



## EXECUTIVE REPORT SUMMARY

Dated 08 April 2015

RUSH UK PROJECT 23735\_HORSE HILL-1

### Results and Recommendations:

NULOOK and NULIST (electric) log interpretation results, now calibrated by POROLAB's rock analyses, calculate that the Horse Hill-1 well, excluding the structurally constrained Upper Portland sandstone, has a total oil in place ("OIP") estimate of 158 million barrels of oil ("MMBO") per square mile. The 158 MMBO per square mile OIP correlates to an aggregate pay section of 653 feet, primarily from the argillaceous limestones and mudstones of the Kimmeridge, and the mudstones of the Oxford and Lias sections. Table 1 shows the calculated OIP values for the well's main stratigraphic units. It is highly recommended that conventional flow testing be undertaken in one or more of the Kimmeridge limestone units as part of the planned flow testing of the Upper Portland sandstone discovery.

From its proprietary regional well log analyses NUTECH considers that the HH-1 OIP extends significantly beyond the 55 square miles of PEDL137 and PEDL246 with strong evidence that the eastern section of the Weald Basin contains considerably larger oil potential than has been previously estimated and published. This regional potential is the subject of ongoing analysis under NUTECH's contracted alliance with UK Oil & Gas Investments PLC and Solo Oil Plc.

**Table 1: HH-1 NULOOK/NULIST OIP Summary Table:**

SECTION	DEPTH FT TOP	DEPTH FT BASE	GROSS FT MD	PAY FT MD	OIP MMBO/Sq. Mile
L. Portland	2038	2320	129	19	<b>7.2</b>
Kimmeridge	2482	4430	1948	511	<b>114.9</b>
Top Corallian	4430	5000	374	0	0.3
Oxford	5050	5466	415	30	<b>7.2</b>
Kellaways	5466	5517	16	0	0.0
Upper Lias	6370	6711	220	0	0.4
Middle Lias	6711	7072	100	4	1.6
Lower Lias	7072	8096	986	53	<b>17.6</b>
Triassic	8288	8507	150	12	3.2
Palaeozoic	8508	8837	213	24	5.5
<b>TOTAL</b>			<b>4308</b>	<b>653</b>	<b>158.0</b>
			TOT	TOT	CUM

The most significant calculated OIP volumes lie within the Upper Jurassic Kimmeridge section at 115 MMBO per square mile. The total Kimmeridge section calculates at 511 feet net pay with a corresponding average TOC of 2.8 %. Table 2, below, illustrates that the Kimmeridge now contains three interbedded argillaceous limestone and mudstone hybrid reservoir sequences, which contain an aggregate OIP of 107 MMBO per square mile, or 93% of the total Kimmeridge OIP.

The Middle Kimmeridge hybrid reservoir sequence is likely the most prospective as it contains two thick circa 100 gross feet oil saturated limestone reservoir units with an aggregate limestone only net pay section of 78 feet. The Middle Kimmeridge units are encased within 593 gross feet of self-sourcing, oil-saturated organic rich mudstones, with high TOCs up to 9.4%.

Fracture analysis, together with information from offset well information, indicates that the Kimmeridge shows good evidence of natural fracturing, particularly in the Middle Kimmeridge Limestone 1 and 2 pay sections.

**Table 2: Kimmeridge Total and Kimmeridge Hybrid Section OIP and Metrics:**

UNIT	LITHOLOGY	TOP FT MD	BASE FT MD	GROSS FT MD	NET PAY FT MD	PAY RANK*	CLAY %	PORO-SITY %	SW PAY <sup>2</sup> %	AVG <sup>3</sup> TOC %	OIP MMBO/SQ. MILE
U. KIMM	Mudstone 1	2482	2649	167	19	3	50.1	9.7		1.14	7.9
M. KIMM HYBRID SEQUENCE	Mudstone 2	2649	2825	176	100	3	50.2	9.7		2.13	19.2
	Upper Limestone 1	2825	2931	106	17	2.94	16.1	8.5	53.8	n/a	3.0
	Mudstone 3	2931	3082	151	98	2.97	42.2	7.9		4.05	17.4
	Lower Limestone 2	3082	3184	102	61	2.66	18.2	8.5	45.6	n/a	12.7
	Mudstone 4	3184	3450	266	113	3	41.4	7.2		3.69	20.6
L. KIMM HYBRID SEQUENCE	Limestone 3	3450	3479	29	17	2.88	23.6	9.3	57.0	n/a	3.0
	Mudstone 5	3479	4430	951	86	3	41.8	5.1		2.48	31.2
<b>TOTAL</b>				<b>1948</b>	<b>511</b>						<b>114.9</b>

