

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0411855118

(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: 855118 2. Type of incident * OIL SPILL/FIRE
 3. Name of Location 28" 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 RPE/PH-1

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 18TH AUGUST, 2012
 b. Start date/time of investigation: 22ND AUGUST, 2012 AND
 c. Investigation End date: 26TH 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	
Northing: (m)	Easting: (m)
SPI 70921.280	535028.921
SP2 70890.563	535028.867

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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

- Government reserved and designated protected area [,m]
 Drinking water source [,m]
 Built up area [,m]
 Farmlands [,m] **FARMLAND WITHIN IMPACTED AREA.**
 Fish Farm/Pond [,m]
 Fishing net [,m]
 Others (specify). [,m]

12. Containment measures put in place;

- Booms Trench Dyke

Others: _____

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	PARTLY
2.	YAM		✓			IMPACTED
3.	COCUYAM	✓				WITHIN FARMLAND

17. Fish/Nets/Ponds

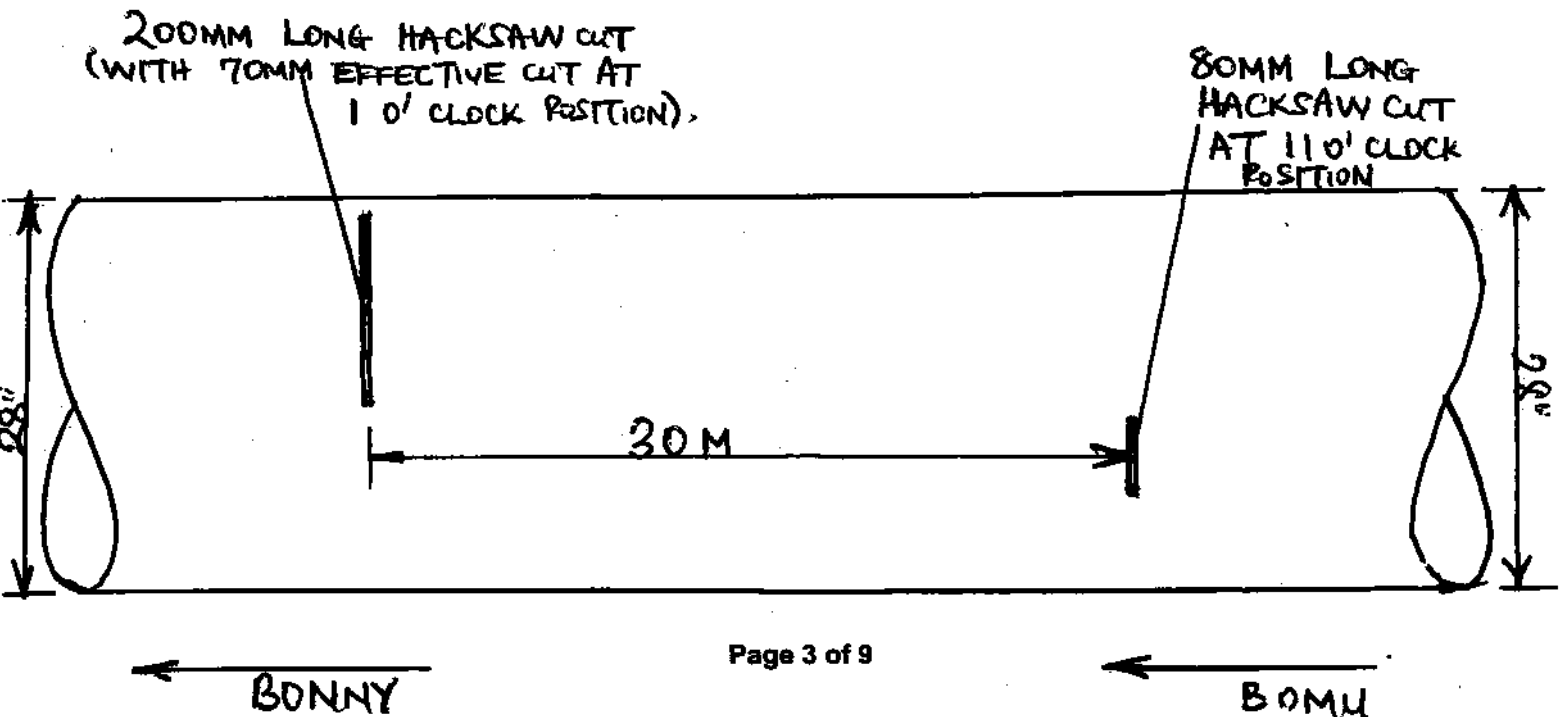
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
NONE WITHIN AREA OF IMPACT				

