

# An integrated geological and geophysical approach to analyzing the hydrocarbon potential of Spring Coulee, Alberta

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# Outline

- History/purpose of Spring Coulee study
- Production and geology of the area
- Target Zone(s)
- Recent BNP Discovery
- Acquired Seismic Data
- Conclusions

# Spring Coulee, Alberta

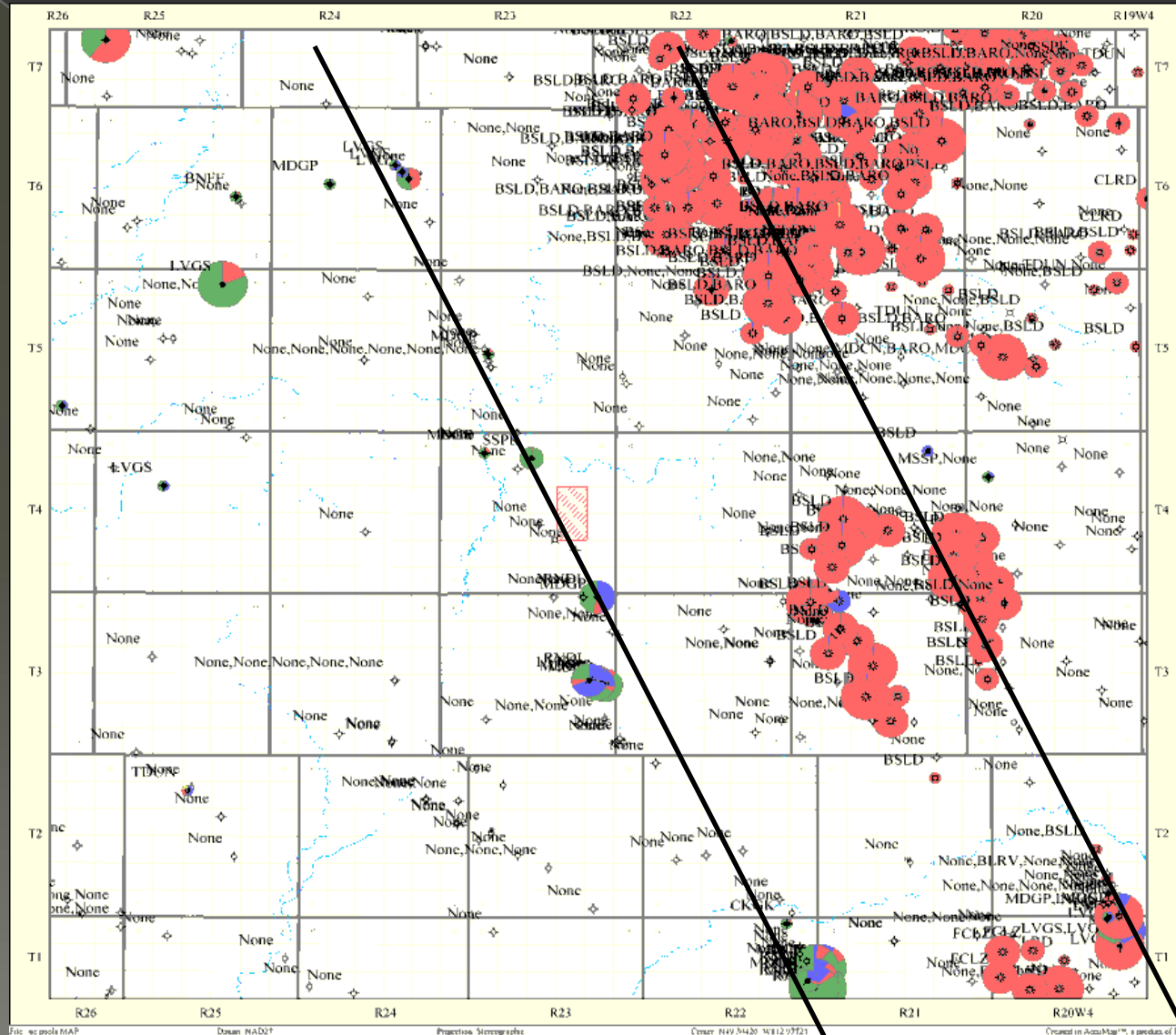


Map courtesy of Kevin Hall



Photo courtesy of Malcolm Bertram

# Regional Production



# Table of Formations – S. Alberta

ERA	PERIOD	SOUTHERN PLAINS
CENOZOIC	QUATERNARY	GRAVEL AND SAND SOIL, CL.
	TERTIARY	
MESOZOIC	CRETACEOUS	<p>UPPER</p>
		<p>LOWER</p>
	JURASSIC	
	TRIASSIC	

← Bow Island

← Sunburst

← Rierdon  
Sawtooth

PALEOZOIC	PERMIAN		
	PENNSYLVANIAN		
	MISSISSIPPIAN		
	DEVONIAN	UPPER	
		MIDDLE	
		LOWER	
	SILURIAN		
ORDOVICIAN			
CAMBRIAN	UPPER		
	MIDDLE		
	LOWER		
PRECAMBRIAN			

