

## ***Environmental Assessment of Ogoniland Site Specific Fact Sheets***

### ***BARA-ALUE***



*This fact sheet is part of a series prepared as part of the Environmental Assessment of Ogoniland by the United Nations Environment Programme (UNEP). It provides the observations and results from one of the individual sites studied in detail, plus the specific risk reduction measures for follow-up action.*

*This fact sheet should be read in conjunction with the main assessment report available at: [www.unep.org/nigeria](http://www.unep.org/nigeria).*

*July 2011*

**I - Site Description**

Site Name	BARA-ALUE
Site Number	qc_013-002
LGA	TAI
Main community	BARA ALUE KIRA
Surrounding communities	BARA ALUE BARA ALUE KIRA
Investigated area (ha)	8.12
Category	SPDC Pipeline ROW
Eastings (WGS 84, Zone 32N)	307060
Northings (WGS 84, Zone 32N)	523294



<p>Recommendations for risk reduction</p>	<ul style="list-style-type: none"> <li>- Communities should be informed in community meetings about health and safety precautions.</li> <li>- A community based security and surveillance system should be put in place so that there is voluntary compliance with the restrictions which are needed to protect public health.</li> <li>- The impacted area should be demarcated and appropriate signage put in place to indicate that the site is impacted.</li> <li>- Highly contaminated core areas should be fenced and guarded until emergency cleanup measures have been carried out.</li> <li>- Floating oil on the surface, if any, should be collected and treated off site.</li> <li>- The site should be remodelled to prevent run off from the contaminated area into the downstream swamps.</li> <li>- Runoff from the area should be monitored and if necessary collected and treated while the cleanup plan is developed and implemented.</li> <li>- Additional soil sampling along with trial pits should be done at the contaminated site to delineate the site to be excavated for clean up.</li> <li>- A detailed plan should be prepared for clean up of the contaminated soil and risk reduction at site.</li> <li>- A system of ground water monitoring wells should be installed to act as early warning for communities which are not yet impacted by ground water contamination.</li> <li>- A detailed plan should be prepared for clean up of the contaminated water and risk reduction in the community.</li> <li>- While undertaking the clean up, management of excavation water should be handled properly to ensure that no pollutants are emitted into the environment without control.</li> </ul>
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## II - Oilfield Infrastructure Type

Wells	No
Flowstations	No
Manifolds	No
Flaresites	No
Oil pipeline in operation	24" NKPOKU TO BOMU TRUNKLINE 36" RUMUEKPE TO NKPOKU TRUNKLINE
NNPC crude line	No
NNPC product line	No

## III - Spill History

Spills reported by SPDC	Incident Number	Incident Date
	2003_00213	20031112
	2007_00144	20070512
Spill reported by community	Yes	

