



RESEARCH CENTRE  
FOR TOXIC COMPOUNDS  
IN THE ENVIRONMENT (RECETOX)

## PROGRESS REPORT

### Implementation of the “GEF GMP2 project” by RECETOX in 2017 - part 1

#### Training in Kenya

PCA/2015/UNEP, DTIE, Chemicals and Waste Branch/RECETOX

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capacity building project  
on POPs monitoring (GMP2)



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## Introduction

This interim report is based on the agreement (PCA) signed between the Chemicals and Waste Branch of the UNEP (hereafter referred to as “UNEP”) and Research Centre for Toxic Compounds in the Environment (hereafter referred to as “RECETOX”), serving also as the Stockholm Convention Regional Centre for Capacity Building and the Transfer of Technology for the Central and Eastern Europe, to support capacity building activities on POPs monitoring, signed on 1 February 2016 (PCA/2015/UNEP, DTIE, Chemicals and Waste Branch/RECETOX).

The work is undertaken as a part of the implementation of the relevant parts of the UNEP/GEF project Project “GEF GMP2” GF4030-1508/1509/1510. This comprises three regional projects supporting POPs monitoring activities undertaken in nine countries of Pacific Islands (GEF 6978), seven countries of Asia Pacific region (GEF 4894), and 15 countries in Africa (GEF 4886).

Overall objective of the agreement is to support UNEP Chemicals and Waste Branch in implementing three out of four GEF projects granted to UNEP to enhance implementation of the Stockholm Convention by building capacities for POPs monitoring, providing training to laboratories and to supplement sampling materials until end of 2018.

RECETOX activities under the agreement are covering three sets of activities

activities 2.1. (as referenced in the contract) **purchase, preparation and shipment of passive samplers for ambient air POPs sampling** to each partner country in Africa, Pacific Islands, and Asia including sampling media (PUF disks),

2.3. and 3.2 (as referenced in the contract) **capacity building activities - training of laboratory experts in two countries in Africa,**

and activity laboratory analyses of samples collected by active sampling of air in Africa.

This progress report describes the work undertaken by RECETOX in the first half of 2017, from January to end of June 2017 as follows:

- POPs analysis training in/for African labs: POPs analysis training in Kenya.
- Active air sampling in Kenya and Ghana: sampling + preparation for laboratory analyses.

RECETOX also participated in a meeting of the project committee in China in April 2017, during the disclosure of results of the POPs analysis proficiency test undertaken in 2016. The Project Committee comprises representatives of the UNEP Chemicals and Waste Branch and representatives of all expert laboratories involved in the project implementation (CVUA, ITM, MTM, Laboratory in Barcelona, SCRC in Uruguay and SCRC Czech Republic (RECETOX).

Finally, there is also a two-page summary of progress in the project implementation provided in a separate document; the present report is annexed to this summary to provide further details on activities undertaken, in particular the training in Kenya.



## POPs analysis training in/for two African labs

In line with the signed agreement and activities 2.3c and 3.2.c and outcomes of the expert online meeting on 26 November 2016, the RECETOX is to train two countries experts - laboratories in Kenya and in Morocco.

Discussions on the dates and availability of the laboratories in Africa made it possible to carry out a training in Kenya between 22-25 May 2017 at the Department of Chemistry, University of Nairobi, Nairobi, Kenya.

Due to a religious period (Ramadan) and schedule of the joint meeting of the Conferences of the Parties to Basel, Rotterdam and Stockholm Convention did not allow to carry out the training in Morocco in the first half of 2017. The schedule was postponed to end of November 2017 and report of the training will thus be provided by end of 2017.



Participants of the training in Nairobi, Kenya with Dr. Roman Prokeš and Petr Kukučka, trainers from RECETOX

### Training in Kenya

The training prepared for Kenya was based on the discussions with dr. Vincent Madadi and his colleagues as well as on the information provided in the form/checklist for training needs that is reproduced in Annex 1 to this report.



Agenda of the training prepared in a close cooperation with the University of Nairobi is provided in Annex 2 and the training was scheduled from 22-25 May 2017. It comprised of both lectures, hands on sampling as well as a thorough training in the laboratory including sample clean up, extraction, volume reduction and laboratory analyses. Laboratory analyses also consisted of the maintenance of the instrument, set up of an analytical method, calibration and validation of the method and experimental run-ups of test samples. In addition, a session was also dedicated to the evaluation of results and QA/QC procedures implementation. The greatest emphasis was placed on the introduction and validation of the method to analyze brominated POPs.

Objective of the training was: advance the work to cover also PBDEs, work with GCMS-troubleshooting and operational maintenance, calibration and validation of methods

The Group of participants varied in size a bit - there were 10-15 people from University of Nairobi, mainly from Department of Chemistry.

The biggest challenge encountered were frequent power outages every day that resulted in delay of extraction steps and validation of chromatographic method, as the analytical equipment had to be restarted several times. This situation is not helping the stability of the chromatographic system and to the reproducibility of results.

RECETOX provided the following consumables for the training:

Agilent consumables:

-septa: 5190-3158 Agilent septa, Advanced Green, non-stick, 11 mm, 400/pk

-o-ring S/SL: 5190-2269 Agilent inlet liner O-ring, non-stick fluorocarbon, certified, 100/pk

-ferrules, short, 0.4 mm id, graphite/vespel (for S/SL inlet): 5181-3323

Ferrule, 0.4 mm id, 15% graphite/85%Vespel, 0.1 to 0.25 mm column, 100/pk

-ferrules, long, 0.4 mm id, graphite/vespel (for MS interface):

5062-3508 Ferrule, 0.4 mm id, preconditioned for MSD interface, 15%

graphite/ -85% Vespel, 0.25 mm column, long, recommended Agilent GC/MS

transfer lines with MS interface column nut, p/n 05988-20066, 10/pk

-gold plated seal: 5190-2209 Agilent GC inlet seal, gold plated, with

washer, 10/pk

-Syringe 10 uL for 7673/7683/7693 autosampler: 9301-0725 ALS Syringe, 10µl straight, fixed needle, 23/42/cone, 6/pk

-filament EI: G7005-60061 Filament, high temperature, EI ion source  
a multiplier for Agilent MS systems.

Restek consumables:

-liners, sky, double cyclo for S/SL inlet Agilent: 23310.5 Topaz 4.0 mm

ID Cyclo Double Taper Inlet Liner

columns for GC:

pesticides and PCBs : SGE HT8 column 60mx0,25mmx0,25um.





For PBDEs (including BDE 209): Restek RTX-1614 column 15mx0,25mmx0,1um.

Standard solutions for calibration of analytical method on GC-MS: OCP, PCB, PBDEs (and PAHs) and vials with inserts or high recovery conic vials.

These consumables above were shipped to Kenya prior the training via DHL, but it was very difficult to clear some boxes from the customs.

In addition, a list of further items to be purchased for Kenya for further use during the GMP2 project was discussed and prepared in the margins of the training and Kenya was to send it to coordinator of the procurement in the GMP-2 project (Örebro, Heidi Fiedler).



On sampling - we covered all core topics - air both passive and active sampling including sampler maintenance, storage and troubleshooting. Moreover, we sampled water in Nairobi and surroundings as well as ran a test sample by active sampler.

In addition, standard operating procedures for sampling of air by passive samplers and active sampler were provided as well as training videos for sampling air and water were screened and provided to training participants on USB disks for later reference and use.

Finally, both the trainers and participants of the training were asked to fill in relevant questionnaires on the training components, approach and performance. The questionnaires are reproduced in Annex 3 - first by participants (3a) and second by RECETOX trainers (3b).



There were eight participants receiving the training in its full scope and some other members of the Department of Chemistry who participated in the lectures or demonstration part of the training only. A list of participants is provided in Annex 4.

