



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
JOINT INVESTIGATION REPORT FOR INCIDENT NO: 660107

No. 00910

A. GENERAL INFORMATION:

1. Spill incident Number: 660107
2. Name of Location AWOBA NORTH-WEST WELL 1 L/S
3. Name of nearest community BORO
4. State RIVERS LGA AKUKUTORU LGA
5. Type of Production facility/Installation Flowline Asset owner /District SWAMP II

B. INCIDENT INFORMATION:

6. Details of incident

- a. Date of incident 15/05/2011
- b. Date/Period of investigation, 19/05/2011; 13:20 HRS
- c. Description of spill point environment

- | | | |
|--|-------|-------|
| <input type="checkbox"/> Firmed soil | [Y] | [N] ✓ |
| <input type="checkbox"/> Loose soil | [Y] ✓ | [N] |
| <input type="checkbox"/> Previously excavated area | [Y] | [N] ✓ |
| <input type="checkbox"/> Under water | [Y] | [N] ✓ |
| <input checked="" type="checkbox"/> Swampy | [Y] ✓ | [N] |
| <input type="checkbox"/> Exposed pipe surface | [Y] ✓ | [N] |

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

- | | | |
|--|-------|-------|
| <input type="checkbox"/> Drilled hole, | [Y] | [N] ✓ |
| <input type="checkbox"/> Hack saw cut, | [Y] | [N] ✓ |
| <input type="checkbox"/> Explosive tear, | [Y] | [N] ✓ |
| <input type="checkbox"/> Complete Rupture | [Y] | [N] ✓ |
| <input type="checkbox"/> Inward dent, | [Y] | [N] ✓ |
| <input type="checkbox"/> Well head tampering | [Y] | [N] ✓ |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | [Y] | [N] ✓ |
| <input type="checkbox"/> Missing pipeline (flowline) | [Y] | [N] ✓ |
| <input type="checkbox"/> Crude oil theft (illegal bunkering) point, | [Y] | [N] ✓ |
| <input type="checkbox"/> Third party tampering with Clamp Bolt/Nut, | [Y] | [N] ✓ |
| <input type="checkbox"/> Third party tampering with valve setting, | [Y] | [N] ✓ |
| <input type="checkbox"/> Third party tampering with flange Nuts/bolts, | [Y] | [N] ✓ |
| <input type="checkbox"/> Corrosion, | [Y] ✓ | [N] |
| Type: <u>FAILED CLAMP</u> | | |
| <input type="checkbox"/> Saver-pit over flow, | [Y] | [N] ✓ |
| <input type="checkbox"/> Surge vessel overflow, | [Y] | [N] ✓ |
| <input type="checkbox"/> Outward dent | [Y] | [N] ✓ |
| <input checked="" type="checkbox"/> Others (specify) <u>Failed CLAMP</u> | | |

AFTER JOINT INVESTIGATION OF THE INCIDENT, SPILL WAS FOUND TO BE DUE TO OPERATIONAL FAILURE.

e. Spill point coordinates (MINNA MID-BELT)

Northing:

62163.17 METRES

Easting:

478722.91 METRES



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C. RISK/DAMAGE ASSESSMENT

7. Type of environment of spill site:

- Land
- Swamp
- water

Type of environment of which oil has spread:

- Land
- Swamp
- water

8. Distance from the nearest sensitive habitat

- Government reserved and designated protected area [. ,m]
- Drinking water source [. ,m]
- Built up area [5,000 ,m]
- Farmlands [. ,m]
- Fish Farm/Pond [. ,m]
- Fishing net [. ,m]
- Others (specify). [. ,m]

9. Containment measures put in place;

- Booms [Y] [N]
- Trench [Y] [N]
- Dyke [] [N]

Others: NOT APPLICABLE

10. Any pictures or video coverage? [] [N]

11. 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

A. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
1	BLOCK HOUSE	A UNIT	10m X 36m	1	Community House



