



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
 JOINT INVESTIGATION REPORT FOR INCIDENT NO: 651318

No. 00107

A. GENERAL INFORMATION:

1. Spill Incident Number: 651318
 2. Name of Location: KOCR 21 T FLOWLINE (KOCOCREEK WELL 21T)
 3. Name of nearest community: IMIRINGI
 4. State: BAYELSA LGA: 0481A
 5. Type of Production facility/Installation: FLOWLINE Asset owner /District: LAND 2

B. INCIDENT INFORMATION:

6. Details of incident

- a. Date of incident: 23RD APRIL, 2011
 b. Date/Period of investigation: 29/04/2011
 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 | [N] | [N] ✓ |
| <input type="checkbox"/> Exposed pipe surface | [Y] | [N] ✓ |

IT WAS OBSERVED THAT
 A SECTION OF THE
 FLOWLINE WAS MISSING

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

- | | | |
|--|-----|-------|
| <input type="checkbox"/> Drilled hole, | [Y] | [N] ✓ |
| <input checked="" type="checkbox"/> Hack saw cut, | [X] | [N] ✓ |
| <input type="checkbox"/> Explosive tear, | [X] | [N] ✓ |
| <input type="checkbox"/> Complete Rupture | [X] | [N] ✓ |
| <input type="checkbox"/> Inward dent, | [X] | [N] ✓ |
| <input type="checkbox"/> Well head tampering | [X] | [N] ✓ |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | [X] | [N] ✓ |
| <input type="checkbox"/> Missing pipeline (flowline) | [X] | [N] ✓ |
| <input type="checkbox"/> Crude oil theft (illegal bunkering) point, | [X] | [N] ✓ |
| <input type="checkbox"/> Third party tampering with Clamp Bolt/Nut, | [X] | [N] ✓ |
| <input type="checkbox"/> Third party tampering with valve setting, | [X] | [N] ✓ |
| <input type="checkbox"/> Third party tampering with flange Nuts/bolts, | [X] | [N] ✓ |
| <input type="checkbox"/> Corrosion, | [X] | [N] ✓ |
| Type: <u>NOT APPLICABLE</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 type="checkbox"/> Others (specify): <u>NOT APPLICABLE</u> | [Y] | [N] ✓ |

AFTER JOINT
 INVESTIGATION OF
 THE INCIDENT
 SPILL WAS FOUND
 TO BE DUE TO
 THIRD PARTY
 INTERFERENCE

e. Spill point coordinates

Northing: (MINNA MID-BETT) Easting:

99024 METERS

435522 METERS



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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
- Drinking water source
- Built up area
- Farmlands
- Fish Farm/Pond
- Fishing net
- Others (specify).

[.m]
 [.m] } NOT APPLICABLE
 [.m]
 [30 .m]
 [NIL .m]

9. Containment measures put in place;

- Booms [Y] [N] ✓
- Trench [Y] [N] ✓
- Dyke [Y] [N] ✓
- Others: NATURALLY CONTAINED

10. Any pictures or video coverage?

11. Was there any disruption to the investigation?

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
	<u>NONE WITHIN AREA OF IMPACT</u>				



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B. Crops/Economic Trees

S/N	Type of crop	Young	Medium	Matured	Quantity	Comments
	RAFFIA TREE	FEW	FWS	✓	LOTS	FARMING/ ECONOMIC TREES

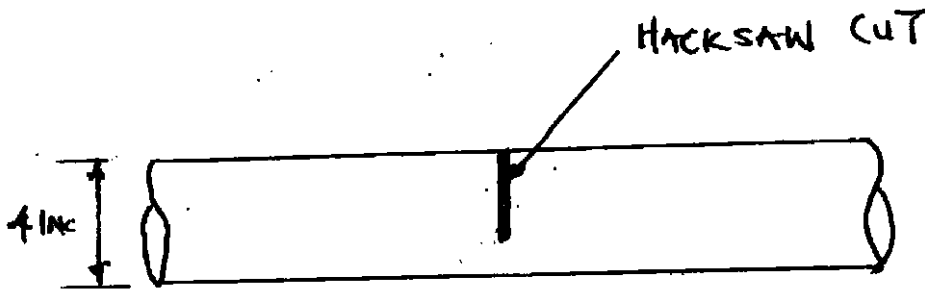
C. Fish/Nets/Ponds

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

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

S/N	Others	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT.			

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



SECTION OF KOLOCREEK WITH 2IT FLOW LINE WITH CUTS



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G INCIDENT INFORMATION:

17 Impacted Area Details

- a. Total calculated area of impact 0.0242 Ha
 - Impact within SPDC R.O.W 0.0242 Ha
 - Impact outside R.O.W NIL

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

Recovery of Oil	<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 193.6 m^2
- ii. Average Depth (m) of pool of free phase oil 0.0015m
- iii.

Volume of pooled free phase oil	<u>1.83</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: 242 m^2
- ii. Average Depth (m) below ground surface of infiltration of oil: 0.0035m
- iii. Soil type: CLAY
- iv. ρ_e (effective porosity of the soil): 8%

	<u>0.43</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		
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
	Percent Total	100%	Total Volume

NOT APPLICABLE

NIL bbl

Spill Factors from USCG FOG (2000 Edition)



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	NIL	barrels
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21. Calculation of evaporated volume:

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

	0.75	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 $V_{Est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$
$V_{Est}(bbls) = 0.75 + 0.43 + 1.83 = 3.01 \text{ BARRELS} \approx 3 \text{ bbls}$
10. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$
$V_{Est}(bbls) = 0.75 + 0.43 + 1.83 \approx 3 \text{ BARRELS}$

- * 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 29 / 04 / 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