

# Viking Light Oil Project in Halkirk, Alberta

[ MKS INVESTMENTS LTD. ]

November 2021

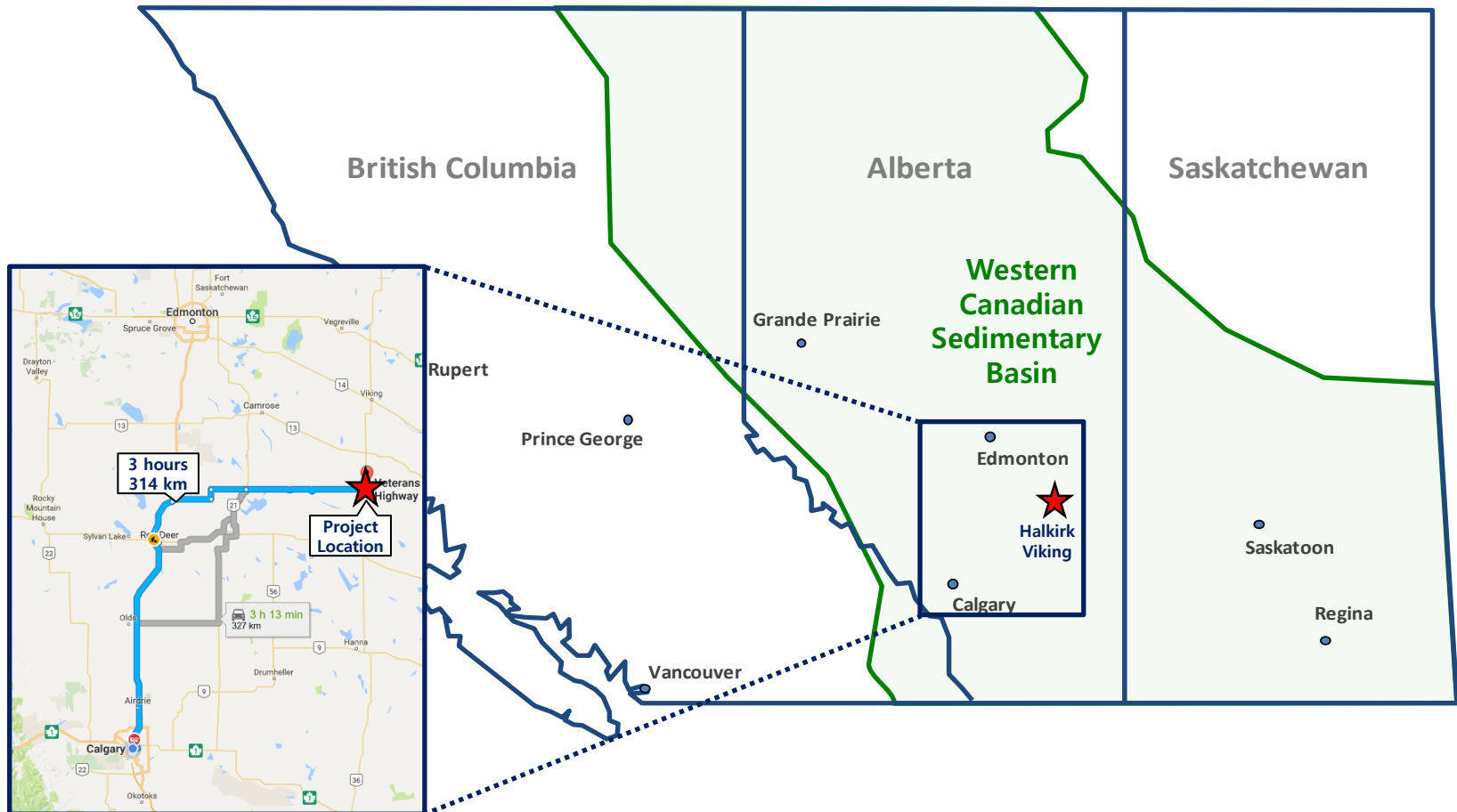


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# I. Location

## ■ Location of Halkirk Project Area in Southern Alberta, Canada

- Halkirk project location in Southern Alberta located in 314 km Northeast of Calgary (3 hours drive).
- Looking for undeveloped light oil opportunities in an existing, productive Viking sandstone in project lands.



## II. WCSB Viking Geology

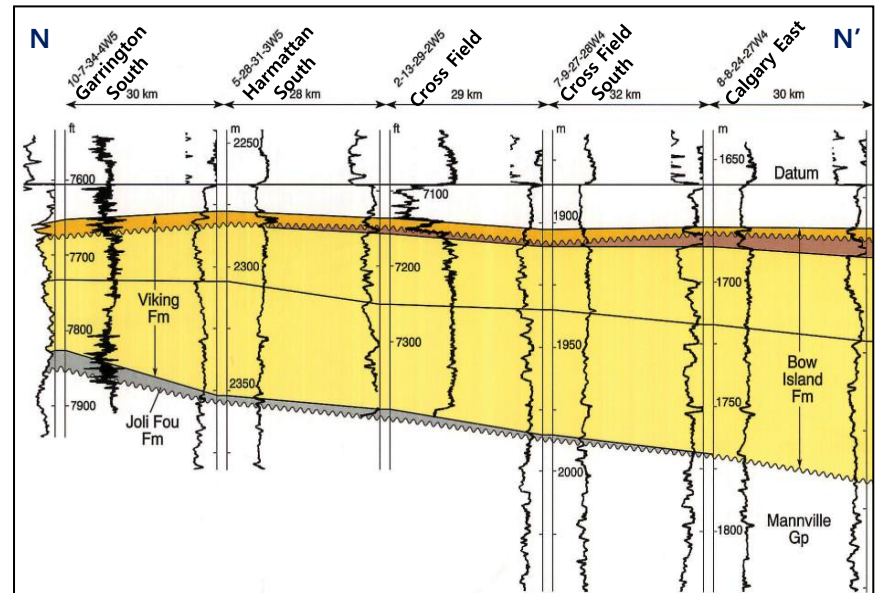
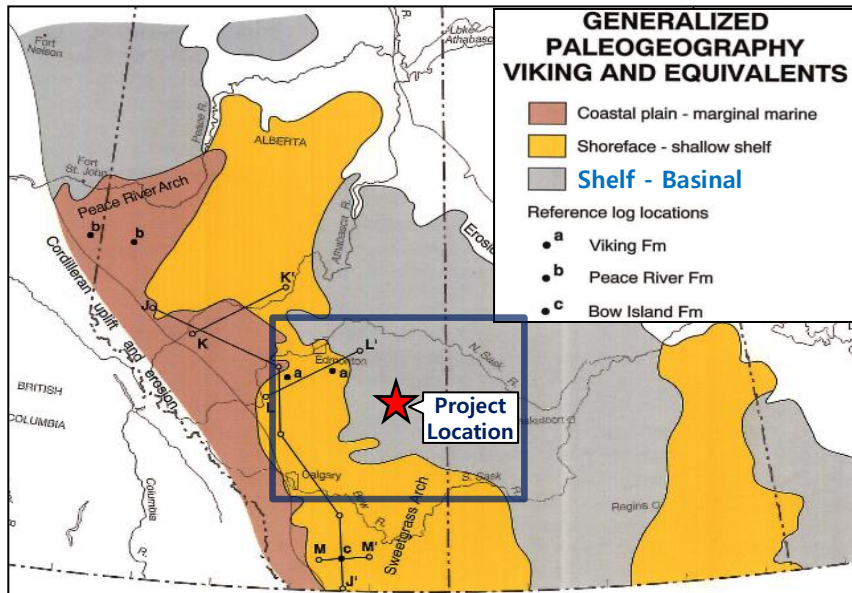
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### ■ Regional Viking Geology of the Western Canada Sedimentary Basin

