

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0540 911964

(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: 911964 2. Type of incident * OIL SPILL
 3. Name of Location 10" DIEBU CREEK - NUN RIVER PIPELINE
 4. Name of nearest community ONYOMA 5. State: BAYELSA 6. LGA SOUTHERN IJAW
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/ District NPE / SWAMP

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 1ST JANUARY 2013
 b. Start date/time of investigation: 5TH JANUARY 2013
 c. Investigation End date: 6TH JANUARY 2013
 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

Measuring unit (M)		MINNA MID-BELT	
Northing:		Easting:	
SP1:	85261.65		404865.88
SP2:	85227.85		404862.68

*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: 0540 91964

16. Crops/Economic Trees

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

17. Fish/Nets/Ponds

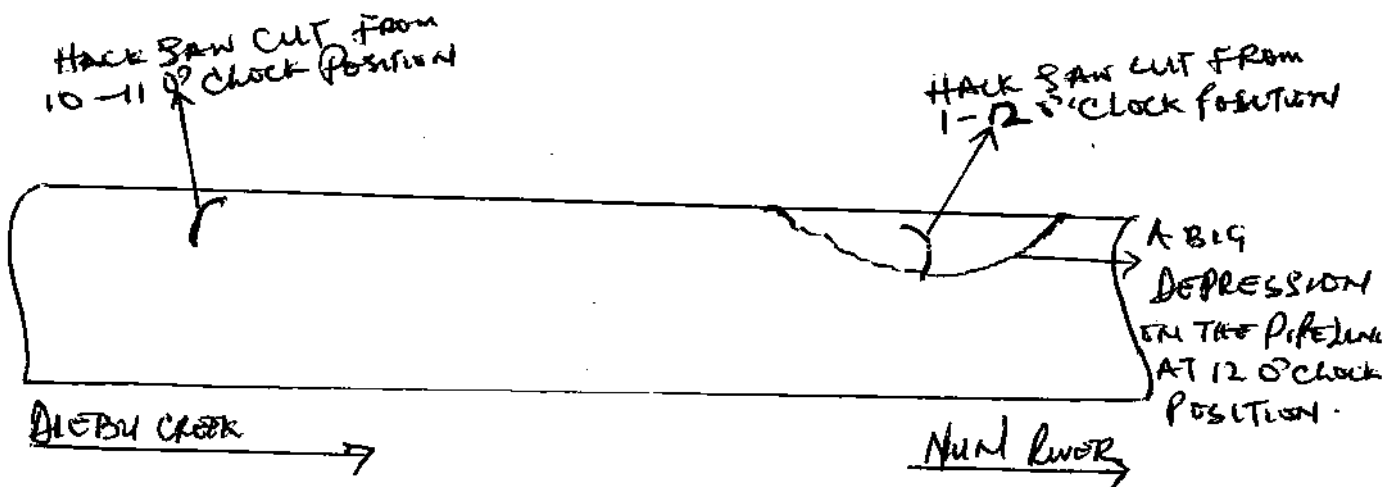
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

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)

A SECTION OF 10" DIEBU CREEK - NUM RIVER PIPELINE AT ONYOMA SHOWING 2 NOS. HACK SAW CUT AND A DEPRESSION AT 12 O'CLOCK POSITION



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0540 911964

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-BELT

S/N	Northing (m)	Easting (m)
WP20	85273.94	404869.01
WP21	85261.60	404881.30
WP22	85236.98	404890.46
WP23	85181.65	404890.27
WP24	85169.23	404927.23
WP26	85175.35	404933.42
WP27	85163.06	404933.38
WP29	85190.63	404961.22
WP31	85209.06	404964.37
WP32	85199.81	404970.51
WP33	85215.12	404989.06
WP35	85224.29	405004.51
WP36	85208.95	404995.21

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.79 Ha
- Impact within SPDC R.O.W YES
- Impact outside R.O.W YES

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

Recovered oil V_{rec}	barrels
NU	

20. Computation of the residual volume on site

- a. Computation of volume of pool of free phase oil (on land or confined water body).
- i. Area (m^2) occupied by pool of free phase oil 3300 m^2
 - ii. Average Depth (m) of pool of free phase oil 0.0015 m

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0540 911964

iii. Emulsification factor: NU

iv.

Volume of pool of free phase oil. V_{pool} :	<u>31.14</u>	barrels
--	--------------	---------

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

Peak Point
r = 4m
Depth 1.6m
oil layer

Peak Point
r = 3
Depth 1.6
oil layer

Total → 5.64 Barrels

i. $4 \times 0.08 \times 1.6$ Area *(m²) covered by the oil: 4593m²
 ii. 3.22 Barrels Area of the pool of free phase oil in touch with soil: 3300m²
 iii. Average Depth (m) below ground surface of infiltration of oil: 0.003m
 iv. Soil type: 8% clay
 v. P_c (effective porosity of the soil): 8%

iv.

Volume of infiltrated oil. V_{inf}	<u>11.92 + 5.64 → 17.56</u>	barrels
--------------------------------------	-----------------------------	---------

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

i. Total area of oil on open water: NU
 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	APPLICABLE	
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume bbl

iii.

Volume of oil on open water. V_{wat}	<u>NU</u>	barrels
--	-----------	---------

22. Calculation of evaporated volume:

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

iii.

Volume of evaporated oil. V_{evap}	<u>16.23</u>	barrels
--------------------------------------	--------------	---------

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)

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0540 911984

23. Gross Total Estimated Spilled Volume

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

$$V_{Est}(bbls) = 16.23 + NM + 17.56 + 31.14 + NM \Rightarrow 64.93$$

24. Net Total Estimated Spilled Volume

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

$$V_{Est}(bbls) = 16.23 + NM + 17.56 + 31.14 + NM \Rightarrow 64.93 \approx 65 \text{ BARRELS}$$

*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 6/07/2013 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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0540
911964

21. Appendix 2: TABLE SHOWING ADDITIONAL COORDINATES TAKEN DURING JIV FOR AREA CALCULATION

MINNA MID-BELT

S/N	Northing (m)	Easting (m)
WP37	851 96.68	404 989.00
WP38	851 93.66	404 973.57
WP28	851 72.17	404 964.24
WP40	851 19.99	404 945.56
WP41	850 92.39	404 926.96
WP42	851 04.73	404 914.67
WP43	851 13.91	404 923.95
WP44	851 63.11	404 917.96
WP45	851 72.44	404 887.16
WP46	851 66.41	404 853.22
WP47	851 75.71	404 831.66
WP48	85 224.84	404 844.17
WP49	852 86.26	404 859.80
WP50	852 80.08	404 869.03