6.0 PATH FORWARD TO RISK MANAGEMENT

From the risk assessment, the site can be placed into one of five categories of risk management priority, namely:

- Level A – action is required;
- Level B - action likely required;
- Level C - action may potentially be required;
- Level N - remedial action not needed; and
- Level I - insufficient data.

It is challenging to categorize a contaminated site based only on a screening level risk assessment. The risk assessment performed as part of this case-study only examined a specific group of contaminants (i.e., POPS, not non-POPS or metals for example) and was based on a limited number of samples. However, for training purposes, it may be reasonable to categorize the MEA Facility as a Level B – actions are likely required.

The MEA Facility site is a concern because of:

- The potential risks to human health and ecology (from the results of the risk assessment); and
- Responsibility/liability that it may pose to the owners (e.g. cost of remediation, reputation and relation with community, and affected parties such as workers at the site, nearby property owners.

6.1 EXISTING MANAGEMENT PLAN

Risk management for contaminated sites is a balancing act of many diverse factors such as social, economic, political, legal, technical, and scientific issues. Any remediation strategy should comply with legal/regulatory obligations, address public/stakeholder concerns and suggestions, and ensure auditing and monitoring mechanisms are included.

It is understood that there are currently no specific actions undertaken by the responsible authorities to mitigate the potential PCB exposures at the site. At the National Training Workshop which took place in Hue Hin, Thailand from January 26-27, 2009, the national participants used the case study for developing risk management goals, sub-goals (objectives), and indicators. The Workshop participants also reviewed the proposed long-list and short-list of management options for the site (using the POPs toolkit). During the risk management group discussion and plenary session, the Workshop discussed the following key topics:

Topic 1 – *What are the potential risks associated with the site, if any? Are there likely to change in the coming years?*

Topic 2 – *What are the management options for the site?*

Topic 3 – *What additional monitoring and remediation should be conducted, if any? Who should be in charge of monitoring? Of reviewing results?*

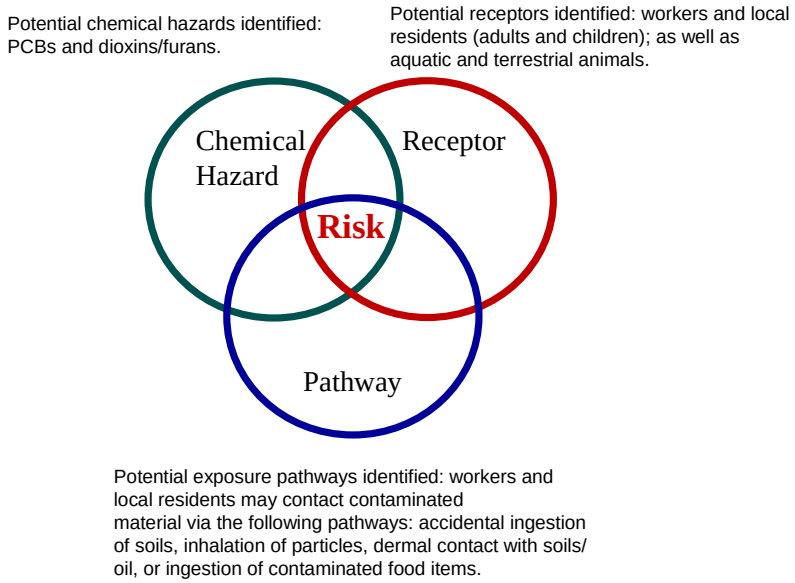
Topic 4 - *What are the potential costs of implementing management and monitoring requirements?*

The following section provides the key recommendations for the risk management of the MEA Facility in Samut Prakan site.

6.2 SETTING RISK REDUCTION GOALS FOR THE SITE

From the risk assessment above, it is obvious that all three elements that potentially causes human health risk from PCBs, are present at the site: chemical hazards, pathway and receptors. Hence, the goals, sub-goals (objectives), and indicators have to be developed by taking into account the need to address three elements of risk – hazard, pathway and receptors.

Figure 6.1 Potential Risk and its major components.



6.2.1 Goals

The MEA Facility site mitigation strategy must help contribute to the achievement of the overall *accelerated growth strategy*. It is evident that any disabilities or premature death of the principal income-earners and other family members, as well the loss of other sources of food and income (salary and potential devaluation of property), will certainly not contribute to the goal.

