

The Application of Geology in the Founding of Alberta's Petroleum Industry*

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Abstract

Oil seeps and bituminous (oil) sands were utilized by aboriginal people for ages and were known by early settlers of the region. Henry Marshall Tory appointed John Allan as the first Professor of Geology at the University of Alberta in 1912. As Tory envisioned, this appointment helped to define and expand the role of geology in the development of Alberta's natural resources. John Allan was also a founding member of the Scientific and Industrial Research Council of Alberta in 1921. As Director of the Research Council's geological survey, John Allan published many reports on Alberta's energy resources. In a talk on CKUA radio in 1927, he predicted the oil boom which began in 1947 with the discovery of the Leduc oil field. He was also one of Alberta's first consulting geologists, who pioneered the use of core and drill cuttings and found petroleum for several clients. John Allan's students, Doug Layer and Charlie Stelck, were working for Imperial Oil when this company discovered this oil field. These geologists published papers on the geological history and origin of this oil field. Many more of John Allan's students discovered oil and gas fields in Alberta. Karl Clark was hired by Henry Tory with the advice of John Allan in 1920 to research the use of the bituminous sands at the Research Council of Alberta. Various pilot plants led in 1967 to the opening of the first commercially successful oil sands operation of Suncor. Barry Mellon did a M.Sc. study with Charlie Stelck on the age and origin of the McMurray Formation in 1955 and completed a Ph.D. at the Pennsylvania State University in 1959 on the Mannville and Blairmore groups, which include the bituminous sands. He joined the Alberta Geological Survey (at that time part of the Alberta Research Council) continuing his work on these deposits and became its Head from 1966 to 1973. In 1973 Mellon was appointed Deputy Minister of the Mines and Minerals Department by Premier Lougheed and was involved with negotiations with private interests to get Syncrude off the ground. The Alberta Oil Sands Technology and Research Authority (AOSTRA) was established in 1974 under the direction of Clem Bowman and Maurice Carrigy with a focus on in-situ bitumen recovery. This organization obtained government funding for an underground test facility for Steam-Assisted Gravity Drive (SAGD). The success of these experiments paved the way for the extensive application of this method in present day in-situ bitumen recovery in NE Alberta.

References Cited

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Strobl, R.S., W.K. Muwais, D.M. Wightman, D.K. Cotterill, and L-P. Yuan, 1997, Geological Modeling of McMurray Formation Reservoirs Based on Outcrop and Subsurface Analogues, *in* S.G. Pemberton and D.P. James (eds.), *Petroleum Geology of the Cretaceous Mannville Group, Western Canada*: Canadian Society of Petroleum Geologists, Memoir 18, p. 292-311.

Strobl, R.S., W.K. Muwais, D.M. Wightman, D.K. Cotterill, and L-P. Yuan, 1997, Application of Outcrop Analogues and Detailed Reservoir Characterization to the AOSTRA Underground Test Facility, McMurray Formation, Northeastern Alberta, *in* S.G. Pemberton and D.P. James (eds.), *Petroleum Geology of the Cretaceous Mannville Group, Western Canada*: Canadian Society of Petroleum Geologists, Memoir 18, p. 375-391.

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*Willem Langenberg
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Department heads, University of Alberta, 1914



- John Allan 1884-1955
- Founder of U. of A. Geology Department
- “Uplifting the whole people” as Tory said
- Founder of Alberta Geological Survey (AGS)
- Founder of CSPG

John Allan doing Field Work, Crowsnest Pass, 1933



Holding present CSPG President's hammer

Bituminous (Oil) Sands, 1919



- During formation of the AGS
- no oil nor tar in these sands, but bitumen

Exposure of 'Bit' Sand boulder, near Edmonton, 1927



Cooking on Gas (by Ralph Rutherford), 1919



Wainwright Heavy Oil, 1926



Royalite #4, Turner Valley, 1926



Allan's Student Pete Sanderson found Oil Leg in 1936

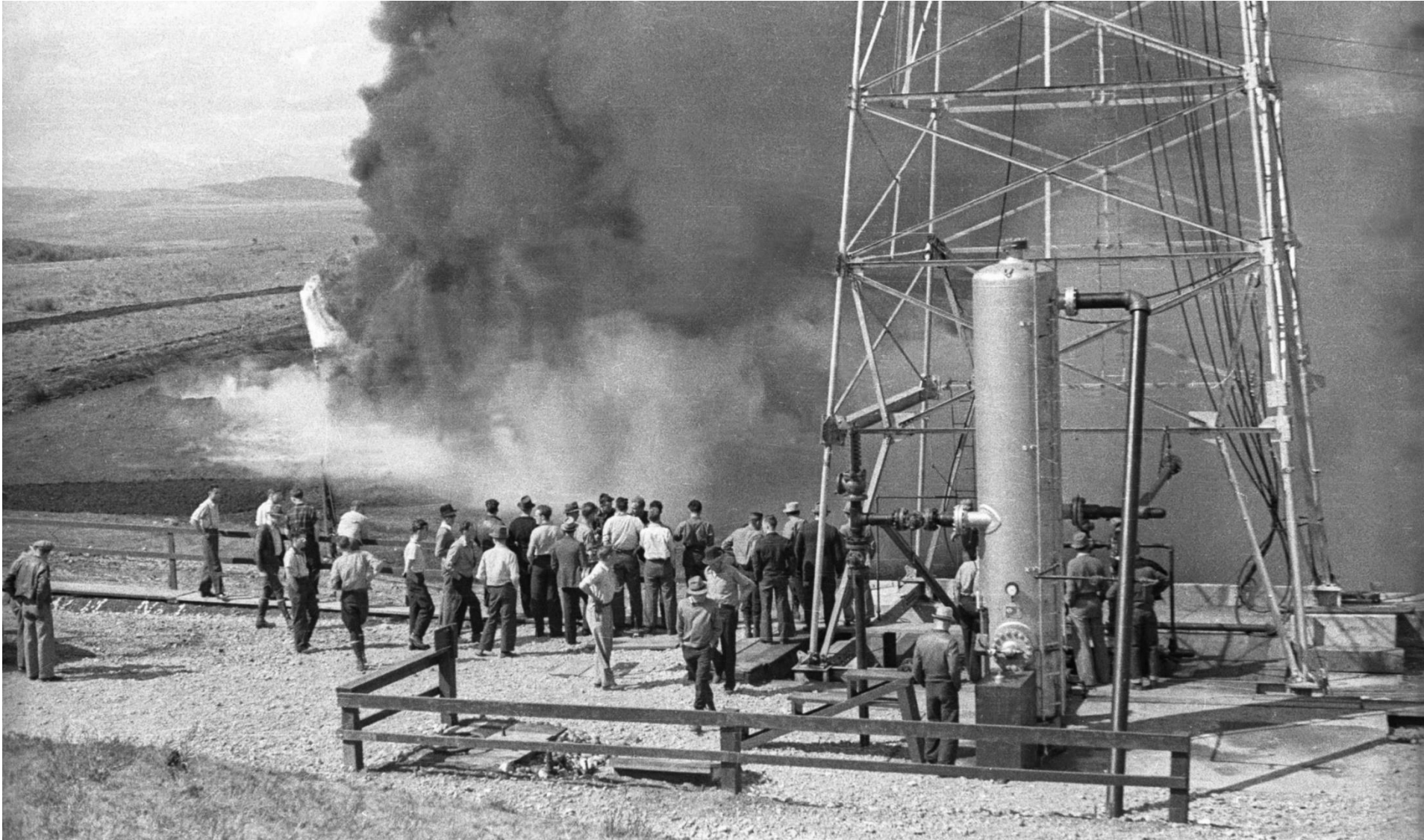
Skiff Well sited by Rock Star John Allan

