



# **Overview of Petroleum Exploration in Kenya**

**PRESENTATION TO THE 5<sup>TH</sup> EAST AFRICAN PETROLEUM CONFERENCE AND  
EXHIBITION 2011**

**HELD AT**

**KAMPALA SERENA HOTEL**

**KAMPALA, UGANDA**

**By**

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## **OUTLINE**

- **Kenya at a Glance**
- **Components of the Kenya Petroleum Industry**
- **Oil Exploration History in Kenya**
- **Upstream Institutional Framework**
- **Kenya Sedimentary Basins**
- **Kenya Fiscal Regime**
- **Oil & Gas Exploration Opportunities**
- **Why Invest in Kenya**



## KENYA AT A GLANCE



**Location :** East Coast of Africa  
**Capital :** Nairobi  
**Government type:** Democratic Republic (Coalition)  
**Area:** 582,646 sq. km  
**Population:** 40million  
**GDP growth rate:** 5% (2010)  
**Contributors to GDP:** Tourism  
 Agriculture/Forestry/Fishing  
 Manufacturing  
 Transport/Communication



# MINISTRY OF ENERGY



## KENYA AT A GLANCE...cont

**Capital City:** Nairobi  
**Main Seaport:** Mombasa  
**Main Airport:** Jomo Kenyatta International  
**Other Airports:** Wilson, Mombasa, Eldoret, Kisumu  
**Official Languages:** English, Kiswahili  
**Sed. Basins:** Four (4) covering 317,000 sq km  
**Wells drilled:** 32





## COMPONENTS OF THE KENYA PETROLEUM INDUSTRY

- Upstream Sector
  - No proven reserves of hydrocarbons yet
  - Four (4) sedimentary basins
  - Thirty Six(36) blocks (21 Licensed)
  - Thirty one (32) exploration wells and >80000 KM Seismic
  - Contract is Production Sharing Contract
  - Previous and Existing contractors include CNOOC, TOTAL, SHELL, AMOCO, BP, LUNDIN, ANARDAKO e.t.c.
- Midstream Sector
  - **Pipeline** network of approx. **900km** operated by Kenya Pipeline Corporation for refined products
  - Refining capacity of four(4) **million metric tonnes per annum** (mmtpa) operated run by Kenya Petroleum Refinery Limited. (Due for upgrade)
  - Over 1,000,000M<sup>3</sup> Storage
- Downstream Sector
  - Countrywide retail network of 1052 stations operated by Multi-nationals (Total, Shell, Oil Libya etc) & smaller Kenyan OMCs
  - Ownership of Retail network - Multinational (73%) National Oil(8%) Independents (19%)





## OIL EXPLORATION HISTORY IN KENYA

- 1950'S - Oil exploration commenced
- 1960 to 1984 - 16 wells drilled mainly in the Lamu and Anza basins
- 1981- National Oil was incorporated in 1981
- 1984 GOK enacted new Petroleum (Exploration and Production) Act.
- 1986 Petroleum (E & P) Act revised. Royalties replaced by PSC's
- 1985 to 1992 - Further 14 wells drilled
- 1995 - Lamu Basin Study completed.
- 2001 - Tertiary Rift Study complete
- 2000+ - Award of offshore PSC's and reinvigorated exploration
- 2006 – Deepest offshore well drilled by Woodside
- 2009 – Deepest onshore well being drilled by CNOOC



## **THE PETROLEUM (EXPLORATION & PRODUCTION) ACT, CAP 308, 1986**

The Petroleum Act provides legal framework and regulates the negotiation and conclusion of ***Production Sharing Contracts*** (PSC) with potential investors.

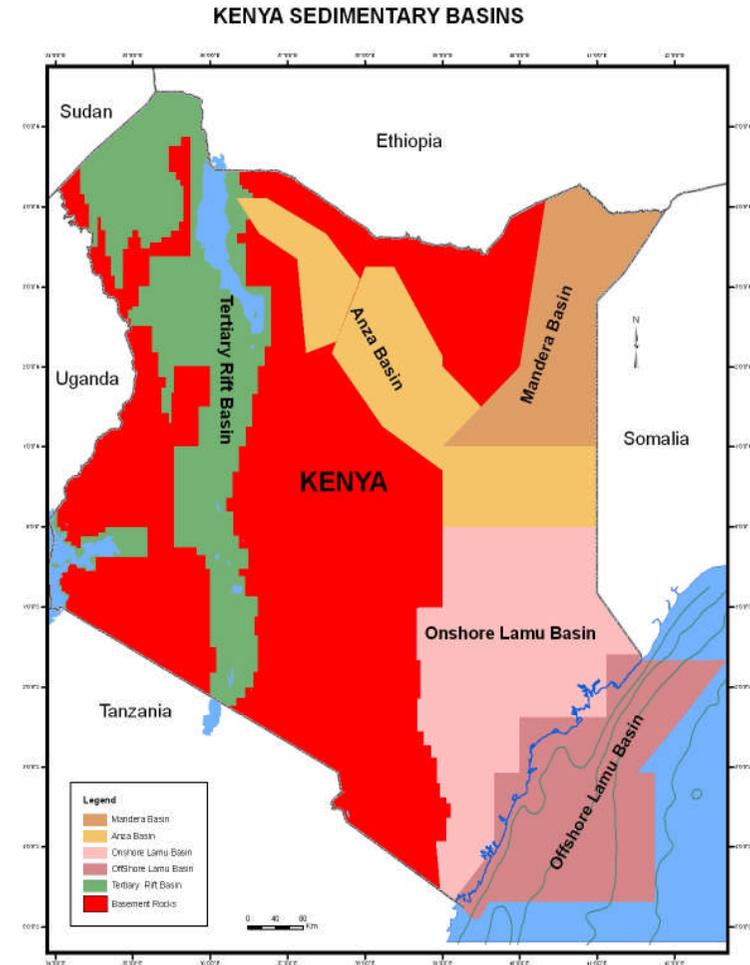
The PSC's are subject to negotiations and are governed by

- The Petroleum Act, Cap 308, 1986
- The Petroleum (E & P) Regulations
- The Income Tax (Amendments) Act
- Environmental Management & Coordination Act 2000 - NEMA



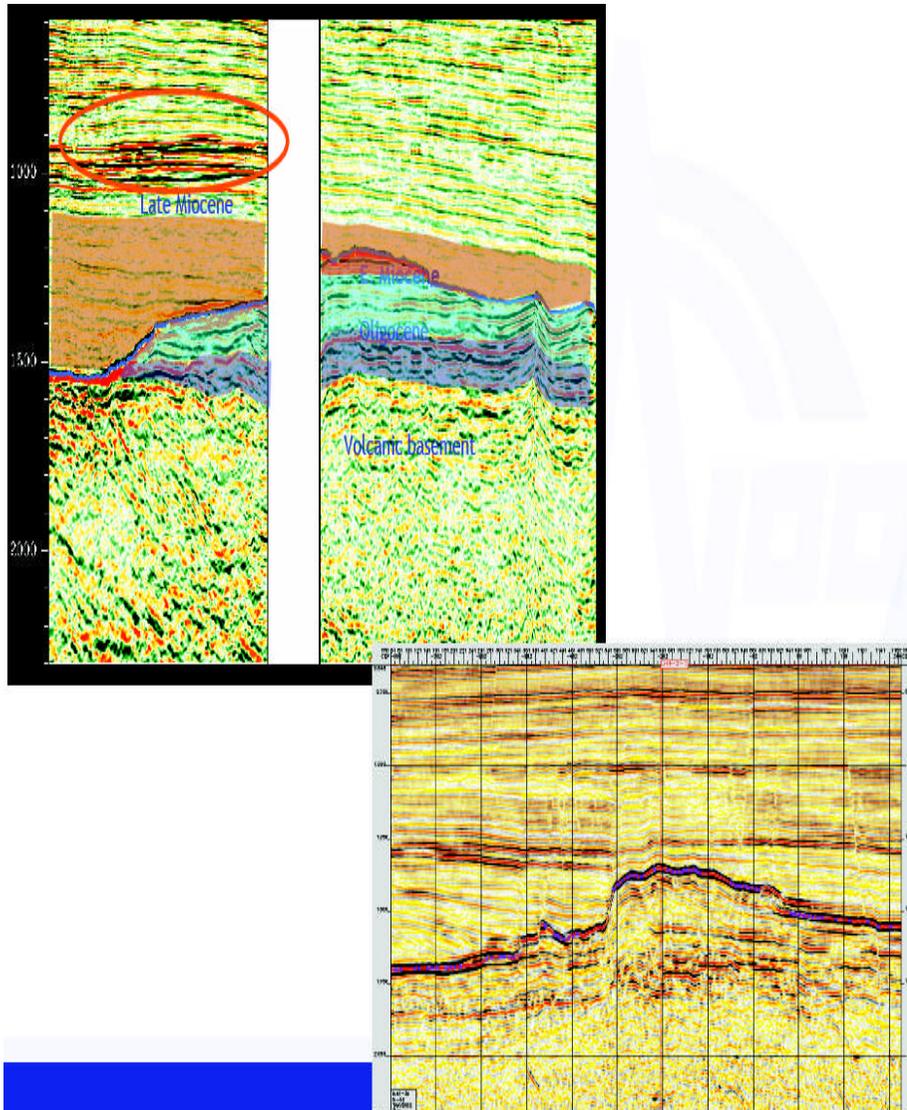
## KENYA SEDIMENTARY BASINS

Basin	Area km <sup>2</sup>	Wells drilled	Average Sediment thickness
Lamu	132,770	16	12,000 m
Mandera	51,920	3	10,000 m
Anza	94,220	11	10,000 m
Tertiary Rift	38,904	2	4,000 m





