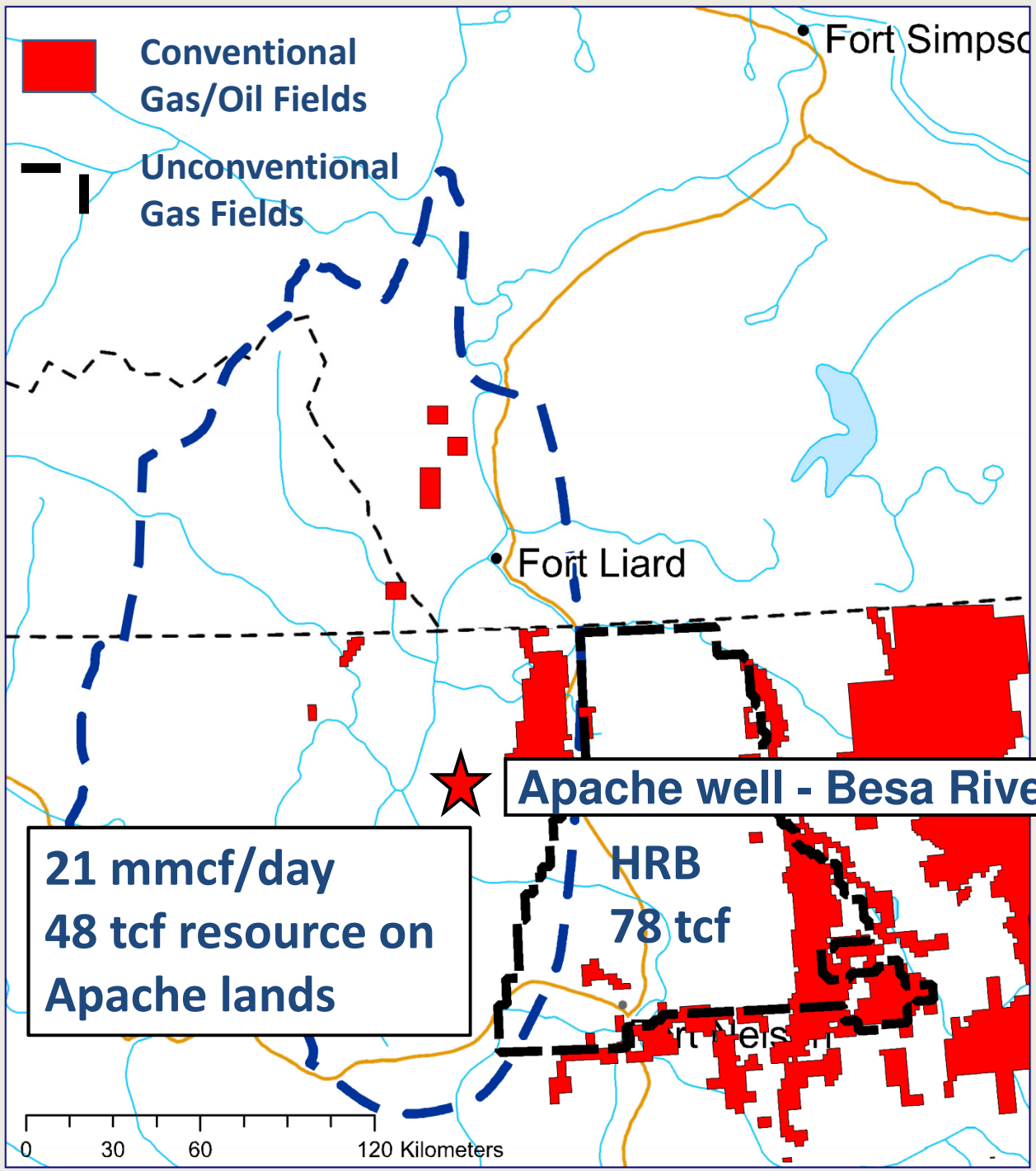
a-62-G
 94-O-1

a-87-C
 94-P-4

Liard Basin

Horn River Basin



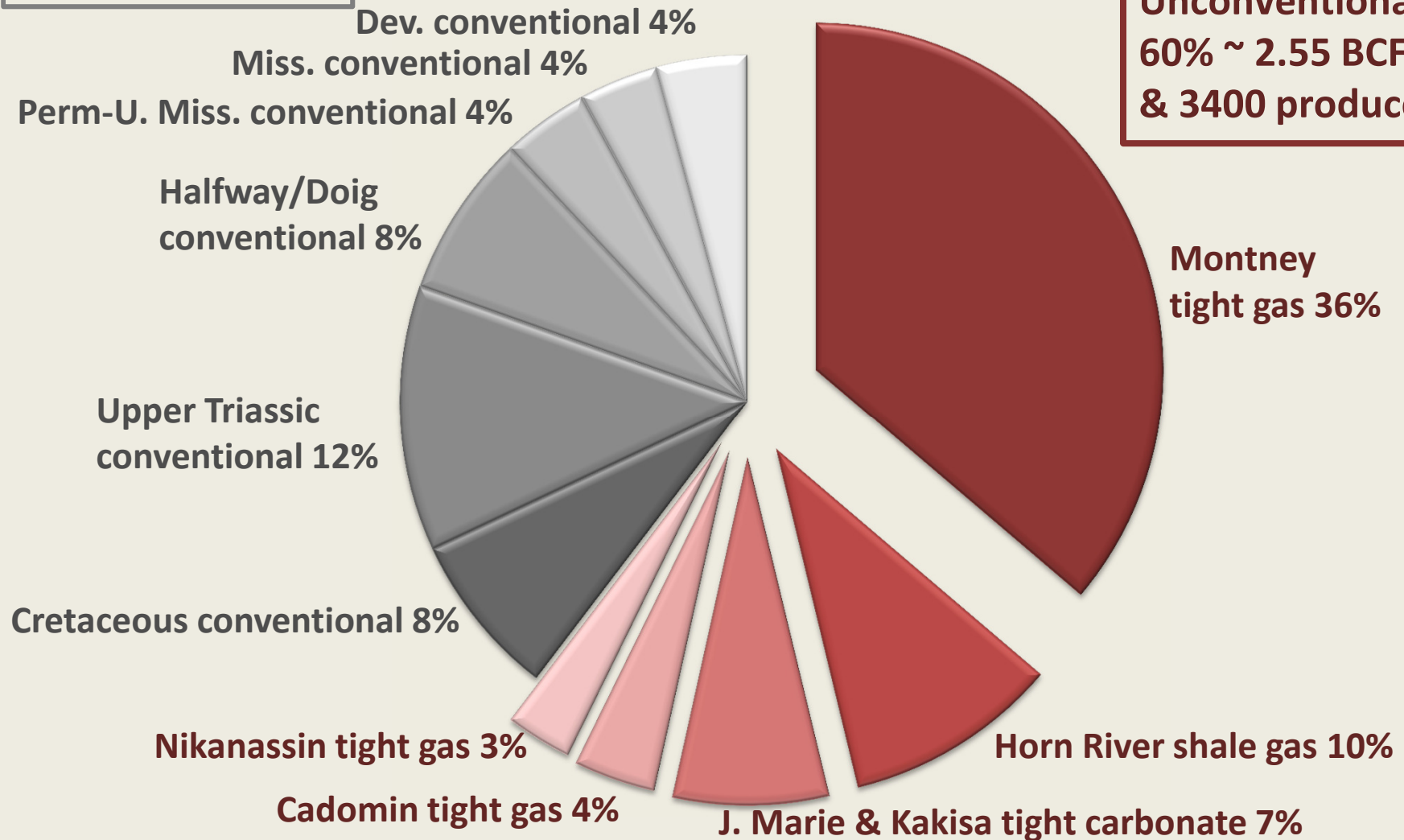


Unconventional is the New Conventional

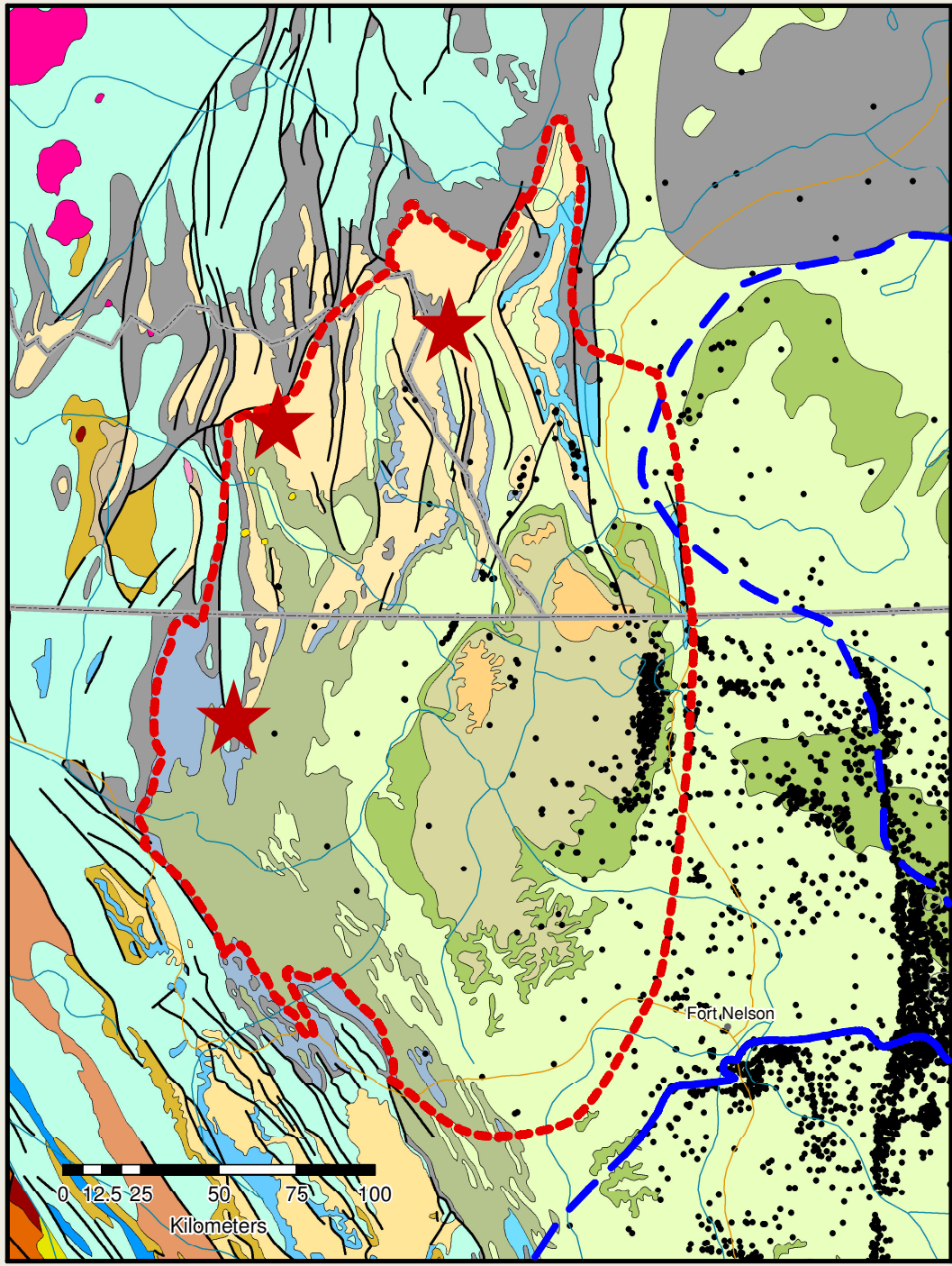
Conventional
40% ~ 1.66 BCF/d
& 5900 producers

% of BC Daily Production by Zone

Unconventional
60% ~ 2.55 BCF/d
& 3400 producers



Location of sections on regional geology



- Tertiary
- U. Cretaceous
-
- L. and Upper Cretaceous
- L. to Upper Triassic
- Pennsylvanian and Permian
