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CORPORATION

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## Our Business - E & P Operations

### History

Ghana has four sedimentary basins. These are the Cote d'Ivoire-Tano Basin (including Cape Three Points Sub-basin), the Saltpond Basin, the Accra/Keta Basin and the Inland Voltaian Basin. The offshore basins cover about 60,000 km<sup>2</sup> (0-3500m water depth) extending from the Cote d'Ivoire-Ghana maritime border in the west to the Ghana-Togo maritime border in the east. The onshore/coastal expressions of the Tano and Keta basins, respectively, located at the south-western and south-eastern corner of Ghana, have a total size of about 4,000 sq. km. The Inland Voltaian basin is the largest sedimentary basin in Ghana. It occupies the central-eastern part of Ghana. It is about 103,600 sq. km in size. The Sedimentary basins are divided into quadrants of size one degree by one degree, equivalent to about 12,000 sq. km. Each quadrant is further divided into eighteen (18) blocks with each block size equal to about 690 sq. km.

Exploration for hydrocarbons in Ghana started in 1896, when oil seepages were sighted onshore in the Western Region. This was due to the presence of onshore oil seepages found by early explorers in that area. Between 1896 and 1957, twenty-one (21) shallow exploration wells (wildcats) were drilled. Most of these shallow wells encountered hydrocarbon in shallow horizons. It is important to note that exploration activities within this period, was purely wildcatting/chasing seepage. Ghana was not left behind when global activities moved offshore. The first offshore well was drilled in the Saltpond Basin in 1970. The success of that well led to increased interest, offshore Ghana. Subsequently, more acreage were awarded and exploration activities intensified in the 1970s mainly in the Tano-Cape Three Points and Saltpond basins.

The Tano basin also recorded its first offshore exploratory success in 1970 with the Volta Tano well and subsequently the North Tano field.

The first and only exploratory well in the Voltaian basin was drilled in 1974 by Shell, following the acquisition of a 206-line kilometer 2D seismic data at the southern part of the basin. Oil and gas production in the Saltpond Field started in 1978 and peaked at 4,500 bopd. The first deep water well, the South Dixcove -1X was drilled in 1978 by Phillips Petroleum, offshore Cape Three Points.

Commercial production started in the late 70's in the offshore Saltpond area in the Central basin of Ghana. In December 2010 first oil was produced from the J1 field, which was discovered in 2007.

### DISCOVERIES

#### MAHOGANY-1

The Mahogany-1 well was discovered on 18th June 2007 in the West Cape Three Points(WCTP) license area of Ghana. The well was drilled with the *Belford Dolphin* drillship to a total depth of 3,683m in a water depth of 1320m.

The *Mahogany-1* well targeted the Santonian turbidite stratigraphic trap that opens a new play fairway in the Tano Basin. It encountered a gross hydrocarbon column of 270m with 85m net pay stack.

#### HYEDUA-1

In August 2007, Tullow Oil Plc using the *Belford Dolphin* drillship made a discovery upon drilling the *Hyedua-1* well in the Deep-water Tano license area offshore.

discovered significant light oil. Based on the initial data from the well it was believed then that the *Hyedua-1* and *Mahogany-1* wells were likely representing a continuous trap extending across the West Cape Three Points and Deep-waterTano Blocks.

The *Hyedua-1* well was drilled as the initial exploration well on the Deep-waterTano license. It targeted the equivalent Santonian turbidite sandstones encountered in the Mahogany-1 Discovery, located approximately 5.3 km to the northeast of Hyedua-1 well.

The *Hyedua-1* well encountered a gross reservoir interval of 202m with 108m of high quality stack of reservoir sandstones and a net hydrocarbon-bearing pay interval. This well was drilled to a total depth (TD) of 4,002m in a water depth of 1,530m.

#### EBONY-1

The *Ebony-1* well was spudded on 22nd October, 2008 and reached a total depth of 2,640m in a water depth of 86m using the *West Ceres* semi-submersible. It encountered a pay of a four meters oil bearing interval at 2053m and a two meter high-pressure gas condensate interval at 2,570m.