June 1927

Allan predicted the
1947 Oil Boom in a
radio speech



Hell's half acre, 1938



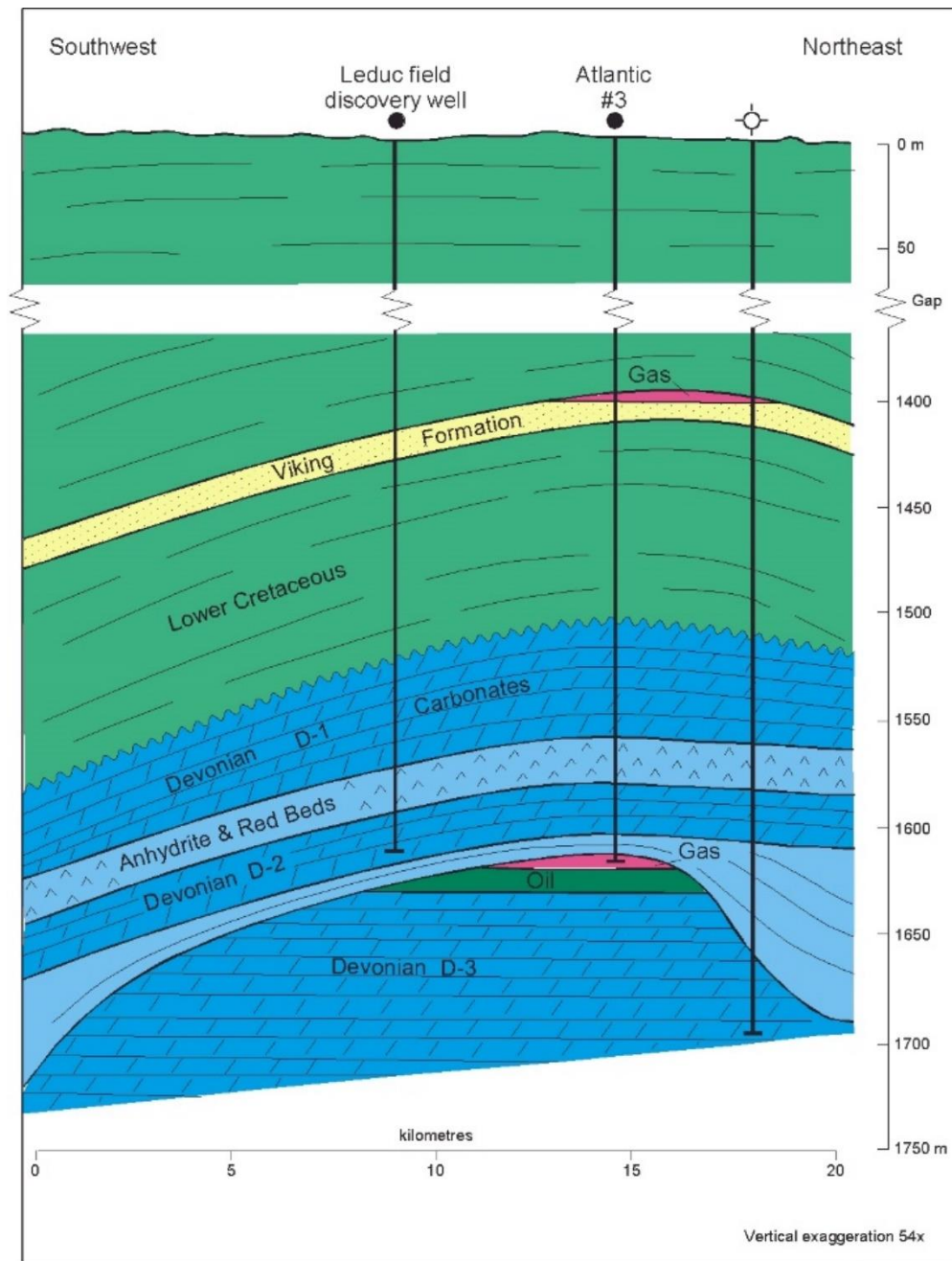
- Allan promoted the conservation of gas since 1930
- Start of ERCB 1938
- 1949 Gas Resources Preservation Act
- John Allan could retire

