

Lab Analysis Demonstrates Severity of Ogoniland Pollution

Scientists from a UK laboratory have analysed over 4,000 air, soil and water samples collected from Ogoniland in the south of Nigeria. The results of the analyses, which were undertaken by ALcontrol Laboratories, have formed a major component of an independent UNEP Environmental Assessment report that sought to measure the extent of the pollution and to define priorities for remediation.

“This report makes a valuable contribution towards improving understanding of the issue of oil spills and the environment in Ogoniland and we pledge to work with the government, UNEP and others on the next steps.”

The UNEP report was published in August 2011 and shows that pollution from over 50 years of oil operations in the region has penetrated further and deeper than many may have supposed. It suggested that the environmental restoration of Ogoniland could prove to be the world's most wide-ranging and long term oil clean-up exercise ever undertaken if contaminated drinking water, land, creeks and important ecosystems such as mangroves are to be brought back to full, productive health.

Background

Ogoniland is a group of four Local Government Areas in the Rivers State of Nigeria. Taken together there are close to a million people living in about 1000 square kilometres. Oil industry operations began in Ogoniland in the late 1950's and the area has since been the subject of many (often tragic) struggles as a result of the political and environmental issues that have occurred.

The two year study of the environmental and public health impacts of oil contamination in Ogoniland is one of the most complex on the ground assessments ever undertaken by UNEP. Conducted at the request of the Federal Government of Nigeria, the work involved desk review, fieldwork and laboratory analysis. As a high profile, politically sensitive project it was extremely important for all environmental analysis to be undertaken by a fully accredited, independent laboratory.

Environmental sampling and analysis

Following an international competitive bidding process, ALcontrol was chosen to conduct the environmental monitoring work. ALcontrol's Iain Swinton was responsible for the bid and believes that his company's success was the result of several key factors. "Firstly, we were obviously able to provide a financially attractive offer, but importantly," he added, "we were also able to demonstrate a very strong track record in the delivery of a large contract, with a requirement for multiple parameter monitoring at remote locations with difficult access. For example, in the recent past we have conducted sampling and analysis programmes in Lebanon, Gaza, Mongolia, Ukraine, Afghanistan and Iraq."

With over 2000 employees in 30 laboratories across 11 European countries supporting a global customer base providing millions of tests per year, ALcontrol is able to offer an enormous variety of tests. ALcontrol's laboratory in Chester, UK, was chosen to analyse the Ogoniland samples because, as a very large ISO 17025 accredited



laboratory, it has the capacity to manage a project of this size and complexity.

The analytes examined in the study included those which are commonly required in oil-spill assessment and clean-up work. They included specific groups of hydrocarbons that are either indicative of oil based pollution or represent a significant human health or environmental hazard. The most important of these are BTEX (benzene, toluene, ethylbenzene and xylenes) and PAHs (polycyclic aromatic hydrocarbons). Volatile organic compounds (VOCs) were the main target of the air quality investigations. Over the course of the project more than 400 different analytes were tested, however, the most significant was TPH (Total Petroleum Hydrocarbon, mg/kg).

Collected samples were dispatched by courier from Nigeria on a daily basis and analytical results had to be published via the @mis web based reporting tool in the shortest possible time. In some instances, additional sampling had to be undertaken based on the results of the first round, whilst in other cases repeat analyses were requested to reconfirm the findings.

In order to ensure that the study produced representative and credible results, ALcontrol was involved throughout the planning and implementation



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stages of the study. This included developing sampling protocols, sample preservation techniques, chain of custody procedures and analytical quality control techniques.

A dedicated team of ALcontrol scientists was established to manage the environmental monitoring component of the Ogoniland project. This helped to ensure that the Nigerian samples were processed quickly but independently of the other work in the ALcontrol laboratory, which was important because the very high levels of contamination in many of the samples necessitated extra pre-analysis procedures. The provision of a dedicated team also improved communications and meant that ALcontrol was able to provide technical support by people that were familiar with the project.