The Viking Formation are Albian in age and occurs within the [Cretaceous Colorado Group](#). Viking and equivalent units extend over practically the entire Western Canada Sedimentary Basin. They represent a wedge-shaped coarse clastic interval that pro-graded from the Cordilleran orogenic belt eastward into the foreland basin. Interbedded, predominantly marine-influenced sandstones and shales make up the Viking units, which range in thickness from a few metres on the eastern margin of the basin to over 175 m in southwestern Alberta.

The Viking and Bow Island formations and Paddy Member have proven to be [prolific oil- and gas-bearing units](#) and have been the target for exploratory drilling for several decades. Recent estimates indicate that [Viking and equivalent strata contain in the order of 5 and 8 percent](#), respectively, of the oil and gas reserves known to exist in Alberta alone.



\* source : Alberta Geological Survey

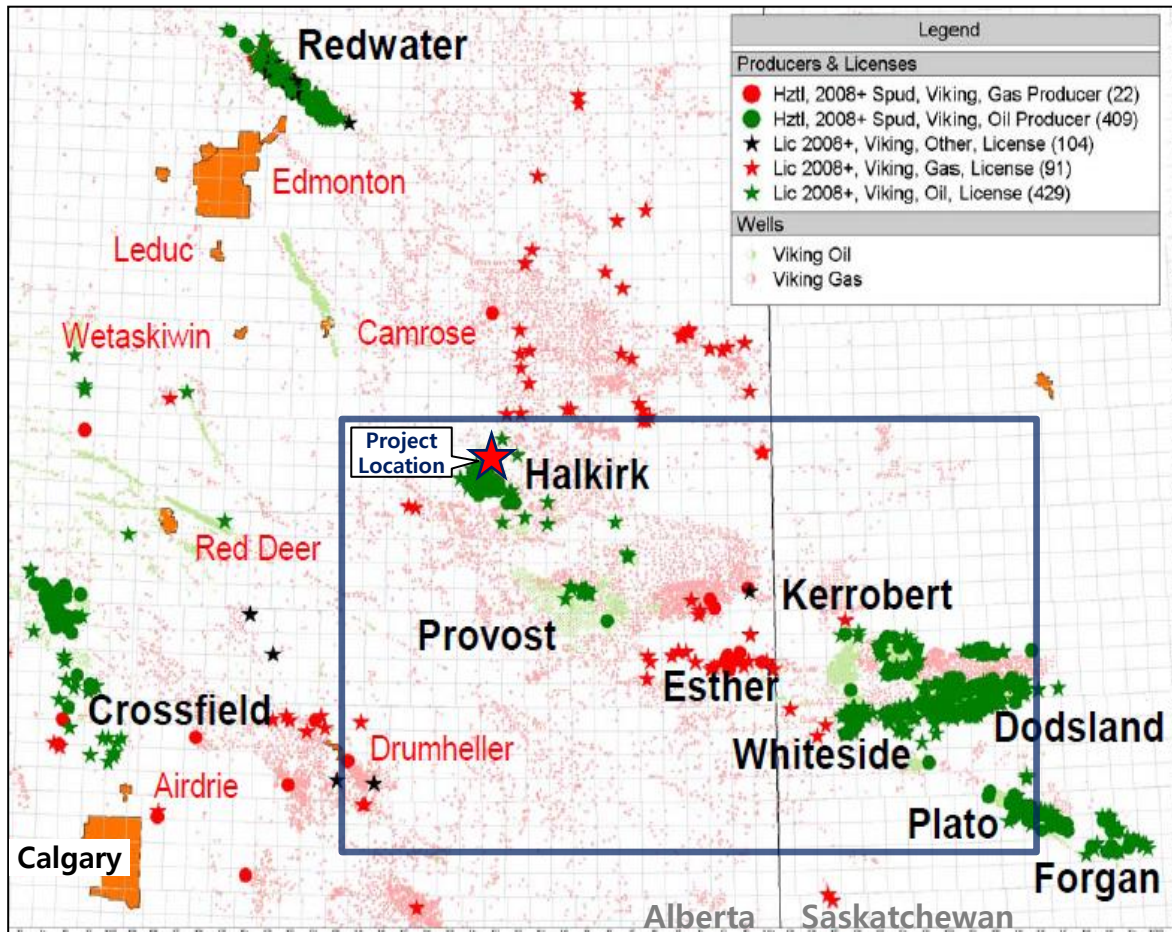
# III. Viking Potential

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## ■ Viking Focus Areas and Production by Region

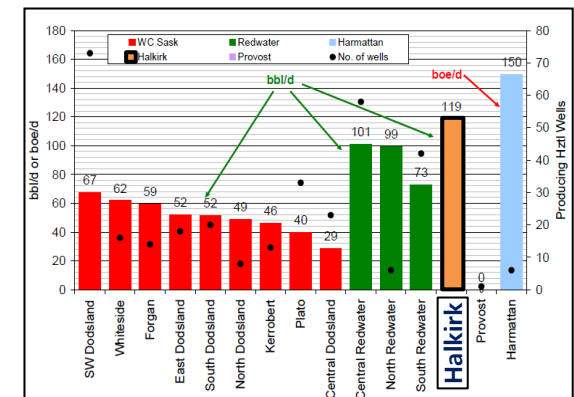
- Viking oil & gas producing areas with producing and licensed wells status
- Halkirk is **the second superior area** compared to all other Viking producing area in IP and EUR