The risk management goals for the site should be to support the site management and surrounding community for:

1. More effective reduction in health risks to sensitive groups of people arising from PCBs contamination (through addressing receptors); and

2. Avoiding or, when avoidance is not feasible, minimizing off-site transfer of PCBs (in soil and sediments).

Achieving the above goals will also assist the overall *accelerated growth strategy*. It is evident that any disabilities or premature death of the principal income-earners and other family members, as well the loss of other sources of food and income (salary and potential devaluation of property), will compromise the accelerated growth strategy.

6.2.2 Sub-goals and Indicators

The MEA facilities' mitigation plan should contain the following sub-goals that help to reduce the human health risk from PCBs and avoid and minimize the uncontrolled release of PCBs.

Sub-goals associated with **Goal One** (to reduce health risks to sensitive groups of people arising from PCBs contamination):

Sub-Goal 1.1: To minimize exposure/health risks of workers and security guards in the MEA Facility; and

Sub-Goal 1.2: To minimize exposure/health risks of residents living near the MEA facility.

Sub-goals associated with **Goal Two** (to avoid or, when avoidance is not feasible, minimize uncontrolled releases of PCB hazardous materials or accidents during their handling, storage and use).

Sub-Goal 2.1: To establish hazardous materials management action plans to address potential chemical hazards, exposure pathways and potential receptors identified through human health risk assessment; and

Sub-Goal 2.2: To implement management controls (procedures, inspections, communications, training, and drills) to mitigate residual risks of existing environmental releases.

6.2.3 Proposed Indicators

Once sub-goals (objectives) are set, the indicators are developed to help the concerned managers to assess the progress and success of the site mitigation strategy, plan and project (Table 6.1).

Table 6.1 Examples of Goals, sub-goals and indicators for the MEA Facility, Samut Prakan, Thailand.

Goal 1	Sub Goals	Indicator
To reduce health risks to sensitive groups of people arising from PCB contamination	1.1. To minimize health risks of workers and security guards in the MEA Facility.	By year 2012, reduce daily exposure to PCBs to the lowest acceptable level (i.e., HQ<0.2) or monitor success of implementing specific risk management approaches (to be determined).
	1.2 To minimize health risks of residents living adjacent to the MEA facility..	By year 2012, reduce daily exposure to PCBs to the lowest acceptable level (i.e., HQ<0.2) or monitor success of implementing specific risk management approaches (to be determined).
Goal 2	**Sub Goals**	**Indicator**
To avoid or, when avoidance is not feasible, minimize off-site transfer of the PCB contaminants remaining in the environment (soil, sediments).	2.1. To establish hazardous materials management action plans to address potential chemical hazards, exposure pathways and potential receptors identified through human health risk assessment.	By year 2012, the national hazardous materials management priorities plan is in place and effectively enforced.
	2.2 To Implement management controls (procedures, inspections, communications, training, and drills) to address residual risks that have not been (or cannot be) prevented or controlled through appropriate risk management measures.	By 2011, management control activities – procedures, inspections, communication, training and drills – are conducted regularly.

6.3 PROPOSED MANAGEMENT MEASURES

There are numerous technical approaches and policy instruments that can be used to reduce risks. In most cases, there will be more than one way to achieve a particular risk reduction goal. A combination of several different approaches may end up being the most effective to manage unacceptable risks at contaminated sites. For example, a voluntary agreement may need to be underpinned by regulation Hence the risk management approaches for MEA Facility can include regulatory controls, engineering options, economic instruments, codes of practice (and technical standards), information programs (and other government initiatives), and voluntary initiatives**.**

The Risk Management Options were selected through the qualitative screening. During the qualitative screening, each management option was weighed against various **balancing factors**. Balancing factors may include: i) Effectiveness; ii) Long term Reliability; iii) Ease of Implementation; iv) Implementation risk; and v) Cost: (cost for implementation, and cost for operation and maintenance).

6.4 RECOMMENDED RISK MANAGEMENT ALTERNATIVES

The following are the recommended risk management options for the MEA site:

1. Develop and enforce an occupational health and safety plan:

1.1 Create a hazard communication and training program to prepare workers and other EDC center staff to recognize and respond to workplace PCBs and other chemical hazards;

1.2. Introduce preventive and protective measures (provide and enforce the use of specific personal protection equipment (PPE), first aid and sanitary facilities in workplace);

1.3. Develop and enforce safe operating and materials handling procedures, safe work practices, basic emergency and decontamination procedures; and

1.4. Define and enforce "restricted entry" into contaminated areas without proper protection or authorization.

2. Monitor and verify effectiveness of mitigation strategies:

2.1 Regular inspection and testing of all safety features and hazard control measures, including the use and condition of personal protective equipment;

2.2. Periodic monitoring of environment and human health conditions at the site; and

2.3 Investigate and report occupational accidents (injuries and near misses) and dangerous occurrences and incidents (occupational disease).

