

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1041698 JIV report S/N: 0259

(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: 1041698 2. Type of incident\* OIL SPILL  
 3. Name of Location 28<sup>th</sup> BOMU - BONNY PIPELINE  
 4. Name of nearest community OLOMA 5. State: RIVERS 6. LGA BONNY  
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

**B. INCIDENT INFORMATION:**

9. Details of incident  
 a. Date of incident: 17<sup>th</sup> SEPTEMBER 2013  
 b. Start date/time of investigation: 18<sup>th</sup> SEPTEMBER 2013 : 14:30 Hours, 25<sup>th</sup> SEPTEMBER 2013  
 c. Investigation End date: 20<sup>th</sup> SEPTEMBER 2013 Actual investigation duration, days: THREE (3)

- d. Description of spill point environment
- |                                                   |                                                |                                                             |
|---------------------------------------------------|------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> Firmed soil              | <input checked="" type="checkbox"/> Loose soil | <input checked="" type="checkbox"/> Recently excavated area |
| <input type="checkbox"/> Under water              | <input checked="" type="checkbox"/> Swampy     | <input type="checkbox"/> Exposed pipe surface               |
| <input type="checkbox"/> Well Platform (on Water) |                                                | <input type="checkbox"/> Drill Rig                          |
- e. Description of leak point (tick as applicable);
- |                                                                                |                                                         |                                                             |
|--------------------------------------------------------------------------------|---------------------------------------------------------|-------------------------------------------------------------|
| <input type="checkbox"/> Drilled hole                                          | <input type="checkbox"/> Hack saw cut                   | <input type="checkbox"/> Tear (_____).                      |
| <input type="checkbox"/> Complete Rupture                                      | <input type="checkbox"/> Inward dent,                   | <input type="checkbox"/> Well head tampering                |
| <input checked="" type="checkbox"/> Failed Weld-on illegal hot tap valve,      | <input type="checkbox"/> Failed Clamp                   | <input type="checkbox"/> Missing Pipeline/Flowline          |
| <input checked="" type="checkbox"/> Crude oil theft (illegal bunkering) point, |                                                         | <input type="checkbox"/> Third party tampering with Clamp   |
| <input type="checkbox"/> Third party tampering with valve setting,             |                                                         | <input type="checkbox"/> Third party tampering with flange, |
| <input type="checkbox"/> Corrosion                                             | <input type="checkbox"/> Saver-pit over flow,           | <input type="checkbox"/> Surge vessel overflow,             |
| <input type="checkbox"/> Bulging Outward                                       | <input type="checkbox"/> Flare System/Bund wall failure | <input type="checkbox"/> Accidental 3 <sup>rd</sup> party   |
| <input type="checkbox"/> equipment impact                                      | <input type="checkbox"/> Valve Failure                  | <input type="checkbox"/> com unit failure                   |
| <input type="checkbox"/> Cold vent                                             |                                                         |                                                             |
| <input type="checkbox"/> Relief valve failure                                  | <input type="checkbox"/> Others (specify) _____         |                                                             |

- f. Incident caused by:
- Third party interference (Sabotage ; crude theft ; Line theft ; Accidental 3<sup>rd</sup> party damage   
 Operational  Others (including Mystery spills) \_\_\_\_\_

g. Spill point coordinates

Measuring unit (m)	
Northing:  <p style="text-align: center; font-size: 1.2em;">53 329.85</p>	Easting:  <p style="text-align: center; font-size: 1.2em;">526 249.94</p>

MINNA MID-BELT

\*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  Shoreline/Waterfront

i. Type of environment to which oil has spread:

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

ii. Weather condition

- Rain       Sunny       Dry       Wet       Windy       Hot       Cool

11. 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). **MANGROVE**

12. Containment measures put in place;

- Booms       Trench       Dyke       Natural depression       Pit  
 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
	<b>NONE</b>	<b>WITHIN AREA OF IMPACT</b>			