\*NUTECH flag system that shows the average pay ranking over a formation sequence (5 flags=1, 4 flags=2, 3 flags=3), where 3 is minimum pay ranking; <sup>2</sup> Sw in generative shale assumed as ~0%, i.e. no free water; <sup>3</sup> TOC calculated appear underestimated at high TOC sample values >5% TOC, values up to 9.4% seen in samples.

**Potential Analogue Plays and Recovery Factors:**

From a geological, reservoir engineering and possible future operational perspective, the interbedded naturally fractured carbonate and mudstone reservoirs encountered in the HH-1 are analogous to the Middle Bakken limestone of the Williston Basin (Figure 1). Further analogues are represented by the interbedded tight clastic reservoirs and source rocks of the Three Forks Formation, the US Permian Basin (Bone Springs, Wolfcamp, Clearfork, Spraberry, and Dean Formations), and possibly the age equivalent Upper Jurassic Bazhenov Formation of Russia’s Western Siberian basin. (Figures 2, 3, 4, 5, 6)

Bakken wells analyzed by NUTECH show a contacted OIP of between 10-20 MMBO per square mile, from a formation thickness of 40-150 feet, containing one hybrid carbonate reservoir to mudstone source-rock pairing. The Kimmeridge in HH-1 now shows three carbonate reservoir-mudstone source-rock pairings. Recoveries per well to date from the Bakken range from 8-15% in identified sweet spots (Figure 1).

NUTECH's analyses of the Wolfcamp/Bone Springs shows a contacted OIP range of between 60-160 MMBO per sq. mile in a 300-400 feet thick section and exhibits recovery factors of 1-10% (Figure 2).

**Table 3: Comparison Metrics of HH Kimmeridge vs. Analogous Hybrid Producing Plays:**

Basin Names	HH Kimmeridge (Weald Basin)	Bakken & Three Forks	Wolfcamp/Bone Springs	U. & L. Bazhenov Russia- W. Siberia
Geological Era	U. Jurassic	Devonian & Carboniferous	Permian	U. Jurassic
Reservoir Age	145-157 MMybp	320-380 MMybp	260-300 MMybp	140-152 MMybp
Depth (feet)	2300-4400*	8,000-11,000	7,000-10,000	8000-11000
Areal Extent (sq. miles)	~1100 <sup>2</sup>	~6500	~7800	~800000
Thickness (feet)	1500-2000	25-150	300-400	60-150
Porosity	4-10%	4-12%	4-8%	2-12%
Water sat. (Sw)	10?-57%	25-60%	20-50%	10-15%***
Clay Content	15**-50***%	25%	20-30%	10-30%
Maturity Ro	0.5- 0.91%	0.5-1%	0.8-1%	0.5-1.1%
Measured TOC%	2- 9.4%	8-12%	4-8%	3->11%
Hydrogen Index	650-900	298-450	~100-700	200-700
OIP/sq. mile (MMBO)	114	10-20	60-160	7.25->13
Recovery Factor	???	8-15%	3-10%	???

\*HH-1 uplifted by up to ~5000 feet, \*\*within argillaceous limestone units, \*\*\* in mudstones, <sup>2</sup> total Jurassic Weald shale prospective area, from BGS 2014, fig 47.

The Bazhenov Formation, of the same geological age and general stratigraphic, oil source rock composition and source richness as the Kimmeridge, constitutes the main oil source rock of the super-giant W. Siberian petroleum system. Some 200 conventional Soviet era vertical wells have been drilled and produced at highly variable rates and recovery factors in the last 50 years in the Bolshoi Salym field area. Production to date is primarily from a hybrid of thin naturally fractured low porosity and permeability limestone, silicite and carbonate silicite conventional tight reservoir units interbedded within the currently generative high TOC source rock (key metrics are shown in Table 3).

