

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1011909 JIV report #/N: 0162

(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: 1011909 2. Type of incident* OIL SPILL
 3. Name of Location 12" IMO RIVER 2 - OGALE PIPELINE
UMUOLOLO
 4. Name of nearest community (DWAZA) 5. State: ABIA 6. LGA UKWA - WEST
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 23RD JULY, 2013
 b. Start date/time of investigation: 24TH JULY, 2013/12:47 HOURS
 c. Investigation End date: 24TH JULY, 2013 Actual investigation duration, days: ONE (1) DAY

d. Description of spill point environment

- | | | |
|---|--|---|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input checked="" type="checkbox"/> Recently excavated area |
| <input type="checkbox"/> Under water | <input 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 checked="" type="checkbox"/> Failed Weld-on illegal hot tap valve, | <input type="checkbox"/> Failed Clamp | <input type="checkbox"/> Missing Pipeline/Flowline |
| <input checked="" 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"/> Relief valve failure | <input type="checkbox"/> Others (specify) _____ | <input type="checkbox"/> Cold vent |

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: (m)	Easting: (m)
<u>104551.01</u>	<u>524784.03</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: 1011909 JIV report S/N: 0162

16. Crops/Economic Trees

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

17. Fish/Nets/Ponds

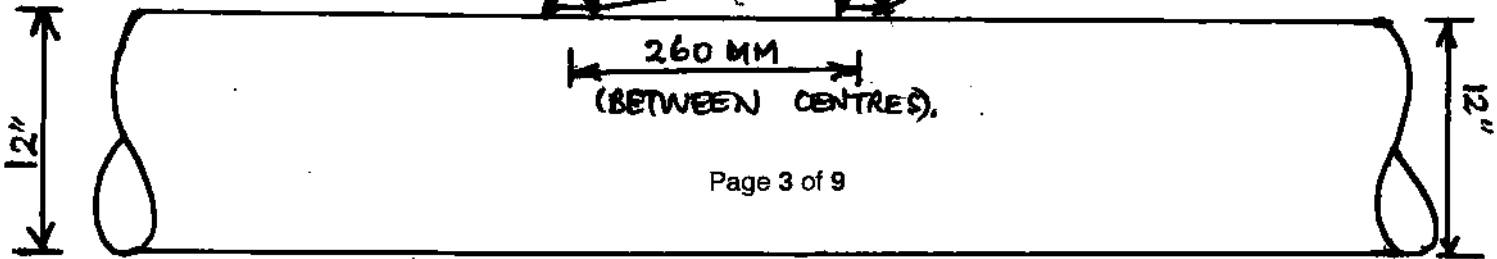
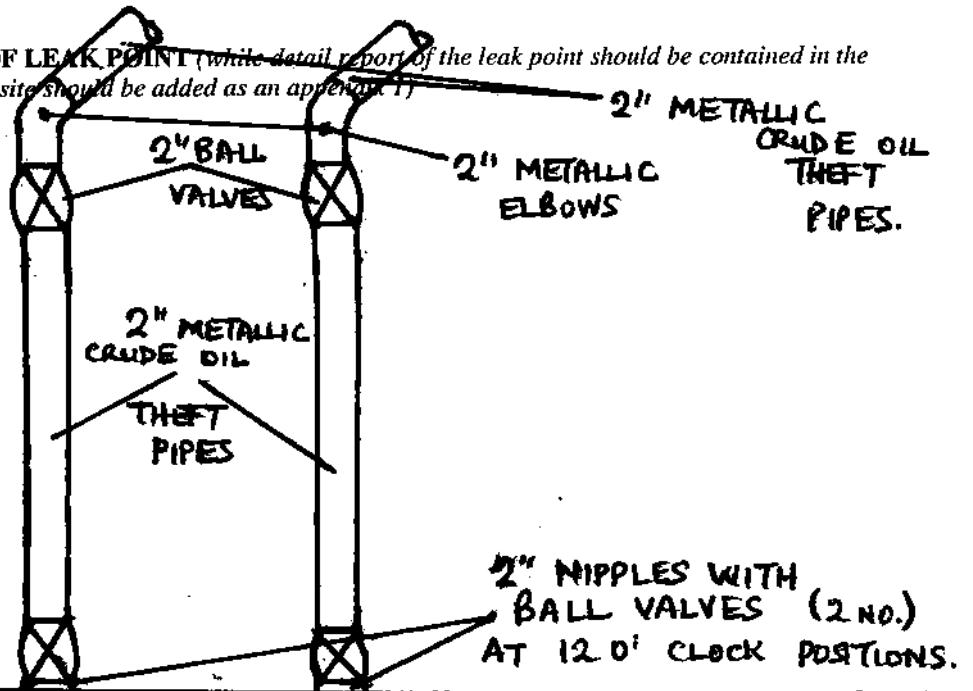
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
NONE WITHIN AREA OF IMPACT				

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)

SECTION OF
12" IMO RIVER 2 -
OGALE PIPELINE AT
UMUOLOLO (OWAZA)
SHOWING POSITIONS
OF 2 NO. CRUDE
OIL THEFT POINTS.



