LOCATION: The block lies within the Abu Gharadig basin and its basined margin area. It is surrounded by Shell, Apache, General Petroleum Co., Nafto Gas and HBSI concessions and fields.
**SOUTH ALAM EL SHAWISH BLOCK**

**2D & 3D SEISMIC COVERAGE**

**AREA**: 1591.5 km²

**WELLS**: 23 Wells

**PREVIOUS CONCESSIONNAIRS:**

SHELL, NAFTO GAS, VEGAS and GPC Company.

**SEISMIC SURVEYS**:

- **2D seismic** (4964 Km)
- **3D seismic** (2110 km²)

<table>
<thead>
<tr>
<th>Survey Name</th>
<th>SHELL AESW 06 Reprocessing</th>
<th>NAFTO GAS WD 2008</th>
<th>VEGAS AESW 06</th>
<th>GPC Abu Sannan 02</th>
<th>E. Alam El Shawish 2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coverage</td>
<td>466 km²</td>
<td>584 km²</td>
<td>479 km²</td>
<td>325km²</td>
<td>256 km²</td>
</tr>
<tr>
<td>Operator</td>
<td>SHELL</td>
<td>NAFTO GAS</td>
<td>SHELL</td>
<td>GPC</td>
<td>NAFTO GAS</td>
</tr>
<tr>
<td>Processing Center/Year</td>
<td>2013</td>
<td>PGS</td>
<td></td>
<td>Western Geco</td>
<td>PGS/ 2010</td>
</tr>
</tbody>
</table>
SOUTH ALAM EL SHAWISH BLOCK

2D SEISMIC (4994 Km)
SOUTH ALAM EL SHAWISH BLOCK
3D SEISMIC (2110 Km²)

3D VEGAS AESW06 = 479 km²
3D Shell AESW06 Reprocessing = 466 km²
3D GPC Abu Sennan 2002 = 325 km²
3D NAFTO E.Alam El Shawish 2008 = 584 km²
3D NAFTO E.Alam El Shawish 2010 = 256 km²
NEARBY FIELDS:

- WD 30 field for Apache Company.
- Abu Sennan field for General Petroleum Company.
- Alam El Shawish East field for Nafto Gas Company.
<table>
<thead>
<tr>
<th>NO.</th>
<th>WELL NAME / NEW NAME</th>
<th>COMPANY</th>
<th>SPUD. DATE COMP. DATE</th>
<th>LAT. LONG.</th>
<th>T. D. FEET</th>
<th>FORMATION REACHED</th>
<th>FINAL STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>AESW-F1-A</td>
<td>SHELL</td>
<td>04/05/2012 24/09/2012</td>
<td>29° 43’ 11.7” 28° 08’ 26.1”</td>
<td>14,318</td>
<td>AR / G</td>
<td>P&amp;A Traces of Oil, no flow</td>
</tr>
<tr>
<td>2</td>
<td>AESW- C87-1</td>
<td>SHELL</td>
<td>23/07/2012 29/08/2012</td>
<td>29° 39’ 15.8” 28° 11’ 16.82”</td>
<td>13,413</td>
<td>KHARITA</td>
<td>T&amp;A</td>
</tr>
<tr>
<td>3</td>
<td>NHG-2/1 &amp; ST1</td>
<td>NAFTO GAZ</td>
<td>29/11/2011 24/04/2012</td>
<td>29° 44’ 46.1” 28° 19’ 13.5”</td>
<td>17,395</td>
<td>KHARITA</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>4</td>
<td>WAES C1-1 HI 32-6</td>
<td>SHELL</td>
<td>29/07/2011 14/08/2011</td>
<td>29° 33’ 45.8” 28° 10’ 59.5”</td>
<td>09,050</td>
<td>AEB</td>
<td>SUSPENDED Oil producer in AR/G</td>
</tr>
<tr>
<td>5</td>
<td>SHG 1/1</td>
<td>NAFTO GAZ</td>
<td>19/01/2011 03/03/2011</td>
<td>29° 35’ 39.1” 28° 23’ 17.1”</td>
<td>10,663</td>
<td>KHARITA</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>6</td>
<td>KARIMA-4X</td>
<td>NAFTO GAZ</td>
<td>12/01/2011 09/02/2011</td>
<td>29° 31’ 31.5” 28° 24’ 31.0”</td>
<td>06,562</td>
<td>AR / G</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>7</td>
<td>KARIMA SW-1X</td>
<td>NAFTO GAZ</td>
<td>24/11/2010 25/12/2010</td>
<td>29° 30’ 20.8” 28° 25’ 52.4”</td>
<td>07,730</td>
<td>KHARITA</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>8</td>
<td>TAMMAM 2X</td>
<td>NAFTO GAZ</td>
<td>25/10/2010 11/11/2010</td>
<td>29° 29’ 1.64” 28° 25’ 49.94”</td>
<td>6,234</td>
<td>ABU ROASH/E</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>9</td>
<td>WAES C2-1 HF 31-7</td>
<td>SHELL</td>
<td>10/08/2010 02/10/2010</td>
<td>29° 33’ 59.2” 28° 05’ 06.8”</td>
<td>13,419</td>
<td>AEB</td>
<td>SUSPENDED Gas Discovery AEB Fm.</td>
</tr>
<tr>
<td>10</td>
<td>WHG-3/1</td>
<td>NAFTO GAZ</td>
<td>22/06/2010 14/10/2010</td>
<td>29° 36’ 38.9” 28° 16’ 21.7”</td>
<td>11,975</td>
<td>KHARITA</td>
<td>P&amp;A Oil shows in AR/G&amp;Bahariya</td>
</tr>
<tr>
<td>11</td>
<td>MOSAAD-IX</td>
<td>NAFTO GAZ</td>
<td>26/08/2009 10/10/2009</td>
<td>29° 28’ 30.9” 28° 23’ 02.7”</td>
<td>08,859</td>
<td>AEB</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>12</td>
<td>HEND-IX</td>
<td>NAFTO GAZ</td>
<td>19/07/2009 03/09/2009</td>
<td>29° 29’ 31.7” 28° 19’ 17.6”</td>
<td>08,695</td>
<td>AEB</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>NO.</td>
<td>WELL NAME / NEW NAME</td>
<td>COMPANY</td>
<td>SPUD. DATE COMP. DATE</td>
<td>LAT. LONG.</td>
<td>T. D. FEET</td>
<td>FORMATION REACHED</td>
<td>FINAL STATUS</td>
</tr>
<tr>
<td>-----</td>
<td>----------------------</td>
<td>-----------</td>
<td>-----------------------</td>
<td>---------------------</td>
<td>-----------</td>
<td>--------------------</td>
<td>-----------------------------------</td>
</tr>
<tr>
<td>13</td>
<td>AL NAJM-1</td>
<td>VEGAS</td>
<td>21/04/2008 20/08/2008</td>
<td>29° 32' 07.8&quot; 28° 09' 00.2&quot;</td>
<td>11,679</td>
<td>BAHARIYA</td>
<td>T&amp;A, AR/G; 2 MMSCFPD, 30BPD cond.</td>
</tr>
<tr>
<td>14</td>
<td>AL WAAD HF 32-8</td>
<td>VEGAS</td>
<td>20/07/2007 05/11/2007</td>
<td>29° 30' 05.2&quot; 28° 10' 49.5&quot;</td>
<td>15,990</td>
<td>PRE - RAS QATTARA</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>15</td>
<td>AL BASHAYER -1 HF 31-2</td>
<td>VEGAS</td>
<td>17/06/2007 26/09/2007</td>
<td>29° 31' 16.9&quot; 28° 01' 50.9&quot;</td>
<td>15,244</td>
<td>BASEMENT</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>16</td>
<td>BAHGA -2 HG 32-2</td>
<td>VEGAS</td>
<td>18/05/2007 08/07/2007</td>
<td>29° 38' 08.1&quot; 28° 08' 13.3&quot;</td>
<td>10,800</td>
<td>MIDDLE BAHARIYA</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>17</td>
<td>GPHH -1 HF 32-5</td>
<td>GPC</td>
<td>14/11/1983 17/02/1984</td>
<td>29° 34' 58.9&quot; 28° 09' 50.1&quot;</td>
<td>10,850</td>
<td>KHALITA</td>
<td>P &amp; A</td>
</tr>
<tr>
<td>18</td>
<td>GPJ-2</td>
<td>GPC</td>
<td>19/10/1983 05/12/1983</td>
<td>29° 32' 01.0&quot; 28° 07' 36.7&quot;</td>
<td>07,218</td>
<td>KHALITA</td>
<td>P&amp;A</td>
</tr>
<tr>
<td>19</td>
<td>GPJJ -1 HF 32-4</td>
<td>GPC</td>
<td>03/08/1983 10/11/1983</td>
<td>29° 33' 22.5&quot; 28° 08' 42.6&quot;</td>
<td>07,205</td>
<td>KHALITA</td>
<td>P &amp; A</td>
</tr>
<tr>
<td>20</td>
<td>GPJ -1 HF 32-3</td>
<td>GPC</td>
<td>19/07/1983 24/08/1983</td>
<td>29° 32' 08.8&quot; 28° 08' 58.4&quot;</td>
<td>07,084</td>
<td>KHALITA</td>
<td>T&amp;A Tested Gas &amp; Cond. from Bah. &amp;AR/G</td>
</tr>
<tr>
<td>21</td>
<td>GPL –1 HF 33-1</td>
<td>GPC</td>
<td>25/08/1982 02/12/1982</td>
<td>29° 35' 30.6&quot; 28° 14' 42.2&quot;</td>
<td>11,473</td>
<td>KHALITA</td>
<td>P &amp; A</td>
</tr>
<tr>
<td>22</td>
<td>BRE 23-2 HF 32-1</td>
<td>BRASPETRO</td>
<td>10/10/1975 30/11/1975</td>
<td>29° 32' 06.0&quot; 28° 09' 30.0&quot;</td>
<td>08,682</td>
<td>ALAMEIN</td>
<td>T&amp;A Gas producer, Bahariya Fm</td>
</tr>
<tr>
<td>23</td>
<td>BRE 23-1 HF 31-1</td>
<td>BRASPETRO</td>
<td>27/02/1975 18/09/1975</td>
<td>29° 33' 30.0&quot; 28° 05' 30.0&quot;</td>
<td>08,701</td>
<td>CENOMANIAN</td>
<td>P &amp; A</td>
</tr>
</tbody>
</table>
**STRATIGRAPHY:**

