

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0421-869163

(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: 869163 2. Type of incident * OIL SPILL
 3. Name of Location 10" DIEBU - NUN - RIVER DELIVERY LINE (PIPELINE)
 4. Name of nearest community EKOWE 5. State: BAYELSA 6. LGA SOUTHERN IJAW
 7. Type of Production facility/Installation PIPELINE 8. Asset owner/ District SWAMP / NESP

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 20TH SEPTEMBER, 2012.
 b. Start date/time of investigation: 25TH OCTOBER, 2012
 c. Investigation End date: 25TH OCTOBER, 2012
 d. Description of spill point environment
 Firmed soil Loose soil Previously excavated area
 Under water Swampy Exposed pipe surface
 Well Platform (on Water) Rig
 e. Description of leak point (tick as applicable);
 Drilled hole Hack saw cut Explosive tear,
 Complete Rupture Inward dent, Well head tampering
 Failed Weld-on illegal hot tap valve, 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
 Outward dent Flare System/Bund wall failure
 Valve Failure com unit failure Cold vent
 Relief valve failure Others (specify) _____
 f. Incident caused by:
 Third party interference Operational Mystery _____

g. Spill point coordinates

(MINNA MID - BEIT)

Measuring unit <u>METER</u>	
Northing: <div style="font-size: 1.5em; font-family: monospace;">82256.831</div>	Easting: <div style="font-size: 1.5em; font-family: monospace;">404516.235</div>

**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
- Drinking water source
- Built up area
- Farmlands
- Fish Farm/Pond
- Fishing net
- Others (specify).

[,m]
[,m]
[,m]
[,m]
[,m]
[,m]
} NOT APPLICABLE

12. Containment measures put in place;

- Booms Trench Dyke

Others: NOT APPLICABLE

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
	<u>NONE WITHIN AREA OF IMPACT</u>				

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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			

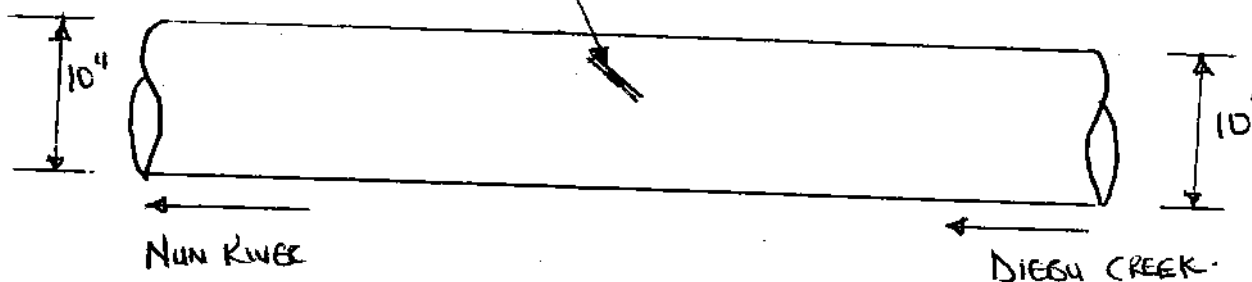
18. Others (Specify) i.e. Animal Traps

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)*

SHOWING SECTIONAL VIEW OF 10" DIEBU-CREEK - NUN RIVER PIPELINE AT EKOWE SITE.

LEAKAGE RESULT FROM A 100mm LENGTH OF CUT WITH EFFECTIVE CUT OF 10mm AT 9^o CLOCK POSITION ON 10" DIEBU CREEK - NUN RIVER PIPELINE AT EKOWE:



	EAST	NORTH	REMARKS
SP	404516.2	82256.83	SPILL POINT

ESTIMATED COORDINATES

741	404562.5	82259.21	OIL SHEEN
742	404560.4	82236.46	OIL SHEEN
743	404560.4	82236.46	OIL SHEEN
737	404525.5	82210	OIL SHEEN
744	404513.3	82115.59	OIL SHEEN
734	404513.3	82115.59	OIL SHEEN
736	404513.3	82115.59	OIL SHEEN
732	404496.9	81998.12	OIL SHEEN
731	404487.9	81930.91	OIL SHEEN
700	404487	81876.94	OIL SHEEN
701	404473.8	81810.16	OIL SHEEN
702	404459.5	81687.39	OIL SHEEN
706	404453.1	81623.68	OIL SHEEN
710	404447.3	81573.94	OIL SHEEN
708	404442	81527.37	OIL SHEEN
712	404435.7	81467.58	OIL SHEEN
714	404432	81427.36	OIL SHEEN
716	404422.4	81343.22	OIL SHEEN
718	404406.6	81210.72	OIL SHEEN
720	404390.4	81082.45	OIL SHEEN
722	404383.3	81023.71	OIL SHEEN
724	404353.3	80756.85	OIL SHEEN
727	404330.7	80625.48	OIL SHEEN
729	404312.7	80573.47	OIL SHEEN
728	404290.2	80577.54	OIL SHEEN
726	404305.6	80629.45	OIL SHEEN
725	404326.7	80758.83	OIL SHEEN
723	404357.9	81025.3	OIL SHEEN
721	404365	81083.24	OIL SHEEN
719	404380.5	81212.7	OIL SHEEN
717	404394.4	81345.87	OIL SHEEN
715	404403.9	81430.53	OIL SHEEN
713	404406.6	81471.28	OIL SHEEN
709	404415	81528.96	OIL SHEEN
711	404420.8	81575.53	OIL SHEEN
707	404426.1	81627.38	OIL SHEEN
703	404433	81690.04	OIL SHEEN
704	404446.8	81812.8	OIL SHEEN
705	404455.2	81880.01	OIL SHEEN
730	404460.4	81931.44	OIL SHEEN
733	404467.8	81999.71	OIL SHEEN
735	404482.1	82116.12	OIL SHEEN
738	404490.5	82213.7	OIL SHEEN
739	404482.6	82243.86	OIL SHEEN

