

THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA JOINT INVESTIGATION REPORT

(SPDC)

INCIDENT NO: 1465510 JIV report S/N: Nº 0000041

(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: 1465510 2. Type of incident* OIL SPILL/FIRE
3. Name of Location 28" NKPOKU - BOMU PIPELINE
4. Name of nearest community G10 5. State: RIVERS 6. LGA GOKANA
7. Type of Production facility/Installation OIL PIPELINE
8. Asset owner/District THE SHELL PETROLEUM DEVELOPMENT COMPANY OF NIGERIA (SPDC)

B. INCIDENT INFORMATION:

9. Details of incident
a. Date of incident: 19TH AUGUST, 2015.
b. Start date/time of investigation: 20TH AUGUST 2015 / 11:15 HRS
c. Investigation End date: 20TH AUGUST 2015 Actual investigation duration, days: ONE (1) DAY
d. Description of spill point environment

- | | | |
|---|--|---|
| ☐ Firm soil | ☒ Loose soil | ☒ Recently excavated area |
| ☐ Under water | ☐ Swampy | ☐ Exposed pipe surface |
| ☐ Well Platform (on Water) | ☐ Drill Rig | |

Additional observations around the spill point: THE JOINT INVESTIGATION TEAM OBSERVED THAT THE SPILL POINT HAS BEEN BURNT, BY FIRE WHICH ACCOMPANIED THE SPILL.

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, | ☐ Saver-pit over flow | ☐ Third party tampering with Clamp |
| ☐ Third party tampering with valve setting | ☐ Bulging Outward | ☐ Third party tampering with flange, |
| ☐ Flare System/Bund wall failure | ☐ Cold vent | ☐ Surge vessel overflow, |
| ☐ Valve Failure | ☐ Relief valve failure | ☐ Accidental 3 rd party equipment impact |
| ☐ 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) construction e) Encroachment f) Fire.

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g. Spill point coordinates

h. Measuring unit

1295 84

Northings: (LATITUDE)	Easting: (LONGITUDE)
4.69999	7.24618

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 NONE OBSERVED AS [,m]
☐ Built up area AT THE TIME OF JOINT [,m]
☐ Farmlands INVESTIGATION [,m]
☐ Fish Farm/Pond VISIT [,m]
☐ Fishing net [,m]
☐ Others (specify). [,m]

12. Containment measures put in place;

☐ Booms ☐ Trench ☒ Dyke ☐ Natural depression ☒ Pit ☐ None
☐ Others: _____

13. Any pictures or video coverage?

☒ [Y] ☐ [N]

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

☒ [Y] ☐ [N]

If yes to item 14, give brief description:

REPAIR BY CLAMPING

15. Was there any disruption to the investigation?

☐ [Y] ☒ [N]

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If yes to item 15 give brief description:

NOT APPLICABLE

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

17. Crops/Economic Trees

S/N	Type of crops	Young	Medium	Matured	Quantity	Comments
<u>1</u>	<u>PAKMA TREE</u>	<u>12</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>BORN</u>

18. Fishing Nets/Fish Ponds

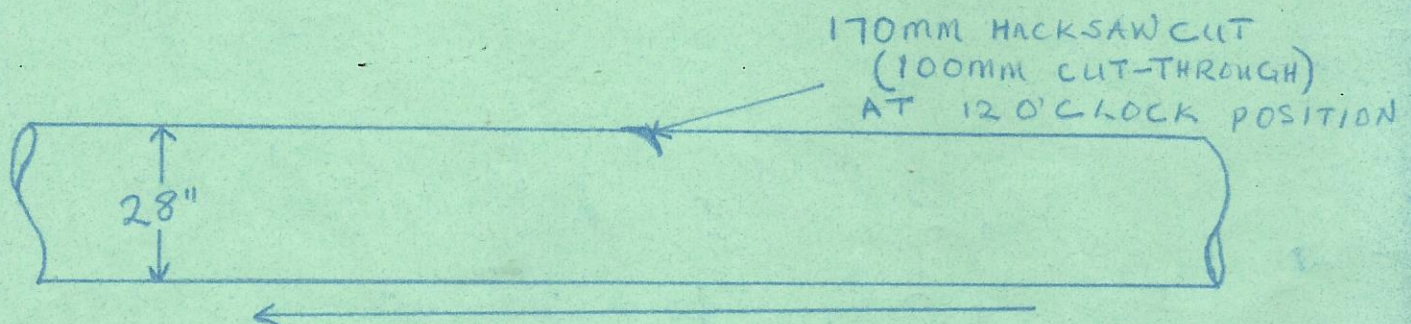
S/N	Nets/Ponds	Description	Quantity/Size	Comments
	<u>NONE WITHIN THE AREA OF IMPACT</u>			