- The block has a stratigraphic sequence ranging in age from Paleozoic to Recent.
- Thicker Mesozoic sequence has all the hydrocarbon elements.

**SOURCE:**

- Abu Roash “F”, “G” and “E” Members are oil-prone.
- Jurassic Khatatba Formation is a gas-prone.

**RESERVOIRS:**

The main producing reservoirs in the area are:

- AR "E" & 'C' sandstones of upper Cretaceous.
- Bahariya & Kharita sandstones of Lower Cret.

**SEALS:**

- Khoman limestone.
- Abu Roash limestone and shale succession.
- Bahariya shales and Alamein dolomite.
The DST's in BRE 23-2 well indicates a potential production capacity of 15 MMCFD of gas with a small percentage of condensate, the well was temporary plugged as a potential gas producer from the interval 1901-1909 m in Bahariya Fm.
The structure is valid and well controlled.

Mature AR/F oil areas and clear migration routes to the prospect.
The target of this Well was to test A/R "G" Reservoir.

The Well found around 3 m H.C. in Lower A/R "G" Sands.

The Production Test 1600 bbl/d. with high GOR.
WAES C2-1 Well (Gas Discovery)
Alam El Buieb reservoirs are postulated to be gas/condensate bearing, sourced from the Khatatba gas-mature kitchen. WAES C2 Prospect has an estimated mean recoverable volume of 101 BCF gas and 4.6 MMbbls of oil and condensate from AEB Fm.
The interpretation of the seismic line in a part of the eastern portion of the block indicated a promising lead.
(7) South Alam El Shawish Block

Introduction

From the geological point of view most of the block is located within the Abu Gharadig basin and its basined margin area, which is part of the southern province sedimentary basins of the north Western Desert while all criteria for hydrocarbon accumulation exist.

