

**THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.**

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1005335(A) IV report S/N: 0158

*(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: 1005335(A) 2. Type of incident\* OIL SPILL  
 3. Name of Location 12" ADIBAWA - OKORDIA PIPELINE  
 4. Name of nearest community IKARAMA 5. State: BAYELSA 6. LGA YENAGOA  
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

**B. INCIDENT INFORMATION:**

9. Details of incident

- a. Date of incident: 8TH July, 2013  
 b. Start date/time of investigation: 19TH July, 2013 / 11:58 HOURS  
 c. Investigation End date: 19TH July, 2013 Actual investigation duration, days: ONE (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 3<sup>rd</sup> 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 3<sup>rd</sup> party damage   
 Operational  Others (including Mystery spills) \_\_\_\_\_

g. Spill point coordinates

Minna - Mid belt.

|  |                                  |
|--|----------------------------------|
| Measuring unit <u>(m)</u>                          |                                  |
| Northing:<br><br><u>SP</u><br><br><u>129165.23</u> | Easting:<br><br><u>445624.22</u> |

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**C. RISK ASSESSMENT**

10. Type of environment:

- Land       Swamp       Water       Seasonal swamp  Shoreline/Waterfront

i. Type of environment to which oil has spread:

- Land       Swamp       Water       River (identify) \_\_\_\_\_

ii. Weather condition

- Rain       Sunny       Dry       Wet       Windy       Hot       cool

11. Distance from the nearest sensitive habitat

- Government reserved and designated protected area [      ,m]
- Drinking water source [      ,m]
- Built up area [      ,m]
- Farmlands [      ,m]
- Fish Farm/Pond [      ,m]
- Fishing net [      ,m]

Others (specify). **MAIZE PLANTS**

**IMPACTED BY SPILL**

12. Containment measures put in place;

- Booms       Trench       Dyke       Natural depression       Pit  
 Others: \_\_\_\_\_

13. Any pictures or video coverage?

[ Y  ] [ N ]

14. 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**

15. Structures / Properties

| S/N                               | Type of Structures | Description | Size | Number | Comments |
|-----------------------------------|--------------------|-------------|------|--------|----------|
| <b>NONE WITHIN AREA OF IMPACT</b> |                    |             |      |        |          |
|                                   |                    |             |      |        |          |
|                                   |                    |             |      |        |          |

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|  |  |  |  |  |  |
|--|--|--|--|--|--|
|  |  |  |  |  |  |
|--|--|--|--|--|--|

16. Crops/Economic Trees

| S/N | Type of crops | Young | Medium | Matured | Quantity | Comments           |
|-----|---------------|-------|--------|---------|----------|--------------------|
| 1.  | MAIZE PLANTS  |       | ✓      |         | 6        | IMPACTED BY SPILL. |
|     |               |       |        |         |          |                    |
|     |               |       |        |         |          |                    |