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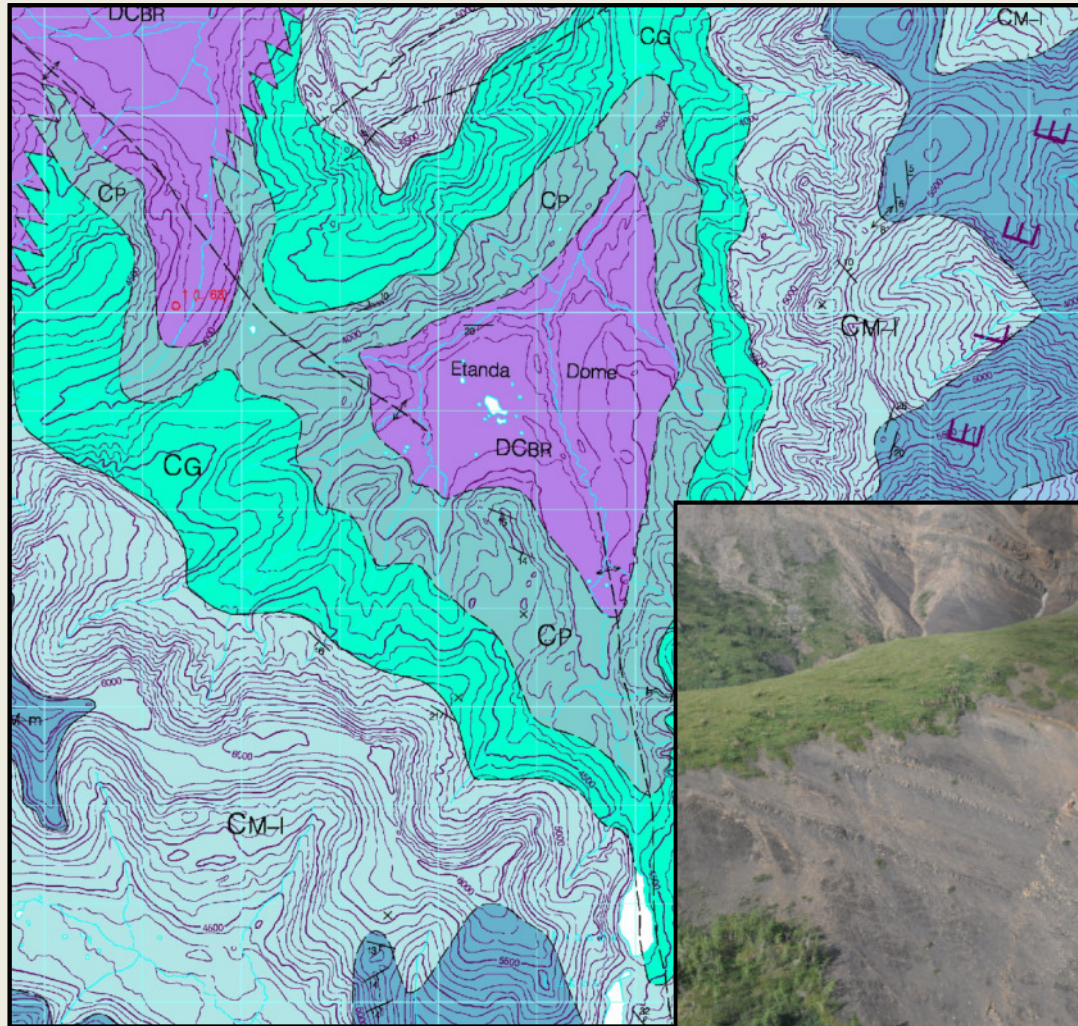
0 12.5 25 50 75 100
Kilometers


Fort Nelson

Data

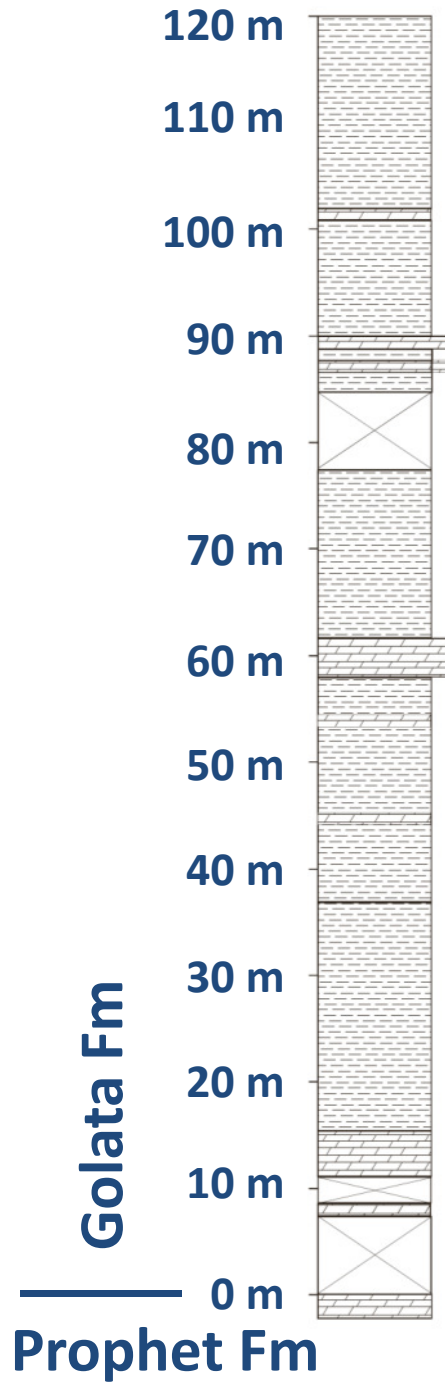
- Litho log
- Gamma Ray spectrometry on 1 m spacing
 - (U, Th and K)
- Rock-Eval across 2 m intervals
- Lithogeochemistry across 2 m intervals
 - Whole rock (12), trace (32) and rare earth (14) elemental abundances via ICP-MS and ICP-ES
- Representative X-ray diffraction analysis
- Thermal maturity by reflective light microscopy
- Condont and radiolarian samples