Recent publications show that the Upper and Lower Bazhenov mudstone oil source rock formations both contain a 10-30 feet low porosity limestone/carbonate conventional reservoirs created by the replacement of radiolarian fossils and algae or bacteria by carbonate cementation (Figure 3, 4). Additional reservoirs exist in thin 5-10 feet thick naturally fractured silicites and carbonate silicites. The Bashenov constitutes a significant future hybrid reservoir target and oil resource albeit on a much larger geographical scale than the Kimmeridge. It is the focus of intense studies and horizontal drilling by Shell/Gazprom and Exxon/Rosneft. Bazhenov well economics have likely been significantly boosted by Russia's recent oil/corporation tax exemptions for tight (low poroperm i.e., under 2 milliDarcy permeability) reservoir developments.

**Work in Progress:**

Final assessments of the Upper Portland sandstone reservoir and the Oxford and Lias sections are still being completed with the assistance of UKOG and its technical team. The overall regional potential of the Weald Basin is the subject of ongoing analysis under the contracted alliance.

**-END OF EXECUTIVE REPORT SUMMARY-**

Sincerely,

A handwritten signature in black ink, appearing to read 'Allen D. Howard II', written over a light blue horizontal line.

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# Figures Referenced In Executive Report Summary

Figure 1: NUTECH Bakken Well Analysis

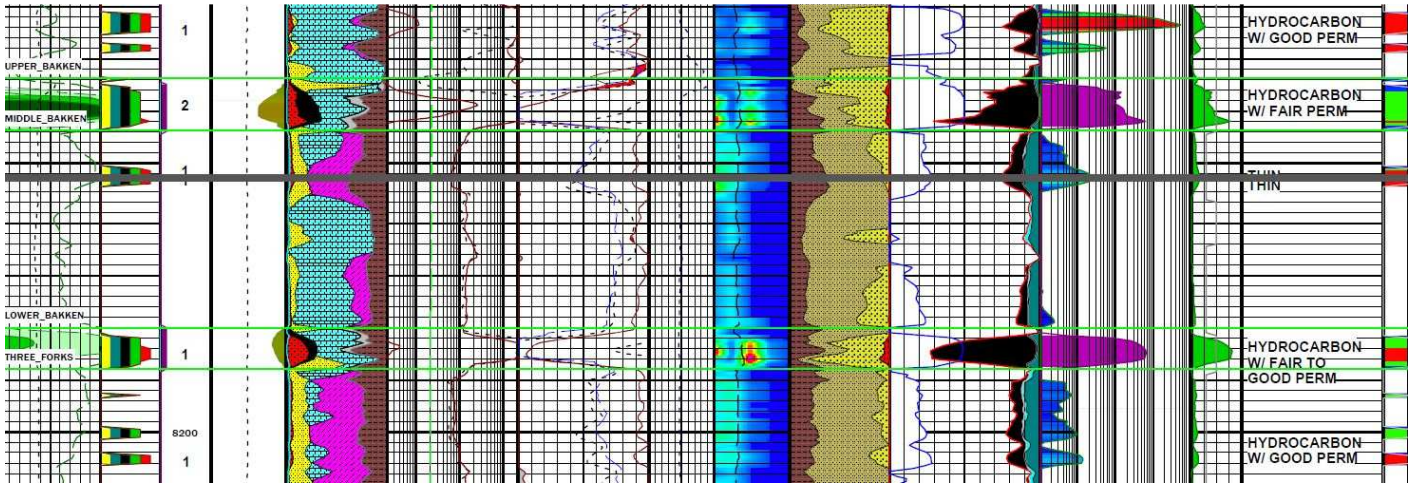


Figure 2: NUTECH Wolfcamp/Bone Springs Analysis

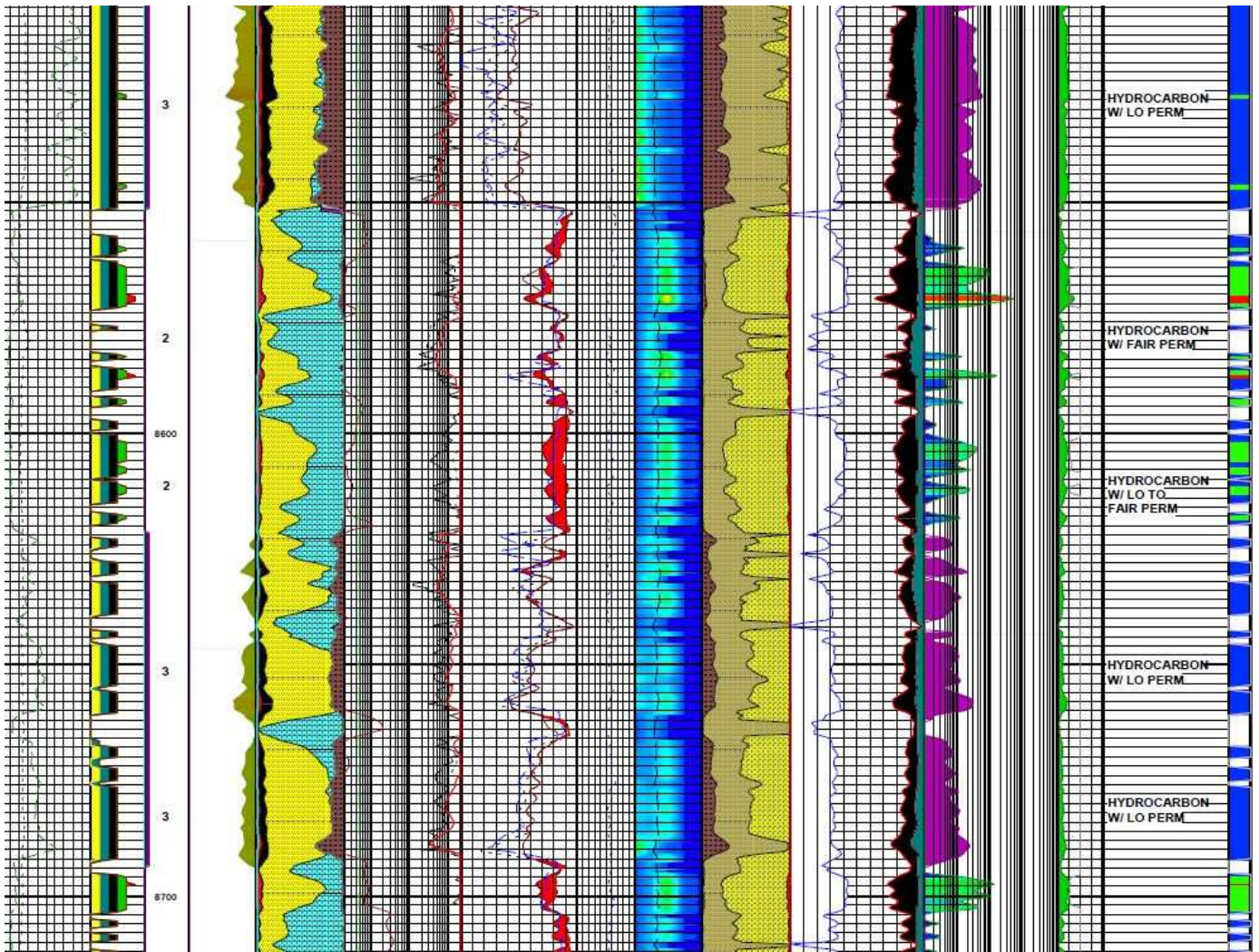


Figure 3: Bazhenov Stratigraphy

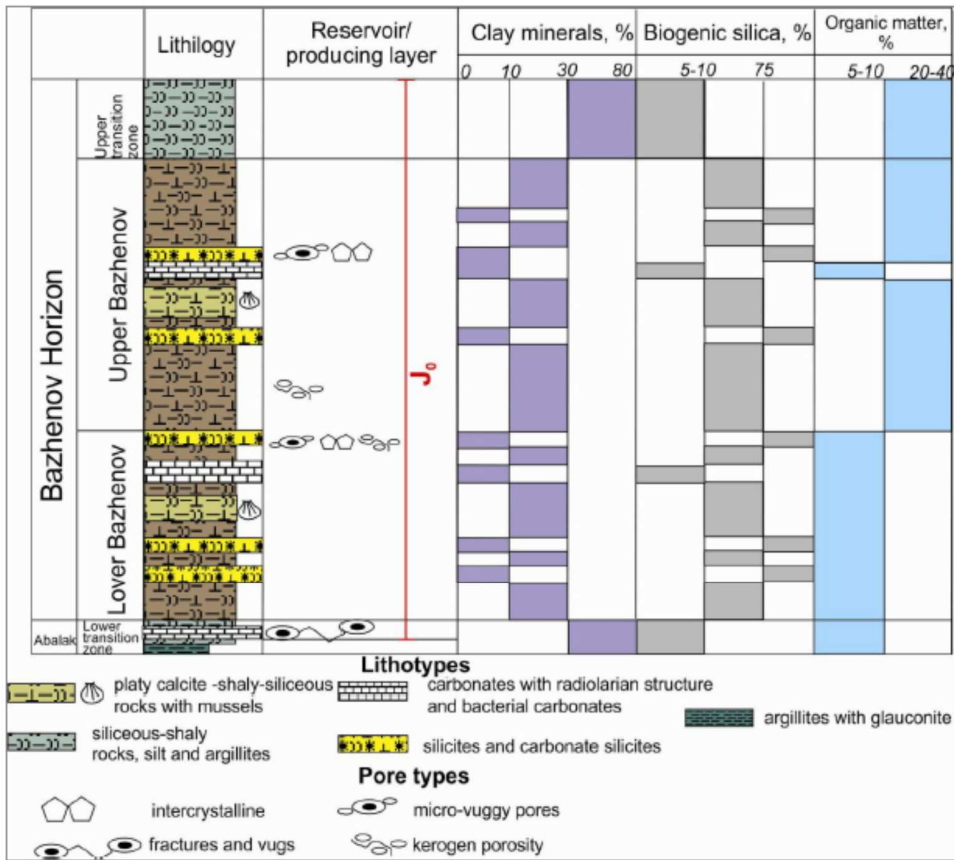


Figure 4: Bazhenov Formation Well Interval, Log Evaluation and Geochemistry, from Danko et al, 2015

3<sup>rd</sup> International Workshop on Rock Physics, Perth, 13<sup>th</sup>–17<sup>th</sup>, April 2015

