

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0170 751339

(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: 751339 2. Type of incident* OIL SPILL
 3. Name of Location BONNY - OLOMA WELL 2L FLOWLINE
 4. Name of nearest community OLOMA 5. State: RIVERS 6. LGA BONNY
 7. Type of Production facility/Installation FLOWLINE 8. Asset owner/District NESI/CAWTHORNE CHANNEL

B. INCIDENT INFORMATION:

9. Details of incident

a. Date of incident: 7TH DECEMBER, 2011.

b. Date/Period of investigation: 9TH DECEMBER, 2011.

c. Description of spill point environment

- | | | |
|---|--|--|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input type="checkbox"/> Previously 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"/> Rig |

d. Description of leak point (tick as applicable);

- | | | |
|---|---|---|
| <input type="checkbox"/> Drilled hole | <input type="checkbox"/> Hack saw cut | <input type="checkbox"/> Explosive 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"/> 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"/> External Corrosion | | <input type="checkbox"/> Internal Corrosion |
| <input type="checkbox"/> Saver-pit over flow, | <input type="checkbox"/> Surge vessel overflow, | <input type="checkbox"/> Outward dent |
| <input type="checkbox"/> Flare System/Bund wall Failure | <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) FAILED WELDED JOINT |

e. Incident due to:

- Third party interference Operational Others (specify) NOT APPLICABLE

f. Spill point coordinates

Measuring unit (<u>METER</u>) <u>MINNA MID-BELT</u>	
Northing: <u>54533.10</u>	Easting: <u>528465.53</u>

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

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C. RISK ASSESSMENT

10. Type of environment:

- Land Swamp Water Seasonal swamp

i. Type of environment to which oil has spread:

- Land Swamp Water River (identify) _____

ii. Weather condition

- Raining Sunny

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). **NOT APPLICABLE**

12. Containment measures put in place;

- Booms Trench Dyke

Others: NONE

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
NONE WITHIN AREA OF IMPACT					

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16. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1.	MANGROVE		✓		NUMEROUS	HEAVILY IMPACTED.

17. Fish/Nets/Ponds

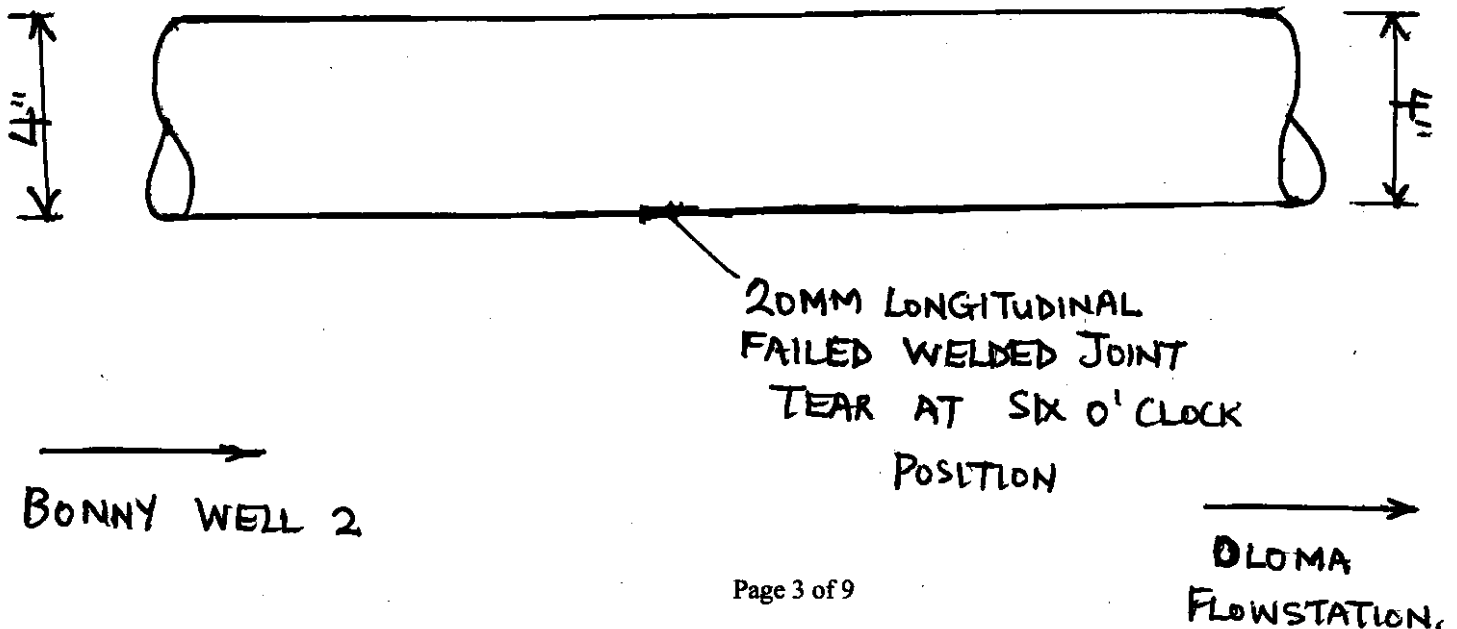
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
		NONE WITHIN AREA OF IMPACT		

