



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED
 JOINT INVESTIGATION REPORT FOR INCIDENT NO: 661328

No. 01038

A. GENERAL INFORMATION:

1. Spill incident Number: 661328
2. Name of Location NEMBE WELL 20L WELL HEAD
3. Name of nearest community NEMBE CREEK
4. State BAYELSA LGA NEMBE
5. Type of Production facility/Installation WELL HEAD Asset owner /District NES 2/ NEMBE

B. INCIDENT INFORMATION:

6. Details of incident

- a. Date of incident 18TH MAY, 2011
- b. Date/Period of investigation, 24TH MAY, 2011
- c. Description of spill point environment

- | | | | |
|--|-----|-------|------------------------------------|
| <input type="checkbox"/> Firmed soil | [Y] | [N] ✓ | WELL HEAD
PLATFORM
ON WATER. |
| <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
INVESTIGATION OF
THE INCIDENT,
THE SPILL WAS
FOUND TO BE
DUE TO EQUIPMENT
FAILURE. |
| <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: <u>NOT APPLICABLE</u> | | | |
| <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 checked="" type="checkbox"/> Others (specify) <u>SECTIONAL RUPTURE.</u> | [Y] | [N] ✓ | |

e. Spill point coordinates

Northing: (MINNA MID-BRIT)
50228-46MN

Easting:
429572.96ME



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C. RISK/DAMAGE ASSESSMENT

7. Type of environment of spill site:

- Land
- Swamp PLAT FORM ON WATER
- 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 [NIL ,m]
- Drinking water source [NIL ,m]
- Built up area [NIL ,m]
- Farmlands [NIL ,m]
- Fish Farm/Pond [NIL ,m]
- Fishing net [NIL ,m]
- Others (specify). MANGROVES [NIL ,m]

9. Containment measures put in place;

- Booms [Y] ✓ [N]
- Trench [Y] [N] ✓
- Dyke [Y] [N] ✓

Others: NOT APPLICABLE

10. Any pictures or video coverage? [Y] ✓ [N]

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

If yes give brief description:

THE PLANNED JOINT INVESTIGATION VISIT (JIV) OF 23RD MAY, 2011 WAS POSTPONED TO 24TH MAY, 2011 DUE TO THE UNAVOIDABLE ABSENCE OF THE KEY COMMUNITY REPRESENTATIVE WHO LATER REFUSED TO SIGN THE JIV REPORT ON THE RE-SCHEDULED DATE OVER DISAGREEMENT WITH THE ESTIMATED VOLUME SPILLED AND AREA OF IMPACT.

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
	<u>NONE WITHIN AREA OF IMPACT</u>				



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B. Crops/Economic Trees

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

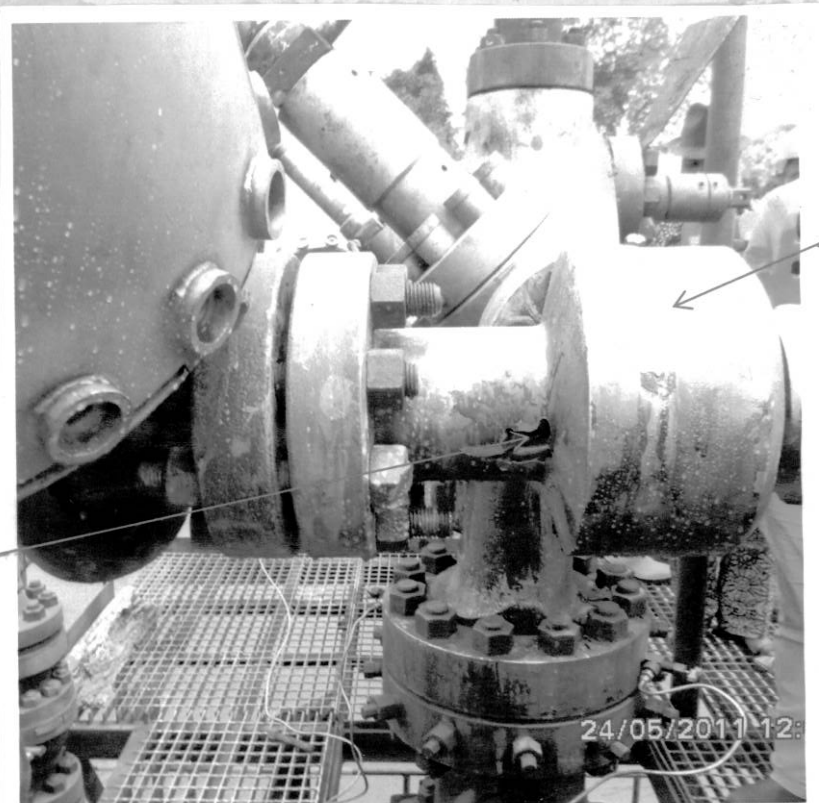
C. Fish/Nets/Ponds

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
	MANGROVES			ALONG THE WATER BOUNDARY WITH LGT IMPACT

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



RUPTURE
SECTION
OF THE BEAN
BOX.