## Top operators/average 'peak' rates

Region	Sub Region	Top Operators	Area Average
Redwater	North	Sure	99bbl/d
	Central	Mancal, Baytex	101bbl/d
	South	WestFire	73bbl/d
West Central Saskatchewan	Kerrobert	Cirdan, Petrobank	46bbl/d
	Whiteside	Compass, Petro Uno, Renegade	62bbl/d
	SW Dods	Penn West	67bbl/d
	South Dods	Baytex, Teine, Wild Stream	52bbl/d
	North Dods	Husky, NAL	49bbl/d
	Central Dods	Harvest	29bbl/d
	East Dods	NAL, Penn West	52bbl/d
	Plato	Husky, Penn West, WestFire	40bbl/d
	Forgan	Husky, Novus	59bbl/d
	Harmattan	Angle	150boe/d
Halkirk	Halkirk	Cutpick	119bbl/d
Provost	Provost	Emerge, WestFire	-

## Ave. Viking peak rate by sub-region

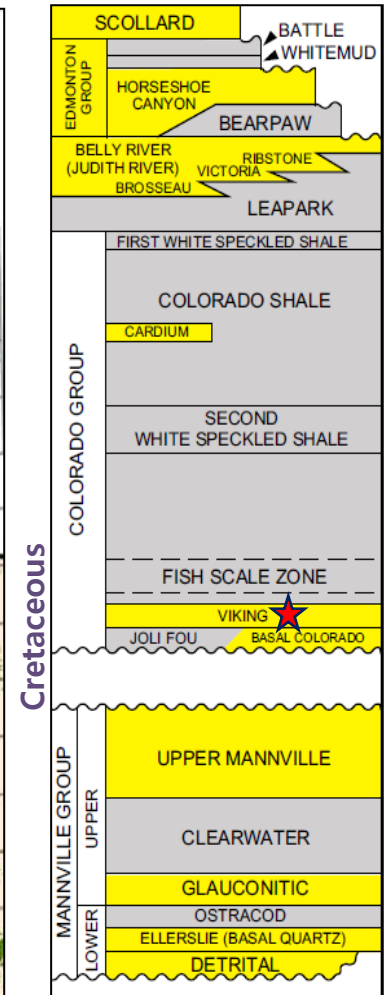
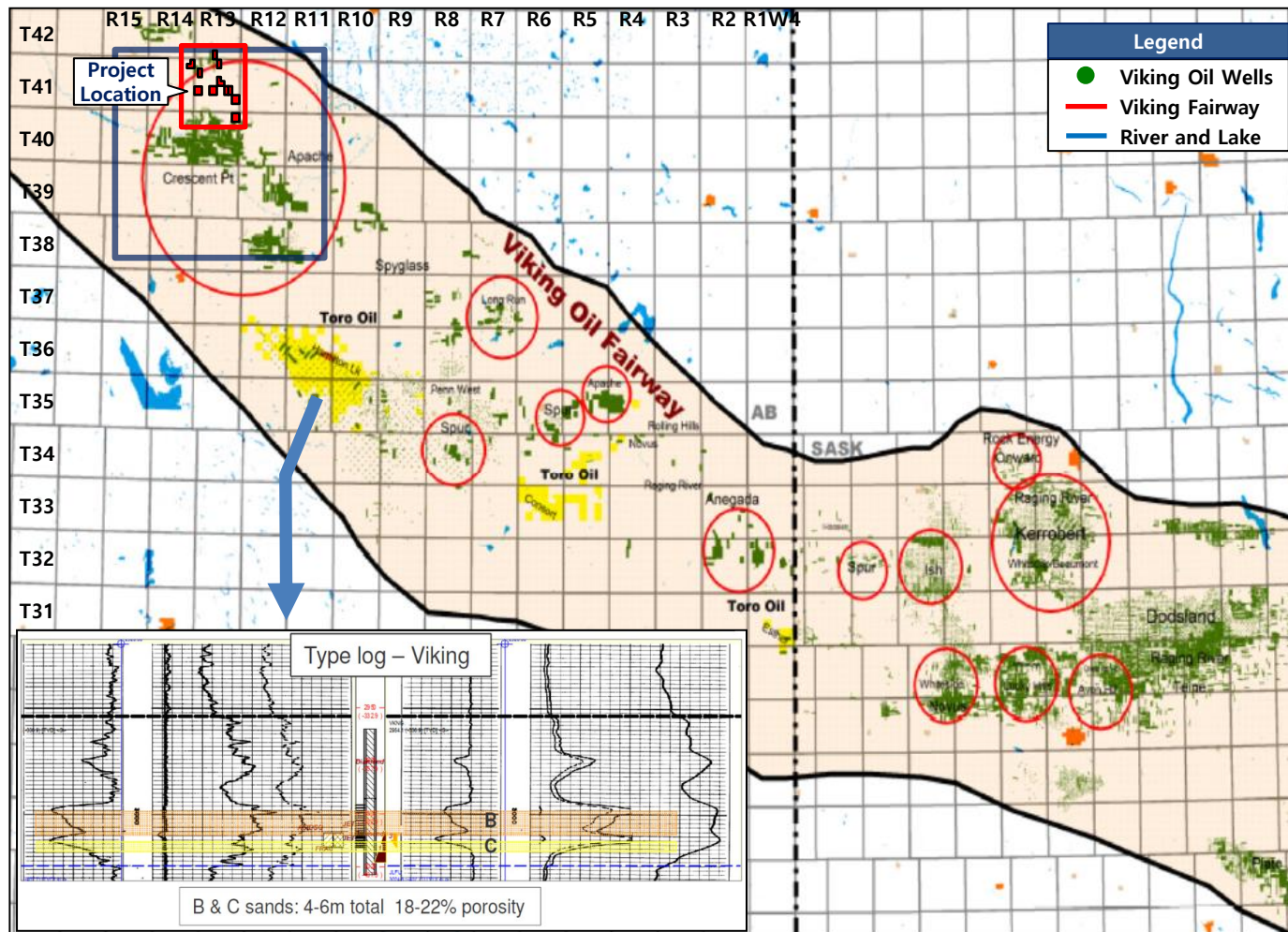


\* source : Macquarie Equity Research - Viking (2011)



## ■ Cretaceous Viking in Southeast Alberta and Southwest Saskatchewan

- High quality, low decline, large oil in place pool with significant near term development opportunities