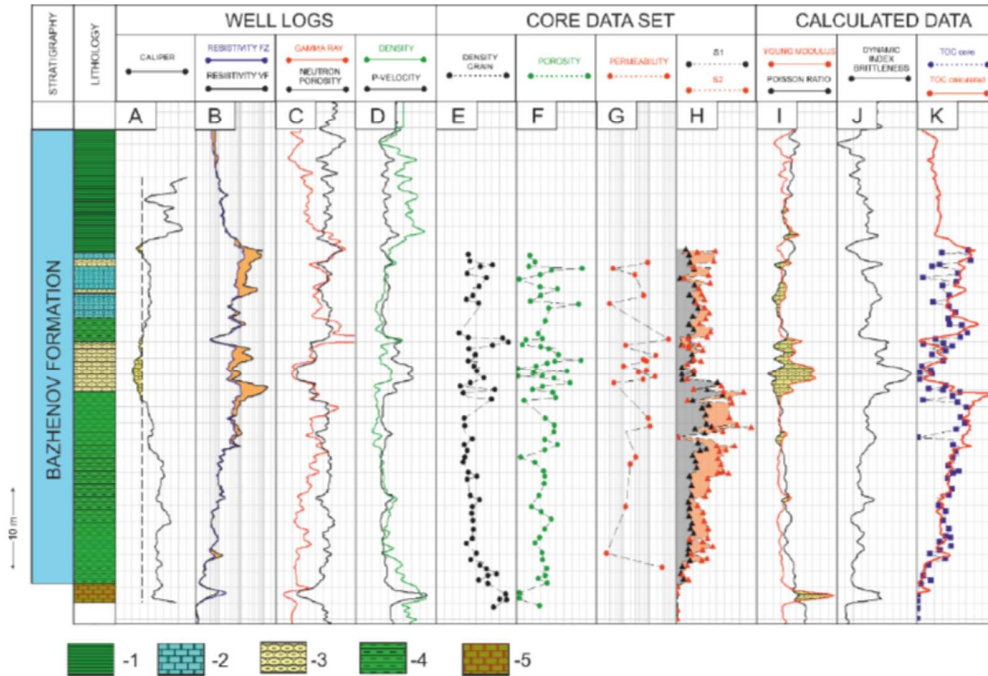


Figure 1. Well section of the Bazhenov formation interval. Lithology: 1-Argillaceous-Siliceous rocks; 2-Carbonaceous-Argillaceous-Siliceous rocks, enriched by TOC; 3-Secondary transformed radiolarians; 4-Argillaceous-Siliceous rocks, enriched by TOC; 5-Carbonates in the bottom of the Bazhenov formation.