The participants comprised from lecturers to technicians and laboratory staff that is also responsible for working/implementing GMP2 in Kenya. Overall, understanding of the national coordinator is excellent (it has to be, as he is coordinator of the POPs monitoring in Africa and a very experienced chemist in the field of POP sampling and analyses).

There were less women than men (3 vs 6 of those who participated 95% of time) and the participation in lectures were predominantly male.

## Evaluation of the Training

Traditionally, RECETOX asks both the participants and trainers to evaluate the course of the week. These opinions are provided in Annex 3.

Questionnaire for Participants contains a set of ten questions that are collecting information on the field of expertise of the participant and main work content as well as their involvement in implementation of the Stockholm Convention nationally. In addition, there were questions on the overall training set-up, quality of the trainers as well as substantive matters. Filled questionnaires are reproduced without changes Annex 3a.

Questionnaire for Trainers strives to assess the level of knowledge before the training and afterwards and it is evaluated by trainers (anyone involved in contact/interaction with Macedonian experts during the training). The questionnaire is divided into three sections (Lecture Part, Sampling or sample treatment (clean-up/extraction) + relevant hands on and Chemical analysis and data management + relevant hands on) and each lecturer filled all sections. Filled questionnaires are provided in Annex 3b.





## Active air sampling in Kenya and Ghana - preparation for laboratory analyses

This part of the report contains a brief summary of work undertaken in 2017 regarding sampling by active samplers and preparation for laboratory analyses. Active air sampling is undertaken by low volume samplers Leckel LV6. There are two sites, one is in Chiromo Campus in Nairobi and the other is located in the premises of the Ghana Atomic Energy Commission, National Nuclear Research Institute operated by the Nuclear Chemistry and Environmental Research Center at East Legon in Accra, Ghana.



Operating active sampler - Kenya (photo by RECETOX)



The samples are taken regularly in line with the standard operating procedure / sampler handling manual that is part of the SOP submitted for comments to other expert laboratories in December 2016. So far no comments were received to the SOP contents.

The GMP2 project requires receiving 5 samples from each sampling site per year and analysis of all Stockholm Convention POPs will be undertaken. The design of the sampling head allows to take sample allowing analysis of both OCPs and brominated POPs and dioxins in one sample (however, the pretreatment steps do need to follow a particular sequence).

Sampling is ongoing at both sites, however the site in Kenya started with a delay, due to malfunctioning equipment that needed to be shipped back to Europe for maintenance. The sampler was re-installed and calibrated during the training in May and is working from that moment on. Samples from both sites for first half of the year would be shipped to RECETOX together with samples collected for a feasibility study on photovoltaic active sampler by end of summer 2017, second half of the year would be shipped together with samples collected for MONET program in spring 2018. Analyses of samples would take place subsequently.





## Conclusions

This report provided description of activities undertaken by RECETOX in implementation of the agreement with UNEP Chemicals and Waste Branch.

All activities undertaken by RECETOX were implemented in accordance with the Implementation Plan and agreed GEF-GMP2 project timeline (as endorsed by steering committee meeting in Ghana in July 2016).

As provided above, implementation of the training activity is ongoing. The first training, however is successfully completed.

It took place in Kenya 22-26 May 2017, University of Nairobi, Department of Chemistry. RECETOX delivered some spare parts/consumables for gas chromatography analyses, sample clean-up and spare chromatographic columns.

We also brought standard operating procedures for active sampling/sampler handling, passive sampling of air and water (including demonstration videos in English covering sample preparation, deployment and use for later reference of participants), provided training in collecting soil samples as well as trained participants in laboratory work - air and water samples clean up by using Soxhlet extraction as well as SPE (solid phase extraction for water samples).

Significant portion of work was devoted to the work with GC-MS, its calibration, run of standard solutions and validation of a method for PBDE analysis. In addition, part of work was devoted to improvement in QA/QC management as well as in work with generated information and data management.

The result of the training is nine trained experts. They strengthened their personal knowledge and capacity in POPs sampling, pre-treatment, analyses, and improved their use of internal standards and filing and filing/working with protocols/sample records as well as with proper data management. The result is 9 trained experts despite the difficulties faced such as difficulty to clear material necessary for the training as well as frequent power outages on site so the analytical part was especially challenging (due to non-stability of the analytical system).

Finally, as shown above, activity 2.4 c (analyses) is still to take place. The sampling is ongoing by using Leckel LV6 samplers located in Nairobi, Kenya and GAEC, Legon - Accra, Ghana from early 2017. A first batch of samples reached RECETOX in end June 2017 from Ghana. Analyses will be performed once all samples collected in 2017 will be at RECETOX. This is expected to take place by end of 2017 or early 2018.



## Annex 1 Check-list for training demand in Kenya

This annex contains a filled document provided by Kenya that defines its needs for the training.

### 1 Check List

Prepared by: [Prof. Shem O. Wandiga, Department of Chemistry, University of Nairobi]

Date the form was filled out: 30<sup>th</sup> July 2016

#### 1. GENERAL

Name of Laboratory:	POPs and Pesticides Research Laboratory, Department of Chemistry, University of Nairobi.
Address of Laboratory:	Department of Chemistry, School of Physical Sciences, College of Biological and Physical Sciences, University of Nairobi, P. O. Box 30197-00100, Nairobi, Kenya.
E-mail:	<a href="mailto:wandigas@uonbi.ac.ke">wandigas@uonbi.ac.ke</a>
Phone:	+254 020 4446138
WebPage:	<a href="http://chemistry.uonbi.ac.ke/">http://chemistry.uonbi.ac.ke/</a>
Contact person:	Prof. Shem O. Wandiga

#### 2. TECHNICAL PART - EXISTING CAPACITY TO ANALYZE POPs

##### 2.1. Description of the Laboratory:

###### 2.1.1. Name and address of the institution hosting the Laboratory

Department of Chemistry, School of Physical Sciences, College of Biological and Physical Sciences, University of Nairobi, P. O. Box 30197-00100, Nairobi, Kenya.

1

This check list has been prepared by the expert back-up laboratories as a self-assessment of laboratories participating in the UNEP/GEF projects to support the implementation of the Global Monitoring Plan. The information provided will assist to develop the programme for the hands-on training in the developing country laboratory. It is intended to obtain a better idea of the actual working conditions of the POPs laboratories and what would be necessary to improve their contribution to a sustainable POPs monitoring. The information therein adds to the data already contained in the UNEP POPs Laboratory Databank.





## 2.1.2. Main activity of the Laboratory

Research and Teaching Laboratory

## 2.1.3. Economic resources/main incomes of the laboratory

- 1) Research projects
- 2) University of Nairobi
- 3) Consultancy

## 2.1.4. Present role in relation to the Stockholm Convention on POPs, other MEAs or regional agreement

The POPs and pesticide laboratory at the Department of Chemistry has a long history of training postgraduate students in sampling, sample preparation and analysis of Pesticides in Kenyan Environment. It is the designated laboratory by the ministry of environment for POPs analysis and capacity building activities.

Members of the Department of Chemistry University of Nairobi, who are also members of the POPs & Pesticide research laboratory, have been in charge coordinating the implementation of the Global Monitoring Plan since 2008. In the process they have also spearheaded the drafting of the first Africa Regional POPs monitoring report in 2009 and the Second Africa POPs regional POPs Monitoring report in 2015. The drafting workshops for the first and second Africa POPs regional monitoring reports were held at the University of Nairobi in 2008 and 2014.

The Department of Chemistry staff members have also been involved in coordinating the ambient air and in Africa under the MONET Africa which is implemented by the RECETOX, Masaryk University Brno, Czech Republic and the mothers' milk sampling.

The POPs and pesticide laboratory participated in the project for assessment of existing capacity for analysis of POPs in Developing countries in 2007. It also participated in the UNEP/GEF GMP1 project in 2010/2011. It is the central University laboratory committed to POPs and pesticide analysis and reference laboratory for Environmental analysis of POPs under the National Environment Management Authority.

