



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 688378

No. 00999

A. GENERAL INFORMATION:

1. Spill incident Number: 688378
2. Name of Location IMO RIVER WELL 59T FLOWLINE
3. Name of nearest community IGIRIKWU
4. State ABIA LGA UKWA WEST
5. Type of Production facility/Installation FLOWLINE Asset owner /District NEL I

B. INCIDENT INFORMATION:

6. Details of incident

- a. Date of incident 18TH JULY 2011
- b. Date/Period of investigation, 20TH JULY, 2011
- c. Description of spill point environment

- | | | |
|--|------|------|
| <input type="checkbox"/> Firmed soil | [Y]✓ | [N] |
| <input type="checkbox"/> Loose soil | [Y] | [N]✓ |
| <input type="checkbox"/> Previously excavated area | [Y]✓ | [N] |
| <input type="checkbox"/> Under water | [Y] | [N]✓ |
| <input type="checkbox"/> Swampy | [Y] | [N]✓ |
| <input type="checkbox"/> Exposed pipe surface | [Y] | [N]✓ |

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

- | | | |
|--|------|------|
| <input type="checkbox"/> Drilled hole, | [Y]✓ | [N] |
| <input type="checkbox"/> Hack saw cut, | [Y] | [N]✓ |
| <input type="checkbox"/> Explosive tear, | [Y] | [N]✓ |
| <input type="checkbox"/> Complete Rupture | [Y] | [N]✓ |
| <input type="checkbox"/> Inward dent, | [Y] | [N]✓ |
| <input type="checkbox"/> Well head tampering | [Y] | [N]✓ |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | [Y] | [N]✓ |
| <input type="checkbox"/> Missing pipeline (flowline) | [Y] | [N]✓ |
| <input type="checkbox"/> Crude oil theft (illegal bunkering) point, | [Y]✓ | [N] |
| <input type="checkbox"/> Third party tampering with Clamp Bolt/Nut, | [Y] | [N]✓ |
| <input type="checkbox"/> Third party tampering with valve setting, | [Y] | [N]✓ |
| <input type="checkbox"/> Third party tampering with flange Nuts/bolts, | [Y] | [N]✓ |
| <input type="checkbox"/> Corrosion, | [Y] | [N]✓ |

Type: NOT APPLICABLE

- | | | |
|--|-----|------|
| <input type="checkbox"/> Saver-pit over flow, | [Y] | [N]✓ |
| <input type="checkbox"/> Surge vessel overflow, | [Y] | [N]✓ |
| <input type="checkbox"/> Outward dent | [Y] | [N]✓ |
| <input type="checkbox"/> Others (specify). <u>NOT APPLICABLE</u> | | |

AFTER JOINT

[Y]✓ [N]
[Y] [N]✓ INVESTIGATION OF
[Y] [N]✓ THE INCIDENT,
[Y] [N]✓ SPILL WAS FOUND
[Y] [N]✓ TO BE DUE TO
[Y] [N]✓ THIRD PARTY
[Y] [N]✓ INTERFERENCE.

e. Spill point coordinates (MINNA MID-BAY)

Northings:

109687.83M

Easting:

52591 78M



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7. Type of environment of spill site:

- Type of environment of which oil has spread:

8. Distance from the nearest sensitive habitat

- $\left\{ \begin{array}{l} [,m] \\ [,m] \\ [,m] \\ [,m] \\ [,m] \\ [,m] \end{array} \right\}$ NOT APPLICABLE

9. Containment measures put in place;

- | | |
|-----|-----|
| [Y] | [N] |
| [Y] | [N] |
| [Y] | [N] |

- ☐ Others: NOT APPLICABLE

10. Any pictures or video coverage?

[Y]✓ [N]