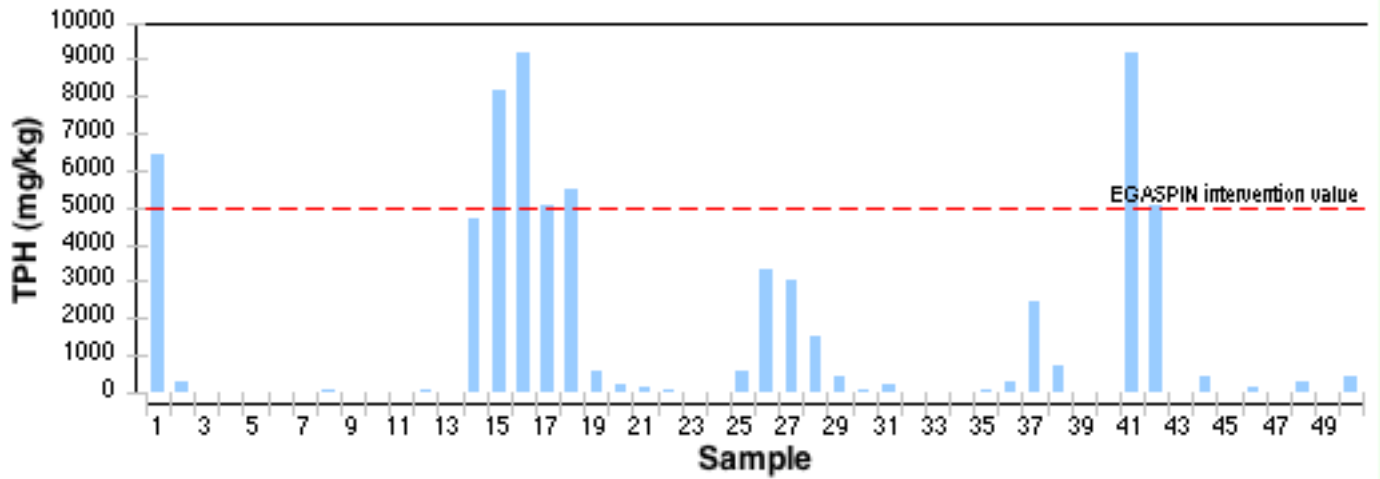
## IV - Data Screening

### **Assessment criteria**

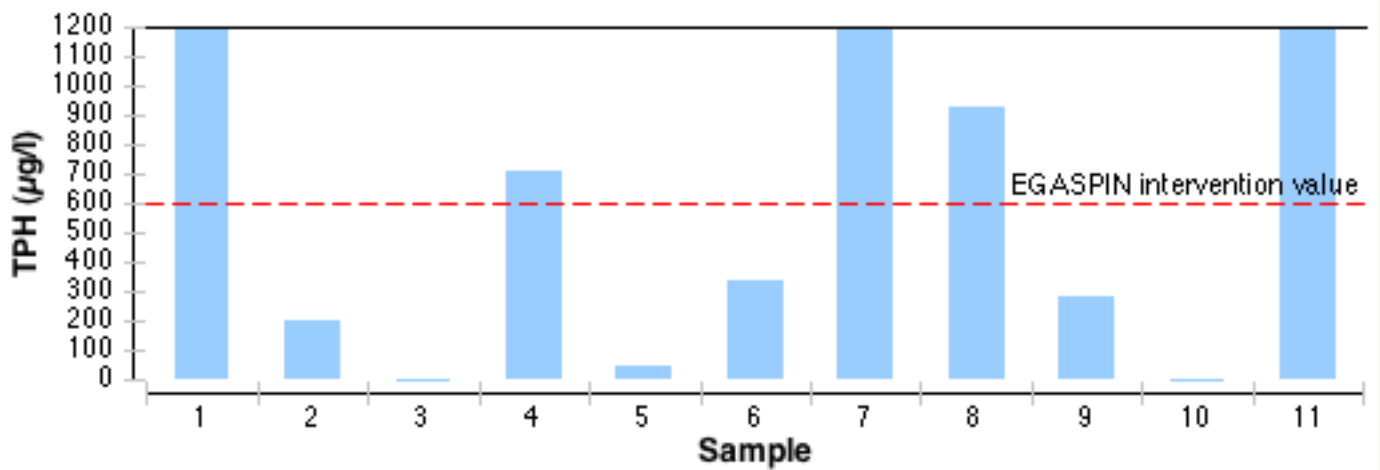
Soil contamination	Nigerian standards EGASPIN (intervention value 5000 mg/kg; target value 50 mg/kg)
Groundwater contamination	Nigerian standards EGASPIN (intervention value 600 µg/l; target value 50 µg/l)
Sediment contamination	Nigerian standards EGASPIN (intervention value 5000 mg/kg; target value 50 mg/kg)
Drinking water contamination	WHO guidelines (benzene: 10 µg/l) Nigerian drinking water standards (mineral oils: 3 µg/l)

Number of soil samples	50
Deepest investigation (m)	5
Maximum soil TPH (mg/kg)	9,200.000
Number of soil measurements greater than EGASPIN intervention value	7
Deepest sample greater than EGASPIN (m)	5
Number of soil measurements below 1m	37
Number of soil measurements below 1m greater than EGASPIN intervention value	6
Number of ground water samples	11
Maximum groundwater TPH (µg/l)	1,760,000
Number of groundwater measurements greater than EGASPIN intervention value	5
Number of community well samples	2
Presence of hydrocarbons in community wells	Not found
Number of CL sediment samples	0
Maximum CL sediment TPH (mg/kg)	Not applicable
Number of CL sediment measurements greater than EGASPIN intervention value	0
Presence of hydrocarbons in sediment above EGASPIN intervention value	Not applicable

