Pilot Application of Responsible Production (RP) Handbook in China
Established in Dec. **1994** by SEPA.

Joined the **UNIDO/UNEP** world-wide program of “Establishing National CP Center in Developing Country” in **1995**.
In the early stage of development, CNCPC employed less than 10 staffs.

Now

- 26 full-time staffs
- 9 students having their Doctor or Master courses here.
Project: Industry Exercise on Implementation the Responsible Production Handbook

Supported by: United Nations Environment Programme

Implemented by: China National Cleaner Production Center (CNCPC)

Time Period: September 2010 – April 2011.

Pilot Company:
- Beijing **** Co., Ltd.
- Hebei **** Bio-Chemical Co., Ltd.
Project Team

- Financial Support
- Technical Support

Technical consultant

Pilot application of RP Handbook

Pilot company 1

Pilot company 2

Project Team
Tools Selected from the Responsible Production Handbook

- **Tool 1.1** Prepare process flow chart
- **Tool 1.2** Chemical inventory and hazard classification
- **Tool 1.3** Identify risks
- **Tool 1.4** Hazard hotspots map
- **Tool 3.1** Identify actions for risk reduction
Activities

- Collect basic information
- Training
- Pay a Visit to the workshop
- Have a meeting with the staffs of the company, collect more details of the company.
- Pilot application of the 5 tools selected.
Pilot Application of RP Handbook
In Pilot Company 1 (Electroplating)
2 Hazard hotspots

- Acid Pickling
- Electroplating

Risk Assessment

5 Risks

Implementation of actions for risk reduction

Identification of actions for risk reduction
<table>
<thead>
<tr>
<th>No.</th>
<th>Process step</th>
<th>Risk scenario</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>R1</td>
<td></td>
<td>When a roller is damaged, the worker will put it anywhere he likes, without any note. When the repairman comes, he has no idea if the roller is damaged, or how many parts of the roller are damaged. The repairman may only repair one of the damaged parts, and put it back to work with other damaged parts, which could cause accidents.</td>
<td>Set special area for roller repair, and add labels with detailed damage information.</td>
</tr>
<tr>
<td>R2</td>
<td>Acid pickling</td>
<td>There is no can for collecting the waste acid. Some of the waste acid is spilled on the ground.</td>
<td>Add cans for acid collection.</td>
</tr>
<tr>
<td>R3</td>
<td>Electroplating</td>
<td>There are too many pipe bends which are hard to clean. It will produce more and more dirt, which means that there will be more waste solution.</td>
<td>Remove the useless pipe bends.</td>
</tr>
<tr>
<td>R4</td>
<td>Electroplating</td>
<td>There is no plate for collecting electroplating solution. The emission of solutions will cause heavy metal pollution.</td>
<td>Add plates for collecting electroplating solution.</td>
</tr>
<tr>
<td>R5</td>
<td>Electroplating</td>
<td>The copper plating solution is a kind of strong acid. It may do harm to the human health when leaked.</td>
<td>Use a weak caustic solution to replace the strong acid one.</td>
</tr>
</tbody>
</table>
Obstacles:

- The company is a small-sized electroplating company, so it is difficult for them to negotiate with the supplier of some raw materials/chemicals to provide further information on the chemicals. And it was hard to obtain the further information about these materials during the pilot project, which resulted in possibility of improper risk analysis of these raw materials.
It is further indicated that the SMEs always has little influence on the large-sized suppliers and consumers when they want to include them into their major stakeholders.
Lessons Learnt:

- CP assessment that done before the pilot project makes the company has high awareness on environmental protection and cleaner production.
- Responsible production provided various tools to the company to do further in CP area.
Lessons Learnt (continued):

- The involvement of the professionals from local electroplating association makes it easy to communicate with the company and provide some professional suggestions and comments.
- The commitment of high management is quite important and makes it easy to follow up the implementation of the risk reduction actions.
Pilot Application of RP Handbook in Pilot Company 2 (Bio-chemical)
Risk Assessment