## ANZA BASIN



- The basin lies *Onshore*
- Reef structures have been mapped *lower cretaceous*
- Reservoir rock: *Bioclastic limestones*
- Potential reservoir thickness: 300m-500m
- Source rock: Lower Cretaceous
- Divided into *four(4)* blocks
- *ELEVEN(11)* wells drilled in Anza Basin
- *Oil* shows encountered between 970m - 1020m
- *Gas* shows encountered between 2150m – 4290m

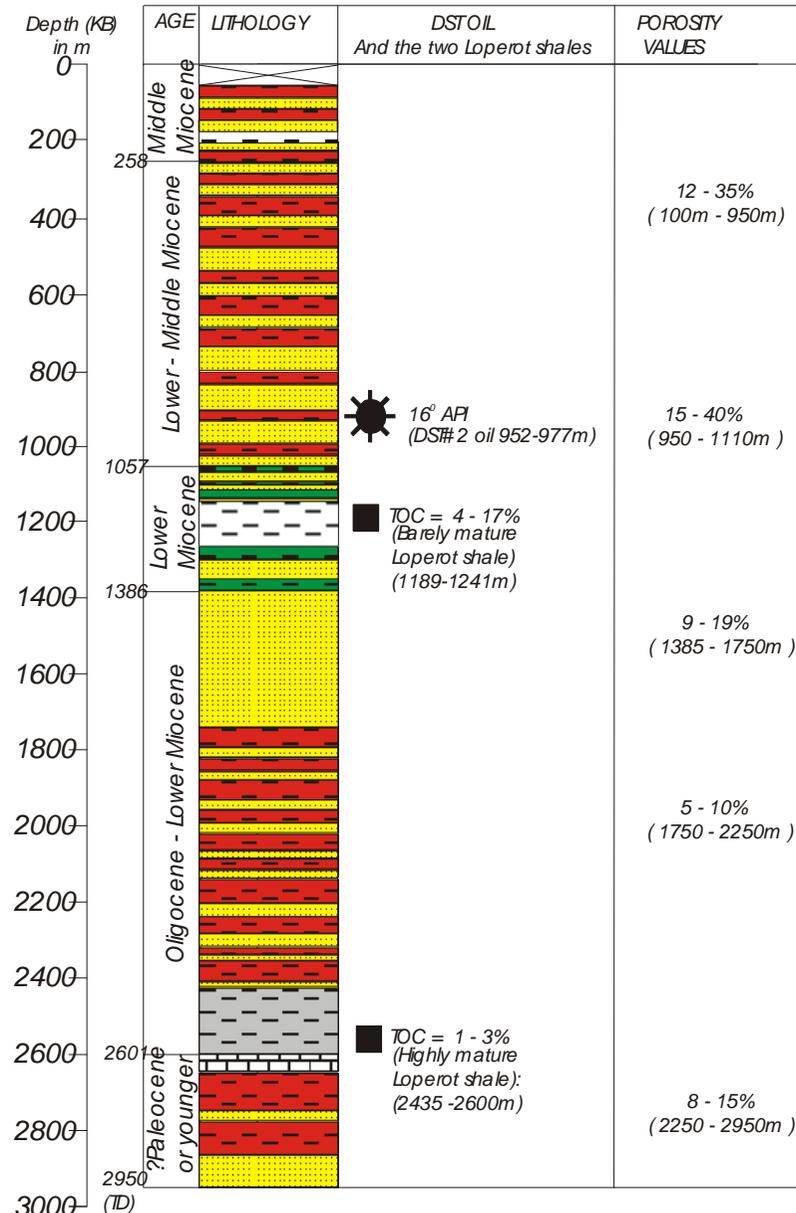


## TERTIARY RIFT BASIN

- The basin lies **Onshore**
- Is the **youngest** geologically
- The basin is **Oligocene** to **Pliocene** in age
- Sediment **thickness** ranges up to **3 km**
- Potential reservoirs: up to 40% porosity in sands (**Loperot-1 well**)
- Divided into **seven(7)** blocks
- **Two(2)** wells drilled in Tertiary

### Stratigraphy of Loperot-1 Well

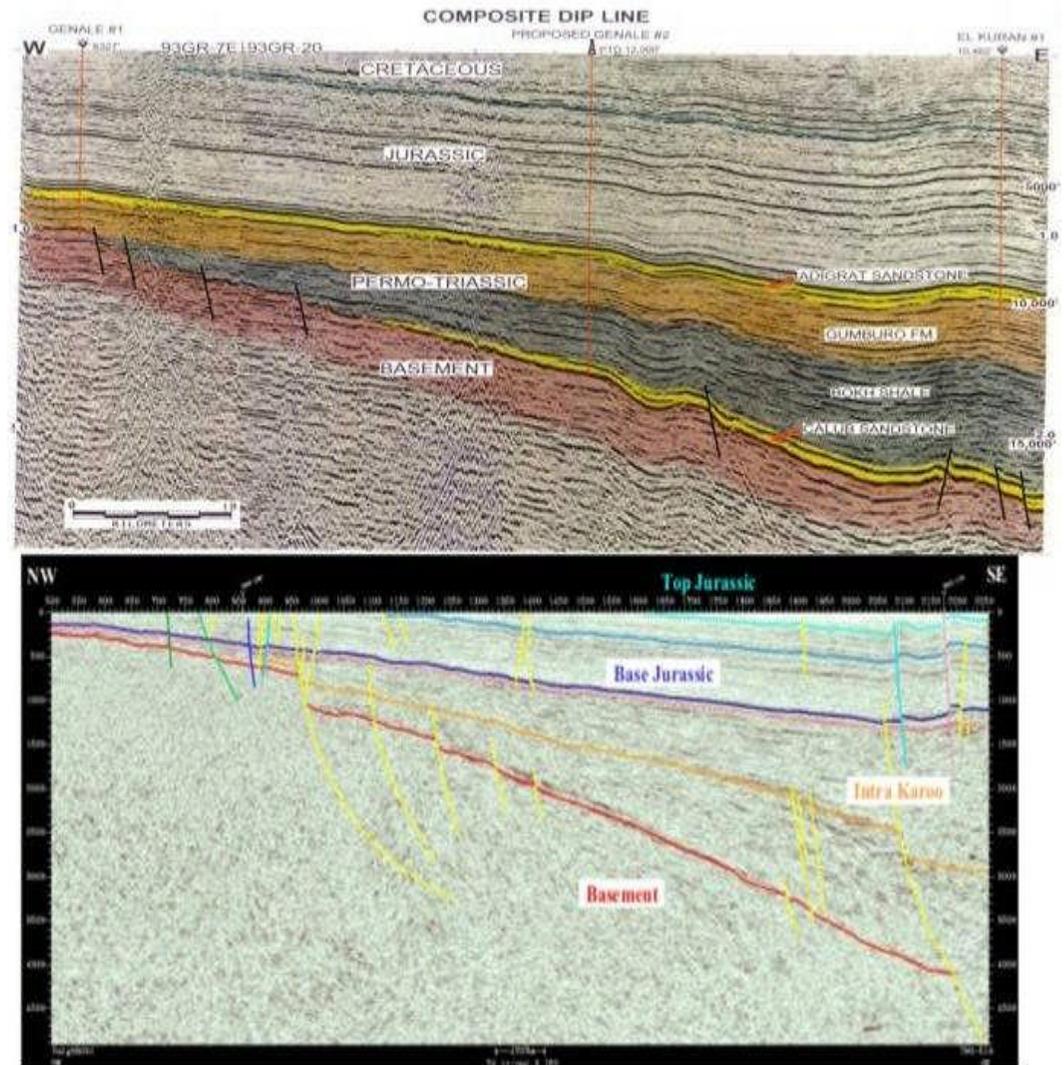
- Loperot-1 Well
  - Drilled in 1992 by Shell
  - Source Rocks – **Shale**
  - Low Sulphur content (0.5%)
  - Tested oil ~ **29°** API gravity
  - **Recovered 9.5 liters** of Oil at depth of 1110m