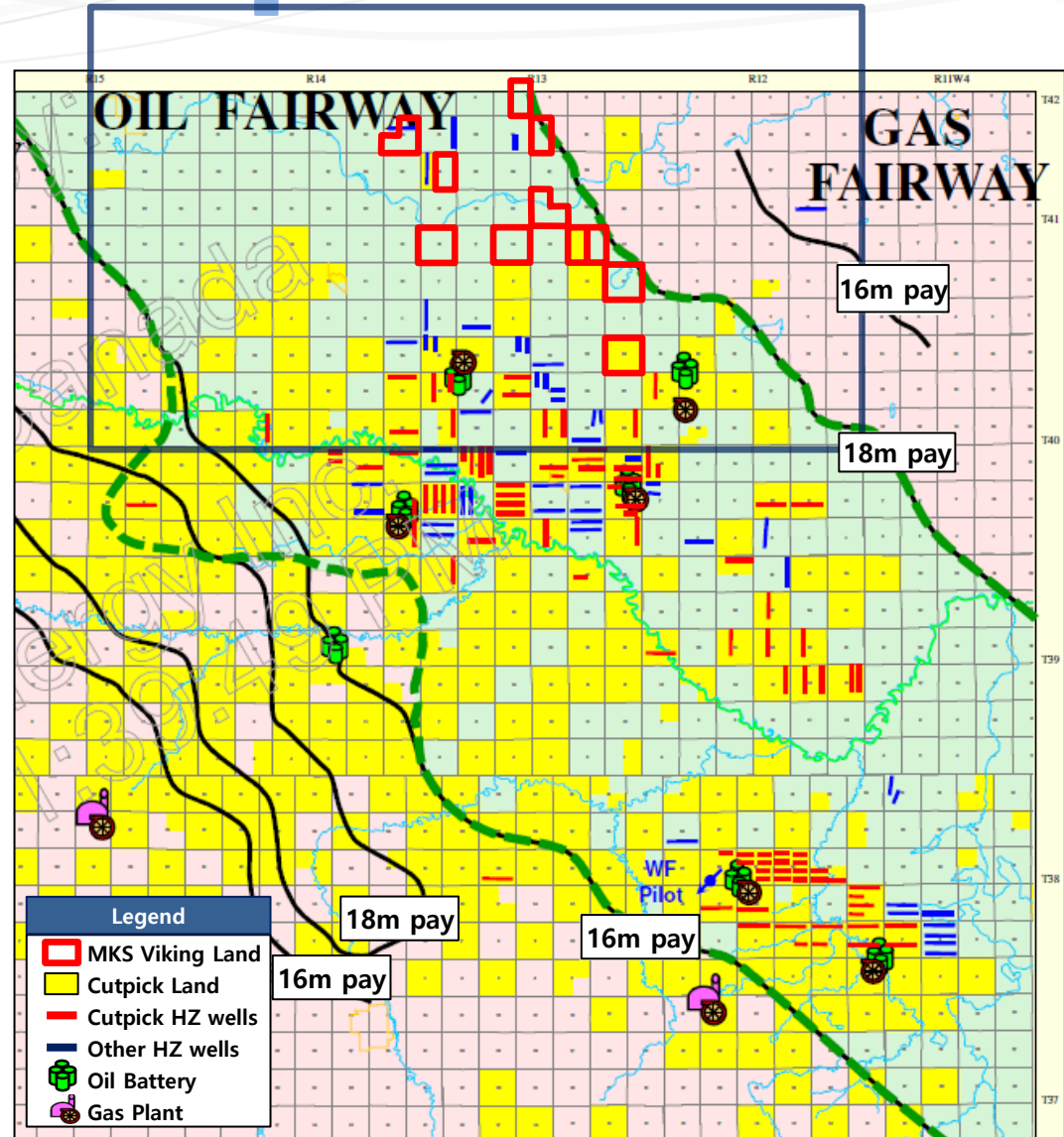
\* source : modified from Toro presentation (Aug. 2015)

## ■ Halkirk Area of Lightstream

- Cutpick has acquired by Lightstream
- High quality sweet light oil (35° API)
- OOIP 6~10 MMbbls per section
- HZ well status (Feb. 9, 2012)
  - Wells drilled 95, Wells frac'd 90
- Waterflood started Aug 2011
- Four oil battery (Crescent Point)
  - Capacity of 12,000 bbls/d
- Gas Plant
  - 2 ~ 5 MMcf/d gas compressor plant
- Pipeline system installed

## ■ Halkirk Viking of MKS Investments

- Right north of Cutpick land position
- TVD 810 m, sweet light oil
- Within 18 m pay oil fairway
- 8 sections with offsetting freehold land
- Huge HZ development from north and south of acquired land



\* source : modified from Cutpick presentation (Feb. 2012)

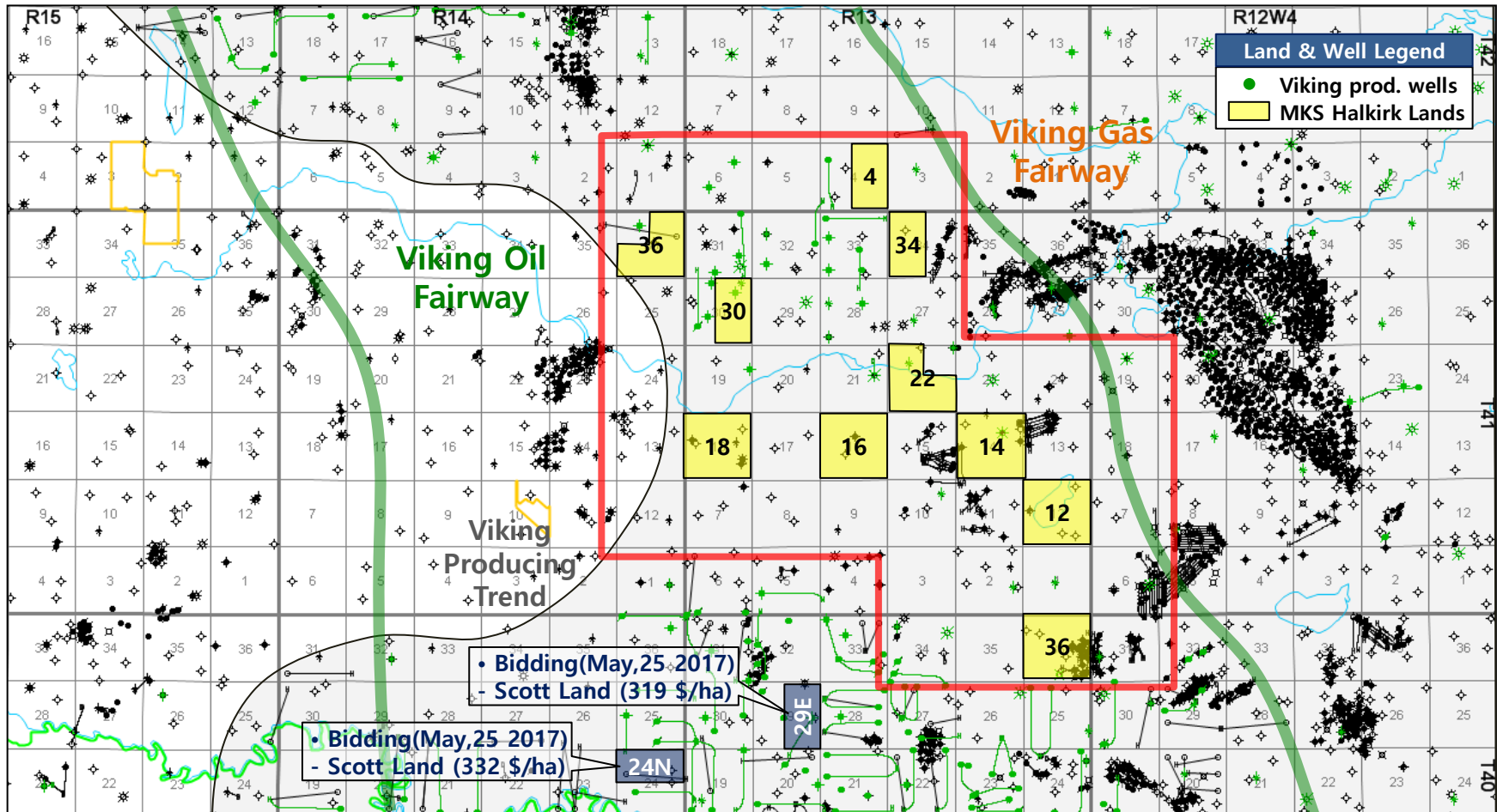
# IV. Halkirk Viking Project

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## ■ MKS Halkirk Viking Location

