

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0471 904888

(Note: As practicable as possible the JIT report is to be signed in the field by all the participating parties)

**A. GENERAL INFORMATION:**

1. Spill incident Number: 904688 2. Type of incident \* Oil Spill  
 3. Name of Location 4" OTAMIRI WELL 8 L FLOWLINE  
 4. Name of nearest community UMVECHEM 5. State: RIVERS 6. LGA ETCHIE  
 7. Type of Production facility/Installation Oil Flowline 8. Asset owner/ District NEL/P#1

**B. INCIDENT INFORMATION:**

**9. Details of incident**

- a. Date of incident: 12<sup>th</sup> DECEMBER 2012  
 b. Start date/time of investigation: 15<sup>th</sup> DECEMBER 2012 AND  
 c. Investigation End date: 17<sup>th</sup> DECEMBER 2012  
 d. Description of spill point environment  
 Firmed soil  Loose soil  Previously excavated area  
 Under water  Swampy  Exposed pipe surface  
 Well Platform (on Water)  Rig  
 e. Description of leak point (tick as applicable);  
 Drilled hole  Hack saw cut  Explosive tear,  
 Complete Rupture  Inward dent,  Well head tampering  
 Failed Weld-on illegal hot tap valve,  Missing Pipeline/Flowline)  
 Crude oil theft (illegal) bunkering) point,  Third party tampering with Clamp  
 Third party tampering with valve setting,  Third party tampering with flange,  
 Corrosion  Saver-pit over flow,  Surge vessel overflow  
 Outward dent  Flare System/Bund wall failure  
 Valve Failure  com unit failure  Cold vent  
 Relief valve failure  Others (specify) \_\_\_\_\_

- f. Incident caused by:  
 Third party interference  Operational  Mystery \_\_\_\_\_

g. Spill point coordinates

Measuring unit	
Northing: (m)  <u>113219.22</u>	Easting: (m)  <u>505005.64</u>

\*This can be a) Oil spill b) Drilling fluid/Chemical c) siltation d) construction e) Encroachment f) Fire,

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**C. RISK ASSESSMENT**

10. Type of environment:

- Land       Swamp       Water       Seasonal swamp

i. Type of environment to which oil has spread:

- Land       Swamp       Water       River (identify) \_\_\_\_\_

ii. Weather condition

- Raining       Sunny

11. Distance from the nearest sensitive habitat

- |  |   |        |
|--|---|--------|
| <input type="checkbox"/> Government reserved and designated protected area | [ | Nil,m] |
| <input type="checkbox"/> Drinking water source                             | [ | Nil,m] |
| <input type="checkbox"/> Built up area                                     | [ | Nil,m] |
| <input type="checkbox"/> Farmlands   | [ | Nil,m] |
| <input type="checkbox"/> Fish Farm/Pond                                    | [ | Nil,m] |
| <input type="checkbox"/> Fishing net                                       | [ | Nil,m] |
| <input type="checkbox"/> Others (specify).                                 | [ | Nil,m] |
- NOT APPLICABLE**

12. Containment measures put in place;

- Booms       Trench       Dyke
- Others: \_\_\_\_\_

13. Any pictures or video coverage?       [N]

14. Was there any disruption to the investigation?      [Y]

If yes give brief description:

NOT APPLICABLE

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

15. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
	NONE	WITHIN			AREA OF IMPACT

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16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
	NONE WITHIN AREA OF IMPACT					

17. Fish/Nets/Ponds

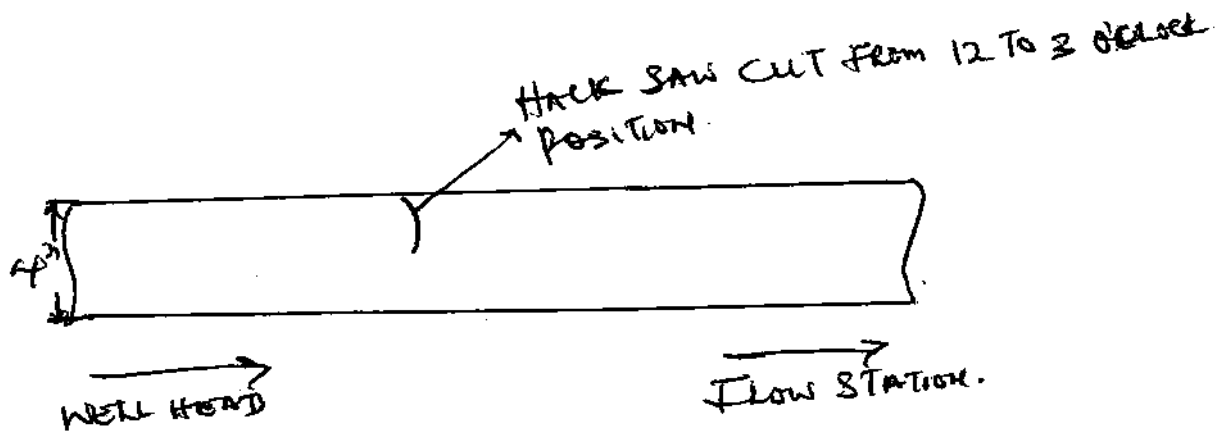
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

