

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0022 702639

(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: 702639 2. Type of incident* SPILL
 3. Name of Location 10" DIGBY CREEK - NYN RIVER PIPELINE
 4. Name of nearest community OPORDA 5. State: BAYELSA 6. LGA SOUTH IJAW
 7. Type of Production facility/Installation PIPELINE 8. Asset owner/District NESP

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 20th AUGUST, 2011
 b. Date/Period of investigation: 1st SEPTEMBER, 2011

c. Description of spill point environment

- | | | |
|---|--|---|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input checked="" 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 checked="" 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 type="checkbox"/> Others (specify) _____ |

e. Incident due to:

- Third party interference Operational Others (specify) _____

f. Spill point coordinates

Measuring unit <u>Meters</u> (MINNA MID-BRIT)	
Northing: <u>88911.71 m</u>	Easting: <u>405279.49 m</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). [,m]

} NOT APPLICABLE.

12. Containment measures put in place;

- Booms Trench Dyke

Others: NO CONTAINMENT IN PLACE.

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
	NONE WITHIN AREA OF IMPACT					

17. Fish/Nets/Ponds

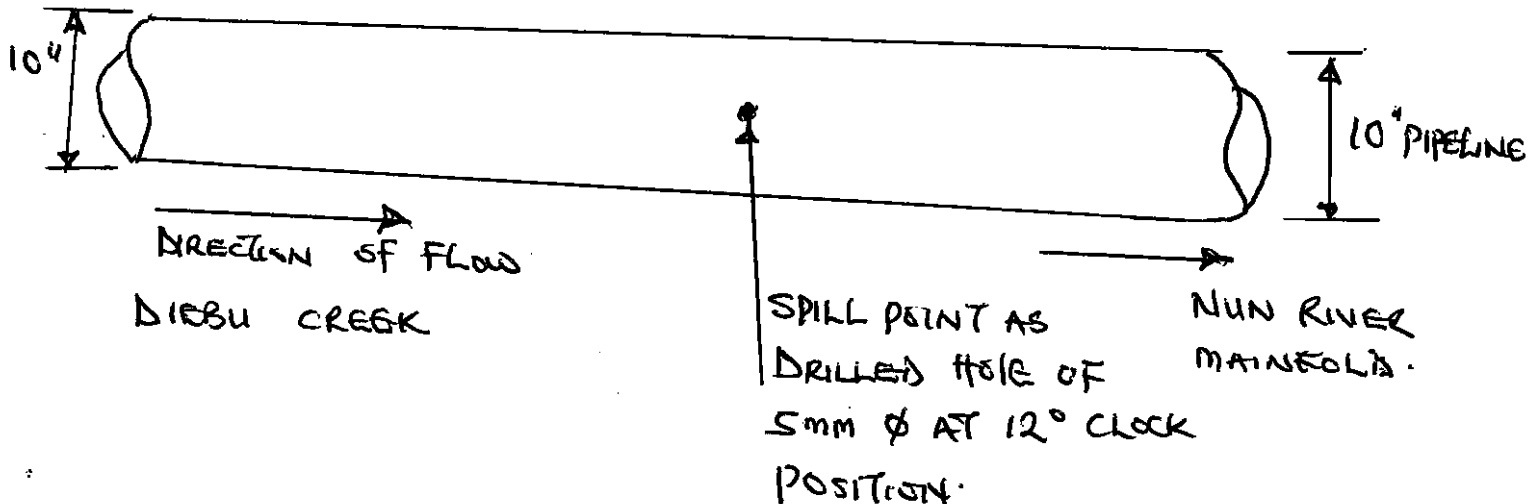
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

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 (Overview sketch of the site should be added as an appendix 1)

LEAK SECTION OF 10" DIEBU CREEK - NUN RIVER PIPELINE
AT OPOROMA.



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

19. Impacted area boundary Coordinates (If more than 12 points, Attach as an appendix 2)

(MINNA MID-BEIT)

S/N	Northing (METER)	Easting (METER)
a1	88991.50	405313.68
a2	88972.92	405294.45
a3	88909.14	405285.22
a4	88836.15	405276.83
a5	88844.15	405260.75
a6	88890.29	405251.66
a7	88905.70	405239.38
a8	88924.17	405230.20
a9	88951.86	405224.13
a10	88981.31	405259.21
a11	88998.93	405275.99
a12	89019.28	405279.49

Loop A
(0.70Ha)

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 1.96 Ha
- Impact within SPDC R.O.W 0.32 Ha
- Impact outside R.O.W 1.64 Ha

21. Volume of oil recovered before completion of JIV ($V_{rec.J}$):

Recovered oil $V_{rec.J}$	<u>NIL</u>	barrels
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20. Computation of the residual volume on site

- a. Computation of volume of pool of free phase oil (on land or confined water body). 7022 m²
- Area (m²) occupied by pool of free phase oil 7022 m²
 - Average Depth (m) of pool of free phase oil 0.001 m
 - Emulsification factor: NIL

iv. Volume of pool of free phase oil. V_{pool} :	<u>44.17</u>	barrels
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b. Computation of volume of infiltrated oil in the soil (V_{inf}).