## MANDERA BASIN

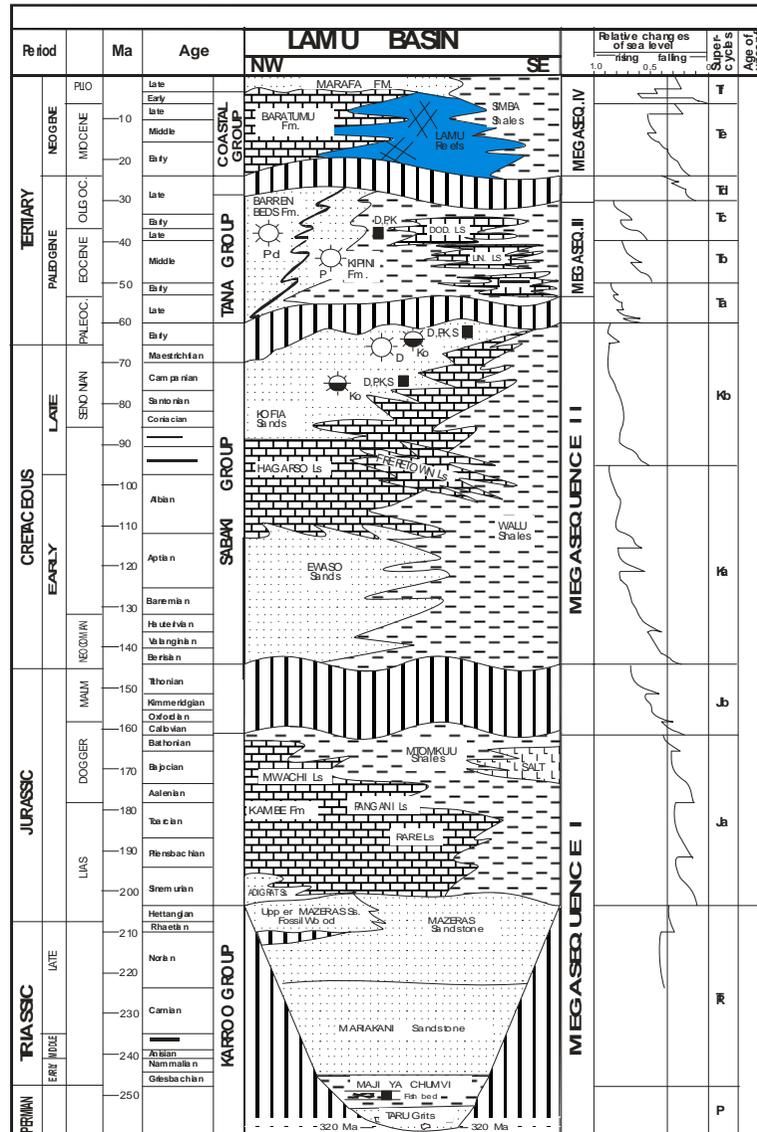
- The basin lies *Onshore*
- The basin is *Permo-Triassic* to *Tertiary* in age
- Sediment *thickness* ranges up to *10km*
- Divided into *three(3)* blocks
- *Four(4)* wells drilled
- Potential source rock interval in *Mid Jurassic-Lower Cretaceous*
- *Oil* shows encountered at 40–44m in the Tarbaj stratigraphic well drilled by TOTAL
- Source rock potential is comparable with the larger *Mandera-Lugh* basin in *Ethiopia* and *Somalia*





## LAMU BASIN

STRATIGRAPHY OF THE LAMU BASIN

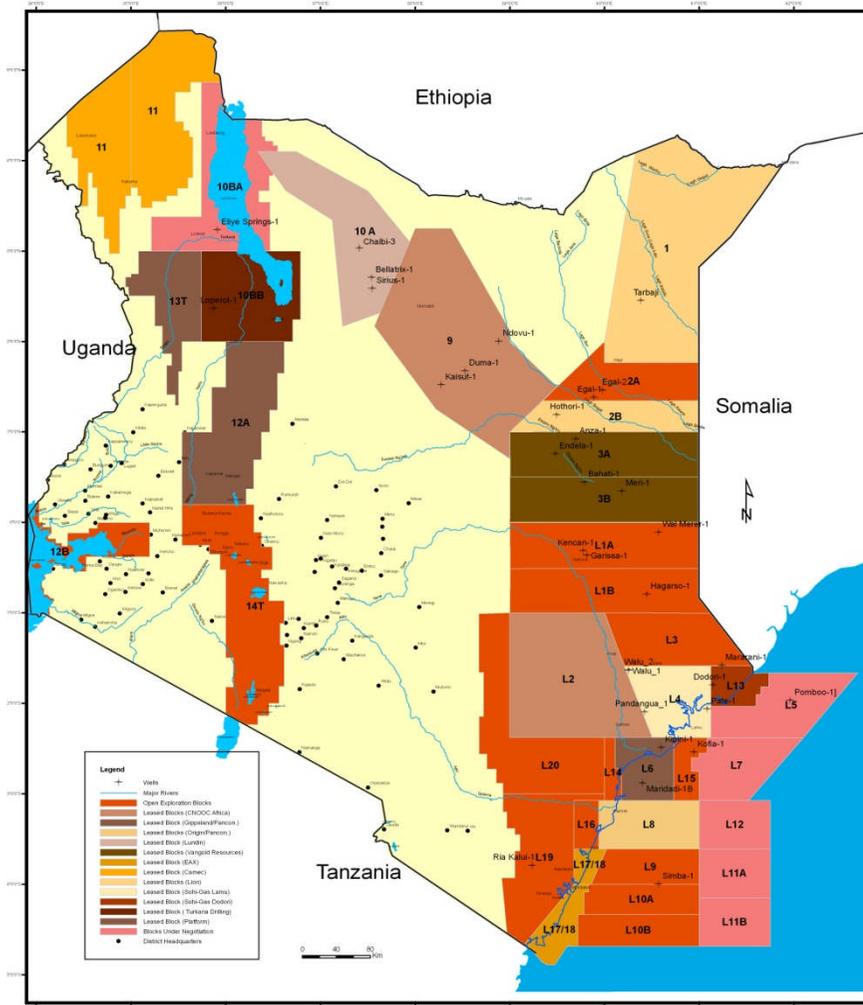


- The basin lies both **Onshore & Offshore**
- The basin is **Upper Carboniferous to Recent** in age
- Formed during separation of **Madagascar** from Africa
- Source rock: **Middle to Late Jurassic**
- Sediment **thickness** ranges up to **12km**
- Divided into **twenty four(24)** blocks
- **Fifteen(15)** wells drilled in Lamu Basin
- **Oil** shows encountered in L.Cretaceous
- Tested **Gas** flows of **3.1MCF/D** in Dodori -1 well and **12.7MCF /D** in Pandangua well and Pate-1 well

☀ gas shows  
 ★ oil shows  
 ■ source rock  
 Ko = Kofia-1  
 D = Dodori-1  
 P = Pate-1  
 S = Smba-1  
 Pd = Pandangua-1  
 K = Kipini-1



