

**THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.**

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1092330 JIV report S/N: 0370

(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: 1092330 2. Type of incident\* OIL SPILL  
 3. Name of Location 16" NUNRIVER - KOLOCREEK PIPELINE  
 4. Name of nearest community OPOROMA 5. State: BAYELSA 6. LGA SOUTHERN IJAW  
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

**B. INCIDENT INFORMATION:**

9. Details of incident

- a. Date of incident: 23RD DECEMBER, 2013  
 b. Start date/time of investigation: 29TH DECEMBER, 2013 / 12:37 HOURS  
 c. Investigation End date: 29TH DECEMBER, 2013 Actual investigation duration, days: ONE (1) DAY  
 d. Description of spill point environment 2013

- Firmed soil                       Loose soil                       Recently excavated area
- Under water                       Swampy                       Exposed pipe surface
- Well Platform (on Water)                       Drill Rig
- e. Description of leak point (tick as applicable);
- Drilled hole                       Hack saw cut                       Tear (\_\_\_\_\_),
- Complete Rupture                       Inward dent,                       Well head tampering
- Failed Weld-on illegal hot tap valve,  Failed Clamp                       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,
- Bulging Outward                       Flare System/Bund wall failure  Accidental 3<sup>rd</sup> party  
 equipment impact                       Valve Failure                       com unit failure                       Cold vent
- Relief valve failure                       Others (specify) \_\_\_\_\_

f. Incident caused by:

- Third party interference (Sabotage ; crude theft ; Line theft ; Accidental 3<sup>rd</sup> party damage   
 Operational                       Others (including Mystery spills) \_\_\_\_\_

g. Spill point coordinates

Measuring unit <u>MINNA (MID BELT)</u>	
Northing:  <u>89535.00mN</u>	Easting:  <u>404591.01mE</u>

\*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     Shoreline/Waterfront

i. Type of environment to which oil has spread:

- Land     Swamp (SEASONAL)     Water     River (identify) \_\_\_\_\_

ii. Weather condition

- Rain     Sunny     Dry     Wet     Windy     Hot     Cool

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). **RAFFIA PALM**

**IMPACTED BY SPILL.**

12. Containment measures put in place;

- Booms     Trench     Dyke     Natural depression     Pit

Others: **RAFFIA PALM FRONDS**

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

16. Crops/Economic Trees

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S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1.	RAFFIA PALM TREES			✓	LOT	WITHIN SPILL-IMPACTED REGION.

17. Fish/Nets/Ponds

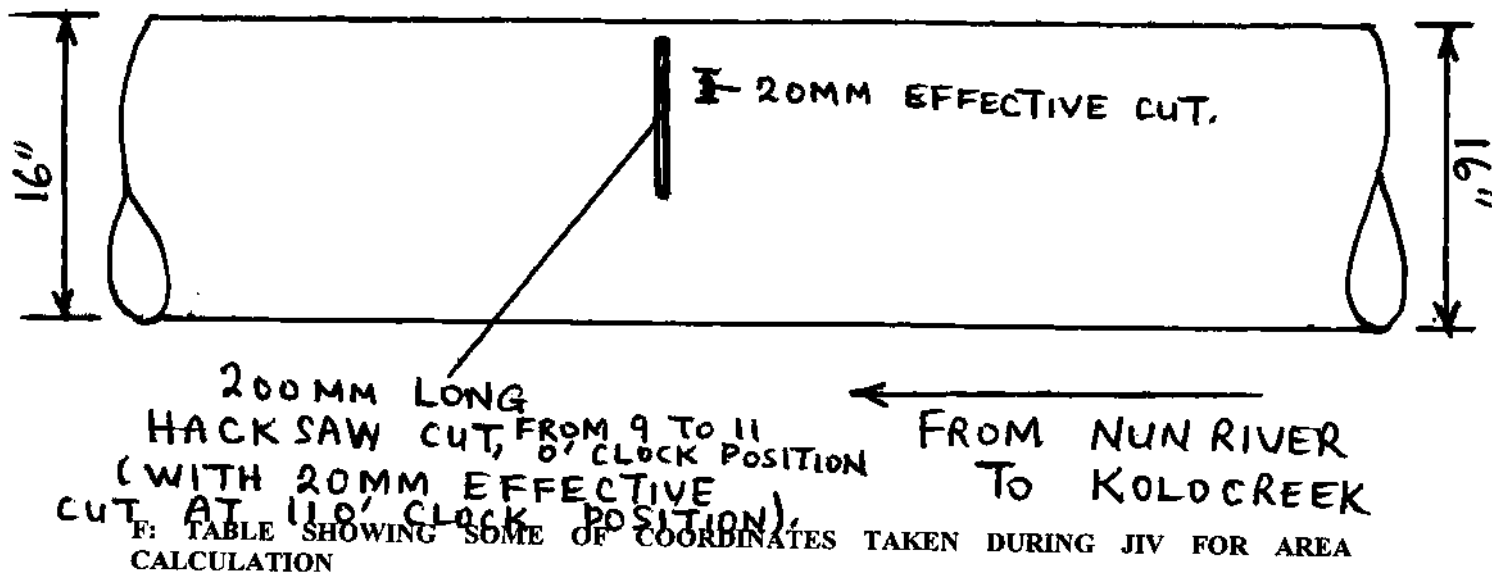
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
		NONE WITHIN AREA OF IMPACT		

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)

SECTION OF 16" NUN RIVER - KOLOCREEK PIPELINE AT OPOROMA SHOWING POSITION OF HACKSAW CUT.



