

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0410 856 014

(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: 856014 2. Type of incident * OIL SPILL
 3. Name of Location 24" BOMU - BONNY PIPELINE
 4. Name of nearest community MOGHO 5. State: RIVERS 6. LGA GOKANA
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/ District NPE/PH 1

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 21ST AUGUST, 2012.
 b. Start date/time of investigation: 24TH AUGUST, 2012.
 c. Investigation End date: 24TH AUGUST, 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		<u>Minna - Mid - belt.</u>	
Northing: (m)		Easting: (m)	
SP 71335.993		535004.984	

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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 | [| ,m] | |
| <input type="checkbox"/> Drinking water source | [| ,m] | |
| <input type="checkbox"/> Built up area | [| ,m] | |
| <input checked="" type="checkbox"/> Farmlands | [| ,m] | FARMLAND WITHIN IMPACTED AREA. |
| <input type="checkbox"/> Fish Farm/Pond | [| ,m] | |
| <input type="checkbox"/> Fishing net | [| ,m] | |
| <input type="checkbox"/> Others (specify). | [| ,m] | |

12. Containment measures put in place;

- Booms Trench Dyke

Others: NATURAL DEPRESSION.

13. Any pictures or video coverage? [Y] [N]

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

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
1.	CASSAVA	✓			NUMEROUS	WITHIN SPILL-IMPACTED AREA.
2.	YAM		✓			
3.	COCAYAM	✓				
4.	PALM TREES			✓		