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

S/N	Others	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

**E. GRAPHIC DESCRIPTION OF LEAK POINT** While detail report of the leak point should be contained in the Leak report, overview sketch of the site should be added as an appendix 1)

A SECTION OF 4" OTAMIRI WELL 8L FLOWLINE SHOWING HACK SAW CUT FROM 12 TO 3 O'CLOCK POSITION.



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F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION

19. Impacted area boundary Coordinates (If more than 12 points, Attach as an appendix 2)

MINNA MED BENT

S/N	Northing (m)	Easting (m)
1.	113280.19	504942.93
2.	113221.07	505000.10
3.	113211.83	505011.17
4.	113174.89	505046.20
5.	113177.70	505047.26
6.	113223.49	505003.08
7.	113282.63	504945.35

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.0467 Ha
- Impact within SPDC R.O.W \_\_\_\_\_
- Impact outside R.O.W \_\_\_\_\_

21. Volume of oil recovered before completion of JIV ( $V_{rec}$ ):

Recovered oil $V_{rec}$	<u>Nil</u>	barrels
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20. Computation of the residual volume on site

- a. Computation of volume of pool of free phase oil (on land or confined water body)
- Area ( $m^2$ ) occupied by pool of free phase oil 299  $m^2$
  - Average Depth (m) of pool of free phase oil 0.005 m

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iii. Emulsification factor: Nil

iv. 

Volume of pool of free phase oil, $V_{pool}$ :	<u>9.4</u>	barrels
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b. Computation of volume of infiltrated oil in the soil ( $V_{inf}$ ).

*full POINT AREA  
AREA = 2m<sup>2</sup>  
Depth = 0.5m  
Soil = Laterite = 25%  
2 x 0.55 x 0.2 = 1.38 barrels*

- i. Area \*(m<sup>2</sup>) covered by the oil: 166
- ii. Area of the pool of free phase oil in touch with soil: 299
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.07
- iv. Soil type: LATERITE
- v.  $P_e$  (effective porosity of the soil): 20%

iv. 

Volume of infiltrated oil, $V_{inf}$	<u>5.85 + 1.38 = 7.23</u>	barrels
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21. Computation of volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: Nil
- ii. Table of average depth of oil on water based on coloration \*\*

	Thickness (mm)	Percentage coverage	Volume (m3)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume <span style="float: right;">bbl</span>

iii. 

Volume of oil on open water, $V_{wat}$ :	<u>Nil</u>	barrels
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22. Calculation of evaporated volume:

- i. Oil type: BONNY LIGHT
- ii. E-Factor: 25%

iii. 

Volume of evaporated oil, $V_{evap}$ :	<u>5.53</u>	barrels
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Evaporation Factors (E-Factor) for SPDC Crude oil			
Oil Type	Days on site	Bonny Light	Bonny Medium
Period Since Oil Spill	< 1 day	10%	5%
	1-7 days	25% ✓	15%
	> 7 days	40%	25%

\*If area is not same as the total area of impact, please indicate in the overview sketch  
 \*\* Spill Factor from USCG FOG (2000 Edition)

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**23. Gross Total Estimated Spilled Volume**

$$V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls)$$

$$V_{Est}(bbls) = 5.55 + Nil + 7.23 + 9.4 + Nil \Rightarrow 22.18 \text{ BARRELS}$$

**24. Net Total Estimated Spilled Volume**

$$V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls)$$

$$V_{Est}(bbls) = 5.55 + Nil + 7.23 + 9.4 + Nil \Rightarrow 22.18 \approx 23 \text{ BARRELS}$$

\*Calculation of the respective estimated volume is to be done on site as far as practicable using the new spill volume estimation software on site

\*Conversion of m3 to barrels is Total volume VT (m3) x 6.29

\*Emulsification factor for spill on water to consider is 60% of volume of oil.

