

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 JIV report S/N: 0387

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

A. GENERAL INFORMATION:

A

1. Spill incident Number: 1103975 2. Type of incident* OIL SPILL
 3. Name of Location 28" MKPOKU - BOMU PIPELINE
 4. Name of nearest community EKPORO 5. State: RIVERS 6. LGA ELEME
 7. Type of Production facility/Installation OIL PIPELINES Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 17TH JANUARY, 2014
 b. Start date/time of investigation: 19TH JANUARY, 2014 / 15:05PM
 c. Investigation End date: 20TH JANUARY, 2014 Actual investigation duration, days: Two (2) Days
 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)		MUNA MID-BELT	
Spill Point 1	Northing:	80037.24	Easting:
			528613.28
Spill Point 2	Northing:	80028.00	Easting:
			528628.67

*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: 1103975 JIV report S/N: 0387

A

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) **(JTF CAMP) < 12M**
- NONE SEEN WITHIN VICINITY**

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit
- Others: **EXCAVATED AREA AT SPILL POINT**

13. Any pictures or video coverage? [N]

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

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
	NONE WITHIN AREA OF IMPACT				

16. Crops/Economic Trees

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 ^A JIV report S/N: 0387

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
	NONE WITHIN AREA OF IMPACT					

17. Fish/Nets/Ponds

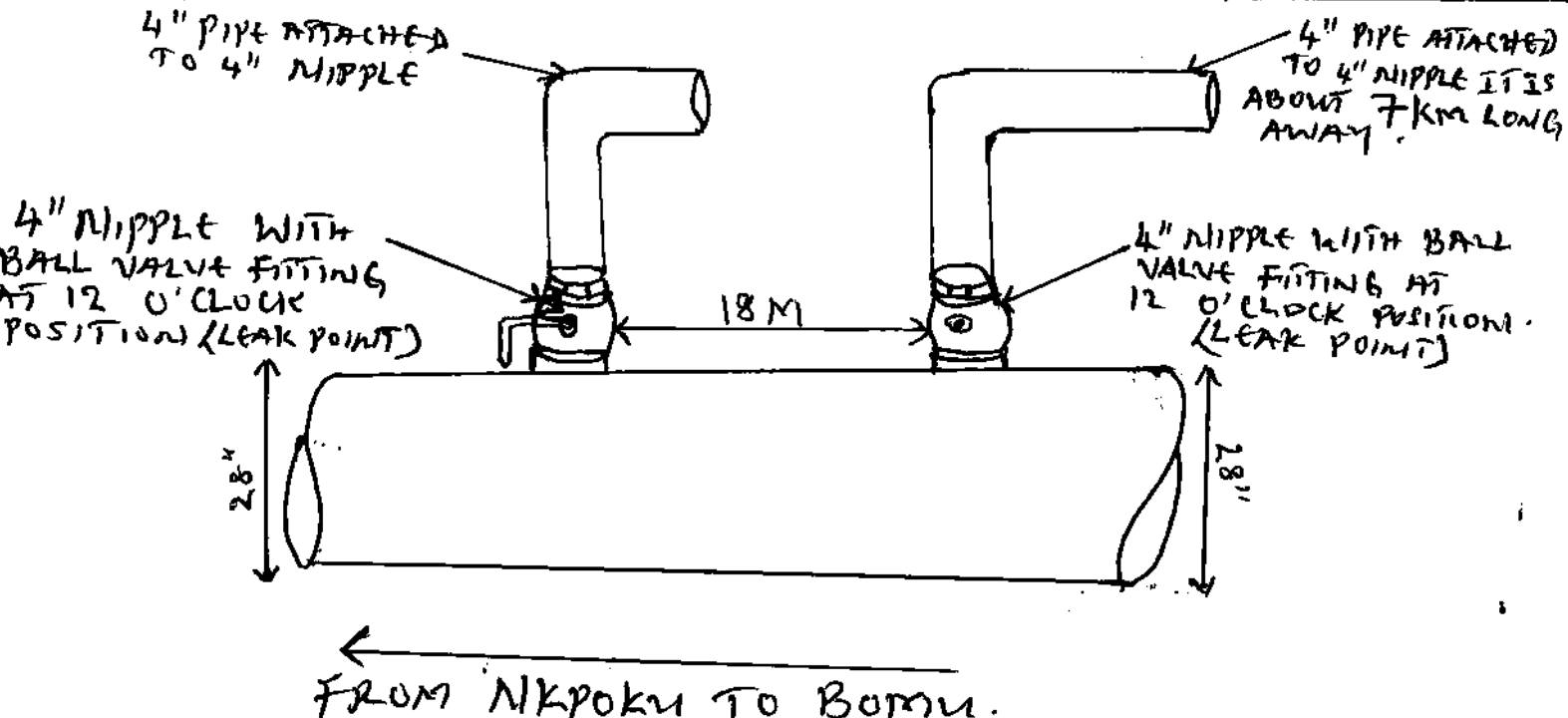
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

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 28" NKPOKU - BOMU PIPELINE AT EKPORO SHOWING 2 NOS OF CRUDE OIL TAPPS POINTS AT 12 O'CLOCK POSITION.



