

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 921622 JIV report S/N: 0201

(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: 921622 2. Type of incident* OIL SPILL
 3. Name of Location OPUKUSHI WELL-24T FLOWLINE
 4. Name of nearest community AGBIDIAMA 5. State: BAYELSA 6. LGA EKEREMOR
 7. Type of Production facility/Installation FLOWLINE 8. Asset owner/District NWS2

B. INCIDENT INFORMATION:

9. Details of incident
- a. Date of incident: 27TH JANUARY 2013
 b. Start date/time of investigation: 31ST JANUARY 2013 AT 1300HRS
 c. Investigation End date: 31ST JANUARY 2013 Actual investigation duration, days: 1 DAY
 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 checked="" type="checkbox"/> Corrosion | <input type="checkbox"/> Saver-pit over flow, | <input type="checkbox"/> Surge vessel overflow, |
| <input checked="" 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) _____

g. Spill point coordinates

Measuring unit	
Northing:	Easting:
<u>101823 mN</u>	<u>368640 mE</u>

*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: 921622 JIV report S/N: 0201

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

16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1.	MANGROVES	YES	YES	---	LOT	
	/	/	/	/	/	/
	/	/	/	/	/	/
	/	/	/	/	/	/

17. Fish/Nets/Ponds

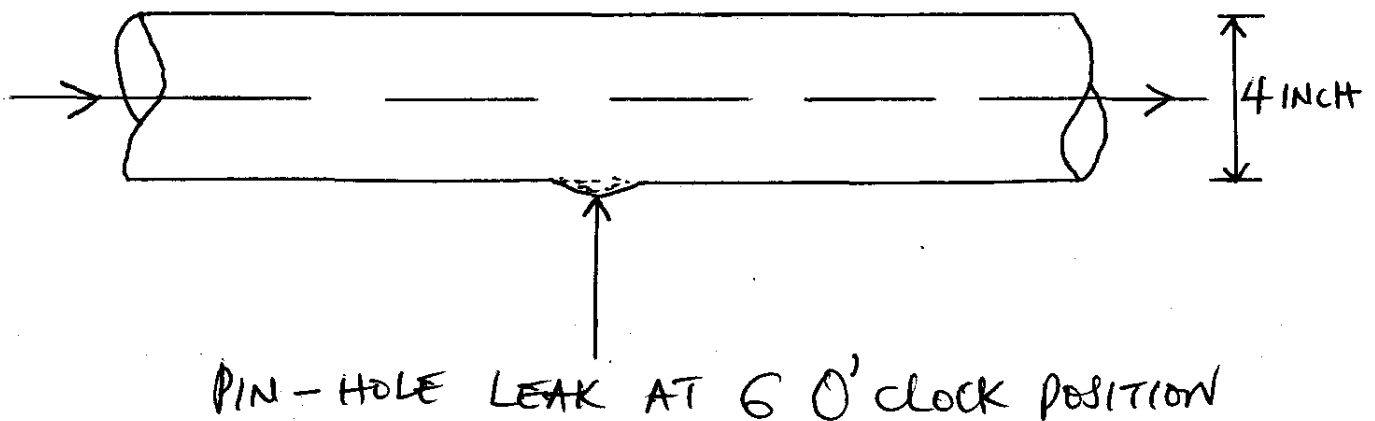
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
1.	FISH NET		1 (ONE)	
	/	/	/	/
	/	/	/	/
	/	/	/	/

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)

OPUKUSHI WELL - 24T FLOWLINE



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 921622 JIV report S/N: 0201

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
SP	101823	368640
2.	101900	368723
3.	101885	368682
4.	101876	368647
5.	101852	368628
6.	101820	368651
7.	101803	368665
8.	101831	368628
9.	101870	368615
10.	101836	368608
11.	101820	368613
12.	101773	368607
13.	101767	368624
14.	101756	368709
15.	101783	368721
16.	101828	368655
17.	101841	368649
18.	101851	368652
19.	101862	368661
20.	101873	368690
21.	101890	368730
22.	101904	368720
23.	101817	368622

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 921622 JIV report'S/N: 0201

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 8393 m²
- Impact within SPDC R.O.W 4899 m²
- Impact outside SPDC R.O.W 3494 m²

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

Recovered oil V _{rec} :	NIL	Barrels
----------------------------------	-----	---------

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 (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} :	NIL	barrels
---	-----	---------

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* (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 iv. P_e (effective porosity of the soil): NOT APPLICABLE
- v. Cause of spill: OPERATIONAL vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 4 DAYS
- 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} :	NIL	barrels
--	-----	---------

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

- 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 iv. P_e (effective porosity of the soil): NOT APPLICABLE
- v. Cause of spill: OPERATIONAL vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 4 DAYS
- 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} :	NIL	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: 921622 JIV report*S/N: 0201

- 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} :	NIL	barrels
--	------------	---------

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

- i. Total area of oil on open water: 8393 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 (m3)
Barely Visible	0.00004	/	/
Silvery	0.00008	/	/
Slight Color	0.00015	/	/
Bright Color	0.0003	<u>5 %</u>	<u>0.00013</u>
Dull	0.001	<u>5 %</u>	<u>0.00042</u>
Dark	0.002	<u>10 %</u>	<u>0.00168</u>
Black oil	0.1	<u>35 %</u>	<u>0.29376</u>
Emulsion (30% Oil)	1	<u>45 %</u>	<u>1.13306</u>

- iii.

Percent Total	100%
Estimated Volume of oil on open water. V _{wat} :	8.99
	Barrels

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 8.99 BBLs
- ii. E-Factor: 15 %
- iii.

Estimated Volume of evaporated oil. V _{evap} :	1.59	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_{rej}(bbls) = 10.57 BBLs

Estimated Reported Volume V_{rep}(bbls) = 11 BBLs**

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 921622 JIV report S/N: **0201**

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 31/01/2013 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: 921622 JIV report S/N: 0201

28. Appendix 1: Overview sketch of the site

