

# JOINT INVESTIGATION REPORT

INCIDENT NO: 1588855 JIV report S/N: Nº 0000142

(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: 1588855 2. Type of incident\* OIL SPILL  
3. Name of Location SOKU WELL 21L WELL HEAD  
4. Name of nearest community SOKU 5. State: RIVERS 6. LGA AKUKU-TORU  
7. Type of Production facility/Installation WELL HEAD  
8. Asset owner/District THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED/SWAMP I

## B. INCIDENT INFORMATION:

### 9. Details of incident

- a. Date of incident: 4TH MARCH, 2016  
b. Start date/time of investigation: 8TH MARCH, 2016 / 13:20 HOURS  
c. Investigation End date: 8TH MARCH, 2016 Actual investigation duration, days: ONE(1) DAY  
d. Description of spill point environment

- Firm soil  Loose soil  Recently excavated area  
 Under water  Swampy  Exposed pipe surface  
 Well Platform (on Water)  Drill Rig

Additional observations around the spill point: **THE JOINT INVESTIGATION TEAM OBSERVED THAT THE BEAN BOX COVER ON THE WELL 21L ARM (WHICH THE ASSET OWNER NOTICED ON THE INCIDENT DATE TO HAVE BEEN REMOVED FROM ITS ORIGINAL POSITION AND LEFT ON THE WELL PLATFORM BY UNKNOWN PERSON(S)) HAD BEEN RE-FIXED BY THE ASSET OWNER AS A WAY OF ISOLATING OR STOPPING THE LEAK. OIL STAINS WERE NOTICED ON THE WELL HEAD CHRISTMAS TREE. A PICTURE OF THE LEAK POINT TAKEN ON THE INCIDENT DATE BY THE ASSET OWNER WAS SHOWN TO THE JOINT INVESTIGATION TEAM ON SITE.**

### 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,  Saver-pit over flow  Third party tampering with Clamp  
 Third party tampering with valve setting  Bulging Outward  Third party tampering with flange,  
 Flare System/Bund wall failure  Cold vent  Surge vessel overflow,  
 Valve Failure  Relief valve failure  Accidental 3<sup>rd</sup> party equipment impact

Others (specify) REMOVAL OF WELL HEAD BEAN BOX COVER BY UNKNOWN PERSON(S).

### f. Incident caused by:

- Third party interference (Sabotage ; crude theft ; Line theft ; Accidental 3<sup>rd</sup> party damage   
 Operational  Others (including Mystery spills) \_\_\_\_\_

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

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g. Spill point coordinates

h. Measuring unit

WGS 84

Northing: <u>LAT.</u>	Easting: <u>LONG.</u>
<u>4-658493</u>	<u>6-636715</u>

*[Signature]*

### 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). **MANGROVE VEGETATION** IMPACTED BY SPILL

12. Containment measures put in place:

- Booms     
  Trench     
  Dyke     
  Natural depression     
  Pit     
  None
- Others: \_\_\_\_\_

13. Any pictures or video coverage? [Y]  [N]

14. Further response/repair initiated as at the time of JIV? [Y] [N]

If yes to item 14, give brief description:

NOT APPLICABLE

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

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If yes to item 15 give brief description:

NOT APPLICABLE

**D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL**

**16. Structures / Properties**

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

**17. Crops/Economic Trees**

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	MANGROVE		✓		WITHIN AN AREA OF APPROXIMATELY 0.06 Ha.	WITHIN SPILL-IMPACTED REGION.