3. Risk Communication and Training:

3.1. Provide Training - basic PCB hazard awareness, site specific hazards, safe work practices, emergency procedures, and prevention/mitigation measures;

3.2. Help MEA Facility Site conduct training and working sessions on PCBs risk management – support the development and implementation of health and safety plans, risk management plans for the site, and health and environmental monitoring for the staff and the site; ; and

3.3. Raise awareness of PCBs impacts, and how to manage them among the local community, other key government institutions and private sectors dealing with potential POPs issues.

4. Measures for Controlling PCB Hazards:

4.1. Build a secured containment facility to safely store contaminated waste and soil on site;

4.2. Conduct test-based inventory of PCB contaminated equipment and oils;

4.3. Move and store PCB contaminated equipment and oils in a separate containment facility for controlling accidental release into critical environment; and

4.4. Provide proper area signage following proper standards, signage should be easy to understand, and label equipment, containers and piping systems.

5. Controlling Off-Site Transport of Contaminants:

5.1 .Capping surface & controlling contaminant from getting into drainage or stream;

5.2. Excavate contaminated soil and sediments from the site and dispose soils/waste in permitted landfills;

5.3. Using settling ponds, catch basins, and silt fences to capture sediments from surface water run-off during rainfall events;

5.4. Provide adequate road drainage, surface material, compaction, and maintenance, and ensure that vehicles are not carrying contaminated soils on tires, and check for mud on tires of trucks leaving the workshop.

6.5 IMPLEMENTATION PLANNING

The detailed Risk Management action plan must include implementation plans by addressing:

How – under what legal mandate will the activity(ies) be undertaken and with what resources?

When – realistic timeframe for the actions; and key milestones?

By whom – ministry, agency, or stakeholder groups to be involved?

Potential funding- Government, POPs Trust Fund, International Organizations, other NGOs, and Charity.

The detailed Risk Management action plan must include indicators of success for each action chosen, for instance.

Similar to most developing countries, monitoring and evaluation remains the weakest link in the whole Risk Management process. Hence, it is very important to monitor and evaluate the implementation of management measures – activities and tasks - to check any deviation from the plans and the reasons for this.

An evaluation on their effectiveness as measured against the baseline situation and in light of the risk reduction goal; whether the current strategy/options should be continued, and if not, recommendations for additional measures.

The results from monitoring and evaluation should be communicated to stakeholders as part of a public accountability process.

6.6 RISK COMMUNICATION

Risk Communication is an important part of the risk management framework. Its main purpose is to:

1. Sensitize and mainstream identified POPs health risk management (RM) options into national political agendas and national development planning; and

2. Foster national political and securing financial commitments to ensure their effectiveness and sustainability.

Risk communication is needed to address the following major challenges:

- to explain the concept of probability;
- to explain the difference between risk (context dependent) and hazard (property bound);
- to deal with cancer and other illnesses that trigger additional fears and concerns;
- to cope with long-term effects;
- to improve literacy in risk-based thinking, including the development of priority lists;
- to provide an understanding of synergistic effects with other lifestyle factors;
- to address the problem of remaining uncertainties;
- to improve the credibility of the agencies and institutions that provide risk information (which is crucial in situations where personal experience is lacking and people depend on neutral and disinterested information);

- to cope with the diversity of stakeholders and parties in the risk management phase; and
- to cope with inter-cultural differences within pluralist societies and between different nations and cultures.

Some suggested approaches for conveying results of risk assessment to policy makers:

- Demonstrate linkage between POPs human health risk affects and the government's strategy for poverty alleviation; and
- Show cost-benefit (economic, social and political cost and benefit) of human health risk management.

The policy makers responsible for the governance of environmental and human health risks often have to make decisions within the context of uncertainty. They must balance risks and err on the side of precaution. They require clear-cut answers to questions of risk so as to generate a solid platform - a discourse of scientific certainty in assessing contaminants, exposure pathway and receptors on which to base a decision.

Some suggested approaches for conveying results of risk assessment to workers and near-by community include: training, meeting and poster sessions focusing on making them recognize and respond to workplace PCBs and other chemical hazards. Topics could include the following: What are PCBs? How do PCBs enter the environment? What happens to PCBs when they enter the environment? How do PCBs enter the human body? How do PCBs affect human health? How can PCBs affect my children and family? How can my family reduce the risk of exposure to PCBs?