

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1084422 JIV report S/N: 0451

(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: 1084422 2. Type of incident* OIL SPILL
 3. Name of Location SEIBOU BULKLINE 3 AT AZARGBENE
 4. Name of nearest community AZARGBENE 5. State: BAYELSA 6. LGA EKEREMOR
 7. Type of Production facility/Installation BULKLINE 8. Asset owner/District PNWST

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 04TH DECEMBER 2013
 b. Start date/time of investigation: 10TH DECEMBER 2013 AT 1350HRS
 c. Investigation End date: 20TH DEC, 2013 Actual investigation duration, days: 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) FAILED 2" WELD-ON ILLEGAL HOT-TAP NIPPLES AT 12 O' CLOCK POSITIONS

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 <u>METERS</u> <u>MUNHA (WEST BELT)</u>	
Northing:	Easting:
SPILL POINT 1: 97833.60	380687.94
SPILL POINT 2: 97833.60	380687.94

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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). [.m]

NONE WITHIN THE 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
NONE WITHIN AREA OF IMPACT					

16. Crops/Economic Trees

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S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	MANGROVES	36	69	114	219	

17. Fish/Nets/Ponds

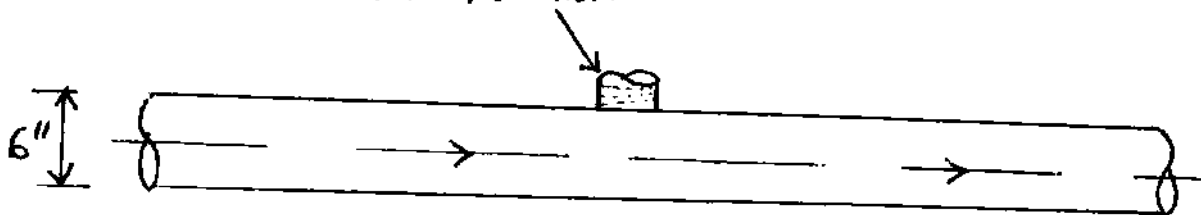
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
		NONE WITHIN AREA OF IMPACT		

18. Others (Specify) i.e. Animal Traps

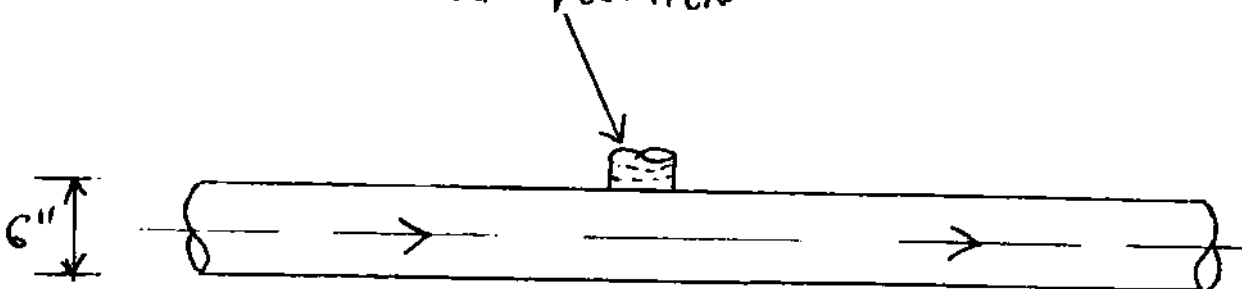
S/N	Others	Description	Quantity/Size	Comments
		NONE WITHIN AREA OF IMPACT		

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)

FAILED 2" WELD-ON ILLEGAL HOT-TAP NIPPLE AT 12 O'CLOCK POSITION



FAILED 2" WELD-ON ILLEGAL HOT-TAP NIPPLE AT 12 O'CLOCK POSITION



SEIBU BULKLINE 3 AT AZARGBENE

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

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Recovered oil V_{rec} :	<u>NIL</u>	Barrels
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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 1659.77 m^2
- ii. Average Depth (m) of pool of free phase oil 0.002 m
- iii. Emulsification factor: 60%

iv.

