

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 JIV report S/N: 0203

(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: 949945 2. Type of incident* OIL SPILL
 3. Name of Location OPUKUSHI WELL 34 T FLOWLING
EGBEMO-ANGALABIRI
 4. Name of nearest community _____ 5. State: BAYELSA 6. LGA EKEREMO
 7. Type of Production facility/Installation FLOWLINE 8. Asset owner/District UIO/G/PNWS T

B. INCIDENT INFORMATION:

9. Details of incident

a. Date of incident: 26TH MARCH, 2013
 b. Start date/time of investigation: 2ND APRIL, 2013 AT 1354 HRS
 c. Investigation End date: 4TH APRIL 2013 Actual investigation duration, days: TWO DAYS

d. Description of spill point environment

- | | | |
|---|--|--|
| <input type="checkbox"/> Firmed soil | <input type="checkbox"/> Loose soil | <input type="checkbox"/> Recently excavated area |
| <input checked="" 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 |

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 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 checked="" type="checkbox"/> Others (specify) <u>PIN HOLE</u> | |

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)	
Northing: <p align="center"><u>100860mN</u></p>	Easting: <p align="center"><u>374331mE</u></p>

*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: 94-9945 JIV report S/N: 0203

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).

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit
 Others: _____

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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 IIV report S/N: 0203

--	--	--	--	--	--

16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	PALM TREE	28	22	54	104	/
2	RAFIA PALM	14	17	123	154	/
	/	/	/	/	/	/
	/	/	/	/	/	/

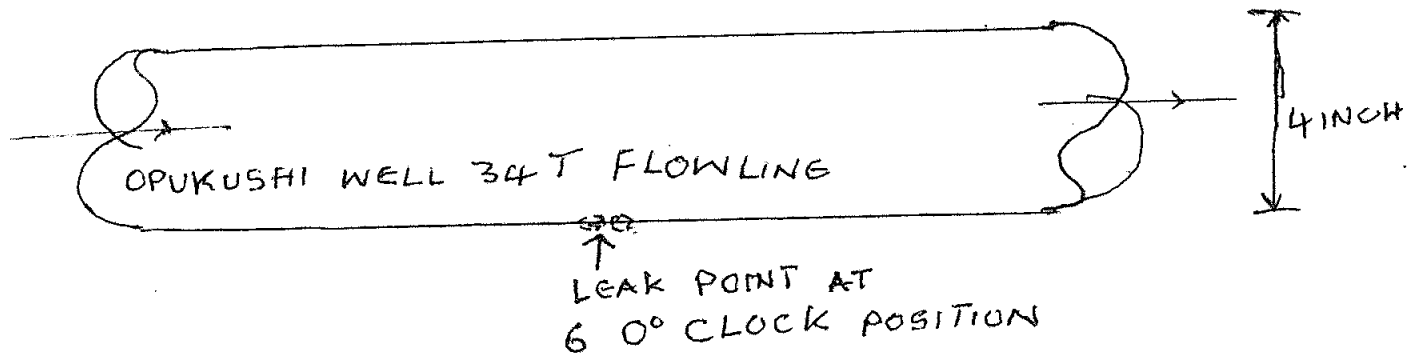
17. Fish/Nets/Ponds

S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
1	FISH NET	/	23	/
2	FISH TRAP	/	11	/
/	/	/	/	/

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)



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 JIV report S/N: 0253

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)

S/N	Northing	Easting
1	100862	374308
2	100817	374314
3	100771	374320
4	100740	374241
5	100651	373865
6	100610	372813
7	100715	374279
8	100746	374401
9	100872	374351

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 JIV report S/N:

0203

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 27643 m²
- Impact within SPDC R.O.W 27643 m²
- Impact outside SPDC R.O.W NIL

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

Recovered oil V_{recj} :	<u>NIL</u>	Barrels
----------------------------	------------	---------

22. Computation of estimated residual volume on site

NOT APPLICABLE

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

- i. Area (m²) occupied by pool of free phase oil NIL
- ii. Average Depth (m) of pool of free phase oil NOT APPLICABLE
- iii. Emulsification factor: NOT APPLICABLE
- iv.

Estimated Volume of pool of free phase oil. V_{pool} :	<u>NIL</u>	barrels
--	------------	---------

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

NOT APPLICABLE

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

- i. Area* (m²) of soil covered by the oil: NIL
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: NOT APPLICABLE
- iii. Soil type: NOT APPLICABLE P_c (effective porosity of the soil): NOT APPLICABLE
- v. Cause of spill: NOT APPLICABLE Oil type: NOT APPLICABLE
- vii. Oil Residence time on site, day: NOT APPLICABLE
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: NOT APPLICABLE
- ix. Estimated depth of infiltration around spill point: NOT APPLICABLE
- x.

Estimated Volume of infiltrated oil at spill point. $V_{inf,a}$:	<u>NIL</u>	barrels
---	------------	---------

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

NOT APPLICABLE

- i. Area* (m²) of soil covered by the oil: NIL
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: NOT APPLICABLE
- iii. Soil type: NOT APPLICABLE P_c (effective porosity of the soil): NOT APPLICABLE
- v. Cause of spill: NOT APPLICABLE Oil type: NOT APPLICABLE
- vii. Oil Residence time on site, day: NOT APPLICABLE
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: NOT APPLICABLE
- ix. Estimated depth of infiltration around spill point: NOT APPLICABLE

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

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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 JIV report S/N:

0203

NOT APPLICABLE

- i. Area (m²) of soil covered by the oil: NIL
- 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: NOT APPLICABLE
- iv. Soil type: NOT APPLICABLE
- v. P_e (effective porosity of the soil): NOT APPLICABLE
- vi.

Estimated Volume of infiltrated oil. At V_{inf} :	<u>NIL</u>	barrels
---	------------	---------

23. Computation of estimated volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: 27,643 m²
- 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	10%	0.000110520
Silvery	0.00008	/	/
Slight Color	0.00015	15%	0.0006219675
Bright Color	0.0003	/	/
Dull	0.001	10%	0.0027643
Dark	0.002	/	/
Black oil	0.1	/	/
Emulsion (30% Oil)	1	65%	5.390385

iii.

Percent Total	100%
Estimated Volume of oil on open water. V_{wat} :	<u>33.93</u> Barrels

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 33.93 BBLs
- ii. E-Factor: 15%
- iii.

Estimated Volume of evaporated oil. V_{evap} :	<u>5.99</u>	Barrels
--	-------------	---------

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_{recd} (bbls) =**

+ NIL = 39.92 BBLs $5.99 + 33.93 + NIL + NIL$

Estimated Reported Volume V_{rep} (bbls) = 40 BBLs**

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 JIV report S/N: 02-3

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

This report was filled, agreed and signed on the 4 / 4 / 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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 949945 JIV report S/N: 0203

28. Appendix 1: Overview sketch of the site

