

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 965856 JIV report S/N: 0063

(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: 965856 2. Type of incident* OIL SPILL
 3. Name of Location 24" NEMBE CREEK PIPELINE (CAWTHORNE CHANNEL - BONNY LOOP LINE)
 4. Name of nearest community KALIBIAMA 5. State: RIVERS 6. LGA BONNY
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 24TH APRIL, 2013
 b. Start date/time of investigation: 24TH APRIL, 2013 / 14:38 HOURS.
 c. Investigation End date: 26TH APRIL 2013 Actual investigation duration, days: THREE (3) DAYS
 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 3rd 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 3rd party damage
 Operational Others (including Mystery spills) _____

g. Spill point coordinates

Measuring unit (M)	MINNA MID-BELT	
Nothing:	Northing:	Easting:
POINT 1 (LEAKING)	55220.98	519247.09
POINT 2 (NON-LEAKING)	55182.09	519328.46

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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). **MANGROVE VEGETATION IMPACTED BY SPILL**

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit
- Others: **BUNDWALLS**

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
	NONE WITHIN AREA OF IMPACT				

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16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
No. 1	MANGROVE			✓	NUMEROUS	WITHIN SPILL-IMPACT REGION

17. Fish/Nets/Ponds

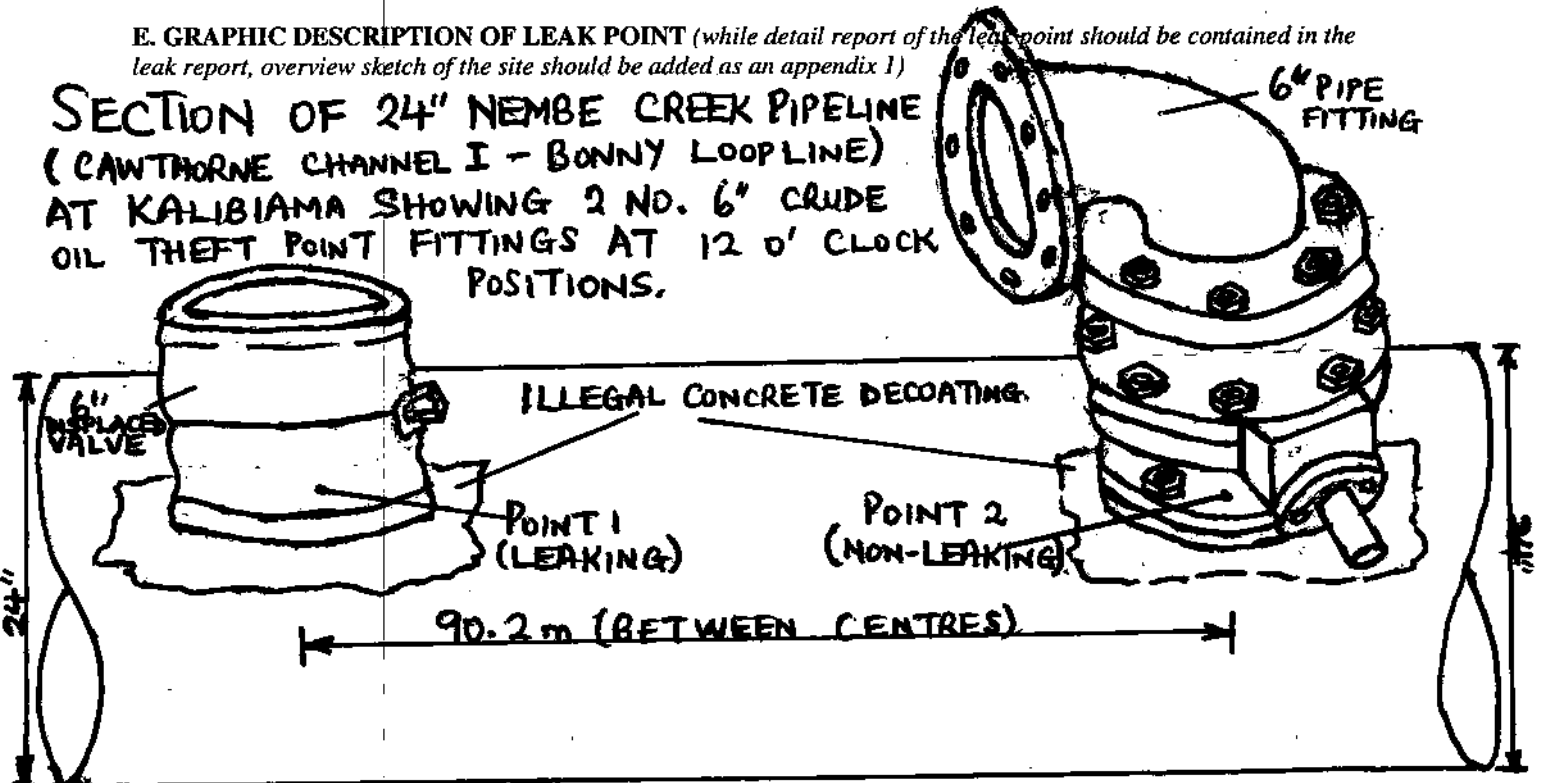
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
		NONE WITHIN AREA OF IMPACT		

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 24" NEMBE CREEK PIPELINE (CAWTHORNE CHANNEL I - BONNY LOOPLINE) AT KALIBIAMA SHOWING 2 NO. 6" CRUDE OIL THEFT POINT FITTINGS AT 12 O' CLOCK POSITIONS.