Golata Fm Section, northern Liard Basin - Northwest Territories

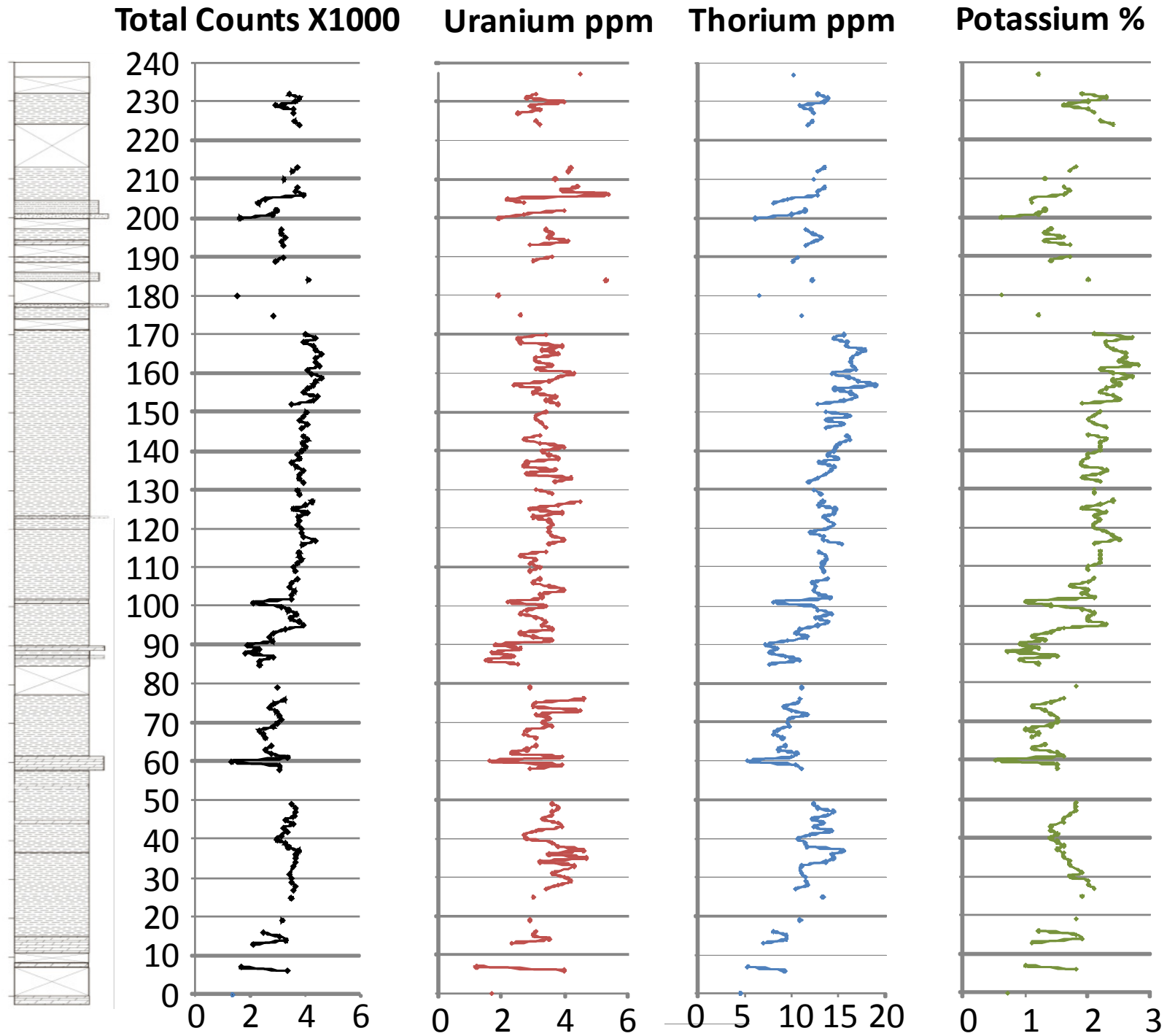


-  Cretaceous
-  Mattson Fm
-  Prophet Fm
-  Golata Fm
-  Prophet Fm

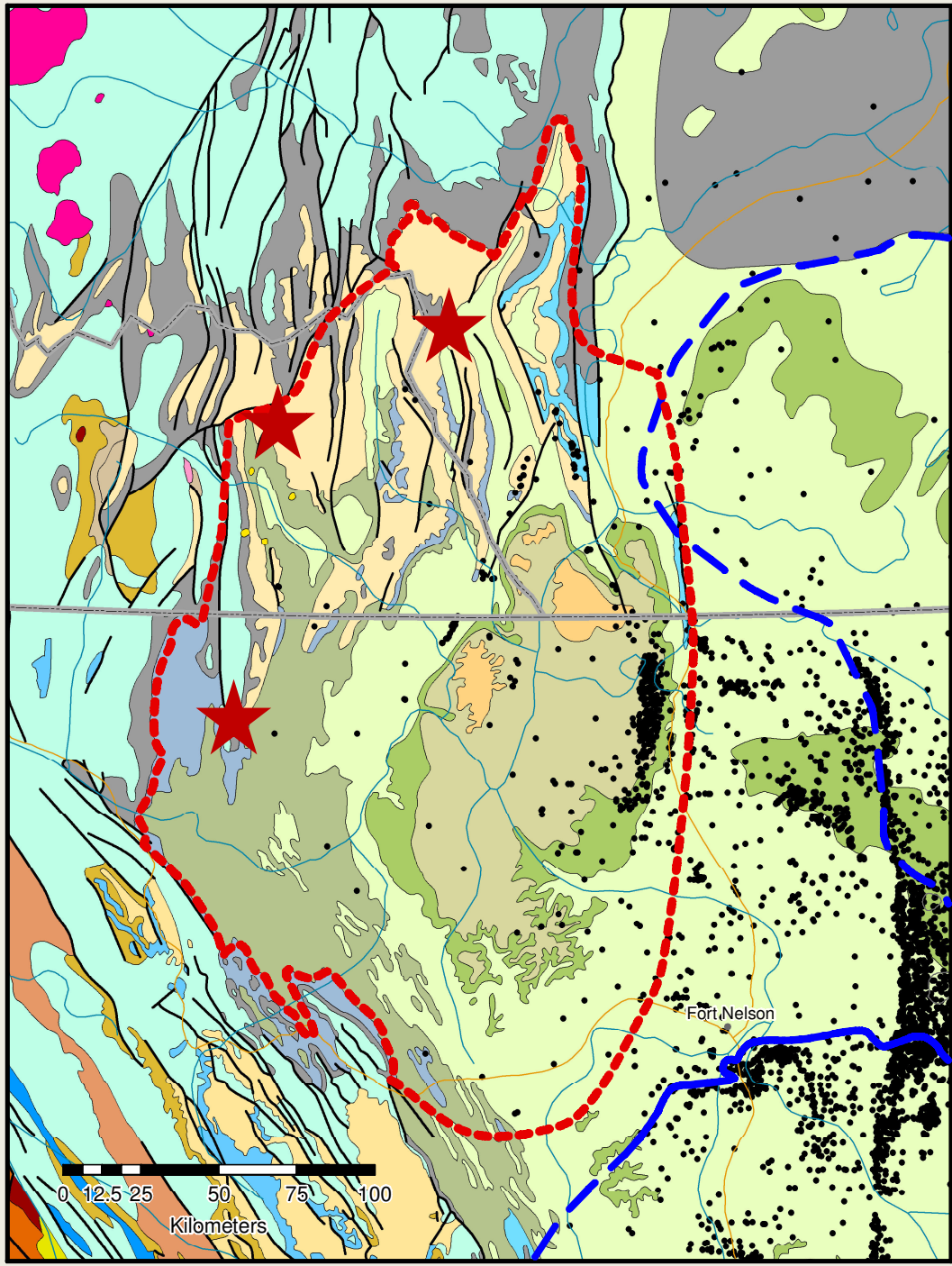




● sample



Location of sections on regional geology

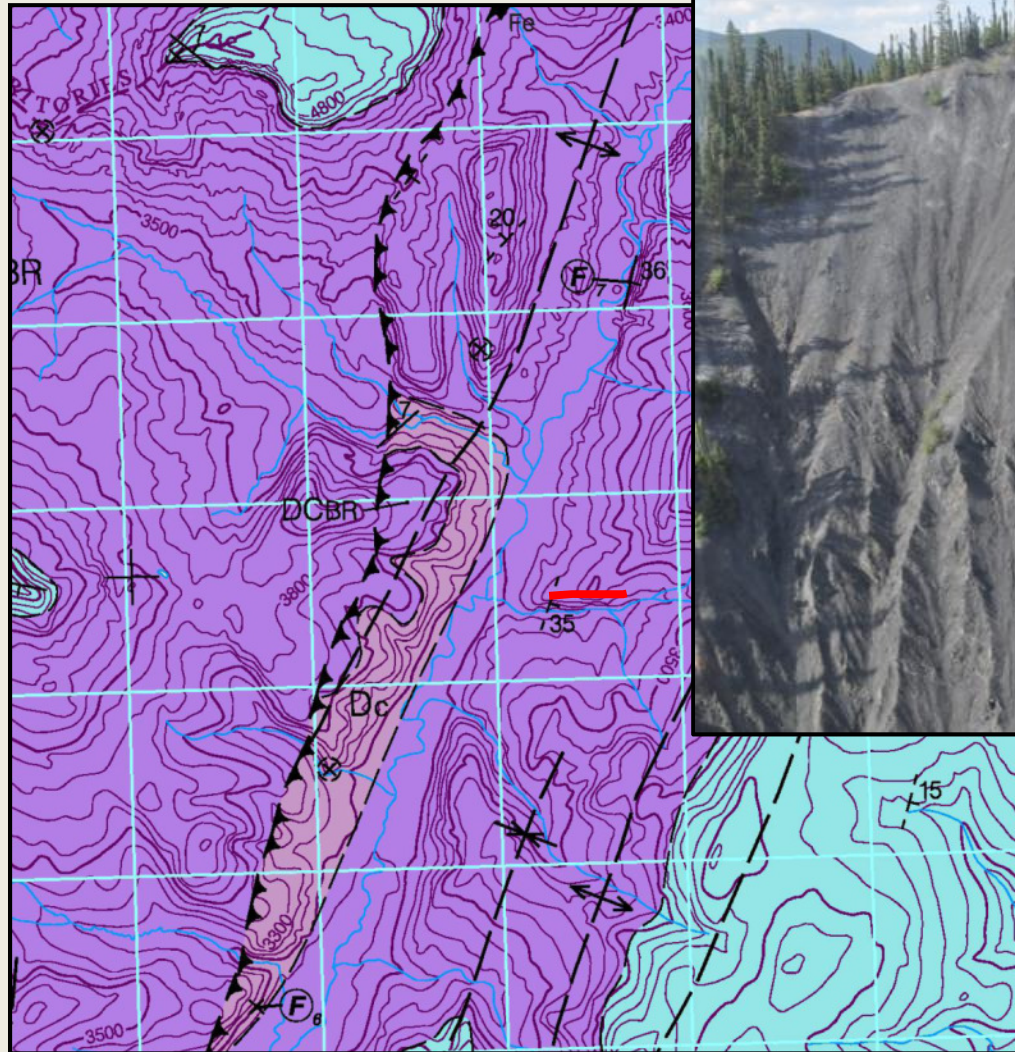


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0 12.5 25 50 75 100