17. Fish/Nets/Ponds

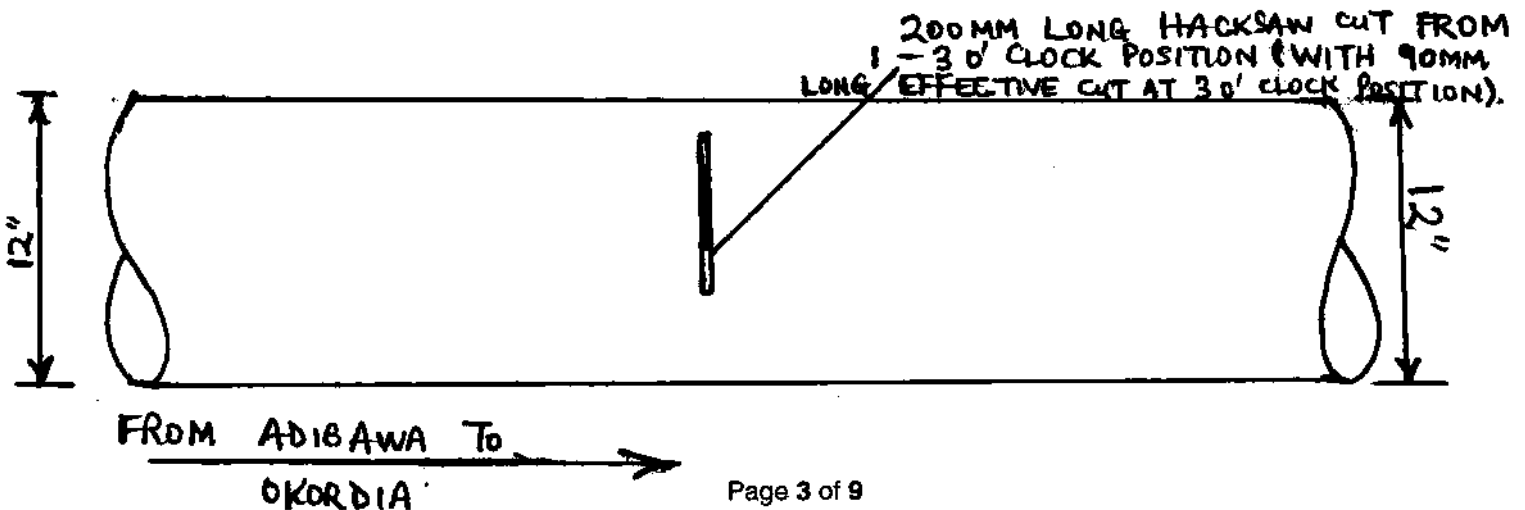
| S/N | Fish/Nets/Ponds | Description                | Quantity/Size | Comments |
|-----|-----------------|----------------------------|---------------|----------|
|     |                 | NONE WITHIN AREA OF IMPACT |               |          |
|     |                 |                            |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

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" ADIBAWA - OKORDIA PIPELINE (OLD LINE) AT IKARAMA SHOWING POSITION OF HACKSAW CUT.





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**G. INCIDENT INFORMATION:**

**20. Impacted Area Details**

- Total calculated area of impact 0.004734 ha (0.005 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 $V_{rec}$ : | <b>NIL</b> | 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 2
- ii. Average Depth (m) of pool of free phase oil 0.002
- iii. Emulsification factor: NIL

iv. 

|  |             |         |
|--|-------------|---------|
| Estimated Volume of pool of free phase oil. $V_{pool}$ : | <b>0.03</b> | 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: 1
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.3
- iii. Soil type: CLAY iv.  $P_e$  (effective porosity of the soil): 8%
- v. Cause of spill: THIRD PARTY INTERFERENCE vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 11 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.003m
- ix. Estimated depth of infiltration around spill point: 1.303m

x. 

|   |             |         |
|---|-------------|---------|
| Estimated Volume of infiltrated oil at spill point. $V_{inf a}$ : | <b>0.66</b> | 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: \_\_\_\_\_

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

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

**NOT APPLICABLE**

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- i. Area (m<sup>2</sup>) of soil covered by the oil: 45
- ii. Area (m<sup>2</sup>) of the pool of free phase oil in touch with soil: NIL
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.003
- iv. Soil type: CLAY
- v. P<sub>e</sub> (effective porosity of the soil): 8%

|  |             |         |
|--|-------------|---------|
| vi. Estimated Volume of infiltrated oil. At V <sub>inf</sub> : | <u>0.07</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 (m3) |
|--------------------|----------------|---------------------|-------------|
| Barely Visible     | 0.00004        | <b>NOT</b>          |             |
| Silvery            | 0.00008        |                     |             |
| Slight Color       | 0.00015        |                     |             |
| Bright Color       | 0.0003         |                     |             |
| Dull               | 0.001          |                     |             |
| Dark               | 0.002          | <b>APPLICABLE</b>   |             |
| Black oil          | 0.1            |                     |             |
| Emulsion (30% Oil) | 1              |                     |             |

|      |               |      |   |            |         |
|------|---------------|------|---|------------|---------|
| iii. | Percent Total | 100% | Estimated Volume of oil on open water. V <sub>wat</sub> : | <u>NIL</u> | Barrels |
|------|---------------|------|---|------------|---------|

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 0.75 BARREL
- ii. E-Factor: 25%

|      |   |             |         |
|------|---|-------------|---------|
| iii. | Estimated Volume of evaporated oil. V <sub>evap</sub> : | <u>0.25</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<sub>Est</sub>(bbls) = V<sub>evap</sub>(bbls) + V<sub>wat</sub>(bbls) + V<sub>inf</sub>(bbls) + V<sub>pool</sub>(bbls) + V<sub>recd</sub>(bbls) = 0.25 + NIL + 0.72 + 0.03 + NIL = 1

