

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 JIV report S/N: 0276

(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: 1052326 2. Type of incident* OIL SPILL
 3. Name of Location 4th IMO RIVER 3 WELL 53L/56L FLOWLINE
 4. Name of nearest community ETIHOHA-IPU 5. State: ABIA 6. LGA UKWA-WEST
 7. Type of Production facility/Installation FLOWLINE 8. Asset owner/District LAND ONE (I)

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 6TH OCTOBER, 2013
 b. Start date/time of investigation: 9TH OCTOBER, 2013/14:45 HRS
 c. Investigation End date: 9TH OCTOBER, 2013 actual investigation duration, days: ONE (1) DAY
 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 <u>MINNA MID BELI</u>	
Northing: (m) <u>107271.19</u>	Easting: (m) <u>523960.73</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: 1052326 JIV report S/N: 0277

C. RISK ASSESSMENT

10. Type of environment:

- Land
 Swamp
 ^{STAGNANT}Water
 Seasonal swamp
 Shoreline/Waterfront

i. Type of environment to which oil has spread:

- Land
 Swamp
 ^{STAGNANT}Water
 River (identify) _____

ii. Weather condition

- Rain
 Sunny
 Dry
 Wet
 Windy
 Hot
 Cool

11. Distance from the nearest sensitive habitat

- | | | | |
|--|---|-----|--------------------------------|
| <input type="checkbox"/> Government reserved and designated protected area | [| .m] | } NONE SEEN
WITHIN VICINITY |
| <input type="checkbox"/> Drinking water source | [| .m] | |
| <input type="checkbox"/> Built up area | [| .m] | |
| <input type="checkbox"/> Farmlands | [| .m] | |
| <input type="checkbox"/> Fish Farm/Pond | [| .m] | |
| <input type="checkbox"/> Fishing net | [| .m] | |
| <input type="checkbox"/> 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]

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					

16. Crops/Economic Trees

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 JIV report S/N: 0277

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
NONE WITHIN AREA OF IMPACT						

17. Fish/Nets/Ponds

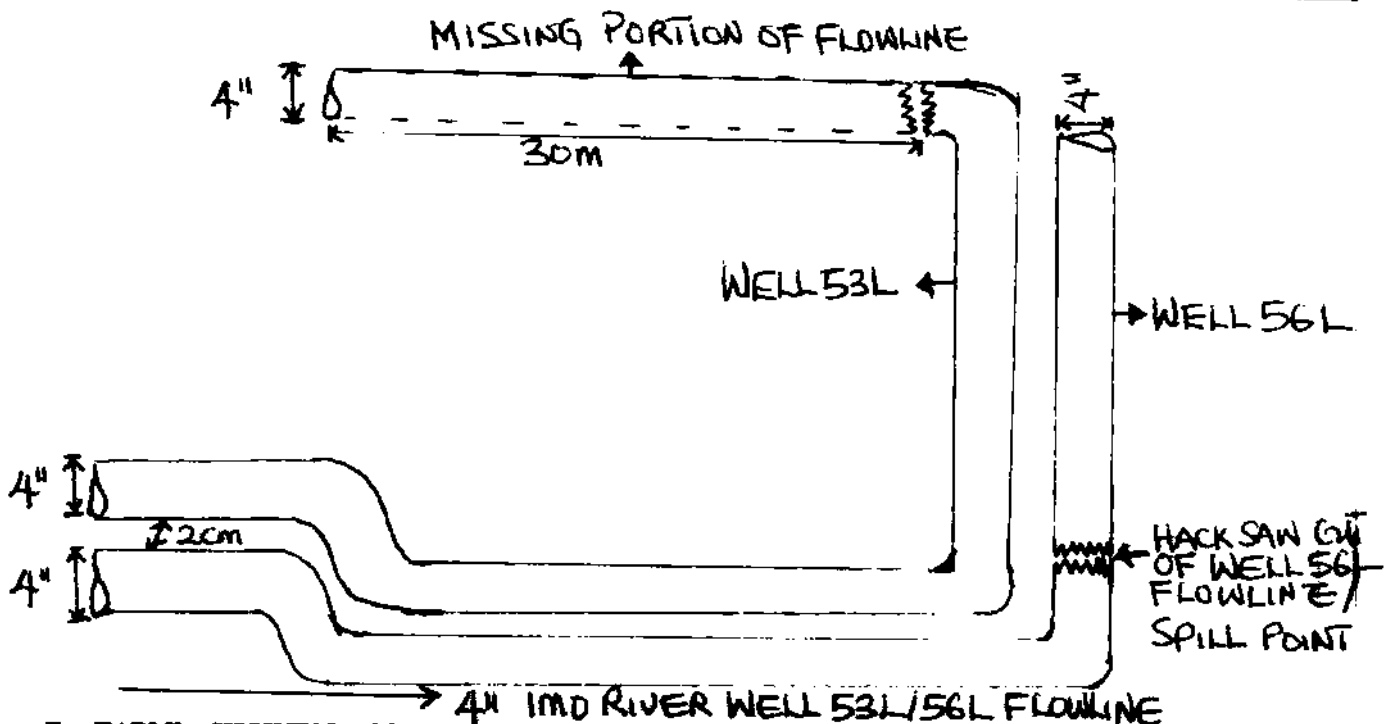
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
NONE WITHIN AREA OF IMPACT				