Kilometers

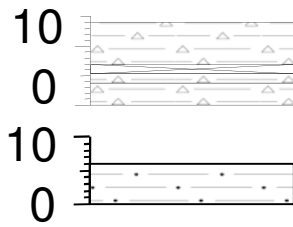
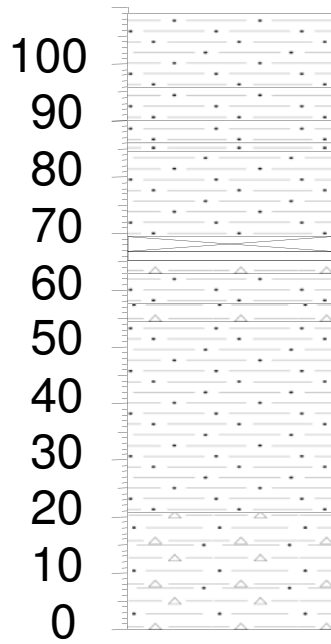
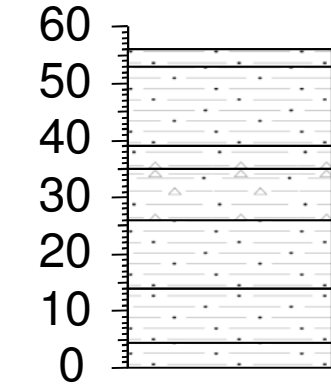
Fort Nelson

Besa River Fm Section, northwestern Liard Basin, Yukon

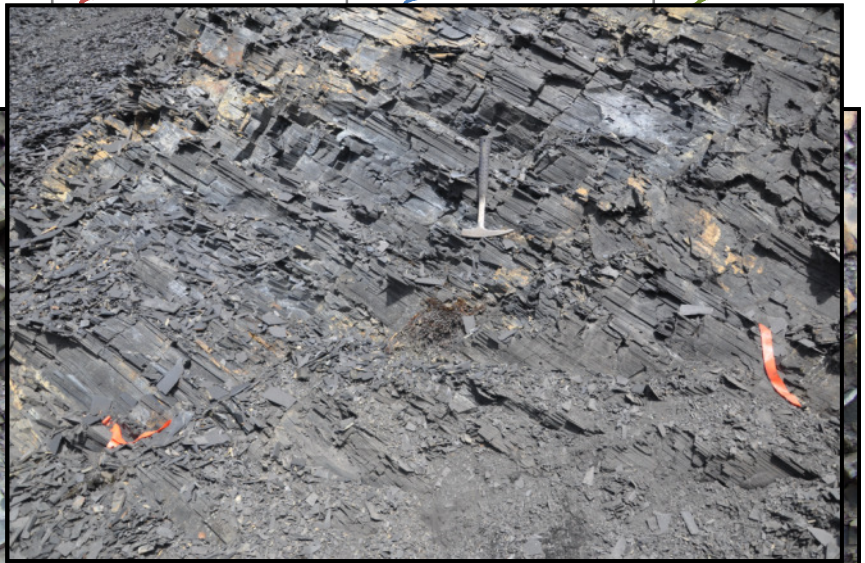
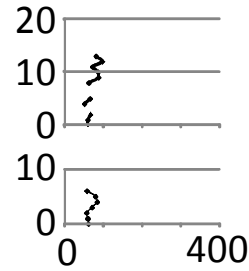
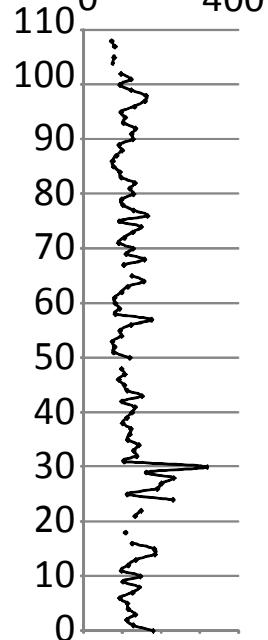
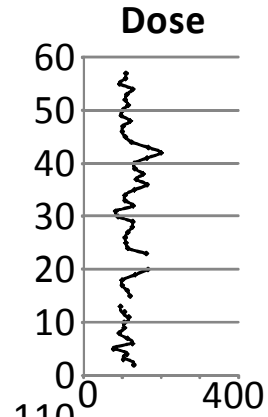