Estimated Reported Volume\*\* V<sub>rep</sub>(bbls) = 1 BARREL

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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 m<sup>3</sup> to barrels is Volume (m<sup>3</sup>) 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:*

|                                     |              |                                   |
|-------------------------------------|--------------|-----------------------------------|
| <i>Calculated volume = 15.3 bbl</i> | <i>-----</i> | <i>Reported volume = 16 bbl</i>   |
| <i>Calculated volume = 0.35 bbl</i> | <i>-----</i> | <i>Reported volume = 0.4 bbl</i>  |
| <i>Calculated volume = 0.01 bbl</i> | <i>-----</i> | <i>Reported volume = 0.1 bbl.</i> |

*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**

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

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 19/07/2013 by joint investigation representatives from

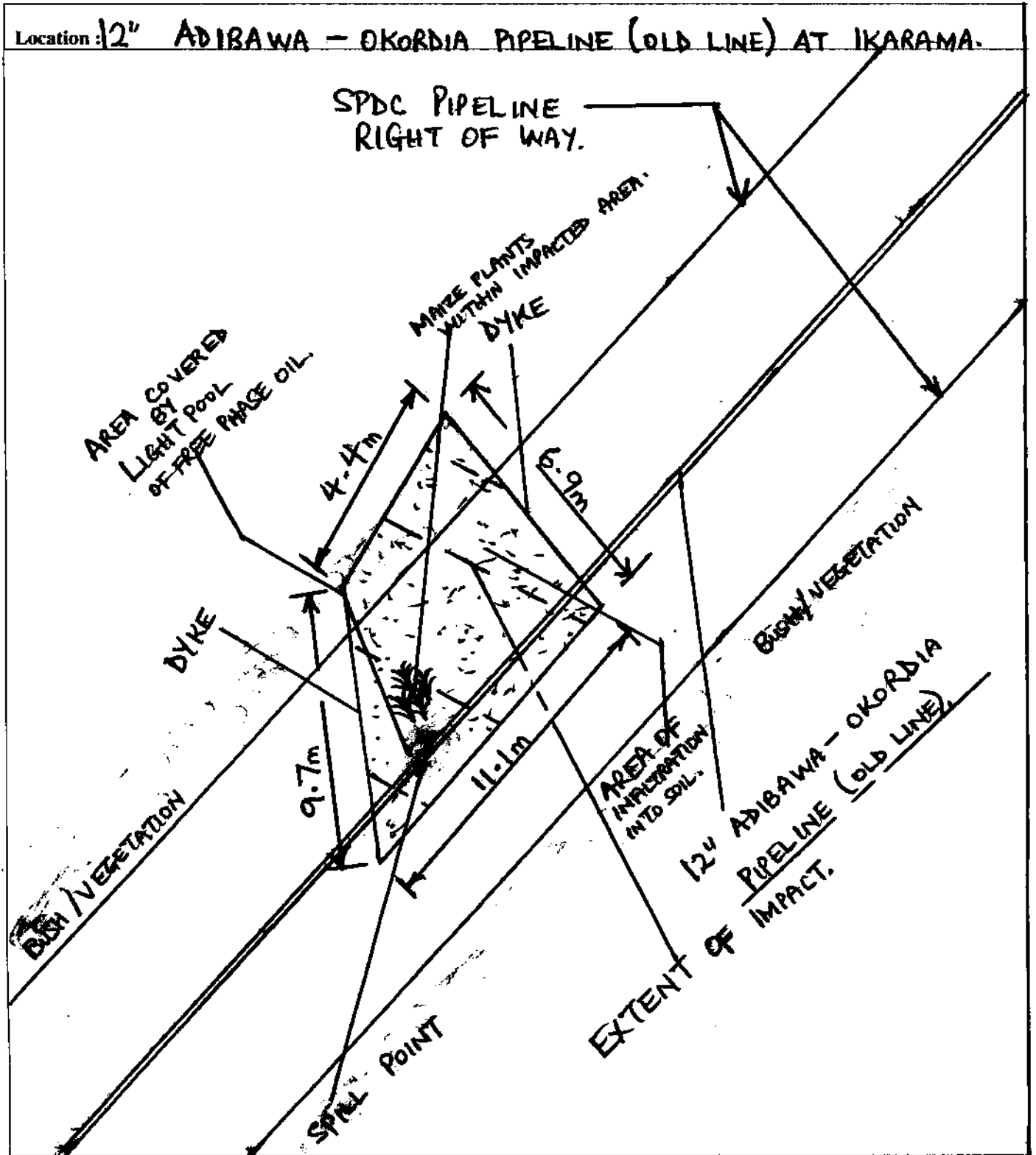
- Host Community:
- Department of Petroleum Resources [DPR]:
- National Oil Spill Detection and Response Agency [NOSDRA]:
- State Ministry of Environment [SME]:
- Nigeria Police Force [NPF]:
- Shell Petroleum Development Company [SPDC]:
- Signatories agree with reported findings:
- Separate DPR form has been filled out with same findings