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 (Overview sketch of the site should be added as an appendix I)

SECTION OF BONNY - OLOMA WELL 2L FLOWLINE AT OLOMA SHOWING POSITION OF FAILED WELDED JOINT TEAR.



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

- i. Area (m^2) covered by the oil: 22330
- ii. Area of the pool of free phase oil in touch with soil: NIL
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.001
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%

iv. Volume of infiltrated oil, V_{inf}	<u>11.24</u>	barrels
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21. Computation of volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: 15425 m^2
- ii. Table of average depth of oil on water based on coloration *

	Thickness (mm)	Percentage coverage	Volume (m^3)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001	<u>70%</u>	<u>0.01</u>
Dark	0.002	<u>29%</u>	<u>0.01</u>
Black oil	0.1		
Emulsion (30% Oil)	1	<u>1%</u>	<u>0.15</u>
Percent Total		100%	Total Volume <u>1.07</u> bbl

iii. Volume of oil on open water, V_{wat}	<u>1.07</u>	barrels
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22. Calculation of evaporated volume:

- i. Oil type: BONNY LIGHT
- ii. E-Factor: 25%

iii. Volume of evaporated oil, V_{evap}	<u>4.1</u>	barrels
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Evaporation Factors (E-Factor) for SPDC Crude oil			
Oil Type	Days on site	Bonny Light	Bonny Medium
Period Since Oil Spill	< 1 day	10%	5%
	1 - 7 days	25%	15%
	> 7 days	40%	25%

23. Gross Total Estimated Spilled Volume $V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls) = 4.1 + 1.07 + 11.24 + NIL + NIL = 16.41$

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$V_{Est}(bbls)=$	16.4 BARRELS
24. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls) = 4.1 + (0.6 \times 1.07) + 11.24 + NL + NIL = 15.98$	
$V_{Est}(bbls)=$	16 BARRELS

- *Calculation of the respective estimated volume is to be done using the new spill estimation software on site
- *Conversion of m3 to barrels is Total volume VT (m3) x 6.29
- *Emulsification factor for spill on water to consider is 60% of volume of oil.

