

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

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1066157 JIV report S/N: 0337

*(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: 2013-1066157 2. Type of incident\* OIL SPILL  
 3. Name of Location 14" OKORODIA-RUMUKEPE TIL AT IKARAMA  
 4. Name of nearest community IKARAMA 5. State: BAYELSA 6. LGA YENAGOMA  
APOLINE  
 7. Type of Production facility/Installation PIPELINE 8. Asset owner/District KOLO CREEK

**B. INCIDENT INFORMATION:**

9. Details of incident

- a. Date of incident: 2-NOV-2013  
 b. Start date/time of investigation: 6-NOV-2013  
 c. Investigation End date: 6-NOV-2013 Actual investigation duration, days: ONE  
 d. Description of spill point environment  
 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>METERS</u> <u>MINNA (MID-BELT)</u>	
Northing:  <p align="center"><u>127837.92</u></p>	Easting:  <p align="center"><u>443645.07</u></p>

\*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
- 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). [ ,m]

12. Containment measures put in place;

- Booms
- Trench
- Dyke
- Natural depression
- Pit
- Others: \_\_\_\_\_

13. Any pictures or video coverage?  [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
<u>NONE WITHIN AREA OF IMPACT</u>					

16. Crops/Economic Trees

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S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	PALM TREES			✓	THIRTY	
2	PALM TREES		✓		EIGHT	
3	PLANTAIN TREES		✓		THREE	

17. Fish/Nets/Ponds

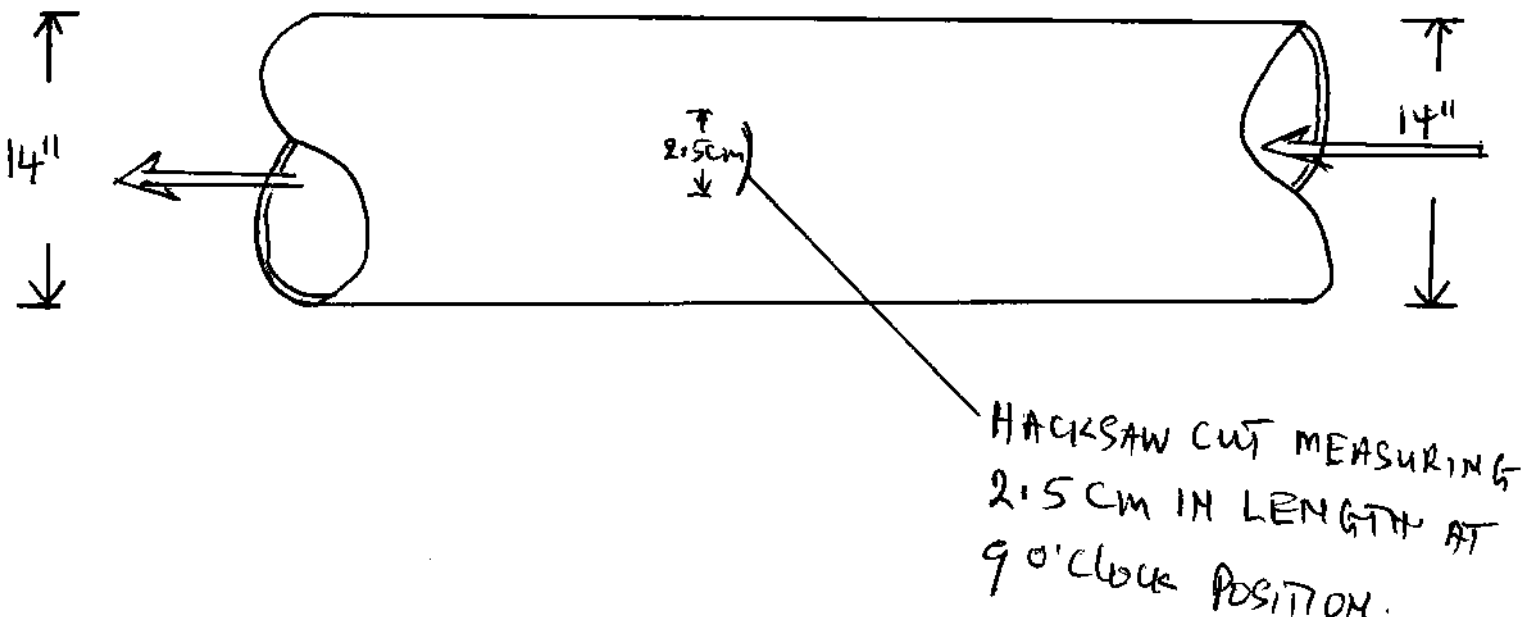
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
1	FISH	SCALED.	ONE (SMALL)	

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 14" OKORITA - RUMUWUPE TRUNK LINE AT IKAAMA  
SHOWING POSITION OF HACKSAW CUT.



