

JOINT INVESTIGATION REPORT

INCIDENT NO: 3016055 JIV report S/N: 0000914

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

A. GENERAL INFORMATION:

1. Fountain Incident Number: 3016055 2. Type of incident* OIL SPILL
3. Name of Location 12" IMO RIVER 2 - OGALE PIPELINE
4. Name of nearest community UMUOLOLO 5. State: ABIA 6. LGA UKWIA West
7. Production Facility/Installation OIL PIPELINE
8. Asset Owner/Hub THE SHELL PETROLEUM DEVELOPMENT COMPANY
OF NIGERIA LIMITED / PIPELINE.

B. INCIDENT INFORMATION:

9. Details of incident
a. Date Reported: 26TH August 2021
b. Start date/time of Investigation: 28TH August 2021 / 13:05 HRS
c. Investigation End date: 31ST August 2021 Day(s) on site: TWO DAYS
d. Description of spill point environment

<input type="checkbox"/> Firm 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	<input type="checkbox"/> Sand bag(s)

Additional observations around the spill point:

NOT APPLICABLE

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

- | | | |
|--|---|--|
| <input type="checkbox"/> Smooth round-edge hole | <input type="checkbox"/> Rough-edge hole | <input type="checkbox"/> Hack saw cut |
| <input type="checkbox"/> Complete Rupture | <input type="checkbox"/> Inward dent, | <input type="checkbox"/> Well head tampering |
| <input checked="" 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"/> Saver-pit over flow | <input type="checkbox"/> Third party tampering with Clamp |
| <input type="checkbox"/> Third party tampering with valve setting | <input type="checkbox"/> Bulging Outward | <input type="checkbox"/> Third party tampering with flange, |
| <input type="checkbox"/> Flare System/Bund wall failure | <input type="checkbox"/> Cold vent | <input type="checkbox"/> Surge vessel overflow, |
| <input type="checkbox"/> Valve Failure | <input type="checkbox"/> Relief valve failure | <input type="checkbox"/> Accidental 3 rd party equipment impact |
| <input type="checkbox"/> Tear (_____) | | |
| <input type="checkbox"/> Others (specify) _____ | | |

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) Water Leak (e) Fire (f) Non-leaking theft point removal

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Distribution of copies: White (Asset Owner); Pink (DPR); Green (NOSDRA); Yellow (State Ministry of Environment);
Blue (Host Community)

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g. Spill Point Coordinates (*Incidents $\leq 100m$ apart to be aggregated into one Joint Investigation Report)

h. Measuring unit

WGS 84

Northing:	Easting:
<u>4.94732</u>	<u>7.18486</u>

C. RISK ASSESSMENT

10. Details of Environment

i. Type of environment where spill occurred (select one):

☒ Land ☐ Swamp ☐ Water ☐ Seasonal swamp ☐ Shoreline/Waterfront

ii. Type of environment to which oil has spread:

☒ Land ☐ Swamp ☐ Waterbody (specify) _____

iii. Weather condition

☒ Dry ☐ Wet ☐ Windy ☐ Hot

11. Distance to Sensitive habitat within 100m radius

☐ Government reserved and designated protected area [NIL,m]
☐ Drinking water source [NIL,m]
☐ Surface water ☐ Borehole
☒ Built up Area [,m]
☒ Residential Area ☐ Commercial/Industrial Area IMPACTED BY SPILL
☐ Farmlands [NIL,m]
☐ Fish Farm/Pond [NIL,m]
☐ Fishing net [NIL,m]
☐ Others (specify) _____ [NIL,m]

12. Containment measures put in place:

☐ Booms ☐ Trench ☒ Dyke ☒ Pit ☒ Natural depression ☐ 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:

REPAIR WORK AND CRUDE OIL RECOVERY
ACTIVITIES ARE ONGOING.

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15. Was there any disruption to the investigation?

[Y] [N]

If yes to item 15 give brief description:

INVESTIGATION WAS DISRUPTED BY THE COMMUNITY ON THE 28TH AUGUST 2021.