11. 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

A. Structures / Properties

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B. Crops/Economic Trees

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

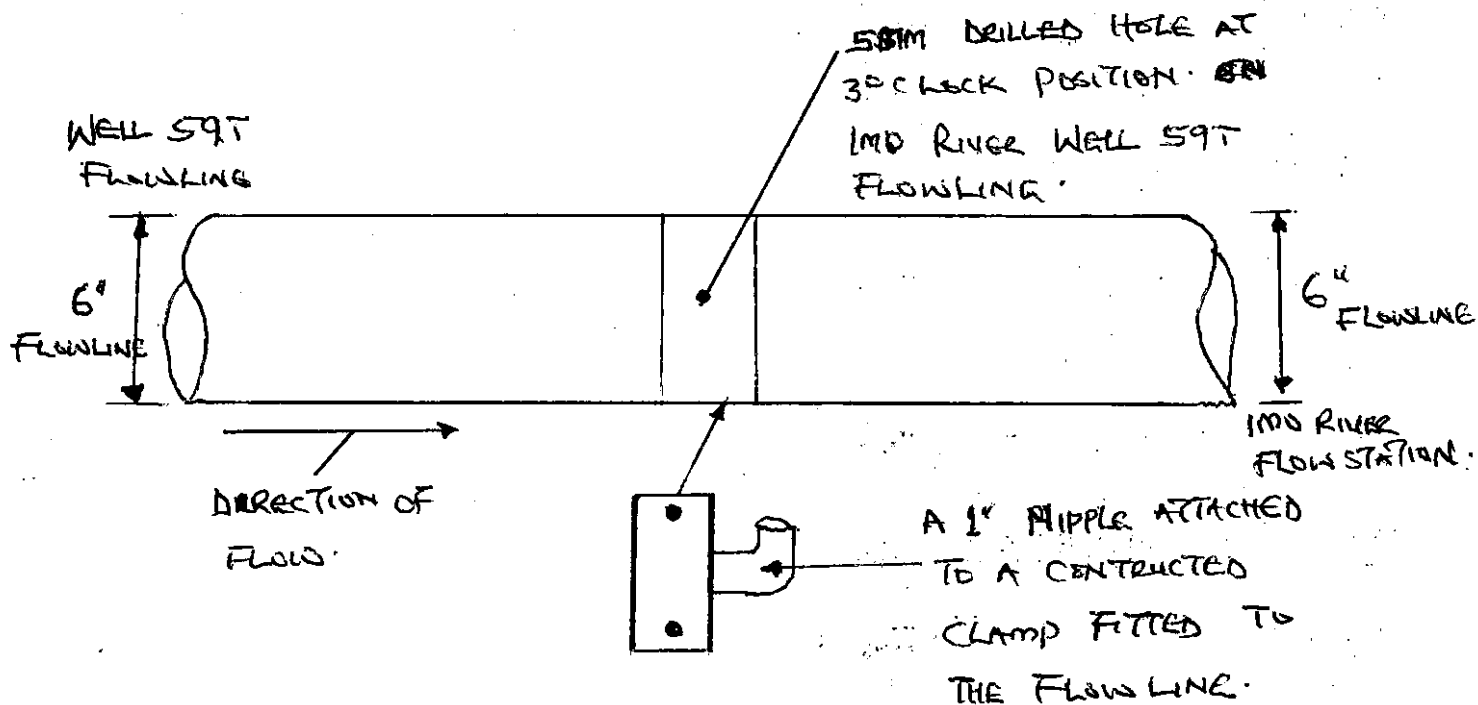
C. Fish/Nets/Ponds

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

D. Others (Specify) i.e. Animal Traps

S/N	Others	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

E. GRAPHIC DESCRIPTION OF LEAK POINT (Details should be contained in leak repair report)





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F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION
E. Coordinates (MINNA MID - BRIT)

S/N	Northing METRE			Easting METRE		
1	525894.097					
2	109666.863	22	109677.838	2	525890.619	22
3	109669.588	23	109678.675	3	525894.077	23
4	109679.043	24	109679.806	4	525907.145	24
5	109688.175	25	109678.250	5	525921.943	25
6	109691.147	26	109677.651	6	525924.523	26
7	109690.434	27	109677.790	7	525925.223	27
8	109687.412	28	109677.231	8	525922.144	28
9	109681.052	29	109676.647	9	525913.543	29
10	109680.549	30	109677.135	10	525913.943	30
11	109680.994	31	109677.508	11	525914.596	31
12	109680.654	32	109678.103	12	525914.953	32
13	109679.290	33	109668.772	13	525913.404	33
14	109679.833	34	109668.238	14	525912.962	34
15	109680.803	35	109668.768	15	525913.597	35
16	109680.780	36	109668.144	16	525913.176	36
17	109679.547	37	109666.972	17	525911.518	37
18	109678.994	38	109667.560	18	525911.969	38
19	109679.556	39	109668.086	19	525912.543	39
20	109678.975	40	109668.650	20	525913.016	40
21	109677.395	41	109666.076	21	525911.078	41

(42) 109666.863

(4) 525890.619

Please check Impact Area Coordinates base on their corresponding S/N of Eastings and Northings.



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G INCIDENT INFORMATION:

17 Impacted Area Details

- a. Total calculated area of impact 0.0048 Ha
- Impact within SPDC R.O.W 0.0048 Ha
 - Impact outside R.O.W NIL

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

Recovered oil V_{rec} : NIL barrels

19. Computation of the residual volume on site

- a. Computation of the volume of pooled free phase oil (on land or confined water body).

- i. Area (m^2) occupied by pool of free phase oil 9.6 m^2
- ii. Average Depth (m) of pool of free phase oil 0.015 m
- iii.

Volume of pooled of free phase oil. V_{pool} : 0.90 barrels

iv.

- b. Computation of volume of infiltrated oil in the soil (V_3).

- i. Area (m^2) covered by the oil: 48 m^2
- ii. Average Depth (m) below ground surface of infiltration of oil: 0.05
- iii. Soil type: MEDIUM SAND
- iv. p_e (effective porosity of the soil): 20%
- v.

Volume of infiltrated oil. V_{in} : 3.02 barrels

20. Computation of volume of oil on open water based on standard coloration.

	Thickness (mm)	Percentage coverage	Volume (m3)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Colour	0.00015		
Bright Colour	0.0003	NOT APPLICABLE	
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume <u>NIL</u> bbl

Spill Factors from USCG FOG (2000 Edition)



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Volume of oil on open water: V_{wat} :

NIL

barrels

21. Calculation of evaporated volume:

i. Oil type: BONNY MEDIUM

ii. E-Factor: 15%

iii.

Volume of evaporated oil: V_{ev} :

0.70

barrels

Oil Type		Bonny Light	Bonny Medium
		E-Factor	E-Factor
Period Since Oil Spill	<1 day	10%	5%
	1-7 days	25%	15%
	>7 days	40%	25%

9. Gross Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$

$V_{Est}(bbls) = 0.70 + 3.02 + 0.90 = 4.62 \text{ BARRELS}$

10. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + 0.6 \cdot V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$

$V_{Est}(bbls) = 4.62 \text{ BARRELS}$

* Calculation of the respective estimated volume is to done using the new spill estimation software on site

* Conversion of m3 to barrel is Total volume VT (m3) x6.29

* Emulsification factor for spill on water to consider is 60% of volume of oil.

This report was filled and signed on the 20 / 07 / 20 11 at incident site by joint investigation representative 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]: ☒

Tick as applicable