7.0 SUMMARY

This report presents the results of a screening level risk assessment for human health associated with exposure of persistent organic pollutants. The report is part of the *Regional Capacity Building Program for Health Risk Management of Persistent Organic Pollutants (POPs) in South East Asia* (POPs Project). The risk assessment has been performed on a case study site, the Sambour Electricite Du Cambodge Warehouse (SEDCW) Case Study Site, Phnom Penh, Cambodia. In support of the capacity building program and the present risk assessment, the following major activities were performed:

A. A Launch Workshop in Luang Prabang, Lao PDR between April 3rd and 6th.
B. Selection by the National Focal Point in consultation with the Project Team of the SEDCW site as the POPs case study site. While there were no existing data or known practices suggesting the presence of POPs at the SEDCW site, the site selection was based on speculative concern for (i) potential PCB contaminated oils which may have been inadvertently deposited in site soils, and (ii) the proximity of residential developments adjacent to the site.

C. Technical seminar and environmental sample collection at the SEDCW site from May 17th to 20th, 2008 **:**

- **A Stakeholders Meeting**: National Focal Points, Senior Management of Key Government Agencies, and National Consultants to discuss the POPs project, including the training program and stakeholder identification and the goal of the field program;

- **A Training Seminar** on sample collection, sample handling and analysis followed by the hands-on demonstration at the study sites for the government officials;

- **A Site Reconnaissance**: to select and map potential sampling locations, to discuss the sampling plan and to liaise with local stakeholders (site management and local community members);

- **Fieldwork**: to collect environmental and biological samples with the support of the national consultant;

- **Fieldwork Demobilization**: to (a) prepare samples for shipping (i.e., sample labeling, storage, shipping and the completion of export formalities), (b) complete and archive important documents (i.e., chain of custody forms, survey and field forms, and (c) properly clean/decontaminate and store field equipment; and

- Chemical analyses of environmental samples was subsequently provided by Hiyoshi on October 4th, 2008 and Axys on January 13th, 2009.

D. Blood sampling on August 5th and 6th, 2008. Chemical analyses of samples was subsequently provided by Axys on January 13th, 2009.

E. Completion by Hatfield of initial draft screening human health risk assessment was presented and discussed at the POPs Toolkit consultation/training meeting on December 4th and 5th , 2008, and further rounds of consultation/collaboration with the National Focal Point and National Consultants thereafter, to incorporate site-specific information on various exposure assumptions and site practices.

F. Provision of a risk assessment training workshop (January 19th to 21st, 2009) given by Hatfield and WB, with specific discussion of the present SEDCW case study.

Key results from the risk assessment of SEDCW case study are:

Problem Formulation

- The problem formulation indicated that all the components required for a human health risk were present: chemical hazards, receptors and pathways linking the hazards and receptors.

- The chemical hazards identified were PCBs and dioxin/furans.

- The receptors identified at the site were both ecological receptors (fish, crabs, snails and terrestrial animals) and humans (workers and residents of local homes).

- Exposure pathways identified were split into onsite exposures, and exposures related to off-site migration of contaminants via wind erosion or surface water run-off. Exposure scenarios included the exposure of SEDCW workers, students living in dormitories and local residents.

Exposure Assessment

- The risk assessment model indicated that ingestion of contaminated food (e.g., crabs) is likely the predominant route of exposure for PCBs and dioxin/furans.

Hazard Assessment

- Toxicity reference values (TRVs) were selected in order to calculate a numerical expression of potential human health risk. The chemicals of potential concern (PCB + dioxin/furan TEQs) were treated both as carcinogens and non-carcinogens.

Risk Characterization

- Results of the Risk Characterization indicated that there is a potential human health risk associated with exposure to PCBs & dioxin/furans in

transformer oils, contaminated sediments and crab tissue. The PCB exposure calculated using the computer-based model was confirmed with measured concentrations of PCBs in the blood of workers.

The potential risk was placed into the context of uncertainties and assumptions made during the risk assessment. Two options were discussed: (1) conducting a refined (more detailed) risk assessment in an attempt to determine if potential risks are actually negligible or absent; or, (2) conduct risk management activities at the site to mitigate potential risks.

The National Training Workshop which took place in Siem Reap, Cambodia from 19 – 21 January 2009 assessed potential risk management measures which could be applied to reduce the exposure and related human health risks to workers, and local residents. A short list of possible measures was created. Recommended measures included:

The following are the key risk management alternatives recommended by the participants of the National Training Workshop (Siem Reap, Cambodia, 19-21 January 2009):

- Develop and enforce an occupational health and safety plan;
- Monitor and verify effectiveness of mitigation strategies;
- Conduct Risk Communication and Training;
- Undertake measures for controlling and containing PCB Hazards;
- Cap the hot spot surface to control erosion of soil surfaces in the hot spot by rain and wind erosion and off-site transport; and
- Governance – strengthen inter-ministerial coordination unit for POPs, and adopt/enforce law & regulation controlling the use, storage and disposal of PCBs and contaminated equipment/waste.

Given the limited resources and competing priorities, the risk management for the site should focus primarily on clusters of simple and implementable risk management options for the site and more detailed clean-up operations follow later. The emphasis of the risk management should be on capacity building, public awareness and putting in place and enforcing health and safety plan and other emergence prevention and control procedures.