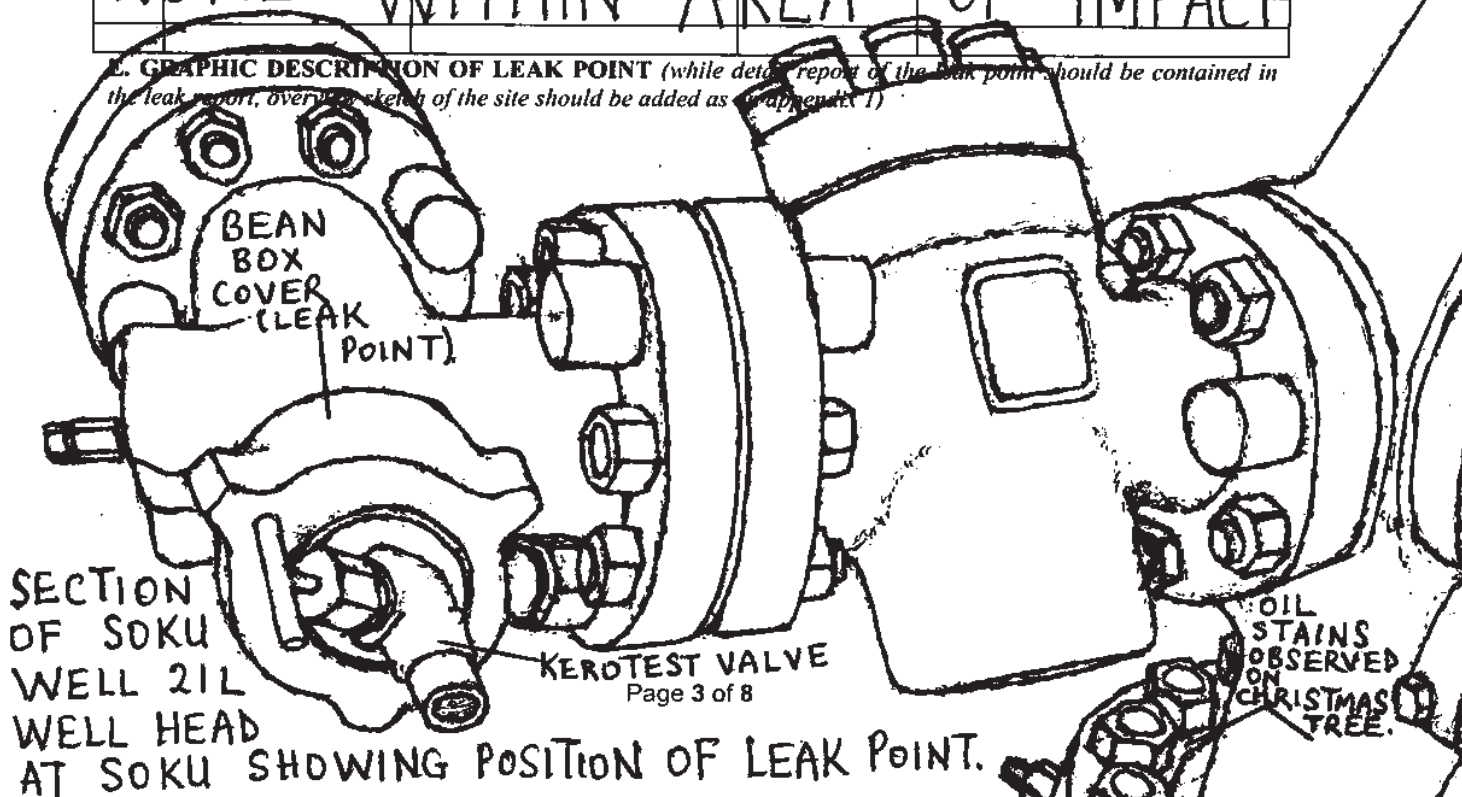
**18. Fishing Nets/Fish Ponds**

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

**19. Others (Specify) i.e. Animal Traps**

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

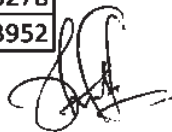
**E. GRAPHIC DESCRIPTION OF LEAK POINT** (while details report of the leak point should be contained in the leak report, overview sketch of the site should be added as Appendix 1)





**APPENDIX A**  
**INCIDENT NO: 1588855**  
**SOKU WELL 21 L WELL HEAD AT SOKU**  
**IMPACTED AREA COORDINATES (WGS 84)**  
**PT\_NO      LATITUDE    LONGITUDE**

1	4.658731	6.638167
2	4.65891	6.638031
3	4.65911	6.638052
4	4.659582	6.639888
5	4.659719	6.640243
6	4.659782	6.640486
7	4.65982	6.640515
8	4.659922	6.640958
9	4.660063	6.641102
10	4.661075	6.640974
11	4.661501	6.640954
12	4.661358	6.641202
13	4.639501	2.882162
14	4.661076	6.641508
15	4.659914	6.641505
16	4.660267	6.641069
17	4.660476	6.641462
18	4.659422	6.641672
19	4.658896	6.641886
20	4.658674	6.642029
21	4.658404	6.642345
22	4.658114	6.642937
23	4.658086	6.643347
24	4.657632	6.643276
25	4.657997	6.642055
26	4.658675	6.641514
27	4.65955	6.64124
28	4.659501	6.640826
29	4.659255	6.640278
30	4.659119	6.63952