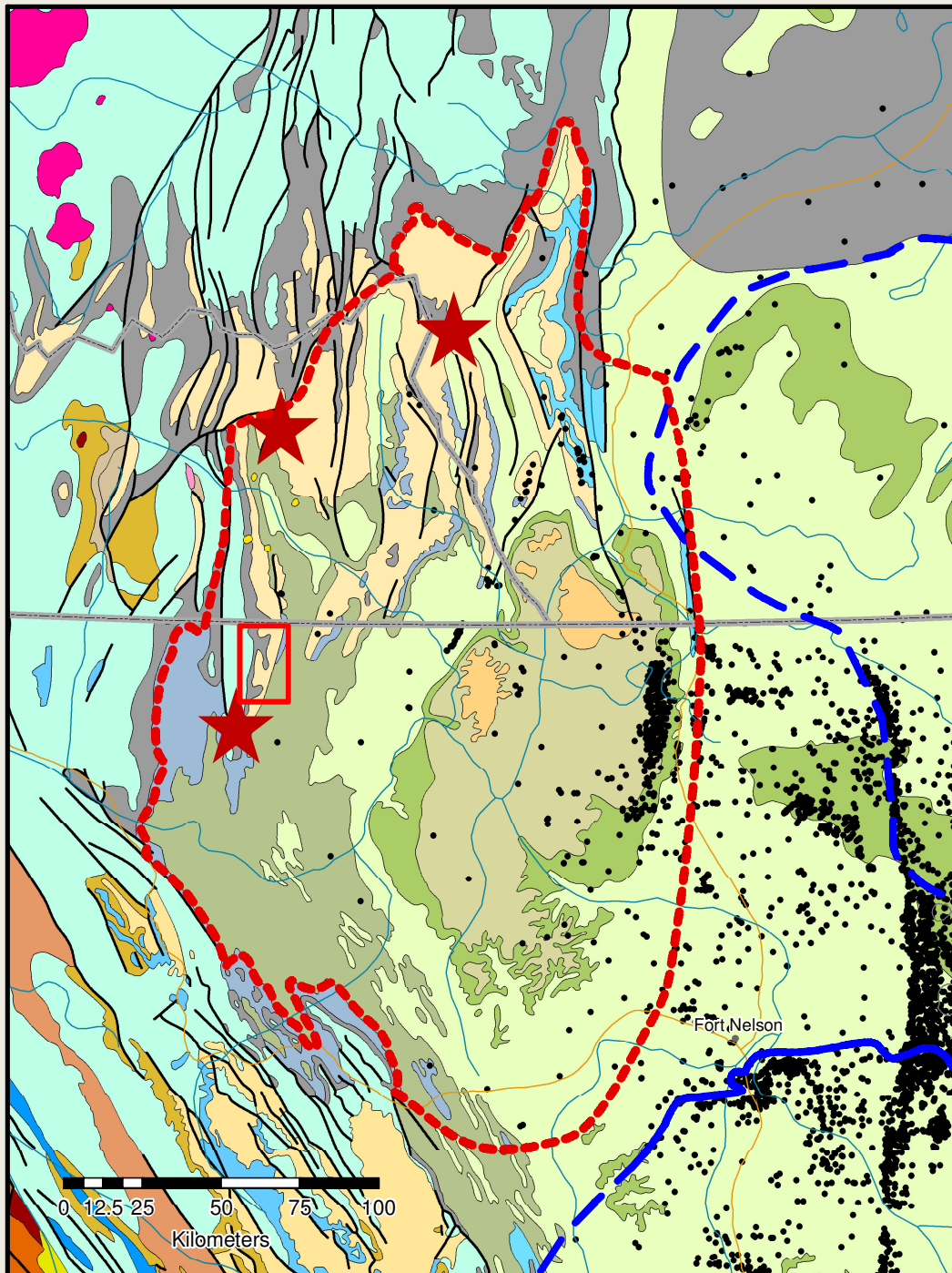
-  Mattson Fm
-  Besa River Fm
-  Devonian Carbonate

2 km



metres

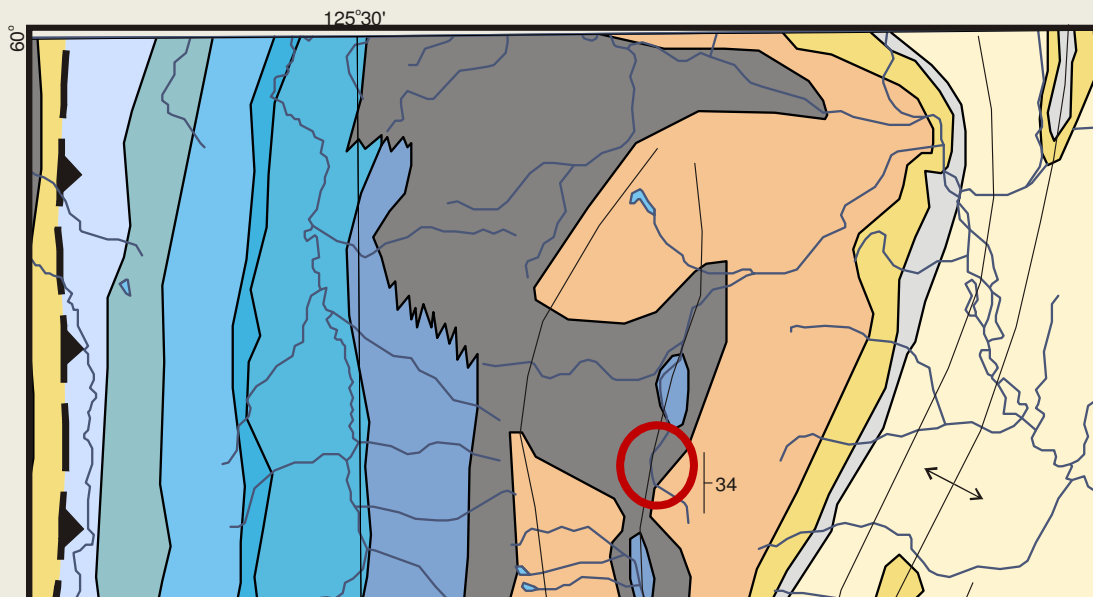




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0 12.5 25 50 75 100
Kilometers