- Acquired 8 sections (2,048 ha) with 100% W.I. (May, 25 2017) located in the Viking light oil producing fairway
- Viking light oil producing history in acquired area and adjacent area









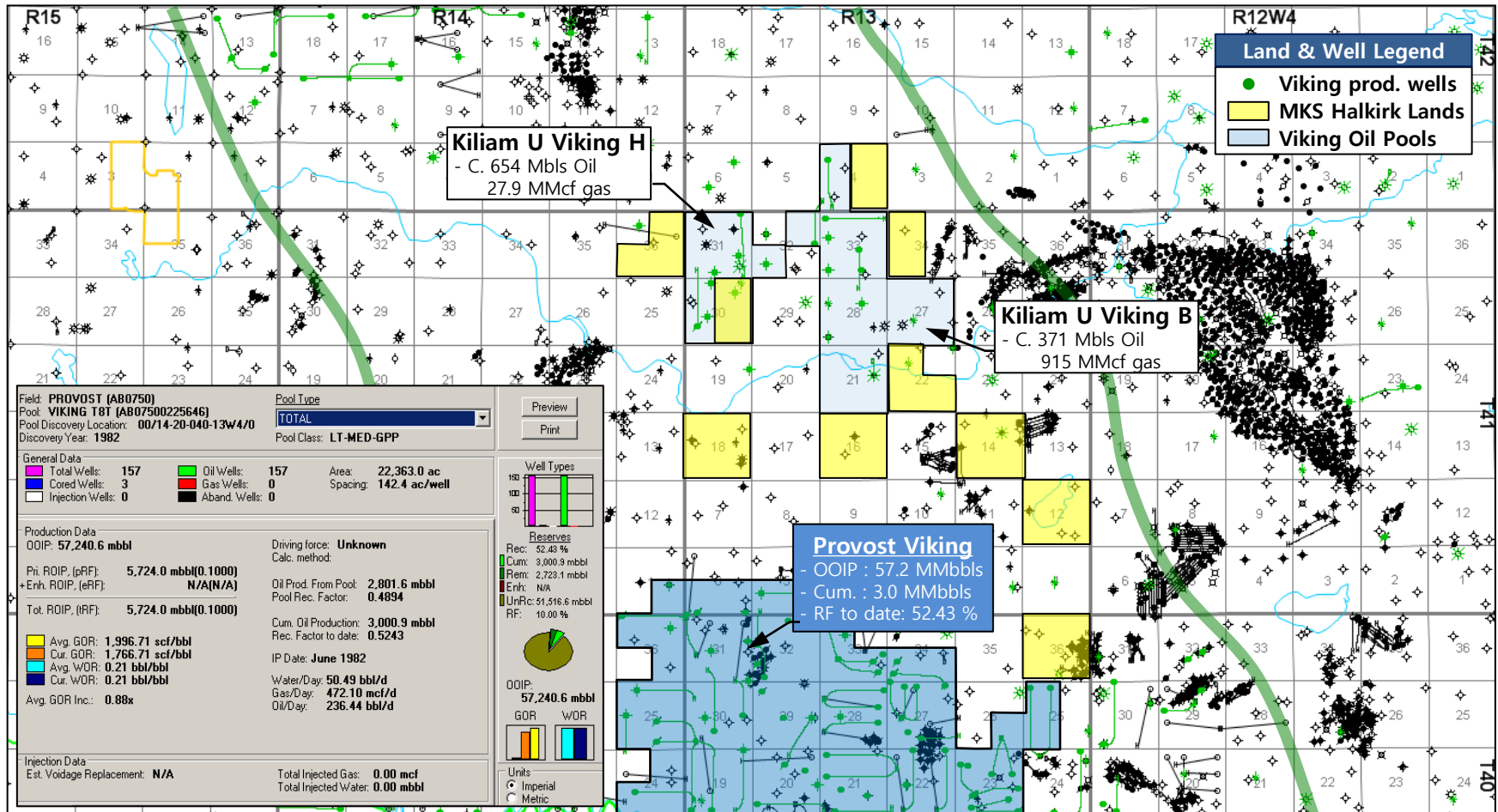
# V. Technical Evaluation

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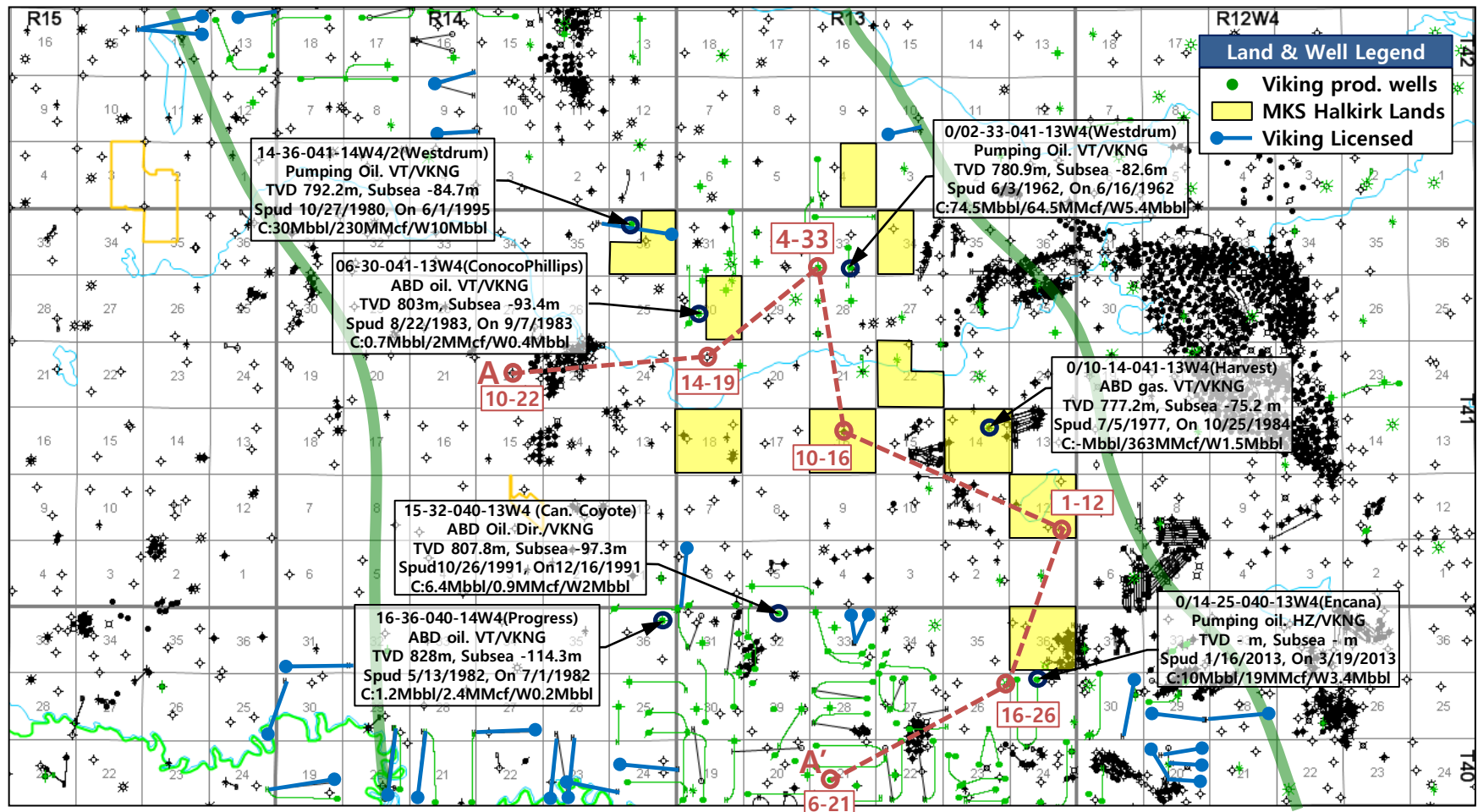
## ■ Viking Producing Pools in Halkirk area

- Offsetting small oil pool cum. of 370 ~ 650 Mbbls by mostly vertical producers
- Immediate north of the Provost Viking pool produced 3 MMbbls oil with OOIP of 57.2 MMbbls



## ■ Viking Production and Development Trend

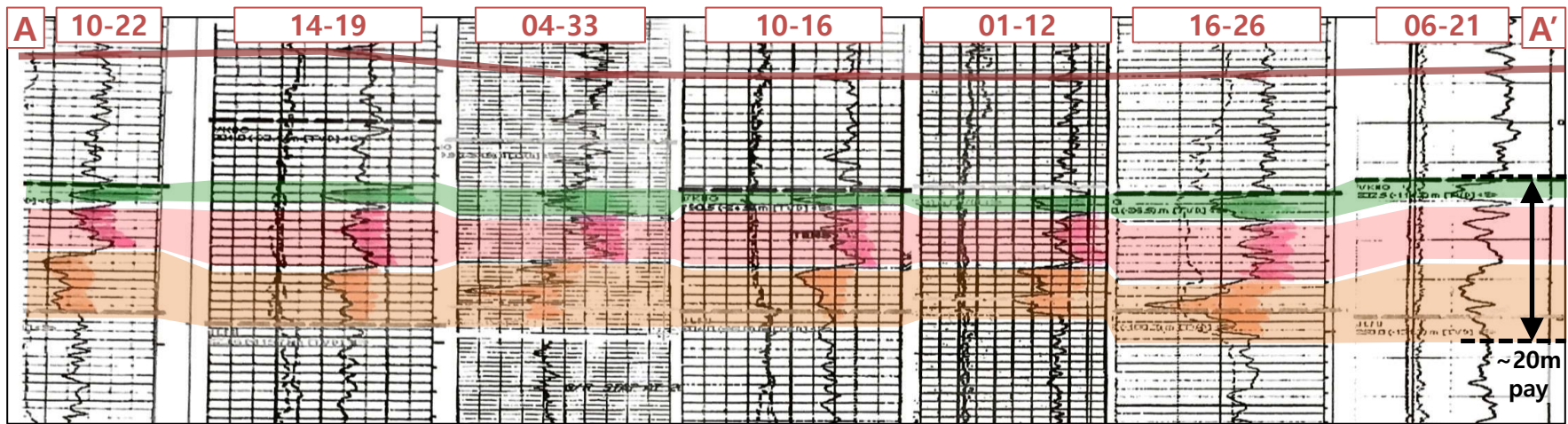
- Good production history from vertical Viking wells lead to massive HZ development in the South & North
