

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 0428 850352

(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: 850352 2. Type of incident * OIL SPILL
 3. Name of Location 36" NKPOKU - OGALE PIPELINE
 4. Name of nearest community AKPAJO 5. State: RIVERS 6. LGA ELEME
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/ District NPE/PH.1

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 4TH AUGUST, 2012.
 b. Start date/time of investigation: 8TH AUGUST, 2012
 c. Investigation End date: 11TH AUGUST, 2012.

d. Description of spill point environment

- Firmed soil Loose soil Previously excavated area
 Under water Swampy Exposed pipe surface
 Well Plateform (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) FAILED CLAMP

f. Incident caused by:

- Third party interference Operational Mystery _____

g. Spill point coordinates

Measuring unit meter. (MINNA, MID-BELT)

Northing: Leaking → SP1 = 93237mN Non-leaking SP2 = 93241mN	Easting: 517191mE 517188mE
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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 [**150** ,m]
 Fish Farm/Pond [,m]
 Fishing net [,m]
 Others (specify) [,m]

12. Containment measures put in place;

- Booms Trench Dyke
 Others: _____

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					

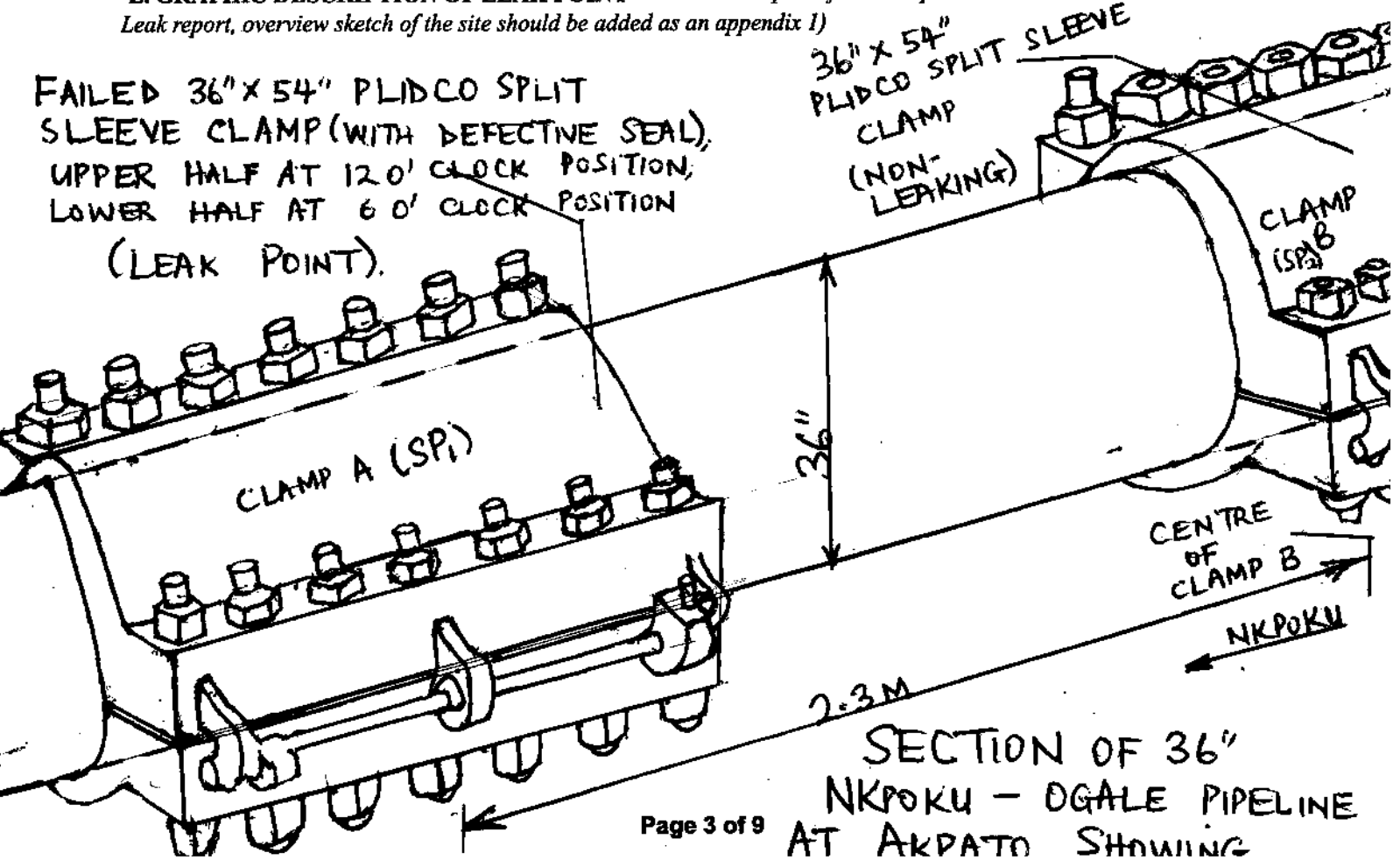
17. Fish/Nets/Ponds

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 *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)*



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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)

MINDA (MID-BTL)

S/N	Northing	Easting
1.	93237 mN	517188 mE
2.	93237 mN	517185 mE
3.	93241 mN	517185 mE
4.	93271 mN	517160 mE
5.	93274 mN	517166 mE
6.	93259 mN	517179 mE
7.	93250 mN	517191 mE
8.	93241 mN	517197 mE
9.	93250 mN	517182 mE
10.	93256 mN	517173 mE
11.	93256 mN	517179 mE
12.	93247 mN	517194 mE
13.	93247 mN	517197 mE

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.04 Ha
- Impact within SPDC R.O.W _____
- Impact outside R.O.W _____

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

