

Evaluation of Hydrocarbon Resource Base  
Licences OPL-321 & OPL-323  
Nigeria Deep Offshore  
Equator Exploration Limited

Prepared for:



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## Executive Summary

Equator Exploration Limited (“Equator”) has requested Horizon Energy Partners (“HEP”) to provide volumetric estimates for the hydrocarbon assets pertaining to the Nigerian Deep Offshore Licences OPL-321 and OPL-323 in which it has a 30% working interest (KNOC is Operator). The quantifications presented in this report have been summarised in terms of In-Place Volumes and Recoverable Volumes.

The exploration assets have as yet a very wide range of possible outcomes, and results are therefore presented in terms of Low, Best and High Estimates for success volumes. It is noted that an overall inter-dependency exists with respect to oil charge of these structures. Consequently, if oil is found in one Lead or Prospect, the chance of success for the other Leads and Prospects will increase considerably.

In terms of Initially-In-Place Oil Volumes, estimates are as follows:

Resource	Type	Equator Share	Unrisked (Success) In-Place Volumes						POS
			100% Field Volumes			Equator Volumes			
			Low	Best	High	Low	Best	High	
Elephant	Oil	30%	5300	8000	13400	1590	2400	4020	32%
Whale	Oil	30%	1900	3050	4200	570	915	1260	70%
Lobster	Oil	30%	700	950	1200	210	285	360	70%
Gorilla	Oil	30%	4300	7500	10800	1290	2250	3240	46%
Octopus	Oil	30%	865	1650	2430	260	495	729	40%

(all volumes in million stock tank barrels)

In terms of Recoverable Oil Volumes, estimates are as follows:

Resource	Type	Equator Share	Unrisked (Success) Recoverable Volumes						POS
			100% Field Volumes			Equator Volumes			
			Low	Best	High	Low	Best	High	
Elephant	Oil	30%	1855	2800	4690	557	840	1407	32%
Whale	Oil	30%	665	1068	1470	200	320	441	70%
Lobster	Oil	30%	245	333	420	74	100	126	70%
Gorilla	Oil	30%	1505	2625	3780	452	788	1134	46%
Octopus	Oil	30%	303	578	851	91	173	255	40%

(all volumes in million stock tank barrels)

June 7<sup>th</sup>, 2006



The quantification of potential Recoverable Resources is work still in progress, and therefore above numbers reflect HEP's best estimates at this moment in time. They may be subject to change as a result of maturing evaluation or new data becoming available.

All Hydrocarbon Resources in OPL-321 and OPL-323 are presently categorised as "Prospective Resources", using the SPE Petroleum Resources Classification System and Definitions.

Whilst this report represents HEP's best professional judgment as an Independent Consultant, its contents should not be considered a guarantee of results.

**Signed:**

A handwritten signature in black ink, appearing to read "S.P. Ottochian", written over a horizontal line.

S.P. Ottochian  
Senior Petroleum Consultant

A handwritten signature in black ink, appearing to read "A. Schouten Netten", written over a horizontal line.

A. Schouten Netten  
Exploration Manager

A handwritten signature in blue ink, appearing to read "S. Constant", written over a horizontal line.

S. Constant  
Director, Reserves Auditor

A handwritten signature in blue ink, appearing to read "E. van Kersbergen", written over a horizontal line.

E. van Kersbergen  
Managing Director



**Glossary:**

Bcf	billion standard cubic feet
CGR	condensate gas ratio
FPSO	Floating Production Storage and Offloading facility
HC	hydro-carbon(s)
MMscf	million standard cubic feet
MMstb	million stock tank barrels
NAG	non-associated gas, or free gas
N/G	net-to-gross reservoir ratio
POS	possibility of success (chance factor)
Risked Volumes	product of POS and Success Volumes
RF	recovery factor – percentage of recoverable HC's
scf	standard cubic foot (at 60 deg F, 14.696 psi)
stb	stock tank barrel (at 60 deg F, 14.696 psi)
Success Volumes	volumes in case a defined success case will materialise



## 1 Introduction

Equator Exploration Limited ("Equator") has requested Horizon Energy Partners ("HEP") to provide estimates of the hydrocarbon assets pertaining to the Nigerian Deep Offshore Licences OPL-321 and OPL-323 in which it has a working interest. In our statements the licence interests assumed are those presented to us by Equator, and HEP has not checked the title to these interests.