## CURRENT EXPLORATION BLOCKS

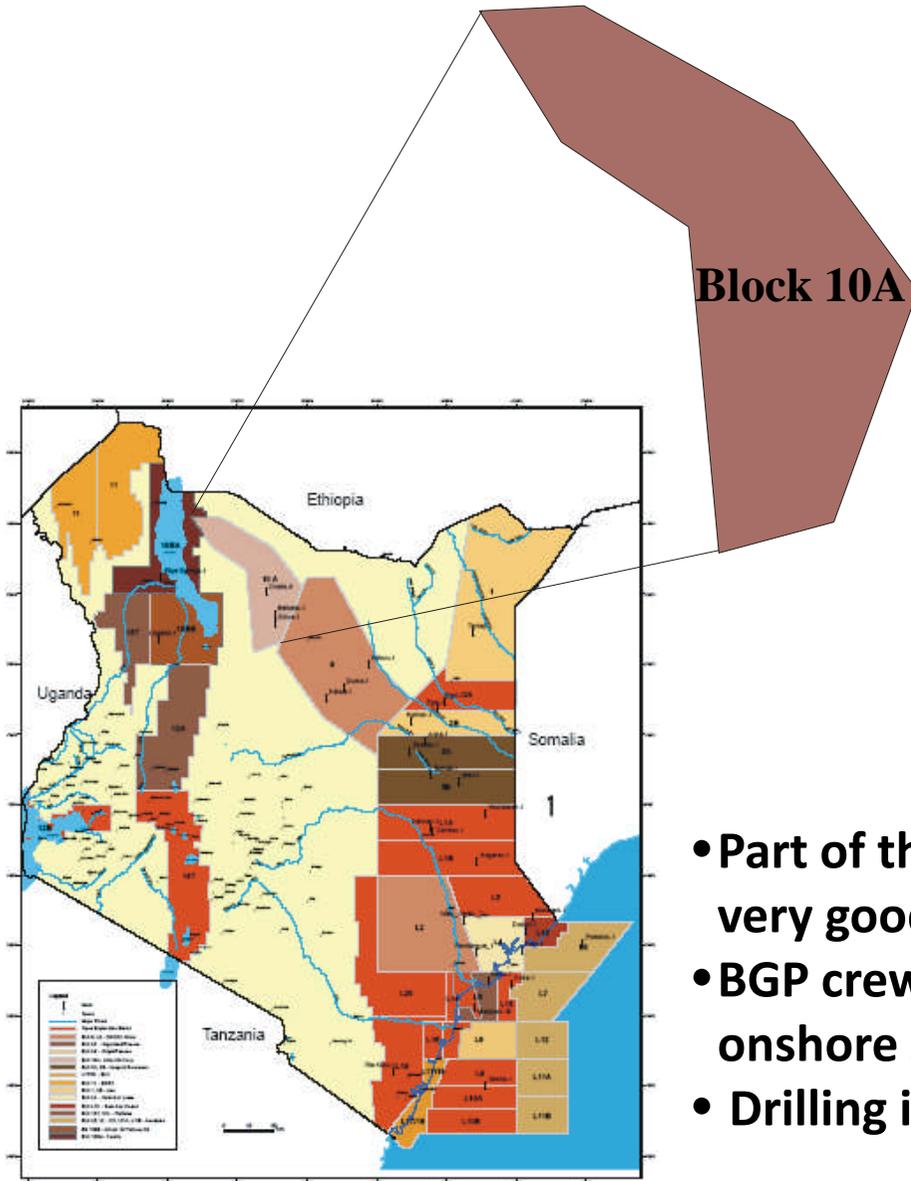


<b>Lease Status:</b>	
<b>Tullow:</b>	<b>5 Blocks</b>
<b>Origin Energy:</b>	<b>1 Block</b>
<b>Flow Energy:</b>	<b>1 Block</b>
<b>Camec</b>	<b>1 Block</b>
<b>Africa Oil Corp</b>	<b>1 Blocks</b>
<b>Vanoil Resources</b>	<b>2 Blocks</b>
<b>AFREN (EAX)</b>	<b>2 Block</b>
<b>Lion Petroleum</b>	<b>1 Blocks</b>
<b>Sohi Gas Lamu</b>	<b>1 Block</b>
<b>Sohi Gas Dodori</b>	<b>1 Block</b>
<b>Anadarko Petroleum</b>	<b>5 Blocks</b>
<b>NOCK</b>	<b>1 Block</b>

**Total leased 21 out of 36 Blocks**



## Tullow Oil- ONSHORE

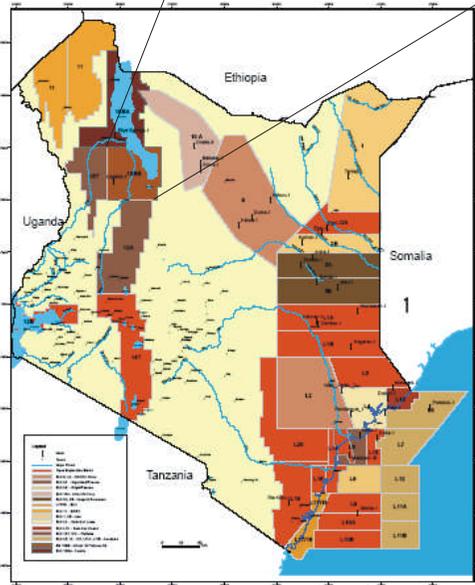


- Part of the Anza Basin, continuation of the CARS, very good oil shows in wells drilled
- BGP crew has mobilized to acquire 750 km of onshore 2D seismic data
- Drilling in 2011



## Tullow Oil - ONSHORE

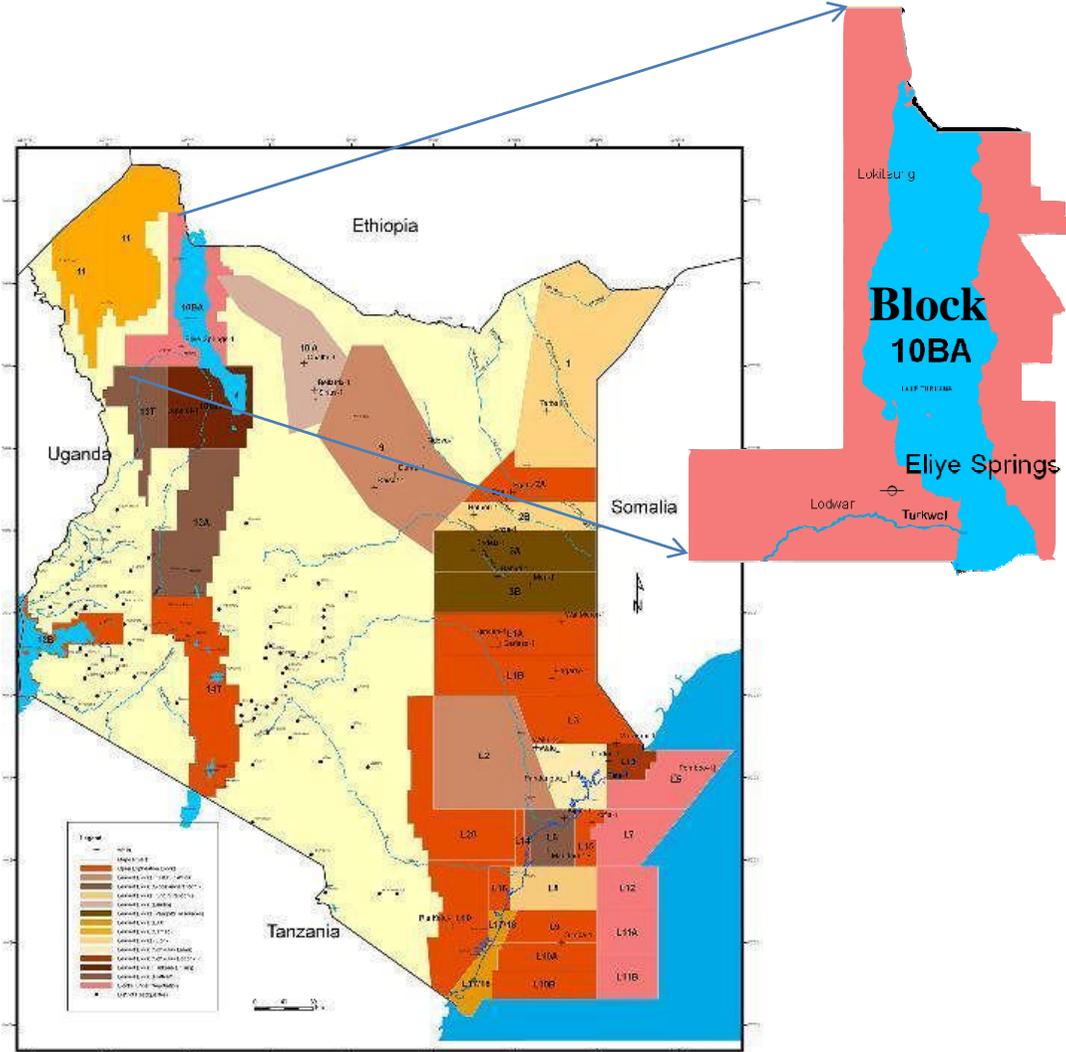
Block 10BB



- Part of the East African Tertiary Rify System (EARS), analogous to Albertine Basin in Uganda
- Block has the most significant oil show in Loperot well
- BGP crew completed acquisition of 615 km onshore 2D Seismic in October 2010
- Drilling in 2011



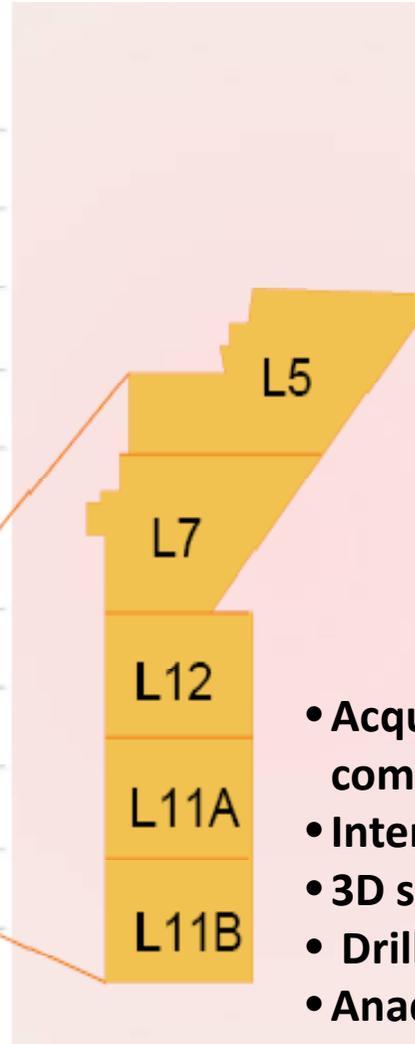
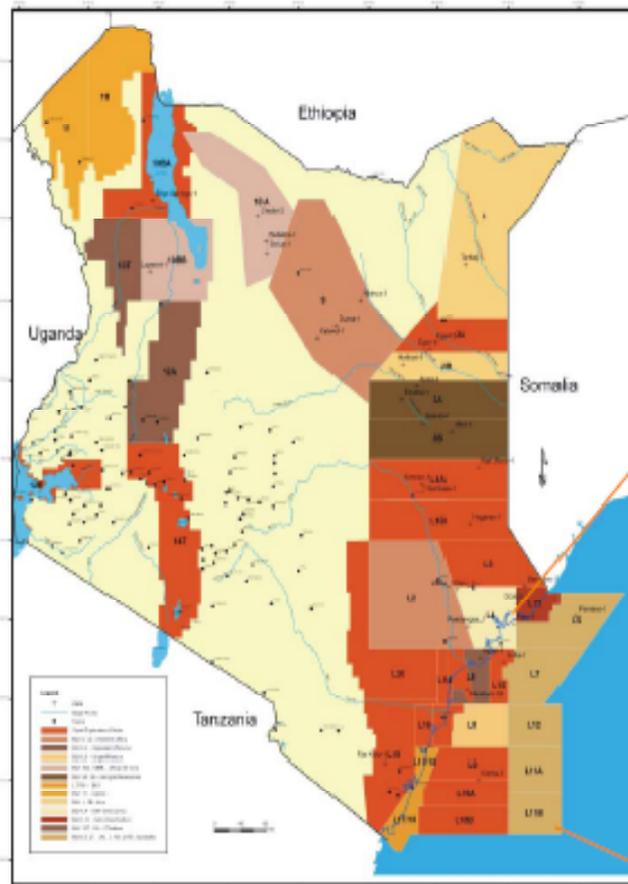
## Tullow Oil - ONSHORE