Currently the laboratory is one of the key laboratories in Kenya certified for analysis of Physico-chemical parameters for Pesticide registration in Kenya.

## 2.1.5. Analytical work in collaboration with other laboratories

The Department of Chemistry POPs laboratory has been involved in both local and regional collaboration projects in Africa. The staff members of the laboratory have hosted the Africa Network for analysis of Chemical Pesticides (ANCAP) training. They have also hosted the National trainings on analysis of Pesticides to build capacity for national analytical laboratories. Department currently hosts the Africa Central Analytical Laboratory for Equatorial Africa Deposition Network.

## 2.1.6. Any needs or follow-up from this self-assessment?

The laboratory needs to continue strengthening the analytical capacity for analysis of POPs pesticides, PCBs and PBDEs. Whereas the POPs pesticides and PCBs are analysed on routine basis, the laboratory seeks to expand analytical capacity to include PBDEs to enhance its capacity for POPs parameters. It also seeks to



participate in international inter-laboratory proficient analysis to monitor and assess her performance and the quality of data generated. It is continuously working on improving the capacity to become a regional centre for Chemicals analyses in line with the University overarching vision to become a World Class Centre of Excellence in pursuit of knowledge generation, preservation, dissemination and application in Science and Technology.

## 2.2. Analytical quality issues

### 2.2.1. Which matrices and POPs are analysed in the Laboratory and with which separation/detection system?

Please use the following abbreviations and the table below and expand as appropriate.

For the groups of POPs: Organochlorine pesticides – OCPs

Polychlorinated biphenyls – PCB; polybrominated flame retardants – BFR  
dioxin-like POPs (PCDD, PCDF, dl-PCB) - dl-POPs;  
perfluorinated alkylated chemicals - PFAS

Extraction methods: C = Supercritical fluid (SFE) D = Dilution F = Solid phase (SPE)  
L = Liquid/liquid M = Microwave P = Pressurized fluid (PFE)  
S = Soxhlet U = Ultrasonic

Separation: Capillary gas chromatographic column (please specify length, type) - HRGC  
Liquid chromatographic column (please specify) – HPLC or UPLC

Detector: ECD LRMS MS/MS TOF MS HRMS

Matrix type	POP(s)	Extraction methods	Separation	Detector
<b>Abiotic</b>				
Abiotic – air	OCPs, PCB, dl-PCB	S	HRGC- 30 m, 60 m	ECD, LRMS
Abiotic - water	OCPs, PCB, dl-PCB	L, SPE	HRGC- 30 m, 60 m	ECD, LRMS
Abiotic – other: soil, sediments, food stuff,	OCPs, PCB, dl-PCB	S	HRGC- 30 m, 60 m	ECD, LRMS
				ECD, LRMS
<b>Biota</b>				
Biota - human milk	OCPs, PCB, dl-PCB	S	HRGC- 30 m, 60 m	ECD, LRMS
Biota – other: Fish, vegetables	OCPs, PCB, dl-PCB	S	HRGC- 30 m, 60 m	ECD, LRMS





### 2.2.2. Please provide approximate number of samples analysed *per class* of POPs in 2015

OCP- 1,000 Samples

PCB- 200 Samples

dI-PCBs -200 Samples

### 2.2.3. Is there any quality system in the Laboratory if so, which? Who is responsible?

The Laboratory does not have ISO 17025 certification.

However the University is ISO 9000 certified. The University Directorate of Quality Assurance Division was established to ensure QA within the service departments in the university. The directorate ensures development and implementation of Quality Assurance Policy and Procedures for monitoring the programme quality and that of delivery processes, and general Quality Assurance matters.

### 2.2.4. Does the Laboratory use standardised methods or own validated methods? (Please specify)

Yes

For specific pesticides, the laboratory applies EPA standard methods of analysis.

However for POPs analysis the Laboratory applies in-house method adapted from IVM-VU University during the GMP1 project. The method covers analysis of air, soil, sediments, fish and mothers milk.

### 2.2.5. Does the Laboratory apply blank tests? (Please specify)

Yes

Matrix blanks

Method blanks

Instrument blanks.

### 2.2.6. Does the Laboratory carry out recovery tests? (Please specify)

Yes

Spike recovery of standards

Surrogate recoveries.



2.2.7. Does the laboratory carry out performance tests of the equipment?  
(Please specify)

Yes

Blank test

Repeatability tests

2.2.8. Does the Laboratory use certified reference materials or laboratory  
reference materials? (Please specify)

Yes

Sediment CRM

Fish CRM

2.2.9. Does the Laboratory take part in interlaboratory studies?

Yes

International Atomic Energy agency inter-calibration studies.

UNEP inter-laboratory comparison studies.

2.2.10. Are there written method descriptions and instructions? Please describe  
location, accessibility, updating procedures.

Yes

The methods are kept in the laboratory reference materials cabinets.

2.2.11. How has the laboratory validated its methods? (Please specify)

Yes

By running spike recoveries and CRM through all the steps in the method for sample preparation and analysis. Individual steps for sample preparation are validated by spiking the standards and determining the recoveries.

By running replicate samples.



## 2.3. Documentation

### 2.3.1. Does the Laboratory have routines for documentation of:

#### 2.3.1.1. *Commissions and projects*

Yes :

Commissioned projects and grants are kept in files separately from the laboratory by the Department administrator.

Analytical reports are kept in the Laboratory computer, hard disks, while hard copies are filed in box files.

#### 2.3.1.2. *Sampling procedures*

Yes : The Laboratory follows formal sampling procedures for different matrices which are documented and filed in the laboratory.

#### 2.3.1.3. *Registration and storage of samples*

Yes :

All samples that come to the laboratory are recorded in the laboratory sample log book.

The logbooks also show the sample matrix, date of entry to the laboratory, contact person, sample storage, date of extraction, cleanup and analysis.

Sample storage is done in the chest freezers at -18°C and the refrigerators at 4 °C for water samples.

#### 2.3.1.4. *Analytical methods*

Yes .

POPs like OCPs, PCBs and dl-PCBs are analysed following in house method adapted from IVM-VU University during the GMP1 training.

The laboratory applies EPA methods for different pesticides analysed in the laboratory.

#### 2.3.1.5. *Analytical work/activities*

Yes

All analytical activities are recorded in a separate logbook which shows the date of activity, for instance standard preparation dates, concentrations by volume and weight and internal standards used.

#### 2.3.1.6. *Instrumental issues*

Yes



Each instrument has a logbook for registration of all activities carried out. These include instrument status, sample matrices and methods used, method parameters & analytes, calibration conditions, gases pressures and instrument error logged.

### 2.3.1.7. *Result reports*

Yes .

The results are stored in the computers, hard disks, and printed copies which are stored in box files and theses.

### 2.3.1.8. *Operational costs*

Yes

The operational costs for the instruments are documented and stored in box files. These include quotations, invoices and receipts for purchases.

### 2.3.1.9. *Validation and performance results*

Yes

Before embarking on analyses, the instruments are calibrated using standards, blank samples and calibration standards.

### 2.3.2. How are these documents filed?

- 1) Hard copies are filed in the box files.
- 2) Soft copies are stored in Computer and external hard disks.

### 2.3.3. Is there a laboratory information management system (LIMS)?

No.

But we use excel files to track the laboratory processes.

## 2.4. Laboratory space/premises

### 2.4.1. Is the Laboratory (space) used in this GMP project shared with another activity?

No.

The space dedicated to POPs analysis is about 100 m<sup>2</sup>. Whereas the laboratory is used hosted in the Department of Chemistry University of Nairobi and is used for training postgraduate students, their area of specialisation remains on POPs and pesticides research and analyses.



## 2.4.2. Is the laboratory free from external disturbances such as temperature, humidity, vibrations, energy supply, etc.?

Yes.