16. Was JIV delayed? [Y] [N]

Reason(s): NOT APPLICABLE

- ☐ Delayed Community Access Approval ☐ Security Challenges ☐ Access constraint due to terrain
☐ Others (specify) _____

D. TYPE/NUMBERS OF PROPERTIES, IF ANY, FOUND WITHIN THE AREA OF SPREAD OF OIL

17. Structures / Properties

S/N	Type of Structures	Description	Size	Number	Comments
1	<u>PALM UNCOMPLETED BUILDING</u>		<u>—</u>	<u>1</u>	<u>IMPACTED BY SPILL</u>

18. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	<u>PALM TREE</u>	<u>—</u>	<u>—</u>	<u>✓</u>	<u>1</u>	<u>IMPACTED BY SPILL</u>

19. Fish/Nets/Ponds

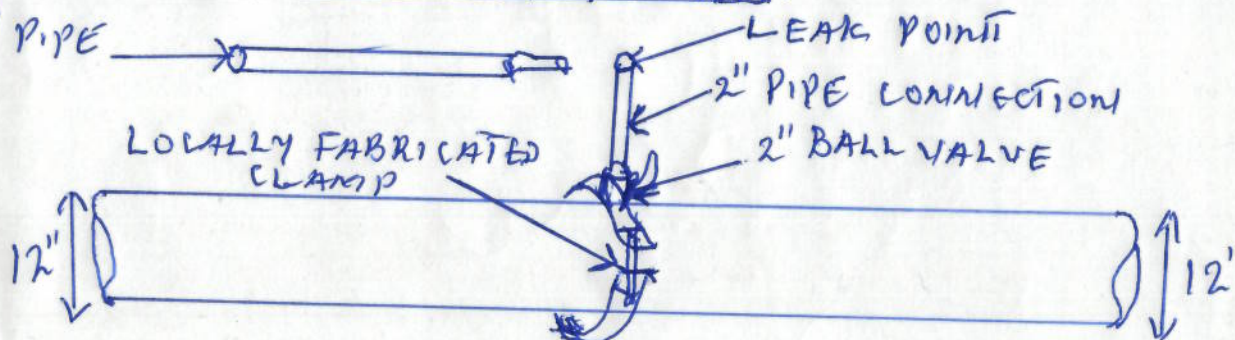
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	<u>NONE</u>	<u>WITHIN AREA OF IMPACT</u>		

20. Others (Specify) e.g. Animal Traps

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

E. GRAPHIC DESCRIPTION OF LEAK POINT (while detailed description of the leak point should be contained in the leak report, overview sketch of the site should be added as appendix 1)

SECTION OF 12" IMO RIVER 2 - OGALE PIPELINE AT UMUHLOLO
HOLDING CRUDE OIL THEFT POINT INSTALLED AT 12 O'CLOCK
POSITION BY UNKNOWN PERSONS.



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

21. Impacted area boundary Coordinates (If more, Print and attach as Appendix)

S/N	Northing	Easting
1	4.94723	7.18481
2	4.94740	7.18479
3	4.94741	7.18475
4	4.94743	7.18472
5	4.94745	7.18474
6	4.94742	7.18477
7	4.94743	7.18480
8	4.94732	7.18488
9	4.94724	7.18489
10	4.94708	7.18481
11	4.94704	7.18474
12	4.94704	7.18467
13	4.94701	7.18452
14	4.94704	7.18448
15	4.94709	7.18449
16	4.94706	7.18467
17	4.94707	7.18467
18	4.94718	7.18452
19	4.94719	7.18452

ESTIMATION OF OIL SPILL VOLUME

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FID: (3016055)12" Imo River 2 - Ogale pipeline at Umuololo spill volume estimation.

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

800.00	m ²
	m ²
	m ²

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

i Estimated Recovered oil (Net)

6.00	bbls
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Estimated Recovered oil (Net) V_{rec}

6.00 bbls

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%)

200.00	m ²
0.002	m
	%

Estimated Volume of pool of free phase oil, V_{pool}

0.40 m³

Estimated Volume of pool of free phase oil, V_{pool}

2.62 bbls

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

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

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
1.100	m
Clay	
8	%

v Cause of spill

Third party interference

Calculation of days for infiltration below the leaking point on pipeline or flowline		
Incident Date	JIV Date	Days on Site
8/26/2021 11:30	8/28/2021 13:05	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

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

Bonny Medium
0.100

ix Total depth below ground surface of infiltration of oil

1.200

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

0.10 m³

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

0.60 bbls

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

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
Clay	
8	%

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

0.001

vi Total depth below ground surface of infiltration of oil

0.001

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

0.00 m³

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

0.00 bbls

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

i Total Area covered by the oil (infiltration)

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

iii Soil type

iv P_e (effective porosity of the soil)