25. 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"/>

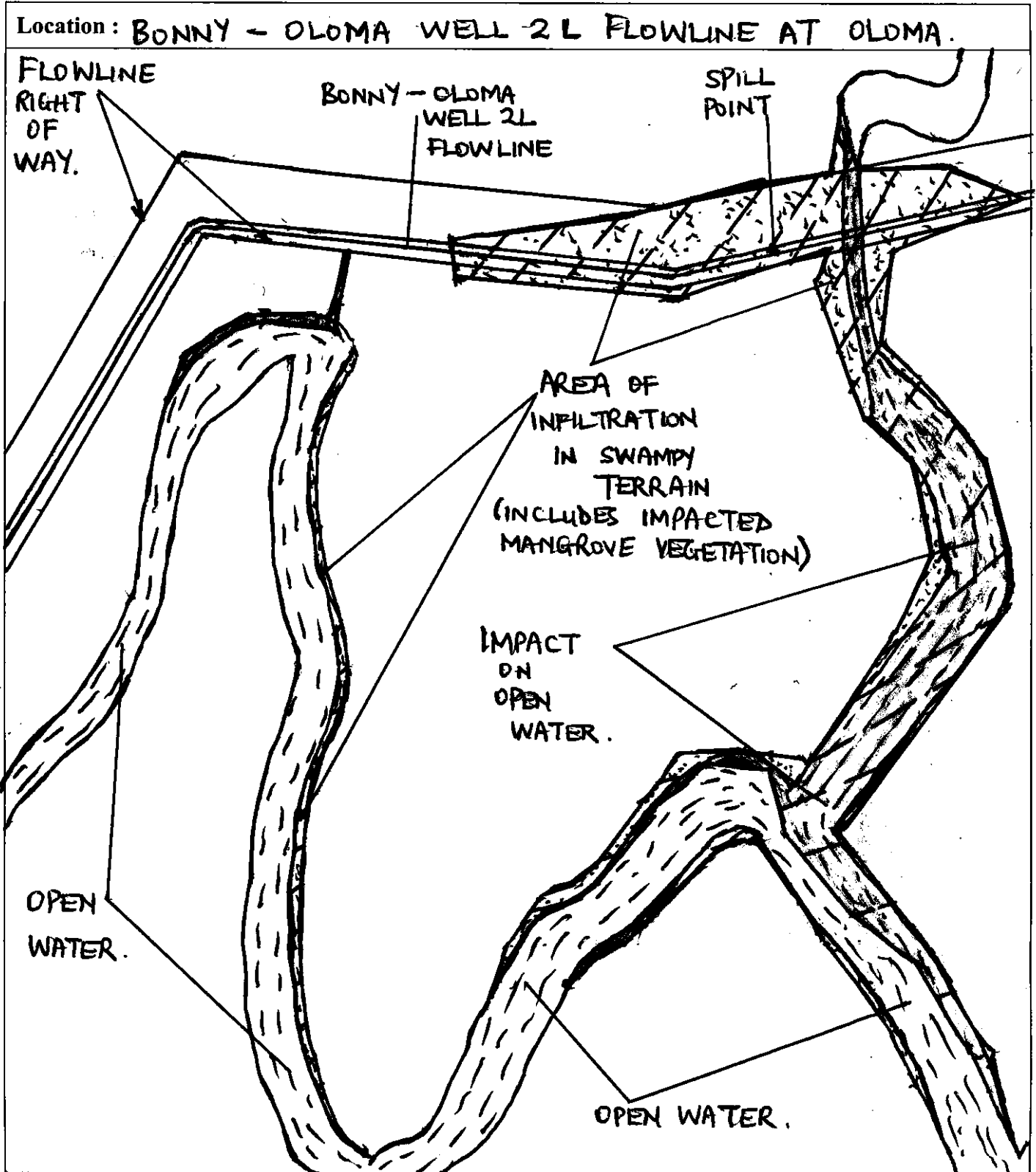
26 Signatories

This report was filled and signed on the <u>09/12/2011</u> at incident site by joint investigation representatives from
<ul style="list-style-type: none">• Host Community <input checked="" type="checkbox"/>• Department of Petroleum Resources [DPR]: <input 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 type="checkbox"/>• Shell Petroleum Development Company [SPDC]: <input checked="" type="checkbox"/>
<i>Tick as applicable</i>

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20. Appendix 1: Overview sketch of the site



APPENDIX

IMPACTED AREA COORDINATES (MINNA MID BELT)