Leduc #1, February 13, 1947



Allan's students: e.g. Charlie Stelck, 1939





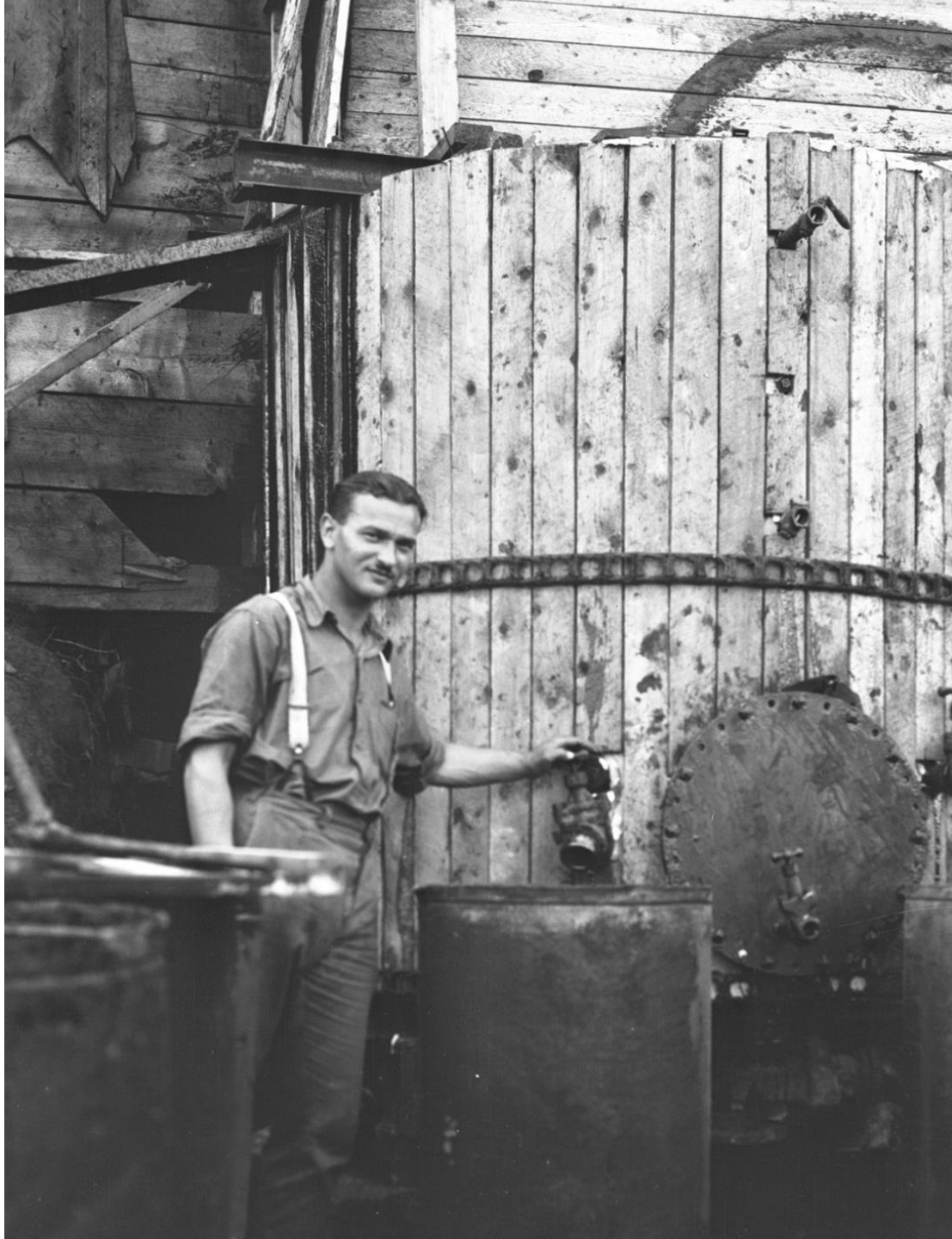
Leduc Discovery

Imperial Oil

Reefs found by Des Boggs, Doug Layer and Charlie Stelck
Also by an unknown engineer, who moved well west



C. Stelck
1917-2016

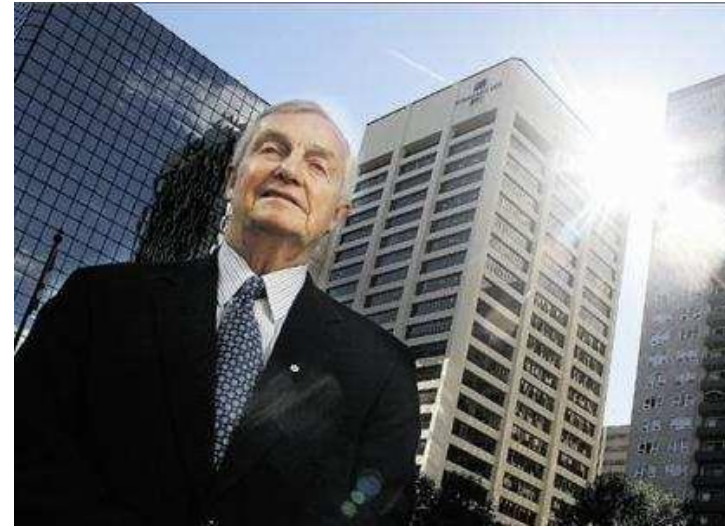


Drs. Pasternak and Clark
1930 and 1949
At Clark's bituminous sand
plant Ft. McMurray

ARC and AGS fundamental
in defining oil sand
reserves

Peter Lougheed (Premier 1971-1985)

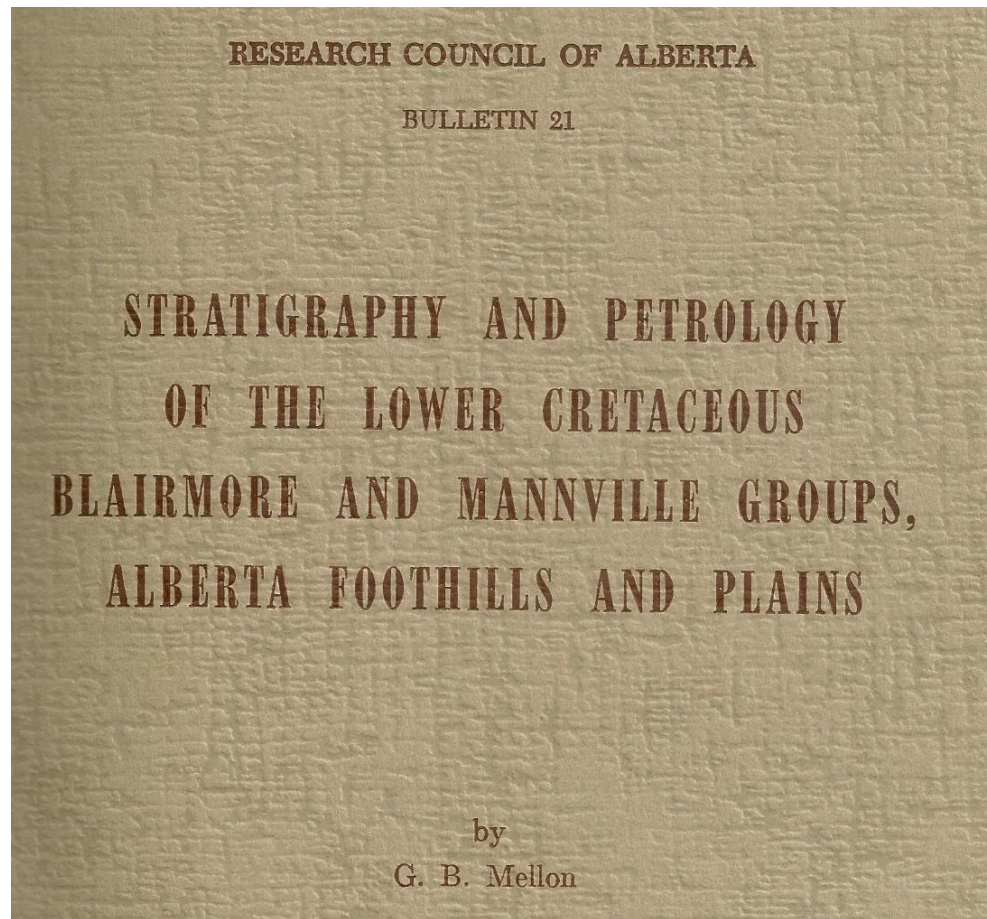
Visionary



- Started Alberta Energy Company in 1973 (50% province owned)
- Got Syncrude off the ground in 1974 with 30% Government ownership (a type of subsidy)
- AOSTRA was at \$100 million per year the biggest research project in North America, outside of NASA