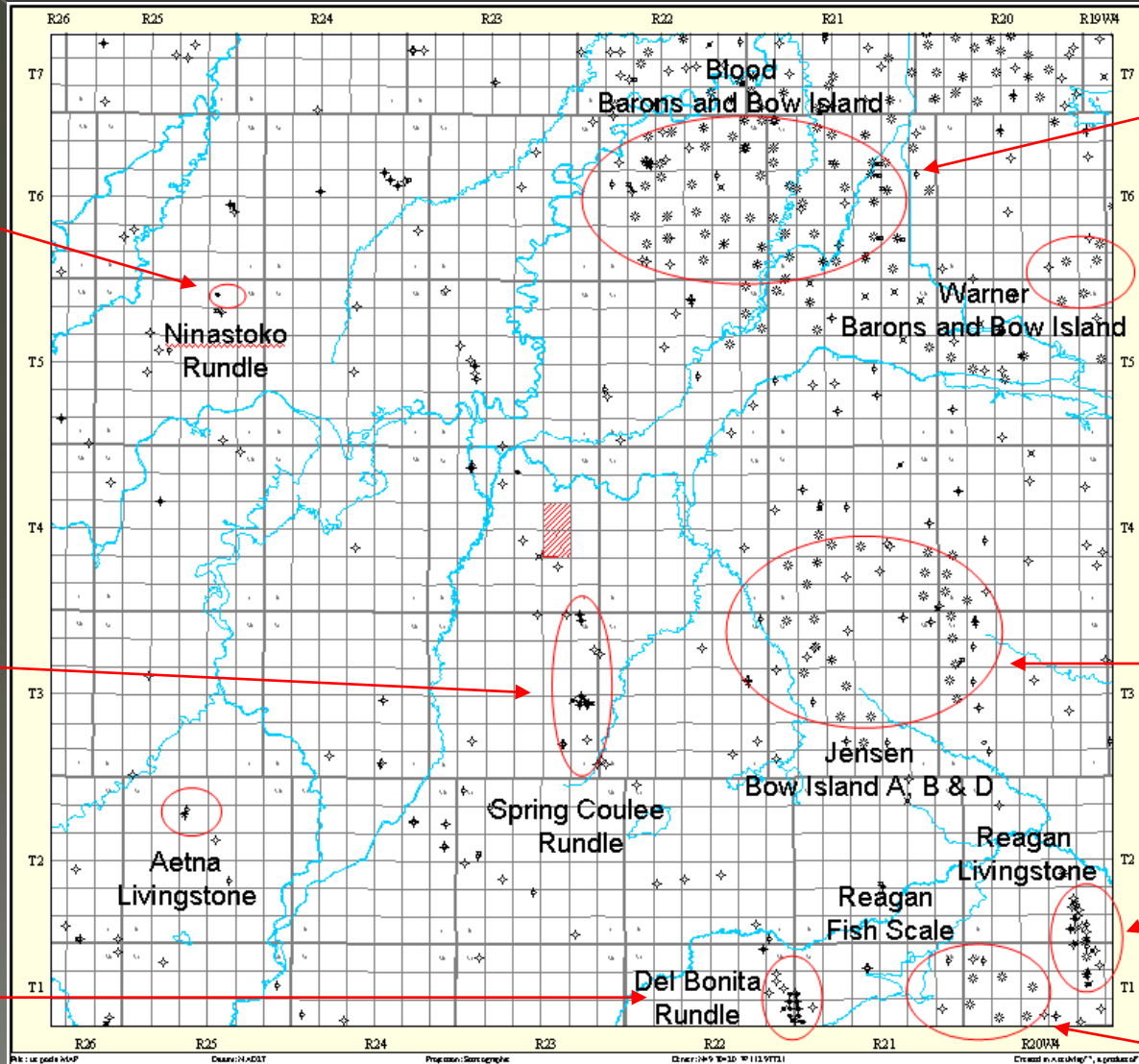
← Madison Rundle

# Defined Pools

150mbbl Oil  
200mmcf Gas  
1 well

100mbbl Oil  
73mmcf Gas  
6 wells

850mbbl Oil  
1200mmcf Gas  
16 wells



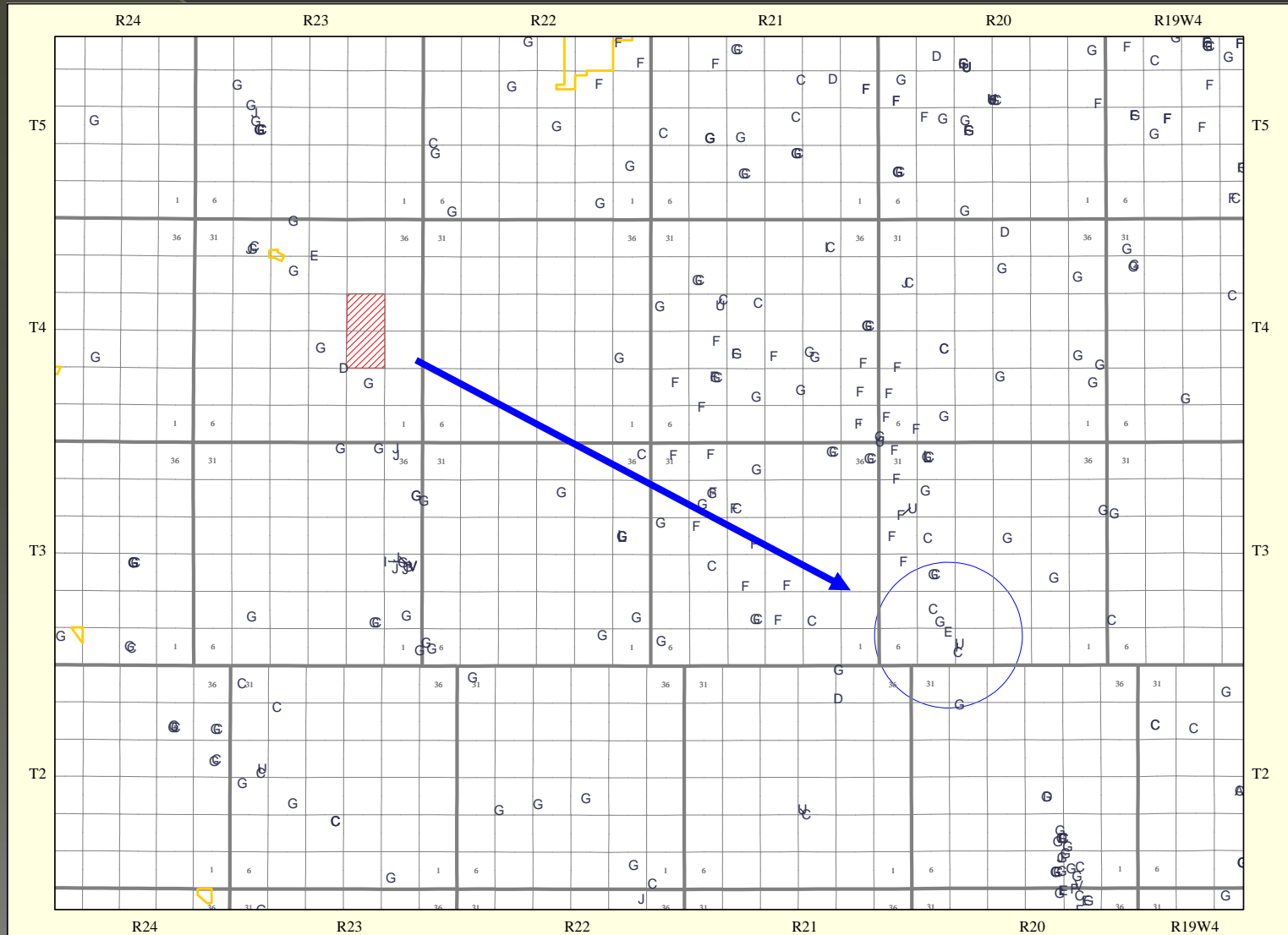
75,000mmcf Gas  
82 wells

9,000mmcf Gas  
22 wells

50mbbl Oil  
580mmcf Gas  
5 wells

4000mmcf Gas  
15 wells

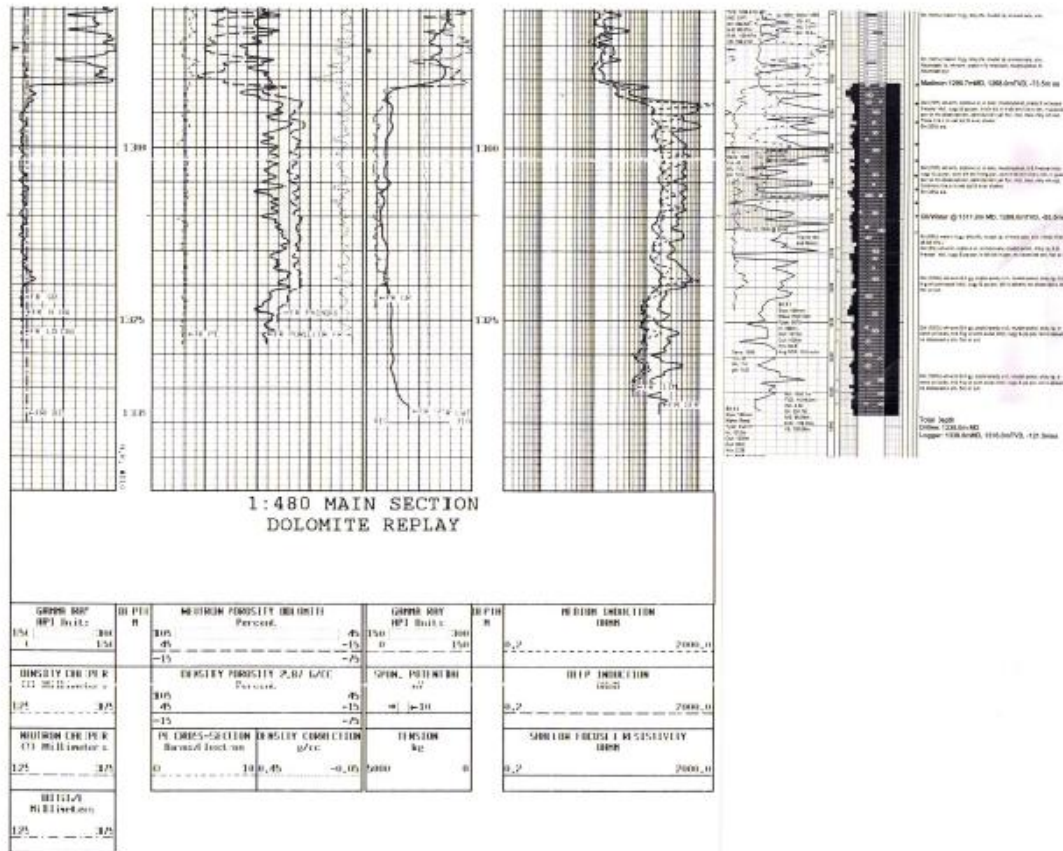
# BNP Mississippian Discovery





# BNP Resources 2007 Madison Oil Column Discovery

100/11-08-003-20W4



- drilled 3 wells, licensed 6 more,  
all wells illustrate ~25-30m oil pay column at ~1300m

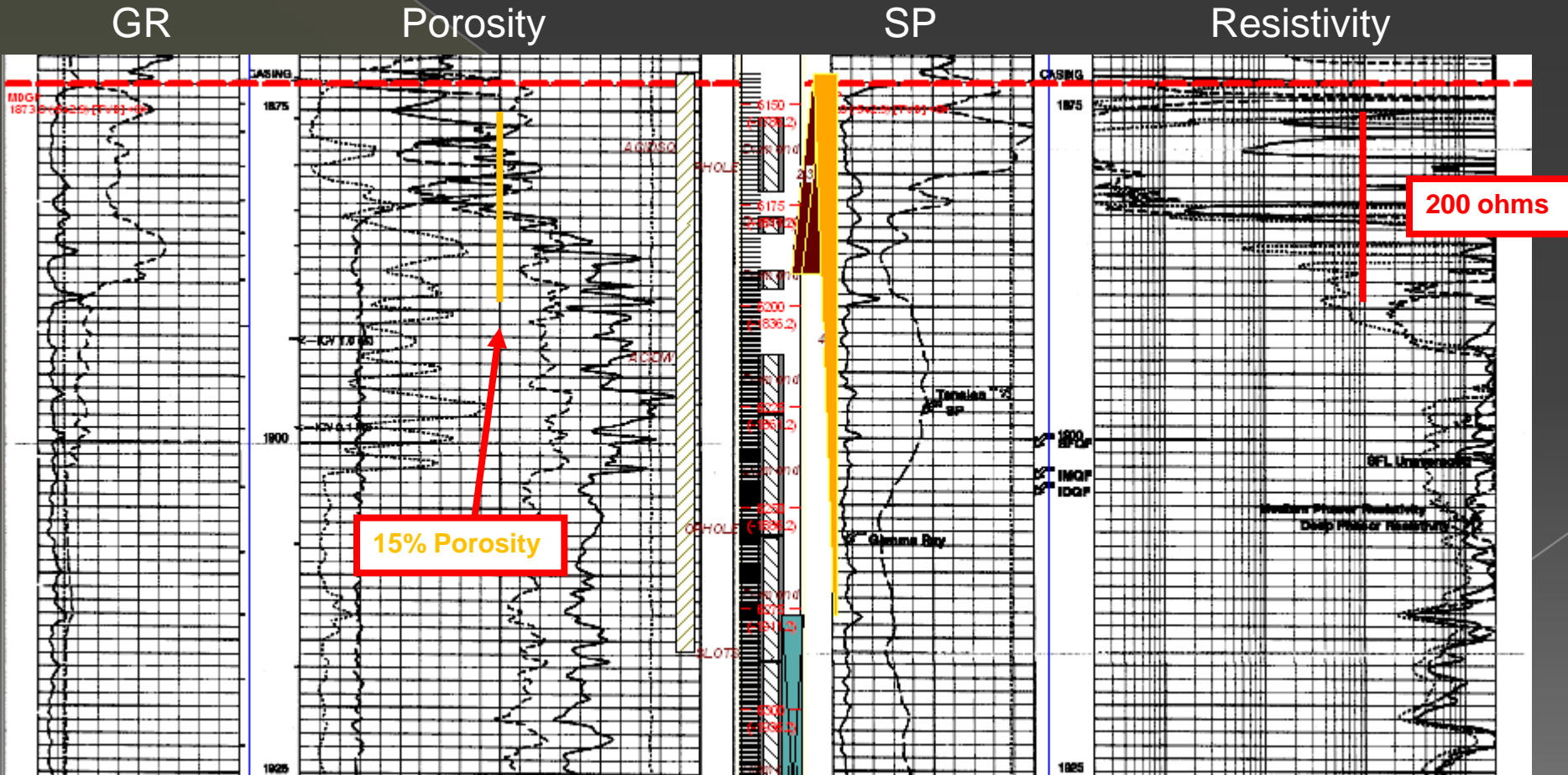
# Primary Target - Madison Formation

- Mississippian age
- Shallow, tropical carbonate shelf
- Limestone – numerous fossils

## Reservoir Characteristics:

- Dolomitization
- Fracturing - hydrocarbon migration
- Structure from tectonic activity