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)

A SECTION OF 4" IMD RIVER 3 WELL 53L/56L FLOWLINE AT EITIIOHA-IPU SHOWING THE HACK SAW CUT AND MISSING (STOLEN) PORTION OF THE LINE



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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 JIV report S/N: 0276

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

MINNA MID BELL

S/N	Northing (m)	Easting (m)
118	107277.35	523951.51
119	107265.05	523957.64
120	107271.19	523960.73
121	107277.33	523957.67
122	107295.42	524013.53
125	107293.82	523987.24
126	107312.76	523976.14
127	107297.61	523946.63

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.10 Ha
- 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}):

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 IIV report S/N: 0277

Recovered oil V_{rec}	<u>NIL</u>	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 (m^2) occupied by pool of free phase oil: 350
- ii. Average Depth (m) of pool of free phase oil: 0.001
- iii. Emulsification factor: NIL

iv.

Estimated Volume of pool of free phase oil.	<u>350</u>	barrels
V_{pool}	<u>267.535</u>	

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: 1.00
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 0.01
- iii. Soil type: CLAY iv. P_e (effective porosity of the soil): 8%
- v. Cause of spill: THIRD PARTY INTERFERENCE vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 3
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0008 m
- ix. Estimated depth of infiltration around spill point: 0.0108 m

x

Estimated Volume of infiltrated oil at spill point. $V_{inf a}$	<u>0.01</u>	barrels
---	-------------	---------

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: NOT APPLICABLE
- 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: NOT APPLICABLE vi. 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. 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: 149
- ii. Area (m^2) of the pool of free phase oil in touch with soil: -
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0008
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%

vi.

Estimated Volume of infiltrated oil. At $V_{inf c}$	<u>0.06</u>	barrels
---	-------------	---------

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

- i. Total area of oil on open water: NIL

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 JIV report S/N: 0277

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	NOT	
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001	APPLICABLE	
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

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

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 5.41 BARRELS
- ii. E-Factor: 15%

iii. Estimated Volume of evaporated oil. V_{evap} :	<u>0.96</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. <u>Net Estimated Spilled Volume V_{net} (bbls) = V_{evap} (bbls) + V_{nat} (bbls) + V_{inf} (bbls) + V_{pool} (bbls) + V_{resid} (bbls) =</u> <u>$0.96 + NIL + 0.07 + 5.35 + NIL$</u> <u>$= 6.38$ BARRELS</u>
<u>Estimated Reported Volume ** V_{rep} (bbls) =</u> <u>7 BARRELS</u>

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 coburn 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"/>
--

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 JIV report S/N: 0277

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 09/10/2013 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

Location: 4" IMO RIVER 3 WELL 53L/56L FLOWLINE AT ETIHOBA-100

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1052326 JIV report S/N: 0277

