

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1183295 JIV report S/N: 0538

(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: 1183295 2. Type of incident* OIL SPILL
 3. Name of Location 28" NKPOKU - BOMU PIPELINE
 4. Name of nearest community EKPORO 5. State: RIVERS 6. LGA ELEME
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 21ST MAY, 2014
 b. Start date/time of investigation: 21ST MAY, 2014 / 12:12 HOURS, 22ND AND 23RD MAY, 2014
 c. Investigation End date: 2ND JUNE, 2014 Actual investigation duration, days: FOUR (4) DAYS.
 d. Description of spill point environment

- | | | |
|---|--|---|
| <input type="checkbox"/> Firmed soil | <input checked="" type="checkbox"/> Loose soil | <input checked="" type="checkbox"/> Recently excavated area |
| <input type="checkbox"/> Under water | <input type="checkbox"/> Swampy | <input type="checkbox"/> Exposed pipe surface |
| <input type="checkbox"/> Well Platform (on Water) | | <input type="checkbox"/> Drill Rig |

Additional observations around the spill point: ON EXPOSURE BY EXCAVATION, THE SPILL POINT WAS OBSERVED TO BE BLIND-FLANGED, WITH WHITE POLYKENE TAPE WRAPPED AROUND THE AFFECTED PIPELINE SECTION INDICATING A TEMPORARY REPAIR (BY DISABLING THE CRUDE THEFT POINT) HAD BEEN DONE PREVIOUSLY. THE SPILL POINT WAS NOTICED TO BE APPROXIMATELY 48 METRES FROM A TIDAL STREAM. IMPACTED SOIL WAS OBSERVED AS LIGHT BROWN SILT WITH LOOSE PARTICLES.

e. Description of leak point (tick as applicable);

- | | | |
|--|---|---|
| <input type="checkbox"/> Drilled hole | <input type="checkbox"/> Hack saw cut | <input type="checkbox"/> Tear (_____), |
| <input type="checkbox"/> Complete Rupture | <input type="checkbox"/> Inward dent, | <input type="checkbox"/> Well head tampering |
| <input type="checkbox"/> Failed Weld-on illegal hot tap valve, | <input type="checkbox"/> Failed Clamp | <input type="checkbox"/> Missing Pipeline/Flowline |
| <input checked="" type="checkbox"/> Crude oil theft (illegal bunkering) point, | | <input type="checkbox"/> Third party tampering with Clamp |
| <input type="checkbox"/> Third party tampering with valve setting, | | <input type="checkbox"/> Third party tampering with flange, |
| <input type="checkbox"/> Corrosion | <input type="checkbox"/> Saver-pit over flow, | <input type="checkbox"/> Surge vessel overflow, |
| <input type="checkbox"/> Bulging Outward | <input type="checkbox"/> Flare System/Bund wall failure | <input type="checkbox"/> Accidental 3 rd party equipment |
| impact | <input type="checkbox"/> Valve Failure | <input type="checkbox"/> com unit failure |
| <input type="checkbox"/> Relief valve failure | <input type="checkbox"/> Others (specify) _____ | <input type="checkbox"/> Cold vent |

f. Incident caused by:

- Third party interference (Sabotage ; crude theft ; Line theft ; Accidental 3rd 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,

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1183275 JIV report S/N: 0538

g. Spill point coordinates

Measuring unit (m) Minna - Mid belt

Northing:	Easting:
<u>79726.37</u>	<u>528951.71</u>
<u>[Signature]</u>	<u>[Signature]</u>

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) _____
(STREAM)

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). PALM AND BAMBOO TREES IMPACTED BY SPILL.

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit None
 Others: _____

13. Any pictures or video coverage?

[X] [N]

14. Further response/repair initiated as at the time of JIV?

[X] [N]

If yes to item 14, give brief description:

RECOVERY OF FREE-PHASE OIL WAS DONE SIMULTANEOUSLY AS REPAIRS WERE EFFECTED ON THE AFFECTED PIPELINE SECTION BY CLAMPING AFTER REMOVAL OF THE CRUDE OIL THEFT FITTING.

