

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 0454

(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: 1144265 2. Type of incident: OIL SPILL
 3. Name of Location: 12" BENISEDE - BRASS CREEK DELIVERY LINE
 4. Name of nearest community: OJOB0 5. State: BAYELSA 6. LGA: EKEREMOR
 7. Type of Production facility/Installation: OIL PIPELINE 8. Asset owner/District: PIPELINE

B. INCIDENT INFORMATION:

9. Details of incident

- a. Date of incident: 22ND MARCH 2014
 b. Start date/time of investigation: 27TH MARCH 2014 AT 1430HRS
 c. Investigation End date: 27TH MARCH 2014 Actual investigation duration, days: 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: METERS MINNA (WEST-BELT)

Northing: <u>110463.86 MN</u>	Easting: <u>361322.36 ME</u>
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THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.
 JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 0454

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
 Drinking water source
 Built up area
 Farmlands
 Fish Farm/Pond
 Fishing net
 Others (specify).

[,m]
 [,m]
 [,m]
 [,m]
 [,m]
 [,m]

NONE WITHIN
 AREA OF IMPACT

12. Containment measures put in place;

- Booms Trench Dyke Natural depression Pit
 Others: NONE

13. Any pictures or video coverages?

[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
	<u>NONE WITHIN AREA OF IMPACT</u>				

16. Cross/Economic Trees

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 0454

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
1.	RAFFIA PALM	27	13	35	75	

17. Fish/Nets/Ponds

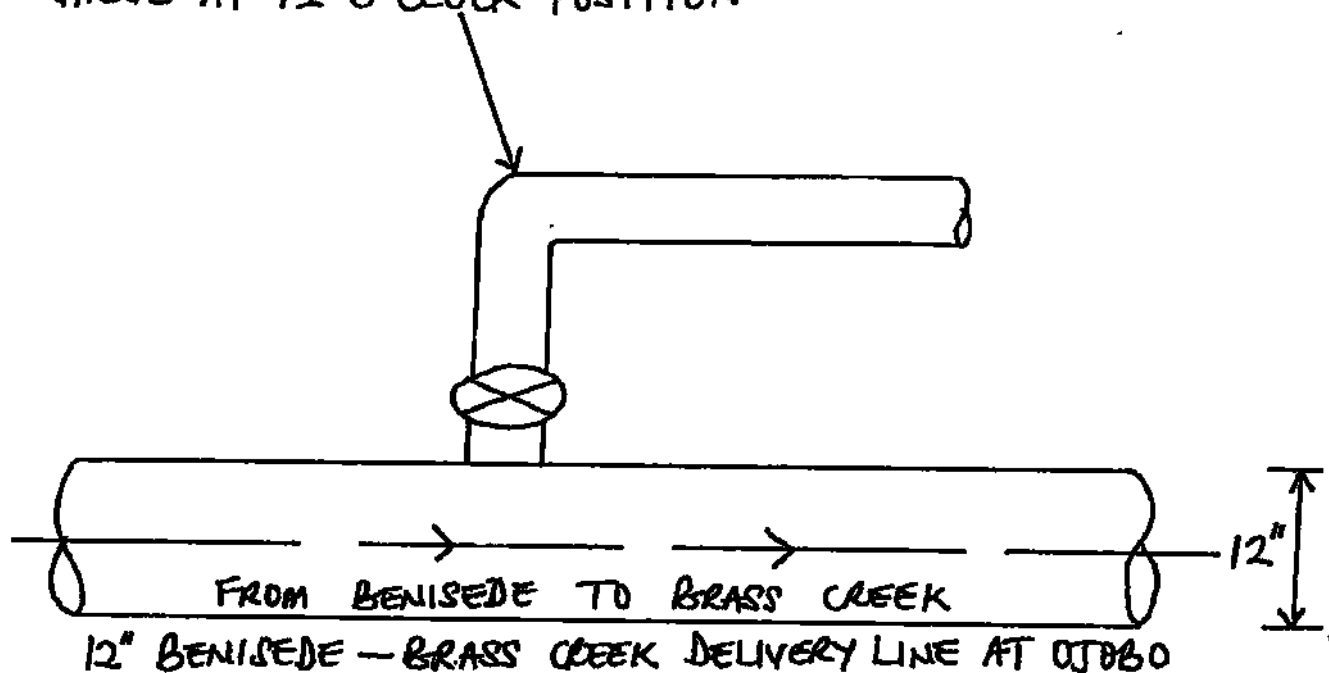
S/N	Fish/Nets/Ponds	Description	Quantity/Size	Comments
	NONE WITHIN AREA OF IMPACT			