Figure 5: Fractured Upper Micrite Bounded by Organic Kimmeridge Mudstone

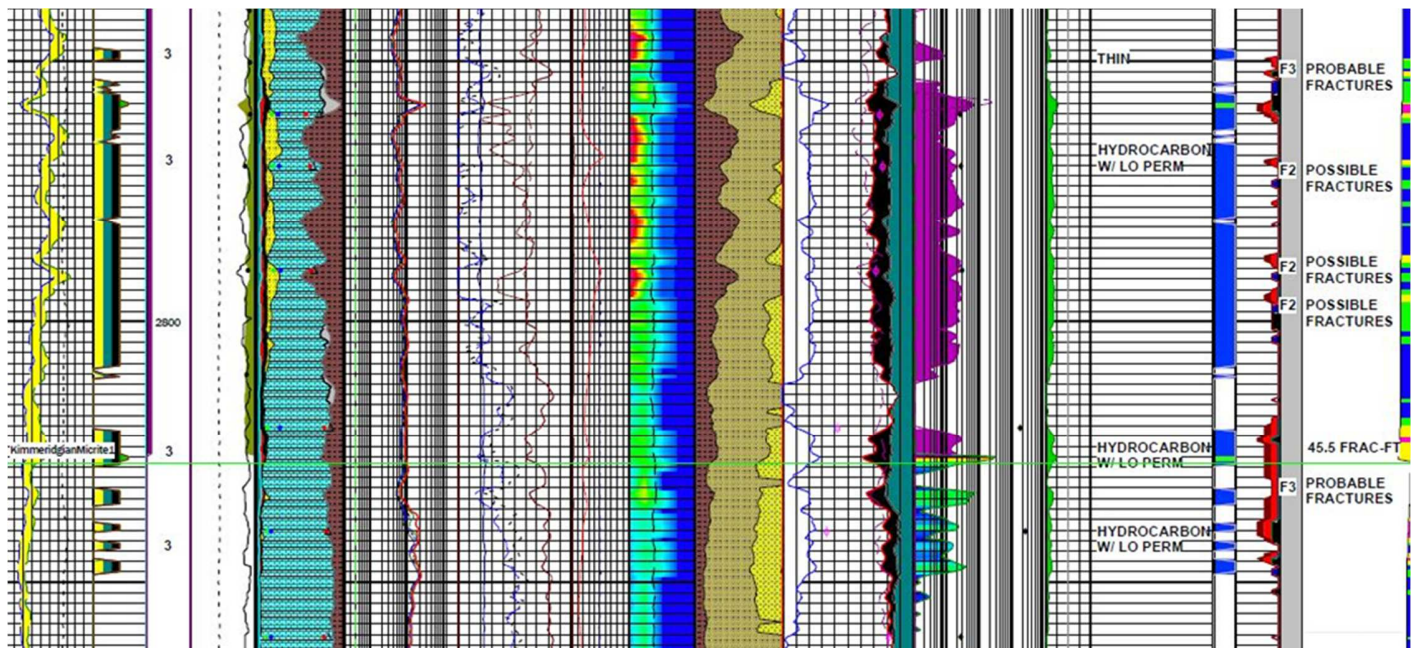
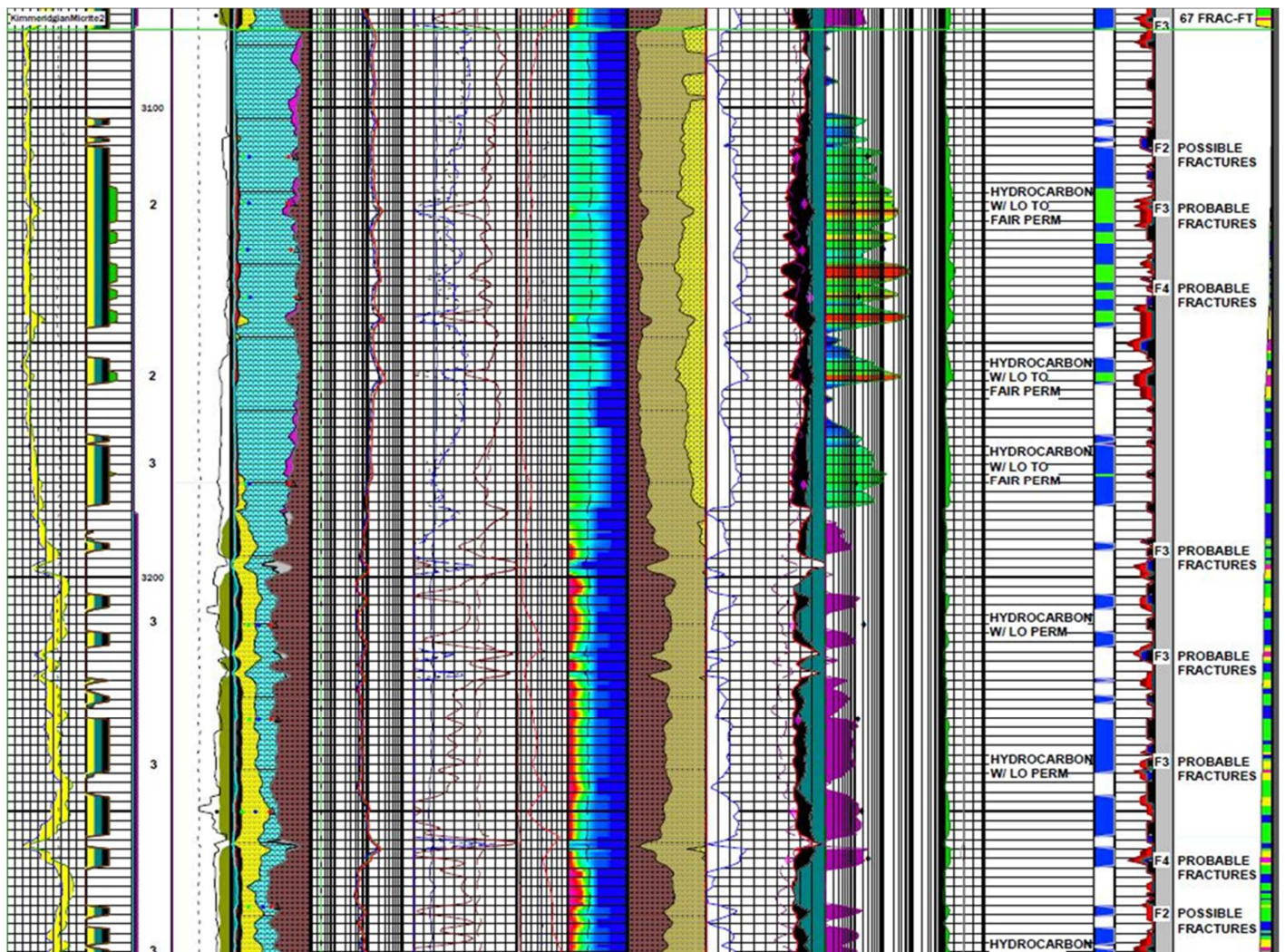