# Madison Target – Well 11-13-003-23W4

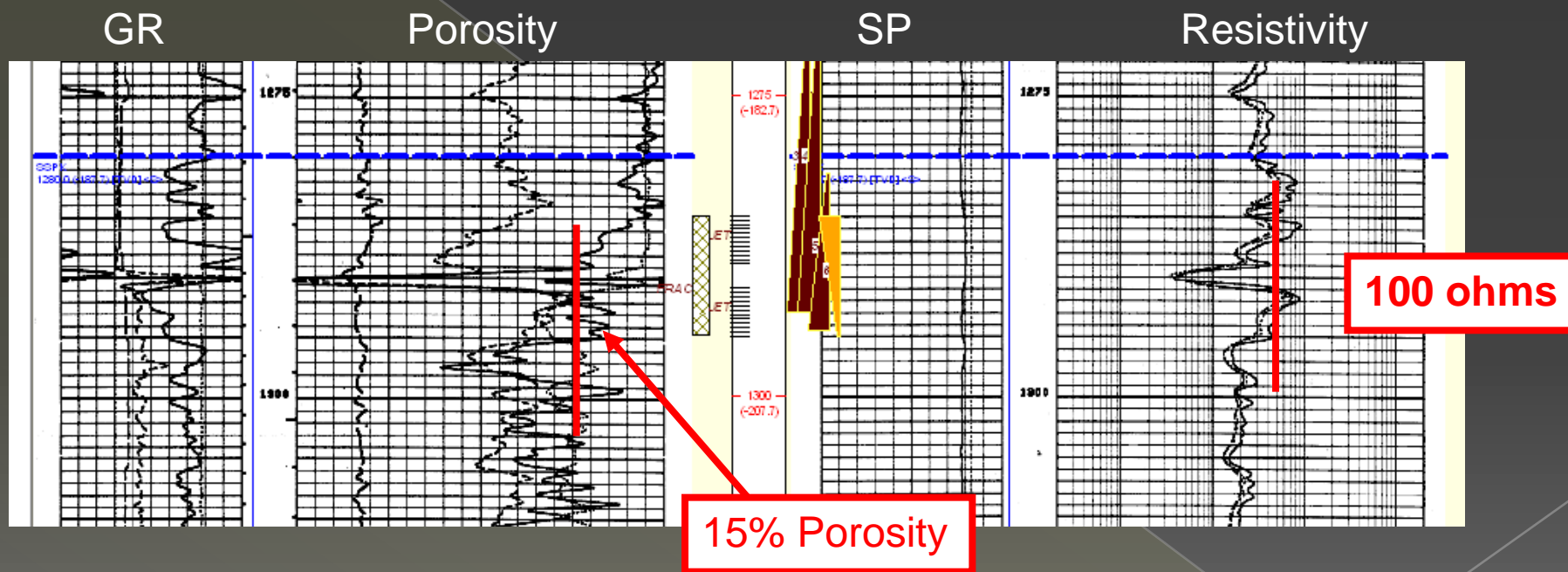


Cum. Production: 35,400bbl Oil; 15,300 mcf Gas

# Secondary Target Zones

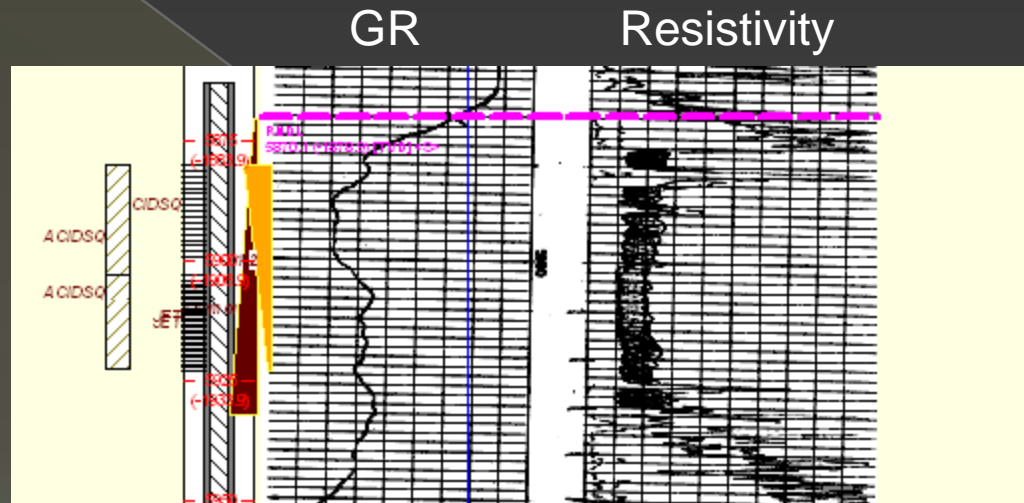
- Milk River Sands
- Colorado Shales
- Medicine Hat Sands
- Second White Speckled Shale
- Older Mississippian targets: Rundle, Banff
- Devonian Nisku & Leduc Carbonates

# Second White Speckled Shale Target – Well 04-34-00423W4



DST Results: 45 minutes – 76m Oil  
Recovered 5 barrels of clean oil in 2 hours  
Cum. Production: 10,760bbl Oil; 1044mcf Gas

# Rundle Target – Well 14-36-0003-23W4

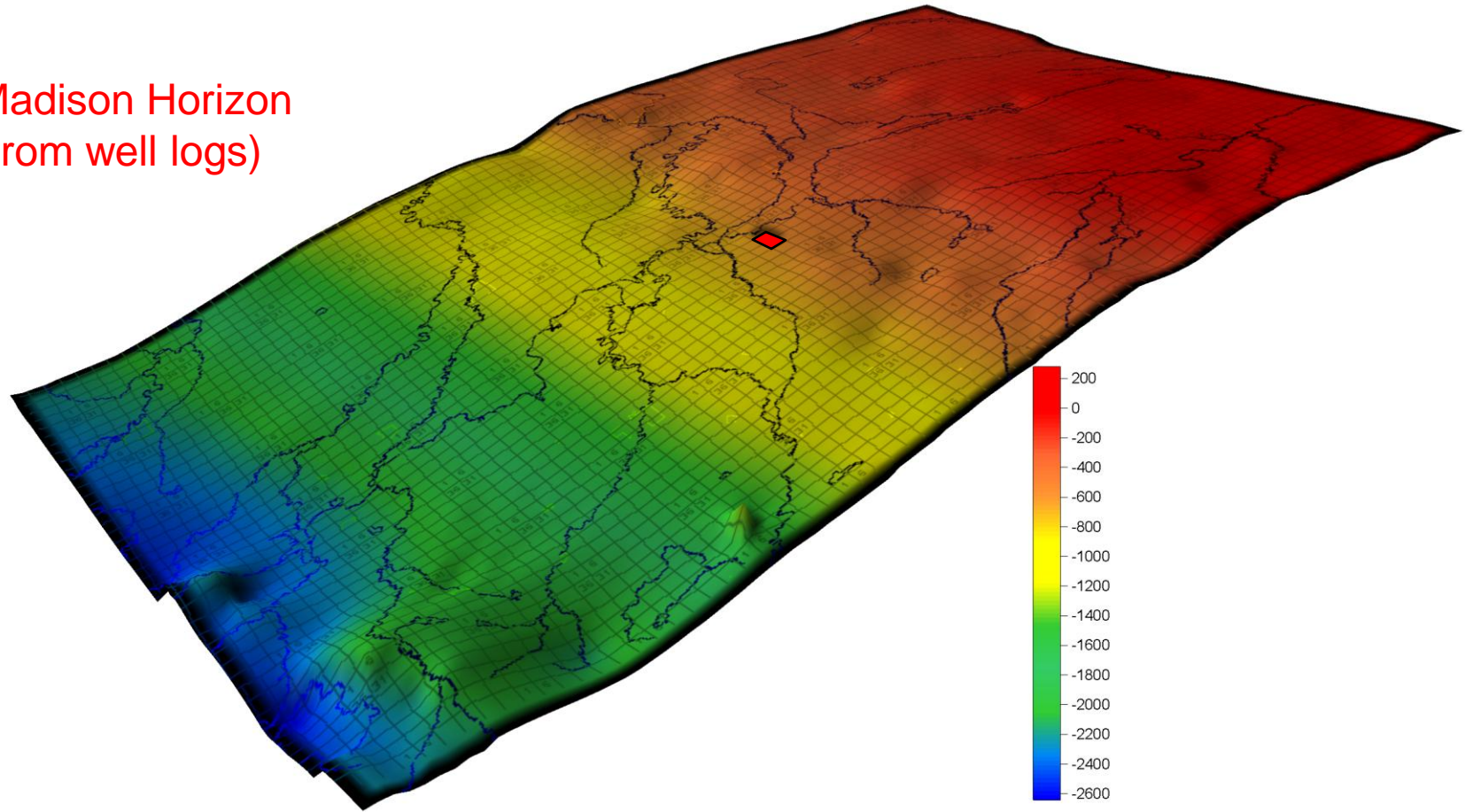


Resistivity: ~25 ohms

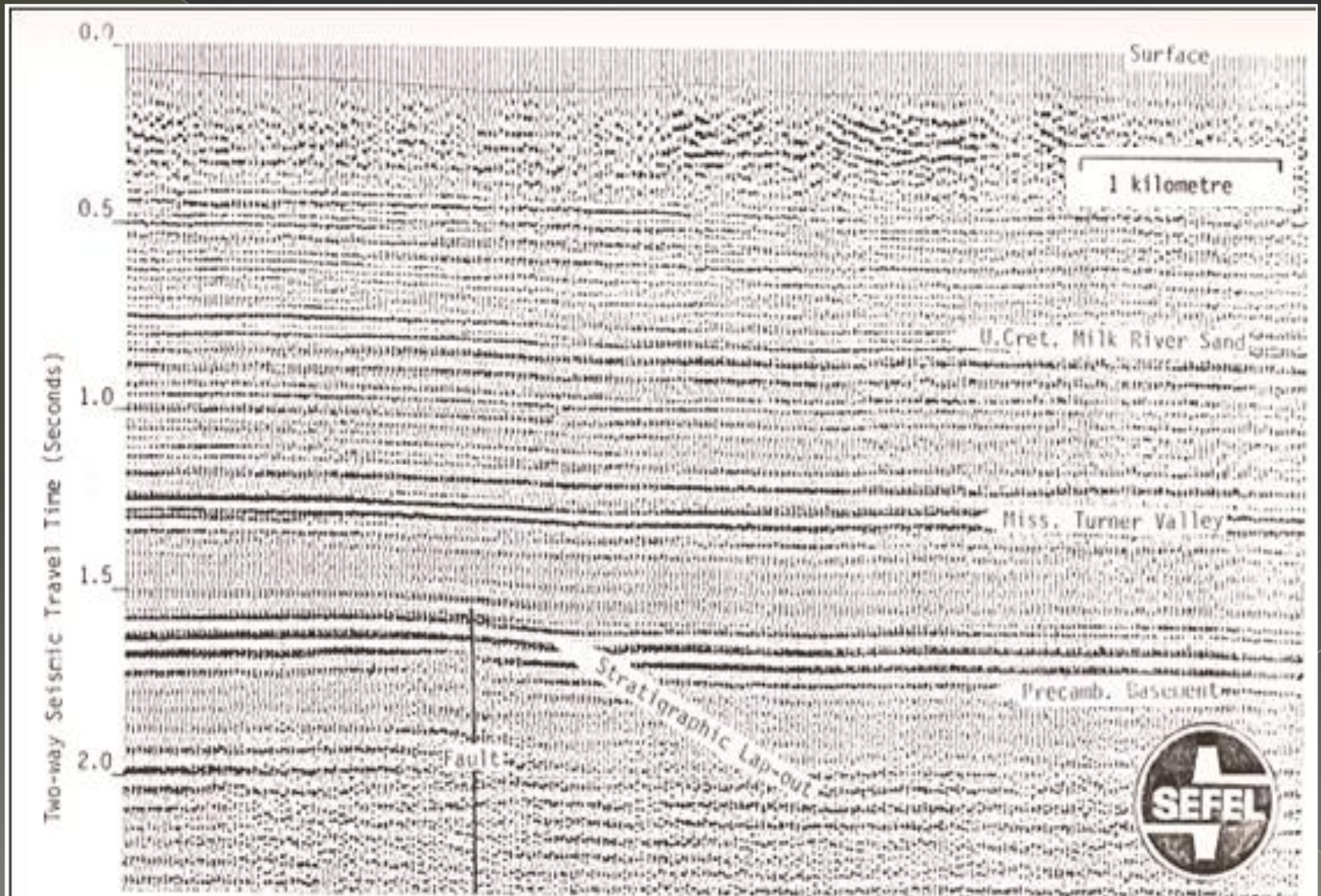
Cum. Production: 18,000bbl Oil; 20,000mcf Gas

# Regional Geology

Madison Horizon  
(from well logs)