599.00	m ²
200.00	m ²
Day	▼
8	%

v Average depth below ground surface of infiltration of oil

0.001	m
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Estimated Volume of infiltrated oil, V_{Intc}

0.04	m ³
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Estimated Volume of infiltrated oil, V_{Intc}

0.22	bbbls
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4 Volume of infiltrated oil outside immediate spill point(s) region (superficial impact, V_{Intd})

i Total Area covered by the oil (infiltration)

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

iii Average depth below ground surface of infiltration of oil

	m ²
	m ²
	m

Estimated Volume of infiltrated oil, V_{Intd}

0.00	m ³
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Estimated Volume of infiltrated oil, V_{Intd}

0.00	bbbls
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Estimated Total Volume of infiltrated oil, V_{Int}

0.13	m ³
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Estimated Total Volume of infiltrated oil, V_{Int}

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

i Total area of oil on open water

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

	m ²
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Link to Coverage Visual

Spill Factors from USCG FOG (2000 Edition)

	Thickness (mm)	Aid	
		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
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Estimated Volume of oil on open water, V_{wat}

0.00	bbbls
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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?

Yes	▼
3.34	bbbls

ii Estimated volume available for evaporation

15	%
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iii E-factor

Estimated Volume of evaporated oil, V_{evap}

0.69	bbbls
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Net Total Estimated Spilled Volume, V_{Est}

9.93	bbbls
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G. INCIDENT INFORMATION:

a. Impacted Area Details *

- Total calculated area of impact (Ha) 0.08 HA
- Impact within SPDC R.O.W YES
- Impact outside SPDC R.O.W YES

* Round off to 2 decimal places if area is $\geq 100 \text{ m}^2$ or to 4 decimal places if area is $< 100 \text{ m}^2$ (e.g. 14.55, 0.0051, 0.0009)

* Express in Hectares (Ha)

b. Volume of oil recovered before completion of JIV (V_{recJ}):

Recovered oil V_{recJ} :	<u>6</u>	Barrels
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Controlled recovery/evacuation from source with no impact to environment:

<u>NIL</u>	Barrels
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c. Net Estimated Spilled Volume $V_{\text{Est}}(\text{bbls})^* =$

9.93 BARRELS

Estimated Reported Volume** $V_{\text{rep}}(\text{bbls}) =$

10 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 volume estimation or cause of spill:

NOT APPLICABLE

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.

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d. General Status of the site

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

e. Representatives

This report was filled, agreed and signed by the following joint investigation team representatives:

