Remediation Success Stories

BOMU MANIFOLD – REMEDIATION BY FITON TECHNOLOGY
February 2012.

BACKGROUND

Bomu Manifold is within Bomu oilfield, OML 11, in Gokana LGA of Rivers State. The facility is a pigging manifold connecting the Trans Niger Pipeline (TNP) from the northern parts to Bonny Terminal. There were a number of Oil spill incidents in the manifold from 1994 to 2009, mostly due to sabotage activities. Virtually all incidents have been accompanied by fire incidents.

The incidents impacted approximately 2.6Ha of mostly upland area, part of which is third party land. The Remediation project commenced in Feb 2011 and was certified in Jan 2012.The remediation activities were done safely without LTI. Approx. 78,000m3 of contaminated soil was remediated in-situ. Average depth of excavation of impacted soil was 3m.

TYPES OF WASTE STREAMS

Figure 1, is the aerial map showing the impacted area. Initial size of impacted area in the 2003 incident was 6 hectares. After a first level clean-up, the size requiring further remediation was reduced to about 2.6 hectares. There were two main types of waste streams.

1. About 2000m^3 of burnt top soil (0.15m depth) and petrified carbonized sand-grit
2. Hydrocarbon impacted soil to average depth of 3.0m

OPTIONS FOR REMEDIATION

Choice of remediation technique is site specific and risk based in line with SPDC Remediation Management System.

Remediation by addition of FITON Bio-catalysis product was deployed for the site based on the following consideration:

- ✓ It is one of the techniques recognized and approved by regulators but tested on this site on a full scale following an earlier pilot.
- ✓ More sustainable in terms of lower carbon emissions than other alternatives
- ✓ Presents less health and safety risk as soils are treated on site without need for haulage.
- ✓ It is cost effective and generates short term employment for community youths.

Bio-catalysis remediation process by FITON Technologies is an enhanced bioremediation technique, utilizing a combination of bio-augmentation and bio-stimulation processes that uses acclimated microbes and proprietary nutrients to convert organic contaminants including burnt carbonized sand grits to simple inorganic such as water and carbon dioxide. Like RENA* process, the end product of the remediation is carbon dioxide and water.

GOVERNANCE

To reduce the hydrocarbon contamination in the soil (both in-situ soil and stockpiled soil) to EGASPIN* Remediation intervention standard of 5000 mg/kg of TPH* and 40 mg/kg of PAH*.

To rehabilitate and restore soil fertility to support natural vegetation growth.

To reduce the hydrocarbon contamination in the shallow groundwater to ALARP* levels consistent with risk based corrective action approach.

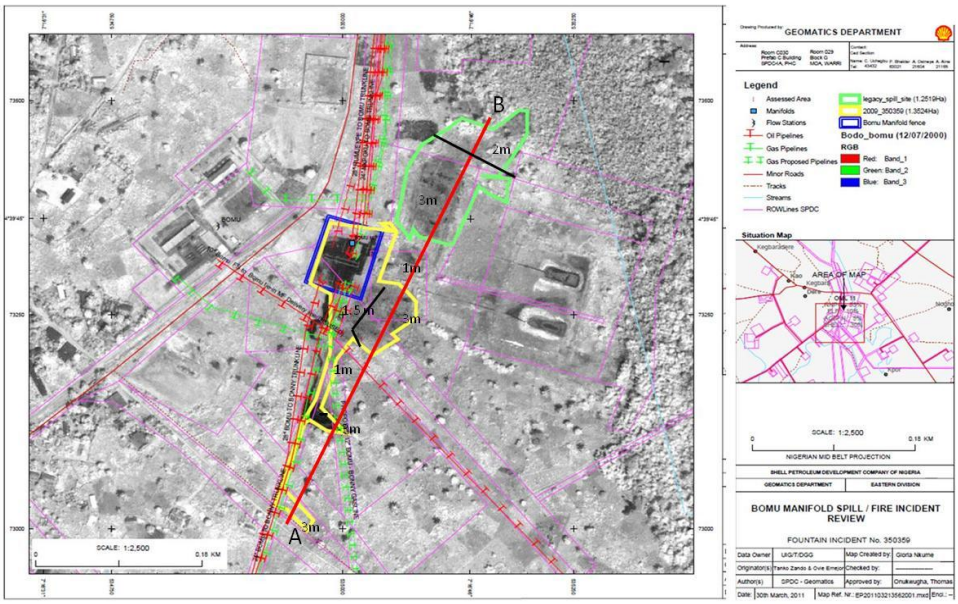
To undertake all remediation activities in a safe manner in compliance with HSSE goal zero and life saving rules requirements.

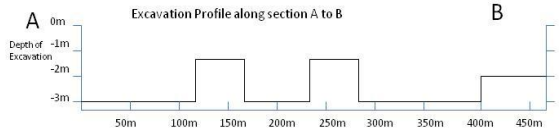
OUTCOME

Remediation was completed in December 2011. Initial TPH of impacted soil ranged from 10,000 mg/kg to 122,950mg/kg. A total of 34 grab samples were collected by NOSDRA at depths between 0.5m to 4.0m across the site for chemical analysis and about 96% reduction of soil TPH was achieved ranging from 13 mg/kg to about 5000 mg/kg. Based on this, the site was certified and closed out.

Acronyms

NOSDRA – National Oil Spill Detection & Response Agency
RENA – Remediation by Enhanced Natural Attenuation
TPH – Total Petroleum Hydrocarbons
EGASPIN* – Environmental Guidelines and Standards for Petroleum Industry in Nigeria
ALARP – As Low As Reasonably Practicable
PAH – Polycyclic Aromatic hydrocarbon





SPILL IMPACT MAP OF BOMU MANIFOLD

Pictures of excavated portions of burnt petrified carbonized materials at Bomu Manifold before and after Remediation by Fiton Technology.

Various Sections of Bomu Manifold Impacted Site Before Remediation

Various Sections of Bomu Manifold Impacted Site After Remediation