Fort Nelson

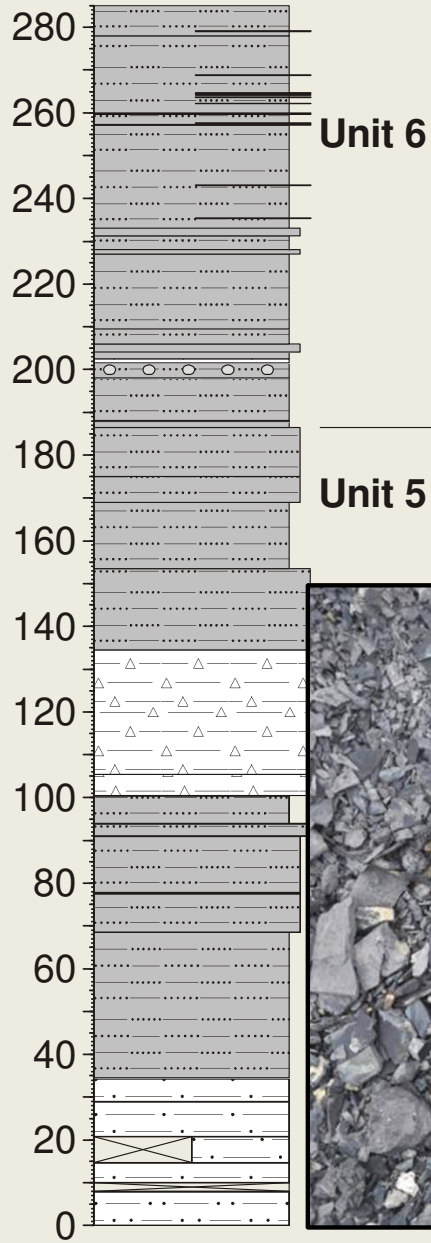


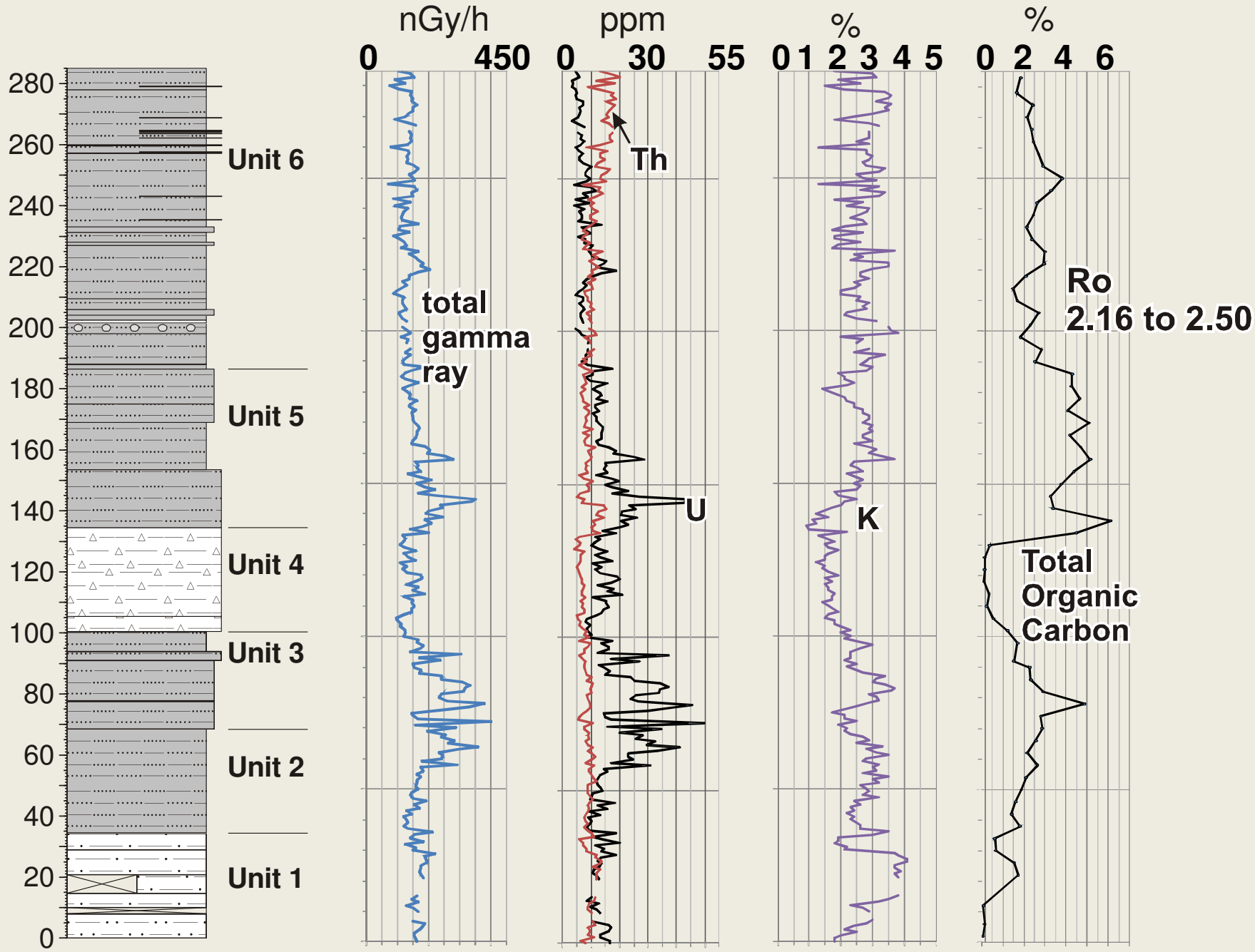
- L. to M. Triassic
- Toad Fm**
- Grayling Fm**
- Permian
- Fantasque Fm**
- Miss. to Permian
- Kindle Fm**
- L. Miss.
- Mattson Fm**
- U. Devonian to L. Miss.

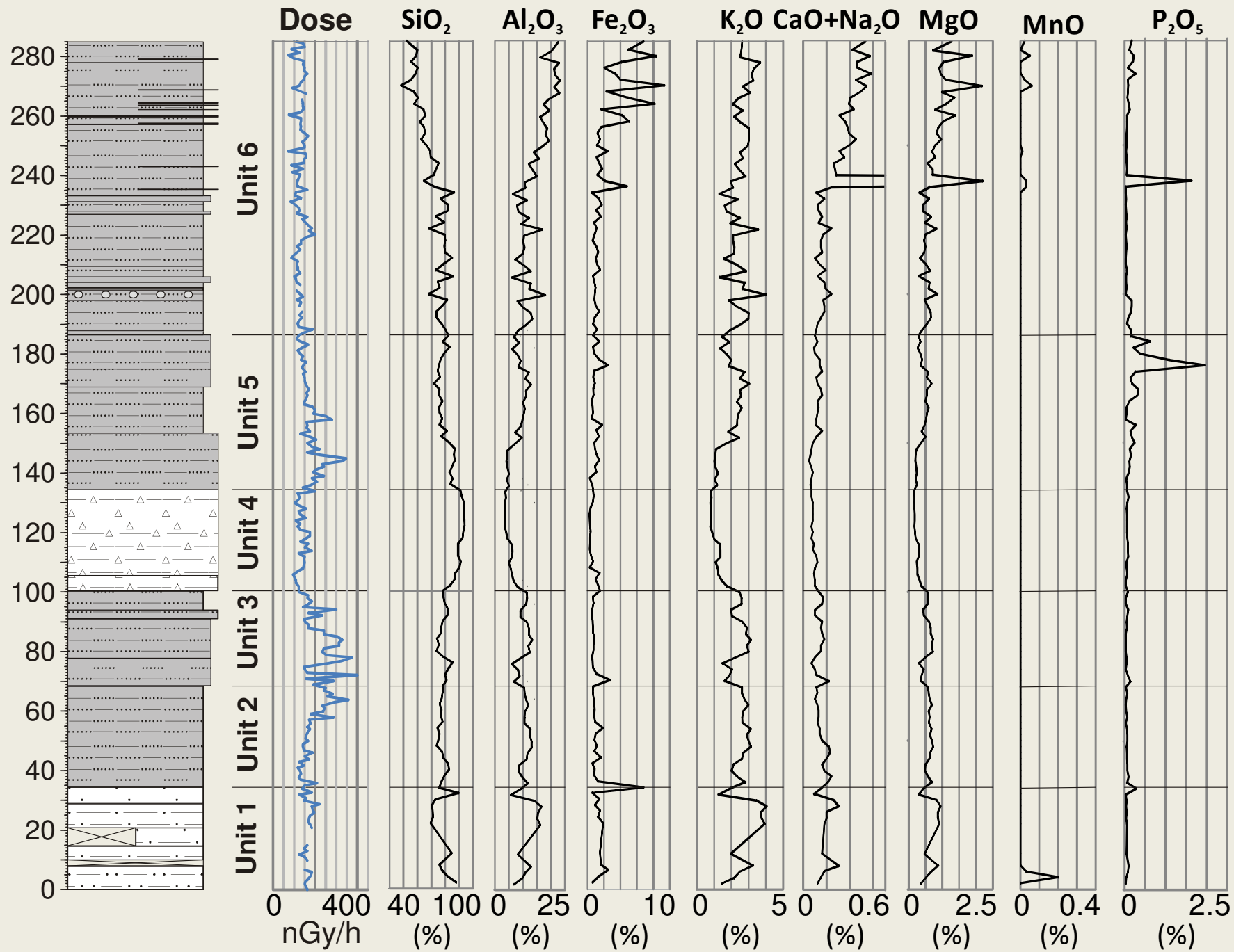


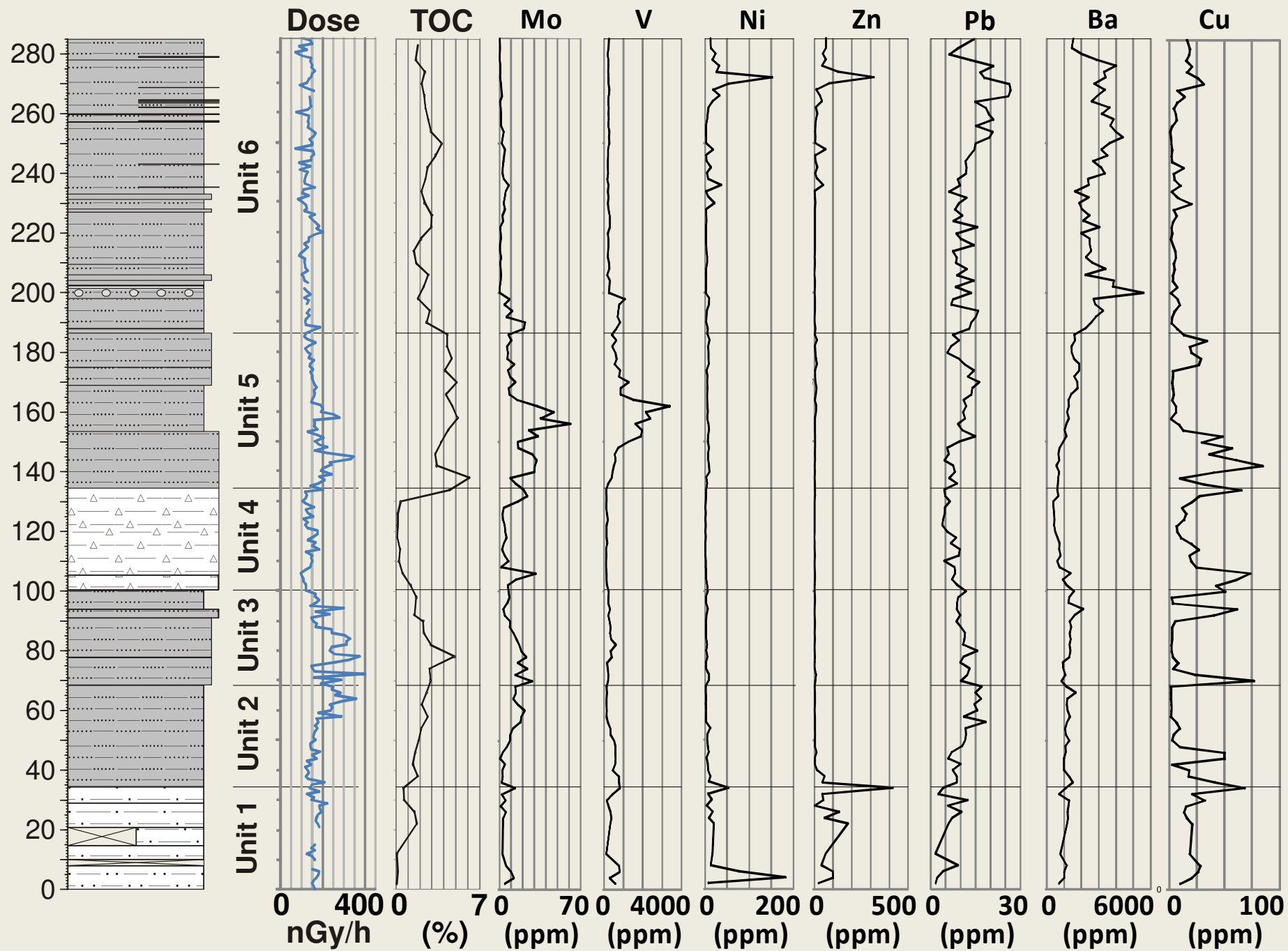
- Besa River Fm**
- Devonian
- Dunedin Fm**
- M. Devonian
- Stone Fm**
- Devonian
- Vokkpash Fm**
- Permian to L. Devonian
- Muncho-McConnell Fm**
- Permian
- Londa Fm**
- Cambrian

