

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1119794 JIV report S/N: 0392

(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: 1119794 2. Type of incident* OIL SPILL
 3. Name of Location SANTA BARBARA WELL 4 L/S FLOWLINE
 4. Name of nearest community NEMBE BASSAMBIRI 5. State: BAYELSA 6. LGA NEMBE
 7. Type of Production facility/Installation OIL FLOWLINE 8. Asset owner/District SWAMP 2

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 7TH FEBRUARY, 2014
 b. Start date/time of investigation: 12TH FEBRUARY, 2014 / 11:30 AM
 c. Investigation End date: 12TH FEBRUARY, 2014 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 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 <u>METERS</u> <u>Mo-Beli (MINNA)</u>	
	Northings:	Easting:
SP 1	59944.01	450448.70
SP 2	59947.07	450451.79

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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 ^(CREEK) ☒ Water ☐ River (identify) _____

ii. Weather condition

☐ Rain ☒ Sunny ☐ Dry ☐ Wet ☐ Windy ☐ Hot ☐ Cool

11. Distance from the nearest sensitive habitat

<input type="checkbox"/> Government reserved and designated protected area	[<u>NIL</u> ,m]
<input type="checkbox"/> Drinking water source	[<u>NIL</u> ,m]
<input type="checkbox"/> Built up area	[<u>NIL</u> ,m]
<input type="checkbox"/> Farmlands	[<u>NIL</u> ,m]
<input type="checkbox"/> Fish Farm/Pond	[<u>200</u> ,m]
<input checked="" type="checkbox"/> Fishing net	[<u>NIL</u> ,m]
<input type="checkbox"/> Others (specify).	

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

NONE WITHIN AREA OF IMPACT

17. Fish/Nets/Ponds

S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
1	FISHING NET	FISHING NET	1	IMPACTED BY CRUDE OIL

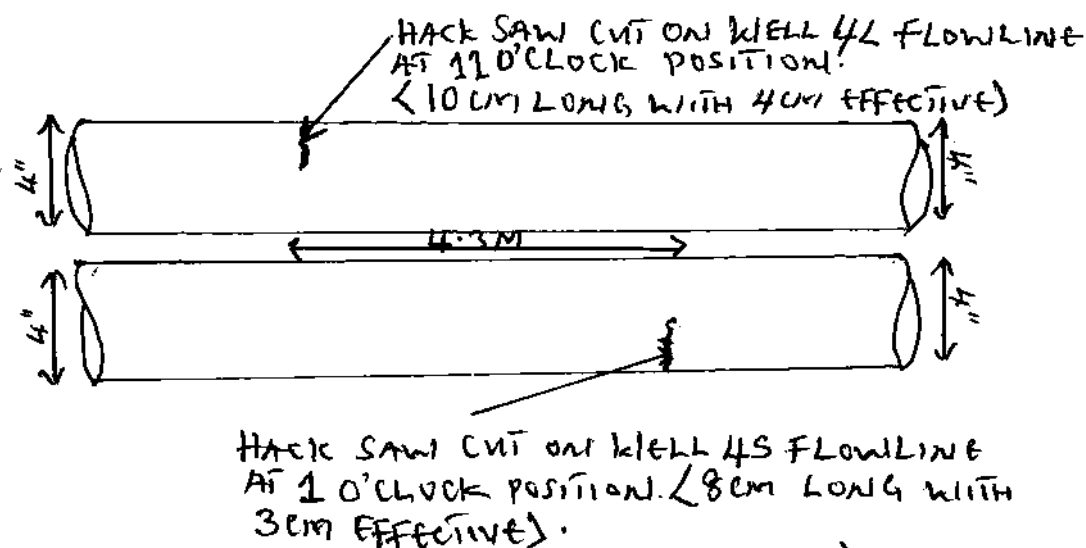
18. Others (Specify) i.e. Animal Traps

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 SANTA BARBARA WELL 4L/S FLOWLINE AT
EMBE BASSAMBIRI SHOWING POSITIONS OF HACK SAW CUTS.



