

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1139648 JIV report S/N: 0490

(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: 1139648 2. Type of incident\* OIL SPILL  
3. Name of Location 10" DIEBU CREEK - NUN RIVER PIPELINE  
4. Name of nearest community PEREMABRI 5. State: BAYELSA 6. LGA SOUTHERN IJAW  
7. Type of Production facility/Installation OIL PIPELINE 8. Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident  
a. Date of incident: 13TH MARCH, 2014  
b. Start date/time of investigation: 19TH MARCH, 2014 / 15.20HRS  
c. Investigation End date: 21ST MARCH, 2014 Actual investigation duration, days: THREE (3) DAYS  
d. Description of spill point environment

- |   |  |  |
|---|--|--|
| <input checked="" type="checkbox"/> Firmed soil   | <input type="checkbox"/> Loose soil        | <input type="checkbox"/> Recently excavated area |
| <input type="checkbox"/> Under water              | <input checked="" 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: THE VEGETATION (GRASS) AROUND THE SPILL POINT WAS RECENTLY CLEARED

- c. 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 checked="" type="checkbox"/> Failed Clamp        | <input type="checkbox"/> Missing Pipeline/Flowline                  |
| <input 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 <sup>rd</sup> 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 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

Measuring unit	
Northing: <u>Meters</u>	Easting: <u>Meters</u>
<u>73490.40</u>	<u>401932.49</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) \_\_\_\_\_

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 [<1000 ,m]  
 Fish Farm/Pond [            ,m]  
 Fishing net [>100 ,m]  
 Others (specify):

12. Containment measures put in place;

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

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

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

If yes to item 14, give brief description:

CLAMPING OF THE AFFECTED PIPE SECTION WAS INITIATED

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

If yes to item 15 give brief description:

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1139648 JIV report S/N: 0490

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
	PLANTAIN	✓	✓	✓		
	RAPIA PALM	✓	✓	✓		
	OIL PALM	✓	✓	✓		

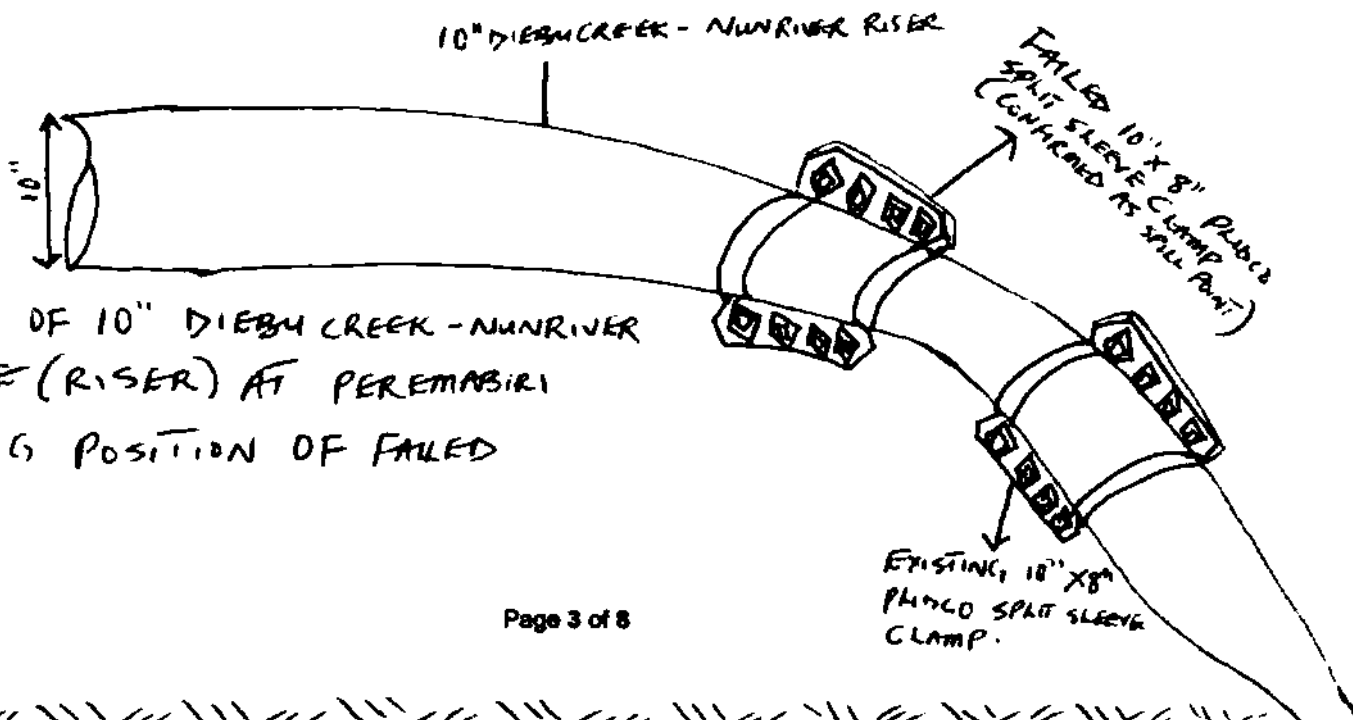
18. Fish/Nets/Ponds

S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
		FISHING NET	18	

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

S/N	Others	Description	Quantity/Size	Comments
		FISHING TRAP	MANY	

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)