16. Crops/Economic Trees

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

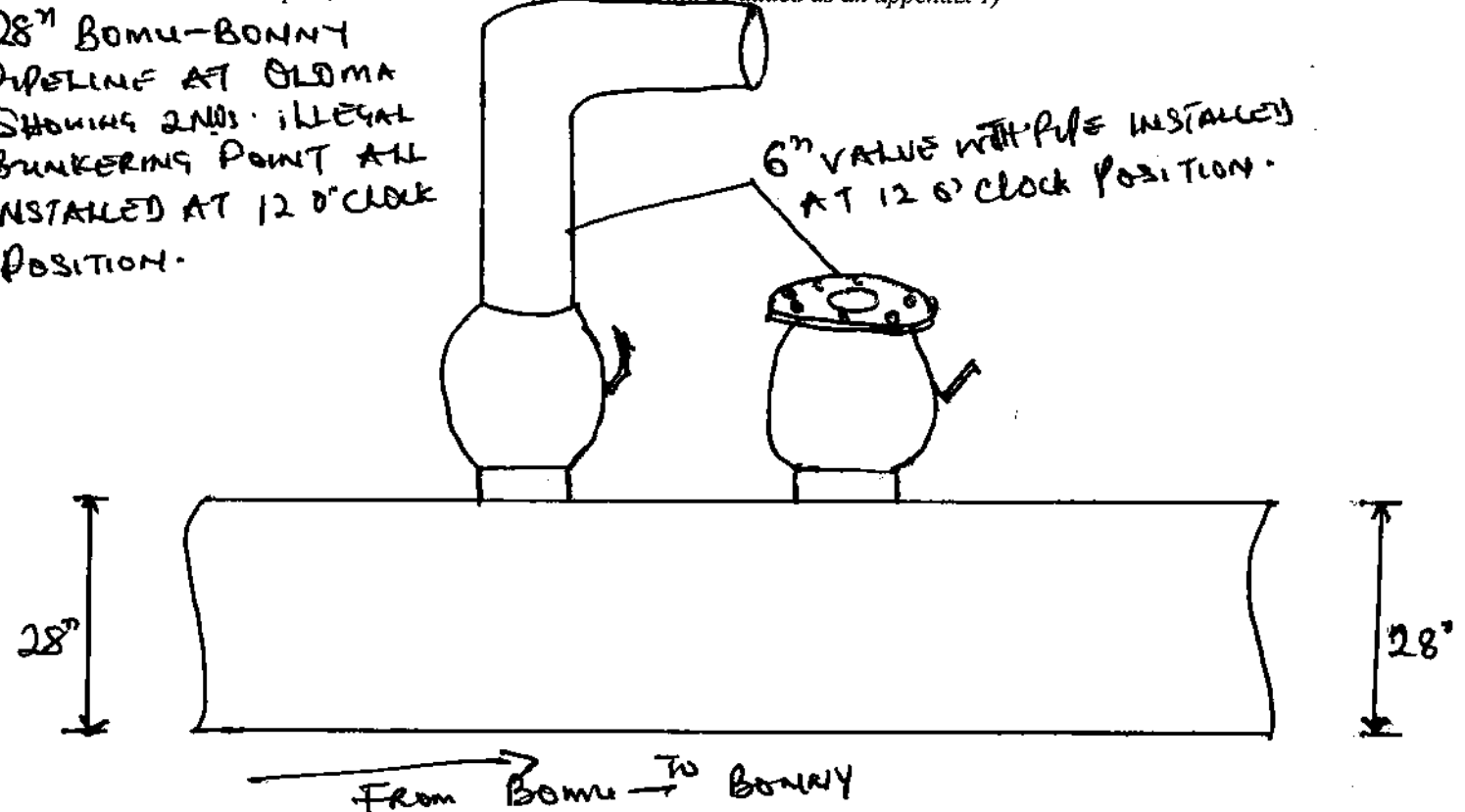
17. Fish/Nets/Ponds

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)



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

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19. Impacted area boundary Coordinates (If more, Print and attach as an appendix)

MINNA MID-BELT

S/N	Northing (M)	Easting (M)
WP585	53 299.29	526 157.40
WP586	53 378.99	526 253.11
WP587	53 400.45	526 277.81
WP588	53 406.55	526 299.40
WP589	53 437.19	526 345.70
WP590	53 446.34	526 379.63
WP581	53 311.08	526 247.67
WP591	53 167.23	526 147.45
WP594	53 136.50	526 154.03
WP595	53 188.82	526 095.55
WP596	53 231.87	526 070.96
WP598	53 250.16	526 151.15
WP597	53 265.54	526 135.76

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 1.079 Ha.
- Impact within SPDC R.O.W YES
- Impact outside SPDC R.O.W YES

21. Volume of oil recovered before completion of JIV (V<sub>rec</sub>):

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Recovered oil $V_{rec}$ :	<u>543</u>	Barrels
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**22. Computation of estimated residual volume on site**

a. Computation of estimated volume of pool of free phase oil (on land or confined water body).

- i. Area ( $m^2$ ) occupied by pool of free phase oil: 1000  $m^2$
- ii. Average Depth (m) of pool of free phase oil: 0.07 m
- iii. Emulsification factor: NIL

iv.

