

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: 00748

(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: 1286319 2. Type of incident* OIL SPILL
3. Name of Location 14" OKORDIA - RUMUEKPE PIPELINE
4. Name of nearest community IKARAMA 5. State: BAYELSA 6. LGA YENAGOA
7. Type of Production facility/Installation PIPELINE 8. Asset owner/District PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 13TH NOVEMBER 2014
b. Start date/time of investigation: 21ST NOVEMBER 2014/10:00HRS
c. Investigation End date: 22ND NOVEMBER 2014/09TH DECEMBER 2014 Actual investigation duration, days: TWO (2) DAYS
d. Description of spill point environment

- | | | |
|---|--|--|
| <input type="checkbox"/> Firmed soil | <input type="checkbox"/> Loose soil | <input type="checkbox"/> Recently excavated area |
| <input checked="" 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:

NOT APPLICABLE

e. 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 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 checked="" 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 rd 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 3rd 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.

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: 00748

g. Spill point coordinates

Measuring unit <u>M</u> <u>MINNA (MID-BELT)</u>	
Northing:	Easting:
<u>127188.14</u>	<u>444206.24</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 [N/A ,m]
- Drinking water source NOT APPLICABLE ,m]
- Built up area NOT APPLICABLE ,m]
- Farmlands 50 ,m]
- Fish Farm/Pond NOT APPLICABLE ,m]
- Fishing net 50 ,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:

THE REPAIR TEAM COMMENCED REPAIR AFTER JOINT INVESTIGATION ENDED, ON 9TH DECEMBER 2014

15. Was there any disruption to the investigation?

[N]

If yes to item 15 give brief description:

THE JOINT INVESTIGATION TEAM WAS STOPPED BY COMMUNITY ON 22ND NOVEMBER 2014

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: 00748

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
1	BUILDING	UNCOMPLETED		1 NO.	UNCOMPLETED
 					
 					

17. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1	PALM TREES	YOUNG	NIL	MATURED	MANY	YOUNG
2	PLANTAIN	YOUNG	NIL	NIL	MANY	YOUNG
 						

18. Fish/Nets/Ponds

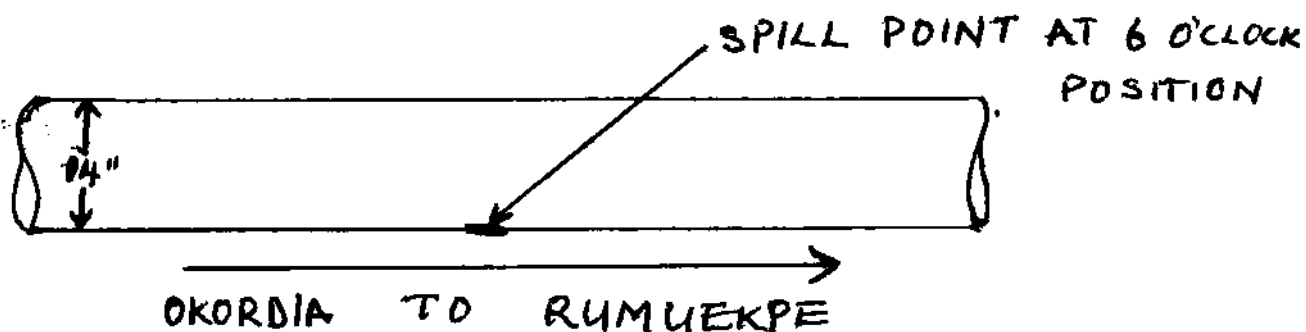
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
1	FISHING CAGE	KEPT ASIDE	16	GATHERED TOGETHER ALREADY
2	FISHING NETS	KEPT ASIDE	6	ALREADY GATHERED TOGETHER
 				

19. 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)

A SECTION OF 14" OKORDIA-RUMUEKPE PIPELINE AT IKARAMA SHOWING SPILL POINT AT 6 O'CLOCK POSITION



THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: **00748**

F: TABLE SHOWING SOME OF COORDINATES TAKEN DURING JIV FOR AREA CALCULATION
20. Impacted area boundary Coordinates *(If more, Print and attach as an appendix)*