Barite nodules ~200m

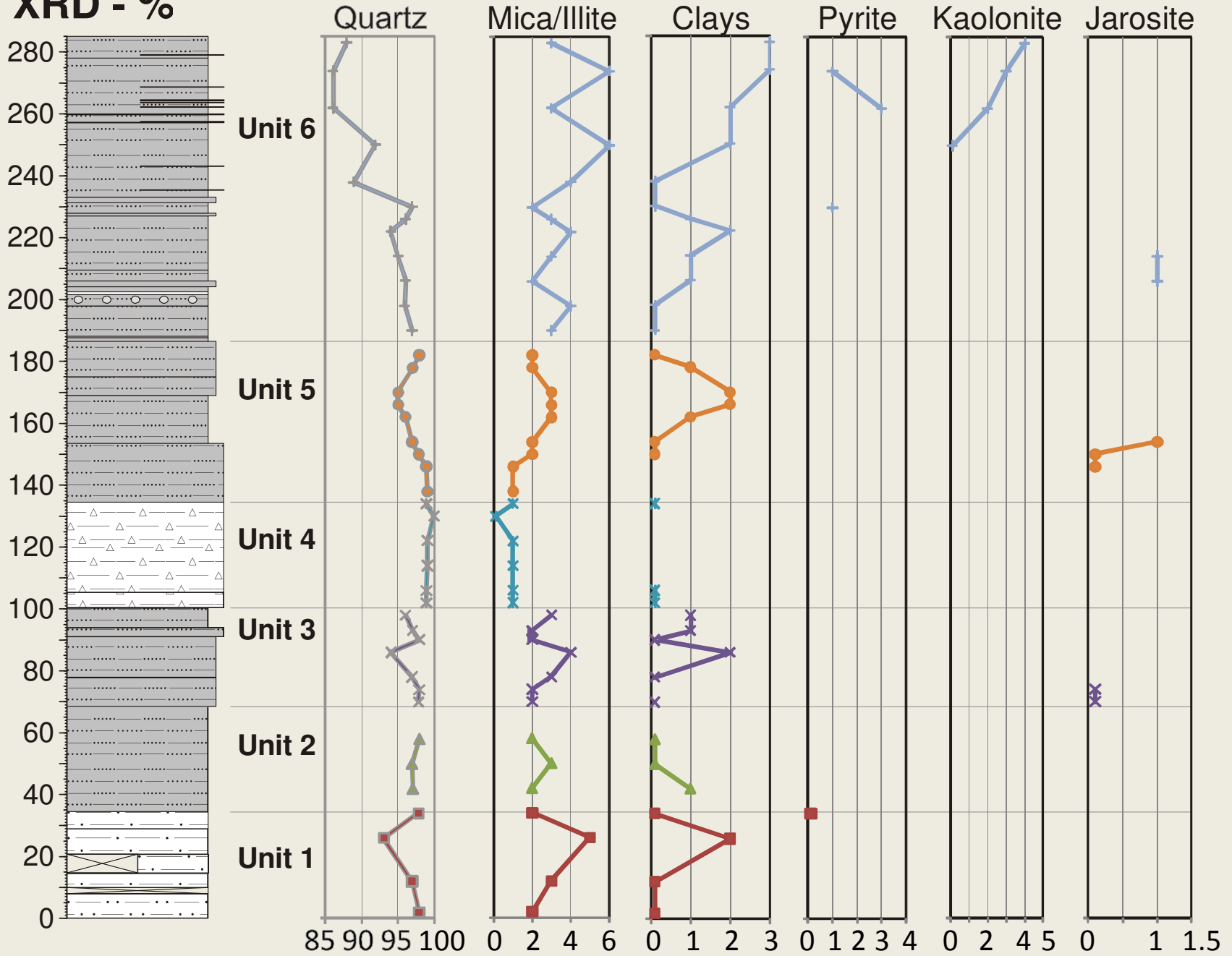




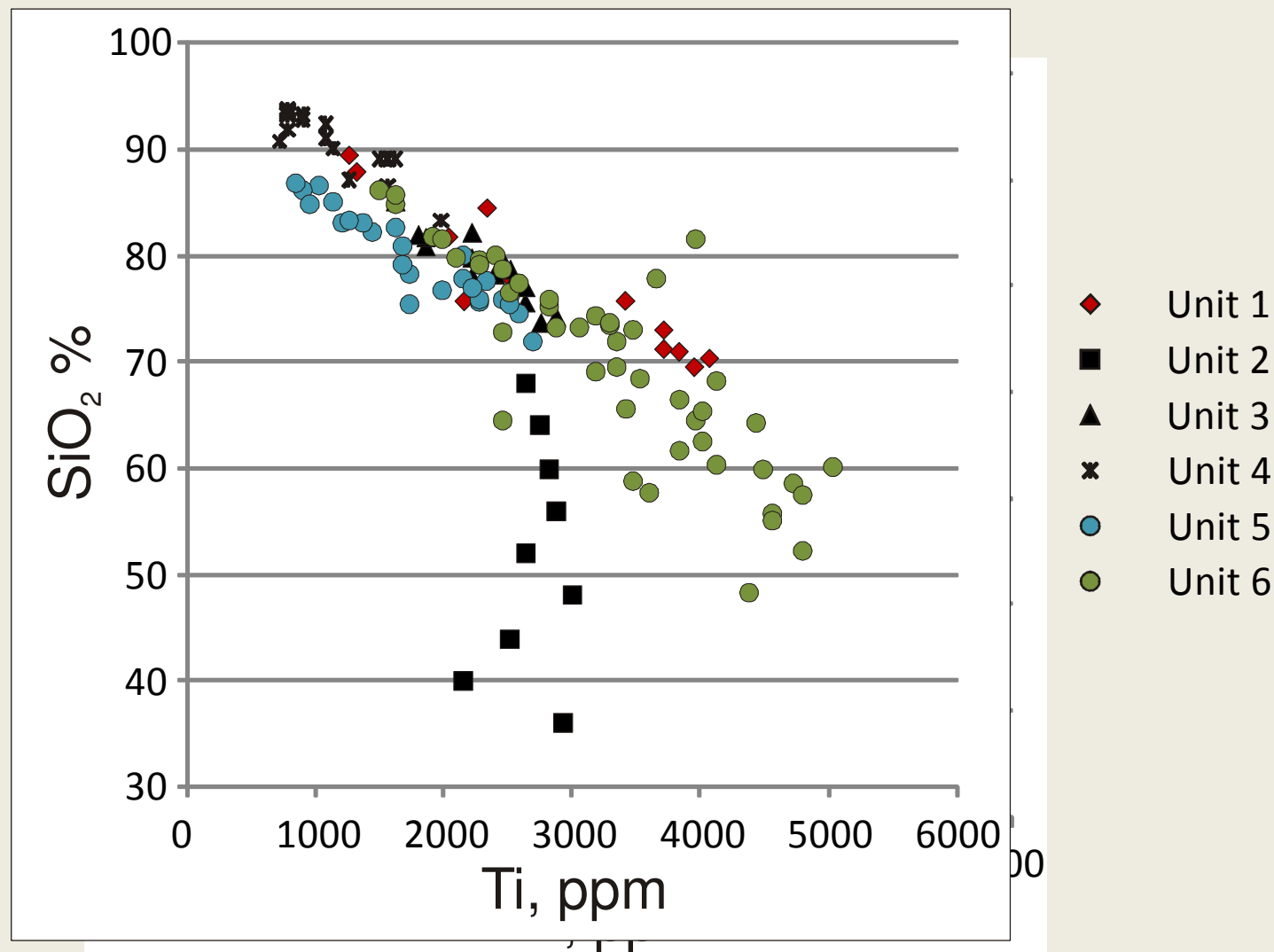
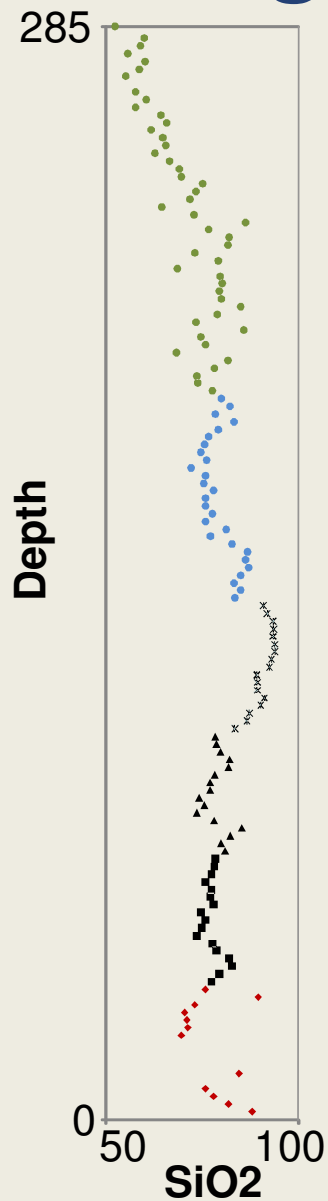