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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 JIV report S/N: 0387

19. Impacted area boundary Coordinates (If more, Print and attach as an appendix) ^A MINNA MID-BELT

S/N	Northing (m)	Easting (m)
WP914	80055.67	528610.24
WP915	80058.73	528619.49
WP916	80055.64	528625.45
WP917	80046.43	528625.63
WP918	80040.30	528619.46
WP913	80036.52	528613.21
WP910	80040.31	528610.21
WP918	80046.47	528604.06
WP919	80046.47	528600.98
WP920	80049.54	528604.07
SITE B		
WP872	80021.86	528622.50
WP873	80028.01	528622.51
WP874	80031.07	528628.68
WP875	80027.99	528631.75
WP886	80018.76	528640.98
WP887	80018.75	528647.15
WP888	80006.44	528659.45
WP889	80006.44	528656.37
WP890	80012.61	528644.05
WP891	80018.76	528637.90

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 0.05 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}):

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 JIV report S/N: 0387

Recovered oil V_{rec} :	<u>200</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 15
- ii. Average Depth (m) of pool of free phase oil 0.58
- iii. Emulsification factor:

iv.

Estimated Volume of pool of free phase oil. V_{pool} :	<u>54.72</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: 4
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.2
- 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: 3 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0008(m)
- ix. Estimated depth of infiltration around spill point: 1.2008(m)

Estimated Volume of infiltrated oil at spill point: $V_{inf a}$:	<u>2.42</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: 3
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.2
- 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: 3 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0008(m)
- ix. Estimated depth of infiltration around spill point: 1.2008(m)

Estimated Volume of infiltrated oil at spill point: $V_{inf b}$:	<u>1.81</u>	barrels
---	-------------	---------

3. E

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

- i. Area (m^2) of soil covered by the oil: 478
- ii. Area (m^2) of the pool of free phase oil in touch with soil: 15
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0008(m)
- iv. Soil type: CLAY
- v. P_e (effective porosity of the soil): 8%

vi.

Estimated Volume of infiltrated oil. At $V_{inf c}$:	<u>0.20</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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 JIV report S/N: 0387

- 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		
Silvery	0.00008		
Slight Color	0.00015	NOT	
Bright Color	0.0003		
Dull	0.001	APPLICABLE	
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

	Percent Total	100%
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: 59.16 BARRELS
- ii. E-Factor: 15%
- iii.

Estimated Volume of evaporated oil. V_{evap} :	<u>10.44</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_{est} (bbls) = V_{evap} (bbls) + V_{wat} (bbls) + V_{inf} (bbls) + V_{pool} (bbls) + V_{rec} (bbls) =
 $10.44 + NIL + 4.43 + 54.72 + 200$
= 269.6 BARRELS

Estimated Reported Volume** V_{rep} (bbls) = 270 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) 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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 ^A JIV report S/N: 0387

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 20/01/2014 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