**25. GENERAL STATUS OF THE SITE**

- A. Joint investigation of the incident site found that there is no residual impact after the initial response and therefore recommend that the site be closed out
- B. Investigation of the incident site showed that there is residual impact on site requiring further works

**26 REPRESENTATIVES**

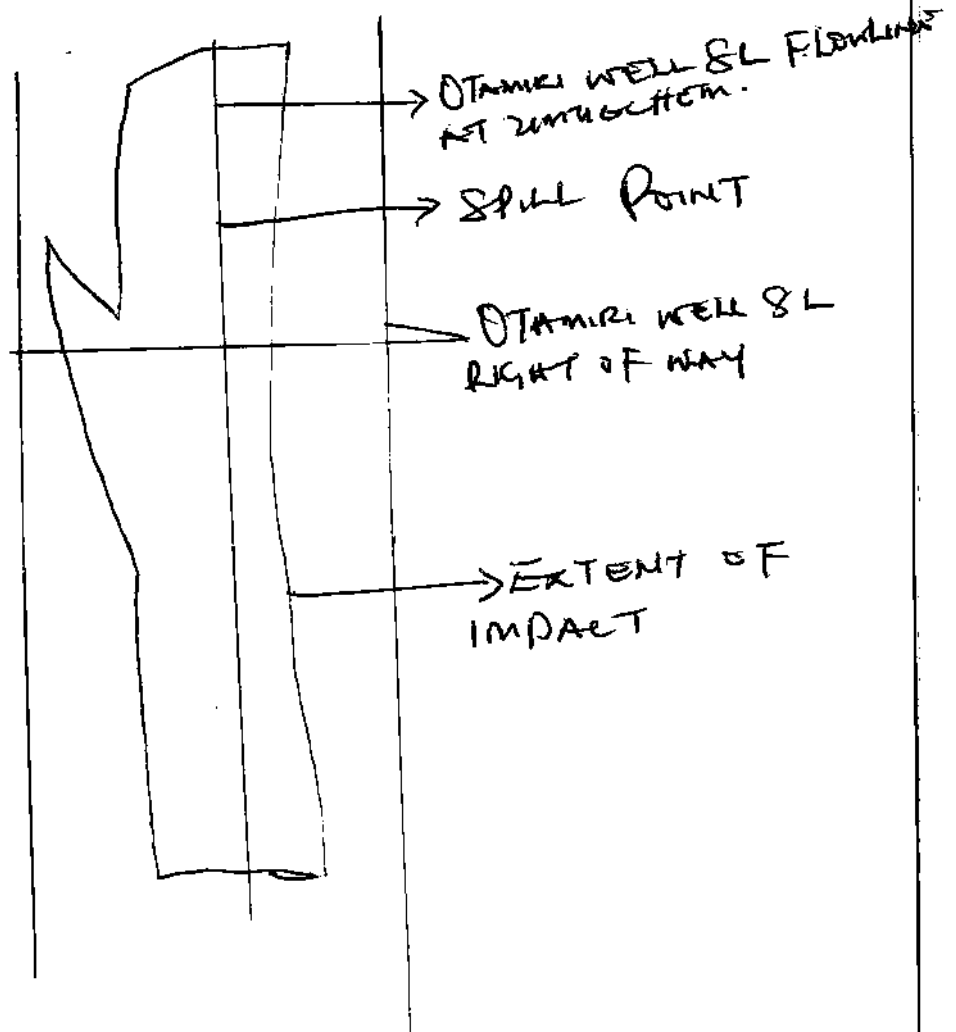
This report was filled and signed on the 7/12/2012 at incident site by joint investigation representatives from

- 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*

27. Appendix 1: Overview sketch of the site

Location: 4<sup>th</sup> OTAMIRI WELL 8L FLOWLINE AT UMUECHEM



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21. Appendix 2: TABLE SHOWING ADDITIONAL COORDINATES TAKEN DURING JIV FOR AREA CALCULATION

S/N	Northing	Easting