- Horizontal development in Sandstone zone estimated IP of 160 Boe/d and Cum. of 91 Mbbls\*



\* source : Cutpick Corporate Presentation (Feb. 2012)

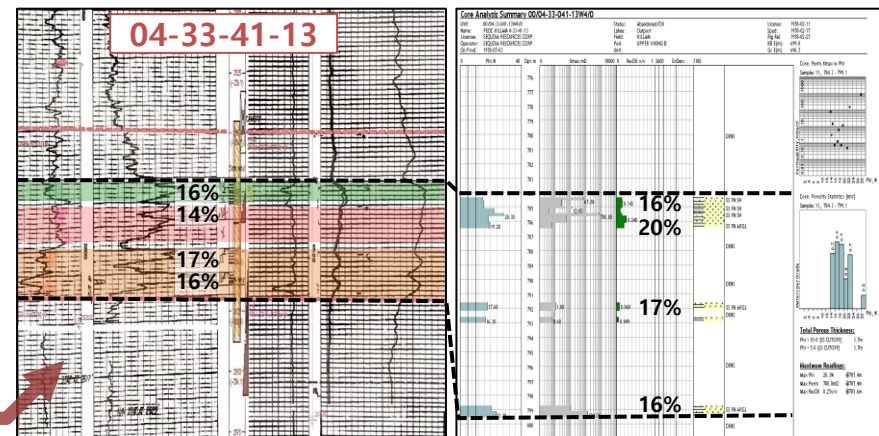
## ■ Viking Stratigraphy and Potential Reservoir

- A-A' Cross section : very simple 3 units across whole project area and strata is consistent with no obvious break



- Well log evaluation for verifying good producing reservoir → At least 4m net pay with 12 % porosity cut

Well no.	Net pay Ø>18%	Net pay Ø>12%	VT or HZ	Initial Prod. (bopd)	Cum. Prod. (Mbbls)
6-21-40-13	1 m	4.5 m	VT	40	112
10-14-40-13	0 m	1.0 m	HZ	250	66
12-14-40-13	0 m	4.5 m	HZ	300	88
14-20-40-13	2.5 m	7.0 m	VT	33	74
2-33-41-13	7.0 m	8.0 m	VT	15	74.5
4-33-41-13	2.0 m	6.0 m	VT	40	230