Geologist Barry Mellon

Executed the Vision



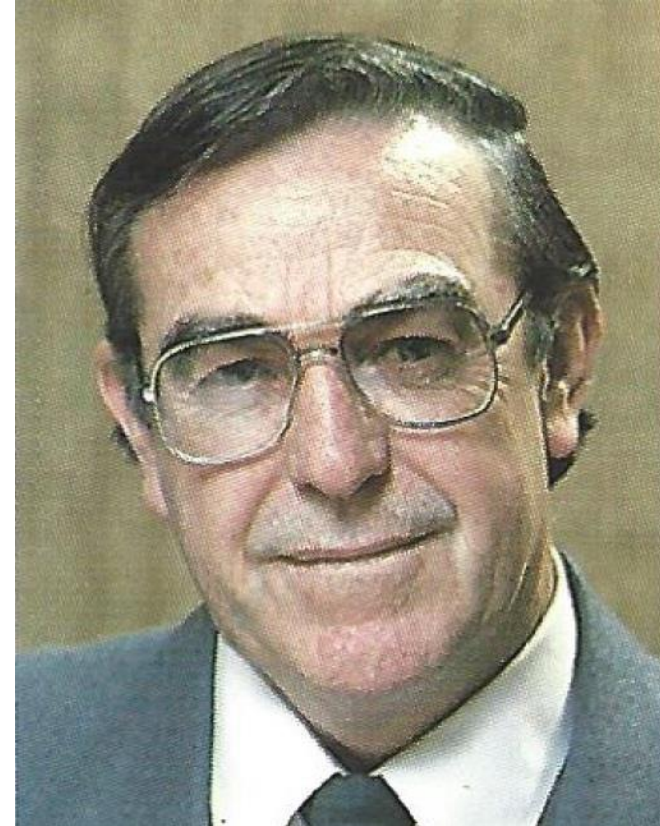
- MSc on McMurray Fm. under Stelck in 1955
- PhD on Blairmore Gp. at Penn State in 1959
- At Alberta Geological Survey (AGS) 1959-1973, being its head 1966-1973
- Energy Deputy Minister 1973-1986
- Assisted Lougheed and Getty in Syncrude negotiations in 1974
- Got AOSTRA going in 1975
- Chief Officer, Executive Council 1986-1992, Alberta's most senior civil servant

AOSTRA Crown Corporation 1975-1994

biggest research project in North America, outside of NASA



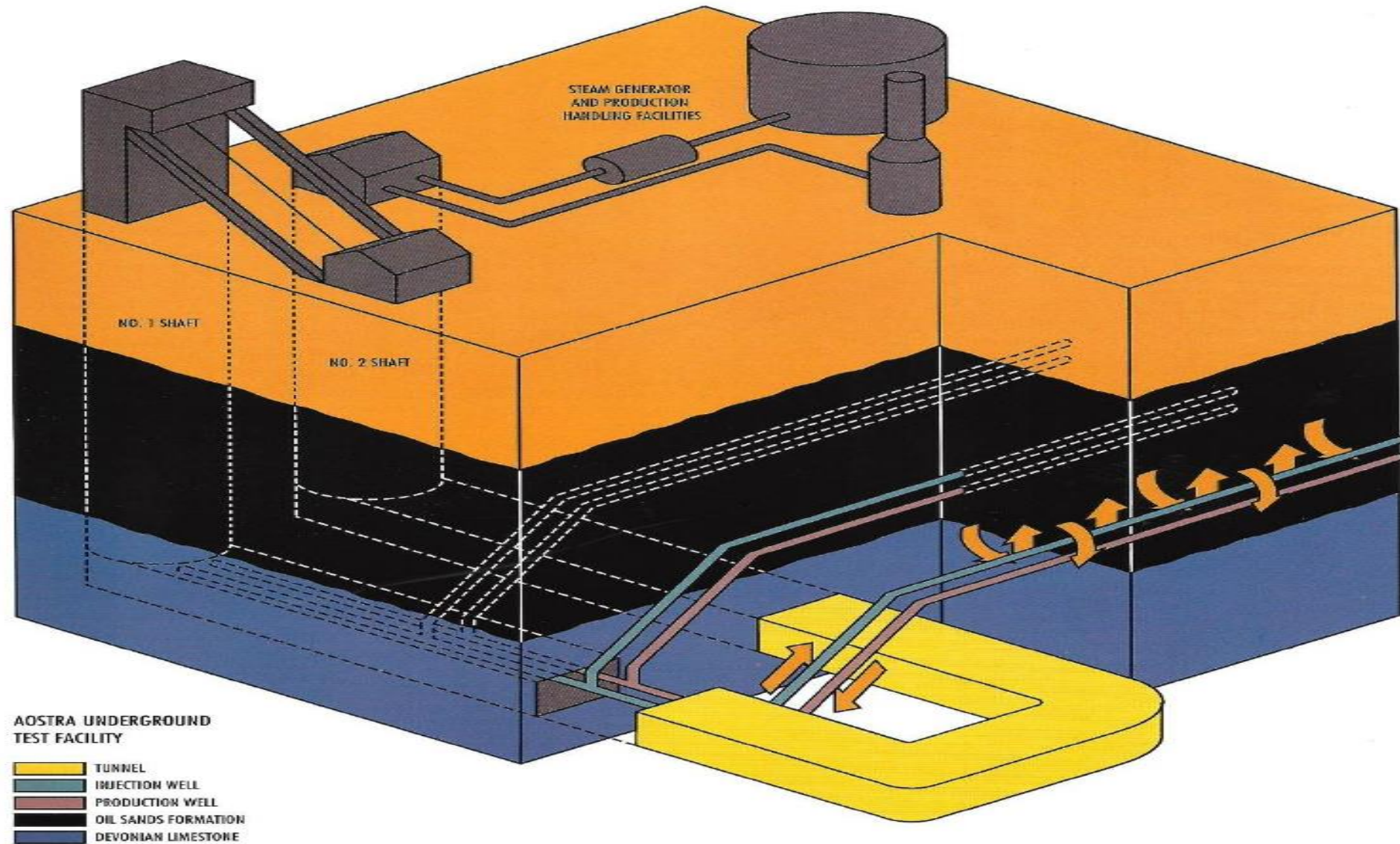
Clem Bowman, engineer
Chairman 1975-1984