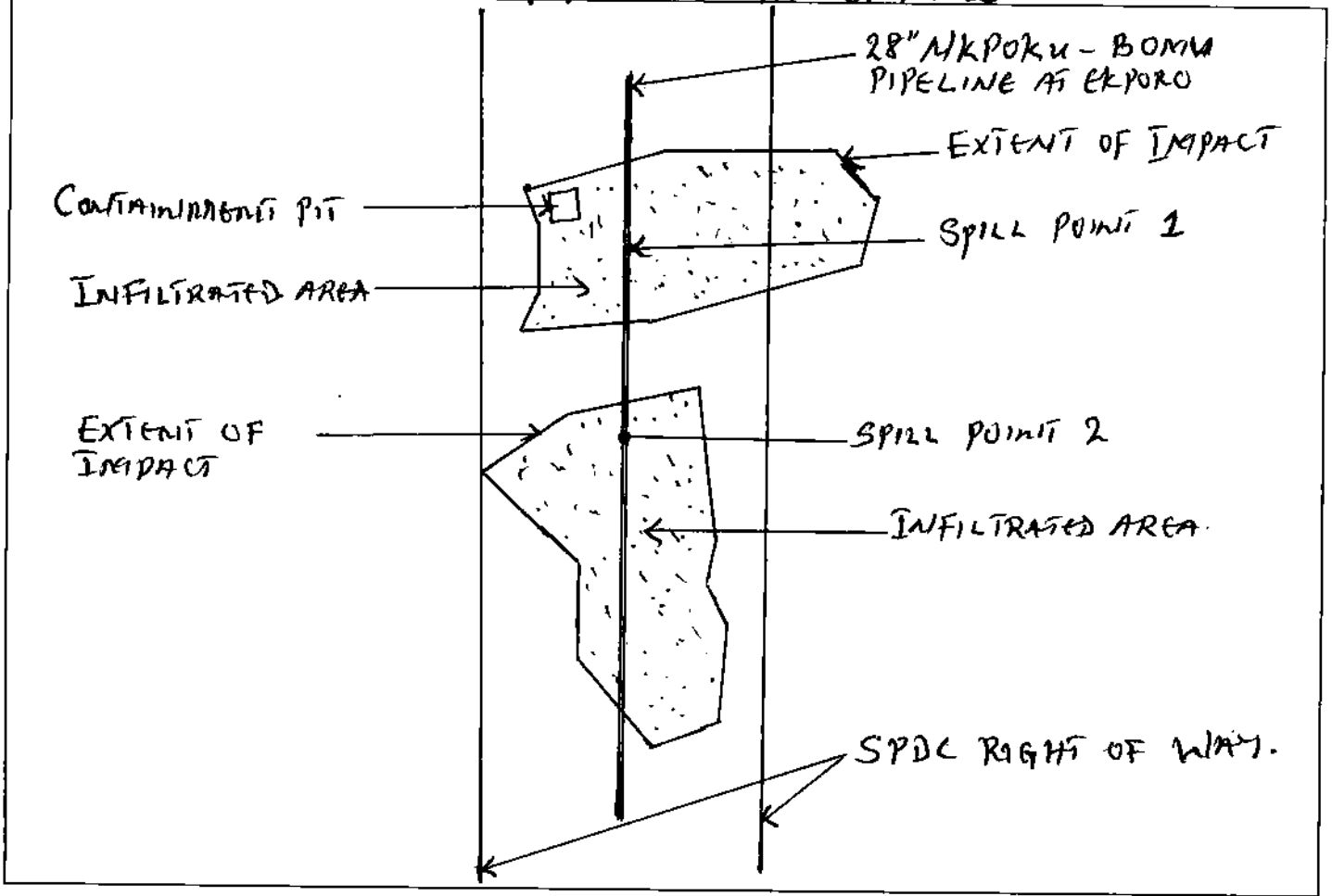
Tick as applicable

28. Appendix 1: Overview sketch of the site

Location: 28" Nkyoku - BOMU PIPELINE AT EKORO

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 ^A JIV report S/N: 0387
28" NKPOKU - BOMMA PIPELINE AT EKORO



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 JIV report S/N: 0389

(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: 1103975 2. Type of incident* OIL SPILL
 3. Name of Location 28" MKPUKU - BOMU PIPELINE
 4. Name of nearest community EKPORO 5. State: RIVERS 6. LGA ELERIT
 7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 17th JANUARY, 2014
 b. Start date/time of investigation: 19th JANUARY, 2014 / 12:05 PM
 c. Investigation End date: 19th JANUARY, 2014 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 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)	
Northing: 79972.61 79969.52	Easting: 528680.96 528681.12

MINNA MID-BELT

LOW-LEAKING POINT SPILL

~~LOW-LEAKING POINT SPILL~~

*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: 1103975 JIV report S/N: 0389

B

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). [,m]

None seen within vicinity

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit
 Others: _____

13. Any pictures or video coverage? [N]

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

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
		<i>NONE WITHIN AREA OF IMPACT</i>			

16. Crops/Economic Trees

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 ^B JIV report S/N: 0389

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	PALM TREE	—	1	1	2	IMPRESSED BY SPILL