All interpretations and conclusions presented here are opinions based on inferences from geological, geophysical, engineering and analogue data. Seismic data sets have been provided to HEP by or through Equator. Whilst the report represents HEP's best professional judgment as an independent Consultant, its contents should not be considered a guarantee of results. It is emphasized that the exploration prospects have a very wide range of possible outcomes.

Each reviewed entity has been given a "Maturity" qualifier in order to illustrate where in the asset life-cycle of identification - evaluation - exploration - appraisal - development cycle it is currently situated. Un-drilled structures (Leads, Prospects) typically have a Very Low to Low maturity level, whereas proven accumulations have a maturity level ranging from Low to Medium to High, depending on the knowledge of the field, and the confidence that can be placed in calculation of recoverable volumes and formulation of a (notional) development plan.

## **2 Evaluations OPL-321**

### **2.1 Prospect Elephant**

#### **2.1.1. Status**

Exploration Prospect – 3D seismic fully mapped.

#### **2.1.2. Methodology**

Interpretation of 3D seismic data set to de-lineate the structure.

Gross Rock Volumes estimated from 3D seismic interpretations and mapping.

Reservoir and Fluid Properties estimated from deepwater analogues (Bosi Field).

N/G is varied to define low, mid, high cases, honouring observed spill point.

Recovery factors are estimated from deepwater analogues, accounting for anticipated reservoir type, fault density, etc.

Possibility Of Success (POS) largely expresses the perceived likelihood of the sealing capacity of the bounding fault.

#### **2.1.3. Maturity**

Low to Medium – can be drilled.

#### **2.1.4. Narrative**

The Elephant prospect is located in the Eastern part of OPL-321 in 2000-2100 m water depth, extending slightly into OPL-323. The structure is a large anticline, with a relatively small, steep crest and a large, gently sloping flank to the North-East. On its Southern edge the anticline is bounded by the large trans-current fault system transecting OPL-321 and OPL-323.

The Elephant prospect lies immediately northwest (70 km) and on trend with the Bosi field (Exxon operator) The Bosi field is widely believed to contain very large oil and gas reserves.

The large transcurrent fault separates the Bosi field from the Elephant structure and acts as a possible migration pathway for hydrocarbons from Late Cretaceous source rocks that are thought to be within the oil window in the area. The Bosi field and the Elephant prospect probably share the same hydrocarbon kitchen. Bosi has proven charge from the Cretaceous.

The source rock potential in the drainage area of the Elephant field is estimated at 25 Billion bbls.



OPL-321 is located down-slope from several large canyon systems, cutting the continental shelf. These canyons have fed sediment to channel complexes and basin-floor fans in the area of OPL-321 and OPL-323. The reservoir intervals in Elephant consist mainly of fan bodies that are very likely to be part of this system.

Similar units in the Bosi field, thought to be the distal parts of the same basin-floor fan system, have excellent reservoir properties. This implies that the Elephant Prospect could contain even thicker sand packages with higher net-to-gross reservoir ratio than the Bosi Field.

The potential Oil-In-Place volume is heavily dependent on the net-to-gross reservoir ratio. In the Best Estimate scenario, a net-to-gross ratio of 0.6 has been used, which is slightly more favourable than Bosi (0.5). This results in a Best Estimate un-risked Oil-In-Place volume of 8.0 billion stock tank barrels (Bstb). As a Low Case, a net-to-gross ratio of 0.4 is assumed, which is slightly less favourable than Bosi, resulting in a Low Case un-risked STOIP of 5.3 Bstb. As a High Case, a net-to-gross ratio of 1 is taken, resulting in an estimated 13.4 Bstb un-risked STOIP, representing the upside potential.

Using an overall Recovery Factor of 35%, a Best Estimate recoverable oil volume of 2.8 billion stb is calculated.

It is emphasized that the High Case (total) trap volume of 13.4 billion stb is considerably smaller than the potential generated oil volume of 25 billion barrels, making fully charged reservoirs a realistic possibility.