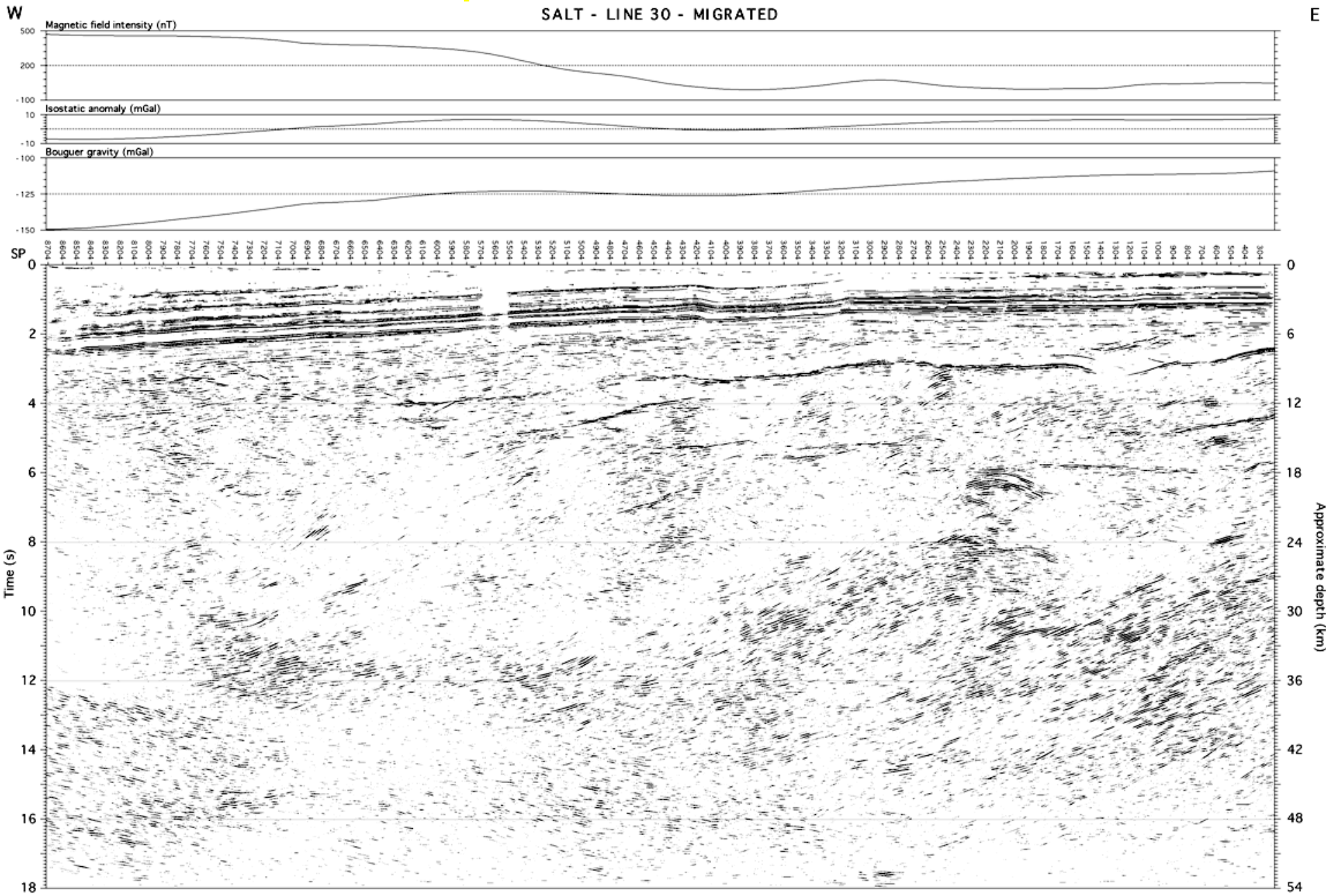


# Paukert Thesis (1980) – Carmangay, AB



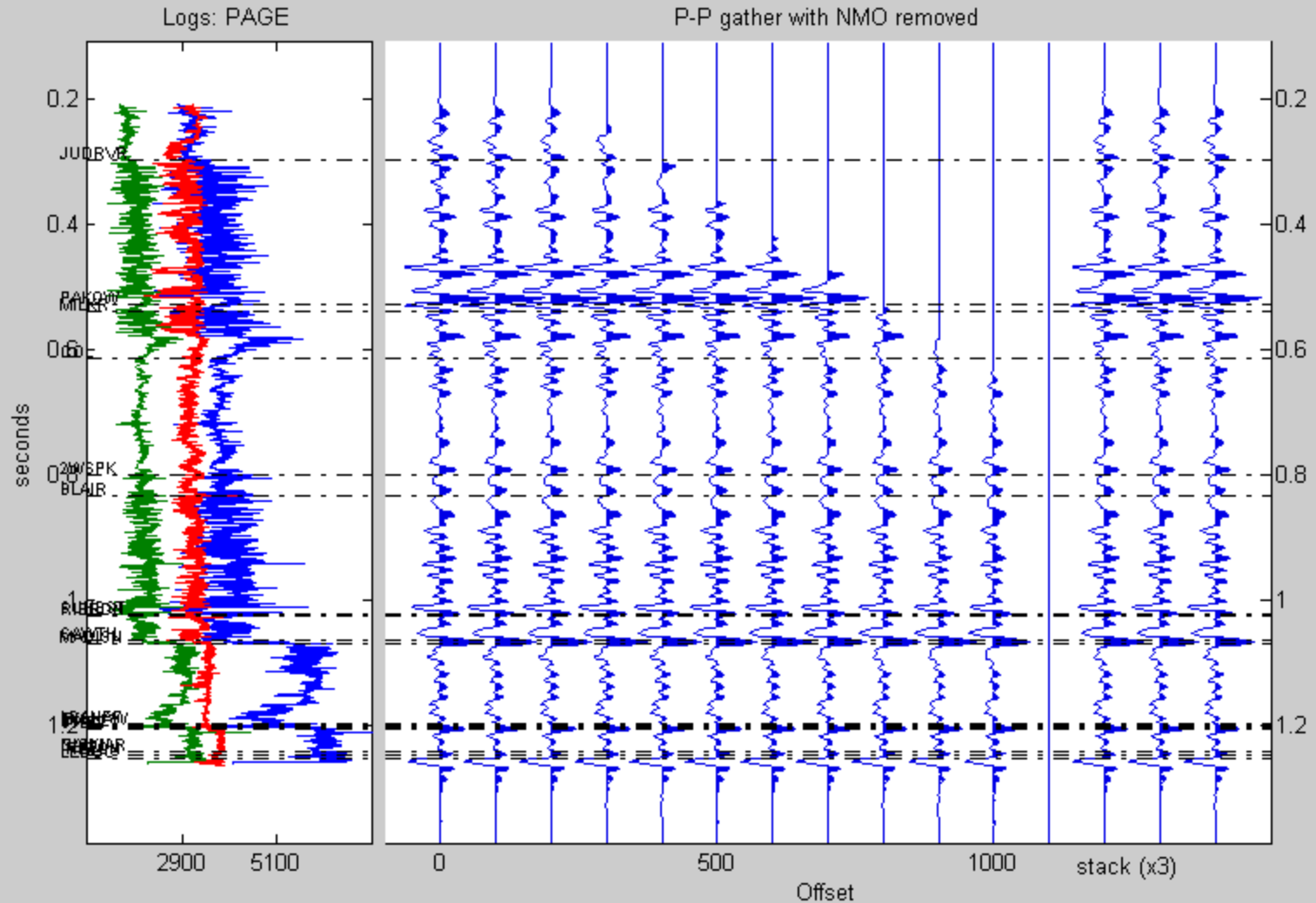


# Lithoprobe Seismic Line

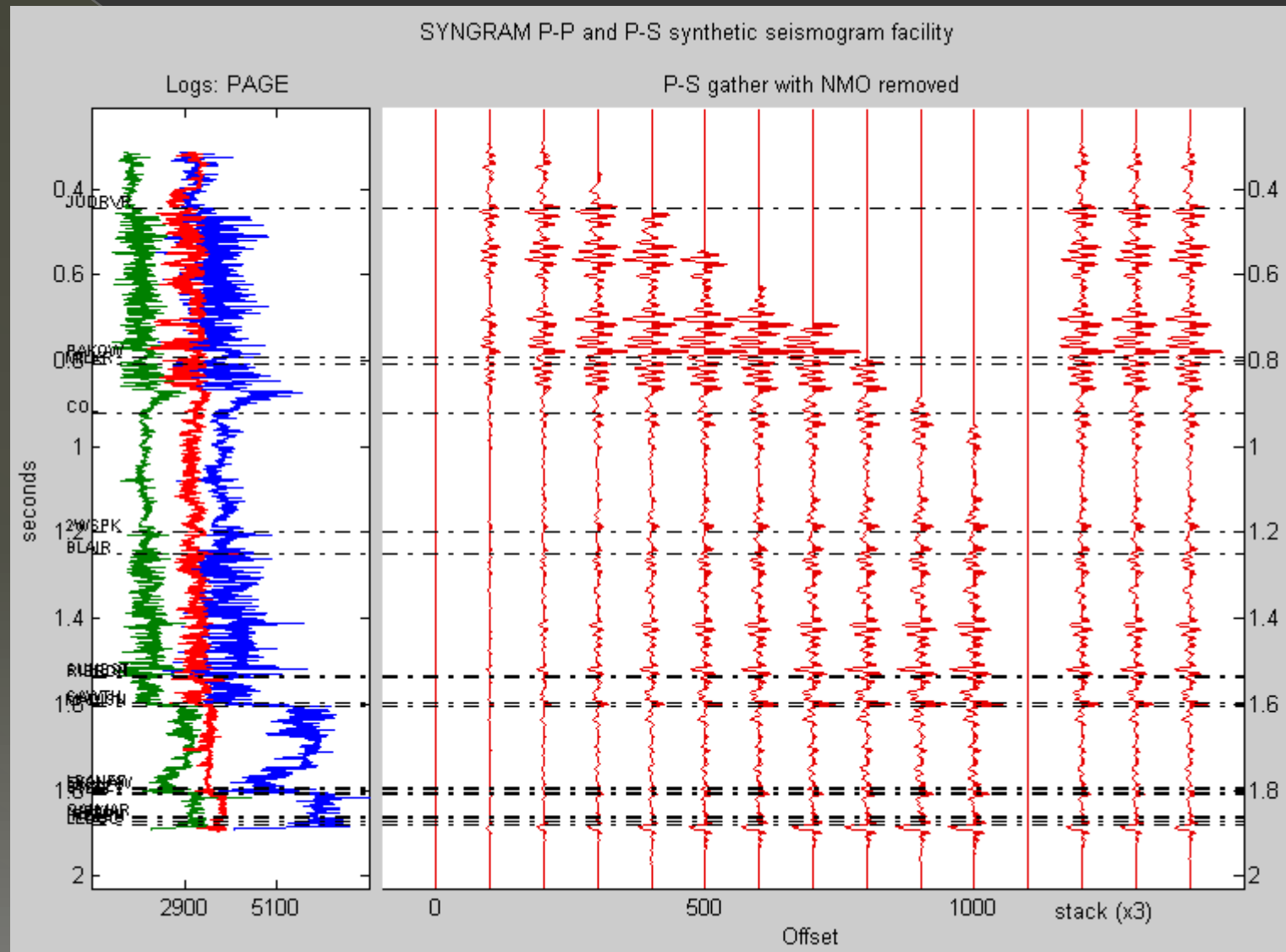