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

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

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 28"
NKPOKU - BOMU PIPELINE AT G10, SHOWING A HUNDRED
AND SEVENTY (170MM) MILIMETRES HACKSAW CUT, AT 12 O'CLOCK
POSITION, DONE BY UNKNOWN PERSONS



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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 (LATITUDE)	Easting (LONGITUDE)
94	4.70012	7.24636
95	4.70025	7.24615
96	4.69998	7.24599
97	4.69987	7.24615
98	4.69990	7.24619
99	4.69987	7.24624
100	4.69975	7.24609
101	4.69972	7.24610
102	4.69971	7.24616
103	4.69977	7.24618
104	4.69982	7.24626
105	4.69987	7.24629
106	4.69995	7.24626
107	4.70008	7.24609
108	4.70003	7.24624
109	4.70008	7.24626
110	4.70004	7.24629

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

1,100.00	m ²
	m ²
	m ²

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

- i Estimated Recovered oil (Net)

100.00	bbls
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Estimated Recovered oil (Net) V_{recJ} **100.00 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%)

	m ²
	m
0	%

Estimated Volume of pool of free phase oil, V_{pool} **0.00 m³****Estimated Volume of pool of free phase oil, V_{pool}** **0.00 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)

2.00	m ²
1.200	m
Silt	
21	%

- v Cause of spill

Third party interference ▼

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

Incident Date	JIV Date	Days on Site
8/19/2015 1:30	8/20/2015 11:00	1
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 ▼

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

0.001	m
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- ix Total depth below ground surface of infiltration of oil

1.201	m
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Estimated Volume of infiltrated oil, $V_{inf a}$ **0.50 m³****Estimated Volume of infiltrated oil, $V_{inf a}$** **3.17 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
- Select -	
0	%

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

0.000	m
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- vi Total depth below ground surface of infiltration of oil

0.000	m
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Estimated Volume of infiltrated oil, $V_{inf b}$ **0.00 m³****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) 468.00 m²
- ii Total Area of the pool of free phase oil in touch with soil 100.00 m²
- iii Soil type Silt ▼
- iv P_e (effective porosity of the soil) 21 %
- v Average depth below ground surface of infiltration of oil 0.001 m

Estimated Volume of infiltrated oil, $V_{inf c}$ 0.11 m³

Estimated Volume of infiltrated oil, $V_{inf c}$ 0.69 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) 530.00 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 0.000 m

Estimated Volume of infiltrated oil, $V_{inf d}$ 0.01 m³

Estimated Volume of infiltrated oil, $V_{inf d}$ 0.07 bbls

Estimated Total Volume of infiltrated oil, V_{inf} 0.62 m³

Estimated Total Volume of infiltrated oil, V_{inf} 3.93 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 Aid](#)

Spill Factors from USCG FOG (2000 Edition)			
	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 m³

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? No ▼
- ii Estimated volume available for evaporation 103.93 bbls
- iii E-factor 15 %

Estimated Volume of evaporated oil, V_{evap} 18.34 bbls

Net Total Estimated Spilled Volume, V_{Est} 122.27 bbls

The spill incident was accompanied by fire incident, hence an estimate (taken as 20% of the computed spilled volume available for evaporation) is hereby made for the spill volume consumed by fire. Thus $20\% \times 103.93 = 20.79$ barrels. Therefore total spilled volume (including that burnt by fire) = Net estimated spilled volume (without fire) + estimated spilled volume consumed by fire (122.27 barrels + 20.79 barrels) = 143.06 barrels.

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G. INCIDENT INFORMATION:

a. Impacted Area Details

- Total calculated area of impact 0.11 Ha
- Impact within R.O.W YES
- Impact outside R.O.W YES

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

Recovered oil V_{rec} :	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 $V_{Est}(bbls)^* =$

122.27 + 20.79

= 143.06

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

144 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:

IN THE
THE SPILLED VOLUME ESTIMATION, THE VOLUME
CONSUMED BY FIRE WAS IN CONSIDERATION.
DETAILS CAN BE FOUND IN THE ATTACHED
VOLUME ESTIMATION DETAILS.

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 volume 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 ☐ |
| ii. Investigation of the incident site showed that there is residual impact on site requiring further works ☒ |