South Alam El Shawish block is situated in the vicinity of well-established oil/gas production transportation facilities connecting the block and its environs to the national oil/gas pipe line system of the country.

Shell, Naftogaz, Vegas, General Petroleum Company and Braspetro oil Companies were acquired parts of the study block in Alam El Shawish east, Alam El Shawish west and SW Abu El Gharadig discovering many fields.

The block covers an area of about 1591.5 km$^2$ and has 4964 km 2D seismic lines, 2110 Km$^2$ 3D seismic and 23 wells.

Hydrocarbon Potential:

Source Rocks: on the basis of the analysis results, three main source rock types could be distinguished.

The first source rock type is oil prone and is represented by Abu Roash "F"&"G" sections. These rocks have high to very high organic contents (TOC 1.2-4.5%) and generally good to excellent hydrocarbon generating potential (pyrolysis S2 yields mostly >8.00 mg/g). The high hydrogen index values (HI mostly >500) are indicative of good quality kerogen capable of generating mainly oil, where mature.

The second source rock type is mixed oil/gas- prone and encountered in the Abu Roash "F" & E and Bahariya Formation. These rocks have average to very high organic contents (TOC 0.78-2.55%) and fair to good potential for oil and gas generation.
The third source rock type is gas-prone and encountered within the Bahariya and Khatatba formations. These rocks have high organic contents (TOC 1.06-1.75%) and generally fair potential for mainly gas generation.

**Reservoirs:** - AR "E" & 'C" sandstones, Bahariya sandstone, Kharita sandstone, also sandstone beds of AR "G" & "A" Mb.

**Seals:**

Khoman limestone is considered as a good vertical seal for upper part of Abu Roash sandstones.

The AR"C" shale is considered as a good vertical seal for its sandstones.

The Abu Roash "D" shale and tight Limestone are considered as a good vertical seal for its Limestone reservoir.

The Abu Roash "E" and "G" shale and tight limestone are also considered as a good vertical seal for their sandstones.

The Bahariya shale is also considered as a good vertical seal for the Bahariya sandstones.

The Alamein dolomites could be a vertical seal for lower Alam El Bueib sandstones.

**Summary of the Wells:**

**AESW ARF/ST well (2012)**

It was the first well to test the unconventional Abu Roash/F Light Tight Oil Play in Egypt.

Objective is to prove moveable hydrocarbons in the AR/F outside any structural closure

The well reached a total depth 14318 ft in Abu Roash/G Formation and encountered Hydrocarbon bearing zone.

The testing performed in the Abu Roash/F Formation recovered traces of oil but no flow, so, the well plugged and abandoned as a dry hole.
NHG 2/1 well (2012)

From the drilling results and petrophysical analysis the well does not prove any hydrocarbon encouraging zones within Abu Roash, Bahariya and Kharita formations. The well was plugged with depth 17.395 ft. at Kharita Formation.

WAES Cl-1 well (2011)

The well is located on the southern terrace of the southern main Abu Gharadig basin boundary fault. It is 10 km east of WAES-C2-1 hydrocarbon discovery, 4 km SE of the GPH-1 and Bahga-SE oil discovery, 5 km North East of the Najm-1 (GPJ-1 deepening) gas condensate discovery at AR-F and AR-G2 levels. Thus it lies at the edge of an area of proven moveable hydrocarbons.

The WAES C1-1 primary target is Abu Roash/G reservoir interval below Abu Roash/F seismic marker. Abu Roash/G one of the main producing interval in many of the offset producing fields in AESW block like Bahga and Al Magd Oil Fields. The secondary target is the Alam El Bueib Formation below the Alamein Dolomite Marker.

