



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
JOINT INVESTIGATION REPORT FOR INCIDENT NO: 689063

No. **00995**

A. GENERAL INFORMATION:

1. Spill incident Number: 689063
2. Name of Location CANTHRONE CHANNEL WELL 24T FLOWLINE
3. Name of nearest community MBIAMA
4. State RIVERS LGA DEGEMA
5. Type of Production facility/Installation FLOWLINE Asset owner /District SWAMP 1

B. INCIDENT INFORMATION:

6. Details of incident

- a. Date of incident
- b. Date/Period of investigation, 18TH JULY, 2011
- c. Description of spill point environment

- | | | |
|----------------------------------------------------|-----|-----|
| <input type="checkbox"/> Firmed soil | [Y] | [N] |
| <input type="checkbox"/> Loose soil | [Y] | [N] |
| <input type="checkbox"/> Previously excavated area | [Y] | [N] |
| <input type="checkbox"/> Under water | [Y] | [N] |
| <input type="checkbox"/> Swampy | [Y] | [N] |
| <input type="checkbox"/> Exposed pipe surface | [Y] | [N] |

**AFTER JOINT INVESTIGATION
OF THE INCIDENT SPILL
WAS FOUND TO BE DUE TO
HUMAN ERROR**

d. Description of leak point (tick as applicable);

- | | | |
|------------------------------------------------------------------------|-----|-----|
| <input type="checkbox"/> Drilled hole, | [Y] | [N] |
| <input type="checkbox"/> Hack saw cut, | [Y] | [N] |
| <input type="checkbox"/> Explosive tear, | [Y] | [N] |
| <input type="checkbox"/> Complete Rupture | [Y] | [N] |
| <input type="checkbox"/> Inward dent, | [Y] | [N] |
| <input type="checkbox"/> Well head tampering | [Y] | [N] |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | [Y] | [N] |
| <input type="checkbox"/> Missing pipeline (flowline) | [Y] | [N] |
| <input type="checkbox"/> Crude oil theft (illegal bunkering) point, | [Y] | [N] |
| <input type="checkbox"/> Third party tampering with Clamp Bolt/Nut, | [Y] | [N] |
| <input type="checkbox"/> Third party tampering with valve setting, | [Y] | [N] |
| <input type="checkbox"/> Third party tampering with flange Nuts/bolts, | [Y] | [N] |
| <input type="checkbox"/> Corrosion, | [Y] | [N] |

Type: _____

- | | | |
|-------------------------------------------------|-----|-----|
| <input type="checkbox"/> Saver-pit over flow, | [Y] | [N] |
| <input type="checkbox"/> Surge vessel overflow, | [Y] | [N] |
| <input type="checkbox"/> Outward dent | [Y] | [N] |
| <input type="checkbox"/> Others (specify). | [Y] | [N] |

**RUN OVER BY A HEAVY EQUIPMENT
ON THE RIGHT OF WAY**

e. Spill point coordinates (MINNA MID BELT)

Northings:

61358.06

Easting:

504812.13



No. 0995

C. RISK/DAMAGE ASSESSMENT

7. Type of environment of spill site:

- ☐ Land
☒ Swamp
☐ water

Type of environment of which oil has spread:

- ☐ Land
☒ Swamp (NO RESIDUAL IMPACT OBSERVED DURING JOINT INVESTIGATION VISIT)
☐ water

8. Distance from the nearest sensitive habitat

- ☐ Government reserved and designated protected area [nu ,m]
☐ Drinking water source [nu ,m]
☐ Built up area NOT [nu ,m]
☐ Farmlands [nu ,m]
☐ Fish Farm/Pond APPLICABLE [nu ,m]
☐ Fishing net [nu ,m]
☐ Others (specify). [nu ,m]

9. Containment measures put in place;

- ☐ Booms [Y] [☒]
☐ Trench [Y] [☒]
☐ Dyke [Y] [☒]

☐ Others: _____

10. Any pictures or video coverage? [☒] [N]

11. Was there any disruption to the investigation? [Y] [☒]

If yes give brief description:

NOT APPLICABLE

D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL

A. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 887063

No. 0995

B. Crops/Economic Trees

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

C. Fish/Nets/Ponds

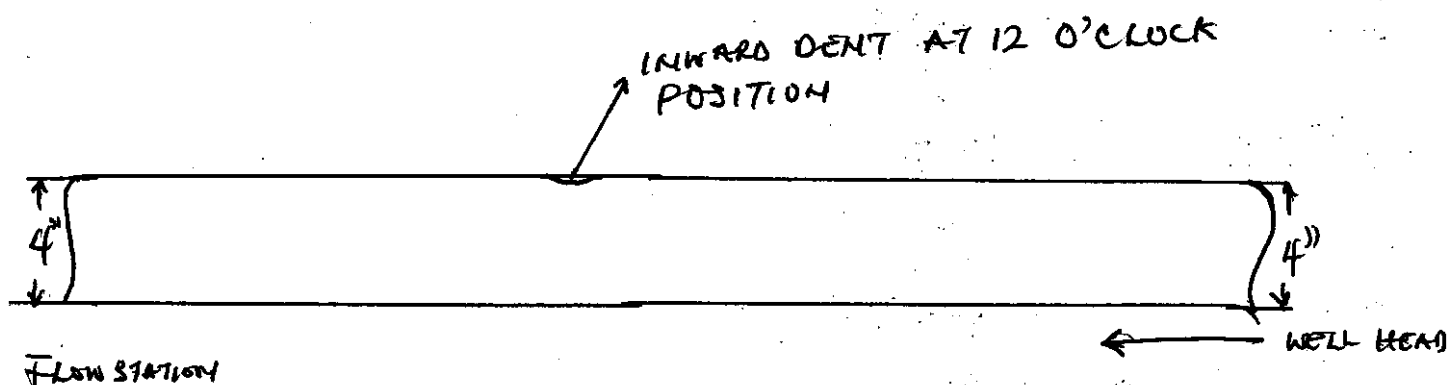
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE	WITHIN	AREA	OF IMPACT

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

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

E. GRAPHIC DESCRIPTION OF LEAK POINT (Details should be contained in leak repair report)

A SECTION OF 4" CANTHRONE CHANNEL WELL 24T FLOWLINE
SHOWING INWARD DENT AT 12 O'CLOCK POSITION





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

Page 4 of 7



No. 0995

G. INCIDENT INFORMATION:

17 Impacted Area Details

a. Total calculated area of impact

- Impact within SPDC R.O.W
- Impact outside R.O.W

(NO RESIDUAL IMPACT WAS FOUND DURING THE TIME OF JOINT INVESTIGATION VISIT)

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

Recovered oil V_{rec} : Nil barrels

19. Computation of the residual volume on site COMPUTATION OF ESTIMATED SPILLED VOLUME IS BASED ON FLOW RATE OF WELL 24T FLOWLINE (4") IDENTIFIED AS SOURCE

a. Computation of the volume of pooled free phase oil (on land or confined water body):

- Area (m^2) occupied by pool of free phase oil NOT APPLICABLE OF SPILL
- Average Depth (m) of pool of free phase oil
-

Volume of pooled of free phase oil, V_{pool} : Nil barrels

iv.

① ESTIMATED FLOWRATE IS 63 BARREL PER HOUR
② OBSERVED LEAK START TIME 12-05 HRS ON 16TH JULY 2011

③ OBSERVED LEAK STOP TIME 12-45 HR ON 16TH JULY

b. Computation of volume of infiltrated oil in the soil (V_3).

- Area (m^2) covered by the oil: NOT APPLICABLE
- Average Depth (m) below ground surface of infiltration of oil: ④ DURATION OF LEAK IS 40 MIN
- Soil type: NOT
- p_e (effective porosity of the soil): APPLICABLE
-

1 Hour - 63 BARREL
40 min - 2

Volume of infiltrated oil, V_{in} : Nil barrels

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

1 Hour - 60mm $\therefore 40mm = 63\% \times 40/60 = 42$ BARREL
42 BARREL WOULD HAVE BEEN SPILLED FOR 4" FLOWLINE BUT THE LEAK DIAMETER IS 2.2mm

	Thickness (mm)	Percentage coverage	Volume (m^3)
Barely Visible	0.00004		
Silvery	0.00008	<u>NOT</u>	
Slight Colour	0.00015		
Bright Colour	0.0003	<u>APPLICABLE</u>	
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

DIAMETER OF 4" PIPE = 101.6 mm
THE PERCENTAGE OF LEAK AREA TO THE PIPE DIAMETER IS
 $\frac{1}{101.6} \times \frac{100}{1} = 2.17\%$
therefore $\frac{42 \times 2.17}{100}$

Percent Total 100% Total Volume Nil bbl = 0.911

Spill Factors from USCG FOG (2000 Edition)

0.9 BARRELS



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 687063

No. 0995

Volume of oil on open water V_{wat} :

NIL

barrels

21. Calculation of evaporated volume:

i. Oil type: BONNY LIGHT

ii. E-Factor: NOT APPLICABLE

iii.

NOTE: EVAPORATION FACTOR WAS NOT APPLIED SINCE OIL SPILL ESTIMATION WAS ASSESSED DIRECTLY AT SOURCE

Volume of evaporated oil V_{ev} :

NOT APPLICABLE

barrels

Oil Type		Bonny Light	Bonny Medium
		E-Factor	E-Factor
Period Since Oil Spill	<1 day	10%	5%
	1-7 days	25%	15%
	>7 days	40%	25%

9. Gross Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$

$V_{Est}(bbls) =$

0.9 BARRELS

10. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + 0.6 \cdot V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$

$V_{Est}(bbls) =$

0.9 BARREL

* Calculation of the respective estimated volume is to done using the new spill estimation software on site

* Conversion of m3 to barrel is Total volume VT (m3) x6.29

* Emulsification factor for spill on water to consider is 60% of volume of oil.

This report was filled and signed on the 18 / 07 / 2011 at incident site by joint investigation representative 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