# PP Synthetic Seismogram – well 3-32-4-23W4

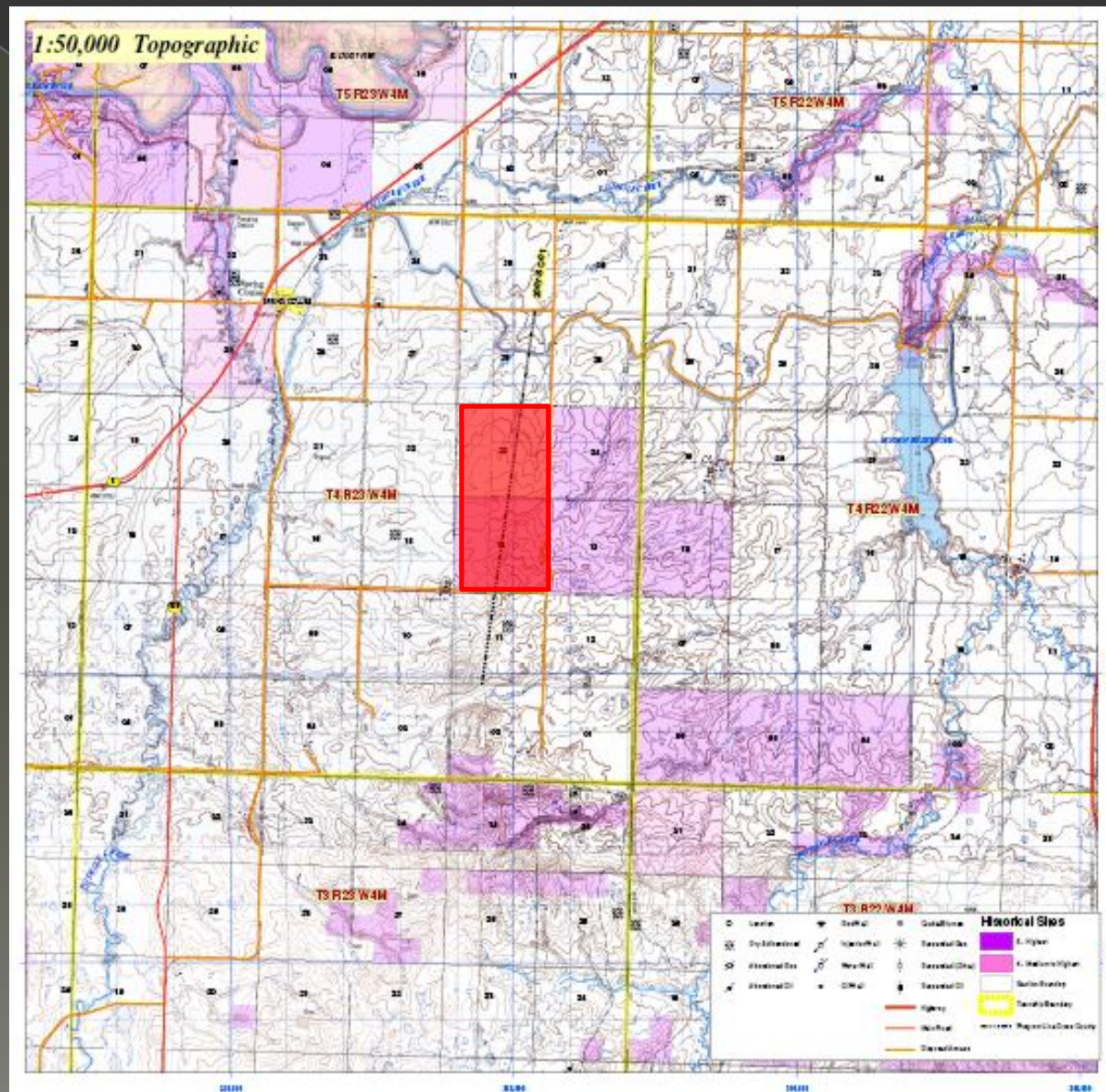
SYNGRAM P-P and P-S synthetic seismogram facility



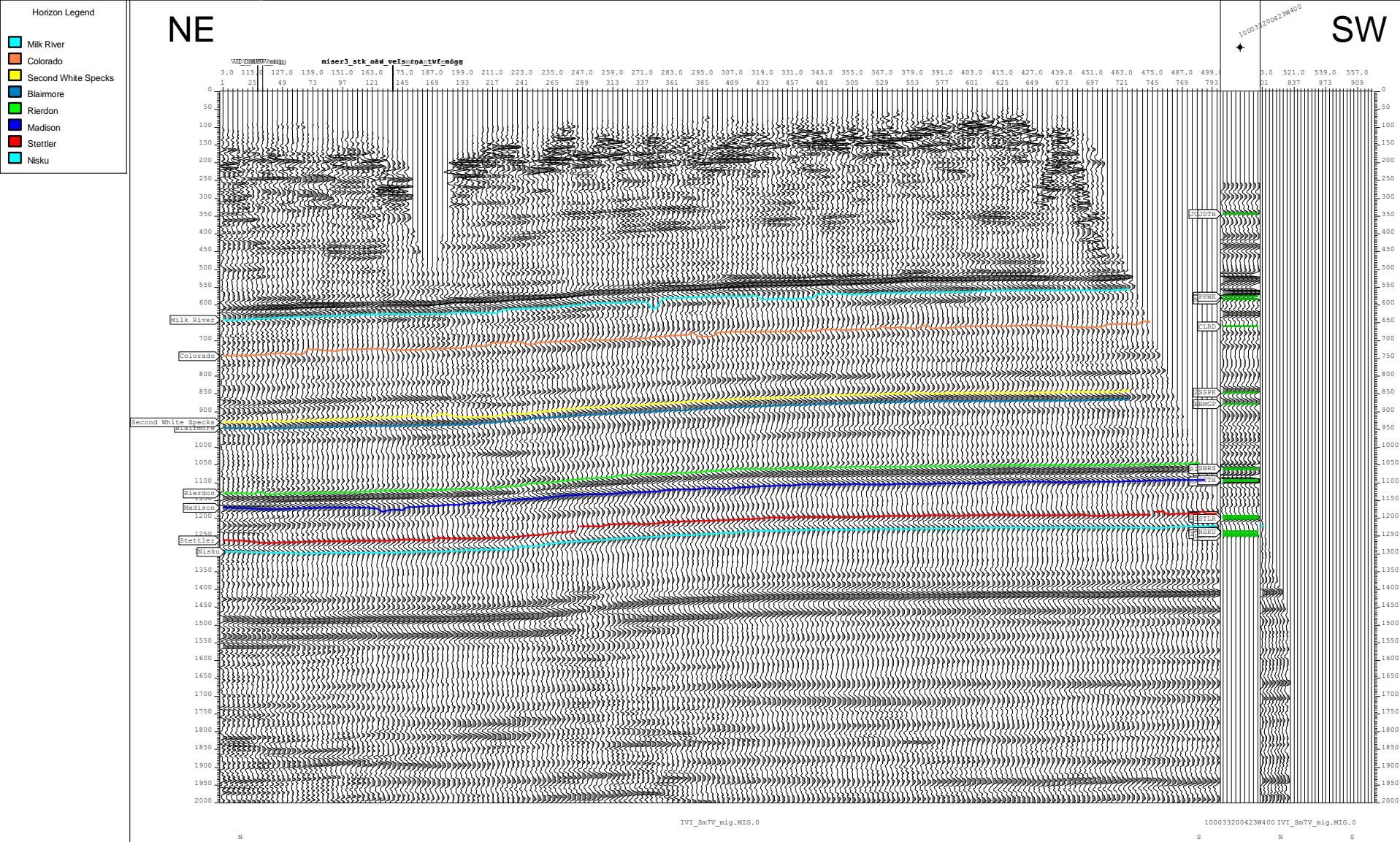
# PS Synthetic Seismogram – well 3-32-4-23W4