- Block 10BA lies in the Tertiary Basin
- Reservoir rocks are present with **porosities** ranging from 25%-30%
- Oil seeps on margin of Lake Turkana
- Surface slicks on Lake Turkana possibly related to seeps
- **Good mature** Source Rocks proven to have reached the **Oil Window**
- The structures similar to Loperot-1 in Block 10BB which recovered **9.5 ltrs - Oil**



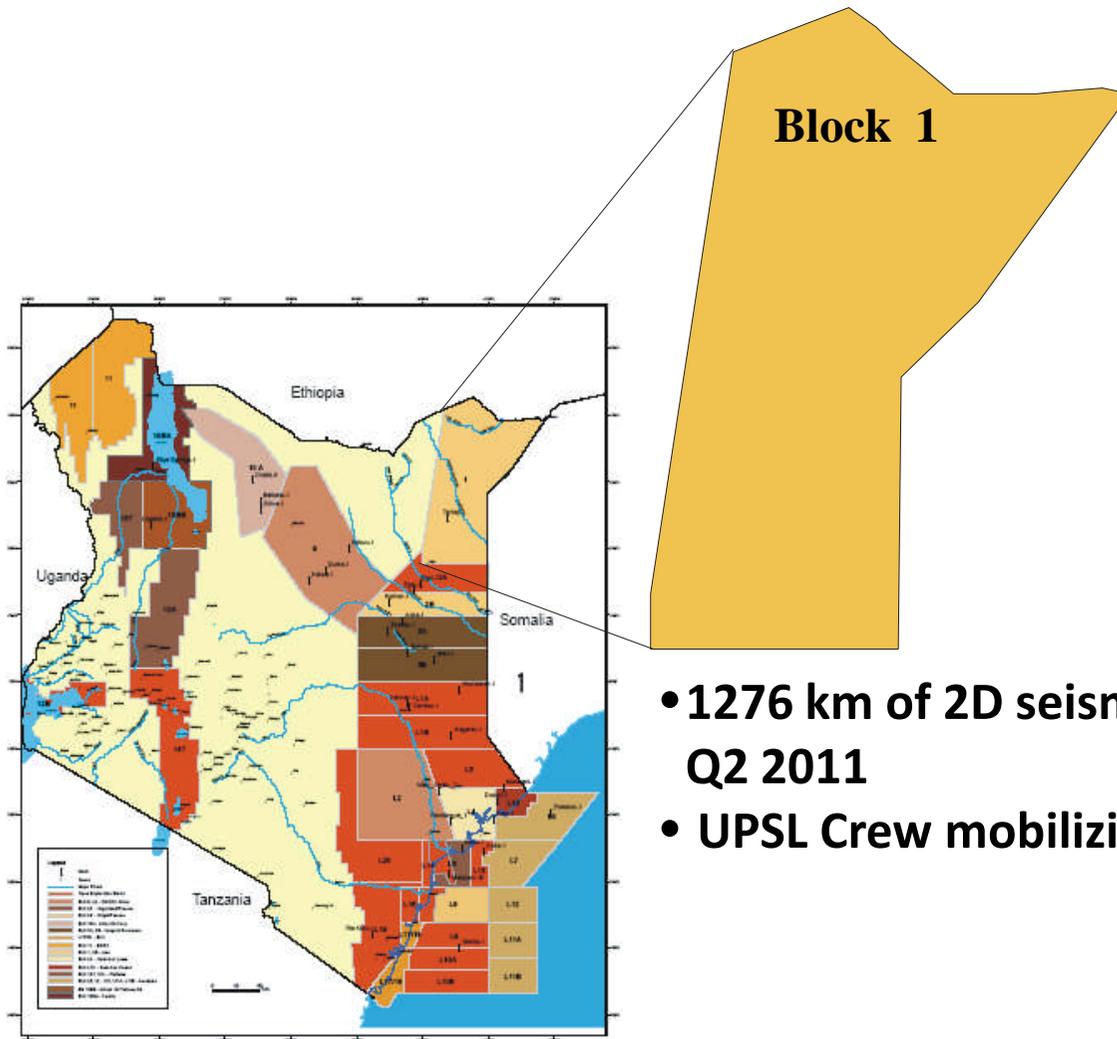
## ANARDARKO Petroleum -OFFSHORE



- Acquisition of 5000 km of 2D seismic data completed
- Interpretation currently ongoing
- 3D seismic acquisition planned for 2011
- Drilling planned for 2012
- Anadarko hoping to replicate their success story from further south in Mozambique



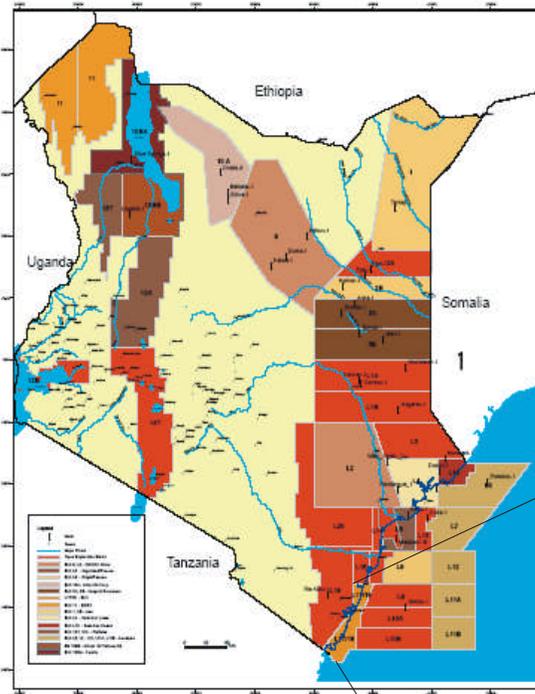
## AFREN (EAX)-Onshore



- 1276 km of 2D seismic planned to commence in Q2 2011
- UPSL Crew mobilizing from Ethiopia