Seismic data indicate possible small gas caps in the crest of the structure.

The main risk of the prospect is the sealing capacity of the bounding fault. Historically strike slip faults develop good fault seal due to repeated movement. As further confidence, no seepage of hydrocarbons has been detected on seismic or on drop core data of the sea bottom. The overall chance factor, taking due account of perceived reservoir risk, seal risk and charge risk, is estimated at 32%. This is based on a perceived charge risk of 20%, and an assumed seal risk of 60%.

Volumes for this Prospect are categorised as "Prospective Resources".



## **3 Evaluations OPL-323**

### **3.1 Prospect Whale**

#### **3.1.1. Status**

Exploration Prospects – overall interpretation finalised, detailed interpretation in progress

#### **3.1.2. Methodology**

Exploratory interpretation of 3D seismic to de-lineate the structure (2005).

Gross Rock Volumes estimated from exploratory seismic interpretations.

Reservoir and Fluid Properties estimated from deepwater analogues.

Realistic low, mid and high cases defined for net sand presence in the identified trap.

Recovery factors are estimated from deepwater analogues.

Possibility Of Success (POS) estimated from systematic relative ranking in combination with deepwater analogues data.

#### **3.1.3. Maturity**

Low.

#### **3.1.4. Narrative**

Prospect Whale is located in the South-Western part of OPL-323, in water depths of 1900 to 2000 m. Whale consists of an anticlinal structure, with dip closure on all sides. The structure is cut by a large number of roughly northeast-southwest trending normal faults, which are likely to cause compartmentalisation. The faults are relatively small and do not extend to surface, and only constitute a limited retention risk. The reservoir units contain several stacked meandering channel complexes as well as fan bodies. Seismic data suggest the possibility of hydrocarbons. The prospect is considered to have a degree of inter-dependence with the Lobster prospect because both are situated on the same geological trend, and are in close aerial proximity.

Presence of reservoirs and access to hydrocarbon kitchen are similar to the Bosi field and Elephant prospect.

The Best Estimate Oil-In-Place volume of Whale is estimated at some 3 billion stb. The Low and High Estimate Oil-In-Place volumes are estimated at 1.9 and 4.2 billion stb respectively. Assuming a reasonable 35% recovery, this would result in recoverable oil volumes ranging from 0.7 to 1.5 billion stb. Such volumes would clearly be economic.

June 7<sup>th</sup>, 2006



The maximum trap volume is even substantially higher, providing significant upside.

The volumes presented here are categorised as "Prospective Resources". The chance factor of finding any oil volume (i.e. at zero cut-off) is estimated to be 70%.

## **3.2 Prospect Lobster**

### **3.2.1. Status**

Exploration Prospects – overall interpretation finalised, detailed interpretation in progress

### **3.2.2. Methodology**

Exploratory interpretation of 3D seismic to de-lineate the structure (2005).

Gross Rock Volumes estimated from exploratory seismic interpretations.

Reservoir and Fluid Properties estimated from deepwater analogues.

Realistic low, mid and high cases defined for net sand presence in the identified trap.

Recovery factors are estimated from deepwater analogues.

Possibility Of Success (POS) estimated from systematic relative ranking in combination with deepwater analogues data.

### **3.2.3. Maturity**

Low.

### **3.2.4. Narrative**

Prospect Lobster is located in the South-Western part of OPL-323, in water depths of 1850 to 1950 m. The prospect is very similar to the Whale prospect and is considered to have a degree of inter-dependence with Whale because both are situated on the same geological trend, and are in close aerial proximity. Like Whale, Lobster consists of an anticlinal structure, with dip closure on all sides. The structural relief of Lobster is lower than that of Whale. Lobster is also cut by a number of roughly northeast-southwest trending normal faults, which may cause compartmentalisation. The faults are relatively small and do not extend to surface, and only constitute a limited retention risk. The reservoir units contain several stacked meandering channel complexes as well as fan bodies. Seismic data suggest the possibility of hydrocarbons.

Presence of reservoirs and access to hydrocarbon kitchen are similar to the Bosi field and Elephant prospect.