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)*

PLAN SECTION OF 28" BOMU - BONNY PIPELINE AT MOGHO SHOWING POSITIONS OF 2 NO. HACKSAW CUTS.



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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)
WP096	71262.253	535017.184
WP097	71253.075	534995.594
WP097A	71228.534	534977.059
WP099	71231.617	534970.900
WP098	71219.314	534980.125
WP100	71154.735	535023.162
WP101	71099.429	535032.312
WP102	71019.561	535035.255
WP103	70951.969	535044.384
WP104	70933.572	535025.860
WP105	70872.134	535028.835
WP107	70890.499	535065.852
WP108	70927.327	535084.408

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 1.1767ha
- 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>266</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 1760
 - Average Depth (m) of pool of free phase oil 0.001

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iii. Emulsification factor: NIL

iv.

Volume of pool of free phase oil: V_{pool} :	<u>11.07</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 SPILL POINTS:-
SPILL POINT 1:-
 VOLUME = 2 M² (AREA) X 2.5M (DEPTH) X 8% (EFFECTIVE POROSITY OF CLAY SOIL) X 6.29 = 2.52 BARRELS.
SPILL POINT 2:-
 3M² (AREA) X 2.5M (DEPTH) X 8% (EFFECTIVE POROSITY OF CLAY SOIL) X 6.29 = 3.77 BARRELS.

i. Area *(m²) covered by the oil: 10,002
 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: 0.003
 iv. Soil type: CLAY
 v. P_c (effective porosity of the soil): 8%
 iv.

Volume of infiltrated oil. V_{inf}	<u>2.52 + 3.77 + 15.1 = 21.39</u>	barrels
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VOLUME OF OIL INFILTRATION (INCLUDING THAT BURNT BY FIRE) OUTSIDE SPILL POINTS = 15.1 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 **
 Barely Visible
 Silvery
 Slight Color
 Bright Color
 Dull
 Dark
 Black oil
 Emulsion (30% Oil)

Thickness (mm)	Percentage coverage	Volume (m3)
0.00004		
0.00008		
0.00015		
0.0003		
0.001		
0.002		
0.1		
1		

NOT APPLICABLE

Percent Total 100% Total Volume NIL 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>99.49</u>	barrels
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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	= 99.49 + NIL + 21.39 + 11.07 + 266 = 397.95
$V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recl}(bbls)$	
$V_{Est}(bbls) =$	398 BARRELS
24. Net Total Estimated Spilled Volume	= 99.49 + NIL + 21.39 + 11.07 + 266 = 397.95
$V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recl}(bbls)$	
$V_{Est}(bbls) =$	398 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 26/08/2012 at incident site by joint investigation representatives from