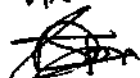
S/N	Northing	Easting

*No. Attached
Coordinates
Landing
22/11/2014*

14" OKORDIA-RUMUEKPE TRUNKLINE SPILL @ IKARAMA

INC. NO.: 2014_1286319

NAME	EAST	NORTH	REMARKS
SP	444206.24	127188.14	SPILL POINT
40	444142.84	127258.38	PLANTAIN PLANTATION
41	444138.01	127254.94	PLANTAIN PLANTATION
42	444158.28	127234.59	PLANTAIN PLANTATION
43	444160.13	127234.58	PLANTAIN PLANTATION
49	444213.12	127178.44	PLANTAIN PLANTATION
50	444208.35	127175.26	PLANTAIN PLANTATION
44	444182.18	127193.95	FREE PHASE CRUDE OIL
45	444180.31	127188.43	FREE PHASE CRUDE OIL
46	444183.99	127181.04	FREE PHASE CRUDE OIL
47	444202.42	127164.39	FREE PHASE CRUDE OIL
48	444252.23	127132.88	FREE PHASE CRUDE OIL
54	444263.26	127114.41	FREE PHASE CRUDE OIL
55	444268.83	127119.92	FREE PHASE CRUDE OIL
56	444243.08	127160.57	FREE PHASE CRUDE OIL
57	444296.73	127173.3	FREE PHASE CRUDE OIL
58	444302.33	127189.88	FREE PHASE CRUDE OIL
59	444311.6	127200.91	FREE PHASE CRUDE OIL
60	444330.06	127191.63	FREE PHASE CRUDE OIL
75	444326.45	127217.46	FREE PHASE CRUDE OIL
76	444330.17	127224.82	FREE PHASE CRUDE OIL
77	444365.35	127243.15	FREE PHASE CRUDE OIL
78	444359.84	127256.07	FREE PHASE CRUDE OIL
79	444337.69	127265.36	FREE PHASE CRUDE OIL
80	444348.85	127285.61	FREE PHASE CRUDE OIL
81	444317.47	127302.3	FREE PHASE CRUDE OIL
82	444302.73	127315.25	FREE PHASE CRUDE OIL
83	444263.94	127326.44	FREE PHASE CRUDE OIL
84	444197.13	127245.53	FREE PHASE CRUDE OIL
86	444159.91	127247.79	FREE PHASE CRUDE OIL
87	444149.06	127261.42	FREE PHASE CRUDE OIL
89	444221.29	127295.27	FREE PHASE CRUDE OIL
90	444188.38	127213.03	POSITION OF FISHING NETS AND CAGES
85	444167.32	127239.99	UNCOMPLETED BUILDING

Jonathan O. Oshoffin
 22/11/2014

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

21,800.00	m ²
	m ²
	m ²

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

- i Estimated Recovered oil (Net)

0.00	bbbls
------	-------

Estimated Recovered oil (Net) V_{rec}	0.00 bbbls
--	-------------------

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%)

17,000.00	m ²
0.003	m
	%

Estimated Volume of pool of free phase oil, V_{pool}	42.50 m³
---	----------------------------

Estimated Volume of pool of free phase oil, V_{pool}	267.33 bbbls
---	---------------------

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)

2.00	m ²
1.500	m
Clay	▼
8	%

- 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
11/13/2014 10:00	11/21/2014 12:30	8
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

Bonny Medium	▼
0.002	m

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

1.502	m
-------	---

- ix Total depth below ground surface of infiltration of oil

Estimated Volume of infiltrated oil, V_{inf a}	0.24 m³
---	---------------------------

Estimated Volume of infiltrated oil, V_{inf a}	1.51 bbbls
---	-------------------

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
- Select -	▼
0	%

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

0.000	m
-------	---

- vi Total depth below ground surface of infiltration of oil

0.000	m
-------	---

Estimated Volume of infiltrated oil, V_{inf b}	0.00 m³
---	---------------------------

Estimated Volume of infiltrated oil, V_{inf b}	0.00 bbbls
---	-------------------