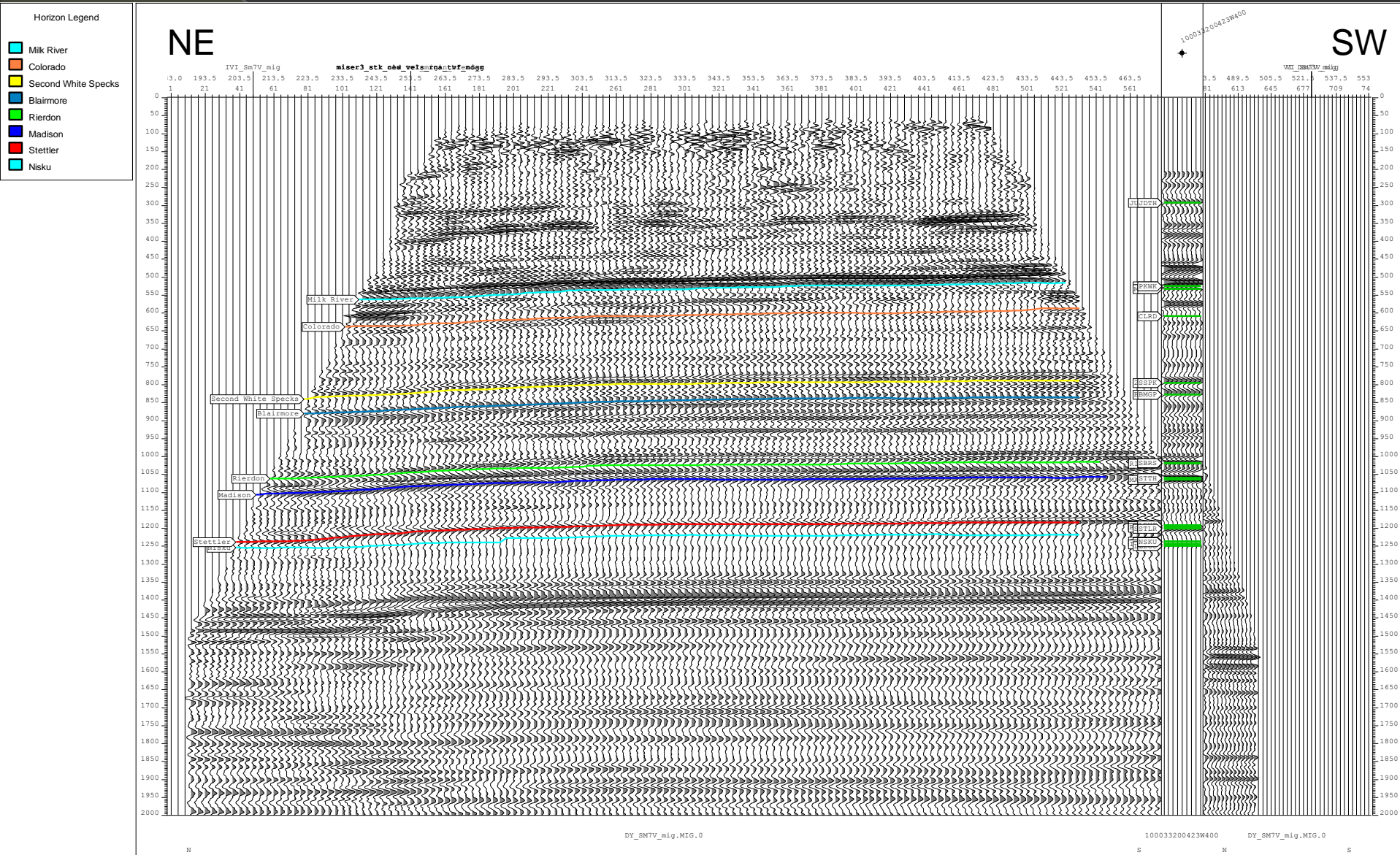
# January 2008 3C-2D Seismic Survey



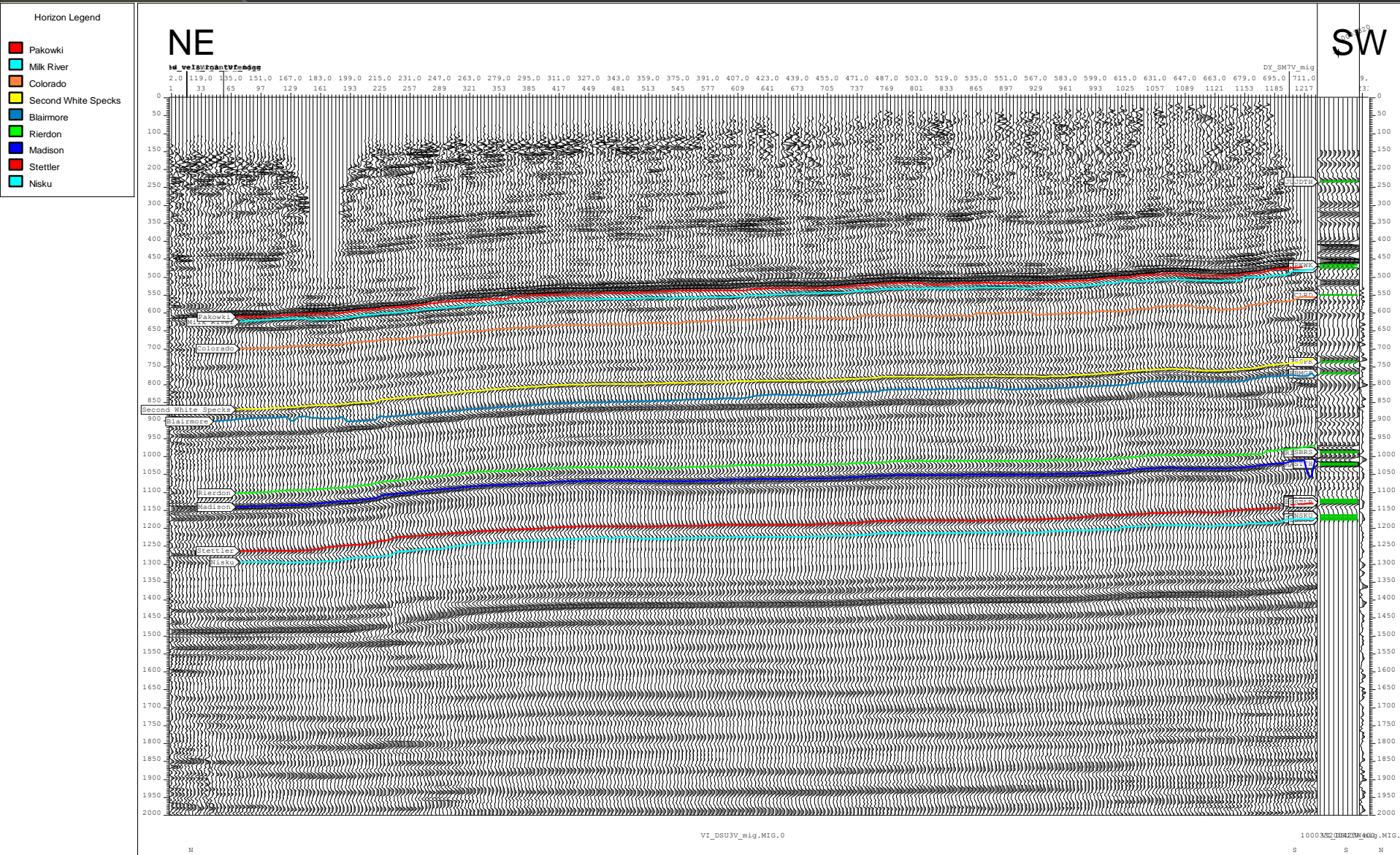
# Mini-Vibe Section with Horizons



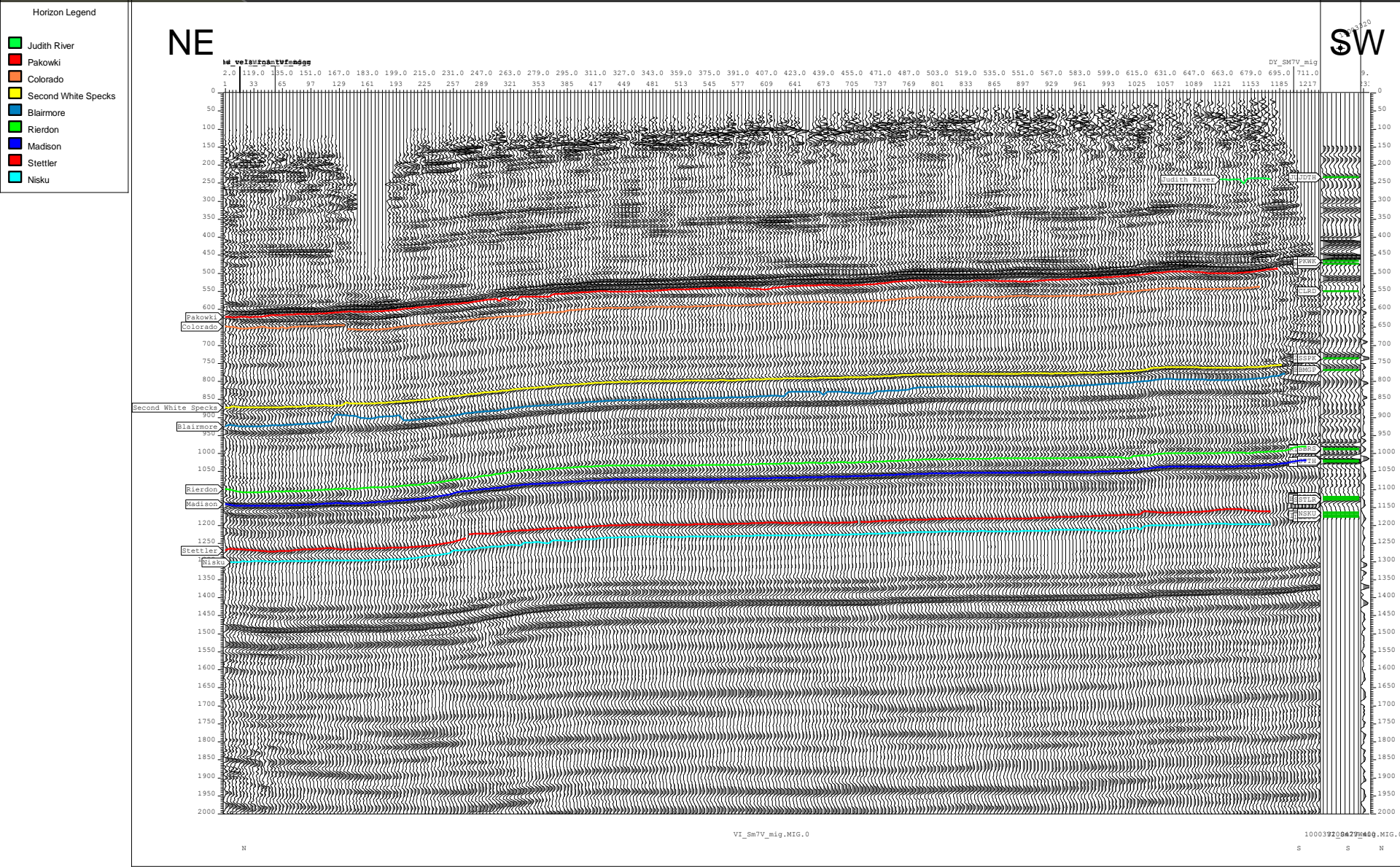
# Dynamite Section with Horizons



# Heavy Vibe – Sercel

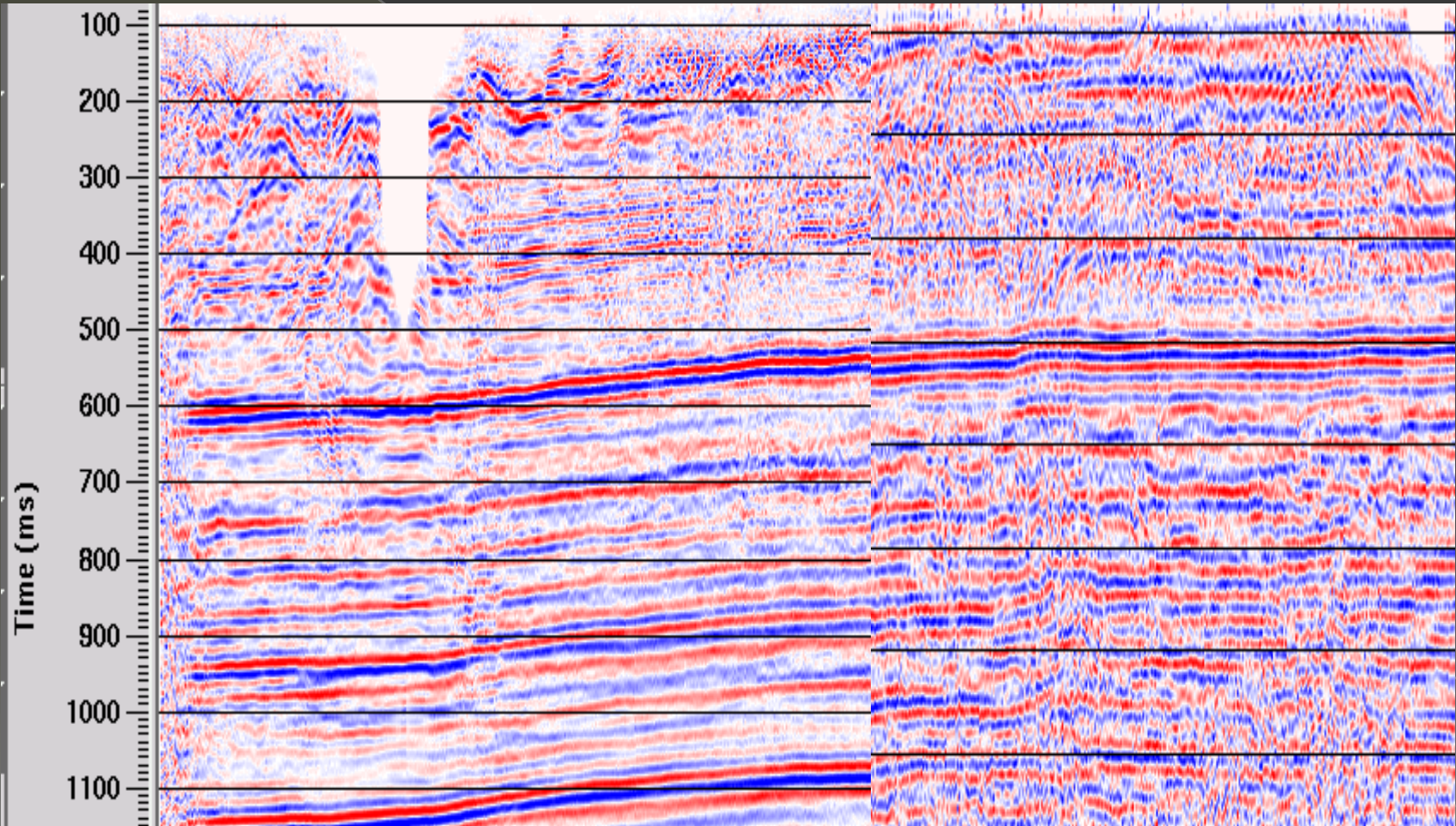