15. Was there any disruption to the investigation?

[X] [N]

If yes to item 15 give brief description:

ON THE THIRD DAY OF JOINT INVESTIGATION VISIT (23RD MAY 2014), ASSESSMENT OF THE IMPACTED AREA ON A NEARBY TIDAL STREAM COULD NOT BE COMPLETED DUE TO DIFFICULTY IN ACCESSING THE BUSHY TERRAIN BY THE BANKS OF THE STREAM AND SECURITY CONCERNS RAISED AT THE TIME, THIS NECESSITATED THE CONCLUDING JIV OF 2ND JUNE 2014 (4TH DAY) BY WHICH TIME THE IMPACTED AREA ASSESSMENT WAS COMPLETED.

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1183275 JIV report S/N: 0538

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	PALM TREES		5 No.	1 No.	6 No.	IMPACTED BY SPILL WITHIN AN IMPACTED AREA OF 1.1 Ha (APPROXIMATELY)
2	BAMBOO TREES			✓		

18. Fish/Nets/Ponds

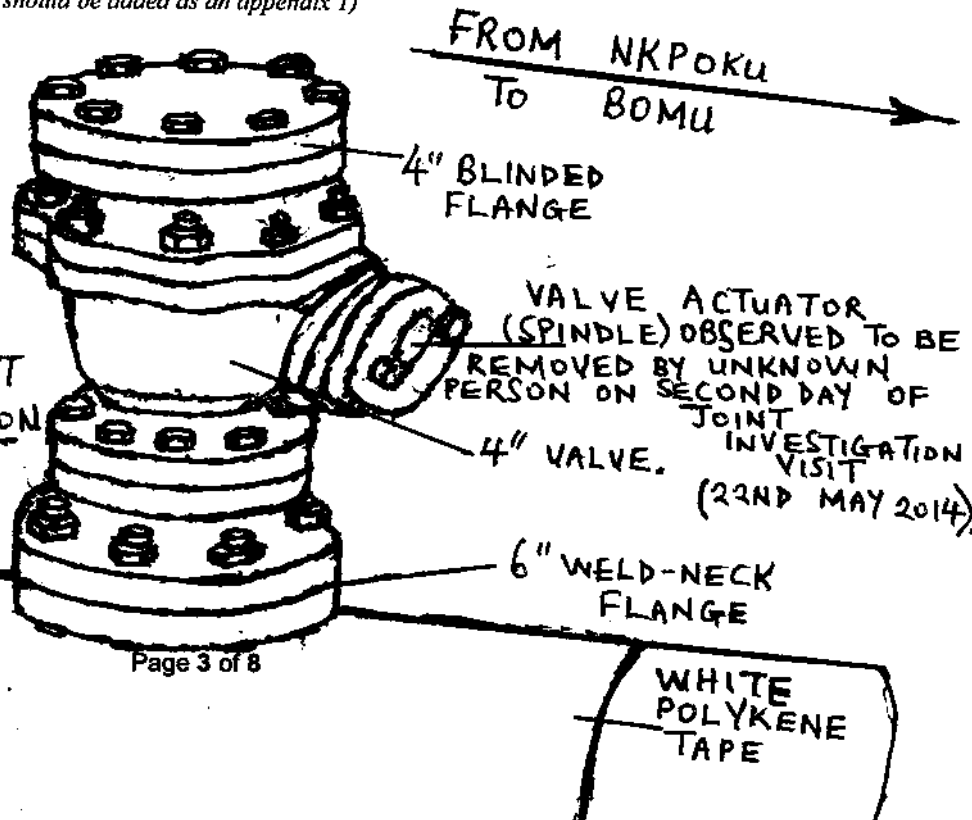
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
NONE WITHIN AREA OF IMPACT				

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 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 28" NKPOKU - BOMU PIPELINE AT EKPORO SHOWING ONE No. 6" REDUCED TO 4" CRUDE OIL THEFT POINT AT 12 O'CLOCK POSITION