There is no extreme temperature and humidity experience in the laboratory. In addition the GC/MS is in an air conditioned room, whereas the GC/ECD room is not air conditioned but there is effort to get all instrument rooms air conditioned. There are no vibrations experienced in the laboratory.

The laboratory has 24 hour power supply from the Department of Chemistry. There is also the college generator to provide power backup in case of electricity power failures. However, recently the college generator developed fault, but efforts are being made to correct the problem. The GC/MS operates on the 5 KVolt UPS and similar efforts are being made to have the GC/ECD run on UPS.

## 2.4.3. Is the laboratory space adequate for organic trace analyses?

### 2.4.3.1. *Hoods*

Yes

The laboratory has one fume hood where extraction takes place. There laboratory is also connected to the Department of Chemistry fume hoods/ventilation systems that connects all laboratory within the Department.

### 2.4.3.2. *Materials free of contaminants*

Yes

The laboratory is divided into sample preparation room and two separate rooms for GC/MS and GC/ECD instruments. Samples are taken to the analytical rooms only after they have been processed for analysis.

Samples are stored in different freezers and refrigerators to void contamination in the laboratory. In addition, there are separate refrigerators to storage of standards and sample extracts.

### 2.4.3.3. *Sample storage*

Yes

There are three different chest freezers, and four refrigerators for storage of the samples based on matrices. Air samples are stored separately from the solid samples such as soils, sediments and fish.

### 2.4.3.4. *Chemicals' storage*

Yes

The laboratory chemicals are stored in laboratory cabinets. Bulk chemicals are stored separately in the Departmental chemical store.



#### 2.4.3.5. *Laboratory safety regulations*

Yes

Laboratory has safety regulations posted within the laboratory. Within the Department, the overall safety is managed by the college safety committee.

#### 2.4.3.6. *Is the access to the laboratory regulated?*

Yes

Laboratory access is highly controlled and is limited to students and staff working under the research group.

### 2.5. Laboratory personnel

#### 2.5.1. Is the personnel familiar with QA/QC?

Yes

The student and staff working in the laboratory are trained on QA&QC while working in the laboratory.

#### 2.5.2. Are there routines for training the personnel?

Yes

The staff and students working in the laboratory are trained routinely within the University and also participate in national training workshops and international training workshops.

#### 2.5.3. Are there specific qualification requirements for the personnel?

Yes.

All staff in the laboratory have at least MSc. Degrees and above and the students are mainly masters and PhD students. Undergraduate students working on POPs projects work under close supervision.

#### 2.5.4. Are there job descriptions for the personnel?

Yes.

The laboratory staff and employees of the Department of Chemistry, University of Nairobi. Each staff has clear Job description.

#### 2.5.5. Is there documentation on the qualifications of the personnel?

Yes

The laboratory personnel are members of academic or technical staff of the Department of Chemistry, University of Nairobi. All academic staff have Masters Degrees and above





### 2.5.6. Are the personnel resources sufficient?

Yes.

We sufficient personnel, six academic members of staff with masters and PHD degrees working on POPs. We also have 3 technical members of staff who are involved in the research group and several PhD and Msc. Students who are over 10.

We are consistently looking for research grants to boost our research activities. We also get financial resources from the University who cater for salaries of the staff, utility bills and general administrative & financial support.

We are also involved in consultancy services and postgraduate research grants which generate additional resources to sustain the operational costs of the laboratory.

## 2.6. Equipment

### 2.6.1. Is there extraction equipment for POPs analyses (Please specify):

[In addition to narrative, please attach a photo]

Yes

We use manual Soxhlet extraction system for solid samples.



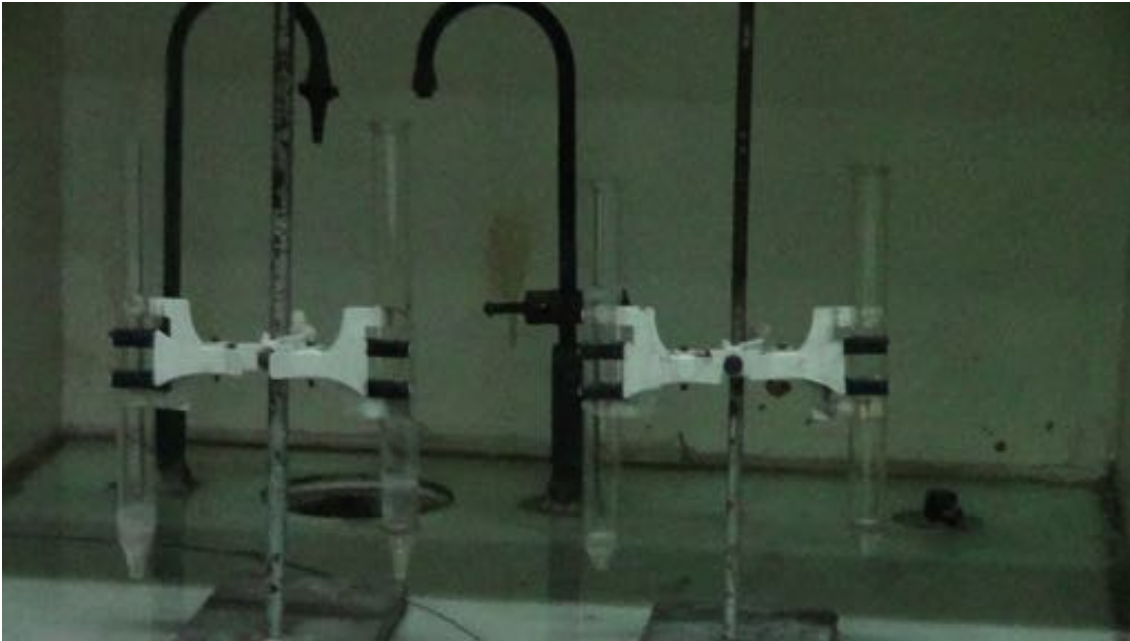
### 2.6.2. Is there clean-up equipment for POPs analyses? (Please specify)

[In addition to narrative, please attach a photo]

Yes



We used alumina cleanup using chromatographic columns.



2.6.3. Which equipments (please modify where necessary<sup>2</sup>) are used for POPs analysis:

[In addition to narrative, please attach a photo]

HRGC and HRGC/LRMS

2.6.3.1. *HRGC/ECD [instrument/model] for analysis of:*

Yes. Agilent 6890N with  $\mu$ ECD used for analysis of OCPs, PCBs and dl-PCBs.

---

2

Such as GC/GC, MS/MS, TOF-MS, etc.



*2.6.3.2. HRGC/MS [instrument/model] for analysis of:*

Agilent 6890- 5872-2 MS used for analysis of OCPs, PCBs and dl-PCBs.

We would like to advance to analysis of PBDEs.



*2.6.3.3. HRGC/HRMS [instrument/model] for analysis of:*

N/A



#### 2.6.3.4. LC-MS/MS [instrument/model] for analysis of:

N/A

#### 2.6.4. How is the technical service of the instruments organized?

The instruments are serviced locally by the department staff. In case of a major problem, there are local agents for the manufacturers who are called for service.

#### 2.6.5. Are there plans to buy new equipment for POPs analyses? Or is there an urgent need for some equipment?

We would wish to increase the resolution of our analyses to Dioxins and furans that require HRGC/HRMS. However, currently there is no immediate plan to buy new higher resolution equipment.

We are currently expecting a second HRGC/LRMS to our research group through our international research collaborations. With the HRGC- $\mu$ ECD and HRGC/LRMS we can analyse OCPs, PCBs and we hope to start analysis of PBDEs soon. We hope that by end of 2016 when we receive the additional equipment, we will be able to dedicate one equipment to POPs parameters only while the other will be used for pesticides and hydrocarbons.

## 2.7. Spares

#### 2.7.1. Do you experience difficulties with supply of spare parts?

Yes.