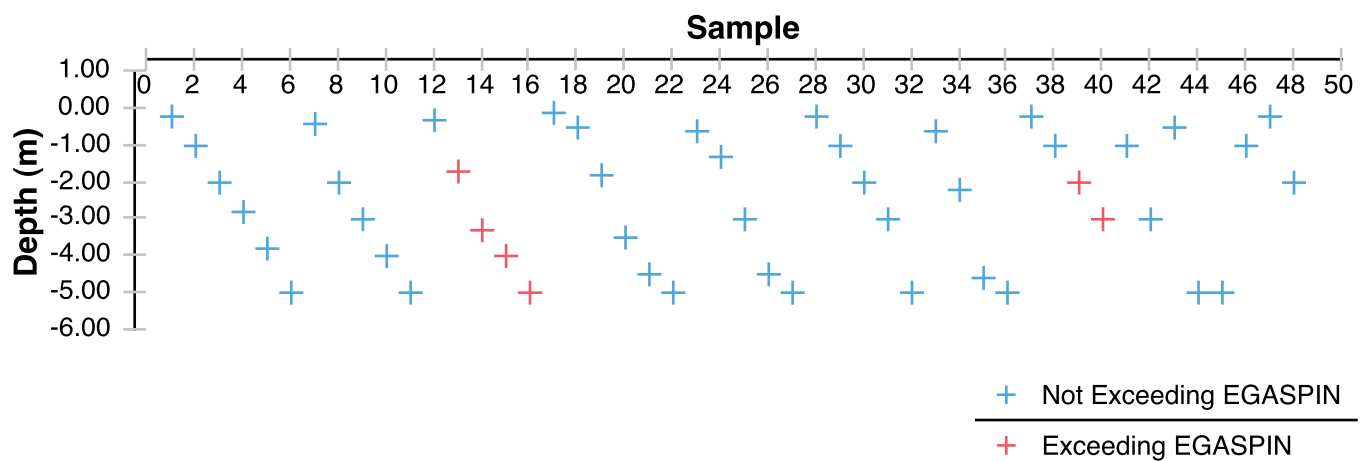
### Soil Samples



### Groundwater Samples



### Soil Samples depth



Satellite image of the site



**Sampling location map**



**Oil Facilities**

- SPDC Right of way
- w** Wells
- Manifold
- ▲ FlowStation
- Pipeline
- NNPC Crude
- NNPC Refined product
- SPDC Oil Pipe in operation

