

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0523 891453

(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: 891453 2. Type of incident * OIL SPILL
 3. Name of Location 24" BONNY - 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 UIG/INTESP.

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 11TH NOVEMBER, 2012
 b. Start date/time of investigation: 15TH AND 16TH NOVEMBER, 2012 / 12 NOON.
 c. Investigation End date: 16TH NOVEMBER, 2012

d. Description of spill point environment

- | | | |
|---|--|---|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input checked="" type="checkbox"/> Previously excavated area |
| <input type="checkbox"/> Under water | <input type="checkbox"/> Swampy | <input type="checkbox"/> Exposed pipe surface |
| <input type="checkbox"/> Well Platform (on Water) | | <input type="checkbox"/> Rig |

e. Description of leak point (tick as applicable);

- | | | |
|---|---|---|
| <input type="checkbox"/> Drilled hole | <input type="checkbox"/> Hack saw cut | <input type="checkbox"/> Explosive 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"/> 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"/> Outward dent | <input type="checkbox"/> Flare System/Bund wall failure | |
| <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 Operational Mystery _____

g. Spill point coordinates

Measuring unit (M) <u>MINNA MID-BELT</u>	
Northing: <p style="text-align: center; font-size: 1.2em;">71 335.56</p>	Easting: <p style="text-align: center; font-size: 1.2em;">535 607.40</p>

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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0523 891453

16. Crops/Economic Trees

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

17. Fish/Nets/Ponds

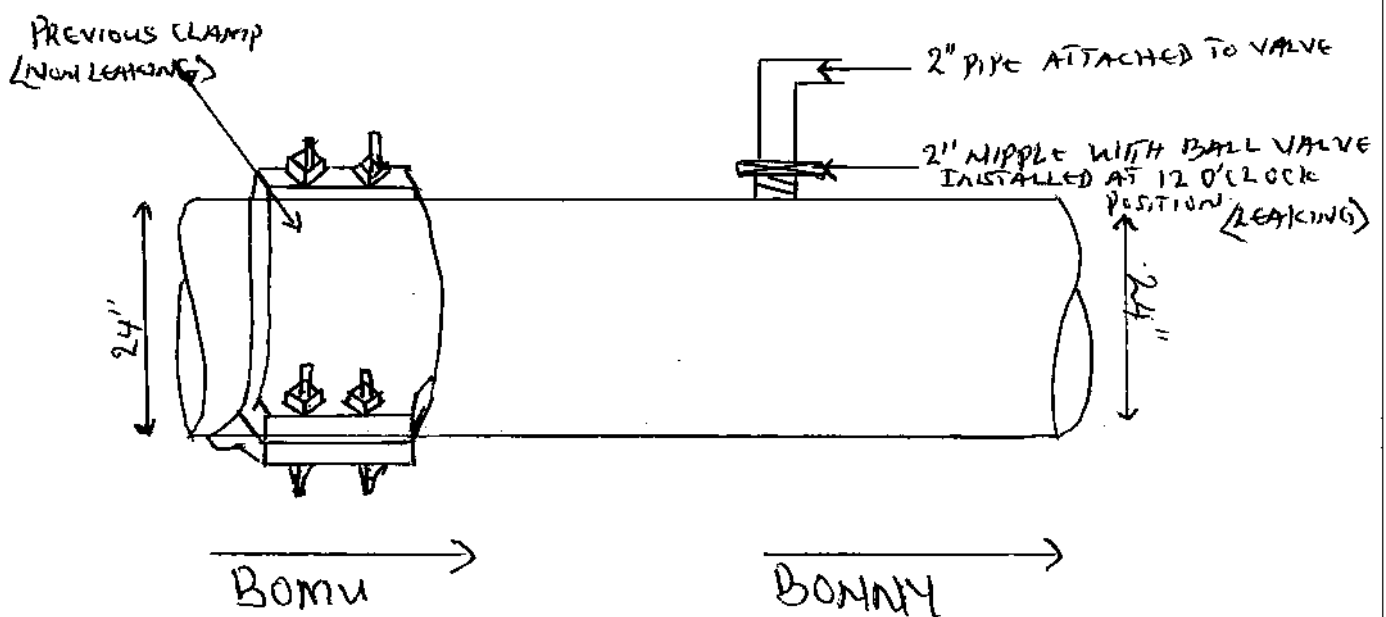
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE	WITHIN	AREA	OF IMPACT

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 I)

A SECTION OF 24" BONNY - BONNY PIPELINE AT MUGHO SHOWING ILLEGAL BUNKERING POINT AT 12 O'CLOCK POSITION.



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0523 891453

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)
WP036	71 335.98	535 014.23
WP037	71 339.05	535 011.15
WP038	71 342.12	535.014.24
WP039	71 332.91	535 014.23
WP040	71 332.91	535 011.14
WP041	71 335.98	535 011.15
WP042	71 329.84	535 011.14
WP043	71 314.49	535 004.95
WP044	71 299.16	534 992.59
WP045	71 283.80	534 989.48
WP046	71 296.10	534 983.34
WP047	71 302.27	534 967.94
WP048	71 299.17	534 986.43

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.0379 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}	NIL	barrels
-------------------------	-----	---------

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 17.5
 - Average Depth (m) of pool of free phase oil 0.05

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0523 891453

iii. Emulsification factor: NIL

iv.

Volume of pool of free phase oil. V_{pool} :	5.5	barrels
--	-----	---------

b. Computation of volume of infiltrated oil in the soil (V_{inf}).

COMPUTATION OF INFILTRATED VOLUME AT SPILL POINT AREA = 1M² DEPTH = 1M SOIL POROSITY = 8% 1 X 1 X 0.08 X 6.29 = 0.5 BARREL

- i Area *(m²) covered by the oil: 356.5
- ii Area of the pool of free phase oil in touch with soil: 17.5
- iii Average Depth (m) below ground surface of infiltration of oil: 0.02
- iv Soil type: CLAY
- v P_e (effective porosity of the soil): 8%

INFILTRATED VOLUME OUTSIDE SPILL POINT = 3.8

iv.

Volume of infiltrated oil. V_{inf}	$0.5 + 3.8 = 4.3$	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		
Silvery	0.00008		
Slight Color	0.00015	NOT APPLICABLE	
Bright Color	0.0003		
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
	Percent Total	100%	Total Volume bbl

iii.

Volume of oil on open water. V_{wat}	NIL	barrels
--	-----	---------

22. Calculation of evaporated volume:

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

iii.

Volume of evaporated oil. V_{evap}	3.3	barrels
--------------------------------------	-----	---------

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)

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0523 891453

23. Gross Total Estimated Spilled Volume

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

$$V_{Est}(bbls) = 3.3 + NIL + 4.3 + 5.5 + NIL = 13.1 \text{ BARRELS}$$

24. Net Total Estimated Spilled Volume

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

$$V_{Est}(bbls) = 3.3 + NIL + 4.0 + 5.5 + NIL = 13.1 \approx 14 \text{ BARRELS}$$

*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 16/11/2012 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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0523 891453

27. Appendix 1: Overview sketch of the site