e. Representatives

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

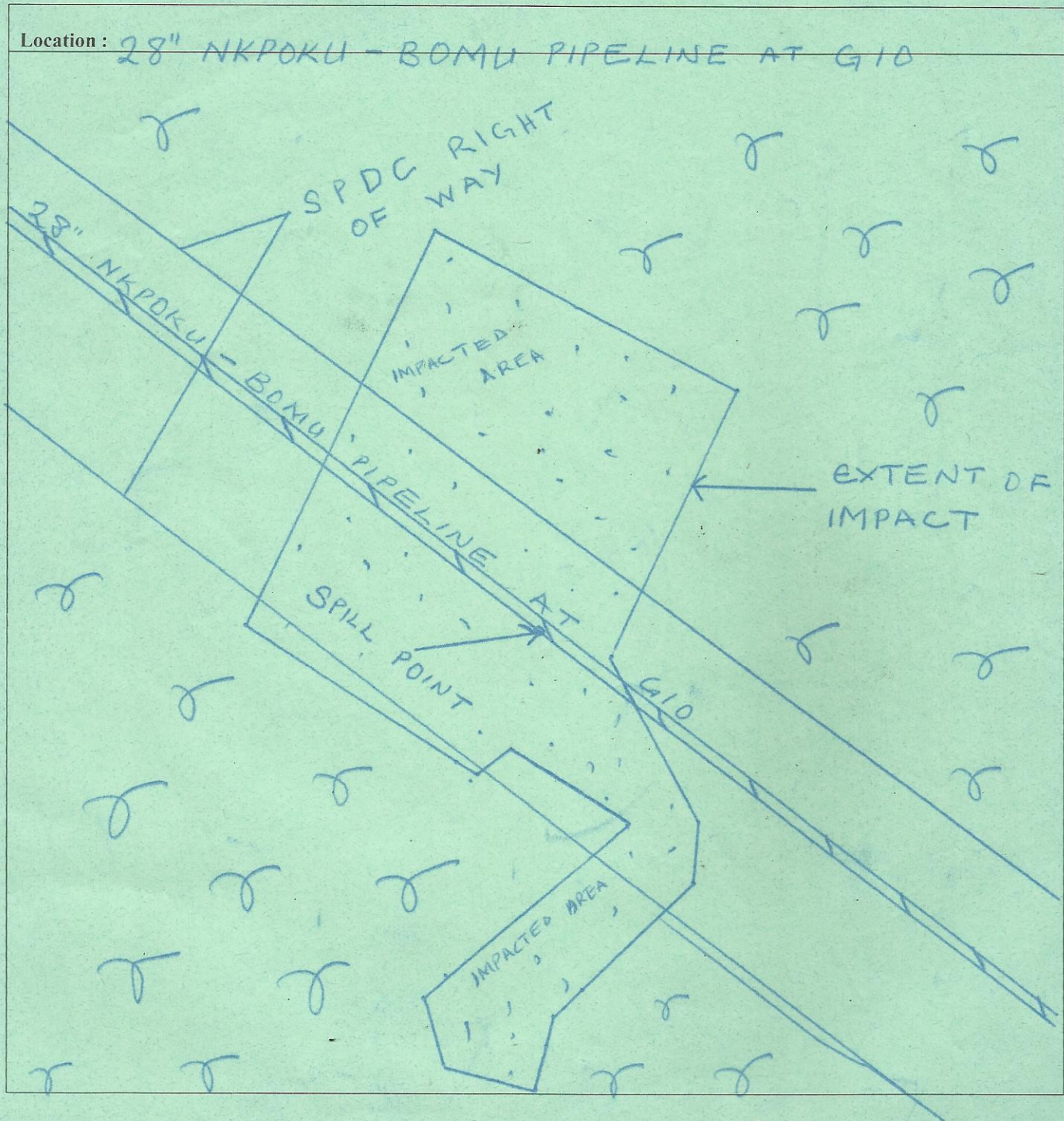
- Host Community: ☒
- Department of Petroleum Resources [DPR]: ☒
- National Oil Spill Detection and Response Agency [NOSDRA]: ☒
- State Ministry of Environment [SME]: ☒
- Asset Owner: ☒
- Signatories agree with reported findings: ☒
- Separate DPR form has been filled out with same findings: ☒

Tick as applicable

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f. Appendix 1: Overview sketch of the site

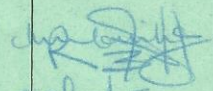
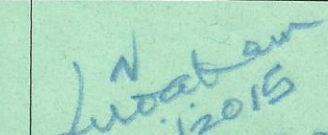
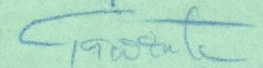
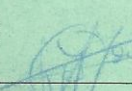
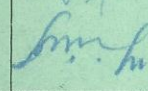


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g. SIGNATORIES: JOINT INVESTIGATION TEAM MEMBERS

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	CHIBUIKE CHIBUZO	DEPARTMENT OF PETROLEUM RESOURCES (DPR)	EC	 20/08/15 14:54
2	KOMS ABAM	NATIONAL OIL SPILL DETECTION AND RESPONSE AGENCY (NOSDRA)	SES	 20/08/2015 3:50pm
3	WONKE, GLORY A.	STATE MIN. OF ENVIRONMENT	SSO	 20-08-2015.
4	VITUIS GHD	HOST COMMUNITY REPRESENTATIVE	CT CHAIRMAN	 20/8/15 14:51
5	GERARD E. ONUIGBO	ASSET OWNER REPRESENTATIVE	210/G/PNPD	 20/08/15 14:50HRS