

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1055582 JIV report S/N: 0293

(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: 1055582 2. Type of incident* FIRE AND OIL SPILL
 3. Name of Location 28" TRANS NIGER PIPELINE NEAR PATREK WATERSIDE MAINTENANCE
 4. Name of nearest community BENNE CITY 5. State: RIVERS 6. LGA GOKANA
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE / LAND

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 14TH OCTOBER, 2013
 b. Start date/time of investigation: 15TH OCTOBER, 2013
 c. Investigation End date: 15TH OCTOBER, 2013 Actual investigation duration, days: ONE DAY
 d. Description of spill point environment
 Firmed soil Loose soil Recently excavated area
 Under water Swampy Exposed pipe surface
 Well Platform (on Water) Drill Rig
 e. Description of leak point (tick as applicable);
 Drilled hole Hack saw cut Tear (_____).
 Complete Rupture Inward dent, Well head tampering
 Failed Weld-on illegal hot tap valve, Failed Clamp 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,
 Bulging Outward Flare Systems/Bund wall failure Accidental 3rd party
 equipment impact Valve Failure com unit failure Cold vent
 Relief valve failure Others (specify) _____

f. Incident caused by:

- Third party interference (Sabotage , crude theft , Line theft , Accidental 3rd party damage)
 Operational Others (including Mystery spills) _____

g. Spill point coordinates

Measuring unit <u>M&BT</u>	
<u>MINNA MID - B&T</u>	
Northing: <div style="font-size: 2em; text-align: center;">67446.97</div>	Easting: <div style="font-size: 2em; text-align: center;">533423.24</div>

*This can be: a) Oil Spill b) Drilling fluid/Chemical c) Situation d) construction e) Encroachment f) Fire.

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C. RISK ASSESSMENT

10. Type of environment:

- Land Swamp Water Seasonal swamp Shoreline/Waterfront

i. Type of environment to which oil has spread:

- Land Swamp Water River (identify) _____

ii. Weather condition

- Rain Sunny Dry Wet Windy Hot Cool

11. Distance from the nearest sensitive habitat

- Government reserved and designated protected area [,m]
- Drinking water source [,m] **NONE SEEN**
- Built up area [,m] **WITHIN**
- Farmlands [,m] **VICINITY.**
- Fish Farm/Pond [,m]
- Fishing net [,m]
- Others (specify). [,m]

12. Containment measures put in place:

- Booms Trench Dyke Natural depression Pit
 Others: _____

13. Any pictures or video coverage? [] [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				

16. Crops/Economic Trees

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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

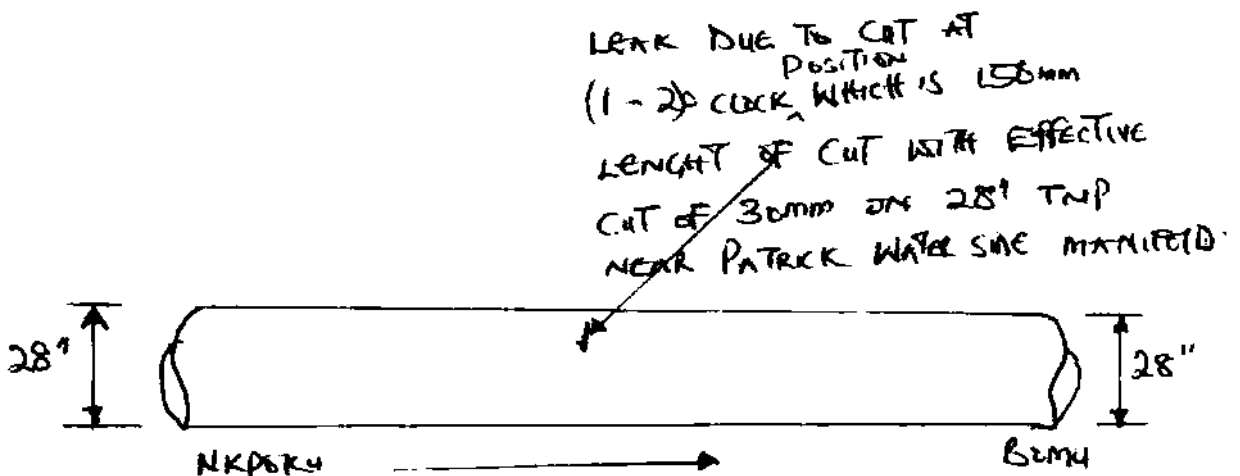
S/N	Others	Description	Quantity/Size	Comments
NONE WITHIN AREA OF IMPACT				

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)

