A. GENERAL INFORMATION:

1. Spill incident Number: 639812

2. Name of Location: 6°19'00" IMO RIVER WELL 597 FLOWLINE AT IGIRIUKWU

3. Name of nearest community: IGIRIUKWU

4. State: ABIA
   LGA: UKWA WEST

5. Type of Production facility/Installation: FLOWLINE
   Asset owner /District: LAND 1

B. INCIDENT INFORMATION:

6. Details of incident:
   a. Date of incident: ____________
   b. Date/Period of investigation: 27TH MARCH, 2011
   c. Description of spill point environment
      □ Firmed soil [Y] [N]
      □ Loose soil [Y] [N]
      □ Previously excavated area [Y] [N]
      □ Under water [Y] [N]
      □ Swampy [Y] [N]
      □ Exposed pipe surface [Y] [N]
   d. Description of leak point (tick as applicable):
      □ Drilled hole, [Y] [N]
      □ Hack saw cut, [Y] [N]
      □ Explosive tear, [Y] [N]
      □ Complete Disagreement [Y] [N]
      □ Inward dent, [Y] [N]
      □ Well head tampering [Y] [N]
      □ Failed Weld-on illegal hot tap valve, [Y] [N]
      □ Missing pipeline (flowline) [Y] [N]
      □ Crude oil theft (illegal bunkering) point, [Y] [N]
      □ Third party tampering with Clamp Bolt/Nut, [Y] [N]
      □ Third party tampering with valve setting, [Y] [N]
      □ Third party tampering with flange Nuts/bolts, [Y] [N]
      □ Corrosion, [Y] [N]
      □ Saver-pit over flow, [Y] [N]
      □ Surge vessel overflow, [Y] [N]
      □ Outward dent [Y] [N]
      □ Others (specify). ___________________________
   e. Spill point coordinates (MUNNA MIO-BELT)
      Northing: 109728.66 m, 526082.07 m
      Easting: 109749.84 m, 525992.82 m
C. RISK/DAMAGE ASSESSMENT

7. Type of environment of spill site:
   ✔ Land
   □ Swamp
   □ Water

Type of environment of which oil has spread:
   ✔ Land
   □ Swamp
   □ Water

8. Distance from the nearest sensitive habitat
   □ Government reserved and designated protected area [ ] m
   □ Drinking water source [ ] m
   □ Built up area [ ] m
   □ Farmlands [ ] m
   □ Fish Farm/Pond [ ] m
   □ Fishing net [ ] m
   □ Others (specify).

9. Containment measures put in place;
   □ Booms [ ] ✔ [ ]
   □ Trench [ ] ✔ [ ]
   □ Dyke [ ] ✔ [ ]
   □ Others: ____________________________

10. Any pictures or video coverage? [ ✔ ] [ ]

11. Was there any disruption to the investigation? [ ] ✔ [ ]

If yes give brief description:

NOT APPLICABLE

D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL

A. Structures / Properties

<table>
<thead>
<tr>
<th>S/N</th>
<th>Type of Structures</th>
<th>Description</th>
<th>Size</th>
<th>Number</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NONE WITHIN AREA OF IMPACT</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
B. Crops/Economic Trees

<table>
<thead>
<tr>
<th>S/N</th>
<th>Types of crops</th>
<th>Young</th>
<th>Medium</th>
<th>Matured</th>
<th>Quantity</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NONE WITHIN AREA OF IMPACT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

C. Fish/Nets/Ponds

<table>
<thead>
<tr>
<th>S/N</th>
<th>Fish/Nets/Ponds</th>
<th>Description</th>
<th>Quantity/Size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NONE WITHIN AREA OF IMPACT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

D. Others (Specify) i.e. Animal Traps

<table>
<thead>
<tr>
<th>S/N</th>
<th>Others</th>
<th>Description</th>
<th>Quantity/Size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>NONE WITHIN AREA OF IMPACT</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

E. GRAPHIC DESCRIPTION OF LEAK POINT (Details should be contained in leak repair report)

A section of 6" IMO River Well 59T Flowline at Igiri Ukwu-Ipu showing position of illegal bunkering connections.