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19. Impacted area boundary Coordinates (*If more, Print and attach as an appendix*)

MINNA (MID BELT)

S/N	Northing (m)	Easting (m)
WP271	89544.26	404578.71
WP272	89550.40	404581.82
WP273	89550.24	404628.07
WP274	89562.40	404665.11
WP275	89562.38	404671.28
WP276	89516.54	404597.12
WP277	89516.56	404590.95
WP278	89544.29	404572.55
WP279	89578.72	404709.14
WP280	89574.43	404690.09
WP281	89570.14	404716.91
WP282	89534.27	404634.37
WP283	89477.91	404470.86
WP284	89471.16	404497.71
WP285	89494.85	404484.21
WP286	89525.27	404547.22
WP287	89433.62	404559.99
WP288	89489.93	404577.14

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.88Ha
- Impact within SPDC R.O.W YES
- Impact outside SPDC R.O.W YES

21. Volume of oil recovered before completion of JIV (V<sub>rec</sub>):

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Recovered oil $V_{rec}$ :	<u>1.51</u>	Barrels
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22. Computation of estimated residual volume on site

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

- i. Area ( $m^2$ ) occupied by pool of free phase oil 8,667
- ii. Average Depth (m) of pool of free phase oil 0.004
- iii. Emulsification factor: NIL

iv.

Estimated Volume of pool of free phase oil:	<u>218.06</u>	barrels
$V_{pool}$ :		

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

1. Estimated Volume of infiltrated oil at spill point ( $V_{inf a}$ )

- i. Area\* ( $m^2$ ) of soil covered by the oil: 1
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.4m
- iii. Soil type: SILT iv.  $P_c$  (effective porosity of the soil): 21%
- v. Cause of spill: THIRD PARTY INTERFERENCE vi. Oil type: BONNY LIGHT
- vii. Oil Residence time on site, day: 6 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.1m
- ix. Estimated depth of infiltration around spill point: 1.5m

Estimated Volume of infiltrated oil at spill point $V_{inf a}$ :	<u>1.98</u>	barrels
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2. Estimated Volume of infiltrated oil at second spill point [if applicable] ( $V_{inf b}$ )

- i. Area\* ( $m^2$ ) of soil covered by the oil: \_\_\_\_\_
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: \_\_\_\_\_
- iii. Soil type: \_\_\_\_\_ iv.  $P_c$  (effective porosity of the soil): \_\_\_\_\_
- v. Cause of spill: \_\_\_\_\_ vi. Oil type: \_\_\_\_\_
- vii. Oil Residence time on site, day: \_\_\_\_\_
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: \_\_\_\_\_
- ix. Estimated depth of infiltration around spill point: \_\_\_\_\_

Estimated Volume of infiltrated oil at spill point $V_{inf b}$ :	<u>NIL</u>	barrels
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3. E

Estimated Volume of infiltrated oil outside immediate spill point(s) region ( $V_{inf c}$ )

- i. Area ( $m^2$ ) of soil covered by the oil: 98
- ii. Area ( $m^2$ ) of the pool of free phase oil in touch with soil: NIL
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.1
- iv. Soil type: SILT
- v.  $P_c$  (effective porosity of the soil): 21%

vi.

Estimated Volume of infiltrated oil. At $V_{inf c}$ :	<u>12.94</u>	barrels
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23. Computation of estimated volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: NIL

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ii. Table of average depth of oil on water based on coloration (\*\*Spill Factors from USCG FOG (2000 Edition))

	Thickness (mm)	Percentage coverage	Volume (m3)
Barely Visible	0.00004	<b>NOT</b>	
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001	<b>APPLICABLE</b>	
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

iii.	Percent Total 100%	Estimated Volume of oil on open water. $V_{wat}$ :	<b>NIL</b>	Barrels
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24. Calculation of evaporated volume:

i. Estimated Volume available for evaporation within surface area: 234.5 BARRELS

ii. E-Factor: 25%

iii.	Estimated Volume of evaporated oil. $V_{evap}$ :	<b>78.17</b>	Barrels
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Evaporation Factors (E-Factor) for SPDC Crude oil			
Oil Type	Days on site	Bonny Light	Bonny Medium
Oil Residence time	< 1 day	10%	5%
	1-7 days	25%	15%
	> 7 days	40%	25%

**25. Net Estimated Spilled Volume  $V_{net}$  (bbbls) =  $V_{evap}$  (bbbls) +  $V_{wat}$  (bbbls) +  $V_{inf}$  (bbbls) +  $V_{pool}$  (bbbls) +  $V_{recd}$  (bbbls) = 78.17 + NIL + 14.93 + 218.06 + 1.51  
≈ 312.66**

**Estimated Reported Volume\*\*  $V_{rep}$  (bbbls) = 313 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  $m^3$  to barrels is Volume (m3) x 6.29; \*\*Round up estimated volume to next whole number using the following rules:

- Any spill volume in excess of 1 bbl is rounded up to the next whole number.
- Any spill volume in less than 1 bbl is rounded up to the next 0.1 bbl.

Examples: Calculated volume = 15.3 bbl ----- Reported volume = 16 bbl  
 Calculated volume = 0.35 bbl ----- Reported volume = 0.4 bbl  
 Calculated volume = 0.01 bbl ----- Reported volume = 0.1 bbl.

Wherever this estimation tool is not applicable please refer to paragraph 6c (Deviations) of the JIV procedure to use appropriate steps for column estimation; record the calculation in a plain sheet of paper and attach to the JIV report.

**26. 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

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B. Investigation of the incident site showed that there is residual impact on site requiring further works

27. REPRESENTATIVES

This report was filled, agreed and signed on the 29/12/2013 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]:
- Signatories agree with reported findings:
- Separate DPR form has been filled out with same findings

*Tick as applicable*

28. Appendix 1: Overview sketch of the site

Location: 16" NUNRIVER - KOLOCREEK PIPELINE AT OPOROMA