Maurice Carrigy, geologist
Vice-Chairman 1975-1987

Underground Test Facility (UTF) 1987

Gerry Stephenson, Canmore, designer

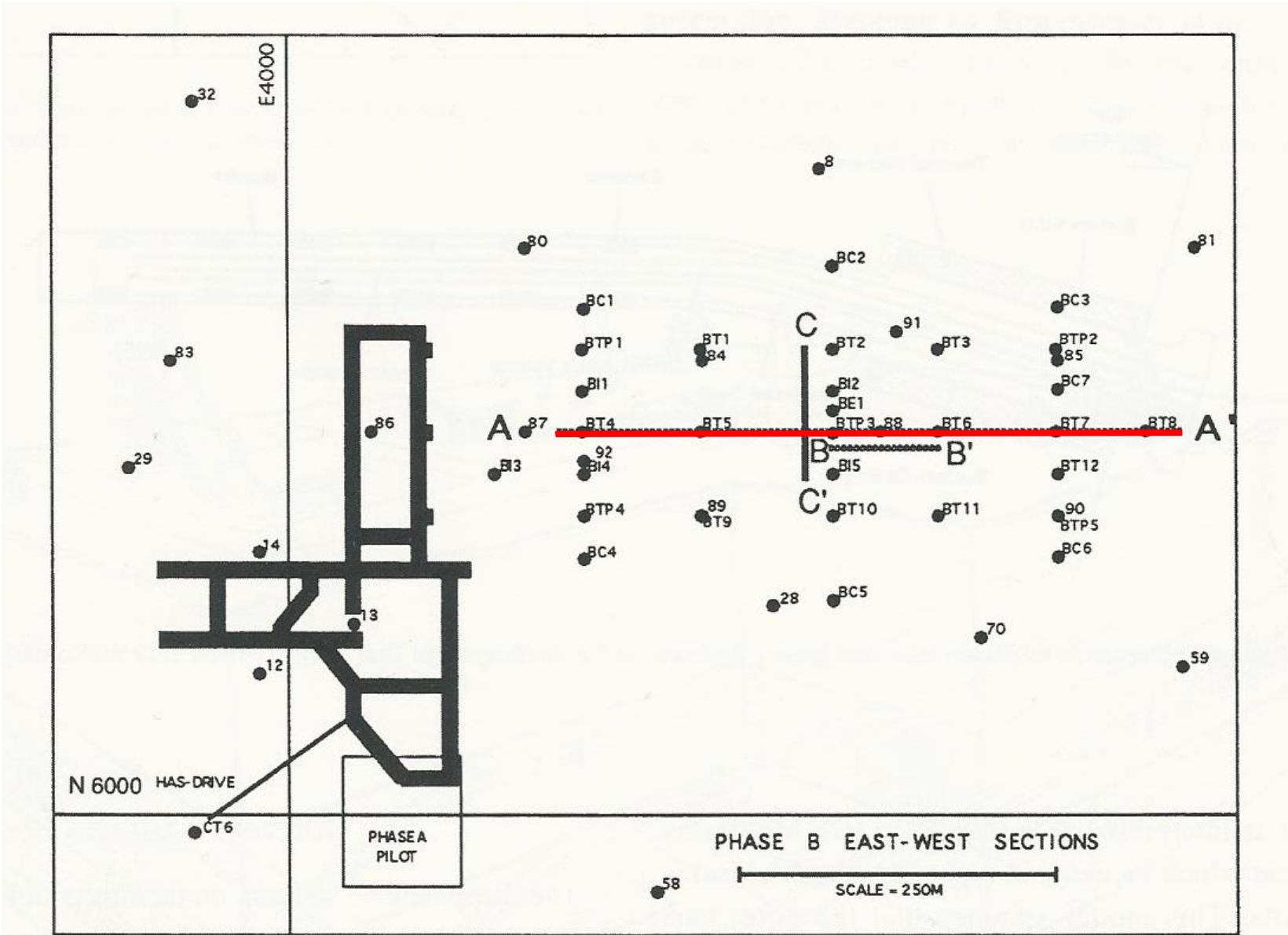


UTF 1987

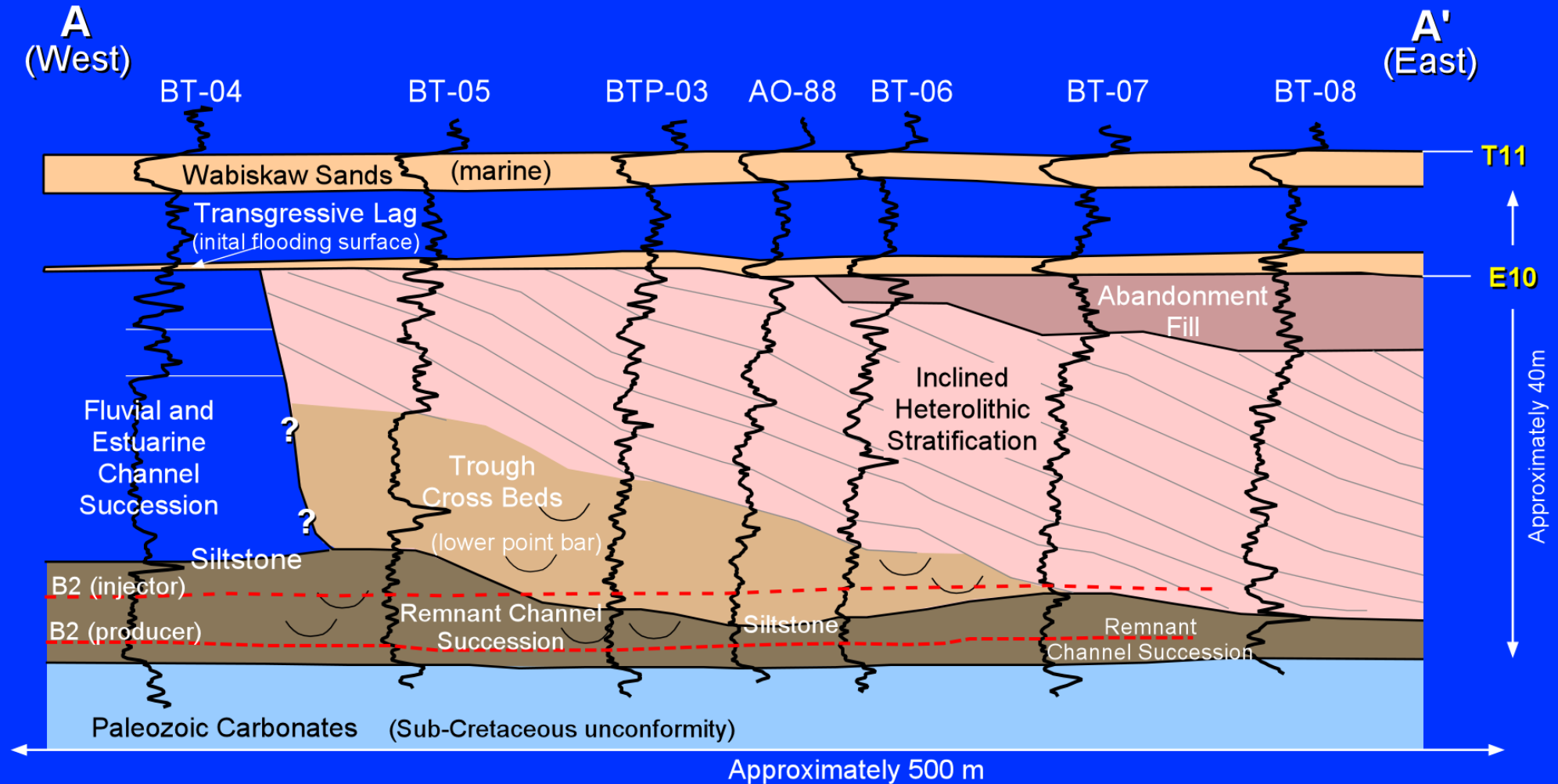


UTF was 100% Government funded.
It showed feasibility of producing from horizontal wells

