
Training Report

UN Environment Capacity Building for POPs Analysis

For Ghanaian Laboratory Personnel

at the EPA, Accra, Ghana

19 April – 27 April 2018



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Summary

The training of theory and practice of POPs analysis was very helpful for both the laboratory staff of the Environmental Protection Agency (EPA, 8 staff members) stationed in Accra and the visiting laboratory staff from the Water Research Institute (CSIR, 2 staff members) and from the Ghana Atomic Energy Commission (GAEC, 6 staff members), both also stationed in Accra. 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 a sediment sample were Soxhlet-extracted, cleaned-up and fractionated. Due to power failures GC-MS analyses could unfortunately not be performed but all calculations were done with the use of a standard set of data.

Introduction

The Ghanaian EPA in Accra is responsible for Stockholm POPs measurements in the UN Environment Global Monitoring Programme. They invited both other laboratories (CSIR and GAEC) to participate in this training because they want to join forces to create a stronger base for measuring pesticides in Ghana. This training program was a refresher course in PCB and OCP analysis for staff that had previously been trained, and presented material for the first time to new staff (see Annex 1 for participants list). The training was 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 19 and 27 April 2018. The first two days were used for the theoretical training, consisting of lectures given by Dr. Sicco Brandsma. Martin van Velzen also participated in the lecture, thus creating a lively discussion with the participants.



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 new POPs such as chlorinated paraffins. 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 QA/QC of laboratory analysis reviewing the principles of QA/QC, QA/QC tools and practice using examples relevant to POPs analysis. Sampling QA/QC, 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.

Also, a presentation was given by Ms. Saada Mohammed who is employed at CSIR and currently doing a PhD research project in cooperation with the Department of Environment & Health at the Vrije Universiteit in Amsterdam. She started a preliminary test to use silicon wristbands as passive sampler. During the course of this training she asked everybody to wear a wristband (total 7 days) and place another wristband outside the house where they live. She also asked all volunteers to fill in a questionnaire. In total around 12 people participated.

The following days, until 27 April 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-MS. This part of the training was given by VU Senior Technician Mr. Martin van Velzen. Printed manuals with procedure descriptions were given for use by the laboratory staff (Annex 2).

The hands-on training consisted of showing all steps necessary for the analysis of POPs in environmental samples. This was done by taking three types of sample matrices: PUFs (air sample), fish (tilapia) and a sediment sample. All samples were extracted and cleaned by the methods described in the training manual (see Annex 2). In short, the samples were Soxhlet extracted (PUF with dichloromethane and fish and sediment with a mixture of hexane:acetone (3:1 v/v) and subsequently cleaned with alumina (deactivated with 8% water) and fractionated with silica (deactivated with 1.5% water). The final extracts were subsequently ready for measuring by GC-MS. Also a calibration curve was prepared by the trainees in order to quantify the samples. Due to unforeseen problems with the electric power supply of the building (during three nights the power went off) we were not able to measure the samples during the training period. However, the samples were taken by the people from CSIR to be analyzed in their laboratory by GC-MS and will return after the measurements to EPA so they can perform the analysis when the problems with the power outages are solved.



During the training emphasis was put on working clean and precise. The last day a lecture was given about the procedures necessary to perform a correct calculation of the results. Because we were not able to analyze the samples prepared during this course a “handmade” dataset to do calculations was provided to the trainees. In a group session we constructed calibration curves in Excel and calculated the “samples” taking all QA/QC aspects in account.

Conclusions and recommendations

In total, 16 certificates of course completion were given at the end of the training. The trainers received positive feedback on the training. The practical part of the training was valuable to the participants who practiced techniques hands-on and learned some skills regarding GC(MS) 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 set-ups in the laboratory for extraction (Soxhlet) 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
Dr. Crentsil Kofi Bempah	GAEC
Dr. Harriet Kuranchi-Mensah	GAEC
Mr. Francis Aryeequaye	GAEC
Mrs. Beatrice Puplampu	GAEC
Mrs. Gladys Adjei	GAEC
Mr. Ibrahim Kwame Kwarteng	GAEC
Dr. Kwadwo Ansong Asante	CSIR
Ms. Grace Adoley Dartey	CSIR
Mr. Hope Smith Lomotey	EPA
Mr. Abdalla Abubakakri Siddiq	EPA
Mr. Jeremiah Asumbere	EPA
Mr. John Kofi Nyante	EPA
Mr. Michael Akwei	EPA
Mr. Godfred Savior Azaglo	EPA
Dr. Lawrence Akoto	EPA
Dr. Sam Adu-Kumi	EPA

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Annex 2. Training Manual for Ghanaian laboratory personnel

The manual is attached as a separate file.