# Heavy Vibe – Aram



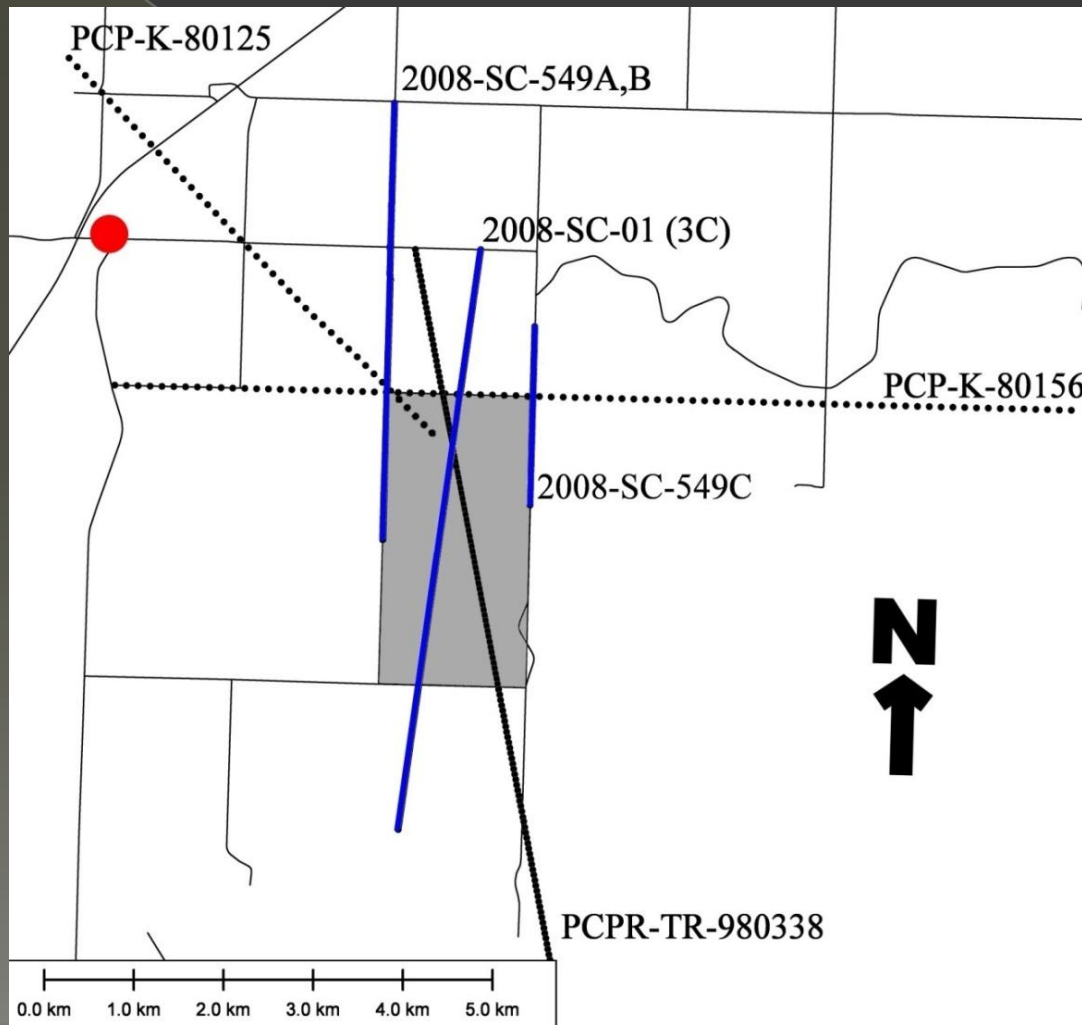


# Comparison of PP and PS Sections



Time is scaled using  $VP/VS = 1.9$ .

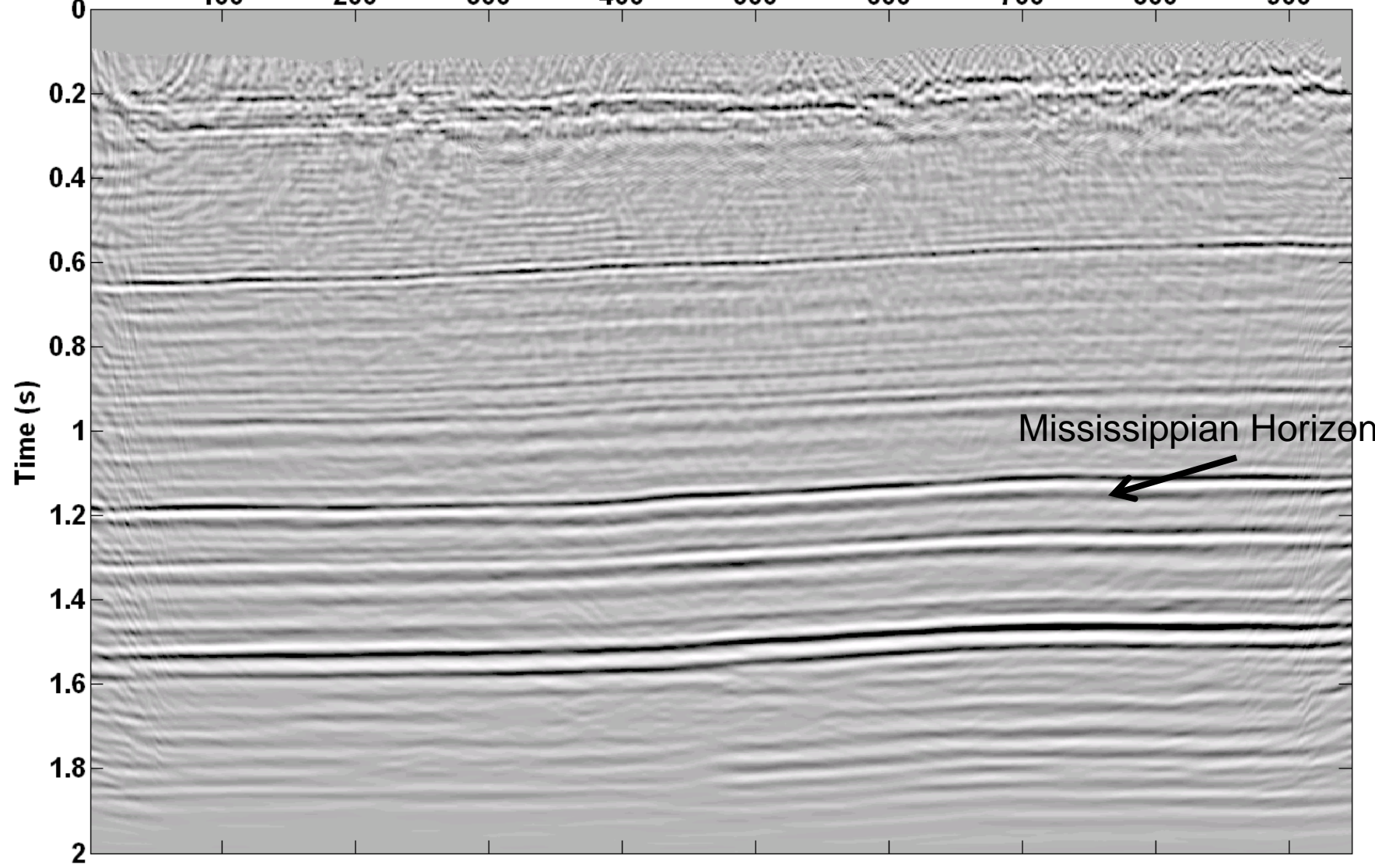
# August 2008 Field School Survey – Preliminary Results