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)

3" FAILED WELD-ON ILLEGAL HOT-TAP VALVE AT 12 O'CLOCK POSITION



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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 0454

19. Impacted area boundary Coordinates (if more, Print and attach as an appendix)

MINNA (WEST - BELT)

S/N	Northing (M)	Easting (M)
1.	110464.8	361322.2
2.	110455.6	361329.1
3.	110452.5	361329.1
4.	110443.3	361323
5.	110428	361350.7
6.	110437.2	361369.2
7.	110421.9	361375.4
8.	110381.9	361384.7
9.	110369.7	361394
10.	110363.5	361397
11.	110314.4	361415.6
12.	110308.3	361418.7
13.	110296	361431
14.	110289.9	361434.1
15.	110280.7	361434.2
16.	110262.3	361446.5
17.	110246.9	361446.5
18.	110228.5	361452.7
19.	110228.5	361455.8
20.	110225.4	361462
21.	110222.4	361462
22.	110219.3	361474.3
23.	110222.4	361480.5
24.	110228.5	361483.5

G. INCIDENT INFORMATION:

20. Impacted Area Details

- Total calculated area of impact 4896.87 m²
- Impact within SPDC R.O.W YES
- Impact outside SPDC R.O.W YES

21. Volume of oil recovered before completion of JIV (V_{recd}):

THE SHELL-PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 0454

Recovered oil V_{reg}	<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 2696.87 m^2
- ii. Average Depth (m) of pool of free phase oil 0.005 m
- iii. Emulsification factor: 30 %

iv.

Estimated Volume of pool of free phase oil V_{pool}	<u>59.37</u>	barrels
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b. Computation of estimated volume of infiltrated oil in the soil (V_{in}).

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: _____ 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 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. B

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 $V_{inf c}$	<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: 2200 m^2

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 04545

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	35 %	0.001
Slight Color	0.00015		
Bright Color	0.0003	45 %	0.0003
Dull	0.001	15 %	0.0003
Dark	0.002		
Black oil	0.1		
Emulsion (30% Oil)	1	5 %	0.0330

iii.	Percent Total	100%	Estimated Volume of oil on open water: V_{oil}	0.21	Barrels
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24. Calculation of evaporated volume:

i. Estimated Volume available for evaporation within surface area: 59.58 BBLs

ii. E-Factor: 15 %

iii.	Estimated Volume of evaporated oil: V_{evap}	10.51	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_{net} (bbls) = V_{oil} (bbls) + V_{evap} (bbls) + V_{res} (bbls) + V_{sca} (bbls) + V_{poo} (bbls) + V_{sed} (bbls) = $10.51 + 0.21 + 59.39 = 70.10$ BBLs

Estimated Reported Volume** V_{rep} (bbls) = 71 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 m³ 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 6a (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

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144265 JIV report S/N: 0454

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 27/28/03/2014 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