- i. Area (m^2) covered by the oil: 19,600 m^2
- ii. Area of the pool of free phase oil in touch with soil: 9100 m^2
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.002m
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%

iv. Volume of infiltrated oil. V_{inf}	<u>9.16</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: NOT APPLICABLE.
- ii. Table of average depth of oil on water based on coloration *

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

iii. Volume of oil on open water. V_{wat} :	<u>NIL</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>35.56</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 $V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls)$	<u>$35.56 + NIL + 9.16 + 44.17 + NIL = 88.88$ bbls</u>
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$$V_{Est}(bbls) = 35.56 + NIL + 9.16 + 44.17 + NIL = 88.88 \approx 89 \text{ Barrels}$$

24. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recj}(bbls)$

$$V_{Est}(bbls) = 88.88 \approx 89 \text{ Barrels}$$

*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

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

26 Signatories

This report was filled and signed on the 01/09/2011 at incident site by joint investigation representatives from

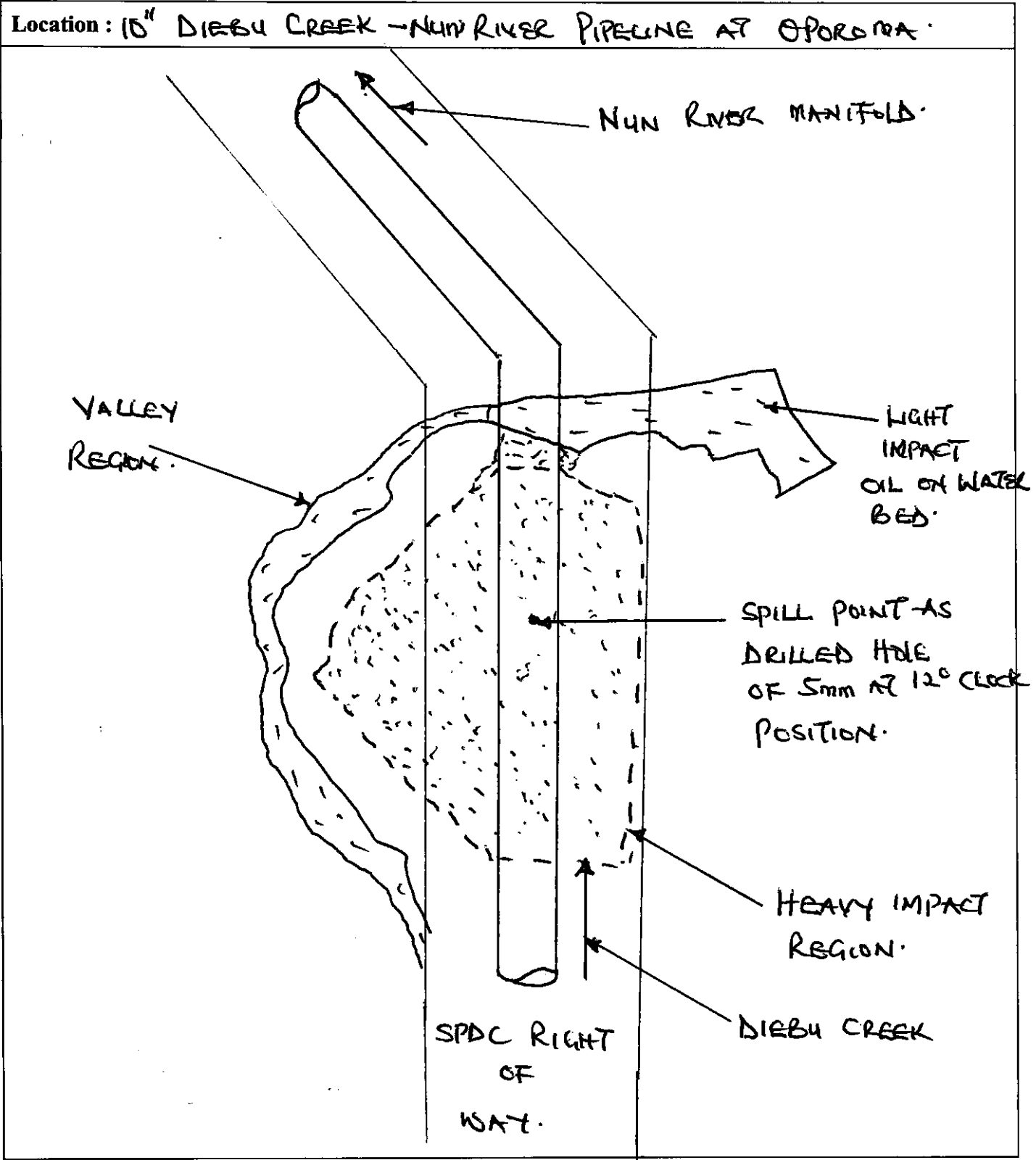
- Host Community
- Department of Petroleum Resources [DPR]:
- National Oil Spill Detection and Response Agency [NOSDRA]:
- State Ministry of Environment [SME]:
- Nigeria Police Force [NPF]:
- Shell Petroleum Development Company [SPDC]:

Tick as applicable

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20. Appendix 1: Overview sketch of the site



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21. Appendix 2: TABLE SHOWING ADDITIONAL COORDINATES TAKEN DURING JIV FOR AREA CALCULATION (MINNA MID - BERT)

S/N	Northing (meter)	Easting (meter)
b1	88795.01	405251.33
b2	88785.75	405260.45
b3	88758.09	405260.45
b4	88751.95	405257.34
b5	88788.93	405229.72
b6	88838.93	405227.24
b7	88859.66	405220.72
b8	88899.69	405199.28
b9	88927.73	405198.55
b10	88935.29	405200.49
b11	88995.90	405228.29
b12	89031.59	405276.82
b13	89031.44	405319.99
b14	89032.25	405387.94
b15	89039.75	405472.33
b16	88968.48	405554.85
b17	88972.33	405485.95
b18	89001.35	405451.70
b19	89005.99	405406.70
b20	88991.50	405332.18
b21	88991.44	405313.68
b22	88991.50	405279.86
b23	89019.28	405242.72
b24	88999.77	405205.56
b25	88933.48	405205.43
b26	88875.01	405226.94
b27	88865.79	405226.91
b28	88841.15	405239.16

oop B
(1.26ha)