**Soil samples**

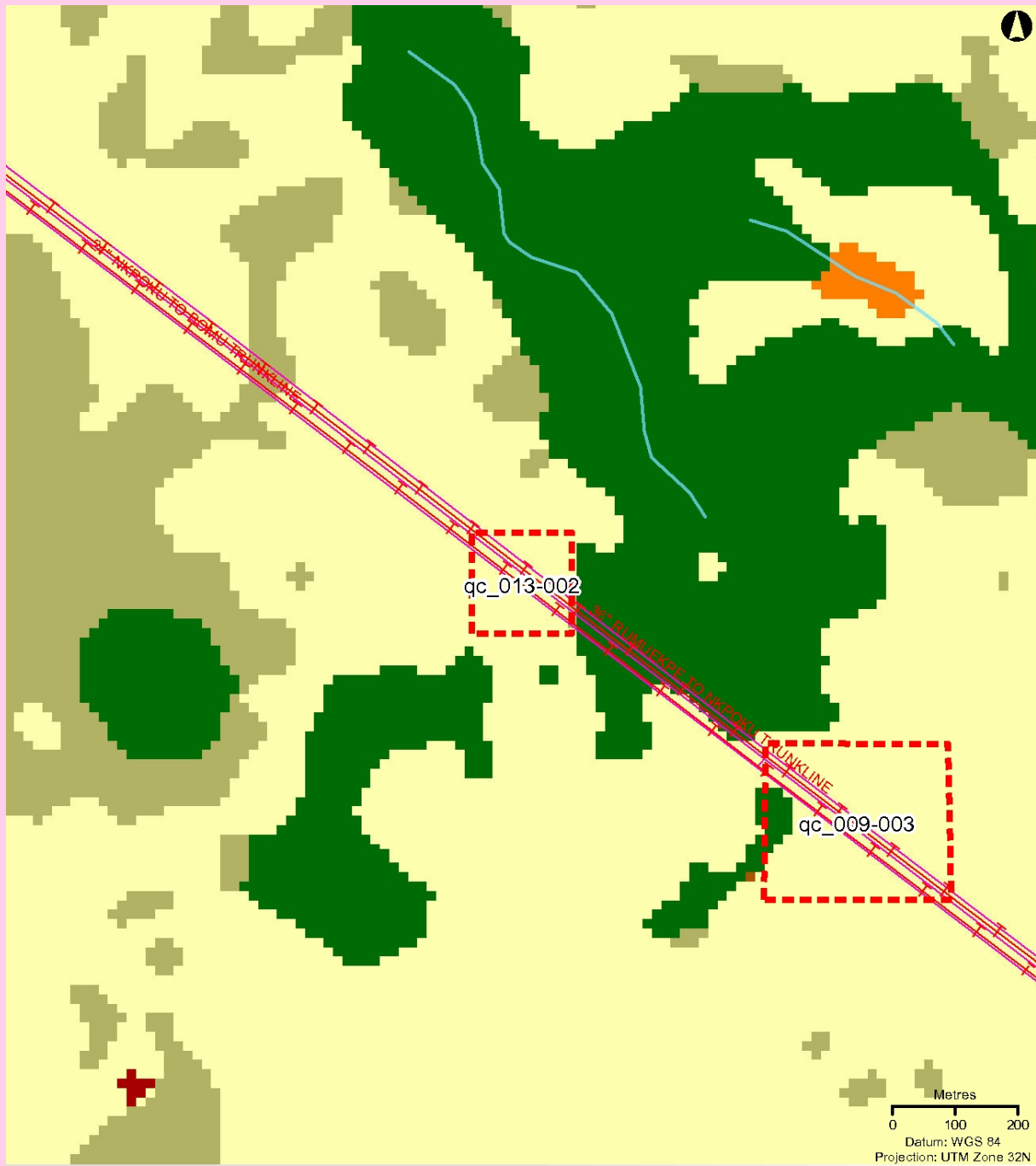
- Grassplot centroid
- Soil samples
- Soil Samples from GW monitoring well
- Grassplot sampling area
- Approximate site investigation area (that area does not correspond to contamination extent).
- Others**
- ▲ Air quality sampling
- Fish tissue sampling
- Sediment samples from Acquatic team
- Water Samples from Acquatic team

**Water samples**

- ▲ Rainwater samples (Community)
- ★ Bore-well (community)
- ★ Hand-dug well (community)
- Free-Phase samples
- ◆ Groundwater sample
- s w Surface water
- w Water sample taken from an oil well
- Drilling well



Datum: WGS 84  
 Projection: UTM Zone 32N  
 UNEP 2011



**Oil Facilities**

- SPDC Right of way (ROW)
- w** Wells
- Manifold
- FlowStation
- Pipeline
  - NNPC Crude
  - NNPC Refined product
  - SPDC Oil Pipe in operation