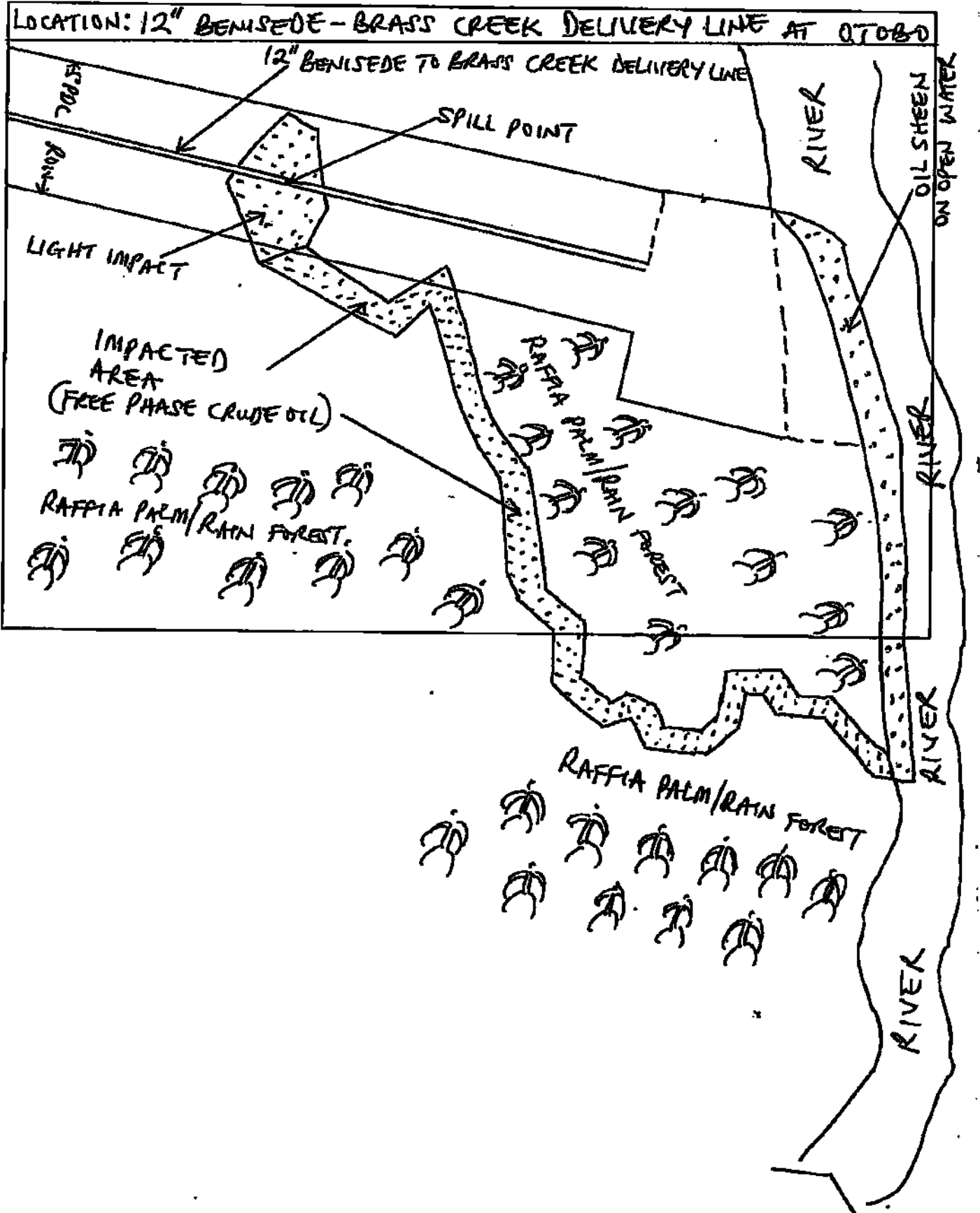
NOTE: THE HOST COMMUNITY REPRESENTATIVES FROM PERETOUKUGBENE ALLEGED THAT THE CRUDE OIL SPILLAGE HAD IMPACTED THE ENTIRE SURFACE WATER IN THEIR COMMUNITY. THE JIV ACCOMPANIED BY THE HOST COMMUNITY REPRESENTATIVES IMMEDIATELY WENT TO ASSESS THE ALLEGED IMPACTED AREA AND OBSERVED THAT THERE WERE NO SIGNS OF ENVIRONMENTAL IMPACT ON THE SURFACE WATER (THOUGH, IT WAS RAINING AT THE TIME OF THIS INVESTIGATION)
28. Appendix 1: Overview sketch of the site

Location :

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THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA LIMITED.

