A. GENERAL INFORMATION:

1. Spill incident Number: 638284

2. Name of Location: Umuechem Well 22T at Umuechem

3. Name of nearest community: River

4. State: Rivers

5. Type of Production facility/Installation: Flowing Asset owner/District: Land 1

B. INCIDENT INFORMATION:

6. Details of incident:
   a. Date of incident: 22nd March, 2011
   b. Date/Period of investigation: 25th 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 rupture: [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]
   e. Spill point coordinates:
      - Northing: 111972.267m
      - Easting: 506225.837m
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
   - [ ] Drinking water source
   - [ ] Built up area
   - [ ] Farmlands
   - [ ] Fish Farm/Pond
   - [ ] Fishing net
   - [ ] Others (specify):

9. Containment measures put in place;
   - [ ] Booms
   - [ ] Trench
   - [ ] Dyke
   - [ ] Others:

10. Any pictures or video coverage?
    - [√] [ Y ]

11. Was there any disruption to the investigation?
    - [ Y ] [ √ ]

If yes give brief description:

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>

Page 2 of 7
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>NO CROPS 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>NO FISH 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>NO OTHERS 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" WELL 22T FLOW LINE

Corrosion hole at 6 O'Clock position
<table>
<thead>
<tr>
<th>S/N</th>
<th>Northing M</th>
<th>Easting M</th>
</tr>
</thead>
<tbody>
<tr>
<td>A27</td>
<td>111966.771</td>
<td>506244.962</td>
</tr>
<tr>
<td>A28</td>
<td>111966.081</td>
<td>506244.808</td>
</tr>
<tr>
<td>A29</td>
<td>111969.174</td>
<td>506235.072</td>
</tr>
<tr>
<td>A30</td>
<td>111972.246</td>
<td>506235.079</td>
</tr>
<tr>
<td>A31</td>
<td>111972.267</td>
<td>506225.837</td>
</tr>
<tr>
<td>A32</td>
<td>111969.195</td>
<td>506225.830</td>
</tr>
<tr>
<td>A33</td>
<td>111972.267</td>
<td>506225.837</td>
</tr>
<tr>
<td>A34</td>
<td>111972.267</td>
<td>506225.837</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>S/N</th>
<th>Northing M</th>
<th>Easting M</th>
</tr>
</thead>
<tbody>
<tr>
<td>A20</td>
<td>506225.837 111972.267</td>
<td>506225.837 (S)</td>
</tr>
<tr>
<td>A21</td>
<td>111981.476</td>
<td>506228.939</td>
</tr>
<tr>
<td>A22</td>
<td>111981.483</td>
<td>506225.858</td>
</tr>
<tr>
<td>A23</td>
<td>111969.195</td>
<td>506225.830</td>
</tr>
<tr>
<td>A24</td>
<td>111972.260</td>
<td>506228.918</td>
</tr>
<tr>
<td>A25</td>
<td>111966.06</td>
<td>506253.550</td>
</tr>
<tr>
<td>A26</td>
<td>111962.988</td>
<td>506253.543</td>
</tr>
</tbody>
</table>
G. INCIDENT INFORMATION:

17 Impacted Area Details
   a. Total calculated area of impact: 141.964 m²
      - Impact within SPDC R.O.W: 141.964 m²
      - Impact outside R.O.W: NIL

18 Volume of oil recovered before completion of JIV (V_{rec}):
   Recovered oil V_{rec}: NIL barrels

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 (m²) occupied by pool of free phase oil: 29.91 m²
      ii. Average Depth (m) of pool of free phase oil: 0.02 m
      iii. Volume of pooled of free phase oil: V_{pool}: 3.7 barrels
   iv. 

   b. Computation of volume of infiltrated oil in the soil (V_{3})
      i. Area (m²) covered by the oil: 112.173 m²
      ii. Average Depth (m) below ground surface of infiltration of oil: 0.01 m
      iii. Soil type: CLAY
      iv. $\phi$ (effective porosity of the soil): 82
      v. Volume of infiltrated oil, $V_{in}$: 0.6 barrels

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 (m³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barely Visible</td>
<td>0.000004</td>
<td>NOT</td>
</tr>
<tr>
<td>Silvery</td>
<td>0.00008</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>0.001</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>

Percent Total 100% Total Volume: NIL bbl

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></td>
<td></td>
</tr>
<tr>
<td>&lt;1 day</td>
<td>10%</td>
<td>5%</td>
</tr>
<tr>
<td>1-7 days</td>
<td>25%</td>
<td>15%</td>
</tr>
<tr>
<td>&gt;7 days</td>
<td>40%</td>
<td>25%</td>
</tr>
</tbody>
</table>

**Volume of evaporated oil:** 0.75 barrels

9. Gross Total Estimated Spilled Volume:

\[ V_{est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{ef}(bbls) + V_{pool}(bbls) + V_{sil}(bbls) = 0.75 + 0.6 + 3.7 + 0.5 + 0 = 5.05 \text{ bbls} \]

**V_{sil}(bbls) = 5.05 \text{ bbls}**

10. Net Total Estimated Spilled Volume:

\[ V_{est}(bbls) = V_{vap}(bbls) + 0.6*V_{wat}(bbls) + V_{ef}(bbls) + V_{pool}(bbls) + V_{sil}(bbls) = 0.75 + 0.6 + 3.7 + 0.5 + 0 = 5.05 \text{ bbls} \]

**V_{est}(bbls) = 5.05 \text{ bbls}**

*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 **28/03/2011** 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