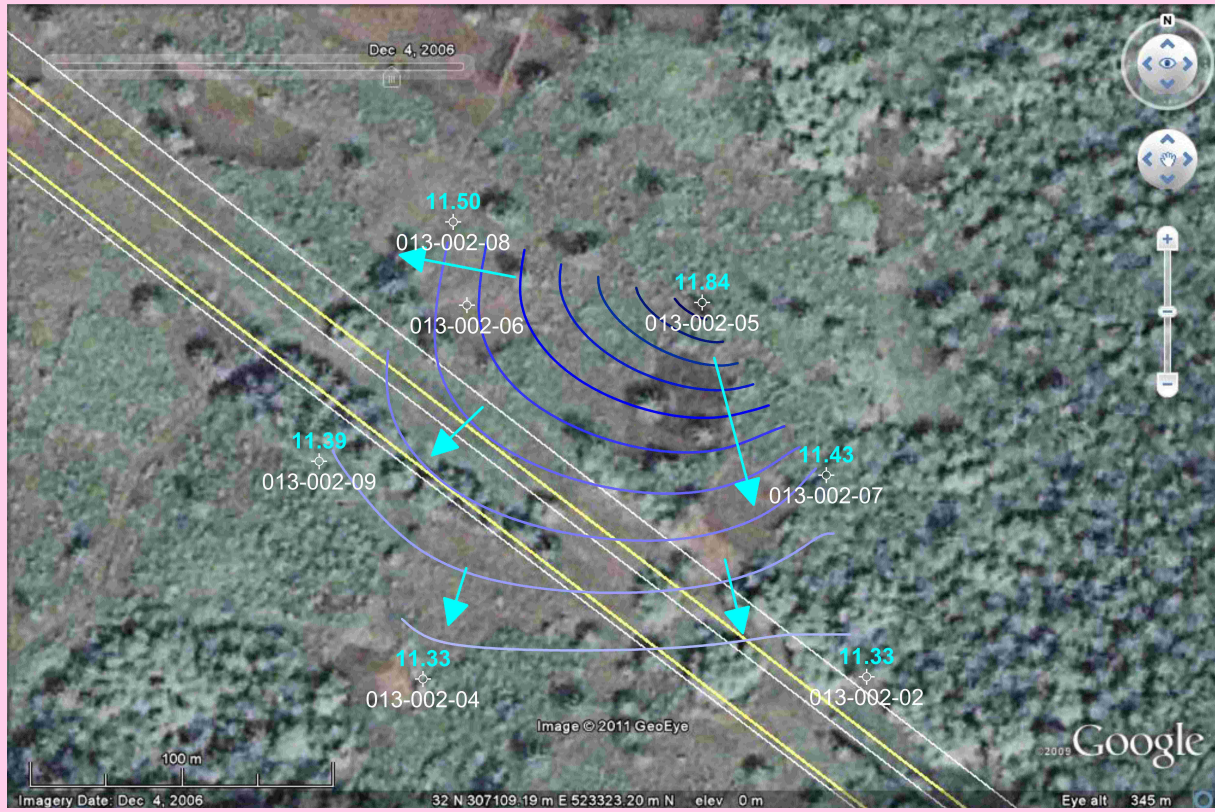
Approximate site investigation area (that area does not correspond to contamination extent).

- Tree plantation
- Farmland, low tree cover
- Farmland, high tree cover
- Fallow land
- Riparian forest, including fresh water swamp forest
- Forest on former beach ridge
- Mangrove
- Mangrove, degraded
- Urban
- Bare soil, terrestrial
- Bare soil, mud flat
- Water