MINNA MID-BELT			WGS 84	
NAME	East	North	lat	long
SP	401932.494	73490.403	4°39'40.500"N	6°04'42.500"E
427	401931.77	73562.61	4°39'42.849"N	6°04'42.469"E
371	401963.514	73542.549	4°39'42.200"N	6°04'43.500"E
372	401997.385	73527.064	4°39'41.700"N	6°04'44.600"E
377	402046.5	73416.57	4°39'38.111"N	6°04'46.205"E
434	402008.15	73422.32	4°39'38.293"N	6°04'44.961"E
433	401997.57	73422.32	4°39'38.292"N	6°04'44.618"E
432	401986.98	73415.97	4°39'38.085"N	6°04'44.275"E
431	401957.35	73384.22	4°39'37.048"N	6°04'43.318"E
430	401945.71	73364.11	4°39'36.393"N	6°04'42.943"E
415	401935.12	73332.36	4°39'35.359"N	6°04'42.603"E
375	401895.316	73441.352	4°39'38.900"N	6°04'41.300"E
373	401852.108	73432.28	4°39'38.600"N	6°04'39.900"E
374	401839.815	73444.617	4°39'39.000"N	6°04'39.500"E
370	401876.992	73493.668	4°39'40.600"N	6°04'40.700"E
421	401973.31	73947.99	4°39'55.392"N	6°04'43.772"E
389	401998.677	73902.051	4°39'53.900"N	6°04'44.600"E
390	402038.621	73858.882	4°39'52.500"N	6°04'45.900"E
391	402118.318	73717.217	4°39'47.900"N	6°04'48.500"E
392	402182.764	73624.784	4°39'44.900"N	6°04'50.600"E
393	402201.067	73566.321	4°39'43.000"N	6°04'51.200"E
383	402160.859	73532.648	4°39'41.900"N	6°04'49.900"E
382	402086.462	73422.251	4°39'38.300"N	6°04'47.500"E
397	401934.498	73176.878	4°39'30.300"N	6°04'42.600"E
398	401850.806	73054.218	4°39'26.300"N	6°04'39.900"E
399	401773.398	72965.347	4°39'23.400"N	6°04'37.400"E
428	401735.45	72901.46	4°39'21.317"N	6°04'36.177"E
400	401742.187	72857.875	4°39'19.900"N	6°04'36.400"E
403	402338.981	72416.284	4°39'05.600"N	6°04'55.800"E
404	402486.656	72311.271	4°39'02.200"N	6°05'00.600"E
417	402627.31	72208.05	4°38'58.857"N	6°05'05.172"E
405	402606.428	72163.323	4°38'57.400"N	6°05'04.500"E
416	402570.16	72078.94	4°38'54.651"N	6°05'03.333"E
420	402525.71	72036.6	4°38'53.268"N	6°05'01.897"E
436	402511.14	72000.85	4°38'52.103"N	6°05'01.428"E
423	402497.98	72001.04	4°38'52.108"N	6°05'01.002"E
424	402505.92	72055.28	4°38'53.874"N	6°05'01.253"E
425	402580	72134.65	4°38'56.464"N	6°05'03.646"E
426	402597.2	72195.51	4°38'58.446"N	6°05'04.197"E
414	402144.71	72530.42	4°39'09.292"N	6°04'49.488"E
413	401694.85	72869.88	4°39'20.285"N	6°04'34.864"E
412	401742.6	72994.29	4°39'24.338"N	6°04'36.398"E
411	401837.95	73126.57	4°39'28.652"N	6°04'39.475"E
410	401944.2	73280.03	4°39'33.657"N	6°04'42.903"E
378	401940.26	73317.54	4°39'34.877"N	6°04'42.771"E
415	401935.12	73332.36	4°39'35.359"N	6°04'42.603"E
430	401945.71	73364.11	4°39'36.393"N	6°04'42.943"E
431	401957.35	73384.22	4°39'37.048"N	6°04'43.318"E

435	401973.78	73397.69	4°39'37.488"N	6°04'43.849"E
432	401986.98	73415.97	4°39'38.085"N	6°04'44.275"E
433	401997.57	73422.32	4°39'38.292"N	6°04'44.618"E
434	402008.15	73422.32	4°39'38.293"N	6°04'44.961"E
377	402046.5	73416.57	4°39'38.111"N	6°04'46.205"E
407	402093.36	73483.12	4°39'40.281"N	6°04'47.717"E
409	402164.55	73563.8	4°39'42.914"N	6°04'50.016"E
406	402165.62	73584.06	4°39'43.573"N	6°04'50.049"E
384	402121.201	73658.807	4°39'46.000"N	6°04'48.600"E
385	402004.602	73831.336	4°39'51.600"N	6°04'44.800"E
408	401950.75	73914.4	4°39'54.296"N	6°04'43.045"E
386	401927.798	73917.664	4°39'54.400"N	6°04'42.300"E
387	401921.747	73951.496	4°39'55.500"N	6°04'42.100"E
388	401931.041	73963.759	4°39'55.900"N	6°04'42.400"E
431	401957.35	73384.22	4°39'37.048"N	6°04'43.318"E
435	401973.78	73397.69	4°39'37.488"N	6°04'43.849"E
432	401986.98	73415.97	4°39'38.085"N	6°04'44.275"E