Figure 6: Fractured Lower Micrite Bounded by Organic Kimmeridge Mudstone



**Glossary:**

argillaceous limestone	a limestone containing a significant proportion of clay minerals
cementation	involves ions carried in groundwater chemically precipitating to form new crystalline material between sedimentary grains
clastic	rocks composed of broken pieces of older rocks
discovery	a discovery is a petroleum accumulation for which one or several exploratory wells have established through testing, sampling and/or logging the existence of a significant quantity of potentially moveable hydrocarbons
effective porosity (PHIE)	The interconnected pore volume or void space in a rock that contributes to fluid flow or permeability in a reservoir. Effective porosity excludes isolated pores and pore volume occupied by water adsorbed on clay minerals or other grains
electric logs	tools used within the wellbore to measure the rock and fluid properties of surrounding rock formations
fractured	containing a crack or surface of breakage within rock; fractures can enhance permeability of rocks greatly by connecting pores together
free water	water that is mobile, available to flow, and not bound to surfaces of grains or minerals in rock
hydrogen index (HI)	the amount of hydrogen relative to the amount of organic carbon in a sample, normally expressed in milligrammes of hydrogen per gramme of TOC. The higher the amount of hydrogen the more oil prone the source rock when subjected to time, temperature and pressure; an initial HI over 450 normally indicates an oil prone source rock
limestone	a carbonate sedimentary rock predominantly composed of calcite of organic, chemical or detrital origin. Minor amounts of dolomite, chert and clay are common in limestones. Chalk is a form of fine-grained limestone
lithology	The macroscopic nature of the mineral content, grain size, texture and color of rocks
micrite	a sedimentary rock formed of very fine grained calcareous particles ranging in diameter from 0.06 to 2mm, often referred to as lime mudstone
milliDarcy	a standard unit of measure of permeability. One Darcy describes the permeability of a porous medium through which the passage of one cubic centimeter of fluid having one centipoise of viscosity flowing in one second under a pressure differential of one atmosphere where the porous medium has a cross-sectional area of one square centimeter and a length of one centimeter. A milliDarcy (mD) is one thousandth of a Darcy and is a commonly used unit for reservoir rocks
MD	measured depth
MMBO	millions of barrels of oil
MMybp	millions of years before present
mudstone	an extremely fine-grained sedimentary rock consisting of a mixture of clay and silt-sized particles
oil in place (OIP)	the quantity of oil or petroleum that is estimated to exist originally in naturally occurring accumulations before any extraction or production
oil saturation	the amount of the pore space within a reservoir containing oil

organic rich	a rock rich in organic matter which, if subjected to sufficient heat and pressure over geological time, will generate oil or gas. Typical source rocks, usually shale or limestone, contain above an initial 2% organic matter by weight
pay	a reservoir or portion of a reservoir that contains economically producible hydrocarbons. The term derives from the fact that it is capable of "paying" an income. The overall interval in which pay sections occur is the gross pay; the smaller portions of the gross pay that meet local criteria for pay (such as minimum porosity, permeability and hydrocarbon saturation) are net pay
permeability	the capability of a porous rock or sediment to permit the flow of fluids through its pore spaces
play	a set of known or postulated oil and or gas accumulations sharing similar geologic, geographic, and temporal properties, such as source rock, migration pathways, timing, trapping mechanism, and hydrocarbon type
porosity	the percentage of void space in a rock formation, where the void may contain, for example, water or petroleum
recovery factor	those quantities of petroleum, as a proportion of OIP anticipated to be commercially recoverable by application of development projects to known accumulations from a given date forward under defined conditions
reservoir	a subsurface rock formation containing an individual natural accumulation of moveable petroleum that is confined by impermeable rock/formations
sandstone	a clastic sedimentary rock whose grains are predominantly sand-sized. The term is commonly used to imply consolidated sand or a rock made of predominantly quartz sand
silicite	fine grained rocks composed primarily of layered silica
source rock	a rock rich in organic matter which, if subjected to sufficient heat and pressure over geological time, will generate oil or gas. Typical source rocks, usually shale or limestone, contain above an initial 1% organic matter by weight
sweet spot	the area within a shale source rock unit showing highest TOC and generative potential normally associated with basin centred deposition
thermal maturity ( $R_o$ )	a term applied to source rocks which have received sufficient temperature and pressure over geological time to generate hydrocarbons
TOC	total organic carbon - the weight percent amount of organic carbon within the rock which is a commonly used measure of hydrocarbon source rock richness
water saturation ( $S_w$ )	The fraction of water in a given pore space. It is expressed in volume/volume, percent or saturation units.