Source:  
land cover 2007  
from Aster imagery

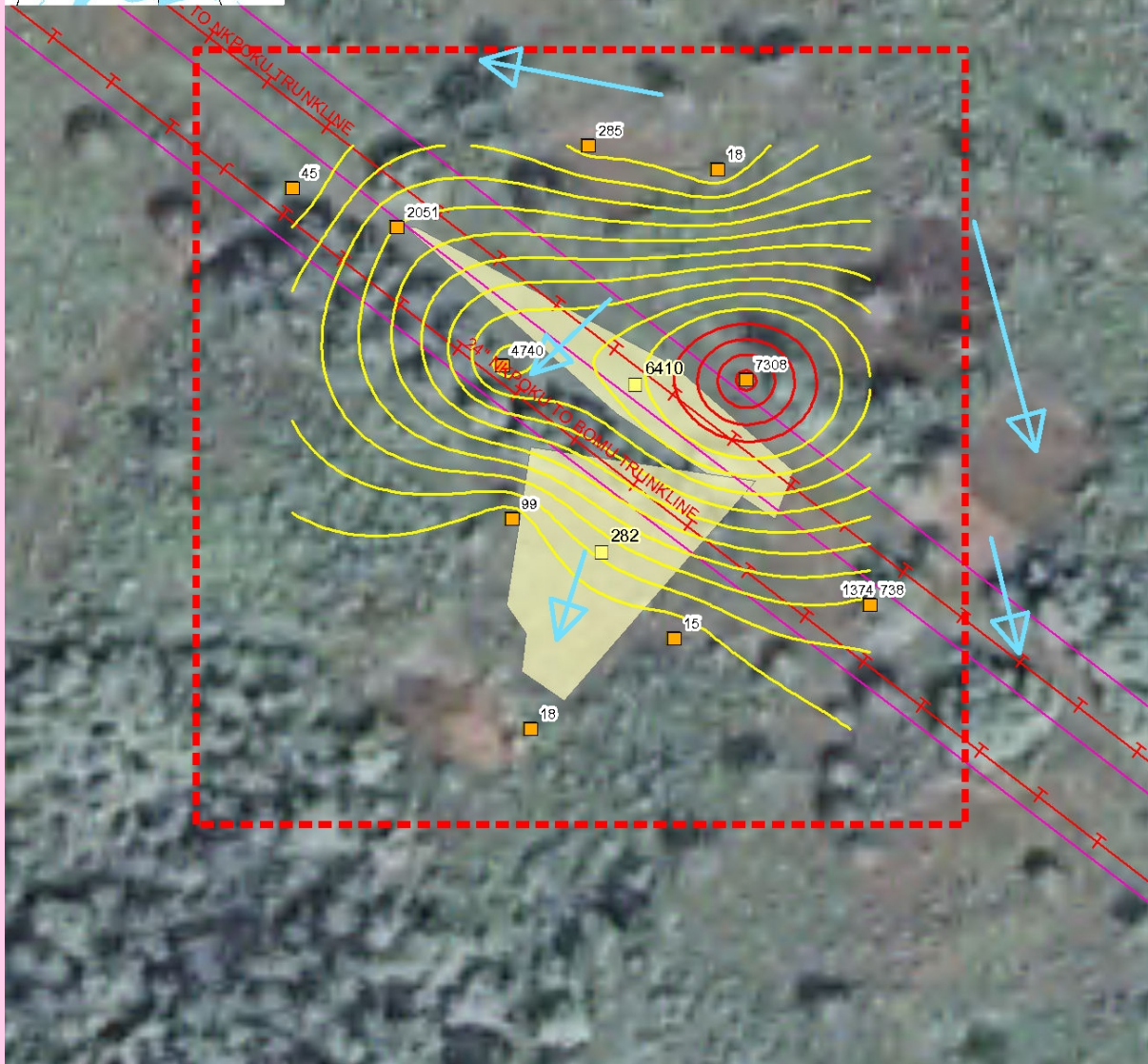
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# Ground Water Elevation Map





# Soil Contamination Map



### Oil Facilities

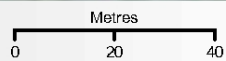
- SPDC Right of way (ROW)
- Wells
- Manifold
- FlowStation
- Pipeline**
- NNPC Crude
- NNPC Refined product
- SPDC Oil Pipe in operation

### Contamination contours (mg/kg)

- > 5 000
- 50 - 5 000
- < 50

### Soil samples

- Soil samples
- Grassplot centroid
- Grassplot sampling area
- Investigated area
- Groundwater flow direction



Projection: WGS 84  
UTM Zone 32 N

Approximate site investigation area (that area does not correspond to contamination extent).

UNEP 2011

The values shown next to soil sample points represent the average TPH value for all samples taken from the borehole at that location.

***Ground photograph***



VII - Sample List

**Soil sample list**

Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2326953	159.000	1.80	307045	523277
2327054	1,500.000	4.50	307021	523338
2327082	BDL	2.00	307088	523350
2327119	26.100	1.00	307088	523350
2327156	8,150.000	1.70	307094	523306
2327181	9,180.000	3.30	307094	523306
2327200	BDL	2.80	307088	523350
2327229	584.000	0.60	307021	523338
2327245	4,670.000	0.30	307094	523306
2327258	BDL	0.20	307088	523350
2327326	398.000	5.00	307021	523338
2327349	30.000	4.50	307045	523277
2327365	BDL	5.00	307079	523252
2327378	271.000	2.20	307120	523259
2327388	39.900	0.20	306999	523346
2327405	0.589	3.00	306999	523346
2327419	248.000	0.50	307045	523277
2327438	9,200.000	2.00	307043	523309
2327464	6,410.000	-	307071	523305
2327490	46.200	5.00	307088	523350
2327506	195.000	1.00	306999	523346
2327524	580.000	0.10	307045	523277
2327539	5,070.000	4.00	307094	523306
2327553	3,340.000	1.30	307021	523338
2328062	not analyzed for TPH	1.00	307043	523309
2328217	6.970	1.00	307049	523233
2328235	738.000	5.00	307120	523259
2328251	455.000	3.00	307061	523355
2328279	3.390	0.50	307049	523233
2328287	22.700	0.40	307079	523252
2328360	3,010.000	3.00	307021	523338
2328423	134.000	5.00	307061	523355
2328482	50.700	0.60	307120	523259
2328518	22.500	5.00	307049	523233
2328544	23.100	5.00	306999	523346
2328569	291.000	1.00	307061	523355
2328594	BDL	5.00	307045	523277
2328620	41.400	4.00	307079	523252
2328645	8.100	0.20	307049	523233
2328675	14.300	3.80	307088	523350

