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From vision to action

UN WATER



Société d'Énergie et d'Eau du Gabon

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Summary

The national Electricity and water service company of Gabon, the Société d'Énergie et d'Eau du Gabon (SEEG), provides electricity to 49 cities (271 399 customers) and water services to 44 Cities (159 customers). Since 1997, SEEG is a concession 51% owned by Veolia. Oyem, 42,900 inhabitants, is the capital-city of Woleu-NTem, the ninth province of Gabon. The Government of Gabon decided to ensure the electricity supply with a local power-plant built in Oyem in 1963, on the local pond shore, despite of the drinking water intake located 9 Km downstream. The power-plant remained in operation until its decommissioning in 2005, when the urban environment development made it no longer possible to keep the plant in operation. The SEEG launched investigations about the water and soil environment of the former plant. It revealed the presence of mineral oils in soils and pond water (volatile hydrocarbons), and heavier oils in the sediments, representing a risk for pond users, riparian and downstream populations, through either direct contact with soils, possible inhalation of volatile fractions and dusts, or finally, groundwater consumption.

With a self-funded investment of 1.4 Million Euros, SEEG cleaned up the old plant site and the lake sediments, to protect the riparian population's health and the environment. A sports complex is being constructed before handing the site over to the local authorities.

Keywords

Pollution, depollution, hydrocarbons, risk prevention, pond, health protection, site enhancement.

Issues addressed

WASH (inequalities, schools, health centers, refugee camps, women and girls)

Pond de-facto used as recreational water, children of local communities bath in the pond.

Water resources management (water-use efficiency, integrated water resources management, transboundary cooperation, sustainable extraction and supply of freshwater)

Groundwater and pondwater protection:

- Watershed delineation;

- Intake perimeter design including immediate, close, and catchment perimeters

Water quality (pollution, dumping of toxic materials, wastewater management, recycling, reuse)

Soil, water & sediment pollution with mineral oils

- Investigations identified the pollution with mineral oils in the water/sediment and soil environments.
- The investigations also established the absence of heavy metals, PAH and PCB

Risks (mortality, economic losses caused by natural and human-induced disasters)

The presence of oils represents a threat for local populations and the environment:

- Body-contact with either water, sediments or soil
- Inhalation of volatile hydrocarbons or dusts
- Drinking water contamination through groundwater contamination.

Tools for implementation

Technology: Beyond the excavation of polluted soils and sediments, the core of the process was to accelerate the natural, biological degradation of the hydrocarbons, which under the local climate is the most efficient and environmental friendly approach.

- This process could be selected because the investigation allowed to rule out the presence of heavy metals etc.
- This represents an innovation in Gabon, compared with the usual approach with chemical treatment (mainly lime)

Who is involved?

- National Anti-pollution Center
- Regional Department of Water and Forests
- Local Authorities (Governor, Mayor, Prefect, Neighborhood authorities)
- 2 NGO (Healthy Environment Growth & Géosciences)
- GRS Valtech (for clean-up works) ;
- Sécu-Service (sub-contractor of GRS Valtech)
- ALcontrol Laboratories
- Veolia Central Lab.
- National & local media
- Consultants Seureca ; Ortec ; Spie ; SEEG departments (North Region ; purchases; works; Direction des achats ; safety ; Communication ; lab.

What were the objectives?

- Exact identification of the nature and extent of the pollution,
- Selection of the treatment options
- Project delivery and site rehabilitation

Implementation challenges:

- Visit and listing of all drinking water intakes,
- Comprehensive inventory and mapping of pollution sources
- Law & by-laws analysis to identify both responsibilities and margin of action
- Finding local specialized companies to do the works

Main task/activities undertaken /Tools used:

- The preliminary studies determined that the natural biodegradation could clean-up the pollution of the site all the way to the pond. The precautionary measure would hence be the construction of a basement after demolition of the existing building, and fencing a natural vegetation cover between the site and the pond, the two avoiding body contacts with the sediments, which made it possible to concentrate on the cleaning of the pond bank and sediments
- The preliminary studies also identified two polluted banks, named channels 1 & 2, which were excavated and treated, to first reach a reference 20% depollution in 9 months, and hence confirm the remaining oil could degrade in situ;
- For this sediments in-situ treatment, air was boosted through PVC drains, with surfactants injection (12 months of treatment)
- The excavated earths were set in « bio-mounds », with a goal of finally reaching 50 % hydrocarbon removal over 2 years.
- NPK (Nitrogen, Phosphorus et Potassium) balance & microbiological counting were done to ensure the biological degradation was optimized;
- Analytical contradictory follow-up was carried out by the NGO Géosciences, and GRS Valtech: samples were taken over 16 months to follow progress until targets were met.

Main outcomes / impacts (what has changed?):

- Results show that total hydrocarbons in channels 1 & 2 earth dropped from 11,234 mg/kg & 15,656 mg/kg down to 3,000 mg/kg and 2,455 mg/kg, i.e. 73 % and 84 % removal efficiency (respectively);
- The Bio-mounds reached 53 % total hydrocarbons removal;
- The pond waters are not polluted any more, with less than 20 µg/L of hydrocarbons;
- The average hydrocarbon concentration in sediments dropped from 2,033.33 mg/kg down to 426 mg/kg, hence 79%.
- Local Authorities, citizens representative expressed their satisfaction with the results, which were reported upon by the media (national newspaper « L'union » +TV).

Lessons Learned:

Triggers: Decision to decommission the power-plant

Drivers:

- Environmental protection law of 26 August 1993
- Veolia & SEEG Corporate Social Responsibility

Barriers: Limits of local capacities including to carry the works.

What has worked well?:

- The collaboration & dialogue between the national, local authorities, the SEEG, and the local NGOs
- The project analysis and development, thanks to the available expertise of GRS-Valtech

- Awareness raising action was also conducted with local population to stop disposal of wastes in the pond
- No polluted material was disposed in an uncontrolled way

What can be improved?: The land farming and bio-mounds efficiency, through a long time allotment for enhanced biological degradation

The way forward: Several other waterbodies in Gabon show pollution challenges, in Cocobeach, Bitam et Mouila, and they are being subject to similar investigation & remediation programs

Links: http://cocom.rggov.org/veille/4_2012/_files/v20121221%20ENVIRONNEMENT.pdf