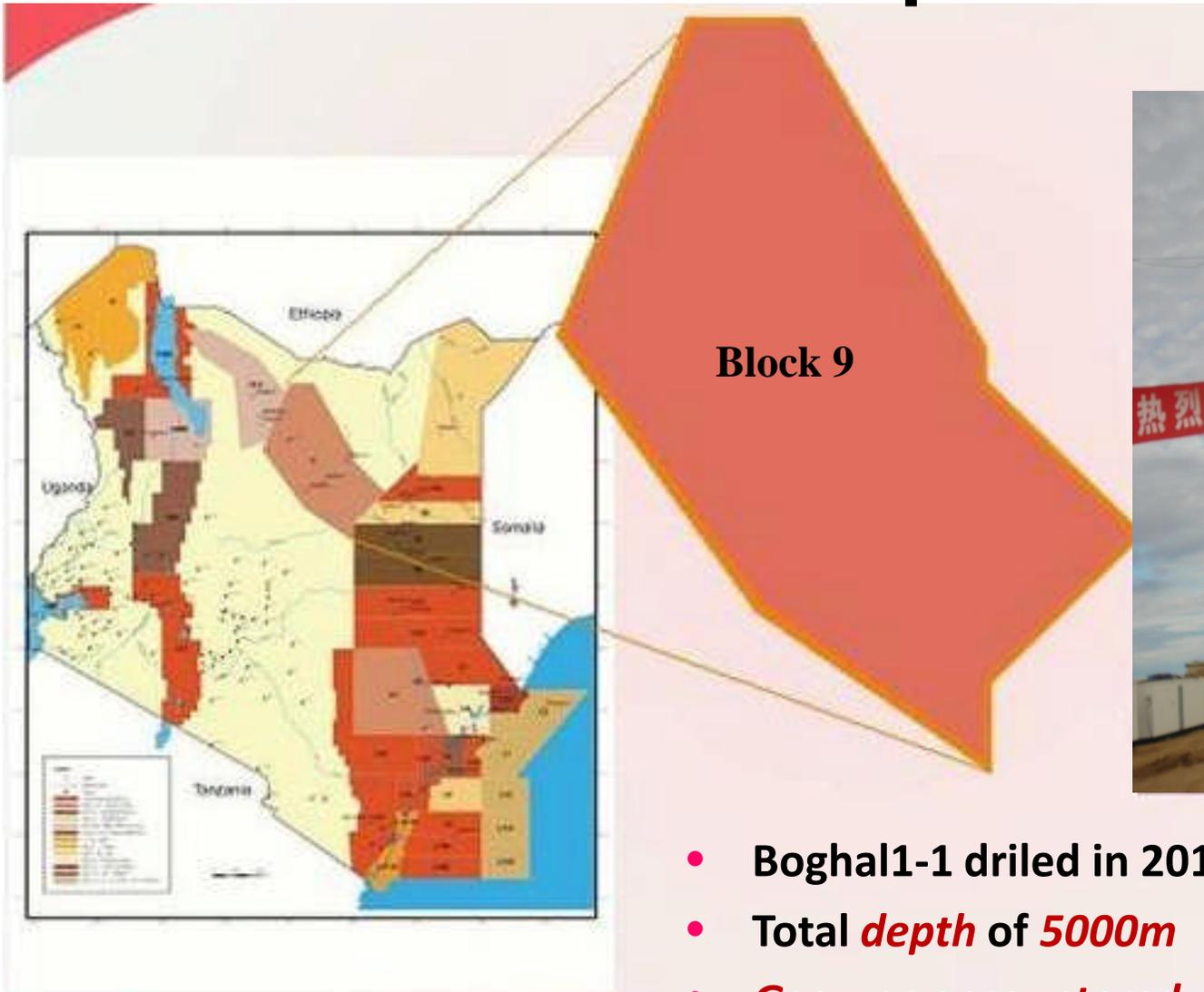
## AFREN (EAX)-Offshore/Onshore



- Acquisition of 460 km shallow water - transition zone 2D seismics completed in October 2010
- Company plans to acquire onshore 2D



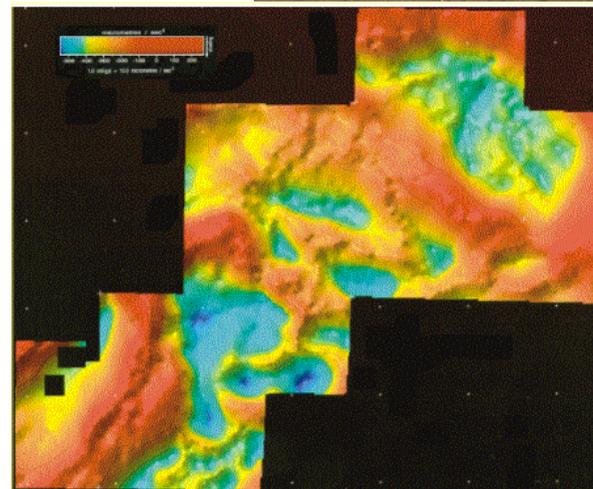
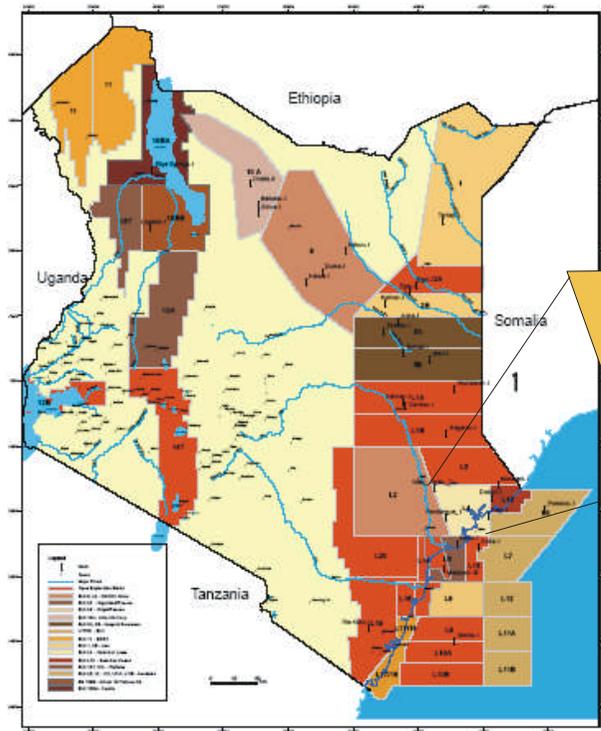
# African Oil Corp- ONSHORE



- Boghal1-1 drilled in 2010
- Total *depth* of *5000m*
- *Gas was encountered*



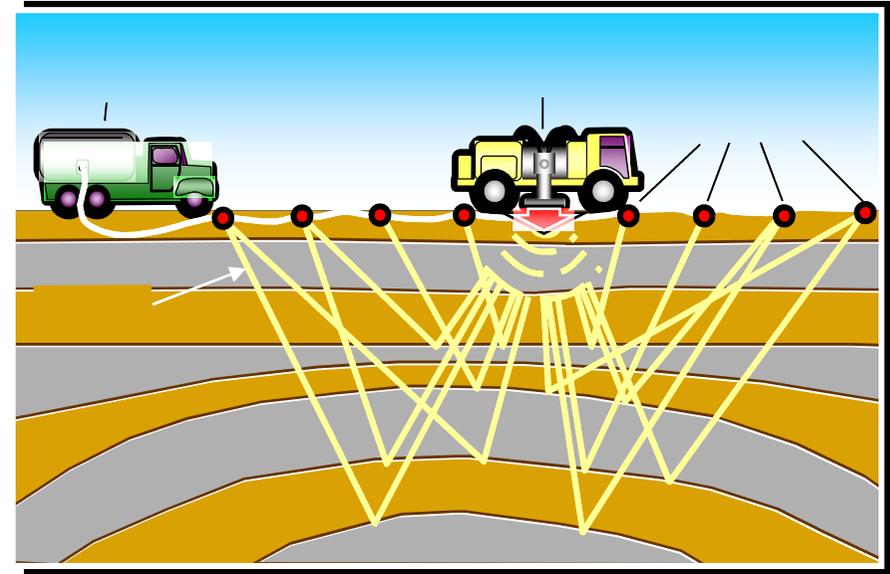
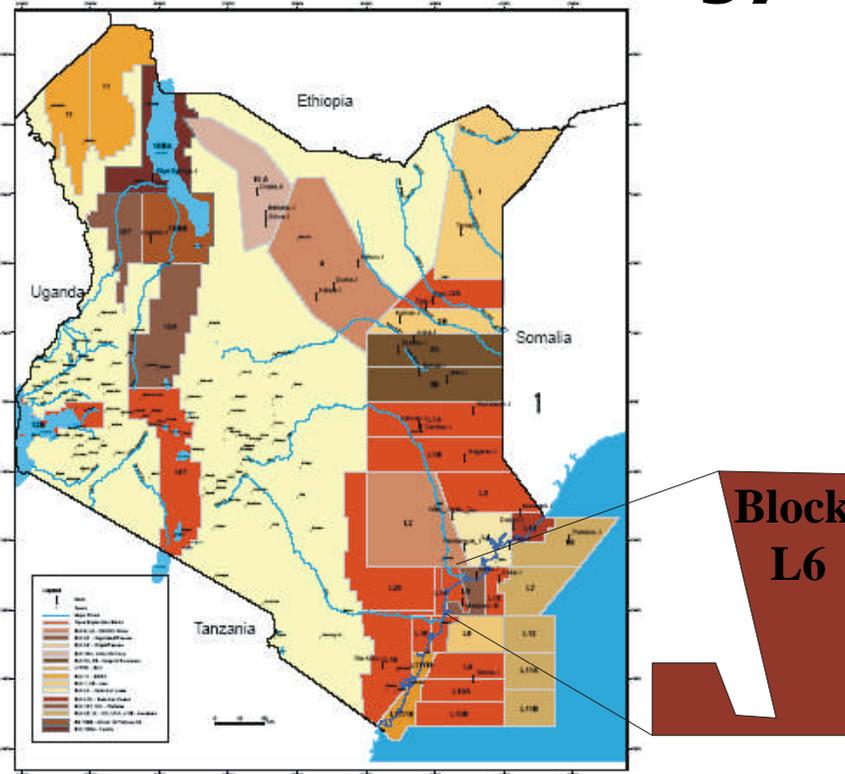
## SOHI – Onshore/Offshore



- Acquisition of 3D and 2D Seismic planned for early part of 2011.