#### ODUM-1

*Odum-1* is the second exploratory well drilled in West Cape Three Points license area offshore Ghana. It was drilled to a total depth of 3,391m in a water depth under the operatorship of Kosmos Energy, using the *Songa Saturn* drillship. It encountered a gross oil column of 60m and a net pay of 22m of 29 degrees API oil.

#### TWENEBOA-1

The *Tweneboa-1* well, was drilled in March 2008, by Tullow Oil Plc, using the *EirikRaude* semi-submersible rig, in the Deep-waterTano block, depth of 1,148m. It was drilled to a total depth of 3,593m and encountered a 21m net pay. The well was optimally located to penetrate multiple targets, including the edge of an undrilled major Turonian fan system.

#### DAHOMA-1

The *Dahoma-1* well is 11 km to the south of *Mahogany-3* in the West Cape Three points license area. It was to explore the down-dip satellite prospect within the southeast Jubilee area. It encountered a 30m good quality sandstone reservoir below a possible oil-water contact, and some indication of oil migration pointed potential for oil trapped up-dip.

The Atwood Hunter rig was used in the drilling of the *Dahoma-1* well to a total depth of 4390 m in a water depth of 1564m. The well was spudded on the 8th of 2010 under the operatorship of Kosmos Energy, Ghana.

#### OWO-1

The *Owo-1* discovery was made in July 2010 by Tullow oil Plc as it explored in the Deep-waterTano license area offshore Ghana. The well is 6km to the west of the *Tweneboa-1* well. It encountered a gross vertical reservoir interval of 154m with total net pay of 53m found in two zones of high quality stacked reservoir sand. Initial test indicated that these zones were of the same accumulation and samples showed that it was a light oil of between 33 and 36 degrees API.

The *Sedco-702* semi-submersible was used in the drilling of the *Owo-1* well in a water depth of 1,428m to a total depth of 3,891m.

#### TEAK-1

The *Teak-1* well was drilled under the operatorship of Tullow oil Plc in the West Cape Three Points license area in a water depth of 868m to a total depth of 3,110m. It discovered approximately 73m of hydrocarbons in two Campanian and three Turonian-aged reservoir. The well was drilled with the *Atwood Hunter* semi-submersible. A six (6) metre oil pay was found in the upper zone and 33m of gas pay with an underlying 15m of 40 degrees API oil leg in the lower zone. In the deeper stratigraphic Turonian-aged reservoirs, the well intersected 14m of gas-condensate pay in two separate zones and 5m of 32 degrees API oil pay in a deeper level.

#### MAHOGANY DEEP-2

The *Mahogany Deep-2* well was drilled about 2 km to the west of the *Mahogany-3* appraisal well to appraise the down-dip extent of oil pools found in Mahogany. It was drilled by Kosmos on the West Cape Three Points license with the *Aban Abraham* drillship in a water depth of 1,354m and a total depth of 2,150m. It was the furthest down-dip appraisal well drilled by Kosmos on the West Cape Three Points license as of that time.

The well encountered a 15m pay of high quality sandstones, which appeared to be in static pressure communication with the reservoir of similar geological age penetrated in the Mahogany appraisal wells. It also intersected 20m of high quality water-bearing reservoir.

#### SANKOFA-1A

Vitol Upstream Ghana, in partnership with GNPC and Eni, operated the *Sankofa-1* well in the Offshore Cape Three Points block in a water depth of 866 m. The well was drilled to a total depth of 3,702m using the *Blackford Dolphin* semi-submersible rig. It encountered high-quality reservoir sands containing 36.3 m (net) of oil and 33.1 m of gas and a 3.2 metre column of oil). The success of this well confirmed the prospectivity of the Upper Cretaceous reservoir sands in the Tano/Cape Three Points Basin. This discovery was made in September 2009.

#### SANKOFA EAST-1X

In January 2013, EniSpA successfully drilled the *Sankofa East-1* well in the Offshore Cape Three Points block. It was drilled with the *Transocean Marianas* semi-submersible rig in a water depth of 990 m to a total depth of 4,050 m. The well encountered 23m of gas and condensate with a net pay of 17m and a 76m of gas (32 m net) in the Cretaceous.