Recovered oil V_{rec}	<u>53</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).

- Area (m^2) occupied by pool of free phase oil 250
- Average Depth (m) of pool of free phase oil 0.037

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iii. Emulsification factor: NIL

iv.

Volume of pool of free phase oil V_{pool} :	58.18	barrels
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b. Computation of volume of infiltrated oil in the soil (V_{inf}).

COMPUTATION OF INFILTRATED OIL VOLUME AT SPILL POINT:
OIL INFILTRATED AREA AT SPILL POINT = $2M^2$.
AVERAGE DEPTH OF OIL INFILTRATION AT SPILL POINT = $2M$.
OIL INFILTRATION VOLUME = $2M^2 \times 2M$
 $2M \times 2M \times 8\%$ (EFFECTIVE POROSITY OF CLAY SOIL) $\times 6.29 = 2.01$ BARRELS

- i Area *(m²) covered by the oil: 148
- ii Area of the pool of free phase oil in touch with soil: 248
- iii Average Depth (m) below ground surface of infiltration of oil: 0.012
- iv Soil type: CLAY
- v P_e (effective porosity of the soil): 8% VOLUME OF INFILTRATED OIL OUTSIDE SPILL POINT

iv.

Volume of infiltrated oil. V_{inf} (TOTAL)	$2.01 + 2.39 = 4.4$	barrels = 2.39 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: NIL
- ii. Table of average depth of oil on water based on coloration **

	Thickness (mm)	Percentage coverage	Volume (m3)
Barely Visible	0.00004	NOT APPLICABLE	
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002		
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} :	NIL	barrels
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22. Calculation of evaporated volume:

- i. Oil type: BONNY MEDIUM
- ii. E-Factor: 15%

iii.

Volume of evaporated oil. V_{evap} :	20.4	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	= 20.4 + NIL + 4.4 + 58.18 + 53 = 135.98
$V_{Est}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recj}(bbls)$	
$V_{Est}(bbls) =$	136 BARRELS
24. Net Total Estimated Spilled Volume	= 20.4 + NIL + 4.4 + 58.18 + 53 = 135.98
$V_{Est}(bbls) = V_{evap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recj}(bbls)$	
$V_{Est}(bbls) =$	136 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 11/08/2012 at incident site by joint investigation representatives from