WELL HEAD
BEAN BOX

**RUPTURE BEAN BOX OF NEMBE
WELL 20L WELL HEAD**



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

E. Coordinates (MINNA MID-BEIT)

S/N	Northing METER	Easting METER
Pt 1	50297.87m	429845.38m
Pt 2	50342.01m	429654.78m
Pt 3	50347.89m	429638.94m
Pt 4	50363.45m	429608.16m
Pt 5	50375.28m	429565.53m
Pt 6	50378.57m	429531.80m
Pt 7	50368.09m	429516.49m
Pt 8	50339.98m	429506.92m
Pt 9	50328.62m	429511.70m
Pt 10	50317.25m	429530.84m
Pt 11	50314.86m	429554.76m
Pt 12	50305.29m	429561.94m
Pt 13	50285.93m	429560.77m
Pt 14	50241.29m	429551.17m
Pt 15	50219.35m	429539.01m
Pt 16	50202.42m	429545.19m
Pt 17	50189.86m	429563.14m
Pt 18	50186.27m	429582.87m
Pt 19	50194.64m	429594.83m
Pt 20	50187.69m	429613.59m
Pt 21	50287.95m	429642.08m
Pt 22	50288.87m	429628.31m
Pt 23	50296.32m	429631.32m
Pt 24	50299.72m	429641.59m
Pt 25	50257.09m	429835.21m
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G INCIDENT INFORMATION:

17 Impacted Area Details

- a. Total calculated area of impact 2.54 Ha
- Impact within SPDC R.O.W 2.54 Ha.
 - Impact outside R.O.W NIL

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

Recovered oil V_{rec} :	<u>NIL</u>	barrels
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COMPUTATION OF ESTIMATED SPILLED VOLUME BASED ON FLOW-RATE OF NEMBE WELL 20L WELL HEAD WITH VALVE FULLY OPEN.

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 (m^2) occupied by pool of free phase oil _____

ii. Average Depth (m) of pool of free phase oil _____

iii. Volume of pooled of free phase oil, V_{pool} : _____ barrels

iv.

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

i. Area (m^2) covered by the oil: _____

ii. Average Depth (m) below ground surface of infiltration of oil: _____

iii. Soil type: _____

iv. p_e effective porosity of the soil: _____

v.

Volume of infiltration oil V_{in}	_____	barrels
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IS $\frac{1}{6}$ OF THE ORIFICE SECTIONAL AREA WHEN THE ORIFICE

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

	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		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		
Percent Total		100%	Total Volume

6) ESTIMATION OF HOURLY FLOWRATE.

24 HOURS = 520 BARRELS

1 HOUR = $\frac{520}{24}$

= 21.67 BARRELS.

TOTAL SPILLED IF ORIFICE IS COMPLETELY RUPTURED

= 21.67×6

= 130 BARREL

Spill Factors from USCG FOG (2000 Edition)

7) ALLOWABLE FLOW FROM THE RUPTURE

Page 5 of 7 SECTION = $\frac{1}{6}$ OF THE ORIFICE.

= $\frac{1}{6} \times 130$

= 21.67 BARREL

NET SPILLED = 22 BARREL



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Volume of oil on open water V_{oil}	NIL	barrels
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21. Calculation of evaporated volume:

- i. Oil type: BONNY LIGHT
- ii. E-Factor: NOT APPLICABLE
- iii.

NOTE! - EVAPORATION FACTOR NOT APPLICABLE SINCE OIL SPILL ESTIMATION WAS ASSESSED DIRECTLY AT SOURCE

Volume of evaporated oil V_{evap}		barrels
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OF SPILL (I.E WELL-HEAD)

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 $V_{Est}(bbls) = V_{vap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{recJ}(bbls)$

$V_{Est}(bbls) = 21.67$ BARRELS

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

$VEst(bbls) = 22$ BARRELS

- *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 24 / 05 / 20 11 at incident site by joint investigation representative from

- Host Community (COMMUNITY REPRESENTATIVE REFUSED TO SIGN)
- 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