## FLOW Energy – Offshore/Onshore

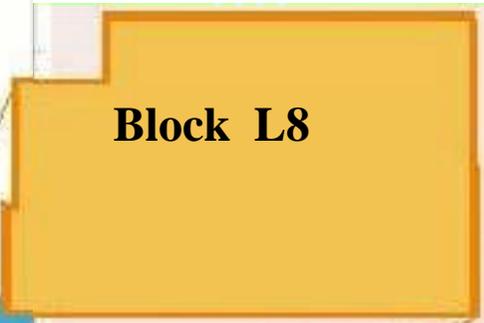
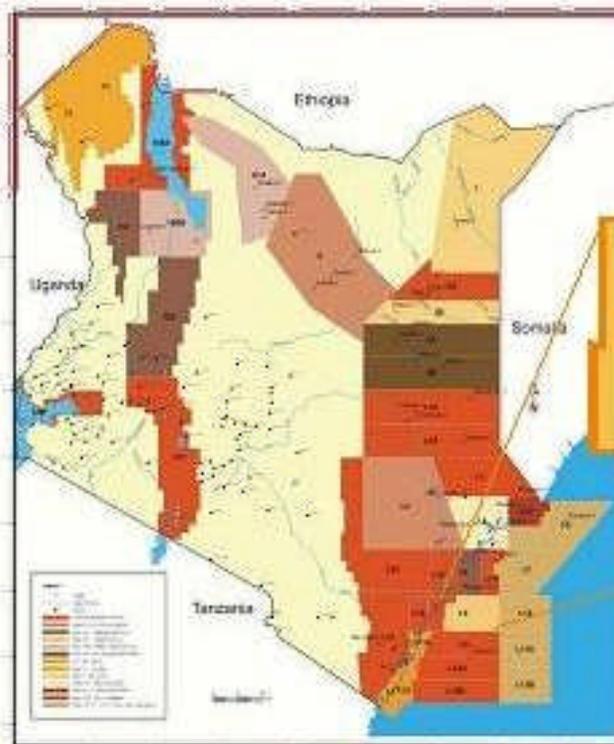


- 3D offshore seismics planned for 2011
- Acquisition of 100 km of onshore 2D seismic acquisition to commence in early 2011.

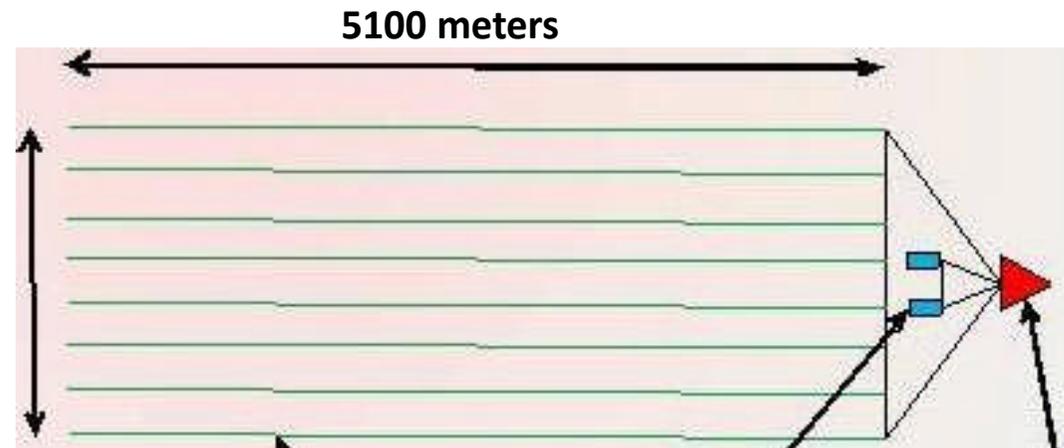


## ORIGIN ENERGY - OFFSHORE

Acquisition *of 900 sq km of 3D* by **Origin Energy** completed December 2009



Block L8



Hydrophone  
Streamer  
Cables (8)

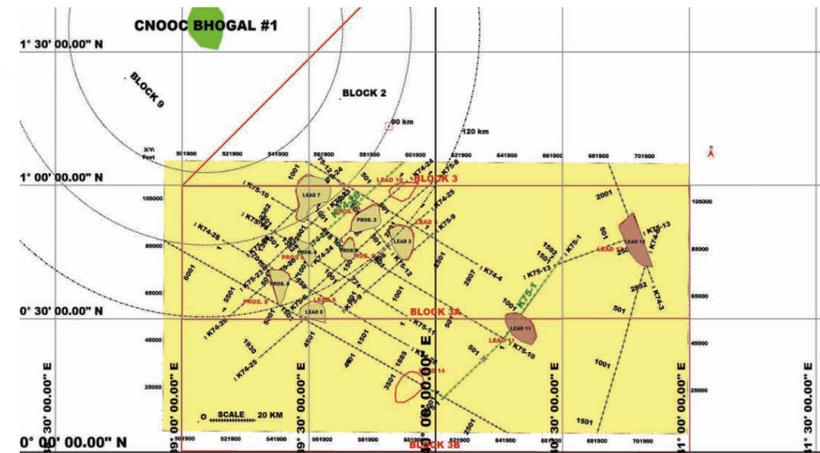
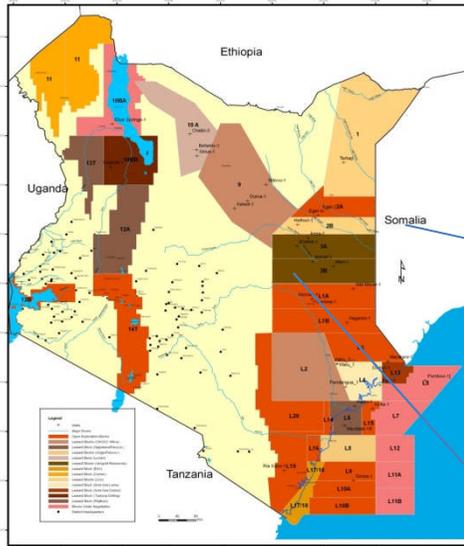
Air gun  
Arrays

M/V  
Seisquest



## VANOIL – Onshore

- 1,500 km 2D seismic data reprocessed
- 447 line km of new 2D acquisition completed in 2010
- 3D seismic planned for 2011
- Well planned for 2012