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**G. INCIDENT INFORMATION:**

**a. Impacted Area Details**

- Total calculated area of impact 3.908 Ha
- Impact within R.O.W YES
- Impact outside R.O.W YES

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

Recovered oil $V_{rec}$ :	<u>NIL</u>	Barrels
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Controlled recovery/evacuation from source with no impact to environment:

<u>NIL</u>	Barrels
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**c. Net Estimated Spilled Volume  $V_{Est}$  (bbbls)\* = 0.79**

**Estimated Reported Volume\*\*  $V_{rep}$  (bbbls) = 0.8 BARREL**

**\*Notes:**

- Volume estimation was done using an excel based tool. (see attached for details on the calculation)
- Reported spilled volume is an estimate

Write other relevant notes taken into consideration for estimating the spilled in the box below:

AS AT TIME OF INVESTIGATION, THE EXTENT OF SPILL IMPACT WAS SIGNIFICANTLY CHARACTERISED BY OIL SHEEN ON WATER.

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 ( $m^3$ ) 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 volume estimation; record the calculation in a plain sheet of paper and attach to the JIV report.

**ESTIMATION OF OIL SPILL VOLUME**

**A OIL SPILLED ONSHORE/OFFSHORE (Leak stopped at source)**

**Impacted Area Details**

Total Calculated Area of Impact

39,076.00	m <sup>2</sup>
	m <sup>2</sup>
	m <sup>2</sup>

i Impact within SPDC R.O.W

ii Impact outside SPDC R.O.W

**1 Volume of oil recovered before completion of JIV (V<sub>rec,1</sub>)**

i Estimated Recovered oil (Net)

	bbbls
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<b>Estimated Recovered oil (Net) V<sub>rec,1</sub></b>	<b>0.00</b>	<b>bbbls</b>
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**2 Computation of estimated residual volume on site**

**a Computation of volume of free phase oil (on land or confined water body)**

i Total area occupied by pool of free phase oil

	m <sup>2</sup>
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ii Average depth of pool of free phase oil

	m
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iii Emulsification factor (If applicable, else 0%)

	%
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<b>Estimated Volume of pool of free phase oil, V<sub>pool</sub></b>	<b>0.00</b>	<b>m<sup>3</sup></b>
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<b>Estimated Volume of pool of free phase oil, V<sub>pool</sub></b>	<b>0.00</b>	<b>bbbls</b>
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**b Computation of estimated volume of infiltrated oil in the soil (V<sub>inf</sub>)**

**1 Volume of infiltrated oil at spill point (V<sub>inf,a</sub>)**

i Total area covered by the oil (infiltration)

	m <sup>2</sup>
--	----------------

ii Average depth of infiltration above leaking facility i.e. pipeline/flowline

	m
--	---

iii Soil type

Silty or sandy clay	▼
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iv P<sub>e</sub> (effective porosity of the soil)

12	%
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v Cause of spill

Third party interference	▼
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Calculation of days for infiltration below the leaking point on pipeline or flowline		
Incident Date	JIV Date	Days on Site
3/4/2016 8:45	3/8/2016 13:20	4
If 'cause of spill' is operational, use 1 week as worst case scenario except where 'days on site' exceeds 7.		
		7

Infiltration of oil types in various soil types vs time.			
Oil type	Soil type	Approximate time to reach 1m depth below ground level	
		Sand	Loam
Bonny Medium		3 weeks	3 years
Bonny Light		2 days	2 months
			> 10 years

vii Oil type

Bonny Light	▼
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viii Average depth of infiltration below leaking facility i.e. pipeline/flowline

0.001	m
-------	---

ix Total depth below ground surface of infiltration of oil

0.001	m
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<b>Estimated Volume of infiltrated oil, V<sub>inf,a</sub></b>	<b>0.00</b>	<b>m<sup>3</sup></b>
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<b>Estimated Volume of infiltrated oil, V<sub>inf,a</sub></b>	<b>0.00</b>	<b>bbbls</b>
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**2 Volume of infiltrated oil at second spill point (if applicable) (V<sub>inf,b</sub>)**

i Total area covered by the oil (infiltration)

	m <sup>2</sup>
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ii Average depth of infiltration above leaking facility i.e. pipeline/flowline

	m
--	---

iii Soil type

- Select -	▼
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iv P<sub>e</sub> (effective porosity of the soil)

0	%
---	---

v Average depth of infiltration below leaking facility i.e. pipeline/flowline

0.000	m
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vi Total depth below ground surface of infiltration of oil