SECTIONAL VIEW OF 28" TRANS NIGER PIPELINE NEAR PATRICK WATER

-SIDE MANIFOLD AT BONDU CITY SHOWING HACKSAW

CUT AT 1^o CLOCK TO 2^o CLOCK POSITION



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

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19. Impacted area boundary Coordinates (If more, Print and attach as an appendix)

NINNA MID - BEIT

S/N	Northing (METRE)	Easting (METRE)
WP664	67 440.82	533 423.23
WP665	67 443.91	533 413.99
WP666	67 456.22	533 401.68
WP667	67 471.62	533 377.05
WP668	67 459.29	533 401.69
WP669	67 462.36	533 404.78
WP670	65 450.02	533 432.50

G. INCIDENT INFORMATION:

20. Impacted Area Details

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

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

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Recovered oil V_{r}	Barrels
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22. Computation of estimated residual volume on site

a. Computation of estimated volume of pool of free phase oil (on land or confined water body).

- i. Area (m^2) occupied by pool of free phase oil 20 m^2
- ii. Average Depth (m) of pool of free phase oil 0.16 m
- iii. Emulsification factor: 30%
- iv.

Estimated Volume of pool of free phase oil.	3.52	barrels
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b. Computation of estimated volume of infiltrated oil in the soil (V_{inf}).

1. Estimated Volume of infiltrated oil at spill point ($V_{inf a}$)

- i. Area* (m^2) of soil covered by the oil: 8 m^2
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1m
- iii. Soil type: Silt iv. P_c (effective porosity of the soil): 20%
- v. Cause of spill: THIRD PARTY vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: ONE DAY
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.005m
- ix. Estimated depth of infiltration around spill point: _____

Estimated Volume of infiltrated oil at spill point. $V_{inf a}$	10.58	barrels
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2. Estimated Volume of infiltrated oil at second spill point [if applicable] ($V_{inf b}$)

- i. Area* (m^2) of soil covered by the oil: NIL
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: NIL
- iii. Soil type: NIL iv. P_c (effective porosity of the soil): NIL
- v. Cause of spill: NIL vi. Oil type: NIL
- vii. Oil Residence time on site, day: NIL
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: NIL
- ix. Estimated depth of infiltration around spill point: NIL

Estimated Volume of infiltrated oil at spill point. $V_{inf b}$	NET APPLICABLE	barrels
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3. Estimated Volume of infiltrated oil outside immediate spill point(s) region ($V_{inf c}$)

- i. Area (m^2) of soil covered by the oil: 320 m^2
- ii. Area (m^2) of the pool of free phase oil in touch with soil: _____
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.009m
- iv. Soil type: (SANDY CLAY) SILT
- v. P_c (effective porosity of the soil): 20%
- vi.

Estimated Volume of infiltrated oil. At $V_{inf c}$	0.39	barrels
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23. Computation of estimated volume of oil on open water based on standard coloration.

i. Total area of oil on open water: NOT APPLICABLE

NOTE:
ESTIMATED VOLUME OF OIL BURNED OFF BY FIRE, FROM 2 AM OF 14TH OCTOBER TO 1.00 PM SAME DAY IS ASSUMED TO BE 25% OF THE CALCULATED VOLUME ON JIV DATE OF 15TH OCTOBER, 2013
 $17.04 \times 0.25 = 4.26$
 $= 5$ BARRELS BURNED OFF BY FIRE.

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ii. Table of average depth of oil on water based on coloration (

***Spill Factors from USCG FOG (2000 Edition)*

	Thickness (mm)	Percentage coverage	Volume (m3)
Barely Visible	0.00004		
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		

NONE SEEN WITHIN VICINITY

Percent Total		I (IP)	
iii.	Estimated Volume of oil on open water. $V_{\text{on water}}$	NOT APPLICABLE	Barrels

24. Calculation of evaporated volume:

i. Estimated Volume available for evaporation within surface area: 14.49 Barrels

ii. E-Factor: 15%

iii.	Estimated Volume of evaporated oil. V_{evap}	2.56	Barrels
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Evaporation Factors (E-Factor) for SPDC Crude oil			
Oil Type	Days on site	Bonny Light	Bonny Medium
Oil Residence time	< 1 day	10%	5%
	1-7 days	25%	15%
	> 7 days	40%	25%

25. Net Estimated Spilled Volume $V_{\text{net}}(\text{bbbls}) = V_{\text{evap}}(\text{bbbls}) + V_{\text{on water}}(\text{bbbls}) + V_{\text{on surf}}(\text{bbbls}) + V_{\text{on soil}}(\text{bbbls}) + V_{\text{on veg}}(\text{bbbls}) = 2.56 + 14.49 + 10.96 + 3.52 + \text{NIL} = 17.04 \text{ Barrels}$ $(17.04 + 5 \text{ burnt off by fire}) = 22.04 \text{ Barrels}$
Estimated Reported Volume** $V_{\text{rep}}(\text{bbbls}) = 23 \text{ Barrels}$

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 Volume (m3) x 6.29; **Round up estimated volume to next whole number using the following rules:

- Any spill volume in excess of 1 bbl is rounded up to the next whole number.
- Any spill volume in less than 1 bbl is rounded up to the next 0.1 bbl.