JOINT INVESTIGATION REPORT FOR INCIDENT NO: 1144285 JIV report S/N: 0454



APPENDIX 1

MINNA WEST-BELT

NAME	EAST	NORTH	REMARKS
SP	361322.4	110463.9	SPILL POINT
FREE PHASE CRUDE OIL			
415	361332.2	110464.8	FREE PHASE ALONG HOSE LINE CONNECTION
410	361329.1	110455.6	FREE PHASE ALONG HOSE LINE CONNECTION
409	361329.1	110452.5	FREE PHASE ALONG HOSE LINE CONNECTION
416	361323	110443.3	FREE PHASE ALONG HOSE LINE CONNECTION
417	361350.7	110428	FREE PHASE ALONG HOSE LINE CONNECTION
418	361369.2	110437.2	FREE PHASE ALONG HOSE LINE CONNECTION
419	361375.4	110421.9	FREE PHASE ALONG HOSE LINE CONNECTION
420	361384.7	110381.9	FREE PHASE ALONG HOSE LINE CONNECTION
421	361394	110369.7	FREE PHASE ALONG HOSE LINE CONNECTION
422	361397	110363.5	FREE PHASE ALONG HOSE LINE CONNECTION
423	361415.6	110314.4	FREE PHASE ALONG HOSE LINE CONNECTION
424	361418.7	110308.3	FREE PHASE ALONG HOSE LINE CONNECTION
425	361431	110296	FREE PHASE ALONG HOSE LINE CONNECTION
427	361434.1	110289.9	FREE PHASE ALONG HOSE LINE CONNECTION
428	361434.2	110280.7	FREE PHASE ALONG HOSE LINE CONNECTION
429	361446.5	110262.3	FREE PHASE ALONG HOSE LINE CONNECTION
430	361446.5	110246.9	FREE PHASE ALONG HOSE LINE CONNECTION
431	361452.7	110228.5	FREE PHASE ALONG HOSE LINE CONNECTION
432	361455.8	110228.5	FREE PHASE ALONG HOSE LINE CONNECTION
433	361462	110225.4	FREE PHASE ALONG HOSE LINE CONNECTION
434	361462	110222.4	FREE PHASE ALONG HOSE LINE CONNECTION
435	361474.3	110219.3	FREE PHASE ALONG HOSE LINE CONNECTION
436	361480.5	110222.4	FREE PHASE ALONG HOSE LINE CONNECTION
437	361483.5	110228.5	FREE PHASE ALONG HOSE LINE CONNECTION
438	361492.8	110234.7	FREE PHASE ALONG HOSE LINE CONNECTION
439	361498.9	110234.7	FREE PHASE ALONG HOSE LINE CONNECTION
440	361498.9	110231.6	FREE PHASE ALONG HOSE LINE CONNECTION
441	361514.3	110228.6	FREE PHASE ALONG HOSE LINE CONNECTION
442	361520.5	110228.6	FREE PHASE ALONG HOSE LINE CONNECTION
443	361523.6	110225.5	FREE PHASE ALONG HOSE LINE CONNECTION
444	361539	110210.2	FREE PHASE ALONG HOSE LINE CONNECTION
475	361530.1	110203.2	FREE PHASE ALONG HOSE LINE CONNECTION
465	361518.5	110225.3	FREE PHASE ALONG HOSE LINE CONNECTION
464	361513.5	110223.6	FREE PHASE ALONG HOSE LINE CONNECTION
463	361497.7	110226.6	FREE PHASE ALONG HOSE LINE CONNECTION
462	361494.3	110230.9	FREE PHASE ALONG HOSE LINE CONNECTION
461	361488.1	110226.3	FREE PHASE ALONG HOSE LINE CONNECTION
460	361483.1	110218.7	FREE PHASE ALONG HOSE LINE CONNECTION

