

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0452 887984

(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: 887984 2. Type of incident * OIL SPILL
 3. Name of Location 12" IMO RIVER 1 AND 2 - OGALE PIPELINE
 4. Name of nearest community KOM KOM 5. State: RWERS 6. LGA OB1980
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/ District NESP / LAND 1

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 1ST NOVEMBER 2012
 b. Start date/time of investigation: 8TH NOVEMBER 2012
 c. Investigation End date: 17TH NOVEMBER 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

Minna (Mid-belt)

Measuring unit	
Northing: (m) SP1 = 97028.34 SP2 = 97027.84 SP3 = 97027.34 SP4 = 97006.85 SP5 = 97006.35 SP6 = 97005.75	Easting: (m) SP1 = 52349.60 SP2 = 52349.60 SP3 = 52349.60 SP4 = 52340.30 SP5 = 52340.30 SP6 = 52340.30

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

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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) IMO RIVER

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]
- Fish Farm/Pond [,m]
- Fishing net [,m]
- Others (specify). [,m]

NOT APPLICABLE

12. Containment measures put in place;

- Booms Trench Dyke

Others: _____

13. Any pictures or video coverage? [N]

14. 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

15. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
	<u>NONE WITHIN AREA OF IMPACT</u>				

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16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
	Palm Tree	—	—	✓	20	

17. Fish/Nets/Ponds

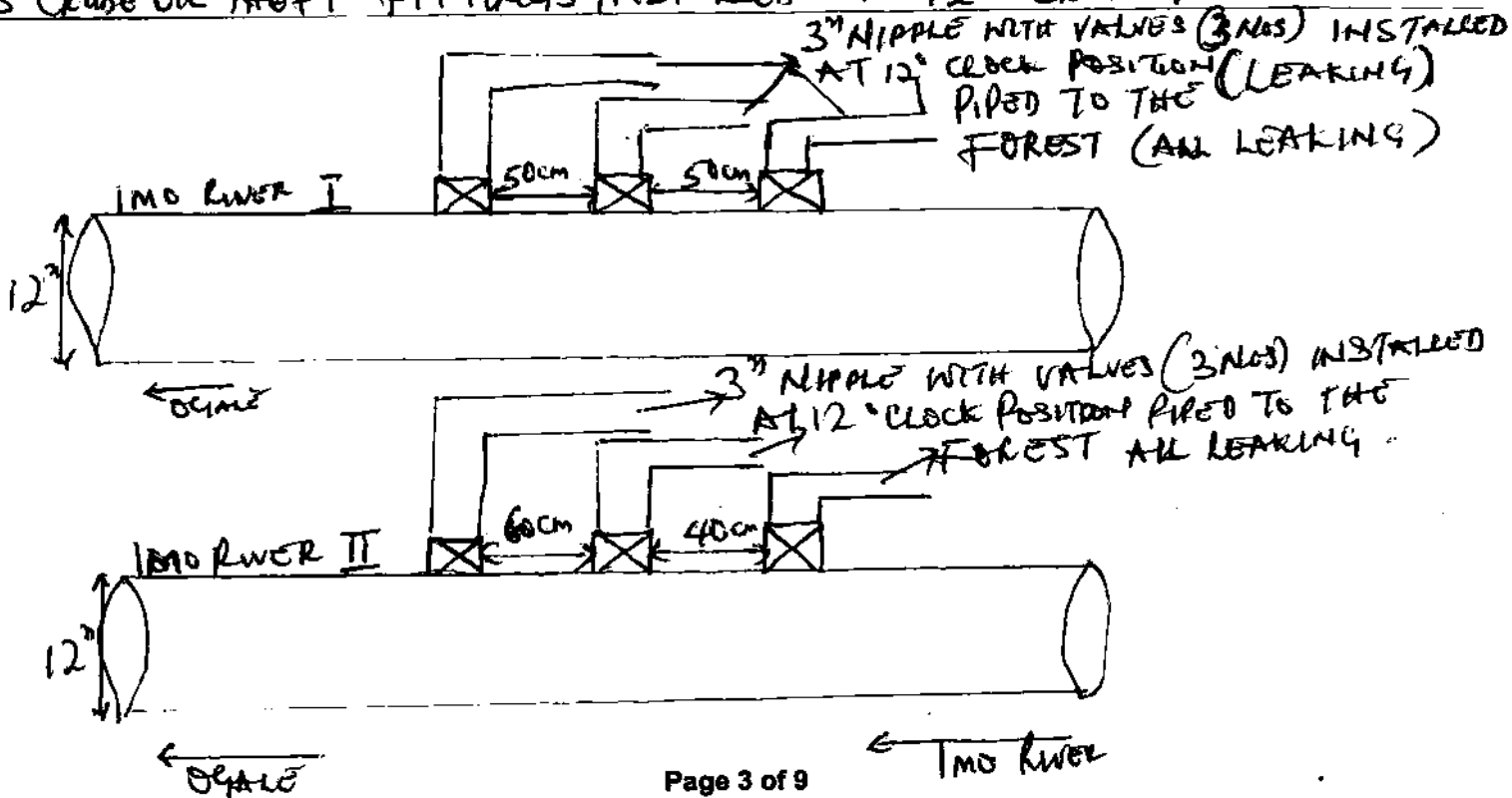
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	Fish	Trapped in boom Area	3	dead