Name	NORTHINGS (METERS)	EASTINGS (METERS)
Heavy impact (loop 1)		
P1	54518.23	528191.14
P2	54525.44	528326.69
P3	54560.82	528459.49
P4	54573.56	528535.97
P5	54613.46	528537.64
P6	54578.55	528552.04
P7	54584.09	528639.06
P8	54580.21	528690.05
P9	54543.64	528575.32
P10	54502.18	528566.45
P11	54487.22	528590.84
P12	54458.39	528623.54
P13	54411.85	528644.60
P14	54394.67	528636.12
P15	54342.02	528568.67
P16	54280.50	528501.06
P17	54226.91	528573.54
P18	54177.82	528634.12
P19	54147.86	528656.29
P20	54130.86	528666.19
P21	54159.76	528643.23
P22	54182.17	528620.26
P23	54220.97	528565.23
P24	54244.27	528517.43
P25	54279.53	528470.60
P26	54295.42	528469.02
P27	54305.30	528466.65
P28	54310.85	528421.91
P29	54293.52	528379.54
P30	54245.99	528325.70
P31	54235.31	528308.28
P32	54226.59	528281.35
P33	54214.72	528262.74
P34	54178.69	528237.80
P35	54179.88	528236.22
P36	54217.84	528257.99
P37	54235.31	528286.10
P38	54246.79	528317.78
P39	54290.73	528368.46
P40	54304.51	528390.63
P41	54312.83	528400.13
P42	54314.81	528422.30


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Name	NORTHINGS (METERS)	EASTINGS (METERS)
P43	54315.20	528451.60
P44	54311.31	528484.98
P45	54378.70	528555.03
P46	54415.18	528594.16
P47	54446.88	528585.61
P48	54462.55	528555.97
P49	54524.79	528527.59
P50	54542.53	528532.43
P51	54523.90	528459.35
P52	54492.09	528342.89
P53	54493.76	528305.76
P54	54503.18	528196.02
Light Impact (Loop 2)		
p55	54184.94	528293.24
p56	54193.65	528301.55
p57	54203.16	528329.26
p58	54238.79	528374.79
p59	54261.36	528403.69
p60	54268.48	528429.43
p61	54266.90	528450.81
p62	54220.18	528508.22
p63	54167.44	528579.48
p64	54134.25	528609.57
p65	54146.06	528596.11
p66	54186.13	528544.25
p67	54209.49	528512.97
p68	54257.00	528458.33
p69	54264.13	528442.10
p70	54259.38	528414.38
p71	54233.64	528376.77
p72	54203.16	528341.53
p73	54191.28	528305.11
Light impact (loop 3)		
p74	54487.02	527946.11
p75	54469.69	527911.96
p76	54494.44	527943.14
p77	54498.89	527993.12
p78	54497.63	528024.45
p79	54482.56	528097.55
p80	54513.74	528101.01
p81	54513.73	528103.48
p82	54475.14	528102.49
p83	54492.46	528024.79
p84	54492.95	527994.61

[Handwritten Signature]
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Name	NORTHINGS (METERS)	EASTINGS (METERS)
Light impact (loop 4)		
p85	54467.71	528118.83
p86	54437.52	528110.41
p87	54414.26	528107.44
p88	54356.85	528131.20
p89	54331.12	528143.08
p90	54310.83	528144.56
p91	54292.12	528139.12
p92	54233.82	528099.53
p93	54213.53	528088.64
p94	54169.98	528074.83
p95	54133.35	528066.37
p96	54112.57	528066.37
p97	54081.39	528078.23
p98	54059.61	528094.58
p99	54051.21	528106.45
p100	54057.14	528090.12
p101	54084.37	528071.58
p102	54114.55	528061.42
p103	54123.46	528059.44
p104	54181.36	528070.33
p105	54210.07	528080.72
p106	54240.75	528097.05
p107	54288.75	528129.71
p108	54301.03	528136.15
p109	54329.73	528136.64
p110	54371.31	528118.83
p111	54396.02	528106.58
p112	54416.35	528101.01
p113	54442.48	528104.39
p114	54462.76	528110.91

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