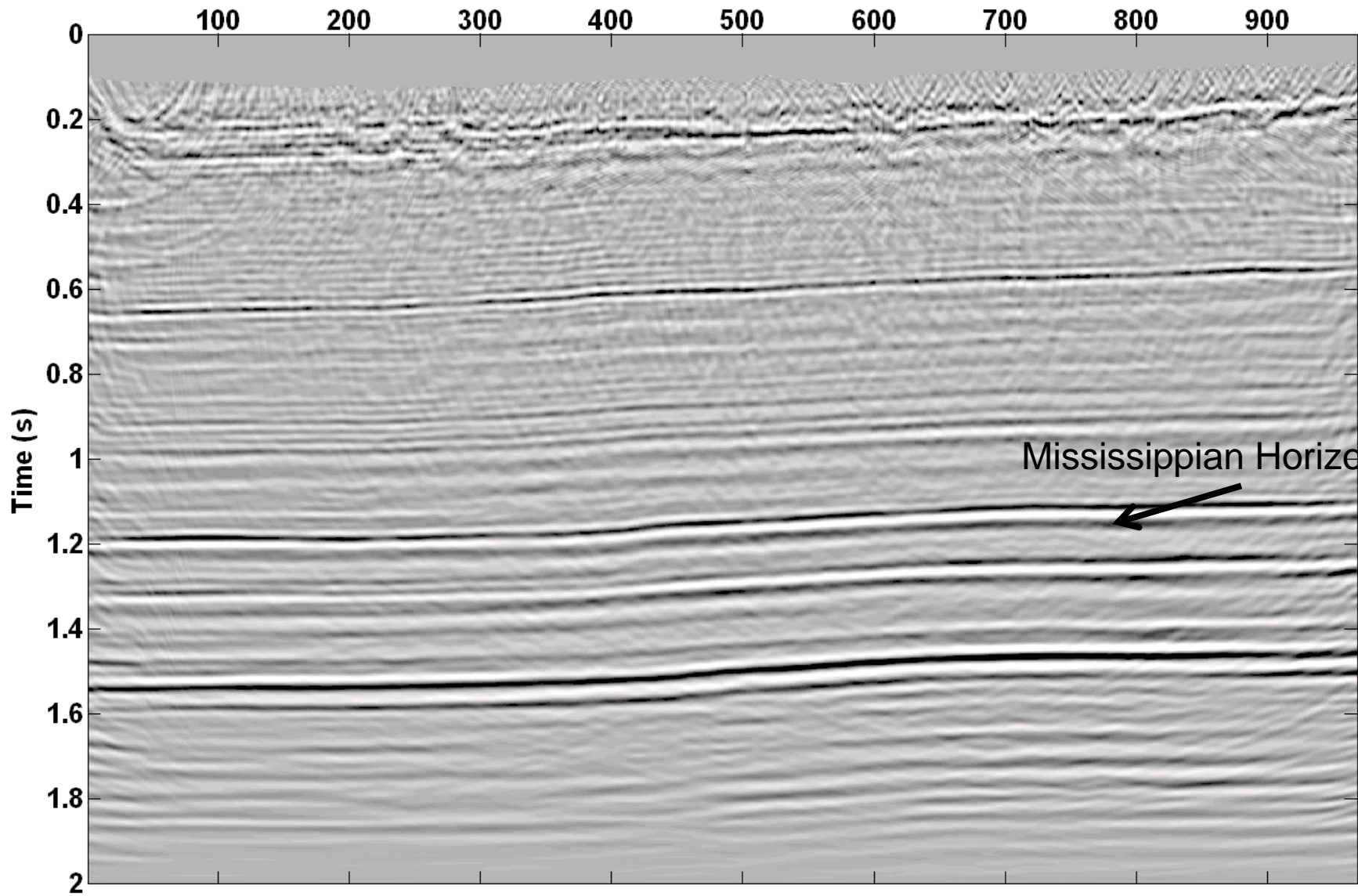


Map courtesy  
of Kevin Hall

Trace

100 200 300 400 500 600 700 800 900





N

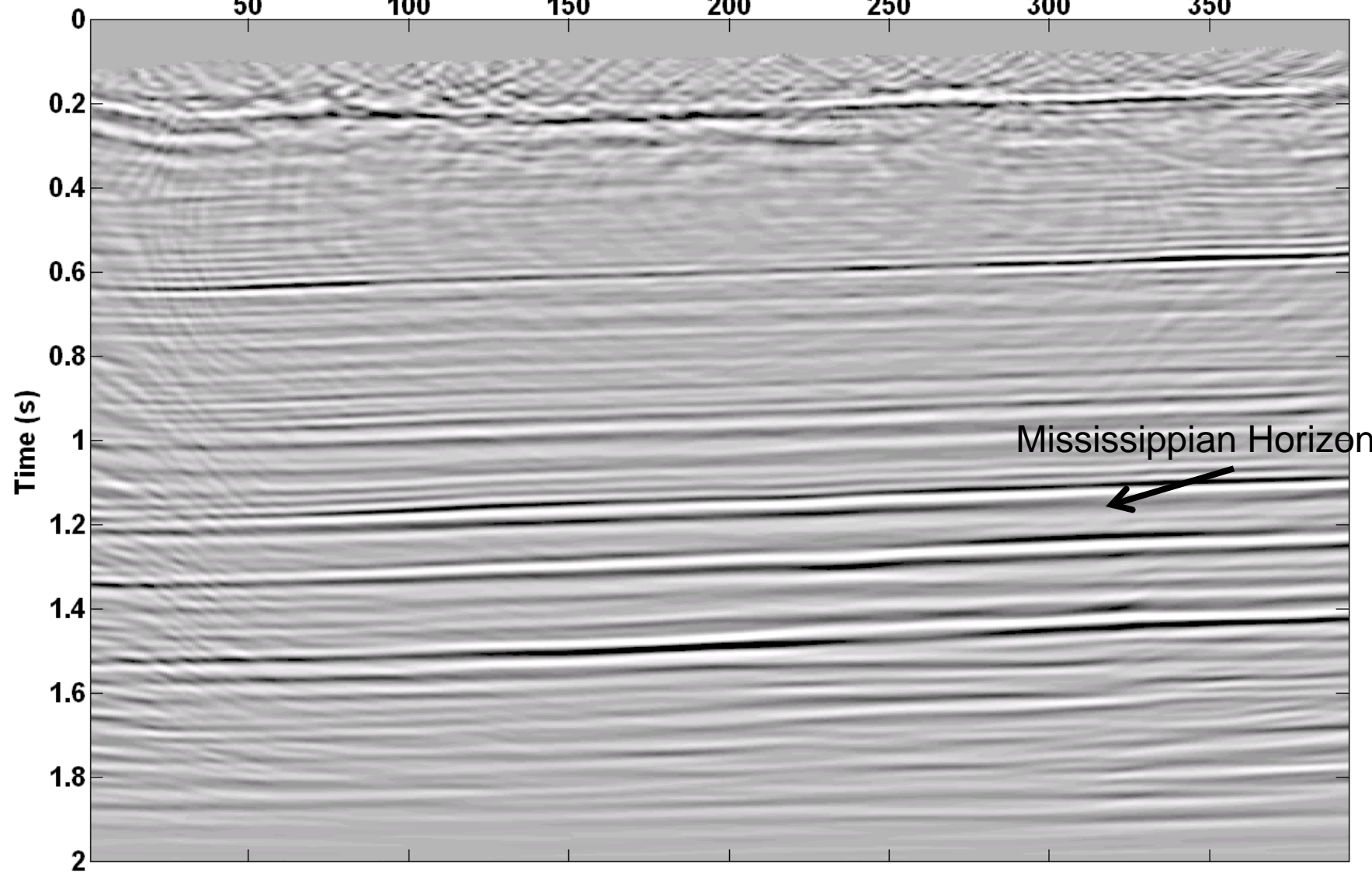
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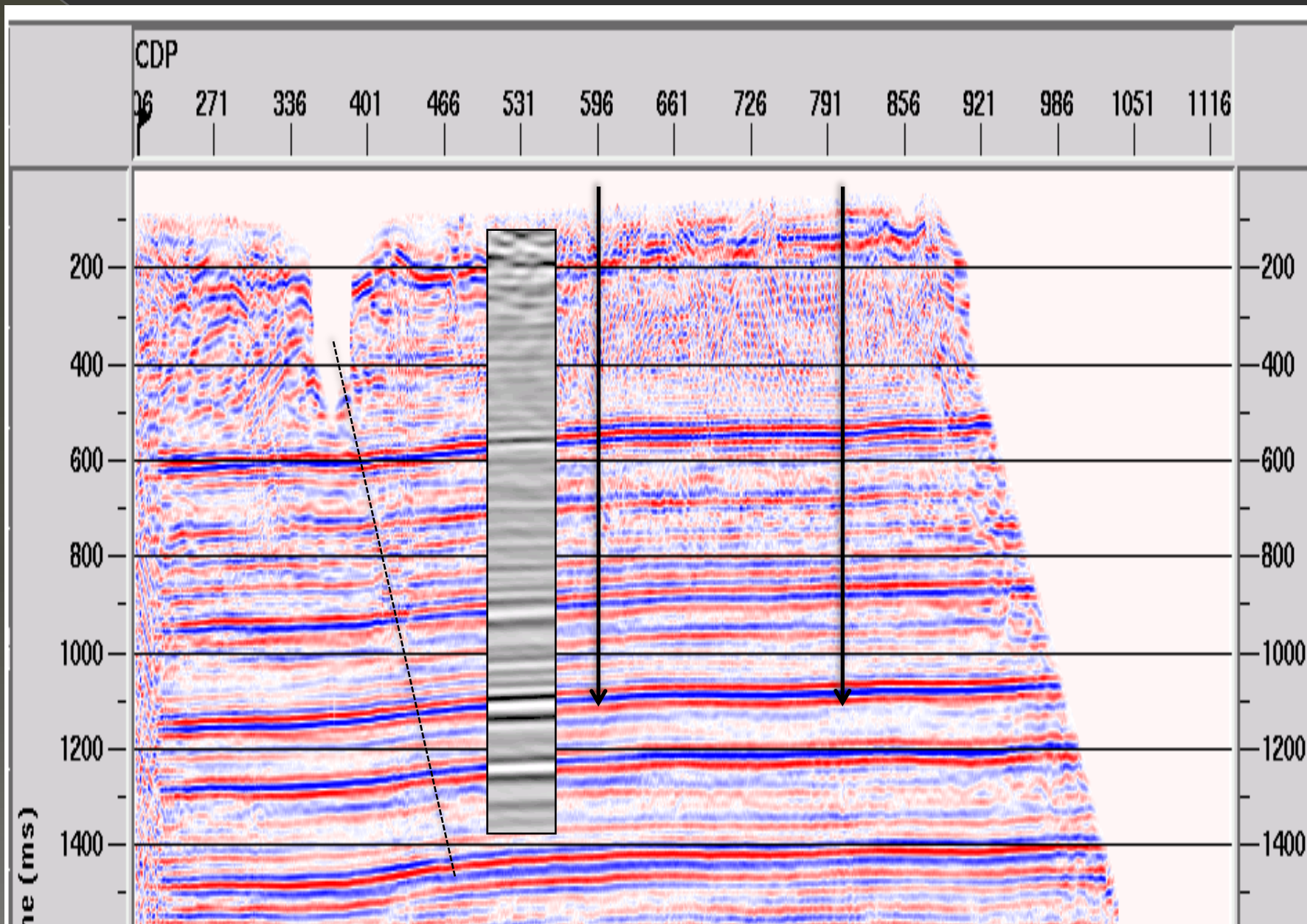
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S

Trace

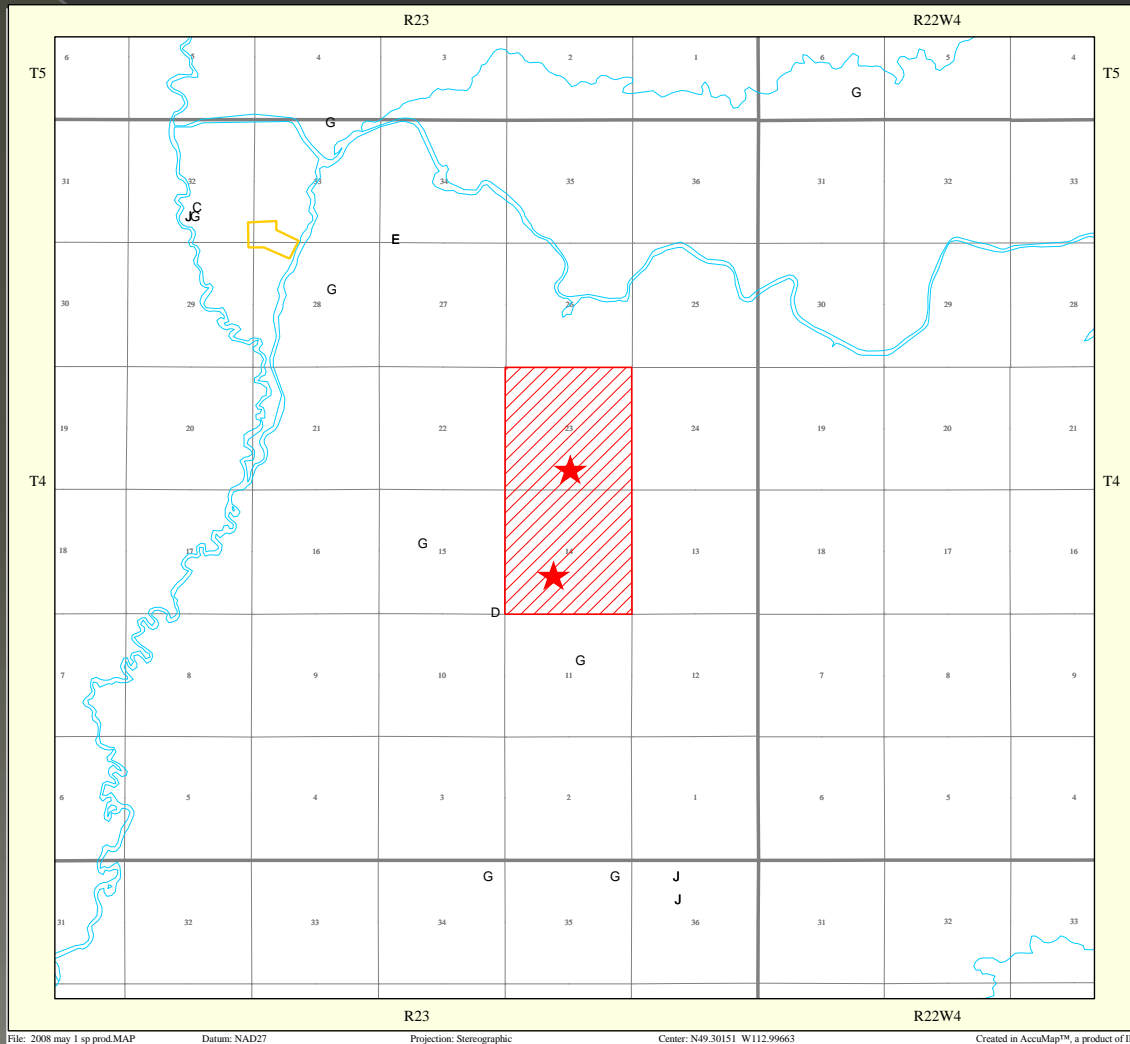
50 100 150 200 250 300 350





CREWES P-wave N-S section at Spring Coulee

# Potential Drilling Locations



# Conclusions

- University of Calgary shot a 3C-2D Survey – January 2008
- Field School 2008 – 3 N-S 2-D lines
- Many producing horizons in the area
- Madison = Main Target
- Possibility of younger sand production



# Continuing Work

- Depth Migrations – is the structure real?
- Analyze the PS data
- Well log analysis / Petrophysics
- East/West seismic line in Field School 2009?
  
- Identify well location(s) for potential farm out ... ?

# Acknowledgements

- Kevin Hall, Han-Xing Lu, Gabriela Suarez, Malcolm Bertram, Joanna Cooper
- Andy Marshall – EnCana Corporation