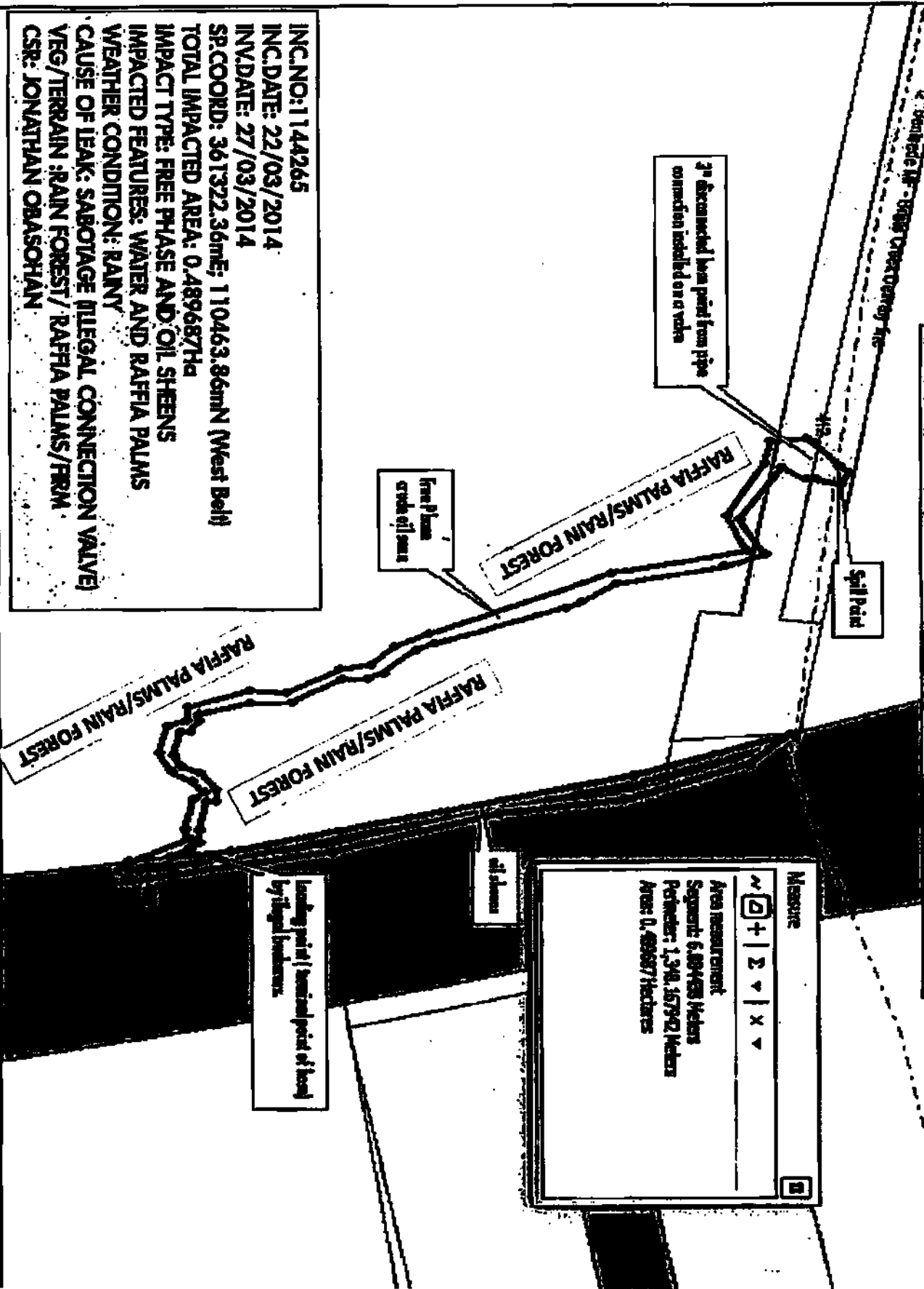
459 361473.2 110214.1 FREE PHASE ALONG HOSE LINE CONNECTION
458 361458.3 110217.4 FREE PHASE ALONG HOSE LINE CONNECTION
457 361456 110224.3 FREE PHASE ALONG HOSE LINE CONNECTION
456 361448.4 110225 FREE PHASE ALONG HOSE LINE CONNECTION
455 361440.1 110247.1 FREE PHASE ALONG HOSE LINE CONNECTION
454 361441.4 110260.4 FREE PHASE ALONG HOSE LINE CONNECTION
453 361428.9 110280.2 FREE PHASE ALONG HOSE LINE CONNECTION
452 361426.5 110291.6 FREE PHASE ALONG HOSE LINE CONNECTION
451 361417 110299.9 FREE PHASE ALONG HOSE LINE CONNECTION
450 361410 110312.4 FREE PHASE ALONG HOSE LINE CONNECTION
449 361378.9 110380.2 FREE PHASE ALONG HOSE LINE CONNECTION
448 361367.3 110430.5 FREE PHASE ALONG HOSE LINE CONNECTION
447 361348.5 110423.2 FREE PHASE ALONG HOSE LINE CONNECTION
446 361320.7 110436.8 FREE PHASE ALONG HOSE LINE CONNECTION
445 361309.1 110439.1 FREE PHASE ALONG HOSE LINE CONNECTION
412 361307.6 110452.5 FREE PHASE ALONG HOSE LINE CONNECTION
411 361310.6 110455.5 FREE PHASE ALONG HOSE LINE CONNECTION
414 361326 110467.8 FREE PHASE ALONG HOSE LINE CONNECTION
415 361332.2 110464.8 FREE PHASE ALONG HOSE LINE CONNECTION

OIL SHEENS

470 361480.8 110430.9 OILS ON WATER
469 361499 110384.9 OILS ON WATER
468 361505.9 110338.4 OILS ON WATER
467 361525.8 110276.9 OILS ON WATER
466 361540.6 110204.1 OILS ON WATER
475 361530.1 110203.2 OILS ON WATER
474 361528.1 110218.3 OILS ON WATER
473 361525.1 110239.8 OILS ON WATER
472 361486.1 110388.2 OILS ON WATER
471 361464.3 110446.1 OILS ON WATER

APPENDIX 2

12" BENISEDE DELIVERYLINE SPILL @ OJOBO



INC.NO:1144265
 INC.DATE: 22/03/2014
 INV.DATE: 27/03/2014
 SR.COORD: 361322.36mE; 110463.86mN (West Belt)
 TOTAL IMPACTED AREA: 0.489687Ha
 IMPACT TYPE: FREE PHASE AND OIL SHEENS
 IMPACTED FEATURES: WATER AND RAFFIA PALMS
 WEATHER CONDITION: RAINY
 CAUSE OF LEAK: SABOTAGE (ILLEGAL CONNECTION VALVE)
 VEG/TERRAIN :RAIN FOREST/ RAFFIA PALMS/FIRM
 CSR: JONATHAN OBASOHAN