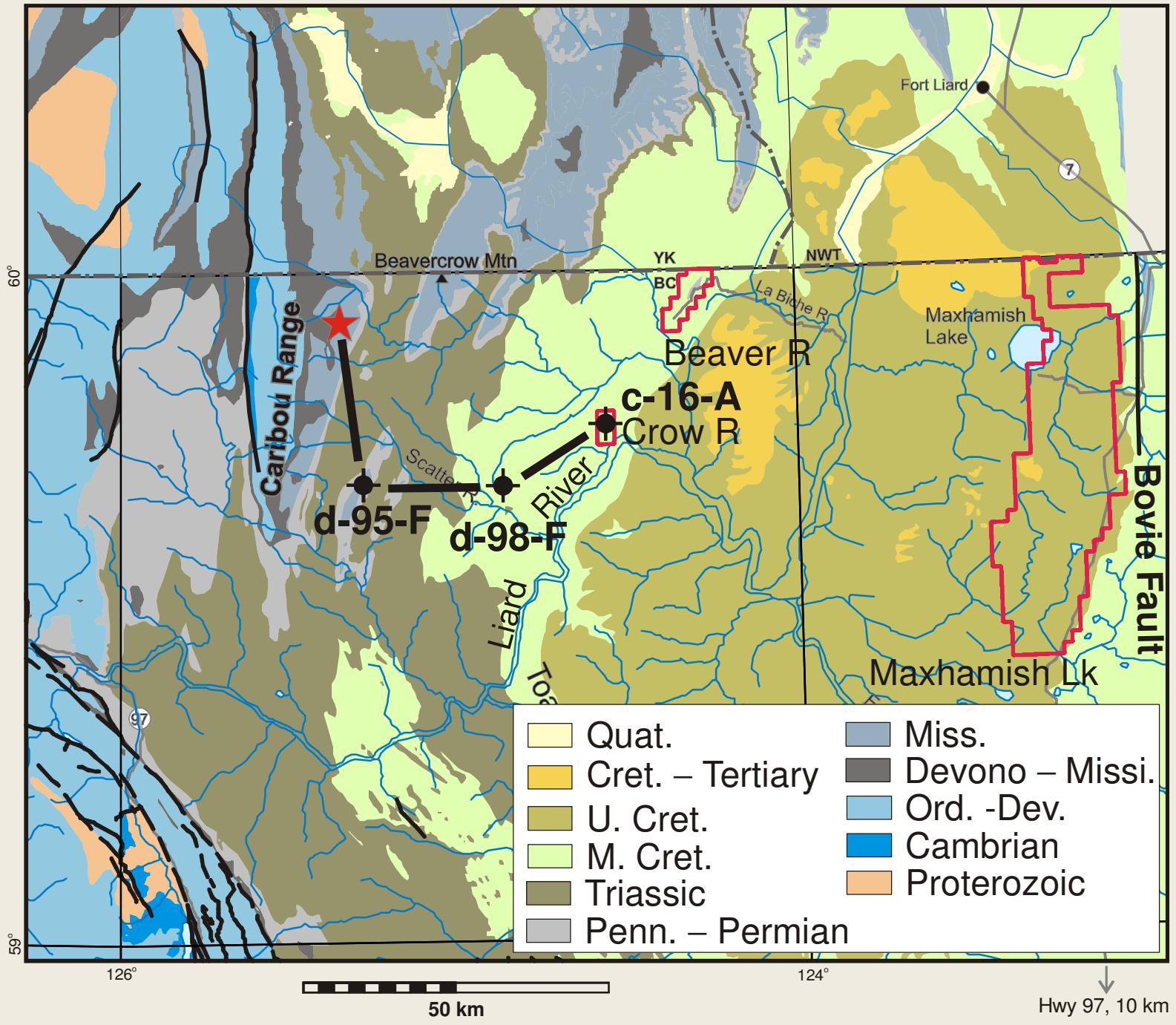


XRD - %



Biogenic silica? – Zr, Ti, SiO₂ contents

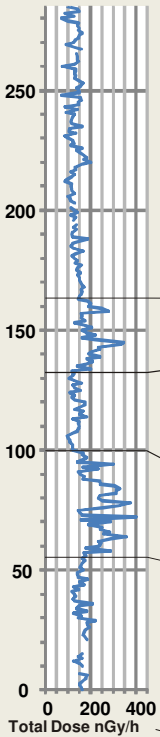




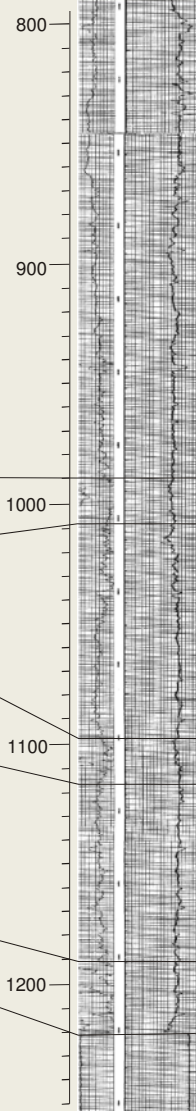
Besa River Fm



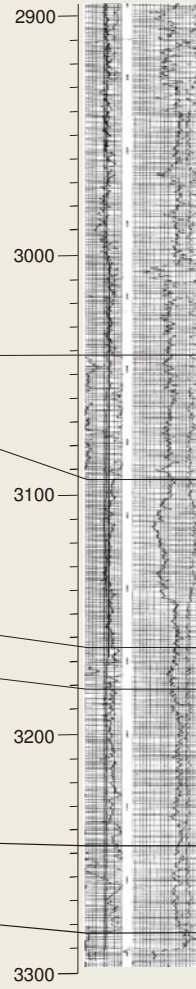
Caribou Range
(this study)
Mattson Fm.



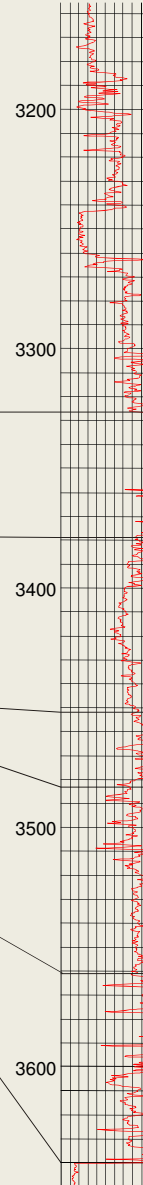
Shell E Graying
d-95-F/94-N-11



Oakwood IOE
et al Scatter
d-98-F/94-N-10



Devon Nec Crow
c-16-A/94-N-15



Banff Fm

Exshaw Fm

Fort Simpson Fm

Muskwa Mbr

Otter
Park Mbr

Evie Mbr

Dunedin/Nahanni Fms

Horn River Fm

Future Work

- **Field data**
- **Subsurface data**
- **Correlation into the subsurface**
- **Reference sections for Besa River and Horn River formations**