WHITE POLYKENE TAPE

APPENDIX A

JIV TO 28" NKPOKU - BOMU PIPELINE AT EKPORO (INCIDENT NO: 1183275)

IMPACTED AREA COORDINATES (MINNA MID-BELT)

POINTS	NORTHING (M)	EASTING (M)
4400	79800.57	529025.92
4390	79771.67	529021.31
4380	79753.42	529016.23
4370	79735.64	529010.20
4360	79731.51	529009.41
4350	79719.02	529011.73
4340	79701.03	529019.78
4410	79690.66	529020.84
4420	79669.07	529016.39
4430	79659.97	529003.27
4440	79649.38	529019.35
4450	79643.67	529011.73
4460	79610.01	528997.98
4470	79603.88	528989.72
4480	79585.25	528984.22
4490	79570.86	528970.88
4500	79567.89	528962.42
4401	79800.09	528999.56
465	79588.28	528874.41
466	79609.82	528855.96
467	79646.73	528831.38
468	79674.42	528806.77
469	79692.86	528800.64
4651	79447.69	528917.32
4660	79559.87	528847.05
4670	79590.04	528831.71
4680	79635.01	528813.19
4690	79664.12	528787.26
4691	79499.55	528847.05
4692	79510.13	528940.19
424	79729.45	528945.56
425	79741.73	528948.66
426	79729.41	528967.13
427	79720.22	528954.78
433	79707.88	528982.50
434	79704.80	528988.66
435	79720.17	528982.52
436	79732.44	528988.71
437	79738.59	528988.72
438	79757.01	528991.83
439	79769.29	528994.94
440	79784.66	528991.88
441	79686.36	528991.70
442	79671.00	528991.68
443	79661.80	528985.49
444	79649.50	528991.64

445	79643.35	528997.79
446	79631.13	528957.70
447	79621.92	528954.60
448	79618.87	528945.35
449	79606.61	528933.00
450	79603.56	528920.67
451	79594.36	528908.33
452	79591.35	528877.50
453	79704.83	528973.25
454	79707.89	528979.42
455	79720.23	528948.62
456	79735.62	528930.16
457	79738.68	528936.33
458	79726.38	528945.55
459	79732.52	528948.64
460	79741.72	528957.91
461	79738.64	528960.98
462	79729.42	528964.05

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1183275 JIV report S/N: 0538

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 2.30HA
- 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} :	250	Barrels
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Controlled recovery/evacuation from source with no impact to environment:

NIL	Barrels
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22. Net Estimated Spilled Volume V_{Est}(bbls)* =	656.71
Estimated Reported Volume** V_{rep}(bbls)=	657 BARRELS.

***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:

ESTIMATION OF SPILL IMPACT WITHIN THE STREAM WAS TREATED AS BEING WITHIN A CONFINED WATER BODY.

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 column 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

22,994.00	m ²
	m ²
	m ²

- i Impact within SPDC R.O.W
- ii Impact outside SPDC R.O.W

1 Volume of oil recovered before completion of JIV (V_{rec,i})

i Estimated Recovered oil (Net)

250.00	bbls
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Estimated Recovered oil (Net) V_{rec,i}	250.00 bbls
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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
- ii Average depth of pool of free phase oil
- iii Emulsification factor (If applicable, else 0%)

10,976.00	m ²
0.004	m
0.000	%

Estimated Volume of pool of free phase oil, V_{pool}	43.90 m³
Estimated Volume of pool of free phase oil, V_{pool}	276.16 bbls

b Computation of estimated volume of infiltrated oil in the soil (V_{inf})

1 Volume of infiltrated oil at spill point (V_{inf,s})

- i Total area covered by the oil (infiltration)
- ii Average depth of infiltration above leaking facility i.e. pipeline/flowline
- iii Soil type
- iv P_e (effective porosity of the soil)