740 404481.5 82258.68 OIL SHEEN

ORIGINAL COORDINATES OBTAINED DURING JIV

652 404550.1 82238.27 OIL SHEEN
653 404519.3 82238.38 OIL SHEEN
654 404506.9 82241.5 OIL SHEEN
655 404509.9 82210.75 OIL SHEEN
656 404506.7 82167.73 OIL SHEEN
657 404497.2 82115.51 OIL SHEEN
658 404487.8 82044.85 OIL SHEEN
659 404481.4 81995.69 OIL SHEEN
660 404478.1 81931.16 OIL SHEEN
661 404468.7 81878.94 OIL SHEEN
662 404462.3 81811.34 OIL SHEEN
663 404452.8 81734.53 OIL SHEEN
664 404446.4 81688.45 OIL SHEEN
665 404437 81627.01 OIL SHEEN
666 404430.6 81574.78 OIL SHEEN
667 404427.4 81528.68 OIL SHEEN
668 404417.9 81470.32 OIL SHEEN
669 404411.6 81430.38 OIL SHEEN
670 404408.2 81344.33 OIL SHEEN
671 404395.6 81264.46 OIL SHEEN
672 404395.4 81212.21 OIL SHEEN
673 404386 81144.62 OIL SHEEN
674 404379.6 81083.17 OIL SHEEN
675 404373.2 81024.79 OIL SHEEN
676 404344.5 80757.48 OIL SHEEN
677 404313.2 80628.49 OIL SHEEN
678 404297.6 80576.3 OIL SHEEN

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iii. Emulsification factor: 30%

iv.

Volume of pool of free phase oil, V_{pool} :	<u>4.31</u>	barrels
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b. Computation of volume of infiltrated oil in the soil (V_{inf}).

INFILTRATION IS LIMITED TO COFFERDAM AXIS OF THE IMPACTED AREA, DUE TO FLOODED NATURE OF THE AREA.

i. Area *(m²) covered by the oil: 100 m²
 ii. Area of the pool of free phase oil in touch with soil: OIL
 iii. Average Depth (m) below ground surface of infiltration of oil: 0.025
 iv. Soil type: CLAY
 v. P_e (effective porosity of the soil): 8%

iv.

Volume of infiltrated oil, V_{inf}	<u>1.23</u>	barrels
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21. Computation of volume of oil on open water based on coloration.

i. Total area of oil on open water: 47,955 m²
 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		
Dark	0.002	<u>80%</u>	<u>6.0767 m³</u>
Black oil	0.1	<u>20%</u>	<u>0.9591 m³</u>
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume <u>6.52</u> bbl

iii.

Volume of oil on open water, V_{wat} :	<u>6.52</u>	barrels
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22. Calculation of evaporated volume:

i. Oil type: BONNY LIGHT

ii. E-Factor: 40%

iii.

Volume of evaporated oil, V_{evap} :	<u>11.49</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%

*If area is not same as the total area of impact, please indicate in the overview sketch
 ** Spill Factor from USCG FOG (2000 Edition)

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23. Gross Total Estimated Spilled Volume

$$V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recj}(bbls)$$

$$V_{Est}(bbls) = 11.49 + 6.52 + 1.23 + 4.31 + 5.2 = 28.76 \approx 28.8 \text{ BBLs}$$

24. Net Total Estimated Spilled Volume

$$V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recj}(bbls)$$

$$V_{Est}(bbls) = 11.49 + (6.52 * 0.6) + 1.23 + 4.31 + 5.2 = 26.14 \text{ BARRELS}$$

*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 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

B. Investigation of the incident site showed that there is residual impact on site requiring further works

26 REPRESENTATIVES

This report was filled and signed on the 25 / 10 / 2012 at incident site 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]:

Tick as applicable

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27. Appendix 1: Overview sketch of the site

