

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.
 JOINT INVESTIGATION REPORT FOR INCIDENT NO: 956319 JIV report S/N: 0034

(Note: As practicable as possible the JIV report is to be signed in the field by all the participating parties)

A. GENERAL INFORMATION:

1. Spill incident Number: 956319 2. Type of incident* OIL SPILL
 3. Name of Location 12" OGUTA-EGBEMA PIPELINE
OPUOMA
 4. Name of nearest community OGUTA 5. State: IMO 6. LGA EGBEMA
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE EAST

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 7TH APRIL 2013
 b. Start date/time of investigation: 16TH APRIL 2013 / 09:05 HRS
 c. Investigation End date: 10-APRIL-2013 Actual investigation duration, days: 1 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 System/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 (M) | | MINNA MID-BELT | |
| Northing: | 176 250.05 | Easting: | 477 833.99 |

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

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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

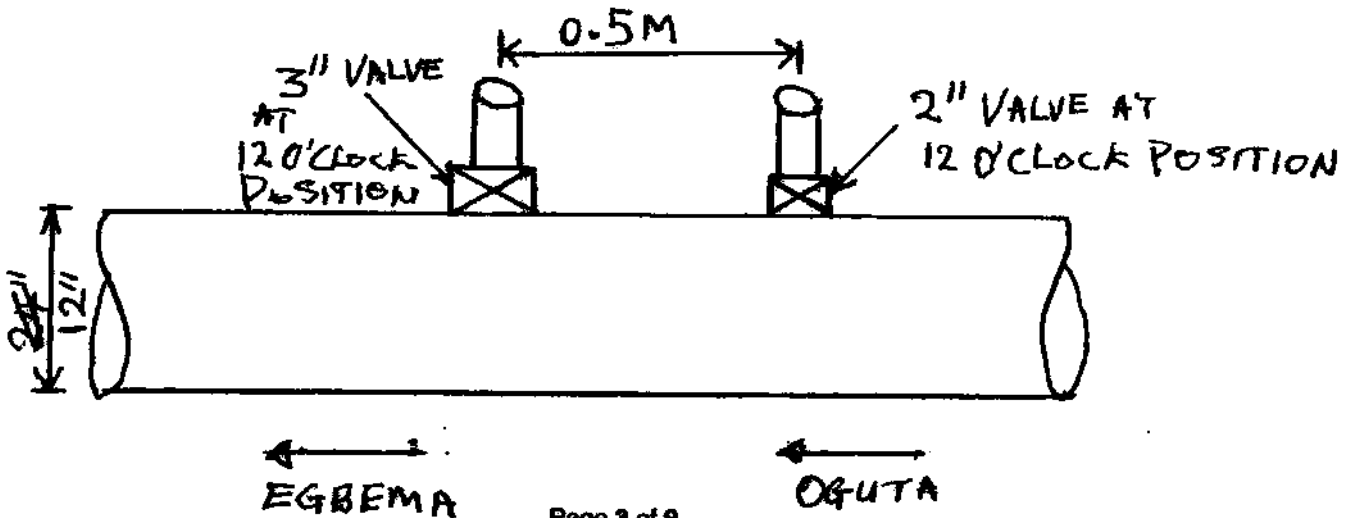
| S/N | Fish/Nets/Ponds | Description | Quantity/Size | Comments |
|-----|----------------------------|-------------|---------------|----------|
| | NONE WITHIN AREA OF IMPACT | | | |

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)

SECTION OF 12" OGUTA - EGBEMA PIPELINE AT OPUOMA, DELTA
SHOWING TWO VALVES AT 12 O'CLOCK POSITION



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F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION
 19. Impacted area boundary Coordinates (If more, Print and attach as an appendix)