Estimated Volume of pool of free phase oil. V_{pool} :	<u>8.35</u>	barrels
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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: _____
- ii. Average Depth (m) above leaking facility i.e. pipeline/flowline: _____
- iii. Soil type: _____ NOT APPLICABLE 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 $V_{inf a}$:	<u>NIL</u>	barrels
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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 second spill point $V_{inf b}$:	<u>NIL</u>	barrels
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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: _____
- 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: _____
- iv. Soil type: _____
- v. P_e (effective porosity of the soil): _____

vi.

Estimated Volume of infiltrated oil outside immediate spill point(s) region $V_{inf c}$:	<u>NIL</u>	barrels
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23. Computation of estimated volume of oil on open water based on standard coloration.

- i. Total area of oil on open water: 109803.27 m^2

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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	_____	_____
Silvery	0.00008	<u>45 %</u>	<u>0.0040</u>
Slight Color	0.00015	<u>10 %</u>	<u>0.0016</u>
Bright Color	0.0003	_____	_____
Dull	0.001	<u>15 %</u>	<u>0.0165</u>
Dark	0.002	_____	_____
Black oil	0.1	<u>15 %</u>	<u>1.6470</u>
Emulsion (30% Oil)	1	<u>15 %</u>	<u>4.9411</u>

iii.	Percent Total	100%	
	Estimated Volume of oil on open water. V_{oil} :	<u>41.58</u>	Barrels

24. Calculation of evaporated volume:

- i. Estimated Volume available for evaporation within surface area: 49.93 BBLs
- ii. E-Factor: 15 %

iii.	Estimated Volume of evaporated oil. V_{evap} :	<u>8.81</u>	Barrels
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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. ~~Estimated Reported Volume V_{rep} (bbls) = V_{oil} (bbls) + V_{evap} (bbls) + V_{s} (bbls) + V_{w} (bbls)~~

~~$(bbls) + V_{oil} (bbls) = 8.81 + 41.58 + 8.25 = 58.74$~~

Estimated Reported Volume V_{rep} (bbls) = 59 BBLs**

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

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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 10/20/12/2013 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

