

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1200385 JIV report S/N: 00603

(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: 1200385 2. Type of incident* OIL SPILL
 3. Name of Location NEMBE 1 WELL 23 T FLOWLINE
 4. Name of nearest community NEMBE CREEK State: BAYELSA LGA NEMBE
 7. Type of Production facility/Installation OIL FLOWLINE 8. Asset owner/District SWAMP 2

B. INCIDENT INFORMATION:

9. Details of incident
 a. Date of incident: 23RD JUNE, 2014
 b. Start date/time of investigation: 3RD JULY, 2014 / 15: 20 HOURS; 25TH JULY, 2014
 c. Investigation End date: 26TH JULY, 2014 Actual investigation duration, days: THREE (3) DAYS
 d. Description of spill point environment

- | | | |
|---|--|--|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input type="checkbox"/> Recently excavated area |
| <input type="checkbox"/> Under water | <input checked="" type="checkbox"/> Swampy | <input type="checkbox"/> Exposed pipe surface |
| <input type="checkbox"/> Well Platform (on Water) | | <input type="checkbox"/> Drill Rig |

Additional observations around the spill point: **BUBBLES WERE NOTICED AT THE IDENTIFIED SPILL POINT LOCATION WHICH WAS OBSERVED TO BE CORDONED-OFF WITH PALM FRONDS AS AT TIME OF JOINT INVESTIGATION TEAM (J.I.T.) ARRIVAL AT SITE. A BRIDGE-LIKE WOODEN STRUCTURE WAS NOTICED BY THE SPILL POINT. IMPACTED SOIL IS BROWN SILTY CLAY WITH SOME ORGANIC MATTER.**

- e. Description of leak point (tick as applicable);
- | | | |
|---|---|--|
| <input type="checkbox"/> Drilled hole | <input type="checkbox"/> Hack saw cut | <input type="checkbox"/> Tear (_____), |
| <input type="checkbox"/> Complete Rupture | <input type="checkbox"/> Inward dent, | <input type="checkbox"/> Well head tampering |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | <input type="checkbox"/> Failed Clamp | <input type="checkbox"/> Missing Pipeline/Flowline |
| <input type="checkbox"/> Crude oil theft (illegal bunkering) point, | | <input type="checkbox"/> Third party tampering with Clamp |
| <input type="checkbox"/> Third party tampering with valve setting, | | <input type="checkbox"/> Third party tampering with flange, |
| <input checked="" type="checkbox"/> Corrosion | <input type="checkbox"/> Saver-pit over flow, | <input type="checkbox"/> Surge vessel overflow, |
| <input type="checkbox"/> Bulging Outward | <input type="checkbox"/> Flare System/Bund wall failure | <input type="checkbox"/> Accidental 3 rd party equipment impact |
| <input type="checkbox"/> Valve Failure | <input type="checkbox"/> com unit failure | <input type="checkbox"/> Cold vent |
| <input type="checkbox"/> Relief valve failure | <input type="checkbox"/> Others (specify) _____ | |

- f. Incident caused by:
- Third party interference (Sabotage ; crude theft ; Line theft ; Accidental 3rd party damage
 Operational Others (including Mystery spills) _____

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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1200385 JIV report S/N: 00603

g. Spill point coordinates

Measuring unit (m)		<u>MENA MID-BELT</u>	
Northing:		Easting:	
<u>48 448.04</u>		<u>428 892.23</u>	
/		/	

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) PALM TREES AND CASSAVA STEMS [,m]

IMPACTED BY SPILL.

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit None
 Others: BUND WALLS; EXCAVATED DITCH AROUND SPILL POINT.

13. Any pictures or video coverage?

[Y] [N]

14. Further response/repair initiated as at the time of JIV?

[Y] [N]

If yes to item 14, give brief description:

RECOVERY OF FREE-PHASE OIL WAS DONE PARTICULARLY AT SPILL POINT LOCATION TO ENABLE EXPOSURE OF SPILL POINT.

15. Was there any disruption to the investigation?

[Y] [N]