0.000	m
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<b>Estimated Volume of infiltrated oil, V<sub>inf,b</sub></b>	<b>0.00</b>	<b>m<sup>3</sup></b>
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<b>Estimated Volume of infiltrated oil, V<sub>inf,b</sub></b>	<b>0.00</b>	<b>bbbls</b>
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**3 Volume of infiltrated oil outside immediate spill point(s) region ( $V_{inf,c}$ )**

- i Total Area covered by the oil (infiltration) 603.00 m<sup>2</sup>
- ii Total Area of the pool of free phase oil in touch with soil m<sup>2</sup>
- iii Soil type Silty or sandy clay
- iv  $P_e$  (effective porosity of the soil) 12%
- v Average depth below ground surface of infiltration of oil 0.001 m

Estimated Volume of infiltrated oil,  $V_{inf,c}$  0.08 m<sup>3</sup>  
**Estimated Volume of infiltrated oil,  $V_{inf,c}$  0.50 bbls**

**4 Volume of infiltrated oil outside immediate spill point(s) region (superficial impact,  $V_{inf,d}$ )**

- i Total Area covered by the oil (infiltration) m<sup>2</sup>
- ii Total Area of the pool of free phase oil in touch with soil m<sup>2</sup>
- iii Average depth below ground surface of infiltration of oil 0.001 m

Estimated Volume of infiltrated oil,  $V_{inf,d}$  0.00 m<sup>3</sup>  
**Estimated Volume of infiltrated oil,  $V_{inf,d}$  0.00 bbls**

Estimated Total Volume of Infiltrated oil,  $V_{inf}$  0.08 m<sup>3</sup>  
**Estimated Total Volume of Infiltrated oil,  $V_{inf}$  0.50 bbls**

**c Computation of volume of oil on open water based on standard coloration**

- i Total area of oil on open water 38,473.00 m<sup>2</sup>
- ii Table of average depth of oil on water based on coloration

[Link to Coverage Visual Aid](#)

Spill Factors from USCG FOG (2000 Edition)

	Thickness (mm)	Percentage coverage (%)	Volume (m3)
Barely Visible	0.0004	20%	0.0003
Silvery	0.0008		0.0000
Slight Color	0.0015	20%	0.0012
Bright Color	0.0003	50%	0.0058
Dull	0.001		0.0000
Dark	0.002	10%	0.0077
Black oil	0.1		0.0000
Emulsion (30% Oil)	1		0.0000
Percent Total:		100%	0.0149

Estimated Volume of oil on open water,  $V_{wat}$  0.01 m<sup>3</sup>  
**Estimated Volume of oil on open water,  $V_{wat}$  0.09 bbls**

**3 Calculation of evaporated volume**

Evaporation Factors (E-Factor) for SPDC Crude oil		
Residence time of spilled oil (days on site)	Oil type	
	Bonny Light	Bonny Medium
< 1 day	10%	5%
1-7 days	25%	15%
> 7 days	40%	25%

- i Was oil recovery before JIV completion done before JIV date? No
- ii Estimated volume available for evaporation 0.59 bbls

iii E-factor 25%

Estimated Volume of evaporated oil,  $V_{evap}$  0.20 bbls

**Net Total Estimated Spilled Volume,  $V_{Est}$  0.79 bbls**



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## d. General Status of the site

i. Joint investigation of the incident site found that there is no residual impact after the initial response and JIT therefore recommend that the site be closed out <input type="checkbox"/>
ii. Investigation of the incident site showed that there is residual impact on site requiring further works <input checked="" type="checkbox"/>

## e. Representatives

<p><b>This report was filled, agreed and signed by the following joint investigation team representatives:</b></p> <ul style="list-style-type: none"><li>• Host Community: <input checked="" type="checkbox"/></li><li>• Department of Petroleum Resources [DPR]: <input checked="" type="checkbox"/></li><li>• National Oil Spill Detection and Response Agency [NOSDRA]: <input checked="" type="checkbox"/></li><li>• State Ministry of Environment [SME]: <input type="checkbox"/></li><li>• Asset Owner: <input checked="" type="checkbox"/></li><li>• Signatories agree with reported findings: <input checked="" type="checkbox"/></li><li>• Separate DPR form has been filled out with same findings: <input checked="" type="checkbox"/></li></ul> <p style="text-align: right;"><i>Tick as applicable</i></p>
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f. Appendix 1: Overview sketch of the site