The major difficulty is to do with delays in procurements and shipping of spares from abroad. Basically it takes 2-6 months to clear processing and shipping of spare parts from Europe or USA. This demands advance financial resources so that procurements can start ahead of time.

#### 2.7.2. Is there an urgent need of some spare parts?

Yes

We need some GC-ECD and GC/MS spares which include:

- 1) GC/MS & GC/ECD capillary columns
- 2) Diffusion pump
- 3) Filaments
- 4) Ferrules and septa
- 5) Liners and gold seals
- 6) Syringes



- 7) Syringes or digital pipettes and tips
- 8) Cleanup and fractional columns
- 9) Autosampler vials with inserts
- 10) Standard solutions: OCPs, PCBs, dl-PCBs and PBDEs standard solution mixtures

## 2.8. Methods/procedures used for POPs analysis

Please briefly describe which methods/procedures are used in the laboratory, *e.g.*, by name of the method such as EPA 8082 (and essential steps, materials)

We apply an in-house method adapted from IVM- VU University. The major steps include:

- 1) Extraction by Soxhlet method- extraction by hexane: acetone 3:1 for 16 hours.
- 2) Concentration by rotary evaporation
- 3) Cleanup by alumina column
- 4) Fractionation by deactivated silica column using hexane and diethyl ether/hexane.
- 5) Analysis by GC/ECD or GC/MS, capillary column

## 2.9. Additional Comments on 2.1-2.7

- 1) We would really wish to increase the through put of our extraction systems and we are looking for automatic Soxhlet system to help us increase the number of samples per day.
- 2) We are looking for collaborations that can help us with a HRGC/HRMS to expand our scope of analyses to dioxins/furans.
- 3) We would like to advance to analysis of PBDEs. Particularly to start off would like to get PBDE standard solutions.

## 3. TECHNICAL PART - CAPACITY BUILDING/TRAINING NEEDS

Based on the response to the above questions an evaluation will be made and the needs for capacity building/training in your laboratory will be specified.

Preferred dates for the hands-on training (initial): \_\_April/May 2017\_\_

### 3.1. Laboratory infrastructure where the training will be held

Sample preparation procedures: POPs & pesticide research laboratory, Department of Chemistry, University of Nairobi.

Clean-up equipment: POPs & pesticide research laboratory, Department of Chemistry, University of Nairobi.



Separation: POPs & pesticide research laboratory, Department of Chemistry, University of Nairobi.

Detection: POPs & pesticide research laboratory, Department of Chemistry, University of Nairobi.

### **3.2. Number/qualification of persons to be trained**

[Please indicate when staff from more than one laboratory will participate]

8 personnel.

Minimum- BSC. Degree.

### **3.3. Matrices/sample types**

Air, Mothers' Milk, Fish and sediments.

### **3.4. POPs**

OCPs, PCBs, dl-PCBs and PBDEs.

### **3.5. Narrative**

## **4. ADDITIONAL COMMENTS**

[Please provide information you feel necessary to know before starting preparation of the training]





## Annex 2 Agenda for the training in Kenya

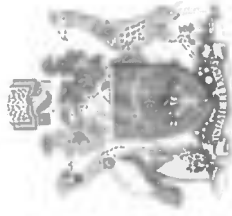
This annex contains agenda for the training prepared in cooperation of RECETOX and Department of Chemistry (6 pages).



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<p>UNEP GEF GMP2 TRAINING WORKSHOP, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NAIROBI, 22<sup>ND</sup> -26<sup>TH</sup> MAY 2017, NAIROBI, KENYA PROGRAMME DAY ONE, MONDAY 22<sup>ND</sup> MAY 2017</p>		
<p><b>SESSION 1 TIME 08:00 AM - 10:00 AM- OPENING SESSION</b></p>		
<p>08:00-09:00 AM : ARRIVAL AND REGISTRATION 09.00-09.40 AM : OPENING REMARKS BY THE DEPARTMENT OF CHEMISTRY 09.40-10:00 AM : GROUP PHOTOS AND TEA BREAK</p>		
<p><b>SESSION 2 TIME 10:00 AM - 13:00 PM</b></p>		
<b>TOPIC: air sampling</b>	<b>LEAD PERSON</b>	<b>VENUE/ROOM</b>
Active air sampling:	Roman Prokeš	Lab134/Room115
-middle volume air sampler Leckel MVS6		
-low volume air sampler Baghirra LVS15-FV with photovoltaic panels		
<p><b>LUNCH BREAK 13:00 PM-14:00</b></p>		
<p><b>SESSION 3: TIME 14:00 PM -16:00 PM</b></p>		
Sampling plan for next year	Roman Prokeš	Lab134/Room115
<p><b>TEA BREAK 15:50 PM-16:20 PM</b></p>		
<p><b>SESSION 4: 16:20 PM -17:00 PM</b></p>		
Data analysis	Roman Prokeš	Lab134/Room115
<p><b>DAY 1 CLOSING REMARKS</b></p>		



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**UNEP GEF GMP2 TRAINING WORKSHOP, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NAIROBI, 22<sup>ND</sup> - 26<sup>TH</sup>  
MAY 2017, NAIROBI, KENYA  
PROGRAMME**

**DAY TWO, TUESDAY 23<sup>RD</sup> MAY 2017**

**SESSION 5 TIME 08:30 AM - 10:30 AM**

TOPIC	LEAD PERSON	VENUE/ROOM
Laboratory instrumental training, GC maintenance, diagnostics	Petr Kukučka	Lab134/Room115
Spot water sampling -5 sites (all day long)	Roman Prokeš	Lab134/Room115

**TEA BREAK 10:30 AM-11:00 AM**

**SESSION 6 TIME 11:00 AM - 13:00 PM**

Laboratory instrumental training, MS maintenance, diagnostics	Petr Kukučka	Lab134/Room115
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**LUNCH BREAK 13:00 PM-14:00**

**SESSION 7: TIME 14:00 PM -15:50 PM**

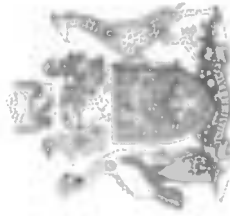
Laboratory instrumental training, MS maintenance, diagnostics	Petr Kukučka	Lab134/Room115
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**TEA BREAK 15:50 PM-16:20 PM**

**SESSION 8: 16:20 PM -17:00 PM**

Laboratory instrumental training, summary	Petr Kukučka	Lab134/Room115
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**DAY TWO CLOSING REMARKS**



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UNEP GEF GMP2 TRAINING WORKSHOP, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NAIROBI, 22 <sup>ND</sup> -26 <sup>TH</sup> MAY 2017, NAIROBI, KENYA PROGRAMME DAY THREE, WEDNESDAY 24 <sup>TH</sup> MAY 2017		
TOPIC	LEAD PERSON	VENUE/ROOM
Laboratory instrumental training, MS tune, checking proper operation, QAQC	Petr Kukučka	Lab134/Room115
Sample preparation – SPE (solid phase extraction)	Roman Prokeš	Lab134/Room115
<b>TEA BREAK 10:30 AM-11:00 AM</b>		
<b>SESSION 10 TIME 11:00 AM - 13:00 PM</b>		
Laboratory instrumental training, GC-MS acquisition method set up	Petr Kukučka	Lab134/Room115
SPE extraction	Roman Prokeš	
<b>LUNCH BREAK 13:00 PM-14:00</b>		
<b>SESSION 11: TIME 14:00 PM -15:50 PM</b>		
Laboratory instrumental training, GC-MS acquisition and processing method set up	Petr Kukučka	Lab134/Room115
SPE extraction	Roman Prokeš	Lab134/Room115
<b>TEA BREAK 15:50 PM-16:20 PM</b>		
<b>SESSION 12: 16:20 PM -17:00 PM</b>		
Laboratory instrumental training GC-MS processing method set-up	Petr Kukučka	Lab134/Room115
<b>DAY THREE CLOSING REMARKS</b>		