12 Risks

Implementation of actions for risk reduction

Identification of actions for risk reduction

Hotspots

Oxidation

Restore

Raw materials

Products

Package

Salt

Risk Assessment
<table>
<thead>
<tr>
<th>Process</th>
<th>Position</th>
<th>Risk</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>-</td>
<td>Emergency exit</td>
<td>There is no sign of emergency exit or emergency access.</td>
<td>Add signs of emergency exit and emergency access, and emergency lights.</td>
</tr>
<tr>
<td>-</td>
<td>Whole workshop</td>
<td>The signboards of equipments are too small, and the workshop is a little lack of lights.</td>
<td>Enlarge the signboards of equipments, and add efficient lights.</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>There is no material about how the human health is damaged by long-time exposure of each chemical. And there is no introduction on how to reduce the damage of human health by long-time exposure of each chemical.</td>
<td>Add guide book of the human damage by long-time exposure of each chemical, and how to reduce the damage.</td>
</tr>
<tr>
<td>-</td>
<td>-</td>
<td>There is no update of art work sheet.</td>
<td>Update art work sheet.</td>
</tr>
<tr>
<td>Reaction</td>
<td>Reactor</td>
<td>When adding chloride phenyl phosphate ester II to fast, it will react with dimethyl sulfoxide, and cause material-spraying.</td>
<td>Add limit measure of adding chloride phenyl phosphate ester II.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>It may cause material-spraying when the supply of power or frozen brine stops.</td>
<td>1. Add power failure alarm for the stirring. 2. Add saline alarm. 3. Add explosion Venting port</td>
</tr>
<tr>
<td>Extraction</td>
<td>Extraction tank</td>
<td>If the bottom of the reactor is broken, the materials will suddenly go into the extraction, and cause overheating or spray.</td>
<td>1. Add explosion Venting port 2. Temperature monitor.</td>
</tr>
<tr>
<td>Dissolution</td>
<td>Dissolution tank</td>
<td>Overheating, material-spraying, or pressure-out</td>
<td>1. Add explosion Venting port 2. Use hot water for heating. 3. Add temperature alarm for the hot water can.</td>
</tr>
<tr>
<td>Ammoniation reaction</td>
<td>Reactor</td>
<td>Overheating, material-spraying</td>
<td>1. Add explosion Venting port 2. Use hot water for heating. 3. Add temperature alarm for the hot water can.</td>
</tr>
<tr>
<td>Reduction, de-protection</td>
<td>Reactor</td>
<td>It may cause material-spraying when adding sodium borohydride too quickly.</td>
<td>1. Add explosion Venting port 2. Add power failure alarm for stirring.</td>
</tr>
<tr>
<td>Salt formation</td>
<td>Dissolution tank</td>
<td>Overheating, material-spraying</td>
<td>1. Add explosion Venting port 2. Use hot water for heating.</td>
</tr>
</tbody>
</table>
The company is close to the centre of the City, according to the new city planning, the whole company will be moved out of downtown by the end of 2012. As a result, only part of the actions identified has been implemented and some actions related to the reconstruction of the old buildings were not implemented due to economic efficiency concerns. However, the remaining measures will be considered in the design process for the new plant.
Obstacles:

- The change of the focal point in the company brought some influence to the smooth of the pilot application, so the RP team had to made additional training and introduction to the RP and the project.
Lessons Learnt:

- CP assessment that done before the pilot project makes the company has high awareness on environmental protection and cleaner production.
- Responsible production provided various tools to the company to do further in CP area.
Lessons Learnt (continued):

- The involvement of a professor from Tsinghua University as a process-control expert makes it easy to communicate with the company and provide valuable professional information on process control and suggestions and comments to the application of RP during the project.
Due to the high management and technical level of the company, in addition to some basic RP tools provided in the RP Handbook and applied in the company, it also tried some advanced RP tools for example the HAZOPS.
Thank You!