← CAWTHORNE CHANNEL I

→ BONNY.

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F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION
 19. Impacted area boundary Coordinates (If more, Print and attach as an appendix)

MINNA MID-BELT

S/N	Northing (m)	Easting (m)
WP365	55185.56	519 332.35
WP366	55179.42	519 332.33
WP367	55182.51	519 323.09
WP368	55185.57	519 326.18
WP369	55213.39	519 236.83
WP370	55228.91	519 242.94
WP371	55232.79	519 254.11
WP372	55225.34	519 263.18
WP373	55224.79	519 233.98
WP374	55222.58	519 249.18
WP375	55219.51	519 249.17
WP376	55219.52	519 243.01
WP377	55225.66	519 243.02
WP378	55213.44	519 209.08
WP379	55210.46	519 159.75
WP380	55229.03	519 085.80
WP381	55265.83	519 116.70
WP382	55244.42	519 067.33
WP383	55222.94	519 054.96
WP384	55201.42	519 067.25
WP385	55152.32	519 042.50
WP386	55207.64	519 158.86
Pt2	55167.41	519 059.48
Pt3	55216.61	519 252.18

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G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.32 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_{rec}):

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 333
- ii. Average Depth (m) of pool of free phase oil 0.021
- iii. Emulsification factor: NIL

iv.

Estimated Volume of pool of free phase oil. V_{pool} :	<u>43.99</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: 1
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 2.6
- iii. Soil type: CLAY iv. P_e (effective porosity of the soil): 8%
- v. Cause of spill: INTERFERENCE Oil type: BONNY LIGHT
- vii. Oil Residence time on site, day: 2 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.001m
- ix. Estimated depth of infiltration around spill point: 2.601m

x.

Estimated Volume of infiltrated oil at spill point. $V_{inf a}$:	<u>1.31</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: _____ 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. Estimated Volume of infiltrated oil outside immediate spill point(s) region ($V_{inf c}$)

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- i. Area (m²) of soil covered by the oil: 1876
- ii. Area (m²) of the pool of free phase oil in touch with soil: NIL
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.001
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%
- vi.

Estimated Volume of infiltrated oil. At V _{inf} :	<u>0.52</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: 1,001m²
- ii. Table of average depth of oil on water based on coloration **Spill Factors from USCG FOG (2000 Edition)

	Thickness (mm)	Percentage coverage	Volume (m ³)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002	<u>5%</u>	<u>0.0001</u>
Black oil	0.1	<u>95%</u>	<u>0.0951</u>
Emulsion (30% Oil)	1		

Percent Total 100% 0.0952

iii.

Estimated Volume of oil on open water. V _{wat} :	<u>0.6</u>	Barrels
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24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 46.41 BARRELS
- ii. E-Factor: 25%
- iii.

Estimated Volume of evaporated oil. V _{evap} :	<u>15.47</u>	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 $V_{est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recf}(bbls) =$ 15.47 + 0.6 + 1.89 + 43.99 + NIL = 61.88

Estimated Reported Volume V_{rep}(bbls)=** 62 BARRELS

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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 m³ 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 <input type="checkbox"/>
B. Investigation of the incident site showed that there is residual impact on site requiring further works <input checked="" type="checkbox"/>

27. REPRESENTATIVES

<p>This report was filled, agreed and signed on the <u>26/04/2013</u> by joint investigation representatives from</p> <ul style="list-style-type: none">• Host Community: <input checked="" type="checkbox"/>• Department of Petroleum Resources [DPR]: <input type="checkbox"/>• National Oil Spill Detection and Response Agency [NOSDRA]: <input checked="" type="checkbox"/>• State Ministry of Environment [SME]: <input checked="" type="checkbox"/>• Nigeria Police Force [NPF]: <input checked="" type="checkbox"/>• Shell Petroleum Development Company [SPDC]: <input checked="" type="checkbox"/>• Signatories agree with reported findings: <input checked="" type="checkbox"/>• Separate DPR form has been filled out with same findings <input type="checkbox"/> <p style="text-align: right;"><i>Tick as applicable</i></p>

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28. Appendix 1: Overview sketch of the site