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

- i Total Area covered by the oil (infiltration) m²
- ii Total Area of the pool of free phase oil in touch with soil m²
- iii Soil type
- iv P_e (effective porosity of the soil) %
- v Average depth below ground surface of infiltration of oil m

Estimated Volume of Infiltrated oil, $V_{inf,c}$	0.00 m ³
Estimated Volume of infiltrated oil, $V_{inf,c}$	0.00 bbls

4 Volume of infiltrated oil outside immediate spill point(s) region (superficial impact, $V_{inf,d}$)

- i Total Area covered by the oil (infiltration) m²
- ii Total Area of the pool of free phase oil in touch with soil m²
- iii Average depth below ground surface of infiltration of oil m

Estimated Volume of infiltrated oil, $V_{inf,d}$	0.93 m ³
Estimated Volume of infiltrated oil, $V_{inf,d}$	5.85 bbls

Estimated Total Volume of Infiltrated oil, V_{inf}	1.17 m ³
Estimated Total Volume of Infiltrated oil, V_{inf}	7.36 bbls

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

- i Total area of oil on open water m²
- ii Table of average depth of oil on water based on coloration

[Link to Coverage Visual](#)

Spill Factors from USCG FOG (2000 Edition)		Alk	
	Thickness (mm)	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
Estimated Volume of oil on open water, V_{wat}	0.00 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?
- ii Estimated volume available for evaporation bbls
- iii E-factor %

Estimated Volume of evaporated oil, V_{evap}	91.56 bbls
--	-------------------

Net Total Estimated Spilled Volume, V_{Est}	366.24 bbls
---	--------------------

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: 00748

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 2.18Ha
- 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
---------------------------	------------	---------

Controlled recovery/evacuation from source with no impact to environment:

<u>NIL</u>	Barrels
------------	---------

22. Net Estimated Spilled Volume V_{Est}(bbls)* =	366.24 BARRELS
Estimated Reported Volume** V_{rep}(bbls)=	367 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 estimating the spilled in the box below:

ALLOWANCE WAS GIVEN DURING SPILLED VOLUME ESTIMATION BECAUSE THE FLOW OF OIL WAS NOT STOPPED AFTER JOINT INVESTIGATION ON 22ND NOVEMBER 2014, BECAUSE THE HOST COMMUNITY STOPPED THE WORK.

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) 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.

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: 00748

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:

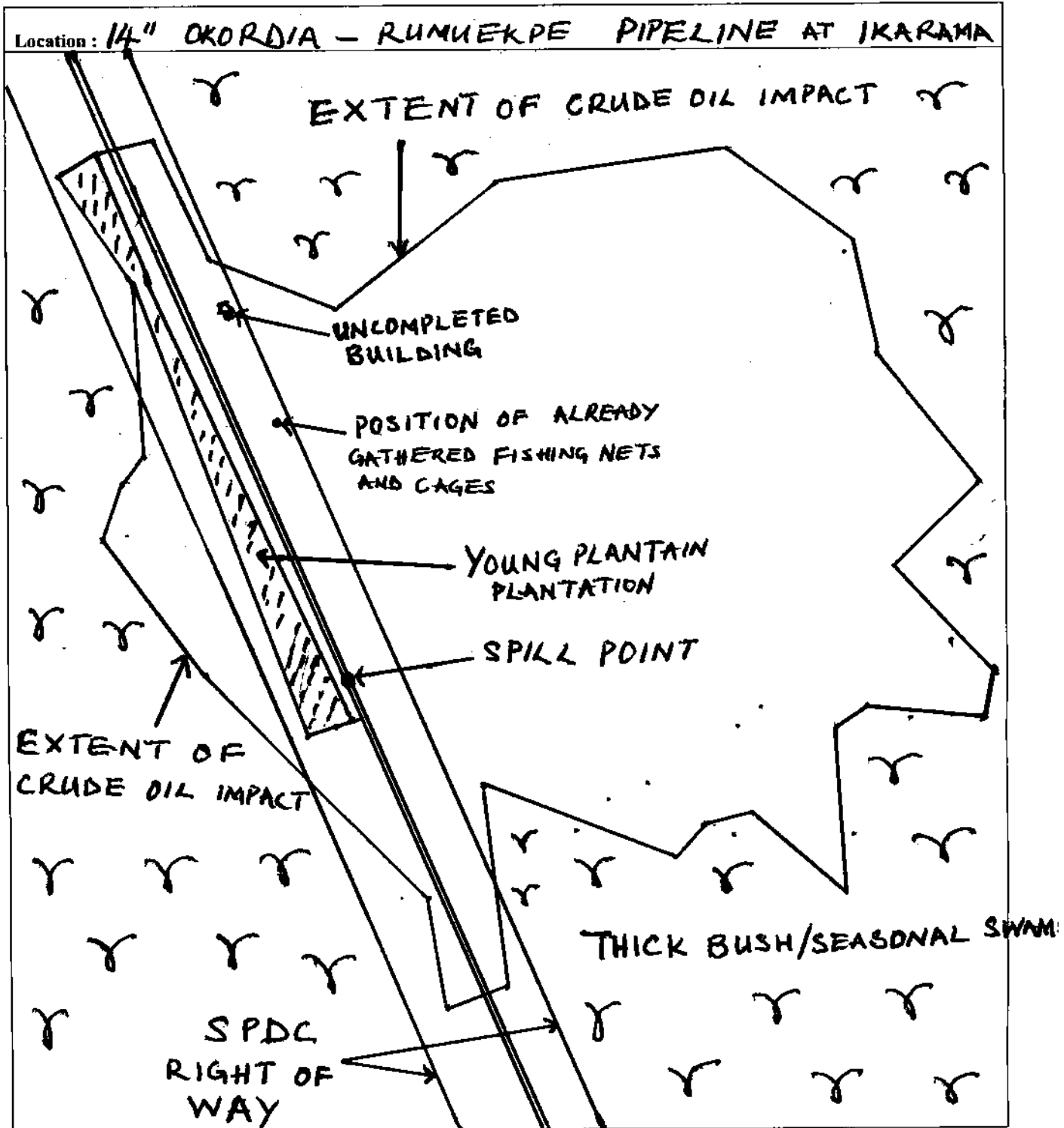
- Host Community
- Department of Petroleum Resources (DPR)
- National Oil Spill Detection and Response Agency (NOSDRA)
- State Ministry of Environment (SME)
- Nigeria Police Force (NPF)
- Shell Petroleum Development Company (SPDC)
- Signatories agree with reported findings
- Separate DPR form has been filled out with same findings

Tick as applicable

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1286319 JIV report S/N: 00748

25. Appendix 1: Overview sketch of the site





The Shell Petroleum Development Company of Nigeria Limited

Note to File

Reason for Variable JIV End Date for 14" Okordia – Rumuekpe TNP at Ikarama

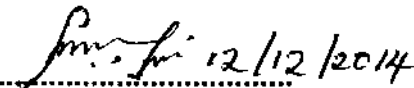
JIV Start Date: 21st November 2014
JIV End Date: 9th December 2014
FID: 2014_1286319
Specific Location: 14" Okordia – Rumuekpe TNP at Ikarama

Background

At about 10:00hrs the 13th of November 2014, crude oil leak was reported on 14" Okordia – Rumuekpe TL at Ikarama.

JIV

- The JIT was able to conclude the joint investigation on 22nd November 2014 as such the relevant parties signed in agreement to the findings of JIV, except the government regulators. They said that SPDC have to repair the leak point before they can sign.
- At this point the host community stopped SPDC from continuing the initiated leak repair pending when they finish their discussion with SPDC on contractor nomination for the clean-up of the site. Hence the regulators did not sign on this date (22nd November 2014).
- On 9th December 2014 the JIT reconvened. Following the leak repair and reassessment of the spill site, the JIV was finally concluded and the regulators signed. They as well requested that the JIV end date be taken as December 9, 2014 instead of the earlier end date of 22nd November 2014.


.....

Gerard E Onuigbo
OSRT (JIV Governance)