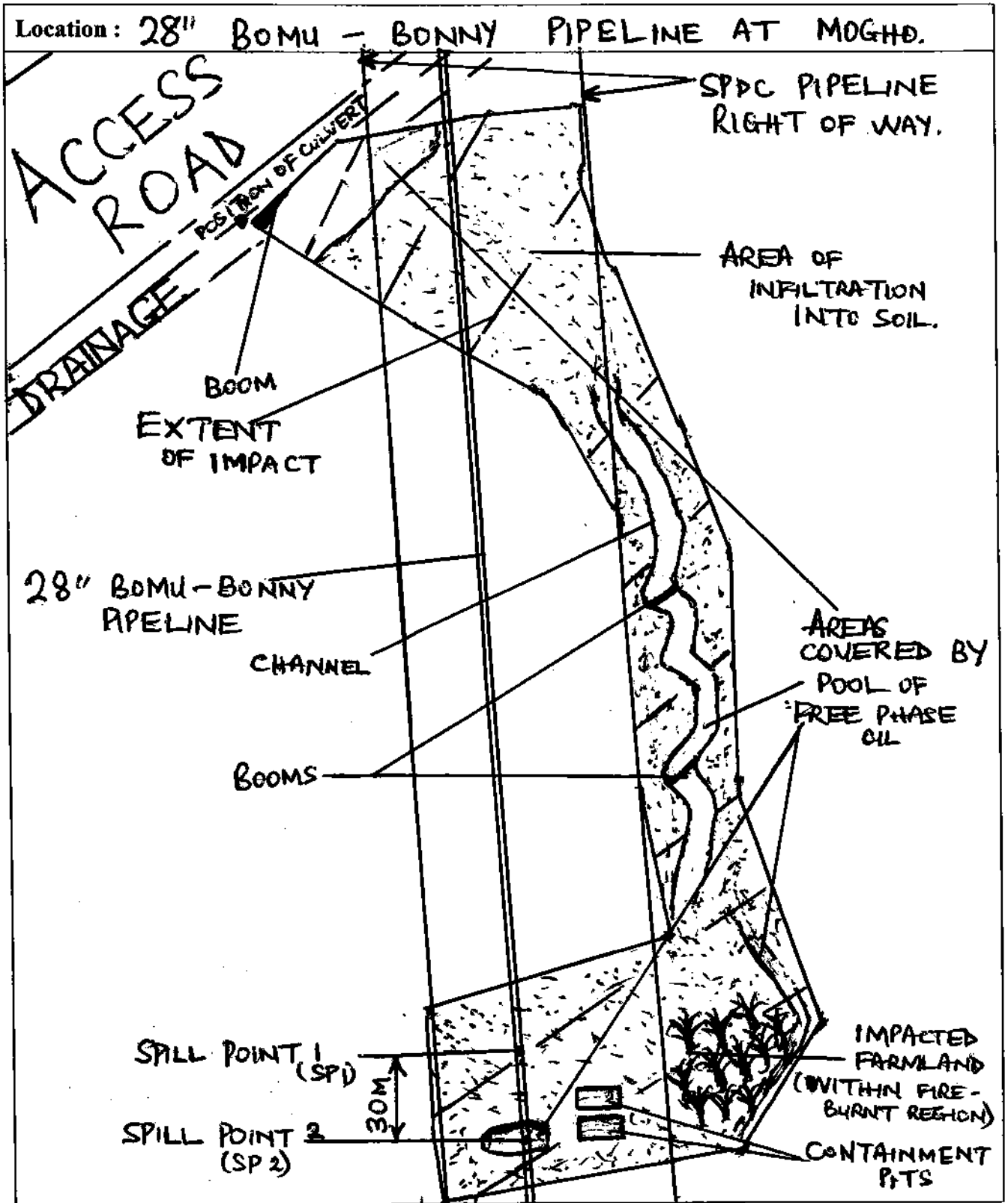
- Host Community
- Department of Petroleum Resources [DPR]: **DPR INVESTIGATION REPORT ATTACHED**
- National Oil Spill Detection and Response Agency [NOSDRA]:
- State Ministry of Environment [SME]:
- Nigeria Police Force [NPF]:
- Shell Petroleum Development Company [SPDC]:

Tick as applicable

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27. Appendix 1: Overview sketch of the site



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

Minna - Mid belt (AKA)

S/N	Northing (m)	Easting (m)
WP108A	70 887.476	535 038.108
WP108B	70 890.542	535 041.196
WP111	70 890.563	535 028.867
NP110	70 921.280	535 028.921
WP097B	71 246.456	535 002.157
WP101A	71 102.105	535 049.228
WP102A	71 024.437	535 053.935