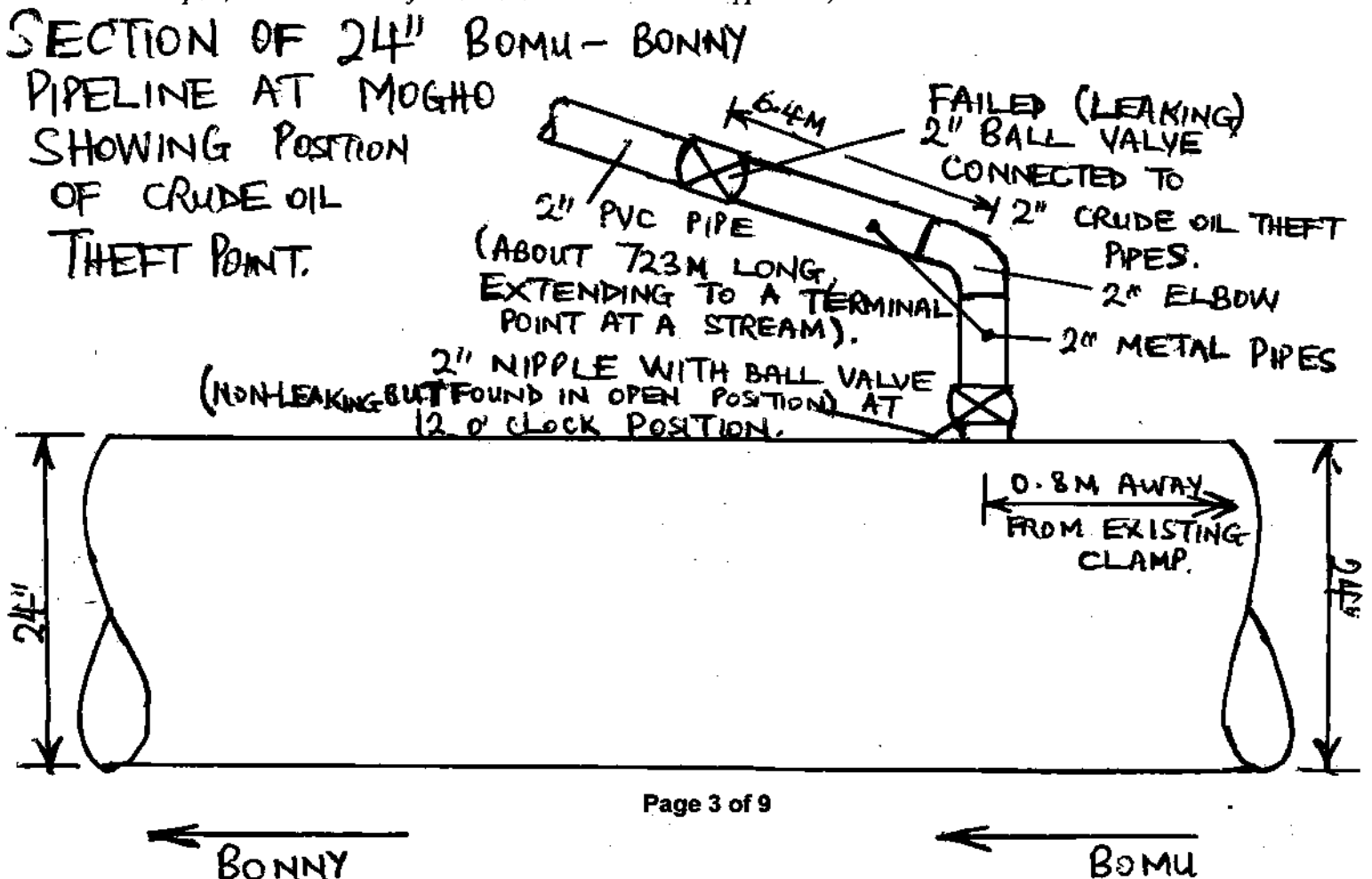
17. Fish/Nets/Ponds

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)*



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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 - Mid-belt.

S/N	Northing (m)	Easting (m)
WP071	71237.771	534964.747
WP072	71296.073	534998.751
WP073	71323.680	535020.373
WP074	71354.428	535001.934
WP076	71283.866	534952.499
WP077	71335.993	535004.984

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.3219 ha
- Impact within SPDC R.O.W Yes
- Impact outside R.O.W Yes

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).
- i. Area (m^2) occupied by pool of free phase oil 330
 - ii. Average Depth (m) of pool of free phase oil 0.002

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iii. Emulsification factor: NIL

iv.

Volume of pool of free phase oil, V_{pool} :	<u>4.15</u>	barrels
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b. Computation of volume of infiltrated oil in the soil (V_{inf}).

COMPUTATION OF VOLUME OF OIL-INFILTRATION AT LEAK POINT:
AREA OF OIL-INFILTRATION = 1M².
DEPTH (AVERAGE) OF INFILTRATED OIL = 1M.
VOLUME = 1M² X 1M.
X 8% (EFFECTIVE POROSITY OF CLAY SOIL)
X 6.29 = 0.5 BARREL

i. Area *(m²) covered by the oil: 2,888
 ii. Area of the pool of free phase oil in touch with soil: NIL
 iii. Average Depth (m) below ground surface of infiltration of oil: 0.005
 iv. Soil type: CLAY
 v. P_e (effective porosity of the soil): 8%
 iv.

Volume of infiltrated oil, V_{inf}	<u>0.5 + 7.27 = 7.77</u>	barrels
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VOLUME OF OIL-INFILTRATION OUTSIDE LEAK POINT = 7.27 BARRELS

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	NOT APPLICABLE	
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002		
Black oil Emulsion (30% Oil)	0.1		
Percent Total		100%	Total Volume <u>NIL</u> bbl

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>3.97</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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<p>23. Gross Total Estimated Spilled Volume = 3.97 + NIL + 7.77 + 4.15 + NIL</p> <p>$V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls) = 15.89$</p>
<p>$V_{Est}(bbls) =$ 16 BARRELS</p>
<p>24. Net Total Estimated Spilled Volume = 3.97 + NIL + 7.77 + 4.15 + NIL = 15.89</p> <p>$V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls)$</p>
<p>$V_{Est}(bbls) =$ 16 BARRELS</p>

*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 24/08/2012 at incident site by joint investigation representatives from

- Host Community
- Department of Petroleum Resources [DPR]: **DPR INVESTIGATION REPORT ATTACHED**
- 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

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27. Appendix 1: Overview sketch of the site