The Best Estimate Oil-In-Place volume of Lobster is estimated at some 0.95 billion stb, with a likely Oil-In-Place range of 0.7 - 1.2 billion stb. Assuming a reasonable 35% Recovery Factor, this would result in recoverable oil volumes of 0.24 - 0.42 billion stb, which, as a satellite to Whale, would be economic. The maximum trap volume is even substantially higher, providing significant upside.

The volumes presented here are categorised as “Prospective Resources”.

The chance factor of finding any oil volume (i.e. at zero cut-off) is estimated to be 70%.

### **3.3 Prospect Gorilla**

#### **3.3.1. Status**

Exploration prospect – overall interpretation finalised, detailed interpretation pending

#### **3.3.2. Methodology**

Exploratory interpretation of 3D seismic to de-lineate the structure (2005).

Gross Rock Volumes estimated from exploratory seismic interpretations.

Reservoir and Fluid Properties estimated from deepwater analogues.

Recovery factors are estimated from deepwater analogues.

Possibility Of Success (POS) estimated from systematic relative ranking in combination with deepwater analogues data.

#### **3.3.3. Maturity**

Very Low.

#### **3.3.4. Narrative**

Prospect Gorilla is located at the Eastern extreme of block OPL 323, in 1000 to 1300 m deep water. It is a large (41 sq km) hanging wall structure with some rollover component. The hanging wall fault closure is the major trapping element, juxtaposing reservoirs against Akata shale. Charge is from kitchens to the South-West and West, and the Akata shale across the fault.

Retention is at risk from a recently active boundary fault seen to intersect sea bottom. The risk may be mitigated by the thickness of the overburden. The reservoir units consist of several massive meandering turbidite channel belts. Within the turbidite channel belts, flat spots are observed, which are interpreted as DHI's (Direct Hydrocarbon Indicators), notwithstanding their somewhat scattered appearance. The scattered appearance is attributed to the interference of the flat events with the internal channel belt geometry.

The Best Estimate Oil-In-Place volume is calculated as 7.5 billion stb, as a mid-point in the likely range of 4.3 – 10.8 billion stb. Combined with a reasonable Recovery Factor of 35% this would result in a recoverable oil resource of 2.6 billion stb.

This volume is categorised as "Prospective Resources".

The overall chance factor (Possibility of Success) is estimated as 46% based on analogues. Charge risk is perceived to be relatively low at 20%, whilst seal risk is assumed to be 40%. Risk of encountering no reservoir is considered very low at 5%.

### **3.4 Prospect Octopus**

#### **3.4.1. Status**

Exploration prospect - overall interpretation finalised, detailed interpretation pending

#### **3.4.2. Methodology**

Exploratory interpretation of 3D seismic to de-lineate the structure (2005).

Gross Rock Volumes estimated from exploratory seismic interpretations and analogues as encountered in the Niger Delta.

Reservoir and Fluid Properties estimated from deepwater analogues.

Realistic low, mid and high cases defined for net sand presence in the identified trap.

Recovery factors are estimated from deepwater analogues.

Possibility Of Success (POS) estimated from systematic relative ranking in combination with deepwater analogues data.

#### **3.4.3. Maturity**

Very Low.

#### **3.4.4. Narrative**

The Octopus prospect is located in the Eastern part of OPL-323, in water depths of about 1000 m. Octopus consists of several smaller footwall structures. This type of structure is proven to be very prospective in the Niger Delta containing typical In-Place-Volumes of 200-400 MMstb.

The major throw of the faults is at deeper levels where good sand to shale juxtaposition is expected. The reservoir units contain several stacked meandering channel complexes as well as fan bodies. All structures are considered to have a degree of inter-dependence because they share the same reservoirs, access to source rocks and dependency on the sealing of the footwall faults.

The Best Estimate for the un-risked Oil-In-Place volume is circa 1650 MMstb. Assuming 35% recovery, this would result in a recoverable oil volume of 578 MMstb.

This volume is categorised as "Prospective Resources".

The maximum trap volume is considered to be in the order of 2.5 billion stb.

The overall chance factor of finding oil is estimated to be circa 40%, with charge risk and seal risk of comparable magnitude.

# EQUATOR INTERESTS