**F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION**

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19. Impacted area boundary Coordinates (If more, Print and attach as an appendix)  
MUNJA (MID-BELI)

S/N	Northing METERS	Easting METERS
	127847.15	443642.02
	127837.95	443635.83
	127831.80	443638.89
	127798.14	443592.57
	127785.94	443564.80
	127776.71	443567.85
	127770.54	443577.07
	127767.43	443586.31
	127752.06	443589.34
	127776.55	443617.14
	127782.65	443632.57
	127770.31	443647.93
	127785.68	443644.90
	127797.87	443675.75
	127849.97	443722.14
	127771.86	443649.39
	127783.52	443638.11
	127825.96	443698.33
	127864.88	443705.79
	127853.99	443679.60

**G. INCIDENT INFORMATION:**

20. Impacted Area Details

- Total calculated area of impact 0.64 Ha
- 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>NIL</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 6,400
- ii. Average Depth (m) of pool of free phase oil 0.002
- iii. Emulsification factor: 0%
- iv.

Estimated Volume of pool of free phase oil. $V_{pool}$ :	<u>80.51</u>	barrels
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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: 4
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.50
- iii. Soil type: CLAY iv.  $P_e$  (effective porosity of the soil): 8
- v. Cause of spill: SABOTAGE vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 4
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0011m
- ix. Estimated depth of infiltration around spill point: 1.5011m

Estimated Volume of infiltrated oil at spill point: $V_{inf a}$ :	<u>3.02</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.  $P_e$  (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: 896
- ii. Area ( $m^2$ ) of the pool of free phase oil in touch with soil: 896
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.002
- iv. Soil type: CLAY
- v.  $P_e$  (effective porosity of the soil): 8

Estimated Volume of infiltrated oil. At $V_{inf c}$ :	<u>4.82</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 APPROPRIATE</b>	
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
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: 85.34 Bbls
- ii. E-Factor: 154.

iii.	Estimated Volume of evaporated oil. $V_{evap}$ :	<b>15.06</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  $V_{res}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{int}(bbls) + V_{pool}(bbls) + V_{recf}(bbls) = 15.06 + NIL + 4.82 + 80.51 + NIL = 100.39 Bbls$**

**Estimated Reported Volume\*\*  $V_{rep}(bbls) = 101 Bbls$**

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; 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

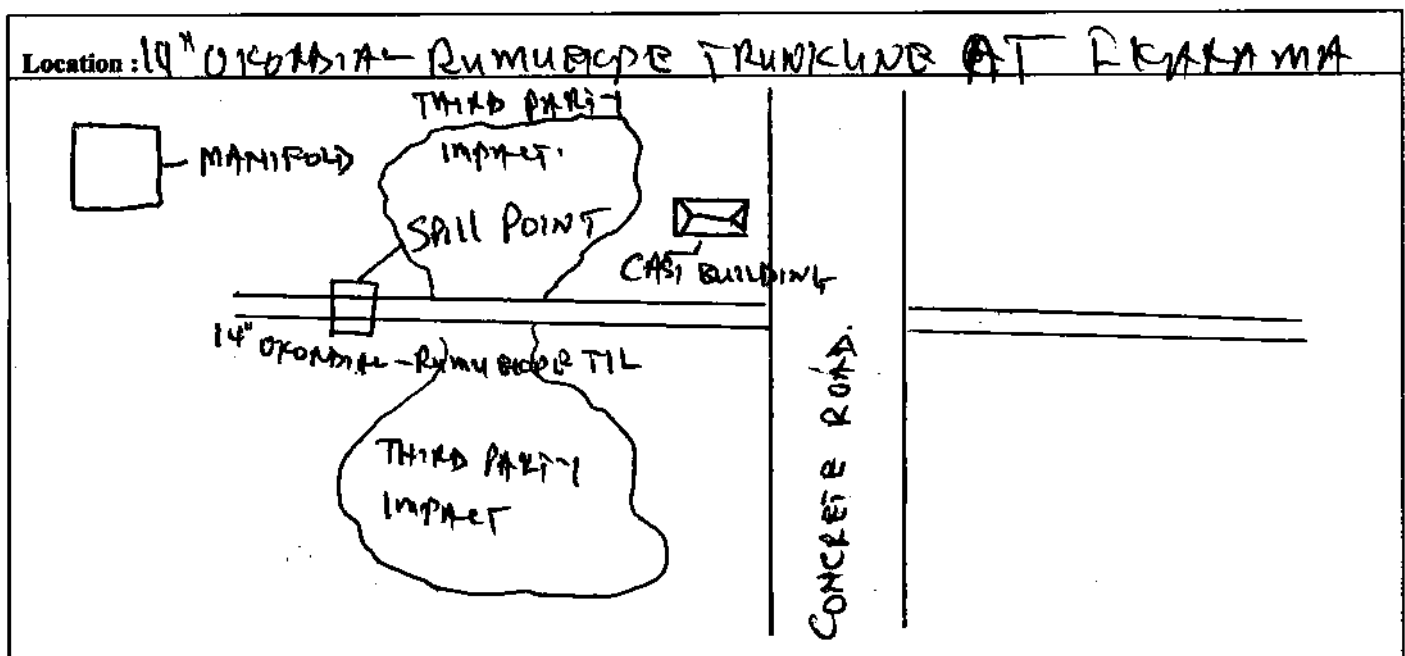
27. REPRESENTATIVES

This report was filled, agreed and signed on the 06/11/2013 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



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