Practical Chemical Management Toolkit for your Company

An introduction

General information on the GIZ Convention Project Chemical Safety

Chemistry plays an important role in modern society and therefore in development and development co-operation. There are both dangers and benefits connected with chemicals. The GIZ Convention Project Chemical Safety was launched on behalf of the **German Ministry for Economic Cooperation and Development (BMZ)** in 1997.

The main aims are to assist developing countries and companies in developing countries with the treatment and final disposal of hazardous chemicals (primarily persistent organic pollutants), especially in the form of pesticides, and to assist with the implementation of the concepts of chemical safety and chemical management as well as to improve work safety, competitiveness and cleaner production processes in small and medium size enterprises (SMEs).

Activities today focus on strengthening local capacities and public and private sector levels for hazardous waste disposal (consulting, execution and capacity building), sound chemicals management (e.g. development and implementation of training) as well as supporting the German Federal Ministry for Economic Cooperation and Development (BMZ) in developing concepts for international development cooperation in the context of cleaner production, resource efficiency and international conventions and agreements (Stockholm, Rotterdam, Basel, SAICM etc.).

Practical Chemical Management Toolkit for your Company

Module 1 – Inventory and Risk Assessment under the Umbrella of Resource Efficiency and Cleaner Production

Module 2 – Managing the chemical risks in your company – control measures and gap analysis

Module 3 – Hazardous Waste Management

This toolkit has been developed for companies particularly in developing countries to translate the requirements under the various international chemical conventions and agreements into practical steps. It provides managers, supervisors as well as workers involved in the various aspects of managing chemicals with a ready reference to address the challenges of handling chemicals substances in a sound and responsible manner. It refers to a number of practical measures that they can undertake on their own to implement a practical and successful chemical management in their operations.

Also separate trainer manuals are available for each training module to support local consultants/ facilitators, interested in offering chemical management related support services.

giz CHS Convention Project Chemical Safety

BMZ On behalf of Federal Ministry for Economic Cooperation and Development

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Contact

For further **information** and **additional materials** (such as **Annexes**, **Trainer Manuals** and **Powerpoint Presentations** for teaching, as well as **calculations** and **figures**) or if you have any further queries, please refer to the GIZ Convention Project on Chemical Safety website

www.gtz.de/chemical-safety

and do not hesitate to contact us directly.

We can offer our experience and advice as well as trainers and the opportunity for co-operation.

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1. Our approach

Enterprises have the option of either applying the toolkit on their own or seeking support from an external trainer/ advisor, who acts as a guide and coach to the enterprise throughout a modular step-by-step implementation, enabling the enterprises to continue applying chemical management on their own thereafter.

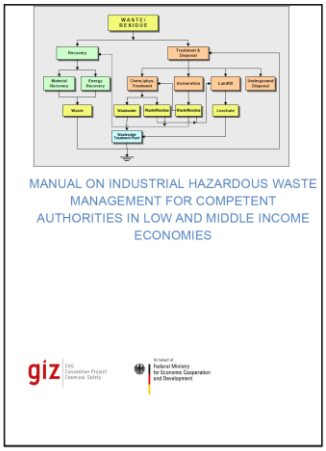
We organise trainings for companies as well as trainers to create a more sustained and far-reaching effect. Our Chemical Management (CM) training approach is based on interactive adult learning principles and applies action learning concepts. Emphasis is give to ready and practical application of the acquired concepts and skills at the enterprise level.