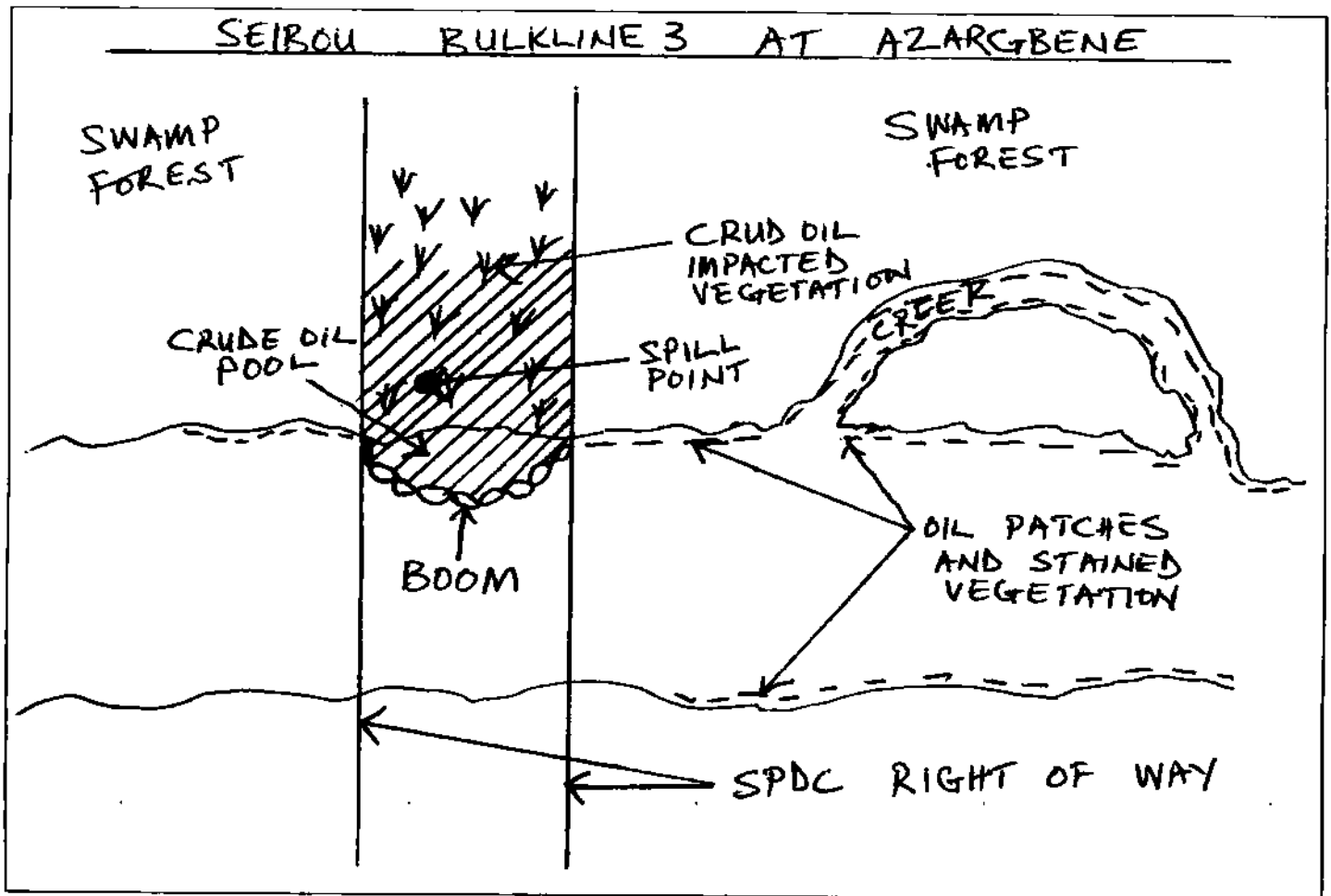
Tick as applicable

28. Appendix 1: Overview sketch of the site

Location :

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SPILL POINT

East North
380687.94 , 97833.6

WEST-BELT

AREA 2(LIGHT IMPACT ON WATER

East North
381276.618 ,98083.360
381200.645 ,98089.657
381288.895 ,98149.477
381292.763 ,98165.126
381303.442 ,98184.756
381324.221 ,98202.319
381384.376 ,98148.038
381399.942 ,98093.281
381435.711 ,98052.988
381393.197 ,98056.696
381384.876 ,98085.629
381355.161 ,98140.530
381300.600 ,98106.691
381276.618 ,98083.360

AREA 1(LIGHT IMPACT ON WATER

East North
381752.783,98187.100
381821.429,98166.488
381756.550,98105.386
381724.111,98090.110
381680.222,98036.646
381598.170,98025.190
381551.903,98003.495
381438.901,98007.148
381296.599,98031.771
381177.321,98062.474
381026.637,98066.577
380858.120,97975.548
380764.431,97857.462
380727.355,97770.796
380672.719,97713.538
380600.514,97585.458
380587.961,97550.284
380596.600,97506.668
380585.121,97300.965
380558.325,97266.718
380529.275,97137.492
380562.223,97008.822
380607.801,96942.072
380689.730,96889.983
380712.448,96885.076

380758.871,96890.347
380767.310,96848.883
380733.871,96829.641
380668.798,96862.582
380555.308,96936.256
380526.867,96973.624
380485.752,97080.708
380492.194,97115.107
380487.237,97150.593
380486.166,97161.362
380517.095,97221.231
380559.946,97364.933
380552.581,97484.824
380558.429,97551.076
380583.446,97663.196
380638.783,97749.120
380655.451,97785.808
380684.900,97815.160
380727.816,97859.088
380730.325,97863.181
380782.407,97948.151
380786.682,97954.254
380809.725,97970.671
380832.177,97993.331
380941.656,98068.169
381066.710,98101.884
381114.651,98101.233
381153.521,98085.671
381200.645,98089.657
381276.618,98083.360
381279.649,98065.331
381365.854,98045.975
381383.205,98048.697
381393.197,98056.696
381435.711,98052.988
381489.230,98038.063
381650.523,98106.848
381752.783,98187.100

AREA 3(FREE PHASE CRUDE OIL IMPACT

East	North
380675.500	97835.460
380680.400	97849.690
380685.100	97862.880
380690.100	97877.090
380730.325	97863.181
380727.816	97859.088
380684.900	97815.160