The lead scientist for site services was ALcontrol's Geraint Williams who visited Ogoniland several times during the project and was responsible for the quality of sampling. He provided training on site investigation techniques, sample handling and chain of custody processes, and established suitable packaging, sample protection and logistics in order to ensure that samples arrived in Chester in perfect condition. He also took a number of control samples to make sure that the sampling and transportation programme did not affect the results.

Detailed soil and groundwater contamination investigations were conducted at 69 sites, which ranged in size from 1,300 square metres to 79 hectares. Each of the 4,000 samples was tested for multiple species. This included water taken from 142 groundwater monitoring wells drilled specifically for the study and soil extracted from 780 boreholes.

Looking back, Geraint believes that the ability to review results over the web was a key benefit for this project. "Ogoniland pollution is a highly sensitive issue and prior to the publication of the final report, the analytical results were confidential, so the data was posted to a secure website running the @mis reporting tool," he explained. "This avoided the necessity for using unsecure email, but the main advantage was the availability of almost live data 24/7, which was important because senior UNEP staff and their consultants were located in different parts of the world."

Typically, the time taken from sampling to the availability of result via the @mis system was ten days. Geraint says "It was very important for this to be kept as short as possible because of the tight timescales for the whole project, so it was vital for the consultants that were responsible for the interpretation of the data, to have access to the results as quickly as possible."

There were a number of occasions in which it became necessary to determine the age and origin of a spill, so further specialist analytical work was necessary and senior members of the project team worked closely with ALcontrol staff to draw appropriate conclusions from the observed results.

The report was subjected to a rigorous international independent expert peer review to ensure that the work, including sampling protocols and quality control procedures, was fit for purpose. The report was finally published on 4th August 2011.

Key findings

Soil pollution by petroleum hydrocarbons in Ogoniland is extensive in land areas, sediments and swampland. Most of the

contamination is from crude oil although contamination by refined product was found at three locations.

Some areas, which appear unaffected at the surface, were found to be heavily contaminated underground. In 49 cases, hydrocarbons were detected in soil at depths of at least 5m. This finding has major implications for the type of remediation required.

The drinking water in at least 10 Ogoni communities is contaminated with high levels of hydrocarbons, posing a significant threat to public health. In one community, at Nisisioken Ogale, in western Ogoniland, drinking water is contaminated with benzene at levels over 900 times the World Health Organization guideline value. In one area, an 8 cm layer of refined oil was discovered floating on the groundwater which serves drinking wells. This was reportedly linked to an oil spill which occurred more than six years ago.

Volatile hydrocarbons, including benzene, were also detected in the air and mangrove vegetation has been severely impacted by oil slicks in the bay.

UNEP has recommended a series of technical, legal and institutional measures to restore the environmental situation in Ogoniland and estimates that it will take up to three decades and cost billions of dollars. UNEP has also recommended the creation of a new Ogoniland Environmental Restoration Authority and an Ogoniland Environmental Restoration Fund with an initial invest of one billion US dollars to initiate the clean up and restoration.

Reactions to the report

Following receipt of the UNEP report President Goodluck Jonathan is reported to have constituted a committee to review its findings and the oil companies operating in Nigeria have constituted a committee for the 'Restoration of Ogoniland to its old glory.' It is anticipated that a transition project, leading to full scale clean up, will commence in 2012.

Following publication of the report, the Government of Rivers State has started providing clean drinking water to the communities whose water wells were demonstrated to be contaminated with carcinogenic substances.

SPDC Managing Director Mutiu Sunmonu has responded to the UNEP report in a video on the Shell Nigeria website. He says: "This report makes a valuable contribution towards improving



understanding of the issue of oil spills and the environment in Ogoniland and we pledge to work with the government, UNEP and others on the next steps."

Commenting on behalf of ALcontrol, Iain Swinton said "We were very pleased to have been able to provide an important component of the UNEP report and we hope that it will mark the beginning of an effective remedial plan for Ogoniland.

"Environmental testing and monitoring forms an essential component of effective remediation, so with the lessons that we have learned from our involvement to date, I hope that we will be invited to participate further in the future.

"Our ability to publish 'live' results on the web was an invaluable tool in the UNEP assessment. However, @mis also gives us the ability to provide transparent environmental data to communities, which can be a useful tool in politically sensitive projects."