- 2" nipple with valve installed at 12 o'clock position
- 4" nipple with valve installed at 12 o'clock position
### TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION

<table>
<thead>
<tr>
<th>S/N</th>
<th>Northing (m)</th>
<th>Easting (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>109774.70</td>
<td>525992.81</td>
</tr>
<tr>
<td>2</td>
<td>109779.84</td>
<td>525992.82</td>
</tr>
<tr>
<td>3</td>
<td>109782.91</td>
<td>525995.91</td>
</tr>
<tr>
<td>4</td>
<td>109736.68</td>
<td>526085.15</td>
</tr>
<tr>
<td>5</td>
<td>109433.59</td>
<td>526082.07</td>
</tr>
</tbody>
</table>

IMPACTED AREA BOUNDARY COORDINATES - MINNA NO-BOIL
G. INCIDENT INFORMATION:

17 Impacted Area Details
   a. Total calculated area of impact: $227 \text{ m}^2 \left(0.0227 \text{ ha}\right)$
      - Impact within SPDC R.O.W: $217 \text{ m}^2 \left(0.0217 \text{ ha}\right)$
      - Impact outside R.O.W: $10 \text{ m}^2 \left(0.001 \text{ ha}\right)$

18 Volume of oil recovered before completion of JIV ($V_{\text{rec}}$):
   
<table>
<thead>
<tr>
<th>Recovered oil $V_{\text{rec}}$</th>
<th>barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>NIL</td>
<td></td>
</tr>
</tbody>
</table>

19. Computation of the residual volume on site
   a. Computation of the volume of pooled free phase oil (on land or confined water body).
      i. Area ($\text{m}^2$) occupied by pool of free phase oil: NOT APPLICABLE
      ii. Average Depth (m) of pool of free phase oil:
      iii. Volume of pooled of free phase oil ($V_{\text{pool}}$): NIL barrels
   iv.

   b. Computation of volume of infiltrated oil in the soil ($V_{\text{in}}$).
      i. Area ($\text{m}^2$) covered by the oil: 227
      ii. Average Depth (m) below ground surface of infiltration of oil: 0.008
      iii. Soil type: MEDIUM SANO
      iv. $\phi_e$ (effective porosity of the soil): 20%
      v.

<table>
<thead>
<tr>
<th>Volume of infiltrated oil ($V_{\text{in}}$)</th>
<th>barrels</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td></td>
</tr>
</tbody>
</table>

20. Computation of volume of oil on open water based on standard coloration.

<table>
<thead>
<tr>
<th>Thickness (mm)</th>
<th>Percentage coverage</th>
<th>Volume (m$^3$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barely Visible</td>
<td>NOT</td>
<td></td>
</tr>
<tr>
<td>Silvery</td>
<td>0.00004</td>
<td></td>
</tr>
<tr>
<td>Slight Colour</td>
<td>0.00015</td>
<td></td>
</tr>
<tr>
<td>Bright Colour</td>
<td>0.0003</td>
<td></td>
</tr>
<tr>
<td>Dull</td>
<td>0.01</td>
<td></td>
</tr>
<tr>
<td>Dark</td>
<td>0.002</td>
<td></td>
</tr>
<tr>
<td>Black Oil</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>Emulsion (30% Oil)</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Percent Total</th>
<th>Total Volume</th>
</tr>
</thead>
<tbody>
<tr>
<td>100%</td>
<td>NIL bbl</td>
</tr>
</tbody>
</table>

21. Calculation of evaporated volume:
   
   i. Oil type: **BONNY MEDIUM**
   
   ii. E-Factor: **15%**
   
   iii. 

<table>
<thead>
<tr>
<th>Oil Type</th>
<th>Bonny Light</th>
<th>Bonny Medium</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>E-Factor</td>
<td>E-Factor</td>
</tr>
<tr>
<td>Period Since Oil Spill</td>
<td>&lt;1 day</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>1-7 days</td>
<td>25%</td>
</tr>
<tr>
<td></td>
<td>&gt;7 days</td>
<td>40%</td>
</tr>
</tbody>
</table>

9. Gross Total Estimated Spilled Volume: 

\[ V_{Est}(bbls) = V_{vap}(bbls) + V_{wet}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{mil}(bbls) = 2.3 + 0.4 + 0.4 = 3.1 \text{ BARRELS} \]

10. Net Total Estimated Spilled Volume: 

\[ V_{Est}(bbls) = V_{vap}(bbls) + 0.6 \times V_{wet}(bbls) + V_{inf}(bbls) + V_{pool} = 2.3 + 0.4 + 0.4 = 3.1 \text{ BARRELS} \]

- Calculation of the respective estimated volume is to done using the new spill estimation software on site
- Conversion of m3 to barrel is Total volume VT (m3) x 6.29
- Emulsification factor for spill on water to consider is 60% of volume of oil.

This report was filled and signed on the 30/03/2011 at incident site by joint investigation representative from:

- Host Community
- Department of Petroleum Resources [DPR]: ✔
- National Oil Spill Detection and Response Agency [NOSDRA]: ✔
- State Ministry of Environment [SME]: □
- Nigeria Police Force [NPF]: □
- Shell Petroleum Development Company [SPDC]: ✔

Tick as applicable