#### GYE NYAME-1

The *Gye-Nyame-1* well was drilled in the Offshore Cape Three Points block 50km off the coast of Ghana. It was drilled under the Operatorship of Eni Ghana. It was drilled to a total depth of 3,702m using the *Sankofa* discovery. The well was drilled in a 519m water column to a total depth of 3,349 m.

The *GyeNyame -1* gas and condensate were in a lower Campanian reservoir, where both fluids and reservoir rock were very similar in composition to those at the *Sankofa*. The secondary Albion target for the well was dry and marked by formations of low porosity and permeability. The well also encountered 15m of net sands in the Cenomanian formation, which was mainly water bearing.

#### DZATA-1

The *Dzata-1* well was spudded on the 12th of May 2011 under the operatorship of Lukoil in the Cape Three Points water block offshore Ghana. The well was drilled to a total depth of 4,500 m from sea level using the *Transocean Marianas* semi-submersible. It encountered a 94 metre-thick hydrocarbon column containing 25m of oil and gas pay. The primary reservoir contains light oil and gas.

#### HESS GHANA DISCOVERIES

Hess Corporation in its exploration campaign has drilled seven exploration wells as of January 2014 in the Deep-waterTano/Cape Three Points block offshore Ghana. The wells are namely Paradise-1, Hickory North-1, Beech-1, Almond-1, Pecan-1, Cob-1 and Pecan North-1.

WELL NAME	RIG	WATER DEPTH	TOTAL DEPTH	NET PAY	HYDROCARBON TYPE
PARADISE-1	Stena DrillMax	1841m	4,737m	126m	Oil & Condensate
HICKORY NORTH-1	Stena DrillMax	1968m	5,736m	30m	Gas Condensate
BEECH-1	Stena DrillMax	1714m	4,574m	45m	Oil

7/4/2016

## Ghana National Petroleum Corporation

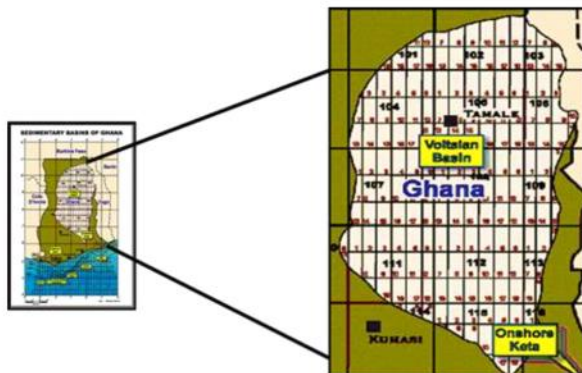
ALMOND-1	Stena DrillMax	2210m	4,859m	53ft	Oil
PECAN-1	Stena DrillMax	2513m	4,630m	16m	Oil
COB-1	Stena DrillMax	1929m	4,480m	9.4m	Oil
PECAN-NORTH 1	Stena DrillMax	2260m	4,518m	12m	Oil

## PROJECTS

### THE VOLTAIAN BASIN PROJECT (VBP)

The Voltaian Basin is Ghana's inland sedimentary basin, spanning an area of approximately 103,600 sq. km. (constituting almost 40% of Ghana's land mass). GNPC is pioneering exploration activities in the basin under a 5-year initial exploration programme from 2015 – 2019, called The Voltaian Basin Project (VBP). The programme will cover 2D seismic data acquisition and processing, environmental impact assessment, community relations management and drilling of two core wells. The main project objective is to establish prospectivity and enhance knowledge base on the Voltaianbasin. The VBP is GNPC's flagship project, to build capacity, increase local content participation, and open up a frontier area to expand exploration activities. The Corporation seeks to exert significant impact on the Ghana petroleum industry.

The VBP is borne out of GNPC's renewed drive for commercial operatorship of its oil and gas assets, coupled with a strong national desire for Ghanaians to maximise and retain maximum benefits from our own petroleum resources. Once an existing petroleum system is confirmed, full blown exploration will be started with the aim of increasing the hydrocarbon reserve base of the country.



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