Estimated Volume of pool of free phase oil. $V_{pool}$ :	<u>62.9</u>	barrels
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b. Computation of estimated volume of infiltrated oil in the soil ( $V_{inf}$ ).

1. Estimated Volume of infiltrated oil at spill point ( $V_{inf a}$ )

- i. Area\* ( $m^2$ ) of soil covered by the oil: 16  $m^2$
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.5 m
- iii. Soil type: CLAY iv.  $P_e$  (effective porosity of the soil): 8%
- v. Cause of spill: INTERFERENCE Oil type: BONNY LIGHT
- vii. Oil Residence time on site, day: ONE DAY
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0003 m
- ix. Estimated depth of infiltration around spill point: 1.5003 m

x.

Estimated Volume of infiltrated oil at spill point. $V_{inf a}$ :	<u>12.08</u>	barrels
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2. Estimated Volume of infiltrated oil at second spill point [if applicable] ( $V_{inf b}$ )

- i. Area\* ( $m^2$ ) of soil covered by the oil: NOT APPLICABLE
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: NOT APPLICABLE
- iii. Soil type: NOT APPLICABLE iv.  $P_e$  (effective porosity of the soil): NOT APPLICABLE
- v. Cause of spill: NOT APPLICABLE vi. Oil type: NOT APPLICABLE
- vii. Oil Residence time on site, day: NOT APPLICABLE
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: NOT APPLICABLE
- ix. Estimated depth of infiltration around spill point: NOT APPLICABLE

Estimated Volume of infiltrated oil at spill point. $V_{inf b}$ :	<u>NIL</u>	barrels
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3. E

stimated Volume of infiltrated oil outside immediate spill point(s) region ( $V_{inf c}$ )

- i. Area ( $m^2$ ) of soil covered by the oil: 1000  $m^2$
- ii. Area ( $m^2$ ) of the pool of free phase oil in touch with soil: 16884  $m^2$
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0003
- iv. Soil type: CLAY
- v.  $P_e$  (effective porosity of the soil): 8%

vi.

Estimated Volume of infiltrated oil. At $V_{inf c}$ :	<u>2.70</u>	barrels
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**23. Computation of estimated volume of oil on open water based on standard coloration.**

- i. Total area of oil on open water: 1400  $m^2$

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ii. Table of average depth of oil on water based on coloration \*\*Spill Factors from USCG FOG (2000 Edition)

	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	20%	0.0006
Black oil	0.1	80%	0.1120
Emulsion (30% Oil)	1		
Percent Total		100%	0.1126

iii. 

Estimated Volume of oil on open water, $V_{wat}$ :	<u>0.71</u>	Barrels
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24. Calculation of evaporated volume:

i. Estimated Volume available for evaporation within surface area: 78.39 BARRELS

ii. E-Factor: 25%

iii. 

Estimated Volume of evaporated oil, $V_{evap}$ :	<u>26.13</u>	Barrels
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Evaporation Factors (E-Factor) for SPDC Crude oil			
Oil Type	Days on site	Bonny Light	Bonny Medium
Oil Residence time	< 1 day	10%	5%
	1-7 days	25% ✓	15%
	> 7 days	40%	25%

25. Net Estimated Spilled Volume  $V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls)$   
 $= 26.13 + 0.71 + 14.78 + 62.9 + 543$   
 $= 647.52 \approx 648 \text{ BARRELS}$

Estimated Reported Volume\*\*  $V_{rep}(bbls) = 648 \text{ BARRELS}$

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  $m^3$  to barrels is  $Volume (m^3) \times 6.29$ ; \*\*Round up estimated volume to next whole number using the following rules:

- Any spill volume in excess of 1 bbl is rounded up to the next whole number.
- Any spill volume in less than 1 bbl is rounded up to the next 0.1 bbl.

Examples: Calculated volume = 15.3 bbl ----- Reported volume = 16 bbl  
 Calculated volume = 0.35 bbl ----- Reported volume = 0.4 bbl  
 Calculated volume = 0.01 bbl ----- Reported volume = 0.1 bbl.

Wherever this estimation tool is not applicable please refer to paragraph 6c (Deviations) of the JIV procedure to use appropriate steps for column estimation; record the calculation in a plain sheet of paper and attach to the JIV report.

**26. 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

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B. Investigation of the incident site showed that there is residual impact on site requiring further works

27. REPRESENTATIVES

This report was filled, agreed and signed on the 26/09/2013 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]:
- Signatories agree with reported findings:
- Separate DPR form has been filled out with same findings:

*Tick as applicable*

28. Appendix 1: Overview sketch of the site

Location :

28" BOMU-BONNY PIPELINE AT OLDMA

