

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1077374 JV report S/N: 0355

(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: 1077374 2. Type of incident* OIL SPILL
 3. Name of Location ELELENWO WELL 9 LANDS WELL HEAD
 4. Name of nearest community ELELENWO 5. State: RIVERS 6. LGA OBIO/AKPO
 7. Type of Production facility/Installation WELL HEAD 8. Asset owner/District LAND 1

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 21ST NOVEMBER 2013
 b. Start date/time of investigation: 10TH NOVEMBER 2013 : 15:00 HOURS AND 12TH DECEMBER 2013
 c. Investigation End date: 11TH DECEMBER 2013 actual investigation duration, day: (2) TWO

d. Description of spill point environment

- Firmed soil Loose soil Recently excavated area
 Under water Swampy Exposed pipe surface
 Well Platform (ON LAND) 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) | | <u>MINNA MID-BELT</u> | |
| Northing: | | Easting: | |
| 94 762.12 | | 515 212.78 | |

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

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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

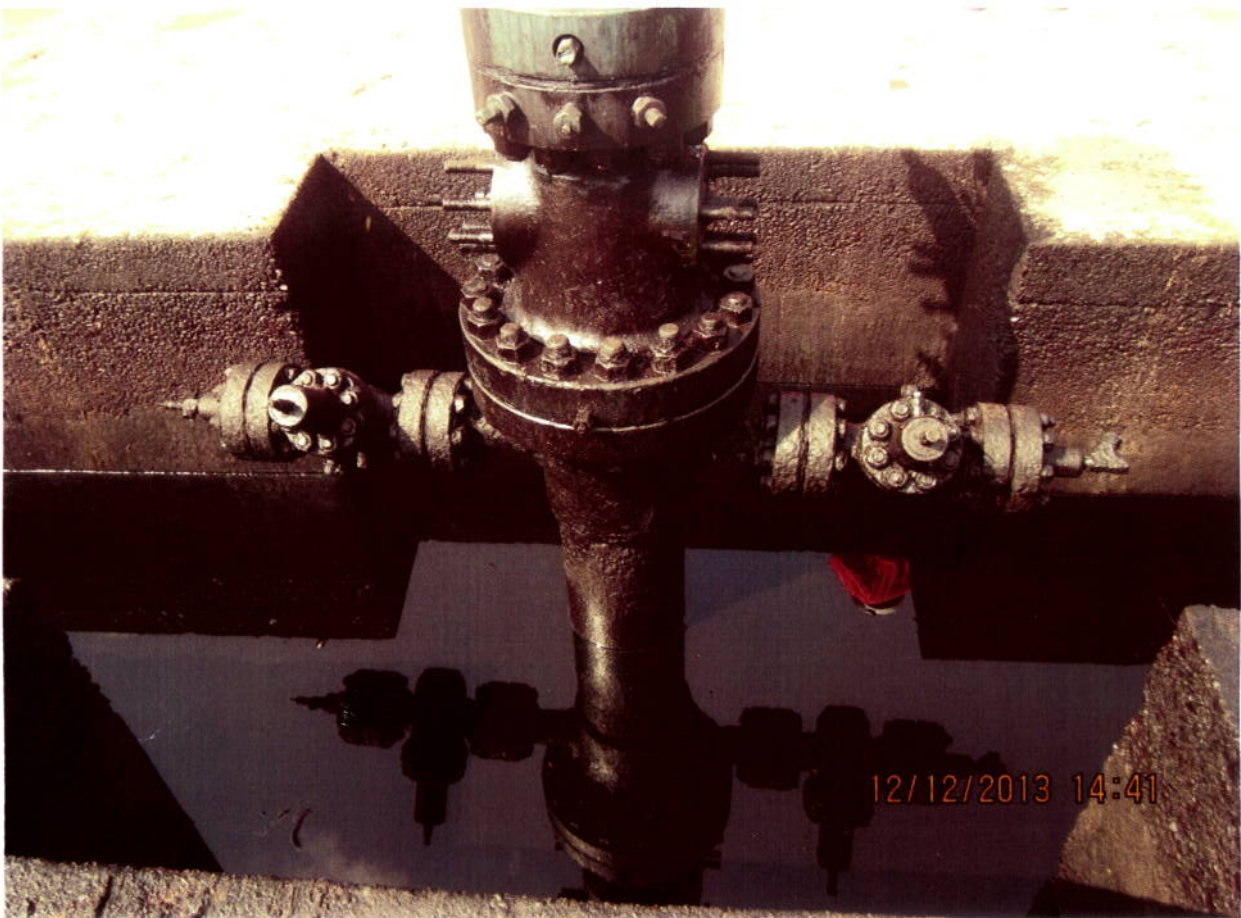
| S/N | Others | Description | Quantity/Size | Comments |
|-----|----------------------------|-------------|---------------|----------|
| | NONE WITHIN AREA OF IMPACT | | | |

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)

SEE PICTURE
ATTACHED

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

1077374 – ELELENWO WELL 9LS WELLHEAD AT ELELENWO



Elenwo Well 9LS Wellhead

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| | | |
|---------------------------|----------|---------|
| Recovered oil V_{rec} : | <u>1</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: NOT
- ii. Average Depth (m) of pool of free phase oil: _____
- iii. Emulsification factor: APPLICABLE

iv.

| | | |
|---|-----------|---------|
| Estimated Volume of pool of free phase oil, V_{pool} : | <u>NU</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: NOT
- 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: APPLICABLE
- 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: _____

| | | |
|---|-----------|---------|
| Estimated Volume of infiltrated oil at spill point. $V_{inf a}$: | <u>NU</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: NOT
- 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: APPLICABLE
- 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: _____

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

3. E

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

- i. Area (m^2) of soil covered by the oil: 166 m^2
- ii. Area (m^2) of the pool of free phase oil in touch with soil: NU
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0174 m
- iv. Soil type: SILT
- v. P_e (effective porosity of the soil): 21%

vi.

| | | |
|---|------------|---------|
| Estimated Volume of infiltrated oil. At $V_{inf c}$: | <u>3.8</u> | barrels |
|---|------------|---------|

23. Computation of estimated volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: NU

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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 | NOT | |
| Silvery | 0.00008 | | |
| Slight Color | 0.00015 | | |
| Bright Color | 0.0003 | APPLICABLE | |
| Dull | 0.001 | | |
| Dark | 0.003 | | |
| Black oil | 0.1 | | |
| Emulsion (30% Oil) | 1 | | |

| | | | | |
|------|--------------------|--|------------|---------|
| iii. | Percent Total 100% | Estimated Volume of oil on open water, V_{wat} : | NIL | Barrels |
|------|--------------------|--|------------|---------|

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 3.8 BARRELS
- ii. E-Factor: 25%
- iii.
- | | | |
|--|-------------|---------|
| Estimated Volume of evaporated oil, V_{evap} : | 1.27 | 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** $V_{res}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{inf}(bbls) + V_{pool}(bbls) + V_{rec}(bbls)$

$(bbls) + V_{rec}(bbls) = 1.27 + NIL + 3.8 + NIL + 1 = 6.07 \text{ BARRELS}$

$6.07 \approx 7 \text{ BARRELS}$

Estimated Reported Volume $V_{rep}(bbls) = 7 \text{ BARRELS}$**

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 m^3 to barrels is $Volume (m3) \times 6.29$; **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"/> |
|--|

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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 12 / 12 / 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

28. Appendix 1: Overview sketch of the site

Location :