2014 WAS CONSIDERABLY DELAYED DUE TO DEMONSTRATIONS FROM COMMUNITY

IF YES TO ITEM 15 GIVE BRIEF DESCRIPTION: WOMEN WHO INITIALLY HINDERED THE J.I.T FROM

ACCESSING THE SPILL SITE ALLEGING NON-PROVISION OF RETICULATED WATER AND ELECTRICITY FOR THE COMMUNITY BY SPDC (SUPPOSEDLY COVERED UNDER THE NEMBE G.MOU. AGREEMENT) AND NON-SETTLEMENT OF BENEFITS TO THE COMMUNITY BY THE REPAIR CONTRACTOR. DUE TO TIME CONSTRAINTS, J.I.T COULD NOT REMAIN ON SITE TO ASCERTAIN THE CAUSE OF LEAK (BUT ONLY ASSESSED THE AREA OF IMPACT) ALTHOUGH ON EXPOSURE, LEAK SOURCE WAS CONFIRMED FROM THE WELL 23T FLOWLINE (NOT THE 8" PIPELINE EARLIER SUSPECTED). ON 25TH JULY, 2014 (SECOND JIV) J.I.T RE-ASSESSED THE NOW-OBSERVED ESCALATED AREA OF IMPACT BUT WAS AGAIN UNABLE TO LEAK CAUSE DUE TO MONETARY DEMANDS MADE BY COMMUNITY BEFORE WORK COULD COMMENCE. HOWEVER, ON 26TH JULY, 2014 (THIRD JIV), SPILL CAUSE WAS CONFIRMED UPON SPILL POINT EXPOSURE TO BE CORROSION.

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1200385 JIV report S/N: 00603

D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL

16. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
1	BLOCKS	HOLLOW SANDCRETE	18" x 6" x 8" HIGH	297 NO.	IMPACTED BY SPILL

17. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1.	PALM TREES	1 NO.	—	2 No.	3 No.	IMPACTED BY SPILL
2.	COCONUT	—	—	1 NO.	1 NO.	
3.	CASSAVA	—	13 NO.	1 NO.	14 NO.	
4.	PLANTAIN	—	7 NO.	—	7 NO.	

18. Fish/Nets/Ponds

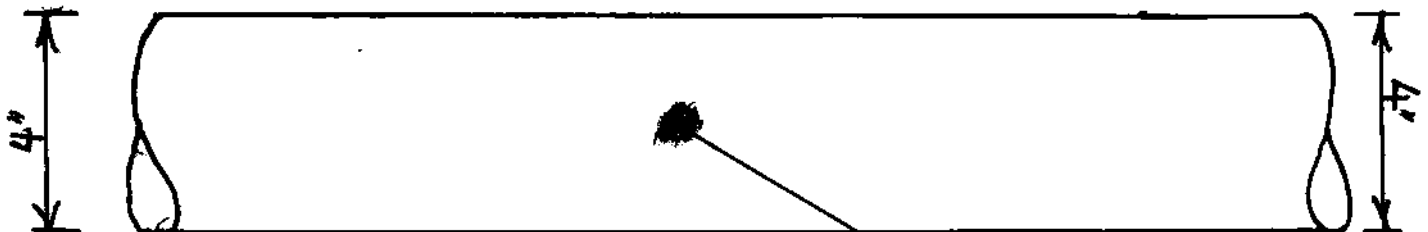
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE	WITHIN AREA OF IMPACT		

19. 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 NEMBE 1 WELL 23T FLOWLINE AT NEMBE CREEK SHOWING LEAK DUE TO CORROSION AT 3 O'CLOCK POSITION.



FROM NEMBE 1 WELL 23

TO NEMBE 1 FLOWSTATION.

LEAK DUE TO CORROSION AT 3 O'CLOCK POSITION.

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1200385 JIV report S/N: 00603

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

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

MWNA MID-BELT

S/N	Northing (m)	Easting (m)
P2	48 533.99	428 926.41
P3	48 527.85	428 926.39
P4	48 472.57	428 913.89
P5	48 383.53	428 885.87
P6	48 312.89	428 870.23
P7	48 300.60	428 870.20
P8	48 306.75	428 867.13
P9	48 328.27	428 864.11
P10	48 355.91	428 870.36
P11	48 414.26	428 885.96
P973	48 435.74	428 895.27
P974	48 432.69	428 889.10
P975	48 435.78	428 882.94
P976	48 445.00	428 882.96
P977	48 466.54	428 873.77
P978	48 457.25	428 898.42
P979	48 444.94	428 901.47
P998	48 469.50	428 910.80
P999	48 478.71	428 913.91
P1	48 515.58	428 917.10

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1200385 JIV report S/N: 00603

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.20Hq.
- Impact within SPDC R.O.W YES
- Impact outside SPDC R.O.W NO

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

Recovered oil V_{rec} :	<u>30</u>	Barrels
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Controlled recovery/evacuation from source with no impact to environment:

<u>NIL</u>	Barrels
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22. New Estimated Spilled Volume V_{est} (bbbls) = <u>179.8</u>
Estimated Reported Volume** V_{est} (bbbls) = <u>180 BARRELS</u>

***Notes:**

- Volume estimation was done using an excel based tool. (see attached for details on the calculation)
- Reported spilled volume is an estimate

Write other relevant notes taken into consideration for estimating the spilled in the box below:

NOT APPLICABLE

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 (m^3) 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.

