



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
 JOINT INVESTIGATION REPORT FOR INCIDENT NO: 631995

No. 00613

A. GENERAL INFORMATION:

1. Spill incident Number: 631995
2. Name of Location 24" AND 28" BOMU - BONNY PIPELINE
3. Name of nearest community BODO WEST
4. State RIVER LGA GOKANA
5. Type of Production facility/Installation PIPELINE Asset owner /District UIG/PI/NESP

B. INCIDENT INFORMATION:

6. Details of incident
- a. Date of incident 7TH MARCH, 2011
- b. Date/Period of investigation, 10TH TO 15TH MARCH, 2011
- c. Description of spill point environment
- | | | | |
|--|------|------|---|
| <input type="checkbox"/> Firmed soil | [Y] | [N]✓ | INVESTIGATION OBSERVED
THREE (3) OUT OF THE FIVE(S)
SPILL POINT WERE LEAKING. |
| <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]✓ | |
- d. Description of leak point (tick as applicable):
- | | | | |
|--|------|------|--|
| <input type="checkbox"/> Drilled hole, | [Y] | [N]✓ | AFTER JOINT
INVESTIGATIONS
OF THE INCIDENT
SPILL WAS
FOUND TO BE
DUE TO THIRD
PARTY INTERFERENCE |
| <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: NOT APPLICABLE
- | | | |
|--|-----|------|
| <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). <u>NOT APPLICABLE</u> | [Y] | [N]✓ |

c. Spill point coordinates For FIVE SPILL POINTS (WGS 84)

	Northing:			Easting:		
SPILL POINT 1A	04° 33'	52.3"		007° 05'	10.2"	
SPILL POINT 1B	04° 33'	53.4"		007° 05'	10.3"	
SPILL POINT 2	04° 33'	50.1"		007° 15'	06.7"	
SPILL POINT 3	04° 33'	50.6"		007° 15'	06.8"	
SPILL POINT 4A	04° 33'	51.3"	Page 1 of 7	007° 15'	06.9"	
SPILL POINT 4B	04° 33'	51.3"		007° 15'	06.8"	
SPILL POINT 5	04° 34'	38.0"		007° 15'	16.9"	



No. 0613

C. RISK/DAMAGE ASSESSMENT

7. Type of environment of spill site:

- Land
- Swamp
- water

Type of environment of which oil has spread:

- Land
- Swamp
- water

8. Distance from the nearest sensitive habitat

- Government reserved and designated protected area
- Drinking water source
- Built up area
- Farmlands
- Fish Farm/Pond
- Fishing net
- Others (specify).

[Nil, m]
 [Nil, m]
 [Nil, m]
 [Nil, m]
 [Nil, m]
 [Nil, m]

} NOT APPLICABLE

9. Containment measures put in place;

- Booms
- Trench
- Dyke

[Y] [N]
 [Y] [N]
 [Y] [N]

Others: NATURAL CONTAINMENT.

10. Any pictures or video coverage?

[Y] [N]

11. 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

A. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
	NONE WITHIN AREA OF IMPACT				