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)

SECTION OF 12" IMO RIVER LAND 2 - OYALE PIPELINE AT Km Km SHOWING 3 NOS CRUDE OIL THEFT FITTINGS INSTALLED AT 12 O'CLOCK POSITION



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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)

S/N	Northing	Easting

See attached
 RW, 20/11/2012

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 46.51 ha
~~70 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}	788	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 (m²) occupied by pool of free phase oil 29,700 m²
 - ii. Average Depth (m) of pool of free phase oil 0.015 m

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iii. Emulsification factor: Nil

iv. Volume of pool of free phase oil, V_{pool} : 2,802.20 barrels

Volume of infiltrated oil at Spill Point I
 $area = 20$
 average depth above = 1.3m
 depth below = 0.002m
 soil type = CLAY
 porosity = 8%
 $20 \times 1.3 \times 0.08 = 2.08$
 volume of infiltrate oil at Spill Point I = 2.08 bbls

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

- i. Area *(m²) covered by the oil: 47,165 m²
- ii. Area of the pool of free phase oil in touch with soil: 29,700 m²
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.002m

Soil type: CLAY
 P_c (effective porosity of the soil): 8% = 74.15 bbls

iv. Volume of infiltrated oil, V_{inf} : 74.18 + 9.83 + 13.10 = 97.11 barrels

area = 15
 depth above = 1.3
 depth below = 0.002
 soil type = CLAY
 porosity = 8%
 $15 \times 1.3 \times 0.08 = 1.56$
 volume of infiltrate oil at Spill Point II = 1.56 bbls

c. Computation of volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: 30ha = 38.81 ha = 388,100 m²
- 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		
Bright Color	0.0003	10%	0.07
Dull	0.001	10%	0.04
Dark	0.002	10%	0.08
Black oil	0.1	20%	7.76
Emulsion (30% Oil)	1	50%	58.22
Percent Total		100%	Total Volume 66.11 bbl

iii. Volume of oil on open water, V_{water} : 415.80 barrels

22. Calculation of evaporated volume:

- i. Oil type: BONNY MEDIUM
- ii. E-Factor: 15%

iii. Volume of evaporated oil, V_{evap} : 585.02 barrels

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

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

$$V_{Est}(bbls) = 585.02 + 415.8 + 97.11 + 2802.2 + 788 \Rightarrow 4688.13 \text{ bbls}$$

24. Net Total Estimated Spilled Volume

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

$$V_{Est}(bbls) = 585.02 + 415.8 + 97.11 + 2802.2 + 788 \Rightarrow 4,688.13 \approx 4,689 \text{ BBLs}$$

*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 = 4,689 BBLs

*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 27/11/2012 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

27. Appendix 1: Overview sketch of the site

Location: 12" IMO RIVER 1 AND 2 - OGALE PIPELINES AT KOM KOM