ESTIMATION OF OIL SPILL VOLUME

A OIL SPILLED ONSHORE/OFFSHORE (Leak stopped at source)

Impacted Area Details

Total Calculated Area of Impact

- i Impact within SPDC R.O.W
- ii Impact outside SPDC R.O.W

2,010.00	m ²
2,010.00	m ²
0.00	m ²

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

- i Estimated Recovered oil (Net)

30.00	bbbls
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Estimated Recovered oil (Net) V_{rec}	30.00	bbbls
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2 Computation of estimated residual volume on site

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

- i Total area occupied by pool of free phase oil
- ii Average depth of pool of free phase oil
- iii Emulsification factor (If applicable, else 0%)

498.00	m ²
0.022	m
0	%

Estimated Volume of pool of free phase oil, V_{pool}	10.98	m³
Estimated Volume of pool of free phase oil, V_{pool}	68.94	bbbls

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

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

- i Total area covered by the oil (infiltration)
- ii Average depth of infiltration above leaking facility i.e. pipeline/flowline
- iii Soil type
- iv P_e (effective porosity of the soil)

2.00	m ²
2.000	m
Clay	
8	%

v Cause of spill

Operational	
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vi Calculation of days for infiltration below the leaking point on pipeline or flowline

Incident Date	JIV Date	Days on Site
6/23/2014 8:30	7/26/2014 12:50	33
If 'cause of spill' is operational, use 1 week as worst case scenario except where 'days on site' exceeds 7.		7

Infiltration of oil types in various soil types vs time.			
Soil type	Approximate time to reach 1m depth below ground level		
Oil type	Sand	Loam	Clay
Bonny Medium	3 weeks	3 years	> 10 years
Bonny Light	2 days	2 months	> 10 years

vii Oil type

Bonny Light	
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viii Average depth of infiltration below leaking facility i.e. pipeline/flowline

0.009	m
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ix Total depth below ground surface of infiltration of oil

2.009	m
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Estimated Volume of infiltrated oil, V_{inf a}	0.32	m³
Estimated Volume of infiltrated oil, V_{inf a}	2.02	bbbls

2 Volume of infiltrated oil at second spill point [if applicable] (V_{inf b})

- i Total area covered by the oil (infiltration)
- ii Average depth of infiltration above leaking facility i.e. pipeline/flowline
- iii Soil type
- iv P_e (effective porosity of the soil)

	m ²
	m
- Select -	
0	%

v Average depth of infiltration below leaking facility i.e. pipeline/flowline

0.000	m
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vi Total depth below ground surface of infiltration of oil

0.000	m
-------	---

Estimated Volume of infiltrated oil, V_{inf b}	0.00	m³
Estimated Volume of infiltrated oil, V_{inf b}	0.00	bbbls

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

JOINT INVESTIGATION REPORT SPILL VOLUME ESTIMATE FOR INCIDENT NO: 1200385

- i Total Area covered by the oil (infiltration) 1,512.00 m²
- ii Total Area of the pool of free phase oil in touch with soil 20.00 m²
- iii Soil type Clay ▼
- iv P_e (effective porosity of the soil) 8 %
- v Average depth below ground surface of infiltration of oil 0.009 m

Estimated Volume of infiltrated oil, V _{inf c}	1.11 m ³
Estimated Volume of infiltrated oil, V _{inf c}	6.97 bbls
Estimated Total Volume of infiltrated oil, V _{inf}	1.43 m ³
Estimated Total Volume of infiltrated oil, V _{inf}	8.99 bbls

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

- i Total area of oil on open water [] m²
- ii Table of average depth of oil on water based on coloration

[Link to Coverage Visual Aid](#)

Spill Factors from USCG FOG (2000 Edition)		Aid	
	Thickness (mm)	Percentage coverage (%)	Volume (m3)
Barely Visible	0.00004		0.0000
Silvery	0.00008		0.0000
Slight Color	0.00015		0.0000
Bright Color	0.0003		0.0000
Dull	0.001		0.0000
Dark	0.002		0.0000
Black oil	0.1		0.0000
Emulsion (30% Oil)	1		0.0000
Percent Total:		0%	0.0000

Estimated Volume of oil on open water, V _{wt}	0.00 m ³
Estimated Volume of oil on open water, V _{wt}	0.00 bbls

3 Calculation of evaporated volume

Evaporation Factors (E-Factor) for SPDC Crude oil		
Residence time of spilled oil (days on site)	Oil type	
	Bonny Light	Bonny Medium
< 1 day	10%	5%
1-7 days	25%	15%
> 7 days	40%	25%

- i Was oil recovery before JIV completion done before JIV date? No ▼
- ii Estimated volume available for evaporation 107.90 bbls
- iii E-factor 40 %

Estimated Volume of evaporated oil, V _{evap}	71.84 bbls
Net Total Estimated Spilled Volume, V _{Est}	179.84 bbls

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1200385 JIV report S/N: **00603**

23. GENERAL STATUS OF THE SITE

A. Joint investigation of the incident site found that there is no residual impact after the initial response and JIT 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"/>

24. REPRESENTATIVES

This report was filled, agreed and signed by the following joint investigation representatives:

- 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

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 12 00385 JIV report S/N: 00603

25. Appendix 1: Overview sketch of the site