*Tick as applicable*

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28. Appendix 1: Overview sketch of the site





**THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.**

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1005335 (B) JIV report SNG 161

*(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: 1005335 (B)      2. Type of incident\* OIL SPILL  
 3. Name of Location 12" ADIBAWA - OKORDIA PIPELINE  
 4. Name of nearest community IKARAMA      5. State: BAYELSA      6. LGA YENAGOA  
 7. Type of Production facility/Installation OIL PIPELINE      8. Asset owner/District PIPELINE

**B. INCIDENT INFORMATION:**

9. Details of incident

- a. Date of incident: 8TH JULY 2013  
 b. Start date/time of investigation: 20TH JULY, 2013 / 12:08 HOURS  
 c. Investigation End date: 20TH JULY, 2013      Actual investigation duration, days: ONE (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 3<sup>rd</sup> 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 3<sup>rd</sup> party damage   
 Operational       Others (including Mystery spills) \_\_\_\_\_

g. Spill point coordinates

|   |  |
|---|--|
| <u>Minna - Mid belt.</u>  |  |
| Measuring unit<br>Northing:<br><br><div style="font-size: 1.5em; text-align: center;">SP</div> <div style="font-size: 1.5em; text-align: center;">129287.63</div> | Easting:<br><br><div style="font-size: 1.5em; text-align: center;">445784.82</div> |

*\*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

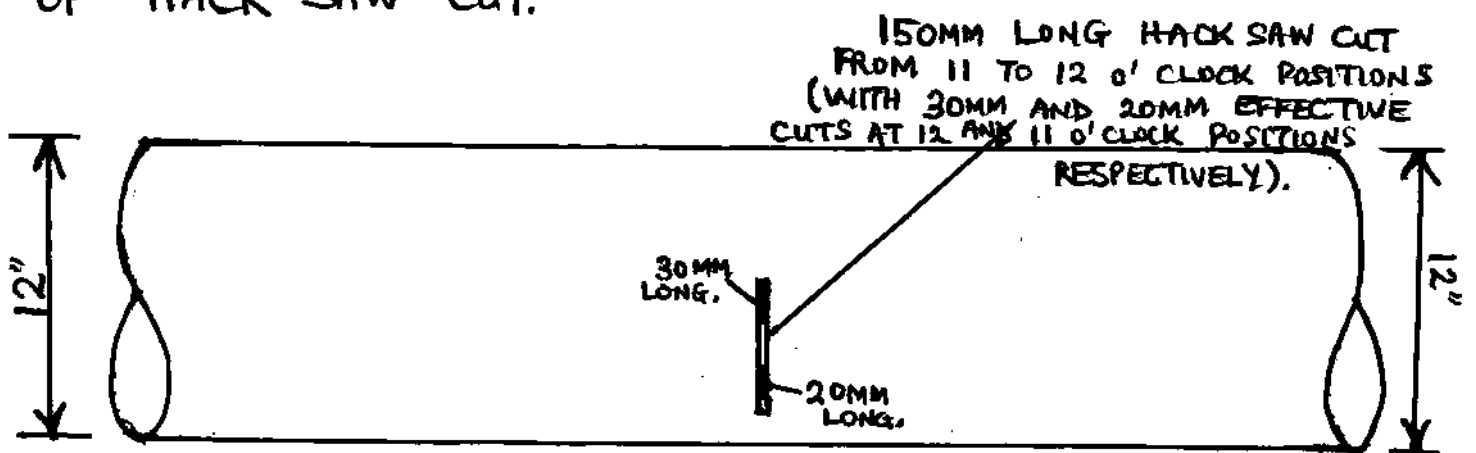
| S/N                        | Fish/Nets/Ponds | Description | Quantity/Size | Comments |
|----------------------------|-----------------|-------------|---------------|----------|
| NONE WITHIN AREA OF IMPACT |                 |             |               |          |