No. 0613

B. Crops/Economic Trees

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

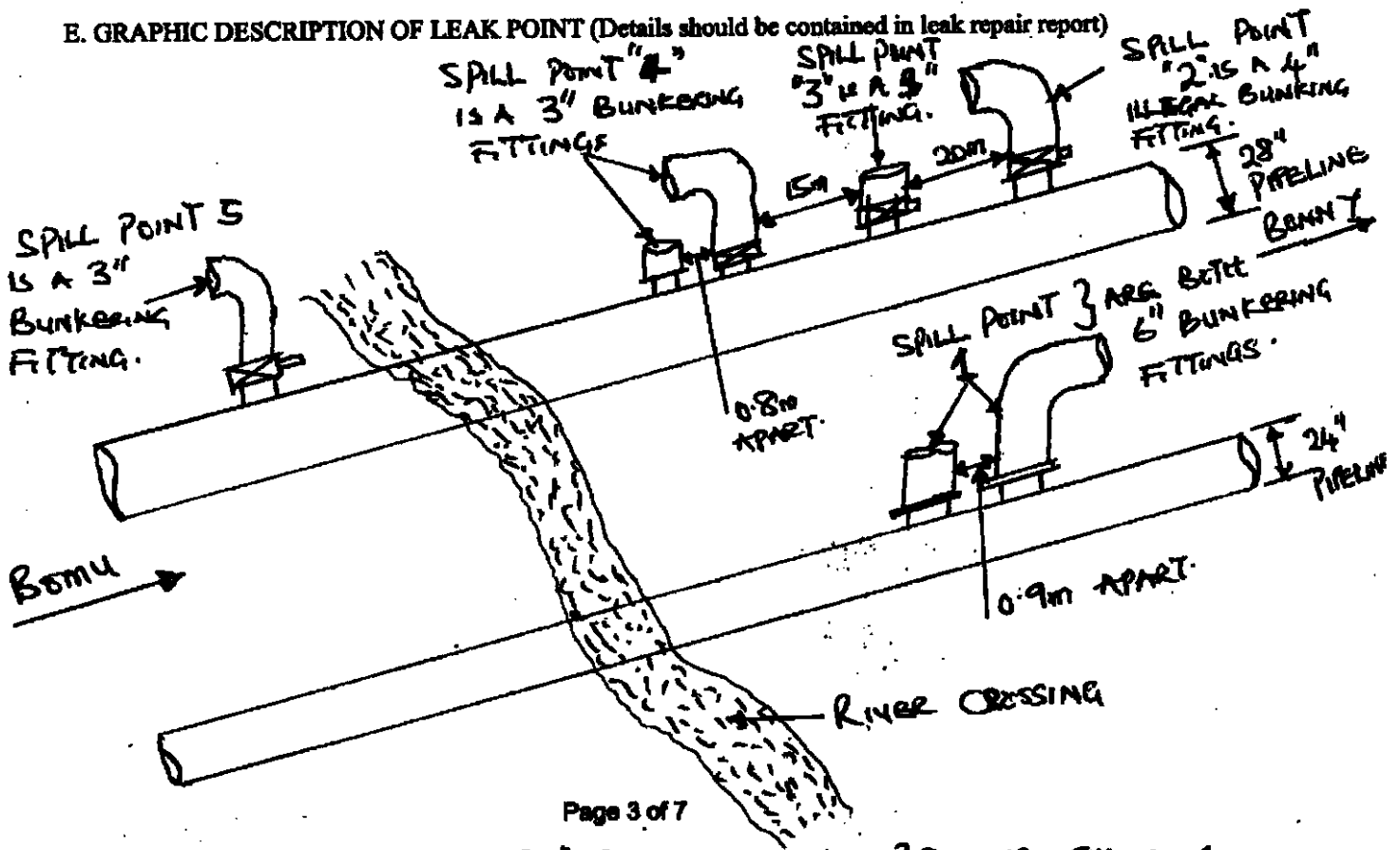
C. Fish/Nets/Ponds

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)



SECTION OF 24" AND 28" BOMU - BONNY PIPELINE SHOWING FIVE SPILL POINTS WITH ILLEGAL BUNKERING FITTINGS AT 12 O'CLOCK POSITIONS.



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
JOINT INVESTIGATION REPORT FOR INCIDENT NO: 28115

No 00613

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

S/N	LINE 24 ⁿ Northing (m)	Easting (m)
SPILL POINT (1) 919	62546.55	532298.9
920	62442.19	532258.6
921	62445.29	532240.12
922	62469.87	532261.8
925	62558.85	532292.8
	LINE 28 ⁿ NORTHING	EASTING:
SPILL POINT (2-4) 1	62506.82	532184.8
4	62442.33	532178.5
5	62371.33	532158.7
7	62305.64	532117.6
10	62187.49	53211.6
11	62182.54	53209.4
14	62315.27	532101.6
15	62359.59	532104.0
17	62343.54	532121.4
18	62625.43	532163.5
19	62617.23	532180.8
SPILL POINT (5) 1	63860.96	532452.8
2	63894.74	532458.5
3	63888.57	532473.9
4	63854.77	532464.5



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
JOINT INVESTIGATION REPORT FOR INCIDENT NO: 63175

No. **0813**

& INCIDENT INFORMATION:

17 Impacted Area Details

- a. Total calculated area of impact 1.3661 Ha (13,661 m²)
- Impact within SPDC R.O.W 0.6350 Ha (6,350 m²)
 - Impact outside R.O.W 0.7331 Ha (7,331 m²)

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

Recovered oil V _{rec}	75.47	barrels
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SPILL WAS
EFFECTIVELY
CONTAINED
AROUND
SPILL POINT
ENVIRONMENT
THEREFORE
LIMITING IMPACT
WITH RECOVERY
WORK ONGOING

19. Computation of the residual volume on site

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

- i. Area (m²) occupied by pool of free phase oil 6330 m²
- ii. Average Depth (m) of pool of free phase oil 0.001 m
- iii. Volume of pooled of free phase oil 39.82 barrels

b. Computation of volume of infiltrated oil in the soil (V-3).

- i. Area (m²) covered by the oil: 10,054.8 m²
- ii. Average Depth (m) below ground surface of infiltration of oil: 0.001
- iii. Soil type: CLAY
- iv. ρ_e (effective porosity of the soil): 8%

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

	Thickness (mm)	Percentage coverage	Volume (m ³)
Barely Visible	0.00004		
Silvery	0.00008		
Slight Colour	0.00015		
Bright Colour	0.0003		
Dull	0.001	100%	0.284 m ³
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume

NOTE AREA OF IMPACT
ON OPEN WATER IS
APPROXIMATELY
2839.5 m²

1.79	bbbl
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Spill Factors from USCG FOG (2000 Edition)



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
JOINT INVESTIGATION REPORT FOR INCIDENT NO: 581995

No. 0613

[Redacted] **1.79** barrels

21. Calculation of evaporated volume:

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

[Redacted] **40.71** 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 $V_{Est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$
$V_{Est}(bbls) = 40.71 + 1.79 + 5.06 + 39.82 + 75.47 \approx 162.85 bbls$
10. Net Total Estimated Spilled Volume $V_{Est}(bbls) = V_{vap}(bbls) + 0.6 * V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$
$V_{Est}(bbls) = 40.71 + (1.79 * 0.60) + 5.06 + 39.82 + 75.47 \approx 162.13 bbls$

- * 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 15th / 03 / 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