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<p>UNEP GEF GMP2 TRAINING WORKSHOP, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NAIROBI, 22<sup>ND</sup> -26<sup>TH</sup> MAY 2017, NAIROBI, KENYA PROGRAMME DAY FOUR, THURSDAY 25<sup>TH</sup> MAY 2017</p>		
<b>SESSION 13 TIME 08:30 AM - 10:30 AM</b>		
<b>TOPIC</b>	<b>LEAD PERSON</b>	<b>VENUE/ROOM</b>
Laboratory sample prep training, PBDEs analysis	Petr Kukučka, Roman Prokeš	Lab134/Room115
<b>TEA BREAK 10:30 AM-11:00 AM</b>		
<b>SESSION 14 TIME 11:00 AM - 13:00 PM</b>		
Laboratory sample prep training, PBDEs analysis	Petr Kukučka, Roman Prokeš	Lab134/Room115
<b>LUNCH BREAK 13:00 PM-14:00</b>		
<b>SESSION 15: TIME 14:00 PM -15:50 PM</b>		
Laboratory sample prep training, PBDEs analysis	Petr Kukučka, Roman Prokeš	Lab134/Room115
<b>TEA BREAK 15:50 PM-16:20 PM</b>		
<b>SESSION 16: 16:20 PM -17:00 PM</b>		
Laboratory sample prep training, PBDEs analysis	Petr Kukučka, Roman Prokeš	Lab134/Room115
<b>DAY FOUR CLOSING REMARKS</b>		



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UNEP GEF GMP2 TRAINING WORKSHOP, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NAIROBI, 22<sup>ND</sup> -26<sup>TH</sup>  
MAY 2017, NAIROBI, KENYA  
PROGRAMME  
DAY FIVE, FRIDAY 26<sup>TH</sup> MAY 2017

**SESSION 17 TIME 08:30 AM - 10:30 AM**

TOPIC – Information Dissemination and Capacity Building Workshop to Enhance Capacities for Monitoring of Toxic Compounds in Ambient Air in Africa	LEAD PERSON	VENUE/ROOM N
Introduction and objective of the workshop	Kateřina Šebková	Room115
Overview of ongoing long-term air monitoring activities in Africa - implementation of the Global Monitoring Plan	Kateřina Šebková	Room115

**TEA BREAK 10:30 AM-11:00 AM**

**SESSION 18 TIME 11:00 AM - 13:00 PM**

MONET in Africa		Room115
Training video available for MONET		Room115
Active versus passive air sampling – calibration study	Petr Kukučka	Room115

**LUNCH BREAK 13:00 PM-14:00**

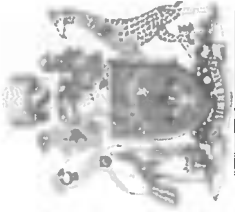
**SESSION 19: TIME 14:00 PM -16:00 PM**

Lessons learned from using the active sampler for air sampling	All	Room115
Introduction to a new tool - photovoltaic sampler	Roman Prokeř	Room115

**TEA BREAK 15:50 PM-16:20 PM**

**SESSION 20: 16:30 PM - 17:00 PM**





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	New monitoring activities in Africa	Kateřina Šebková	Room115
	Introduction to a new training video - water sampling	Kateřina Šebková	Room115
	Discussion	All	
	<b>WORKSHOP CLOSING REMARKS AWARD OF CERTIFICATES END OF THE WORKSHOP</b>		
			Room115



## Annex 3 Questionnaires - Evaluation of the training

### part 3a) Participants

This annex contains questionnaires filled by training participants (limited to those who participated in majority of the sessions - 9 participants (18 pages) and two trainers ( 13 pages).

These are reproduced without changes.



# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional):

Florence Masese

1. What was the most **valuable/important** for you in this training?

The Hand-On experience training on how to handle the GC/MS instrument

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

The running of the GC/MS; the sources of error, Tuning, Calibration, integration; and Actual setting of GC/MS machine

3. Can you comment on agenda /methods/approach used in the training?

Agenda

The Agenda for the workshop was a brilliant idea. Gives a headstart for students who want to do air sampling.

Methods

The method given were educative and an eye opener. Other alternative methods like of extendable water sample, we usually get into a boat to get water from amber bottles.

Approach

A bit of theory before the practical would have made it a bit easier.

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

Practical training:

Very helpful. I wish we would actually have a theory lesson on this before the actual practical training.



**Hands on:**

More in this area, maybe more people should go through handling of equipment to practice knowledge as well.

**Discussion:**

Most of our questions were answered and I was happy with the way Peter communicated his knowledge.

**5. Any message to your lecturers and trainers**

Thank you very much for sharing your knowledge and making us know more about analysis of Pops / PBDE compounds using GC/MS.

Thank you for taking time to complete the questionnaire - RECETOX team

---



# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional):

1. What was the most **valuable/important** for you in this training?

— information on GC-MS working method  
Validation steps and <sup>stat</sup> result interpretation

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

GC-MS-Tuning and maintenance  
Sample collection for water and sample preparation  
by SPE

3. Can you comment on agenda /methods/approach used in the training?

Agenda

The agenda to build capacity on POPs, PBDEs, analysis is very right for our university and region

Methods

Hands on method intended was okay, though some limitation in machine access and power interruptions

Approach

The approach by trainers is commendable!

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

**Practical training:**

Was very appropriate for the capacity building for the manpower.



**Hands on:**

Very useful in building confidence in the trainees.

**Discussion:**

Protocols/procedures should have been provided alongside the training.

**5. Any message to your lecturers and trainers**

Am grateful to them, and ask them to keep in touch with us for more capacity building in our university.

Thank you for taking time to complete the questionnaire – RECETOX team

---





# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional):

1. What was the most **valuable/important** for you in this training?

GC-MS Training  
Water and Air Sampling  
Sample Preparation.

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

Water pollutants (pop)  
Handling ~~and~~ Sampling equipments, ~~A~~ Mounting and dismounting  
of the air sampler ~~etc.~~

3. Can you comment on agenda /methods/approach used in the training?

Agenda Well thought of

Methods Hand on activities that give a first hand experience

Approach Well handled but due to power outages and  
little allocated time ~~some~~ agendas were rushed.

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

**Practical training:**

- Very helpful
- Give some background theoretical approach to bring everyone to a comparatively same level.





**Hands on:**

*Well done*

**Discussion:**

*Well handled.*

**5. Any message to your lecturers and trainers**

- *Work well done*  
*Continue with the partnership to ensure the experience gained builds the capacity of the involved person and the institution they represent.*
- *Increase the length of the training in order to comprehensively handle all the agenda prepared.*

Thank you for taking time to complete the questionnaire – R/CETOX team

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# Evaluation Questionnaire for Participants

## Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional):

1. What was the most **valuable/important** for you in this training?

+collecting water samples from the river and using the

cartridge for filtration and HPLC to analyze  
+ moreover the GC machine to learn how to work with

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

sample preparation, finding different way/information on analyzing the POPs, working with GC machine.

3. Can you comment on agenda /methods/approach used in the training?

Agenda

it was OK for me in this case

Methods

it was much better if ~~for~~ we could do some activities to get in touch much more with different

Approach

N/A

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

it was mentioned above to do some practical

Practical training: activities . . .