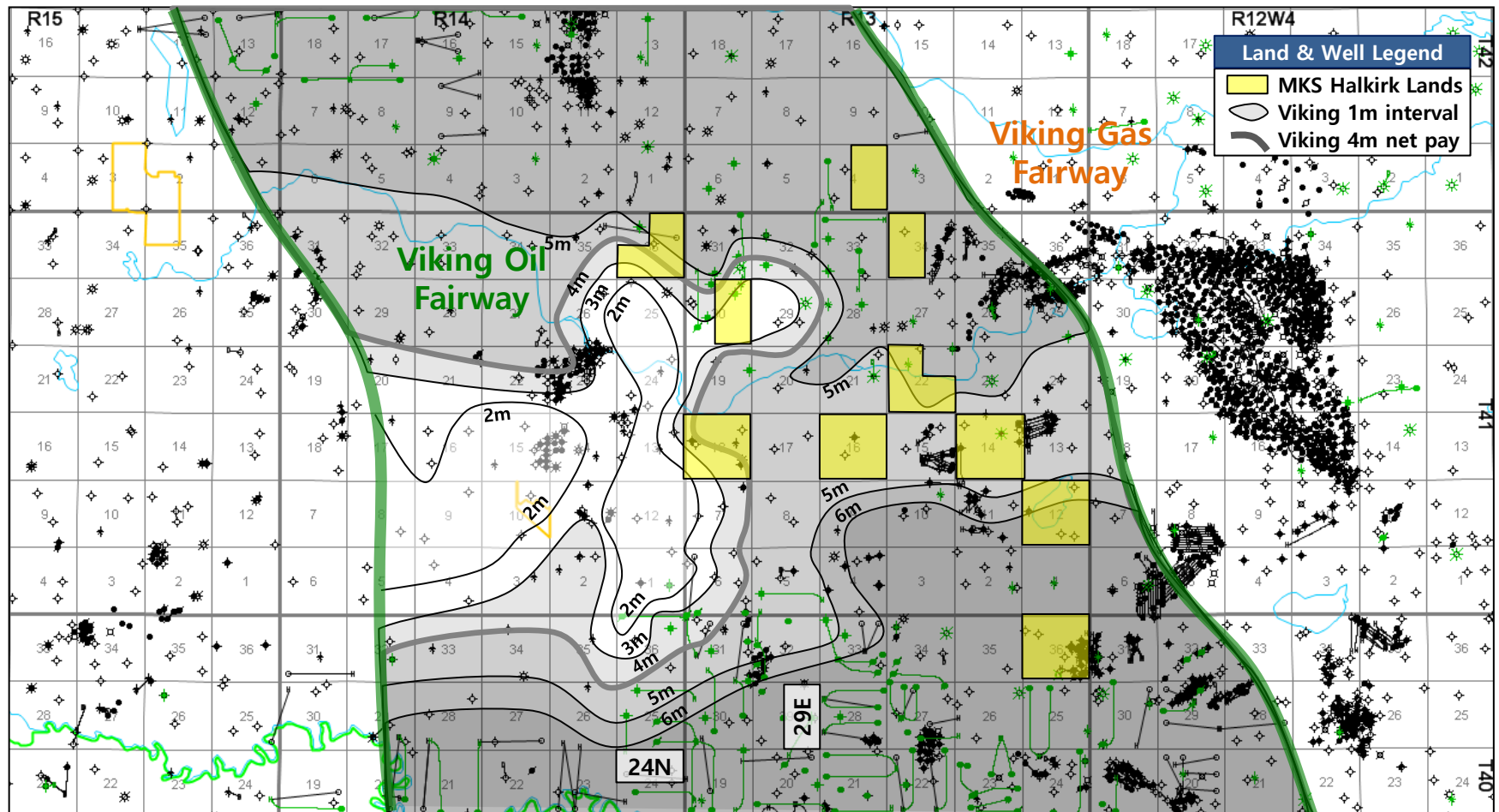


\* Source : IHS Accumap ver. 27.01



## ■ Geological Evaluation of MKS Lands

- Viking sandstone net pay evaluation by over 90 well log analysis (12% porosity cut)
- 4.5 sections over 5m pay and 3.0 sections over 4m pay based on the well log evaluation