WAES Cl Abu Roash G reservoirs are postulated to be Oil bearing, sourced from the Abu Roash/F oil-mature in the kitchen to the north of the prospect, from which clear migration routes from AR/F Active kitchen area to the prospect support the oil case.

WAES Cl secondary objective Alam El Bueib reservoirs are postulated to be gas/condensate bearing, sourced from the deeper Khatatba gas-mature kitchen to the north across the Main Bounding Fault and from the kitchen to the west of 2010 WAES C2-1 discovery, which found hydrocarbons in the Upper Alam El Bueib Formation.

The well reached a total depth of 9.050 ft. in AEB Fm and found hydrocarbon in AR/G sand, the production test was 1600 bbl/d with high GOR, so; it suspended as oil producer.
**SHG 1/1 well (2011)**

The well is recommended to enable studying oil and gas potentials of Abu Roash and Bahariya formations in the area. It is recommended to drill the well to depth 10.827 ft. and bottomed in Kharita Formation.

The well reached a total depth of 10.663 ft. in Kharita Formation without encouraged oil & gas shows, so, it plugged & abandoned as a dry hole.

**Karima-4X well (2011)**

Karima-4X well was penetrated normal stratigraphic sequence down to Abu Roash Formation, and bottomed at depth 6562 ft and encountered hydrocarbon bearing zones.

The hydrocarbon shows, log interpretation, petrophysical analysis of Karima-4X well haven’t revealed the existence of hydrocarbon accumulation in permeable zones within Abu Roash Formation.

The well was not tested and abandoned without running liner.

**WHG -3/1 well (2010)**

The well is located in the south western direction in the distance of 4.3 km. from WHG-2/1 well and 5.6 km. from WHG-1/1 well in the south western direction. The two neighbor wells are producing from Abu Roash "G" and Bahariya formations.

The well is recommended to study the oil and gas bearing potential of Abu Roash and Bahariya formations. It was penetrated normal stratigraphic sequence and bottomed at Kharita Formation at depth 11.975 ft.

The log interpretation and petrophysical analysis of the well have revealed the existence of the hydrocarbon accumulation in permeable zones within Abu Roash and Bahariya formations. Based on this petrophysical analysis, good results from drilling (oil and gas shows) the well was recommended to be test in Bahariya Formation.

The DST performed in the Bahariya Formation recovered salt water, so; the well plugged and abandoned as a dry hole.
**WAES C2-1 well (2010)**

The WAES- C2 prospect is a Top Alamein four-way closure in the hanging wall of the southern AG basin boundary fault that is bounded by a north dipping fault to its north, that converges with the boundary fault to the east, forming a nose at the Alamein Dolomite level. WAES C2 Alam El Buieb reservoirs are postulated to be gas/condensate bearing, sourced from the Khatatba gas-mature kitchen below it and from the deeper basin to the north. WAES C2 Prospect has an estimated mean recoverable volume of 101 BCF gas and 4.6 MMbbls of condensate from the combined Upper and Lower Alam El Buieb objectives.

**Mosaad-1X well (2009)**

The well was drilled to explore hydrocarbon potentiality of any permeable zone in Cretaceous sediments.

The well penetrated Abu Roash, Bahariya and Kharita formations in the horst block (Mosaad block). The main negative factor of the delineated structure is the young age (it is Eocene-Oligocene age), the amplitude of the displacement of the Apollonia Fm.is 50 m., it could be the reason of destruction of structural traps.

The log interpretation and universal logging tool response analysis of Mosaad-1X well have revealed the existence of water accumulation in permeable zone within Abu Roash, Bahariya, Kharita and Alam El Bueib formations. Based on the result of petrophysical analysis, gas reading, the well was plugged (dry hole).

**Hend-1X well (2009)**

The well bottomed in Alam El Bueib Formation at depth 8695 ft., weak oil shows in sandstone of Bahariya Formation and no recorded high gas reading during drilling. The well was testing by RDT (four fluid samples in AR/F, Bahariya and Kharita formations), the result of test was water, so; the well was plugged and abandoned as a dry hole.
**GPHH-1 well (1984)**

The well was the first one in the HH structure; it has been drilled to indicate the hydrocarbon bearing zones.