UTF Map

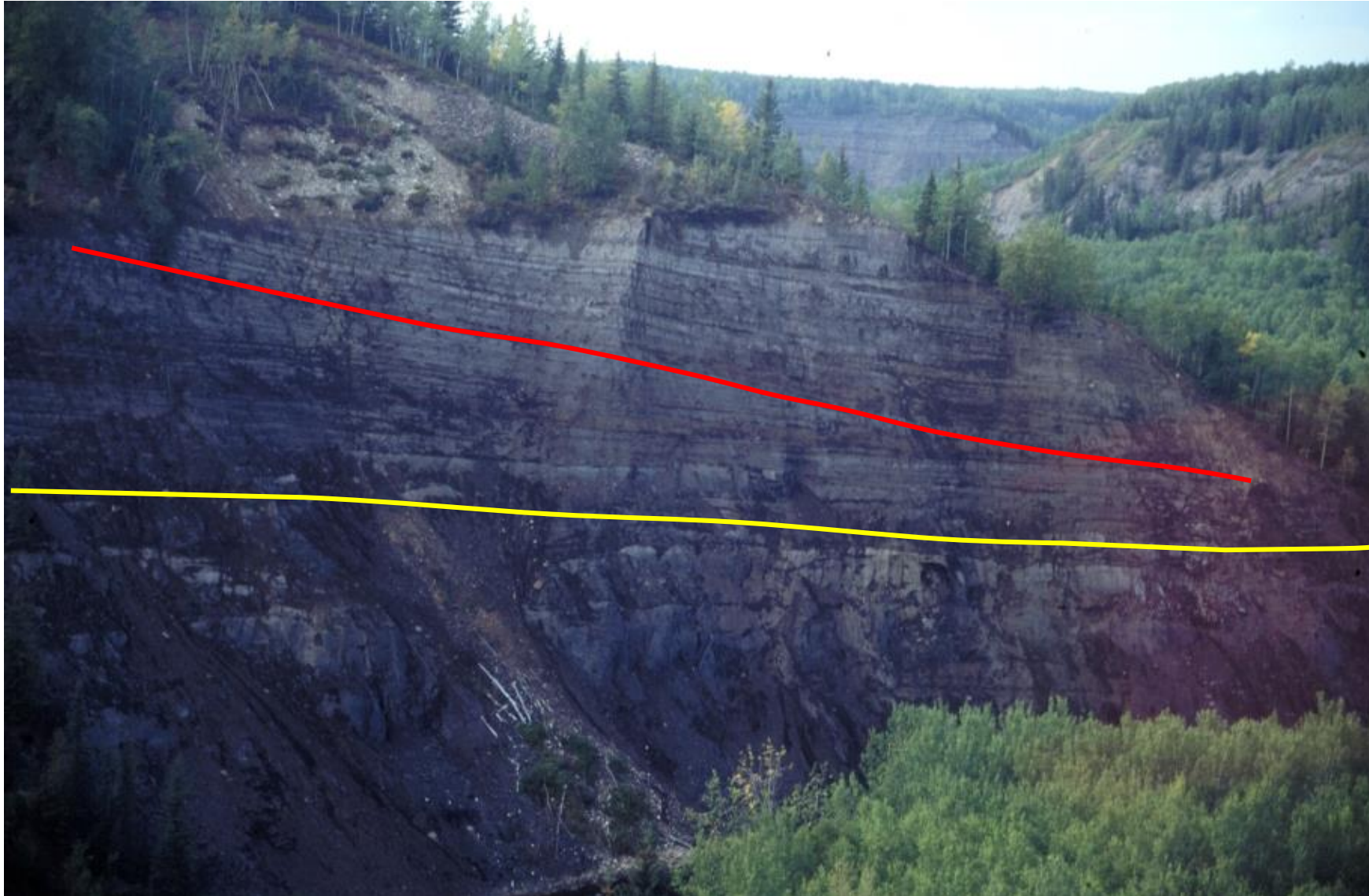


UTF Structural Cross Section

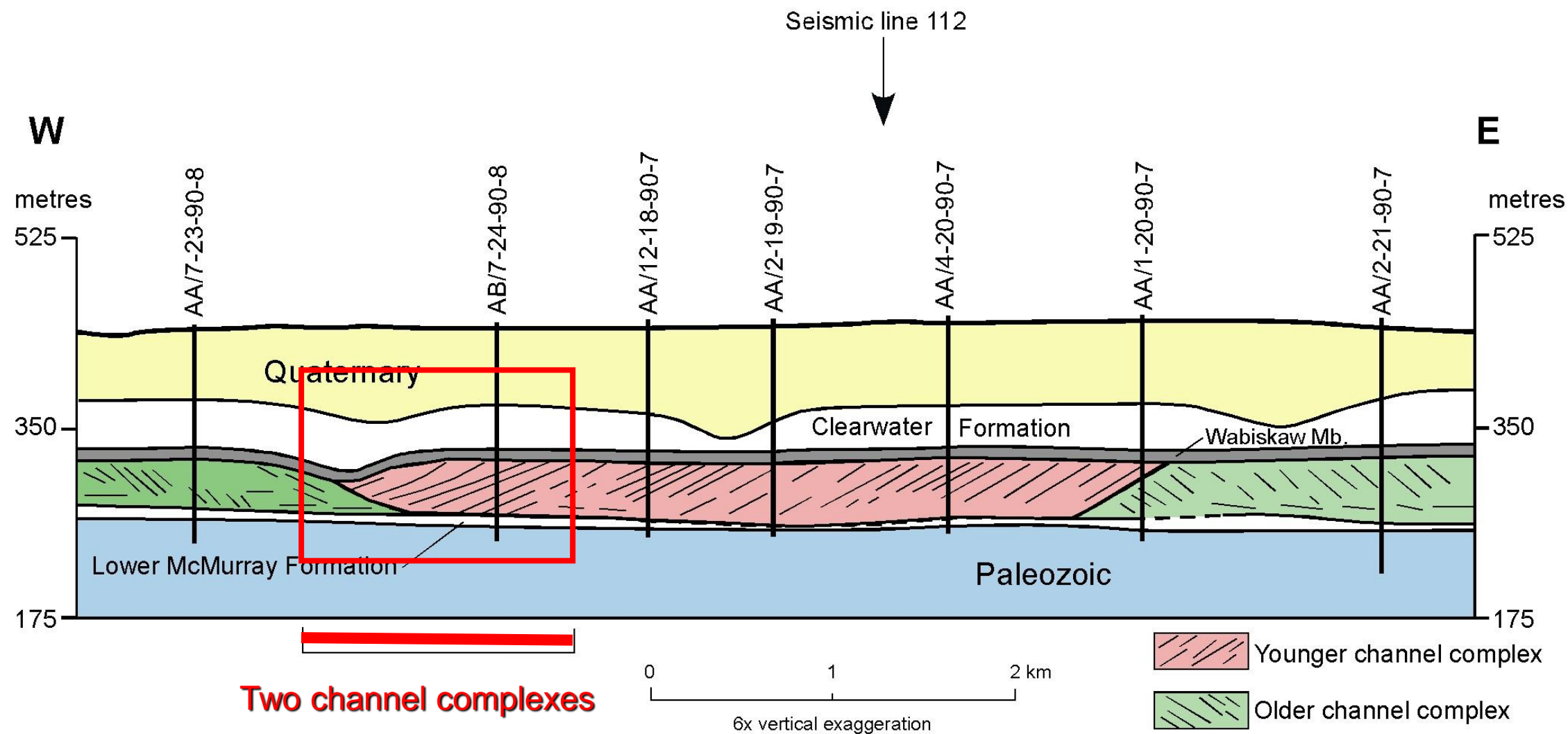


from Strobl et al., 1997

Steepbank River – Outcrop #7
Inclined Heterolithic Stratification (IHS) clearly visible