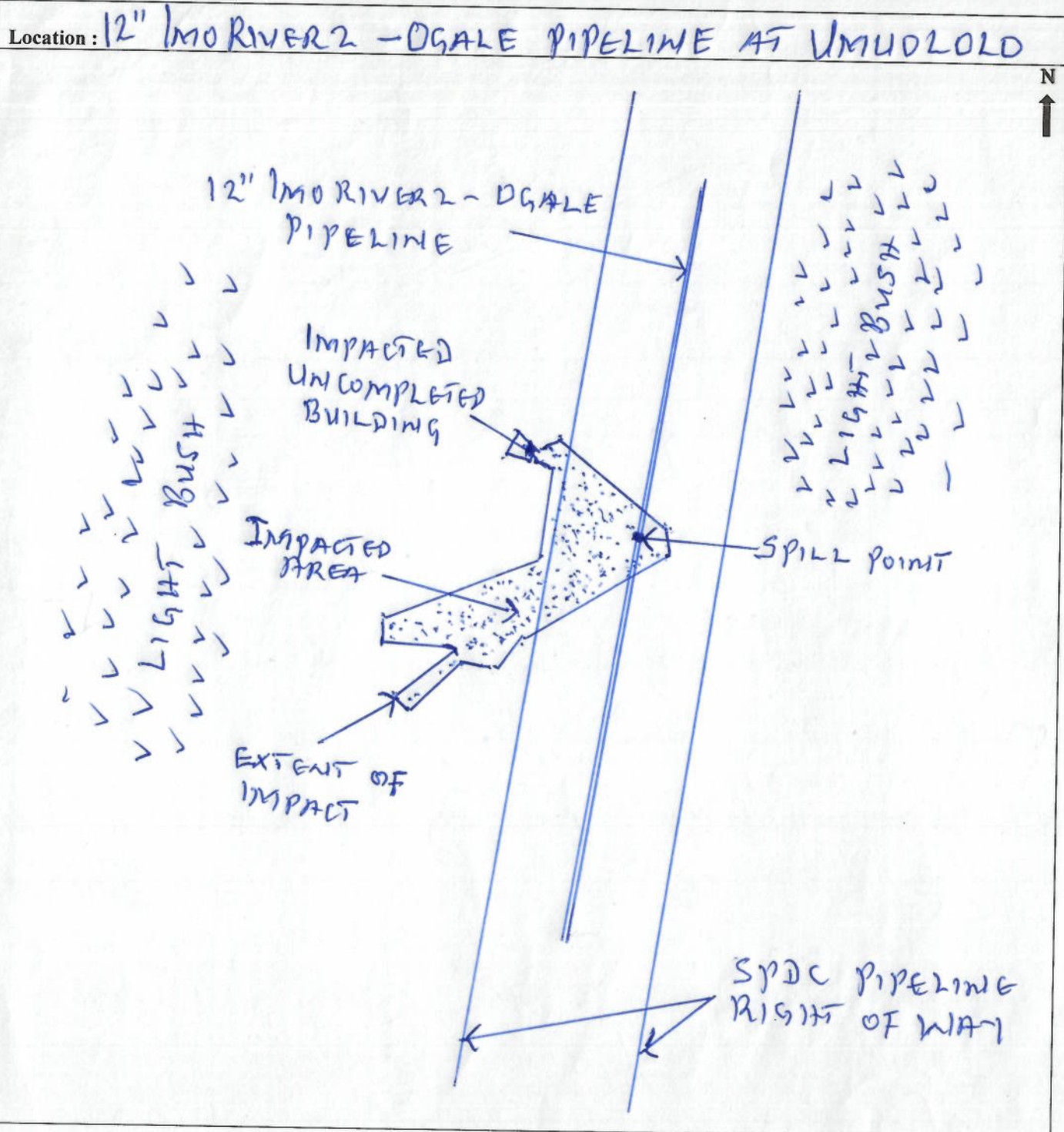
- Host Community: ☒
- Department of Petroleum Resources [DPR]: ☒
- National Oil Spill Detection and Response Agency [NOSDRA]: ☒
- State Ministry of Environment [SME]: ☒
- The Shell Petroleum Development Company [SPDC]: ☒
- *Separate DPR form has been filled out with same findings* ☒
- *Separate NOSDRA form has been filled out with same findings* ☒
- *Separate SME form has been filled out with same findings* ☐

Tick as applicable

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f. Appendix 1: Overview sketch of the site


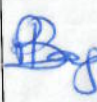
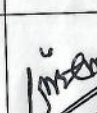

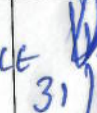
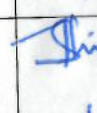


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



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g. SIGNATORIES: JOINT INVESTIGATION TEAM MEMBERS

Having read through the JIT report, the following representatives append their respective signatures in agreement with the content therein:

S/N	Name	Members present	Designation	Signature/Date and Time
1	AMANZE JANE	DEPARTMENT OF PETROLEUM RESOURCES (DPR)	REGULATOR	 31/8/2021 16:05 hrs
2	BANIGO, AMELA	NATIONAL OIL SPILL DETECTION AND RESPONSE AGENCY (NOSDRA)	REGULATOR	 31/8/2021 4:04p.m.
3	ENGR. N. A. GODFURST	STATE MIN. OF ENVIRONMENT	Jur. O	 31/8/2021 16:05 hrs.
4	ALIRI OBOMA ELNIS	HOST COMMUNITY REPRESENTATIVE	Govt. President	 31/8/2021
5	OKERINDE SOLOMON	THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA (SPDC)	Jiv Governance	 31/08/2021 16:06 hrs
6	SAMSON ILIYA	THE NIGERIA POLICE FORCE	ASP	 31/8/21 1605 HRS

ACKNOWLEDGEMENT OF RECEIPT OF JIV REPORT COPIES

S/N	ATTESTATION	NAME	SIGNATURE/DATE
1	DPR copy received by:	AMANZE JANE	 01/9/2021
2	NOSDRA copy received by:	NWAORIE, HUMPHREY	 01/09/2021
3	STATE MINISTRY OF ENVIRONMENT copy received by:	ENGR. N. A. GODFURST	 31/8/21 16:05 hrs
4	HOST COMMUNITY copy received by:	ALIRI OBOMACHUIS	 31/8/21

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