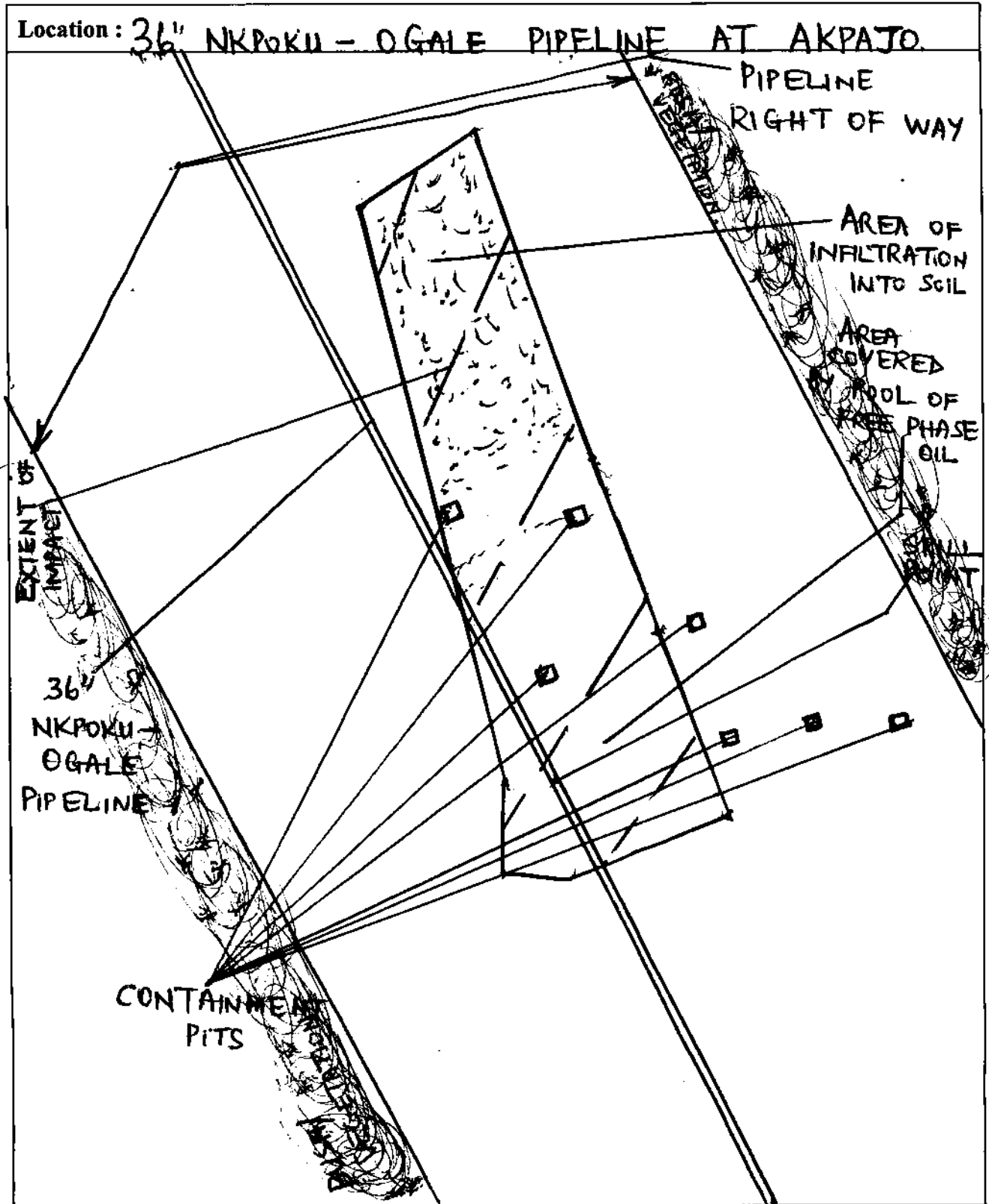
- Host Community
- Department of Petroleum Resources [DPR]:
- National Oil Spill Detection and Response Agency [NOSDRA]:
- State Ministry of Environment [SME]:
- Nigeria Police Force [NPF]:
- Shell Petroleum Development Company [SPDC]:

Tick as applicable

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27. Appendix 1: Overview sketch of the site



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

MINNA (MID-BELT)

S/N	Northing	Easting
14	93247 mN	517200 mE