Sample Identifier	Total petroleum hydrocarbon (mg/kg)	Depth (m)	Easting	Northing
2328753	282.000	-	307064	523270
2328852	5,490.000	5.00	307094	523306
2328861	BDL	2.00	307079	523252
2328880	5,020.000	3.00	307043	523309
2328889	60.800	3.50	307045	523277
2329585	12.700	2.00	306999	523346
2329618	2,440.000	4.60	307120	523259
2329722	23.200	3.00	307079	523252
2329816	410.000	2.00	307061	523355
2338388	not analyzed for TPH	0.20	307043	523309

***Groundwater sample list***

Sample Identifier	Total petroleum hydrocarbon (µg/l)	Easting	Northing
1838425	824,000	307105	523271
1838429	BDL	307263	523179
1838457	196	307193	523233
2701777	926	307179	523300
2701779	1,760,000	307102	523275
2701781	335	307141	523358
2701782	5,820	307063	523356
2701783	39	307045	523233
2701784	278	307058	523384
2701785	BDL	307011	523304
2701786	705	307191	523233

***Community well sample list***

Sample Identifier	Total petroleum hydrocarbon (µg/l)	Easting	Northing
1838376	BDL	306603	522415
1838434	BDL	306509	522455

**Guide to content**

The Site Fact Sheets present more detailed data from UNEP's environmental assessment of Ogoniland on a site-by-site basis. Note that all data is based on the analysis of samples taken during the fieldwork period. The period of most intensive fieldwork ran from April to December 2010. The final sampling visit was completed in January 2011.

Here is a guide to the terms and abbreviations used. Please refer to the Environmental Assessment of Ogoniland report for details of EGASPIN target and intervention values.

**Terminology**

Site number	Reference number allocated by UNEP to identify a study site
Area (ha)	Estimated surface area (in hectares) of a given study site
Well	Oil well, also referred to as a production well
Fugro well	New well installed by Fugro at UNEP's request to enable scientific sampling and monitoring
Community well	Wells belonging to communities which are used to collect water for drinking and sanitation needs
Contamination contour	Maps that display the geographical distribution of oil contamination concentrations in an analyzed receptor
Flare site	Indicates whether the burning of unwanted gas through a pipe (or flare) takes place at a given site
Flow station	Separation facilities (also called gathering centres) which separate natural gas and water from crude oil extracted from production wells
Incident number	Numbers as supplied from the SPDC oil spills database
Manifold	An arrangement of piping or valves designed to control, distribute and often monitor fluid flow

**Abbreviations**

BDL	Below Detection Limit
CL	Contaminated Land
EGASPIN	Environmental Guidelines and Standards for Petroleum Industries in Nigeria
GW	groundwater
LGA	Local Government Area
mbgs	metre/s below ground surface
NNPC	Nigerian National Petroleum Corporation
SPDC	Shell Petroleum Development Company of Nigeria
TPH	total petroleum hydrocarbons
UNEP	United Nations Environment Programme

**Explanatory Note**

1. The recommendations given are for initial risk reduction. Final clean up would need significant additional site specific engineering as well as consultation work.
2. Spill reported by SPDC has the date format YYYYMMDD
3. Assessment is done based on a screening of the measured value against a Nigerian or international standard
4. In the soil sample maps, the highest value has been cut-off to 2 times the intervention value. This was done to visually express the exceedences above intervention values. Actual values are given in the sample tables.
5. The values of soil contamination listed in the Soil Contamination Maps are average values of all samples taken at that sampling location