17. Fish/Nets/Ponds

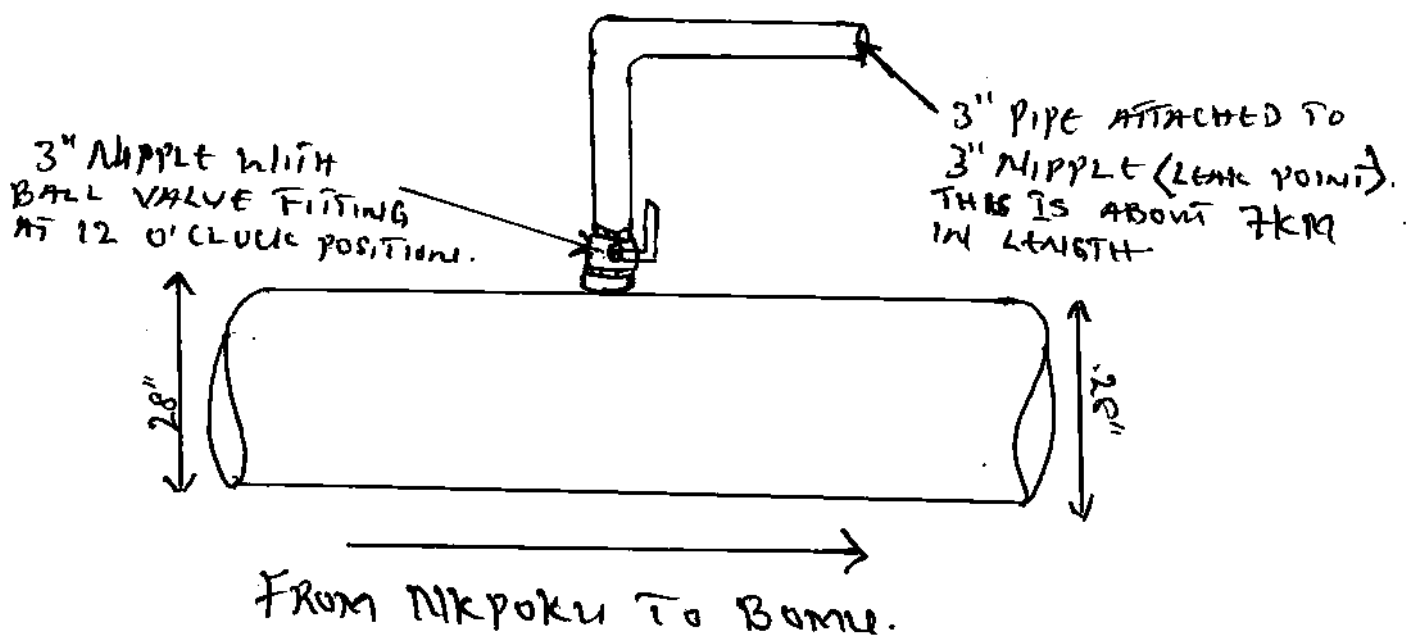
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
		NONE WITHIN AREA OF IMPACT		

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 28" NIKPOLCU - BOMU PIPELINE AT EKPORO SHOWING POSITION OF CRUDE OIL TAP POINT AT 12 O' CLOCK POSITION.



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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 ^B JIV report S/N: 0389

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

Estimated Volume of pool of free phase oil. V_{pool} :	<u>NIL</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: 3
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: 1.2
- iii. Soil type: SILT iv. P_e (effective porosity of the soil): 21%
- v. Cause of spill: THIRD PARTY vi. Oil type: BONNY MEDIUM
- vii. Oil Residence time on site, day: 2 DAYS
- viii. Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0018(m)
- ix. Estimated depth of infiltration around spill point: 1.2018(m)

Estimated Volume of infiltrated oil at spill point. $V_{inf a}$:	<u>4.76</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: NOT APPLICABLE iv. P_e (effective porosity of the soil): _____
- v. Cause of spill: NOT 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>NIL</u>	barrels
---	------------	---------

3. E

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

- i. Area (m^2) of soil covered by the oil: 97
- ii. Area (m^2) of the pool of free phase oil in touch with soil: —
- iii. Average Depth (m) below ground surface of infiltration of oil: 0.0018(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>0.23</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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 B JIV report S/N: 0389

- 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		
Silvery	0.00008		
Slight Color	0.00015		
Bright Color	0.0003		
Dull	0.001		
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

NOT APPLICABLE

	Percent Total	100%
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: 5 BARRELS
- ii. E-Factor: 15%
- iii. Estimated Volume of evaporated oil. V_{evap} :
- | | |
|-------------|---------|
| <u>0.88</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 $V_{res}(bbls) = V_{evap}(bbls) + V_{wat}(bbls) + V_{air}(bbls) + V_{pool}(bbls) + V_{recf}(bbls)$**

$= 0.88 + NIL + 5 + NIL + NIL$

$= 5.88 \text{ BARRELS}$

Estimated Reported Volume $V_{res}(bbls) = 6 \text{ BARRELS}$**

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 $Volume (m^3) \times 6.29$; **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

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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975 ^B JIV report S/N: 0389

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 20/01/2014 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: 28" Nkpoku - Bonny Pipeline at Ekpoko

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1103975^B JIV report S/N: 0389
28" NKPOKU - BOMTI PIPELINE AT EKPORU