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**Hands on:**

**Discussion:**

5. Any message to your lecturers and trainers

*I thank to the trainers who answered all the  
Questions very friendly and completely!*

*Good luck.*

Thank you for taking time to complete the questionnaire – RECETOX team

---



# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional):

1. What was the most **valuable/important** for you in this training?

- Information on the running of the GC/MS  
how to develop the Methods for analysis
- Sample Preparation was also important

sample handling  
The Different Parts of GC/MS

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

- Sampling
- cleaning and assembling the sampling (Apparatus)

3. Can you comment on agenda /methods/approach used in the training?

Agenda The agenda was ok because there is need to build Capacity, information Dissemination  
Could include notes

Methods The methods also was good

Approach Practical approach is good but there was need for each participant to test especially the Equipment

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

**Practical training:**

Sampling was done well, sample prep also but needed to do the analysis



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**Hands on:**

**Discussion:**

5. Any message to your lecturers and trainers

Thank you very much for sharing with us  
such useful information. As we work in the Lab  
may require to consult with you if it is OK.

Thank you again.

Thank you for taking time to complete the questionnaire – RECETOX team

---

Consider more time for a workshop of this nature  
5 days not enough.



# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional): ENOCK OJORO

1. What was the most **valuable/important** for you in this training?

- GC-MS Training
- Water sampling
- Preparation of samples for GC-MS analysis.

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

- How to do water sampling
- Water preparation for GC-MS analysis
- Operating the GC-MS i.e. instrumental running conditions, calibration and method development.

3. Can you comment on agenda /methods/approach used in the training?

Agenda → The agenda was good. i.e. to train people on POPs analysis.

Methods → Direct training of participants on different areas of POPs analysis. It was good approach.

Approach → The approach is also good to people to have hands on experience in POPs analysis.

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

The training was helpful.  
Practical training → More time needed for training on the GC-MS time.



Hands on: It was Helpful.

**Discussion:**

**5. Any message to your lecturers and trainers**

→ I will like to thank the two trainers for their effort in making the training a success. It was a good training but they should be given more time. I suggest that the training to be conducted as follows: -  
1<sup>st</sup> week - sampling and sample preparation  
2<sup>nd</sup> week - GC-MS analysis and trouble shooting  
total 2 weeks training.

Thank you for taking time to complete the questionnaire - RECETOX team

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# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional): Vincent O. Madadi

1. What was the most valuable/important for you in this training?

Isotope calibration using  $^{137}\text{Cs}$  for analysis of PBBs.

2. Please provide the most interesting information/knowledge for you that you received from RECETOX team during the training

Laboratory QA/QC in analysis of POPs

3. Can you comment on agenda /methods/approach used in the training?

Agenda

The training program was well planned but time was short for every item to be completed.

Methods

- Hands on approach is very important and ideal for onsite training.

Approach

- Approach was ok.

4. What do you think about the practical training /hands-on? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

Yes. very helpful.

Practical training:

- It was very helpful to do hands on training on GC/MS and water sampling and active air sampling.  
- Would have wished to analyse some of the local samples in the lab.



**Hands on:**

— Would have used to do PBBs analysis in difficult samples such as mother's milk.

**Discussion:**

— The training was appropriate for improving the analysis of POPs at local lab.

**5. Any message to your lecturers and trainers**

Thank you for your valuable time and commitment. We will need to get the final list of consumables that are necessary for CAMP2 project.

Thank you for taking time to complete the questionnaire – RECETOX team

---



# Evaluation Questionnaire for Participants

## Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional):

DORUMU AMOS OKUMU

1. What was the most **valuable/important** for you in this training?

use of the GC-MS  
instrument

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

lots of information on instrumentation, sampling  
and sample preparation

3. Can you comment on agenda /methods/approach used in the training?

**Agenda**

addresses problems relating human being and  
the environment

**Methods**

**Approach**

simple direct and easily  
to understand

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

**Practical training:**

it was very helpful, I will appreciate if I can  
get notes on GC-MS instrument, sample preparation  
and sampling.

dokumu@unhcr.ac.ke



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**Hands on:**

**Discussion:**

5. Any message to your lecturers and trainers

Thank you for taking time to complete the questionnaire – RECETOX team

---



# Evaluation Questionnaire for Participants

Hands-on: laboratory training in Kenya (22-25 May 2017)

Name (optional): Wilfred B Orangi

1. What was the most **valuable/important** for you in this training?

Knowledge of sampling methods, instrument calibration (standard) and setting instrument part.

2. Please provide the **most interesting** information/knowledge for you that you received from RECETOX team during the training

Instrument setting and calibration and various components of the system as well as troubleshooting.

3. Can you comment on agenda /methods/approach used in the training?

Agenda

Globally acceptable protocol for sampling instrument setting and calibration - tedious and takes long

Methods

the presentation method, good

Approach

Good

4. What do you think about the **practical training /hands-on**? Was it helpful? Is there anything else you would appreciate seeing or learning regarding capacities for analysing POPs?

**Practical training:**

Helpful, but requires constant experience with application on both instrument and on the exercise of sampling



**Hands on:**

Hands on, was, very rare.

**Discussion:**

This were excellent with both  
voice, ~~and~~ audio and video presentation

**5. Any message to your lecturers and trainers**

Thank you and keep up the  
spirit of teaching and training

Thank you for taking time to complete the questionnaire – RECETOX team

---





## part 3b) TRAINERS

# Questionnaire for Trainers (1)

Hands-on: laboratory training in Kenya - GEF/GMP2 project to Enhance Capacities for POPs Monitoring in Africa (Nairobi, Kenya, 22-25 May 2017)

Name (optional): TRAINER 1

Title(s) of the training units

Number of participants:

### 1. Lecture part:

A. Please rate the overall knowledge of the audience **before** the training on the scale 1-10 (1 = never heard of/none, 10 = excellent; write not available if not discussed or not subject of the training that **you** carried out)

on the Stockholm Convention -5

chemicals management frameworks (global, international, national level) -5

physicochemical properties of chemicals discussed -5

occurrence of POPs in the environment -6

sampling techniques -6

analytical techniques -6

B. Please comment on the time allocated for this module (sufficient, too much, too little etc...) in the overall training schedule.

More time for practical work would probably be better.

C. Please describe reaction of the audience to the information provided:

They appreciated this training in their lab.

D. Were there any questions? (please list them if there were any)



Yes, we were discussing a lot of questions from the practical to theoretical issues of environmental chemistry mainly focused on the air and water analyses.

E. Potential of using the transferred knowledge by trainees?

in which field?

They can improve their knowledge about environmental chemistry and apply this information in future study, job, education in the framework of building a new infrastructure in their country.

F. Overall rating of the audience in 3 sentences/bullet points:

- pleasant atmosphere of training
- questioning, skilful and hard trainees
- effort/application of new information

G. Were there any challenges during the training?

Power cuts, obsolete infrastructure

H. Any suggestions for improvement of the training regarding this module?

To get more information about the education level of participants and their facilities before the training.

I. Any further comments you may have: -

Thank you for completing the form and your work and attention given to the training!

SCRC Czech Republic



## Questionnaire for Trainers (2)

Hands-on: laboratory training in Kenya - GEF/GMP2 project to Enhance Capacities for POPs Monitoring in Africa (Nairobi, Kenya, 22-25 May 2017)

Name (optional): TRAINER 1

Title(s) of the training units

Number of participants:

### 2. Sampling or sample treatment (clean-up/extraction) + relevant hands on:

A. Please rate and briefly comment on the overall knowledge of the audience before the training on **sampling techniques/sample clean-up pretreatment** for (use scale 1-10 (1 = never heard of/ none, 10 = excellent):

Air -6

Water -5

Soil -4

Biota -3

human matrices -2

Is relevant material available in the premises (please circle your answer)? **YES (partly)** NO

What equipment they are normally using?

Passive sampling devices, soxhlet extraction, GC

Any surprises?

Non-availability of expendable supplies, blackouts

B. Please comment on the time allocated for this module (sufficient, too much, too little etc...) in the overall training schedule.

More time for practical work would probably be better.

C. Please describe reaction of the audience to the information provided:



They appreciated this training in their lab.

D. Were there any questions? (please list them if there were any)

Yes, we were discussing a lot of questions about various techniques, standards, practical work, maintenance and supply

E. Potential of using the transferred knowledge by trainees?

in which field?