MINIA MID-BELT

| S/N | Northing (M) | Easting (M) |
|-------|--------------|-------------|
| NP215 | 176 237.55 | 477 834.34 |
| NP216 | 176 249.87 | 477 825.15 |
| NP217 | 176 265.23 | 477 825.21 |
| NP218 | 176 271.38 | 477 825.21 |
| NP219 | 176 277.85 | 477 833.44 |
| NP220 | 176 345.11 | 477 828.51 |
| NP225 | 176 354.32 | 477 828.53 |
| NP227 | 176 446.52 | 477 822.65 |
| NP228 | 176 461.88 | 477 822.70 |
| NP229 | 176 464.95 | 477 822.71 |
| NP230 | 176 464.93 | 477 828.86 |
| NP231 | 176 434.22 | 477 825.69 |
| NP226 | 176 431.14 | 477 825.68 |
| NP232 | 176 375.83 | 477 828.60 |
| NP235 | 176 332.81 | 477 831.55 |
| NP219 | 176 280.57 | 477 834.47 |
| NP224 | 176 249.83 | 477 840.54 |
| NP221 | 176 240.62 | 477 837.43 |
| | | |
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G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.08 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}):

| | | |
|---------------------------|-----------|---------|
| Recovered oil V_{rec} : | <u>10</u> | Barrels |
|---------------------------|-----------|---------|

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 3.25 m^2
- ii. Average Depth (m) of pool of free phase oil 0.55 M
- iii. Emulsification factor: NIL

iv.

| | | |
|--|--------------|---------|
| Estimated Volume of pool of free phase oil. V_{pool} : | <u>11.24</u> | barrels |
|--|--------------|---------|

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: 5.0 m^2
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.25M
- iii. Soil type: CLAY iv. P_e (effective porosity of the soil): _____
- v. Cause of spill: THIRD PARTY vi. Oil type: BONNY LIGHT
- vii. Oil Residence time on site, day: 3 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0008M
- ix. Estimated depth of infiltration around spill point: 1.2508M

x.

| | | |
|---|-------------|---------|
| Estimated Volume of infiltrated oil at spill point. $V_{inf a}$: | <u>3.15</u> | barrels |
|---|-------------|---------|

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

NO APPLICABLE

| | | |
|---|------------|---------|
| Estimated Volume of infiltrated oil at spill point. $V_{inf b}$: | <u>NIL</u> | barrels |
|---|------------|---------|

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

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- i. Area (m²) of soil covered by the oil: 795 m²
- ii. Area (m²) of the pool of free phase oil in touch with soil: 3.25 m²
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0008m
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%

| | | |
|--|-------------|---------|
| vi. Estimated Volume of infiltrated oil. At V _{inf} : | <u>3.48</u> | barrels |
|--|-------------|---------|

23. Computation of estimated 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 (

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

| | Thickness (mm) | Percentage coverage | Volume (m ³) |
|--------------------|----------------|---------------------|--------------------------|
| Barely Visible | 0.00004 | | |
| Silvery | 0.00008 | | |
| Slight Color | 0.00015 | | |
| Bright Color | 0.0003 | NOT | |
| Dull | 0.001 | APPLICABLE | |
| Dark | 0.002 | | |
| Black oil | 0.1 | | |
| Emulsion (30% Oil) | 1 | | |

| | | |
|--|------------|---------|
| iii. Estimated Volume of oil on open water. V _{wat} : | <u>NIL</u> | Barrels |
|--|------------|---------|

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 24.72 BBL
- ii. E-Factor: 25%
- iii. Estimated Volume of evaporated oil. V_{evap}:

| | | |
|---|-------------|---------|
| Estimated Volume of evaporated oil. V _{evap} : | <u>8.24</u> | Barrels |
|---|-------------|---------|

| 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_{net} (bbls) = V_{evap} (bbls) + V_{wat} (bbls) + V_{inf} (bbls) + V_{pool} (bbls) + V_{rec} (bbls) = 8.24 + NIL + 3.48 + 11.24 + 10 = 32.96 BBL

Estimated Reported Volume** V_{rep} (bbls) = 33 BBLs

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*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

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

27. REPRESENTATIVES

This report was filled, agreed and signed on the 10/04/2013 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]:
- Shell Petroleum Development Company [SPDC]:
- Signatories agree with reported findings:
- Separate DPR form has been filled out with same findings:

Tick as applicable

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28. Appendix 1: Overview sketch of the site