1.00	m ²
1.700	m
Silt	
	%

v Cause of spill

Third party interference

vi Calculation of days for infiltration below the leaking point on pipeline or flowline		
Incident Date	JIV Date	Days on Site
5/21/2014 13:40	5/23/2014 14:45	2
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.			
Soil type	Approximate time to reach 1m depth below ground level		
Oil type	Sand	Loam	Clay
Bonny Medium	3 weeks	3 years	> 10 years
Bonny Light	2 days	2 months	> 10 years

vii Oil type

Bonny Medium

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

	m
--	---

ix Total depth below ground surface of infiltration of oil

	m
--	---

Estimated Volume of Infiltrated oil, V_{inf,s}	0.38 m³
Estimated Volume of Infiltrated oil, V_{inf,s}	2.25 bbls

2 Volume of infiltrated oil at second spill point [if applicable] (V_{inf,s})

- i Total area covered by the oil (infiltration)
- ii Average depth of infiltration above leaking facility i.e. pipeline/flowline
- iii Soil type
- iv P_e (effective porosity of the soil)

	m ²
	m
- Select -	
	%

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

	m
--	---

vi Total depth below ground surface of infiltration of oil

	m
--	---

Estimated Volume of infiltrated oil, V_{inf,s}	0.00 m³
Estimated Volume of infiltrated oil, V_{inf,s}	0.00 bbls

3 Volume of infiltrated oil outside immediate spill point(s) region (V_{inf,o})

JOINT INVESTIGATION REPORT SPILL VOLUME ESTIMATE FOR INCIDENT NO: **1183275**

- i Total Area covered by the oil (infiltration) 12,018.00 m²
- ii Total Area of the pool of free phase oil in touch with soil 334.00 m²
- iii Soil type Silt
- iv P_e (effective porosity of the soil) %
- v Average depth below ground surface of infiltration of oil m

Estimated Volume of Infiltrated oil, V _{DIFc}	4.74 m ³
Estimated Volume of Infiltrated oil, V _{DIFc}	29.80 bbls
Estimated Total Volume of infiltrated oil, V _{INF}	5.10 m ³
Estimated Total Volume of infiltrated oil, V _{INF}	32.05 bbls

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

- i Total area of oil on open water m²
- ii Table of average depth of oil on water based on coloration

[Link to Coverage Visual](#)

Spill Factors from USCG FOG (2000 Edition)

		Aid	
	Thickness (mm)	Percentage coverage (%)	Volume (m3)
Barely Visible	0.00004		0.0000
Silvery	0.00008		0.0000
Slight Color	0.00015		0.0000
Bright Color	0.0003		0.0000
Dull	0.001		0.0000
Dark	0.002		0.0000
Black oil	0.1		0.0000
Emulsion (30% Oil)	1		0.0000
Percent Total:		0%	0.0000

Estimated Volume of oil on open water, V _{WAT}	0.00 m ³
Estimated Volume of oil on open water, V _{WAT}	0.00 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 bbls
- iii E-factor %

Estimated Volume of evaporated oil, V _{EVAP}	98.51 bbls
Net Total Estimated Spilled Volume, V_{Est}	656.71 bbls

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1183275 JIV report S/N: **0538**

23. GENERAL STATUS OF THE SITE

A. 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

B. Investigation of the incident site showed that there is residual impact on site requiring further works **THE JOINT INVESTIGATION TEAM ALSO RECOMMENDS AN INTERNAL INVESTIGATION BY SPDC OF THE**

CIRCUMSTANCES SURROUNDING THE REMOVAL OF THE VALVE ACTUATOR ON THE CRUDE THEFT POINT BY UNKNOWN PERSON(S), AS OBSERVED ON THE SECOND DAY OF JOINT INVESTIGATION VISIT, AT WHICH POINT, SPILL WAS NOTICED TO HAVE ESCALATED INTO THE NEARBY STREAM.

24. REPRESENTATIVES This report was filled, agreed and signed by the following joint investigation representatives:

- 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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1183275 JIV report S/N: **0538**

25. Appendix 1: Overview sketch of the site