They can improve their knowledge about the sampling and sample preparation and apply this information in future study, job, education in the framework of building a new infrastructure in their country.

F. Overall rating of the audience in 3 sentences/bullet points:

- pleasant atmosphere of training
- questioning, skilful and hard trainees
- effort/application of new information

G. Were there any challenges during the training?

Power supply, timetable

H. Any suggestions for improvement of the training regarding this module?

To get more information about the education level of participants and their facilities before the training.

I. Any further comments you may have: -

Thank you for completing the form and your work and attention given to the training!

SCRC Czech Republic



## Questionnaire for Trainers (3)

Hands-on: laboratory training in Kenya - GEF/GMP2 project to Enhance Capacities for POPs Monitoring in Africa (Nairobi, Kenya, 22-25 May 2017)

Name (optional): TRAINER 1

Title(s) of the training units

Number of participants:

### 2. Chemical analysis and data management + relevant hands on:

A. Please rate and briefly comment on the overall knowledge of the audience before the training on **chemical analysis and data management** for (use scale 1-10 (1 = never heard of/none, 10 = excellent):

Air -4

Water -4

Soil -4

Biota -3

human matrices -3

QA/QC -3

Is relevant material/equipment available in the premises (please circle your answer)? **YES (partly)**  
NO

What equipment they are normally using?

Gas chromatography

Any surprises?

Different unit than declared before

What practices are they using?

Application of basic information

What about QA/QC? In place? Please comment



They have some basic knowledge.

What about data management?

They have a minimal knowledge.

B. Please comment on the time allocated for this module (sufficient, too much, too little etc...) in the overall training schedule.

More time would be needed.

C. Please describe reaction of the audience to the information provided:

They appreciated this training in their lab.

D. Were there any questions? (please list them if there were any)

Yes, we were discussing a lot of questions about maintenance and supply of their GC

F. Were there any challenges during the training?

Power supply

E. Potential of using the transferred knowledge by trainees?  
in which field?

POPs analyses of environmental matrices, potential building of new capacities in Kenya.

F. Overall rating of the audience in 3 sentences/bullet points:



- pleasant atmosphere of training
- questioning, skilful and hard trainees
- effort/application of new information

G. Were there any challenges during the training?

Power supply

H. Any suggestions for improvement of the training regarding this module?

To improve power supply with the generator usage or photovoltaic panels.

I. Any further comments you may have:

Thank you for completing the form and your work and attention given to the training!

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# Questionnaire for Trainers (1)

Hands-on: laboratory training in Kenya - GEF/GMP2 project to Enhance Capacities for POPs Monitoring in Africa (Nairobi, Kenya, 22-25 May 2017)

Name (optional): TRAINER2

Title(s) of the training units

Number of participants:

## 1. Lecture part:

A. Please rate the overall knowledge of the audience **before** the training on the scale 1-10 (1 = never heard of/none, 10 = excellent; write not available if not discussed or not subject of the training that **you** carried out)

on the Stockholm Convention 6

chemicals management frameworks (global, international, national level) 5

physicochemical properties of chemicals discussed 6

occurrence of POPs in the environment 6

sampling techniques 7

analytical techniques 6

B. Please comment on the time allocated for this module (sufficient, too much, too little etc...) in the overall training schedule. Time allocated enough, but delays due to problems with power down

C. Please describe reaction of the audience to the information provided: They knew quite a bit of things but many things were new to them

D. Were there any questions? (please list them if there were any) Yes, instrument-wise, sampling-wise, sample prep-wise



E. Potential of using the transferred knowledge by trainees? yes

in which field? monitoring of ambient air, scientific projects on indoor exposure and outdoor exposure

F. Overall rating of the audience in 3 sentences/bullet points:

prepared and cooperating

listening with asking questions

helpful

G. Were there any challenges during the training?

frequent power outages

H. Any suggestions for improvement of the training regarding this module?

I. Any further comments you may have:

Thank you for completing the form and your work and attention given to the training!

SCRC Czech Republic



## Questionnaire for Trainers (2)

Hands-on: laboratory training in Kenya - GEF/GMP2 project to Enhance Capacities for POPs Monitoring in Africa (Nairobi, Kenya, 22-25 May 2017)

Name (optional): TRAINER2

Title(s) of the training units

Number of participants:

### 2. Sampling or sample treatment (clean-up/extraction) + relevant hands on:

A. Please rate and briefly comment on the overall knowledge of the audience before the training on **sampling techniques/sample clean-up pretreatment** for (use scale 1-10 (1 = never heard of/ none, 10 = excellent):

air 7

water 6

soil 6

biota 5

human matrices 5

Is relevant material available in the premises (please circle your answer)? YES NO

What equipment they are normally using? Soxhlets, column clean-up, nitrogen evaporation, furnace, GC-ECD, GC-MS

Any surprises? not functional UPS for the GC-MS systems

B. Please comment on the time allocated for this module (sufficient, too much, too little etc...) in the overall training schedule:..sufficient, but power outages

C. Please describe reaction of the audience to the information provided: some information was new to them. They were attentive listeners, asking questions.



D. Were there any questions? (please list them if there were any) Yes

E. Potential of using the transferred knowledge by trainees? yes

in which field? environmental monitoring, scientific projects

F. Overall rating of the audience in 3 sentences/bullet points:

attentive listeners

asking questions

helpful and flexible

G. Were there any challenges during the training? frequent power outages

H. Any suggestions for improvement of the training regarding this module?

I. Any further comments you may have:

Thank you for completing the form and your work and attention given to the training!

SCRC Czech Republic



## Questionnaire for Trainers (3)

Hands-on: laboratory training in Kenya - GEF/GMP2 project to Enhance Capacities for POPs Monitoring in Africa (Nairobi, Kenya, 22-25 May 2017)

Name (optional): TRAINER2

Title(s) of the training units

Number of participants:

### 2. Chemical analysis and data management + relevant hands on:

A. Please rate and briefly comment on the overall knowledge of the audience before the training on **chemical analysis and data management** for (use scale 1-10 (1 = never heard of/none, 10 = excellent):

air 7

water 6

soil 6

biota 5

human matrices 5

QA/QC 4

Is relevant material/equipment available in the premises (please circle your answer)? YES NO

What equipment they are normally using? GC-MS, GC-ECD

Any surprises? power outages, non functional UPS

What practices are they using? blanks, reference materials,

What about QA/QC? In place? Please comment

yes, but not evaluated in detail

What about data management?



B. Please comment on the time allocated for this module (sufficient, too much, too little etc...) in the overall training schedule. sufficient

C. Please describe reaction of the audience to the information provided:

Most of the information was new to them

D. Were there any questions? (please list them if there were any) Yes, instrumental techniques, hardware, software, method set-up and optimization

F. Were there any challenges during the training? power outages

E. Potential of using the transferred knowledge by trainees? yes  
in which field? environmental monitoring, scientific projects

F. Overall rating of the audience in 3 sentences/bullet points:

attentive listeners

asking a lot of questions

immediate hands-on

G. Were there any challenges during the training? frequent power outages

H. Any suggestions for improvement of the training regarding this module?

I. Any further comments you may have:

Thank you for completing the form and your work and attention given to the training!

SCRC Czech Republic



## Annex 4 List of participants





Research Centre  
for Toxic Compounds  
in the Environment



UNEP GEF GMP2 TRAINING WORKSHOP, DEPARTMENT OF CHEMISTRY, UNIVERSITY OF NAIROBI, 22<sup>ND</sup> -26<sup>TH</sup>  
MAY 2017, NAIROBI, KENYA  
DAY FOUR, THURSDAY 25<sup>TH</sup> MAY 2017  
ATTENDANCE LIST

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Research Centre  
for Toxic Compounds  
in the Environment



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17	Dr. Ketarina Sebkova	RECETOX			