FROM WELL 4L/S TO SANTA BARBARA FLOW STATION

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

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MINNA (MID)-BELT

S/N	Northing METERS	Easting METERS
SEE ATTACHED FOR COORDINATES LISTING		

20. Impacted Area Details

- Total calculated area of impact 0.98 Ha
- Impact within SPDC R.O.W YES
- Impact outside SPDC R.O.W YES

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NAME	EAST	NORTH	
SP1	450448.7	59944.01	
SP2	450451.8	59947.07	
326	450467.2	59959.32	
327	450424.1	59962.51	
328	450408.7	59956.41	
329	450374.7	59941.14	
330	450343.8	59925.86	
331	450272.9	59926.06	
332	450251.2	59898.46	
333	450306.9	59968.98	
334	450251.5	60006.01	
335	450208.5	60043	
336	450211.7	60095.23	
337	450267.2	60092	
338	450363.1	60230.01	
339	450378.6	60242.26	
340	450477.1	59962.07	
341	450475.1	59949.83	
342	450473.8	59942.55	
343	450466.8	59940.57	
344	450428.5	59932.63	
345	450358.1	59921.72	
346	450337.2	59908.16	
347	450284.3	59897.24	
348	450244.3	59881.04	
349	450230.7	59880.04	
350	450241.9	59901.54	
351	450263.8	59929.29	
352	450280.6	59989.48	
353	450247.6	59999.41	
354	450198.6	60042.47	

NAME	EAST	NORTH	
355	450202.6	60097.7	
356	450220.1	60117.21	
357	450269.1	60099.02	
358	450226.7	60109.27	
359	450217.1	60019.25	
360	450207.5	60013.64	
361	450286.9	60001.4	
362	450294.9	59970.96	
363	450310.5	60092.51	
364	450329.1	60118.7	
365	450308.3	60186.17	
366	450340.6	60227.05	
367	450357.3	60238.16	
368	450387.5	60239.75	
369	450312.5	60078.22	
370	450342.2	60121.08	
371	450313.6	60188.55	
372	450349.8	60218.71	
373	450373.2	60248.48	

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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).

- Area (m^2) occupied by pool of free phase oil: 120
- Average Depth (m) of pool of free phase oil: 0.005
- Emulsification factor: 40%

iv. Estimated Volume of pool of free phase oil.		barrels
V_{pool} :	<u>2.26</u>	

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

1. Estimated Volume of infiltrated oil at spill point ($V_{inf a}$)

- Area* (m^2) of soil covered by the oil: 1
- Average Depth (m) above leaking facility i.e. pipeline/flowline: 0.8
- Soil type: CLAY
- P_e (effective porosity of the soil): 8%
- Cause of spill: THIRD PARTY INTERFERENCE
- Oil type: BONNY LIGHT
- Oil Residence time on site, day: 5 DAYS
- Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0014 m
- Estimated depth of infiltration around spill point: 0.8014 m

x Estimated Volume of infiltrated oil at spill point. $V_{inf a}$:	<u>0.40</u>	barrels
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2. Estimated Volume of infiltrated oil at second spill point [if applicable] ($V_{inf b}$)

- Area* (m^2) of soil covered by the oil: 1
- Average Depth (m) above leaking facility i.e. pipeline/flowline: 0.8
- Soil type: CLAY
- P_e (effective porosity of the soil): 8%
- Cause of spill: THIRD PARTY INTERFERENCE
- Oil type: BONNY LIGHT
- Oil Residence time on site, day: 5 DAYS
- Average depth of infiltration below leaking facility i.e. pipeline/flowline: 0.0014 m
- Estimated depth of infiltration around spill point: 0.8014 m

Estimated Volume of infiltrated oil at spill point. $V_{inf b}$:	<u>0.40</u>	barrels
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3. E

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

- Area (m^2) of soil covered by the oil: 7.400
- Area (m^2) of the pool of free phase oil in touch with soil: —
- Average Depth (m) below ground surface of infiltration of oil: 0.0014
- Soil type: CLAY
- P_e (effective porosity of the soil): 8%

vi. Estimated Volume of infiltrated oil. At $V_{inf c}$:	<u>5.10</u>	barrels
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23. Computation of estimated volume of oil on open water based on standard coloration.

- Total area of oil on open water: NIL

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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		
Slight Color	0.00015	<u>NOT</u>	
Bright Color	0.0003		
Dull	0.001	<u>APPLICABLE</u>	
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1		

iii.	Percent Total 100%	
	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: 8.17 BARRELS

ii. E-Factor: 25%

iii.	Estimated Volume of evaporated oil. V_{evap} :	<u>2.72</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. Net Estimated Spilled Volume $V_{res}(bbbls) = V_{evap}(bbbls) + V_{wat}(bbbls) + V_{inf}(bbbls) + V_{pool}(bbbls) + V_{rec}(bbbls)$
 $(bbbls) + V_{rec}(bbbls) = 2.72 + NIL + 5.90 + 2.26 + NIL$
 $= 10.88 \text{ BARRELS}$

Estimated Reported Volume** $V_{res}(bbbls) =$ 11 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 ☐

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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 12/02/2014 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: SANTA BARBARA WELL 4/2/S FLOWLINE AT NIMB & BAYAMBIRI

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SANTA BARBARA WIGLE 42/5 FLOWLINE AT NEMBE BASSAMBI

