UNIDO TOOLKIT WRITE UP

The United Nations Industrial Development Organization (UNIDO) Expert Group on Persistent Organic Pollutants (POPs) developed a comprehensive Toolkit on POPs. The Toolkit aims to aid developing countries with the identification, classification and prioritization of POP-contaminated sites, and with the development of suitable technologies for land remediation in accordance with best available techniques and best environmental practices (BAT/BEP). The Toolkit focuses exclusively on the 12 POPs. Nine are pesticides (e.g., aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, HCB, mirex and toxaphene); one is an industrial chemical; polychlorinated biphenyls (PCBs) and those released unintentionally to the environment from anthropogenic sources. These are polychlorinated dibenzodioxins (PCDDs), and polychlorinated dibenzofurans (PCDFs), PCBs and HCB.

The toolkit was part of UNIDO's regional project on the development of strategies for identifying sites contaminated by chemicals listed in Annexes A, B and C of the Stockholm Convention. The Toolkit will be used both as a training tool and as a self-directed manual and resource document for decision-makers, practitioners and a range of other stakeholders. It is envisioned that the Toolkit may eventually be used throughout the whole African region and in developing countries in other parts of the world. The Geo-Environmental Research Centre (GRC) established at the BCCC-Africa as a post Stockholm Convention NIP activity was used to authenticate /ground-truth the tool kit in Nigeria. Thereafter , the Toolkit was launched in Ghana on the 13th of December, 2011 followed by a Train-The –Trainer Workshop on the application of the toolkit on 13th-16th December, 2011. It was later launched in Nigeria with a training workshop in Lagos on the 2nd-6th July, 2012.

KEY FEATURES OF THE TOOLKIT

Some of the key design and content features of this Toolkit, which is the first document of its kind to offer such a comprehensive discussion of the various issues, strategies and processes associated with POP-contaminated sites, are

1. **Step-by-step approach:** The Toolkit is designed to provide a clear step-by-step approach that can be easily followed and implemented by a variety of users.
2. **Easy-to-use worksheets and checklists:** The Toolkit includes various worksheets, tables, and checklists, currently used in developed countries that users in developing countries can adopt, and then modify to meet their own needs.
3. **Guidelines for site investigation:** The guidelines for site investigation presented in the Toolkit may be its most important single contribution because, in general, developing countries have no locally derived standards for the assessment of land contamination. Since the process of developing guidelines from scratch is expensive and time consuming, developing countries need to start from somewhere and adopt standards from developed countries. Although the guidelines presented here may come from countries with different ecological and environmental conditions, they will still offer an adequate

degree of human health protection to developing countries in the interim, during which time they can collect adequate ecological and environmental data that can ultimately be used to adapt the guidelines to their own local environment. The Toolkit also includes two detailed case studies, which illustrate the successful implementation of these guidelines in Ghana and Nigeria.

4. **Integration of risk assessment with contaminated site management:** The Toolkit takes a unique approach to the management of POP-contaminated sites by integrating remediation strategy with technical, political, legal, social and economic considerations to develop risk reduction and prevention strategies. While a risk-based approach increases the time and effort spent up front and requires ongoing site monitoring, it can often lead ultimately to lower remediation costs. The steps involved in this type of approach are outlined in the Toolkit.
5. **Screening levels for POPs:** The Toolkit presents screening levels — limits for quantitatively evaluating risk levels for soil and groundwater — for the 12 POPs.
6. **Screening matrix for selection of remediation technologies:** The Toolkit presents an easy-to-use and simple screening matrix system that can be used for selecting the most appropriate remediation technology for a specific site according to the local situation. The application of this low-cost, time-saving tool is illustrated through three case studies.
7. **Cost-benefit analysis:** The toolkit also presents a step-by-step approach to economic analysis of POPs-contaminated sites. It is intended to provide practitioners with an understanding of cost structures and financing mechanisms for developing countries.

APPLICATION OF THE TOOLKIT: HANDS ON TRAINING

The practical toolkit application and hands-on field training demonstration of the toolkit commenced on the 24th to 27th of September, 2013 at Akangba Transmission Company of Nigeria, Adelabu Street, Surulere. The purpose of the demonstration is to identify if the site is contaminated by Polychlorinated Biphenyls (PCBs) using the toolkit for POPs contaminated sites assessment and identification. The purpose of the demonstration is to identify if the site is contaminated by Polychlorinated Biphenyls (PCBs) using the toolkit for POPs contaminated sites assessment and identification.

Sample Collection and Storage

- Surface soil samples were collected for preliminary site investigation
- Sub-surface soil samples were collected for detailed site investigation
- Surface water samples from drainages and well were also collected
- Samples were stored in a cooler containing ice blocks.
- Samples were transferred to the GRC laboratory at the University of Ibadan, Ibadan.

Sample Analysis

- Sample extraction was done using Sonication method (USEPA METHOD 3550B)
- Clean-Up by silica gel chromatographic column (USEPA METHOD 3630C)
- Instrumental analysis using GC-MS (USEPA METHOD 8082A)

Results of soil and water samples collected at the Power Holding Company of Nigeria (PHCN) Station, Akangba, Surulere.

Sample code	Longitude	Latitude	Concentration A	Concentration B	Mean (mg/kg)
Topsoil					
X1	06°29'42.8"N	003°20'54.2"	0.784405	1.225231	1.00 ± 0.31
X2	06°29'42.1"	003°20'54.2"	1.803506	1.536165	1.67 ± 0.19
X3	06°29'41.8"	003°20'54.4"	35.26091	42.75816	39.0 ± 5.3
X4	06°29'43.4"	003°20'59.9"	2.371876	2.093969	2.23 ± 2.0
X5	06°29'43.4"	003°20'59.9"	3.05	2.527158	2.79 ± 0.37
X6	06°29'43.4"	003°29'43.8"	2.19914	2.693377	2.45 ± 0.35
X7	06°29'43.8"	003°20'55.6"	12.66178	13.28757	13.0 ± 0.44
Spill point			2.621631	0.505312	1.56 ± 1.5
Sub-surface soil					
0-0.5 m			3.606242	4.923332	4.26 ± 0.93
0.5-0.84 m			7.970976	7.851975	7.91 ± 0.08
0.84-1.8 m			2.318831	1.214552	1.77 ± 0.78
Water samples					
P1	06°49'51.0"	003°34'71.6"			0.35 mg/L
P2	06°49'51.3"	003°34'72.3"			0.13 mg/L

Note: X1-X7 are surface soil,

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File        :C:\msdchem\1\data\PCB Analysis 10122013\AROCLOR MIX.D\NewPCB
...          Method.M\BSB\standard2.D
Operator    : [BSB6]Dr Adeyi
Instrument  :   instrument1
Acquired    : 11 Dec 2013  13:18     using AcqMethod NEWPCB_METHOD.M
Sample Name: Acoclor
Misc Info   :
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0.3 ppm