# Training Report

## UN Environment Capacity Building for POPs Analysis

## For Malinese and Senegalese Laboratory Personnel

## at the Fondation CERES-Locustox, Dakar, Senegal

## 29 September – 6 October 2017

Heather Leslie and Martin van Velzen

Dept. of Environment and Health, Faculty of Science, Vrije Universiteit, Amsterdam, the Netherlands

www.science.vu.nl/environmentandhealth

20 October 2017

---

## Table of Contents

## Summary

The training of theory and practice of POPs analysis was very helpful for both the laboratory personnel of CERES-Locustox (6 staff members) stationed in Dakar and the visiting laboratory personnel (2 staff members) from the Laboratoire de Toxicologie et de Contrôle de Qualité Environnementale, a part of the LABORATOIRE CENTRAL VETERINAIRE in Bamako, Mali. Theoretical aspects of the analysis of POPs served as an introduction to the activities that took place in the practical training that followed. Environmental samples, including a PUF, fish homogenate and blanks were Soxhlet-extracted, cleaned-up, fractionated, and POPs were identified and quantified using GC-µECD during the training.

## Introduction

CERES-Locustox stationed in Dakar and the visiting laboratory personnel from the Laboratoire de Toxicologie et de Contrôle de Qualité Environnementale are responsible for Stockholm POPs measurements in the UN Environment Global Monitoring Programme. Both laboratories had received training from the Vrije Universiteit in the framework of an earlier UN Environment Capacity Building Project. Some personnel now working at these laboratories were not present in their current functions during the former training period. This training programme was a refresher course in PCB and OCP analysis for personnel which had been previously trained, and presented material for the first time to new staff (see Annex 1 for participants list). The training is intended to assist the laboratories in the POPs analysis work necessary for the mirror analyses, interlaboratory study, and tasks in the Global Monitoring Network of the UN Stockholm Convention on Persistent Organic Pollutants.

## The Training

The on-site training took place between 29 September and 6 October 2017. The first day was used for theoretical training, consisting of lectures given by Dr. Heather Leslie. Martin van Velzen participated in the lectures and worked getting the lab prepared for training starting the next business day.

The following topics were covered: the relevance of POPs monitoring and the context of the UN Environment Global Monitoring Program, sampling and sample storage, extraction and clean up, GC analysis and QA/QC. The context of industrial chemical pollution and the regulations in place needed to address them were sketched, with several examples of the sources, exposure pathways, persistence, bioaccumulation, and toxicity of industrial chemicals, with special emphasis on Stockholm POPs and potential POP candidates such as chlorinated paraffins. In order to identify and understand possible differences between the analytical methods for POPs used in the participating countries and the reference laboratories, and additionally to generate data on levels and geographical trends of POPs per continent, national samples are to be collected in all participating countries including Senegal and Mali. A presentation was given describing the procedures, sample matrix selection, how to avoid contamination during sample preparation, and logistics for transport of samples from Africa to Europe. The analytical scheme was explained to the trainees to prepare them for the hands-on training that followed. Details regarding the solvent extraction, clean up and fractionation steps and following that analysis by GC were explained for the matrices of interest. A presentation was given on QAQC of laboratory analysis reviewing the principles of QAQC, QAQC tools and practice using examples relevant to POPs analysis. Sampling QAQC, study design guidelines and proficiency testing and interlaboratory studies were also handled during the lecture.

The course participants were actively participating, asking questions and sharing their own knowledge, experiences and opinions with the group. Other aspects were discussed including the selection of and logistics of mirror samples (samples to be analyzed in Senegal, Mali and in Amsterdam for comparison). Printed manuals with procedure descriptions were given for use by the laboratory staff (Annex 2), as well as DVDs dedicated to the analytical research conducted and coordinated at the Vrije Universiteit Amsterdam.

The following days, until 6 October consisted of hands-on training in the laboratory in which the staff was trained in extraction and clean-up of test materials with a focus on air and biota samples, and analysis by GC-µECD. This part of the training was given by VU Senior Technician Mr. Martin van Velzen.

The hands-on training consisted of showing all steps necessary for the analysis of POPs in environmental samples. This was done by taking two types of sample matrices: PUFs (air sample) and fish (biota). For both matrices a blank sample was included. Both types were extracted and cleaned by the methods described in the training manual (see annex 2). In short, the samples were Soxhlet extracted and subsequently cleaned with Alumina (8% water) and fractionated with Silica (1.5% water). After that the final extracts were measured on a GC-µECD.

Emphasis was put on working clean and precise. During the 5 days of hands-on training time was reserved for another two lectures about measuring PCBs and OCPs and Quality Control / Quality Assurance. Also a group session was organized in how to do the final calculations by constructing a calibration curve with Microsoft Excel.

### Conclusions and recommendations

In total, 10 certificates of course completion were given at the close of the training. The trainers received positive feedback on the training. The classroom part was well-explained and easy to understand, despite the course being given in the second language of the participants. The practical part of the training was valuable to the participants who practiced techniques hands-on and learned some skills regarding GC maintenance. A large amount of practical and theoretical knowledge was transferred to a motivated, young and well-educated group of participants.

The following recommendations can be given.

1. Make permanent setups in the laboratory for extraction and evaporation instead of taking it apart after use.
2. Try to make the laboratories as much dust-free as possible because that can cause problems with blank values.
3. Start analysing a series of blanks to build up knowledge about the background in the lab (construct a Shewart chart).
4. Take advantage of the knowledge that can be found in literature to develop new methods.

## Annex 1. Participants in the laboratory training

| Name | Organisation |
|---|---|
| Marie Ndao | CERES-Locustox |
| Ndeye Bineta Camara | CERES-Locustox |
| Anna Marcelle Fall | CERES-Locustox |
| Ndeye Yarame Gueye | CERES-Locustox |
| Anna Ndiaye | CERES-Locustox |
| Adama Ndiaye | CERES-Locustox |
| Cedric Fanoli | CERES-Locustox |
| Yaye Seynabou Ndour | CERES-Locustox |
| Boubacar Madio dit Aladiogo Maiga | LABORATOIRE CENTRAL VETERINAIRE |
| Touré Kadiatou Diarra | LABORATOIRE CENTRAL VETERINAIRE |

**Contact person from Senegal:**
Mme. Marie Ndao Sarr
Responsable Unité Chimie Environnementale
Fondation CERES-Locustox
Tél/Fax : +221 33 834 42 94/77 565 33 21
www.cereslocustox.sn

**Contact person from Mali:**
M. Boubacar Madio dit Aladiogo MAIGA
MSc. GRAVMT, Attaché de Recherche
Suppléant au Chef du Bureau Assurance Qualité
Point Focal Biosécurité & Biosûrété
Coordinateur Echantillonnage Air/Eau GMP2-Mali
Laboratoire de Toxicologie et de Contrôle de Qualité Environnementale
LABORATOIRE CENTRAL VETERINAIRE
Tél Bureau : +223 20 24 33 44 Portable :+22376145938
Bamako-République du Mali

## Annex 2. Training Manual for Senegal/Mali laboratories

The manual is attached as a separate file.