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 (SHOWING PLAN) OF 12" ADIBAWA - OKORDIA PIPELINE (OLD LINE) AT IKARAMA SHOWING POSITION OF HACK SAW CUT.





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**G. INCIDENT INFORMATION:**

**20. Impacted Area Details**

- Total calculated area of impact 0.006154 ha (0.006 ha)
- Impact within SPDC R.O.W Yes
- Impact outside SPDC R.O.W NO

**21. Volume of oil recovered before completion of JIV ( $V_{rec}$ ):**

|                           |            |         |
|---------------------------|------------|---------|
| Recovered oil $V_{rec}$ : | <b>NIL</b> | 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 \_\_\_\_\_
- ii. Average Depth (m) of pool of free phase oil APPLICABLE
- iii. Emulsification factor: NOT
- iv. 

|  |            |         |
|--|------------|---------|
| Estimated Volume of pool of free phase oil. $V_{pool}$ : | <b>NIL</b> | 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: 1
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 0.90
- iii. Soil type: CLAY iv.  $P_c$  (effective porosity of the soil): 8%
- v. Cause of spill: THIRD PARTY INTERFERENCE vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 12 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.003m
- ix. Estimated depth of infiltration around spill point: 0.903m

x. 

|   |             |         |
|---|-------------|---------|
| Estimated Volume of infiltrated oil at spill point. $V_{inf a}$ : | <b>0.45</b> | 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: \_\_\_\_\_  $P_c$  (effective porosity of the soil): \_\_\_\_\_
- v. Cause of spill: NOT 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. $V_{inf b}$ : | <b>NIL</b> | barrels |
|---|------------|---------|

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

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- i. Area (m<sup>2</sup>) of soil covered by the oil: 61
- ii. Area (m<sup>2</sup>) of the pool of free phase oil in touch with soil: NIL
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.003
- iv. Soil type: CLAY
- v. P<sub>e</sub> (effective porosity of the soil): 8%

|  |            |         |
|--|------------|---------|
| vi. Estimated Volume of infiltrated oil. At V <sub>inf</sub> : | <u>0.1</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<br>(mm) | Percentage<br>coverage | Volume (m <sup>3</sup> ) |
|--------------------|-------------------|------------------------|--------------------------|
| Barely Visible     | 0.00004           | <b>NOT</b>             |                          |
| Silvery            | 0.00008           |                        |                          |
| Slight Color       | 0.00015           |                        |                          |
| Bright Color       | 0.0003            |                        |                          |
| Dull               | 0.001             |                        |                          |
| Dark               | 0.002             | <b>APPLICABLE</b>      |                          |
| Black oil          | 0.1               |                        |                          |
| Emulsion (30% Oil) | 1                 |                        |                          |

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

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 0.56 BARREL
- ii. E-Factor: 25%

|  |             |         |
|--|-------------|---------|
| iii. Estimated Volume of evaporated oil. V <sub>evap</sub> : | <u>0.19</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<sub>Est</sub>(bbls) = V<sub>evap</sub>(bbls) + V<sub>wat</sub>(bbls) + V<sub>inf</sub>(bbls) + V<sub>pool</sub>(bbls) + V<sub>recl</sub>(bbls) = 0.19 + NIL + 0.56 + NIL + NIL ≈ 0.74

**Estimated Reported Volume\*\* V<sub>rep</sub>(bbls) = 0.8 BARREL**

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1005335(B) JIV report S/N: **0161**

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<sup>3</sup> to barrels is Volume (m<sup>3</sup>) 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**

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

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 20/07/2013 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