← FROM IMO RIVER 2 - OGALE

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1011909 JIV report SAN: 0162

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) (SEE ATTACHED APPENDIX A).

S/N	Northing (m)	Easting (m)
824	104394.35	524780.63
825	104397.43	524777.56
826	104400.51	524774.48
827	104403.58	524777.59
828	104412.80	524774.51
829	104418.93	524777.60
830	104418.92	524783.76
831	104489.58	524780.82
832	104489.57	524783.90
833	104538.72	524784.00
834	104538.73	524780.92
835	104547.94	524780.94
836	104547.96	524771.90
837	104541.82	524771.68
838	104551.03	524771.70
839	104551.03	524774.78
841	104551.01	524780.94
842	104554.09	524780.95
843	104557.16	524777.88
844	104560.23	524780.96
845	104554.08	524784.03
846	104557.15	524754.04
847	104443.50	524783.81
848	104486.51	524780.82
849	104563.33	524788.83
850	104560.27	524759.40
851	104560.28	524753.24
852	104566.45	524744.01
853	104578.73	524744.03
854	104587.95	524740.97
855	104600.24	524744.07

APPENDIX- A		
12" IMO RIVER 2- OGALE TRUNKLINE SPILL @ OWAZA		
INCIDENT:1011909		
POINT	NORTHING(m)	EASTING(m)
824	104394.35	524780.63
825	104397.43	524777.56
826	104400.51	524774.48
827	104403.58	524777.57
828	104412.8	524774.51
829	104418.93	524777.6
830	104418.92	524783.76
831	104489.58	524780.82
832	104489.57	524783.9
833	104538.72	524784
834	104538.73	524780.92
835	104547.94	524780.94
836	104547.96	524771.7
837	104541.82	524771.68
838	104551.03	524771.7
839	104551.03	524774.78
841	104551.01	524780.94
842	104554.09	524780.95
843	104557.16	524777.88
844	104560.23	524780.96
845	104554.08	524784.03
846	104557.15	524784.04
847	104443.5	524783.81
848	104486.51	524780.82
849	104563.33	524768.65
850	104560.27	524759.4
851	104560.28	524753.24
852	104566.45	524744.01
853	104578.73	524744.03
854	104587.95	524740.97
855	104600.24	524744.07
856	104609.41	524762.58
857	104563.3	524780.97
858	104394.48	524782.7
859	104609.09	524779.05
860	104602.61	524785.77
861	104489.8	524782.76
862	104538.78	524783
863	104485.58	524783.47
864	104419	524781.85

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1011909 JIV report S/N: 0162

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.2349
- 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
---------------------------	------------	---------

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 1,552
- ii. Average Depth (m) of pool of free phase oil 0.023
- iii. Emulsification factor: NIL

iv.

Estimated Volume of pool of free phase oil. V_{pool} :	<u>224.53</u>	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* (m^2) of soil covered by the oil: 1
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.9
- 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: 1 DAY
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0003m
- ix. Estimated depth of infiltration around spill point: 1.9003m

x.

Estimated Volume of infiltrated oil at spill point. $V_{inf a}$:	<u>0.96</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: _____
- 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: _____ vi. 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
---	------------	---------

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

NOT APPLICABLE

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1011909 JIV report S/N: 0162

- i. Area (m²) of soil covered by the oil: 725
- ii. Area (m²) of the pool of free phase oil in touch with soil: 1,552
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0003
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%
- vi.

Estimated Volume of infiltrated oil. At V _{inf} :	0.31	barrels
--	-------------	---------

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

- i. Total area of oil on open water: NIL
- 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	NOT APPLICABLE	
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

- iii.

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

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 225.88 BARRELS
- ii. E-Factor: 15%
- iii.

Estimated Volume of evaporated oil. V _{evap} :	39.85	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 $V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recf}(bbls) = 39.85 + NIL + 1.27 + 224.53 + NIL \approx 265.64$

Estimated Reported Volume V_{rep}(bbls)= 266 BARRELS.**

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1011909 JIV report S/N: 0162

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 <u>24/07/2013</u> by joint investigation representatives from
<ul style="list-style-type: none">• Host Community: <input checked="" type="checkbox"/>• Department of Petroleum Resources [DPR]: <input checked="" 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 checked="" type="checkbox"/>
<i>Tick as applicable</i>

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1011909 JIV report S/N: 0162

28. Appendix 1: Overview sketch of the site