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1139648 JIV report S/N: **0490**

**G. INCIDENT INFORMATION:**

20. Impacted Area Details

- Total calculated area of impact 38.97Ha
- 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 $V_{rec}$ :	<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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<p>22. <u>Net Estimated Spilled Volume <math>V_{Est}</math>(bbbls)* = <u>274.18 bbbls</u></u></p>
<p><u>Estimated Reported Volume** <math>V_{rep}</math>(bbbls) = <u>275 bbbls</u></u></p>

**\*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:

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.

**ESTIMATION OF OIL SPILL VOLUME**

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

**Impacted Area Details**

Total Calculated Area of Impact

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

389,661.45	m <sup>2</sup>
	m <sup>2</sup>
	m <sup>2</sup>

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

- i Estimated Recovered oil (Net)

0.00	bbls
------	------

<b>Estimated Recovered oil (Net) V<sub>rec</sub></b>	<b>0.00 bbls</b>
--	------------------

**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%)

18,500.45	
0.002	m
0.000	%

<b>Estimated Volume of pool of free phase oil, V<sub>pool</sub></b>	<b>27.76 m<sup>3</sup></b>
<b>Estimated Volume of pool of free phase oil, V<sub>pool</sub></b>	<b>174.66 bbls</b>

**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 1</sub>)**

- 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<sub>e</sub> (effective porosity of the soil)

	m <sup>2</sup>
	m
Soil	▼
	%

- v Cause of spill

Operational	▼
-------------	---

**vi Calculation of days for infiltration below the leaking point on pipeline or flowline**

Incident Date	JIV Date	Days on Site
3/13/2014 16:00	3/19/2014 15:20	6
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	Approximate time to reach 1m depth below ground level		
	Sand	Loam	Clay
Bonny Medium	3 weeks	3 years	> 10 years
Bonny Light	2 days	2 months	> 10 years

- vii Oil type

Bonny Light	▼
-------------	---

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

	m
--	---

- ix Total depth below ground surface of infiltration of oil

	m
--	---

<b>Estimated Volume of infiltrated oil, V<sub>inf 1</sub></b>	<b>0.00 m<sup>3</sup></b>
<b>Estimated Volume of infiltrated oil, V<sub>inf 1</sub></b>	<b>0.00 bbls</b>

**2 Volume of infiltrated oil at second spill point [if applicable] (V<sub>inf 2</sub>)**

- 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<sub>e</sub> (effective porosity of the soil)

	m <sup>2</sup>
	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

0.000 m

Estimated Volume of infiltrated oil,  $V_{inf b}$

0.00 m<sup>3</sup>

Estimated Volume of Infiltrated oil,  $V_{inf b}$

0.00 bbls

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

i Total Area covered by the oil (infiltration)

230.00 m<sup>2</sup>

ii Total Area of the pool of free phase oil in touch with soil

0.00 m<sup>2</sup>

iii Soil type

Silt

iv  $P_e$  (effective porosity of the soil)

21%

v Average depth below ground surface of infiltration of oil

0.000 m

Estimated Volume of infiltrated oil,  $V_{inf c}$

4.83 m<sup>3</sup>

Estimated Volume of Infiltrated oil,  $V_{inf c}$

30.38 bbls

Estimated Total Volume of Infiltrated oil,  $V_{inf}$

4.83 m<sup>3</sup>

Estimated Total Volume of Infiltrated oil,  $V_{inf}$

30.38 bbls

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

i Total area of oil on open water

370,931.00 m<sup>2</sup>

ii Table of average depth of oil on water based on coloration

[Link to Coverage Visual](#)

Spill Factors from USCG FOG (2006 Edition)

	Thickness (mm)	Percentage coverage (%)	Volume (m3)
Barely Visible	0.00004	20%	0.0030
Silvery	0.00008	20%	0.0059
Slight Color	0.00015	24%	0.0134
Bright Color	0.0003	17%	0.0189
Dull	0.001	19%	0.0705
Dark	0.002		0.0000
Black oil	0.1		0.0000
Emulsion (30% Oil)	1		0.0000
Percent Total:		100%	0.1117

Estimated Volume of oil on open water,  $V_{wat}$

0.11 m<sup>3</sup>

Estimated Volume of oil on open water,  $V_{wat}$

0.70 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,  $V_{evap}$

68.64 bbls

Net Total Estimated Spilled Volume,  $V_{Est}$

274.18 bbls

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1139648 JIV report S/N: **0480**

**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 <input type="checkbox"/>
B. Investigation of the incident site showed that there is residual impact on site requiring further works <input checked="" type="checkbox"/>

**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*

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JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1139648 JIV report S/N: 0490

25. Appendix 1: Overview sketch of the site

