



Improving Worker Health and Safety through Cleaner Production

Health, safety and the workplace environment

Workers are one of the main beneficiaries of Cleaner Production. A less polluted work environment and the implementation of good housekeeping and other sound operational practices can reduce workers' exposure to hazards and improve local work conditions. CP addresses these issues indirectly, through enhanced worker awareness and improved practices. Health and safety standards in Chinese industries are generally not as rigorous as in North America: workplace hazards are more common and more serious; protective equipment is often unavailable or inadequate.

Workplace hazards

The following are some of the occupational hazards and sources of potential incidents and accidents to which workers are exposed.

Air-borne pollutants

Air-borne pollutants include toxic gases such as ammonia, chlorine dioxide and carbon monoxide; fumes from solvents, glues and other sources of toxic vapours; and particulates ranging from urea, dust and coal dust, and hazardous materials. Workers inhaling such substances may suffer from long-term chronic health problems or acute, deadly exposures. Exposure through contact with the skin or eyes may also be an occupational hazard.

Liquid hazardous substances

Liquid hazardous substances may include highly corrosive acids or irritating substances such as alkali (sodium chloride oxide), and harmful substances such as fuel oil and explosive liquids.

Incidents and accidents

Workplace incidents often arise from improper labeling, handling, disposal, and storage of hazardous materials; falls and spills may occur as a result of poorly organized, unkempt work sites; accidents may be caused by poorly maintained equipment, improperly lit work areas, exposure to dangerous conditions or inadequate personal protection/clothing.



SNC-Lavalin files

Inadequate footwear and lack of fume hoods increase the risk of accidents and incidents.

Noise and temperature

Hearing impairment or loss may occur if ear protection is not used while working around noisy equipment. Improper ventilation and poorly insulated pipes may result in unhealthy temperatures in the workplace as well as a loss of process efficiency.

The role of the project

The China Canada Co-operation Project in Cleaner Production was initiated in October 1996 with the goal of introducing Cleaner Production into key industrial sectors, and demonstrating its feasibility and benefits. The Project is funded by the Canadian International Development Agency and is implemented by the Canadian Executing Agency consisting of PricewaterhouseCoopers, SNC-Lavalin and ESSA Technologies. The Project contributed to improvements in the workplace environment through enhanced awareness and reduced pollution at demonstration plants. Knowledge of how to improve conditions through Cleaner Production is also being disseminated to other facilities in participating sectors.



Dr. Bob Lao

Canadian-Chinese audit team at work

How CP implementation improves the workplace environment

Factors that contribute to implementation of Cleaner Production are also key to improving conditions for workers. Successful implementation depends on “buy in” at all levels of plant management and operations; enhanced awareness of the causes of pollution; and adoption of the principles of “good housekeeping.” Many of the improvements in working conditions have been achieved through simple, inexpensive measures.

Awareness raising about health and safety has encouraged managers to provide protective equipment and workers to use it. Some measures have been implemented specifically to improve conditions for workers, such as:

- ear protection to protect hearing in noisy areas;
- fans to improve ventilation in overheated work areas;
- ventilation to reduce exposure to toxic fumes.

Inexpensive good housekeeping measures have reduced worker exposure to hazardous substances and prevented accidents:

- cleaner, more orderly facilities with lower risk of spills, falls, and accidents;
- signage about proper handling, storage, and disposal of hazardous substances and materials;
- labeling of process chemicals and pipes;
- improved maintenance and performance of equipment, with fewer ruptures, leaks and overflows.

Sector-specific approaches

Some industrial sectors involve higher worker exposures to sector specific hazardous substances. It is often possible to reduce these exposures by implementing CP. This has been evident in the Project's work in the PVC/chlor-alkali sector, where process leaks of vinyl chloride monomers (VCMs) cause a particularly high risk of cancer and other diseases. The Project's audit specialists focused the demonstration plant's attention on CP solutions that would reduce VCM leaks at source, thereby improving process efficiency while reducing the exposure of workers to toxic VCM gases.

CP implementation has also helped reduced exposure to ammonia among workers in the fertilizer sector. Exposure to elevated levels of ammonia causes respiratory problems and increases respiratory distress from other causes.

Some of these improvements were achieved through low-cost good-housekeeping measures, while others were the result of the purchase of new equipment by the plants or for the demonstration.



SNC-Lavalin files

In this factory in Fuyang workers used Good Housekeeping techniques to correct leaking valves and other equipment problems, resulting in reduced exposure to ammonia fumes.

Improving Health, Safety and Environment through continuous improvement

The improvements made so far are just the beginning. As the linkage between cleaner production (CP) and worker health and safety became more apparent, the Project's audit team revised the audit criteria to increase the attention given to health and safety issues that can be addressed through cleaner production. Recent audits in the Brewery Sector identified numerous low and no



The senior engineer at Fuyang General Chemical Works points out the blackboard used for raising awareness of CP among workers.

Mary Ellen MacCallum

cost actions which would improve worker health and safety. The brewery has quickly acted on these recommendations by creating an occupational health and safety committee to oversee the implementation of specific solutions to identified problems. The plant is tackling problems that relate to dangers associated with poorly maintained wiring. The brewery is correcting problems in electrical panels, switches and wires identified during the audit, and is reviewing lighting and the maintenance of catwalks and ladders.

The link between cleaner production (CP) and worker health and safety creates strong motivation for achieving continuous improvement. It creates motivation that ripples across individual facilities and through participating sectors. Management and workers extend their application of Cleaner Production to new production units, where new opportunities to improve working conditions are identified. Positive attitudes and skills spread beyond the implementation of individual "CP solutions" to the workplace as a whole. Workers who have adopted the principles of continuous improvement apply those principles to their own safety and health as well as to improving production and the health of the environment. In an increasingly market-based economy, a productive workforce is a competitive advantage. Managers who understand this will support additional measures that improve working conditions and reduce time lost to illness and injury. Everyone wins.

Chinese Project Office:

Environmental Protection Research Institute
Beijing Research Institute of Chemical Industry
China Petroleum & Chemical Corporation

P.O. Box 1442, No. 14 Beisanhuan Donglu
Chaoyang District, Beijing, P.R. China 100013

Tel: 86 10 64287757, 86 10 64216131 ext. 2203

Fax: 86 10 64287757, 86 10 64228661

E-mail: cccpcp@public.bta.net.cn

www.chinacp.com
www.chinacp.org.cn

Published by the China-Canada Cooperation
Project in Cleaner Production

Produced by ESSA Technologies Ltd.

Funded by the Canadian International
Development Agency (CIDA)

© 2002 China-Canada Cooperation
Project in Cleaner Production