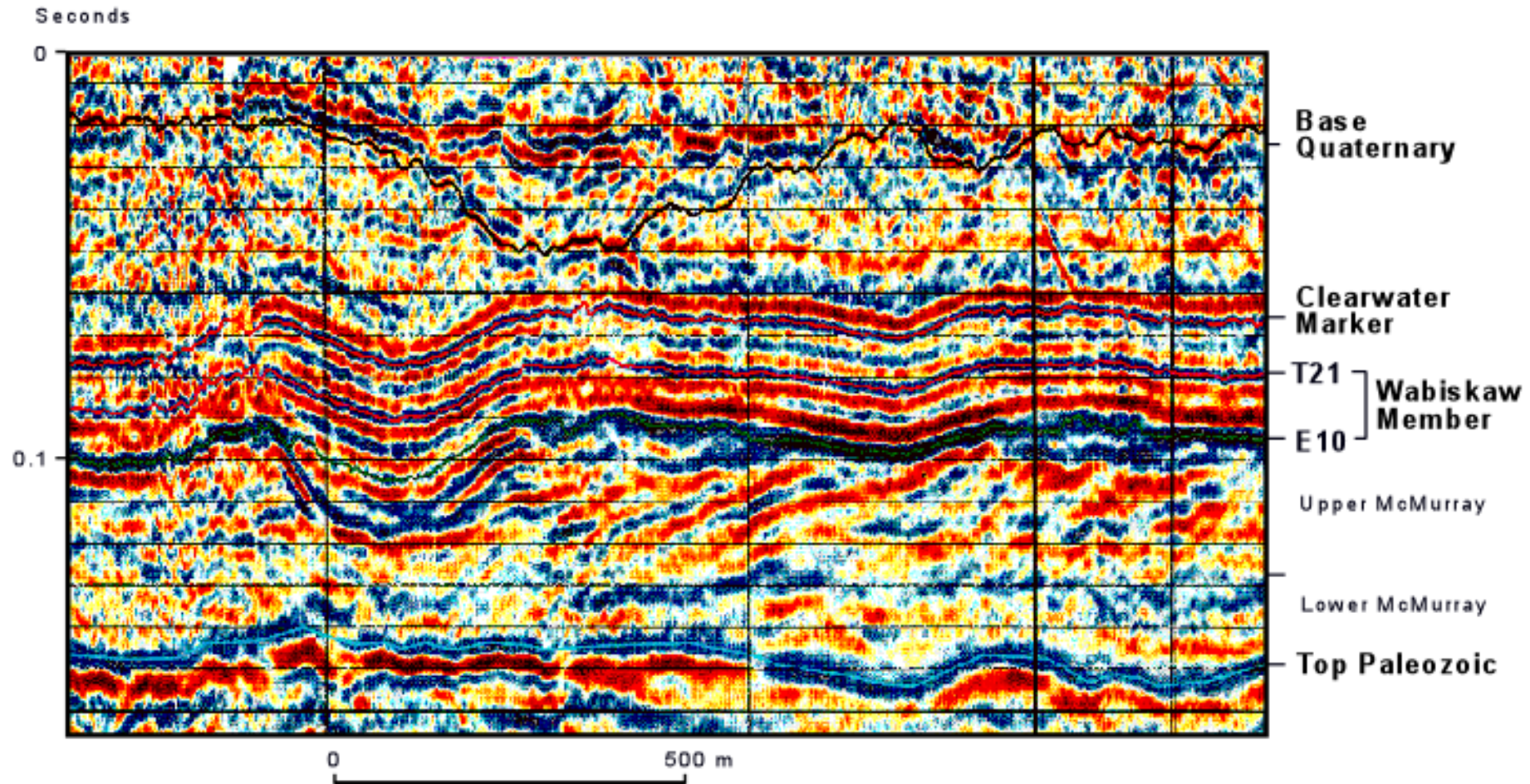


Clarke Creek Line 110

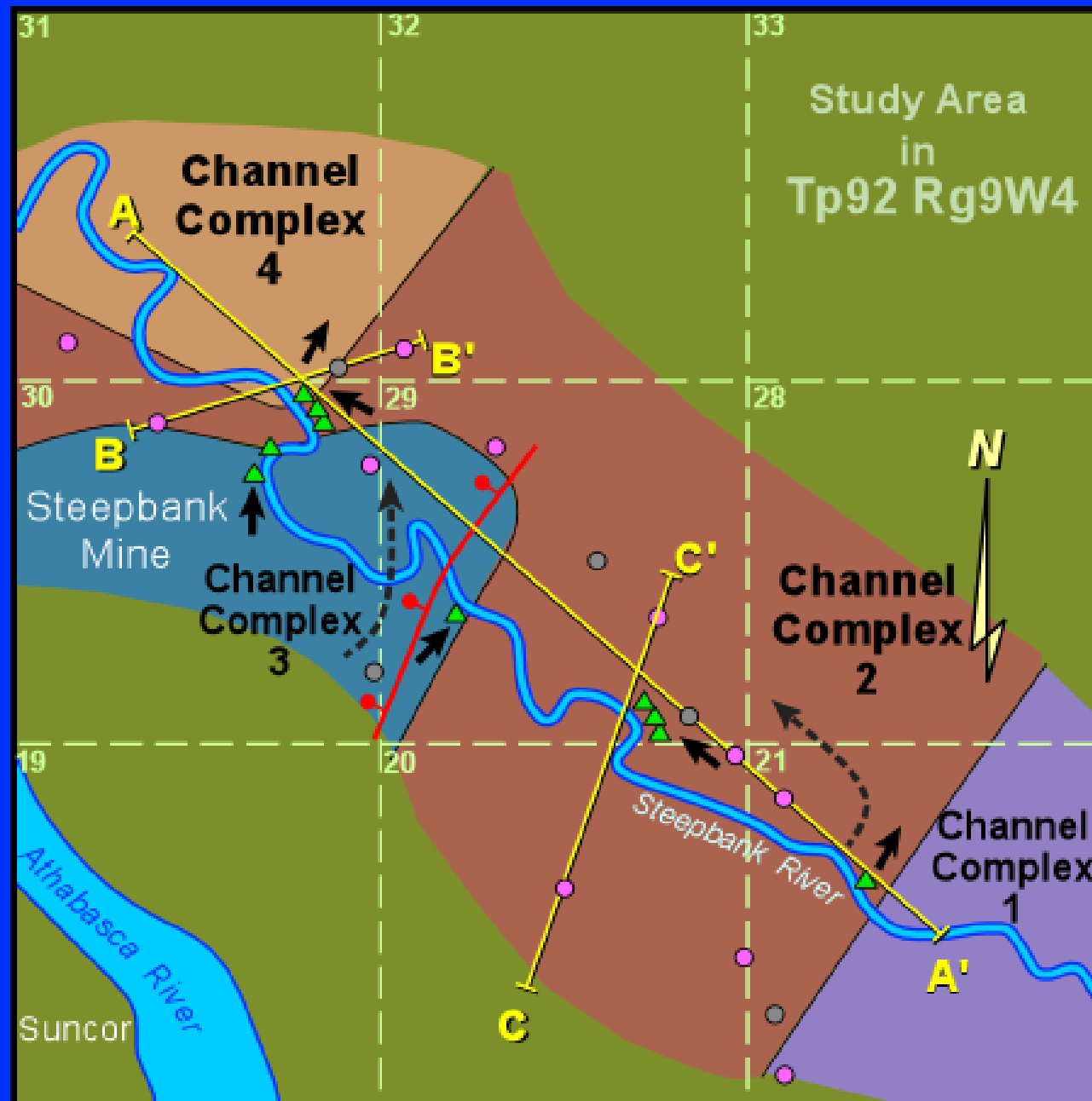


Two channel complexes (Line 110)

7-24



Seismic from Mobil, shot in late 1990s (A. Siewert)



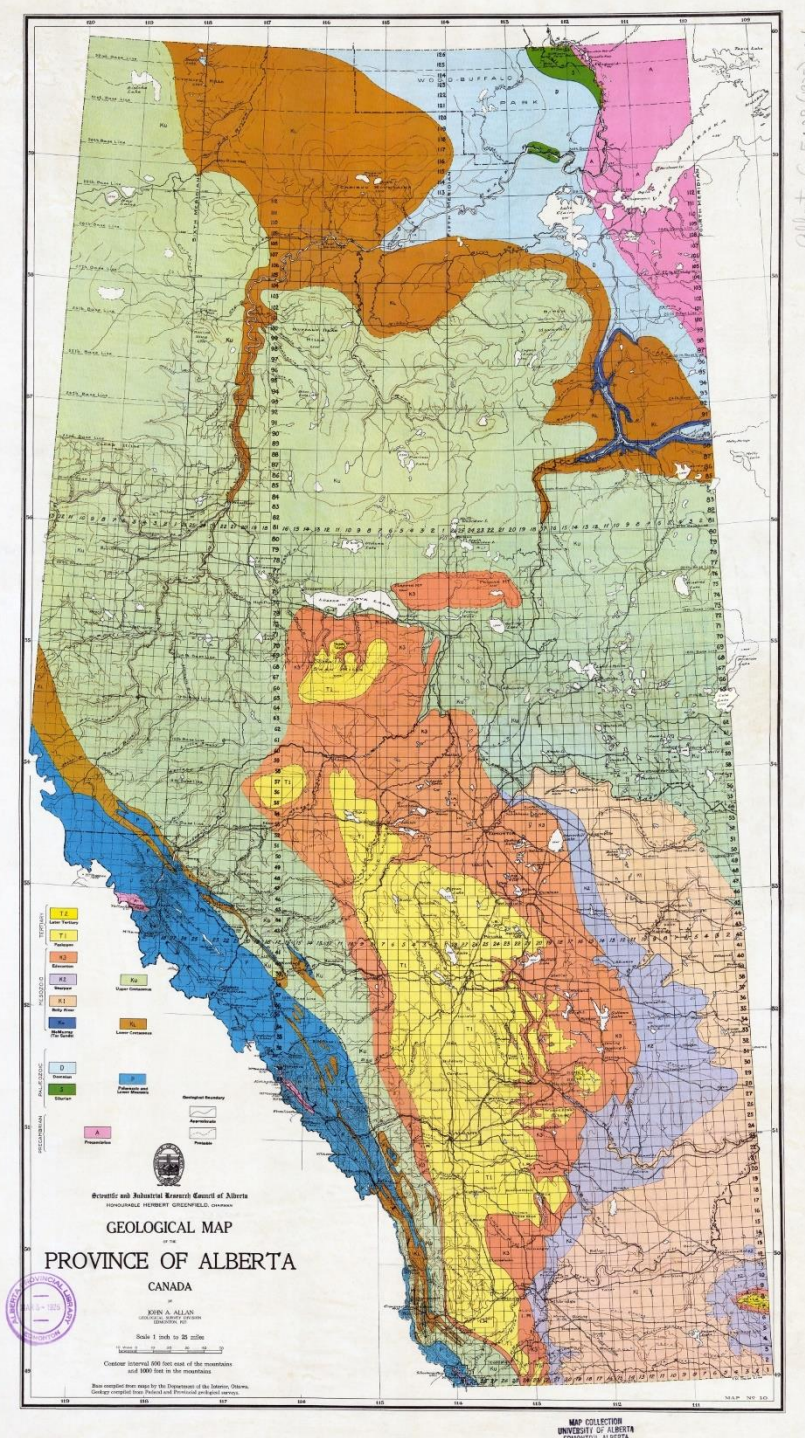
Channel Complexes Along Steepbank River

- Paleoflow Direction
- Cross Section
- Fault
- LSD Section Boundary

0 1 km

John Allan's Geological Map 1925

- Allan predicted the 1947 Oil Boom in a radio speech in 1927, partly based on mapping
- This Oil Boom required 40 years of Research & Development, led by visionaries such as Tory and Allan
- Development of the oil sands required AOSTRA, led by visionaries such as Lougheed, Mellon, Bowman and Carrigy for 20 years
- Geological understanding guided this development
- The success of these initiatives show that a transition to renewable energy is possible



Conclusions

- Geology has proven fundamental in defining petroleum resources
- AOSTRA was at \$100 million per year the biggest research project in North America, outside of NASA
- UTF was 100% Government funded and showed feasibility of SAGD
- The petroleum industry was always a government-led industry
- A transition to renewable energy is possible