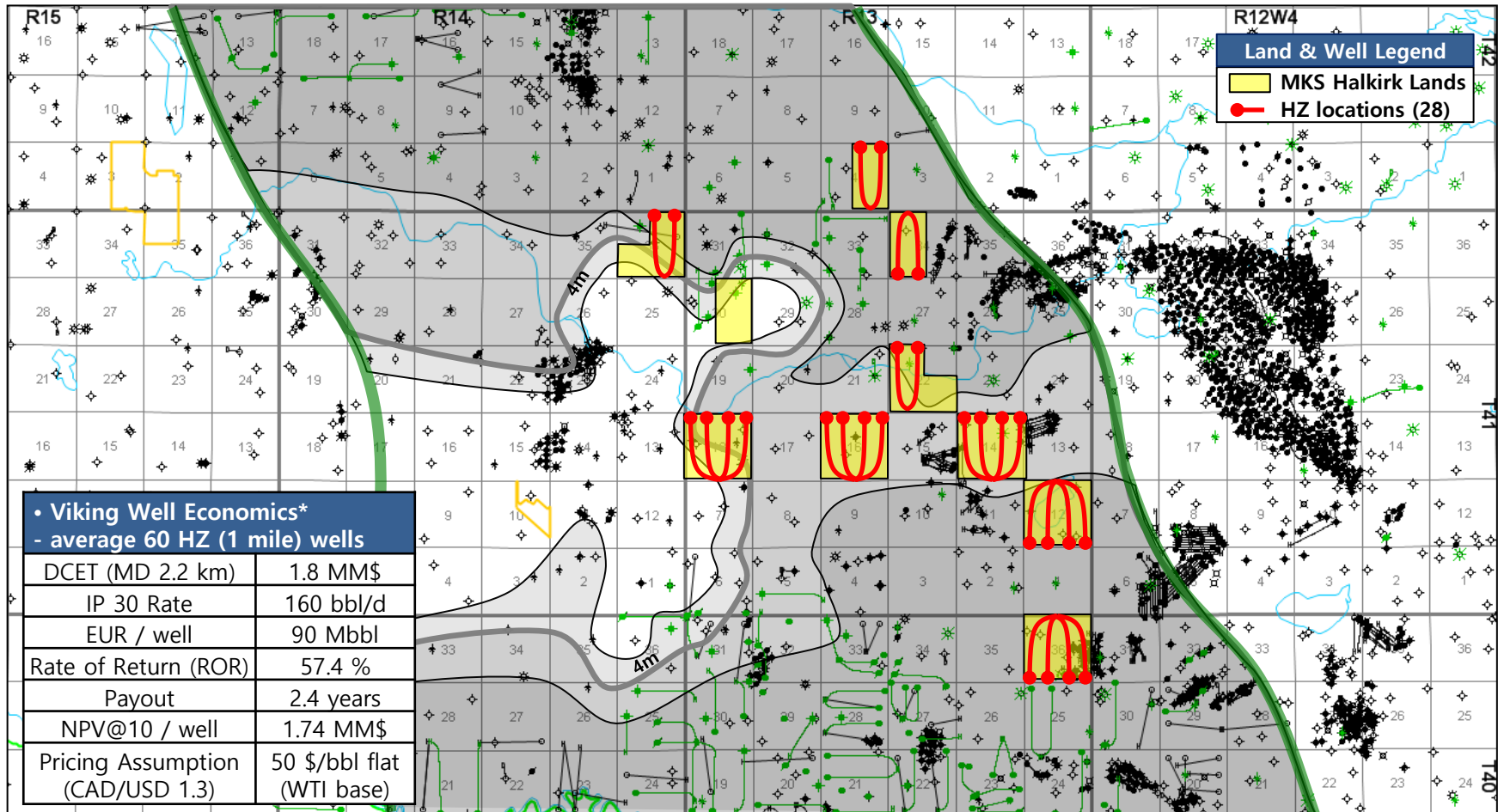
# VI. Project Development

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## ■ Viking Development Potential

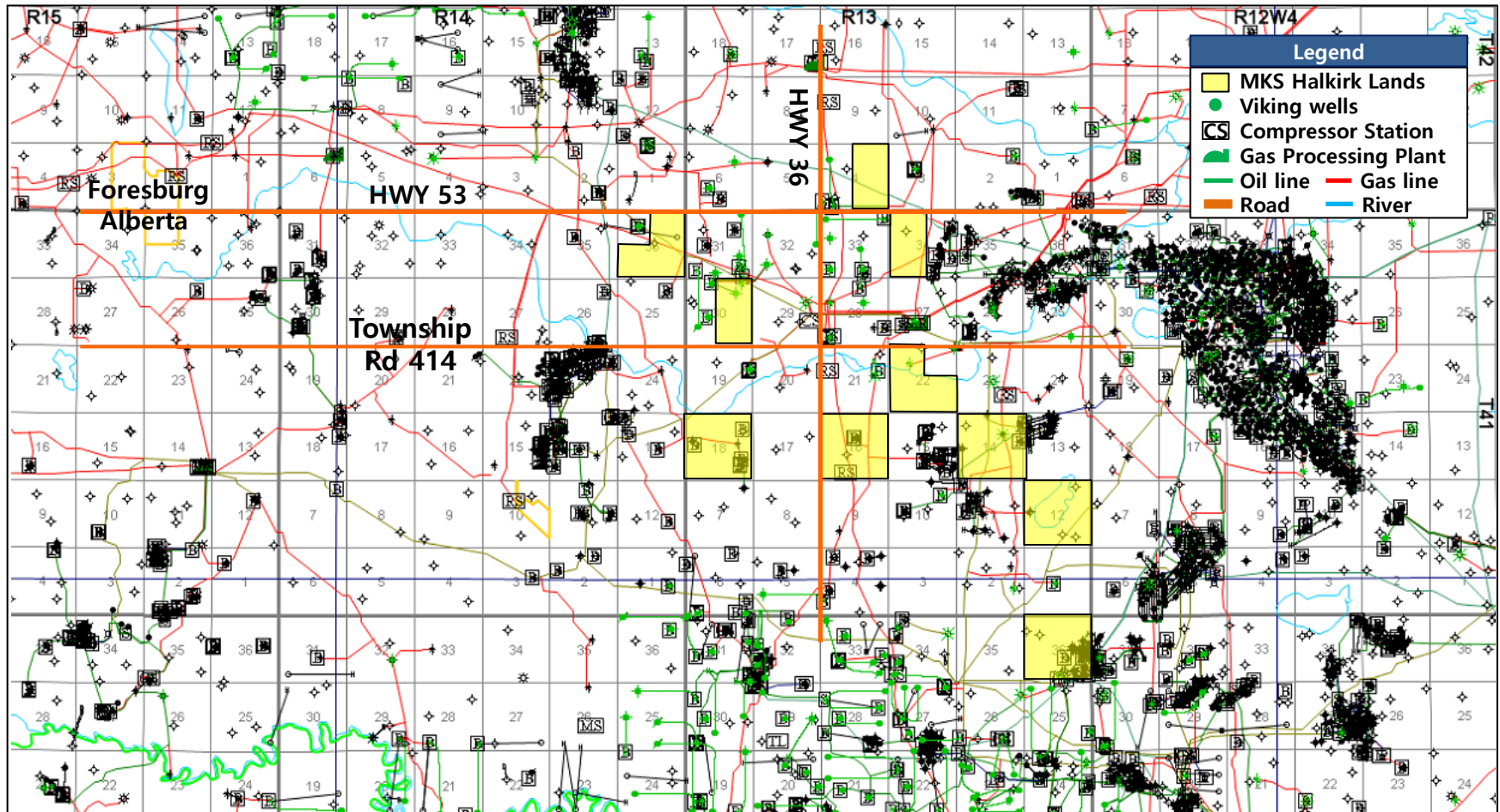
- Total 28 horizontal multi-frac drilling potential in 7.0 section
- Viking economics : DCET 1.8 MM\$, IP 30. 160 bbl/d, EUR 90 Mbbbl, ROR 57.4 %, NPV@10 1.74 MM\$/well



\* source : Cutpick (Feb. 2012) & MKS internal evaluation

## ■ Pipelines, Plants and Access Road

- Well distributed pipelines with main gas sales line within project area and over 10 compressor stations nearby.
- Road access to project lands from [junction of HWY 16 & 53](#), 4 season access for drilling and easy operation



## ■ Halkirk Viking Water Flood Upside Potential

- Waterflood pilot commenced and enhanced recovery
- 1998 vertical pilot waterflood tripled oil rates in eight months
  - Injector : 08-20-038-12W4
- Commenced water injection for waterflood pilot project in August, 2012
  - Injector : 03-20-038-12W4
- Studies suggest recovery factors should increase to 15%
  - vs 5% primary



## ■ Reference

- Alberta Geological Survey : Chapter 21. Cretaceous Viking Formation of the Western Canadian Sedimentary Basin
- IHS Accumap : Canadian petroleum system analysis software (well, production, land, pipeline, plant), version 27.01
- Macquarie Equity Research : Viking quest (February, 2011)
- TORO Oil & Gas Corporate Presentation (August, 2015)

End of Documents

**MKS INVESTMENTS LTD.**