Examples: Calculated volume = 15.3 bbl ——— Reported volume = 16 bbl
 Calculated volume = 0.35 bbl ——— Reported volume = 0.4 bbl
 Calculated volume = 0.01 bbl ——— Reported volume = 0.1 bbl.

Wherever this estimation tool is not applicable please refer to paragraph 6c (Deviations) of the JIV procedure to use appropriate steps for column estimation; record the calculation in a plain sheet of paper and attach to the JIV report.

26. 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 <input type="checkbox"/>
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B. Investigation of the incident site showed that there is residual impact on site requiring further works

27. REPRESENTATIVES

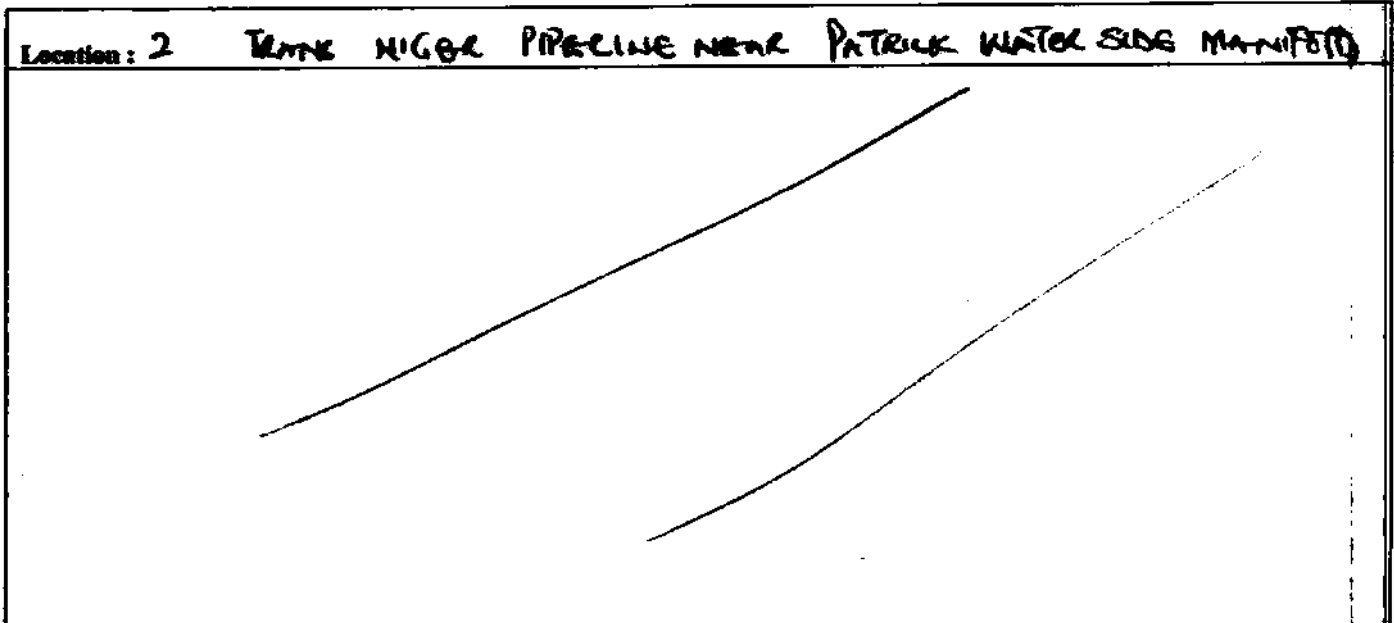
This report was filled, agreed and signed on the 15/10/2013 by joint investigation representatives from

- Host Community:
- Department of Petroleum Resources [DPR]:
- National Oil Spill Detection and Response Agency [NOSDRA]:
- State Ministry of Environment [SME]:
- Nigeria Police Force [NPF]: (NOT PRESENT)
- Shell Petroleum Development Company [SPDC]:
- Signatories agree with reported findings:
- Separate DPR form has been filled out with same findings

Tick as applicable

28. Appendix 1: Overview sketch of the site

Location: 2 WINE NIGER PIPELINE NEAR PATRICK WATER SIDE MANIFOLD



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