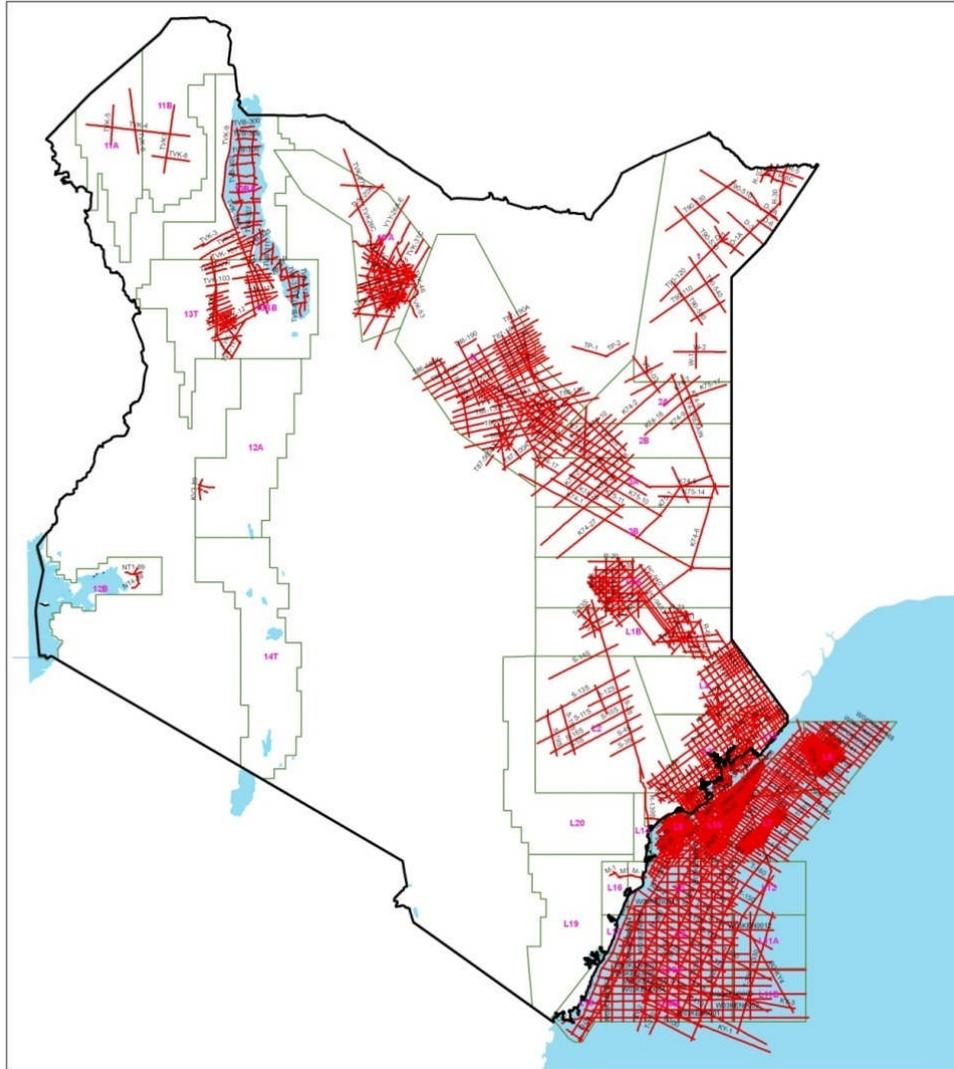
## Wells drilled in Kenya

Well Name	Operator	Latitude	Longitude	TD (m)	TD Age	Year Completed	Status
Walu-1	BP/Shell	01°38'04"S	40°15'09"E	1768	Late Cret.	1960	P&A
Pandangua-1	BP/Shell	02°05'51"S	40°25'15"E	1982	Early Tertiary	1960	P&A with gas shows in Tertiary
Meri-1	BP/Shell	0°20'36"N	40°11' 00"E	1941	Early Tertiary	1961	P&A
Mararani-1	BP/Shell	01°34'57"S	41°14'10"E	1991	Early Tertiary	1962	P&A with oil shows in the Tertiary
Ria Kalui-1	Mehta & Co.			1538	Permo-Trias.	1962	P&A with oil staining in Karroo
Walu-2	BP/Shell	01° 38'02"S	40°15'10"E	3729	Early Cret.	1963	P&A with oil shows in Cretaceous
Dodori-1	BP/Shell	01°48'53.7"S	44°11'04"E	4311	Late Cret.	1964	P&A with oil and gas shows in
Walmerer-1	BP/Shell	0°05'35"S	45°35'05"E	3794	Early Cret.	1967	P&A with gas shows in Cretaceous
Garissa-1	BP/Shell	0°22'04"S	39°48'43"E	1240	Mid. Jurassic	1968	P&A
Pate-1	BP/Shell	02°03'53.98"S	41°04'52"E	4188	Early Tertiary	1971	P&A with gas shows in the Eocene
Kipini-1	BP/Shell	02°29'23.57"S	40°35'51"E	3663	Late Cret.	1971	P&A with oil and gas shows in
Hagarso-1	Texas Pacific	0° 47'43.5"S	40°26'40.5"E	3092	Early Cret.	1975	P&A with gas shows in Cretaceous
Anza-1	Chevron	0°55'10.864"N	39°41'42.761"E	3662	Late Cret.	1976	P&A with oil stain in Cretaceous
Bahati-1	Chevron	0°26'32.913"N	39°47'5.077"E	3421	Late Cret.	1976	P&A with oil stain in Cretaceous
Simba-1	Total	04°00'06.60"S	40°34'03.68"E	3604	Late Cret.	1978	P&A with gas shows in Tertiary and
Maridadi-1B	Cities Services	2°53'8.795"S	40°24'7.856"E	4198	Mid. Tertiary	1982	P&A with gas shows in the Tertiary
Kofia-1	Union	02°32'31.90"S	40°56'18.30"E	3629	Late Cret.	1985	P&A with oil and gas shows in
KenCan-1	PetroCanada	0°18'57.384"S	39°46'16.572"E	3863	Permo-Trias.	1986	P&A
Elgal-1	Amoco	01°22'47"N	39°53'09"E	1280	Permian	1987	P&A
Elgal-2	Amoco	01°27'32.708N	39°58'40.063"E	1908	Triassic	1987	P&A
Ndovu-1	Total	01°59'58"N	38°52'57"E	4269	Early Cret.	1988	P&A with oil and gas shows in
Sirius-1	Amoco	2°35'00.14"N	37°32'48.98E	2638	Lower Cret.	1988	P&A with good oil shows
Bellatrix-1	Amoco	2°42'12.98"N	37°32'22.34"E	3480	Lower Cret.	1988	P&A
Duma-1	Total	1°39'35.66"N	39°30'19.77"E	3333	Early Cret.	1989	P&A with gas shows in Cretaceous
Hothori-1	Amoco	01°11'16.8"N	39°29'37.8"E	4392	Late Cret.	1989	P&A with oil and Gas shows
Chalbi-3	Amoco	3°01'50.81"N	37°24'43.09"E	3644	Lower Cret?	1989	P&A
Endela-1	Walter	0°45'20"N	39°28'52"E	2779	Early Tertiary	1989	P&A with gas shows in Paleogene
Kaisut-1	Total	1°31'03.82"N	38°16'28.89"E	1450	Early Tertiary	1989	P&A
Loperot-1	Shell	02°21'46.229"N	35°52'24.132"E	2950	Paleocene	1992	P&A with oil shows
Eliye Springs-1	Shell	03°13'50.62"N	35°54'40.19"E	2964	Upper Miocene	1992	P&A
Pomboo-1	Woodside	01°57'16.15"S	41°56'28.02E	4887	Late Cret.	2007	P&A





# Seismic Coverage



- 80,000 km of 2D seismics
- 900 sq km of 3D seismics



## FISCAL STRUCTURE

Area Specified Block size is provided with its coordinates.

Duration Exploration: 3 Phases – Initial Exploration – 3 yrs ; First Additional – 3 yrs; Second Additional 2yrs; Total 8 years  
Production: 20 to 30 years, (typically at least 25 years)

Relinquishment - Exploration: 25% after 1<sup>st</sup> Phase, 25% of “original” area after 2<sup>nd</sup> Phase (Negotiable)

Exploration Obligations - Includes seismic data acquisition and drilling obligation with minimum expenditure (Negotiable)

Profit Oil Split - Based upon a *production-based* sliding scale system . Tranches are Negotiable

Cost Recovery Limit - It is *based on gross revenues* and its well within the *World Average - 65%* (Negotiable)

Training Fees – It is based *lump sum* amount payable annually during *exploration, development and production*

Surface Fees Rental - It is based on *per block size basis* and divided into *exploration, development and production* (Negotiable)

Taxation - Under the Kenya Model taxes are paid “*in lieu*” – “*for and on behalf of the Contractor*” out of the GoK share of profit.  
Corporate Income Tax in Kenya – 30% . *World average is between 30-35%*.

Depreciation It uses a *5 year Straight Line Depreciation* method for capital costs. The depreciation begins “*when production starts*”

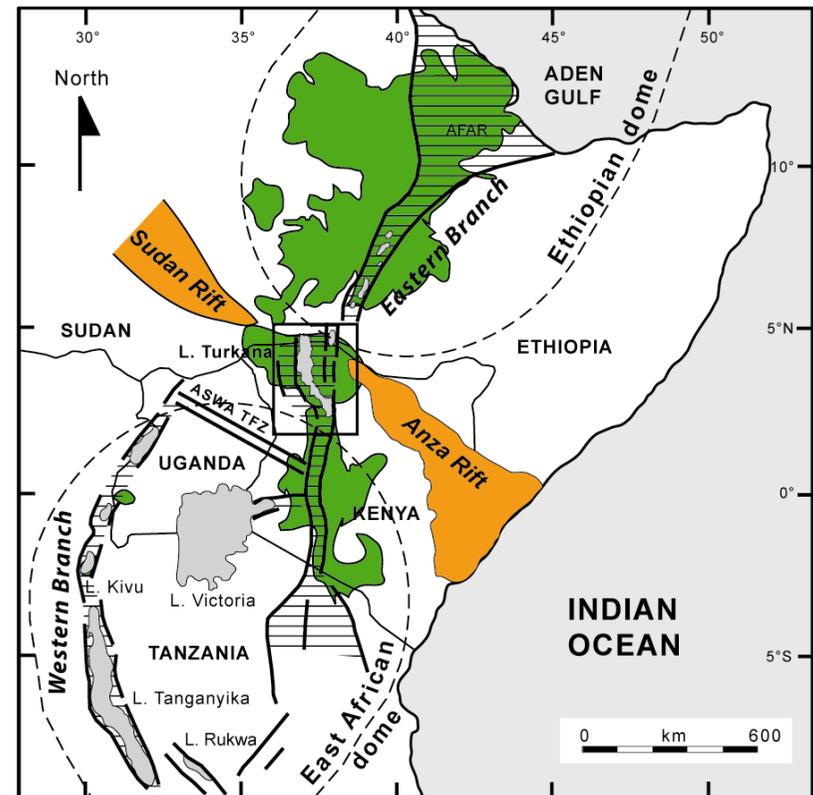
Ring fencing It does not allow costs from one block to be recovered from another

Gvt. Part - The Kenya Model PSC minimum participation of Min 10% . The GoK is carried through exploration. (Negotiable)



# SO IS THERE OIL IN KENYA?

- Positive indications in several of the 31 wells drilled to date e.g. Loperot-1, Sirius-1, Pate-1
- Discoveries in basins adjacent or similar to ours in the region
  - Uganda Western arm of Rift equivalent to our Tertiary Rift
  - Ethiopia Ogaden Basin which is part of our Mandera basin (Tarbaji oil seep)
  - Sudan southern rifts extensions of our Anza Basin
  - Tanzania coastal basins extend into our Lamu basin



**Only Time and Continued Intensified Exploration Effort Will Tell**



## WHY INVEST IN KENYA ?

- Large exploration . Blocks (Onshore/Offshore)
- Competitive commercial terms
- Consider Licensing round especially for vacant offshore blocks as well as new blocks from new spec data
- Acceptable balance of risk/reward.
- Previous exploration data readily available
- Low entry cost, no signature bonuses
- Award focuses on work programme
- Provides investor with growth opportunities
- Access to Ready Market for Oil & Gas in East Africa Region
- Attractive legal & fiscal regime
- Most clauses are open for negotiation
- Kenya is the hub to Eastern Africa & Gateway to most of Africa
- Friendly People, Great & Beautiful Country