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B. Crops/Economic Trees

S/N	Types of crops	Young	Medium	Matured	Quantity	Comments
	NA	NA	NA	NA	NA	NA

C. Fish/Nets/Ponds

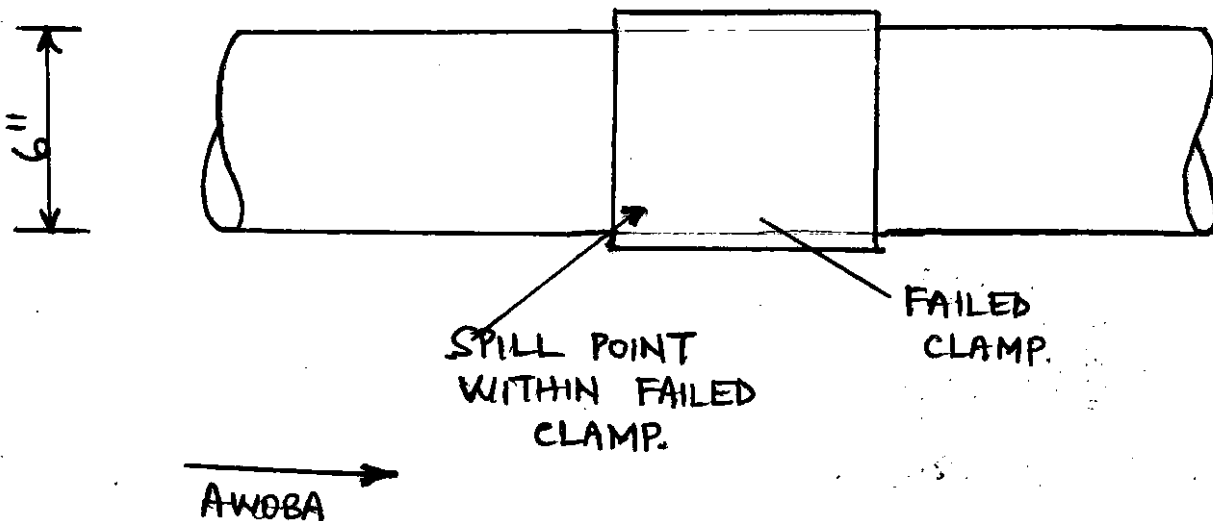
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NA	NA	NA	NA

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

S/N	Others	Description	Quantity/Size	Comments
	NA	NA	NA	NA

E. GRAPHIC DESCRIPTION OF LEAK POINT (Details should be contained in leak repair report)

SECTION OF AWOBA NORTH-WEST WELL 1 L/S FLOWLINE
SHOWING POSITION OF FAILED CLAMP.





F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION
E. Coordinates (IMPACTED AREA BOUNDARY COORDINATES - MINNA MID-BELT)

S/N	Northing (METRES)	Easting (METRES)
1	62041.02	478517.32
2	61908.95	478485.75
3	61819.47	478392.14
4	61635.04	478343.32
5	61359.49	478437.84
6	60937.25	479137.26
7	61268.09	478452.74
8	61081.31	478403.07
9	60900.49	478564.01
10	60921.36	478512.35
11	60915.40	479024.99
12	60925.33	478832.26
13	60859.43	479163.75
14	60953.88	478838.22
15	60966.075	478585.87
16	61016.73	478489.50
17	61309.81	478510.37
18	61544.29	478361.344
19	61819.47	478451.75
20	62041.02	478567.93
21	61529.38	478280.87

NOTE: The area impacted is crude oil sheen.



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G. INCIDENT INFORMATION:

17 Impacted Area Details

- a. Total calculated area of impact 10.43 Ha
- Impact within SPDC R.O.W NIL
 - Impact outside R.O.W 10.43 Ha

18 Volume of oil recovered before completion of JIV (V_{rec}):

Recovered oil (V_{rec})	<u>NIL</u>	barrels
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19. Computation of the residual volume on site

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

- i. Area (m^2) occupied by pool of free phase oil NOT APPLICABLE
- ii. Average Depth (m) of pool of free phase oil NOT APPLICABLE
- iii.

Volume of pooled of free phase oil (V_{res})	<u>NIL</u>	barrels
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iv.

b. Computation of volume of infiltrated oil in the soil (V-3).

- i. Area (m^2) covered by the oil: NOT APPLICABLE
- ii. Average Depth (m) below ground surface of infiltration of oil: _____
- iii. Soil type: CLAY
- iv. p_e (effective porosity of the soil): 8%
- v.

	<u>NIL</u>	barrels
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20. Computation of volume of oil on open water based on standard coloration.

	Thickness (mm)	Percentage coverage	Volume (m3)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Colour	0.00015		
Bright Colour	0.0003	20%	0.01
Dull	0.001		
Dark	0.002	65%	0.14
Black oil	0.1	15%	1.56
Emulsion (30% Oil)	1		
	Percent Total	100%	Total Volume

NOTE: THE TOTAL AREA OF IMPACT IS ON OPEN WATER AND IS APPROXIMATELY 104,263 m².

(NOTE: PART OF THE AREA ON OPEN WATER

I.E. WITHIN THE 65% AREA COVERAGE WAS VIEWED AS SUPERFICIAL IMPACT ON VEGETATION).

Spill Factors from USCG FOG (2000 Edition)



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Volume of oil on open water: V_{wat}	10.73	barrels
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21. Calculation of evaporated volume:

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

Volume of oil on water: V_{res1}	3.58	barrels
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Oil Type		Bonny Light	Bonny Medium
		E-Factor	E-Factor
Period Since Oil Spill	<1 day	10%	5%
	1-7 days	25%	15%
	>7 days	40%	25%

9. Gross Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{res1}(bbls) = 3.58 + 10.73 + NIL + NIL + NIL = 14.3$

$V_{Est}(bbls) = 14.3$ BARRELS

10. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{res1}(bbls) = 3.58 + (0.6 * 10.73) + NIL + NIL + NIL = 10.01$

$V_{Est}(bbls) = 10$ BARRELS

- * Calculation of the respective estimated volume is to done using the new spill estimation software on site
- * Conversion of m3 to barrel is Total volume VT (m3) x6.29
- * Emulsification factor for spill on water to consider is 60% of volume of oil.

This report was filled and signed on the 19 / 05 / 2011 at incident site by joint investigation representative 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