The well is located in the crest of plunging anticline. Due to seismic interpretation and dip meter log there is no obvious structural elements cutting through this well as all the units are present.

According to well site description, logging interpretation and tests the well is considered as a dry hole. There is no any hydrocarbon bearing zones.

This well lies in the highest position in the down throw side part of the fault zone. It is suggested that we have to think about the upper throw side towards the south direction.

**GPJJ-1 well (1983)**

The well was drilled to test the hydrocarbon bearing zones which discovered in the neighbor GPH-1 and BR 23-2 wells.

Four tests were carried out in the well covered Abu Roash "F" & "G" and Bahariya formation recovered formation water, so, the well plugged and abandoned as a dry hole.

**GPJ-2 well (1983)**

The well was drilled to delineate the extension of "J" structure and to evaluate the hydrocarbon occurrence in Abu Roash and Bahariya porosities.

Three tests were carried out in the well covered Abu Roash "G" and Bahariya recovered formation water. The well plugged back and abandoned after reaching a total depth of 7.218 ft. in Kharita Formation.

**GPJ-1 well (1983)**

The well was drilled on a structural closure has a relatively limited areal extension. This closure was previously tested by drilling BRE 23-2 well of Braspetro which tested commercially gas from Abu Roash "G" Member.
Two production tests were carried out in the well from Bahariya Fm. and Abu Roash "G" with recovery of gas & condensate. Tested intervals: (1860-1875), (1908-1913), (1925-1935), (2050-2065). The well was temporary plugged as a potential gas producer.

**GPL-1 well (1982)**

The well was drilled on a relatively low relief anticlinal closure of a large areal extent.

No encouraging intervals were logged, except the doubtful interval at 2866-2869 which was recommended for routine testing while plugging back for abandoned, however, the well was plugged and abandoned as a dry hole, after failing to set the packer.

**BRE 23-2 well (1975)**

The study proved that there are reasonable chances to find new gas accumulations in the area. The main targets were the sandstone of Abu Roash and Bahariya formations. The secondary target was the Alamein carbonates.

The well discovered gas bearing sandstone in 8 meter thickness of Bahariya Formation. This zone has a potential production capacity of 15 MMCFD gas with a small percentage of condensate (approx. 1.0 BCPD).

The DST performed in the Abu Roash/F limestone recovered salt water.

**Present status:** the well was temporary plugged as a potential gas producer from the interval 1901-1909 m. belonging to Bahariya Formation. The cased hole DST's indicates a potential production capacity (AOF) of 425.000 m³/day (15 MMCFD) of gas with a small percentage of condensate. The well total depth is 2646 m (8681 ft.) in the Alamein Formation.

**BRE 23-1 well (1975)**

The purpose of this well was to test a dome-like structure defined by seismic at Abu Roash/ C horizon. The well did show elevated gas...
readings in Abu Roash A Member, and an organic rich AR/ F which exhibited some UV fluorescence.
No hydrocarbon zones of interest were encountered in the drilled section. The well was plugged and abandoned as a dry hole at the total depth of 8701 ft. in the Bahariya Formation.

**Neighbor Oil Wells**

**Karima-1X well**, the well tested gas and condensate in Abu Roash "G"& "D" member.

**Karima-2 well**, the well revealed a good result of Abu Roash "E" recovering 1582 BOPD & 0.9 MMSCFGPD.

**Karima-3X well**, perforated 4m in Abu Roash "G" recovering 619 BCPD & 10.4 MMSCFGPD.

**Tammam-1X well**, the well revealed a good result of Abu Roash "C" recovered 624 BCPD, 11.4 MMSCFGPD on 40/64" ck.

**Malaka-1X well**, the well revealed oil shows and high gas reading from Abu Roash "C"&"E" member.

**WHG 2/1 well**, oil and gas inflow has been registered in Abu Roash "G" horizon and Bahariya Formation.

**WHG 1/1 well**, the well producing from Bahariya Formation.