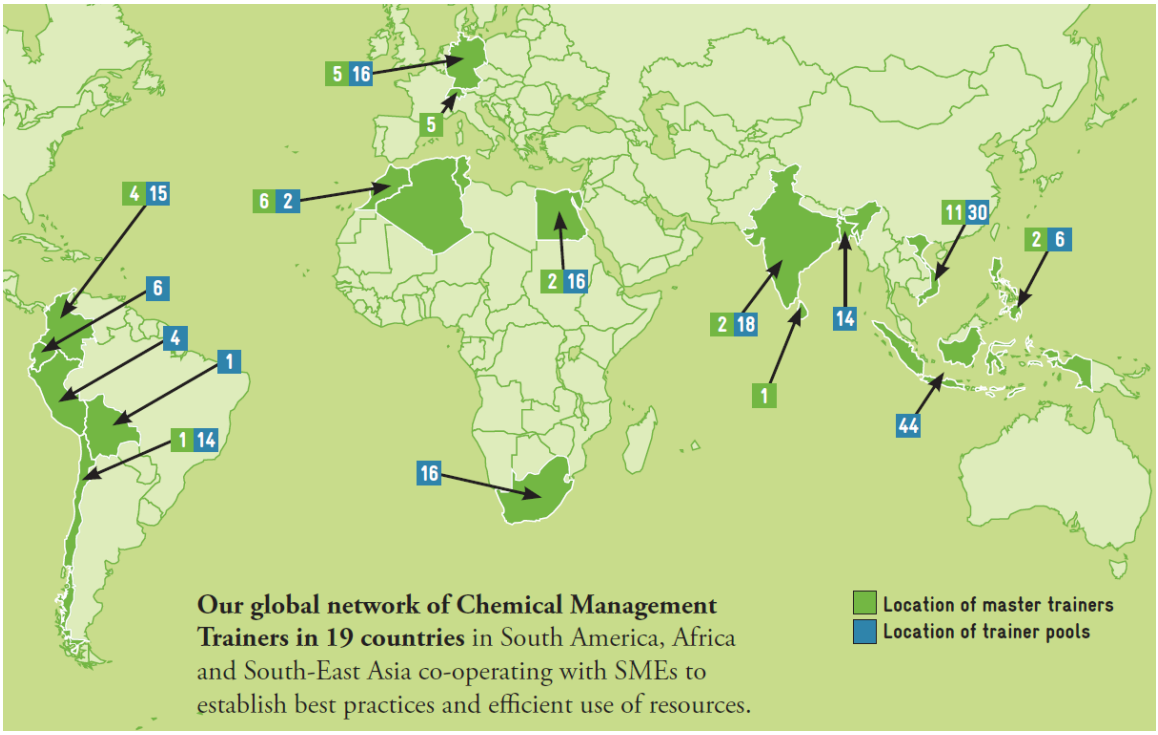
For the worldwide training outreach we cooperate with facilitator networks like PREMAnet International (http://www.premanet.net).

Figure 1: Meeting of PREMAnet in Hanoi 2010

Figure 2: Group exercise during a CM workshop for companies

The project has also developed a Manual on Industrial Hazardous Waste Management for Competent Authorities in Low and Middle Income Economies.





2. How can your company benefit from improving its chemical management?

Out of the around 7 million known chemical substances, more than 150,000 are used by companies in their production processes and operations. It is estimated that around 8,000 commercial chemicals are hazardous. Numerous new chemicals are being developed and produced each year. Today, almost every company uses some type of chemical in its processes. Those enterprises which effectively manage chemicals can enjoy substantial financial and ecological benefits. If your company uses chemicals, your company should manage them properly for your own benefit!

Benefits from reducing production costs

Chemicals can represent a major part of the production inputs and costs for companies. Implementation of any measures that reduce the loss, wastes, contaminations, or expiry of these substances will bring cost savings to companies, and at the same time reduce their environmental impact. Further unexploited potential for enhancing resource efficiency of the chemicals used in your company should be considered.

Benefits from becoming more competitive

While chemicals are often used and necessary to achieve certain characteristics and qualities in a product, consumers are increasingly concerned about harmful chemicals in the products they buy or their effect on the environment. Companies that avoid using banned and restricted substances

can avoid having their products rejected in the marketplace; they can cope with international chemicals regulations such as REACH[1] more easily and therefore be more competitive.

Growing consumer consciousness towards environmental and social issues has led to the establishment of buyers' requirements that suppliers must meet to have their products accepted in many international markets, e.g. for electronic appliances to be compliant with ROHS[2], WEEE[3] or other regulations.

Benefits from reducing impact on environment and improving workers' health & safety

Chemicals alone or mixed with other substances may have inherent characteristics and hazards that can do harm to the environment or the health and safety of humans. The improper use of chemicals may also result in fires and/or explosions.

Such accidents involving chemicals create additional costs for companies in terms of lost materials, damaged equipment and facilities, image loss and compensations or fines to be paid.

Sound chemicals management not only reduces the environmental, health & safety risks, but the overall business risk.

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[1] European Community Regulation on chemicals and their safe use (EC 1907/2006). It deals with the **R**egistration, **E**valuation, **A**uthorisation and Restriction of **Ch**emical substances.

[2] European ROHS Regulation (**R**estriction **o**f certain **H**azardous **S**ubstances) (2011/65/EU)

[3] European WEEE regulation (**W**aste from **E**lectrical and **E**lectronic **E**quipment) (2002/96/EC)

Benefits from compliance with standards

The management of chemicals, as briefly outlined before, requires a systematic and comprehensive approach. Companies which adopt such a systemic way create the stepping stones to implementing a management system, which can address other environmental, health and safety aspects and impacts as well. Many elements of the chemical management as made available in the GIZ

Chemical Management Toolkit represent typical management system elements as required under management system standard series such as ISO 9000 (quality), ISO 14000 (environment), OHSAS 18000 (occupational safety and health) and ISO 26000 (Corporate social responsibility). The measures dealt in this toolkit if implemented by the companies can be regarded as supporting compliance with minimum environmental, safety and occupational standards

What does chemical management involve?

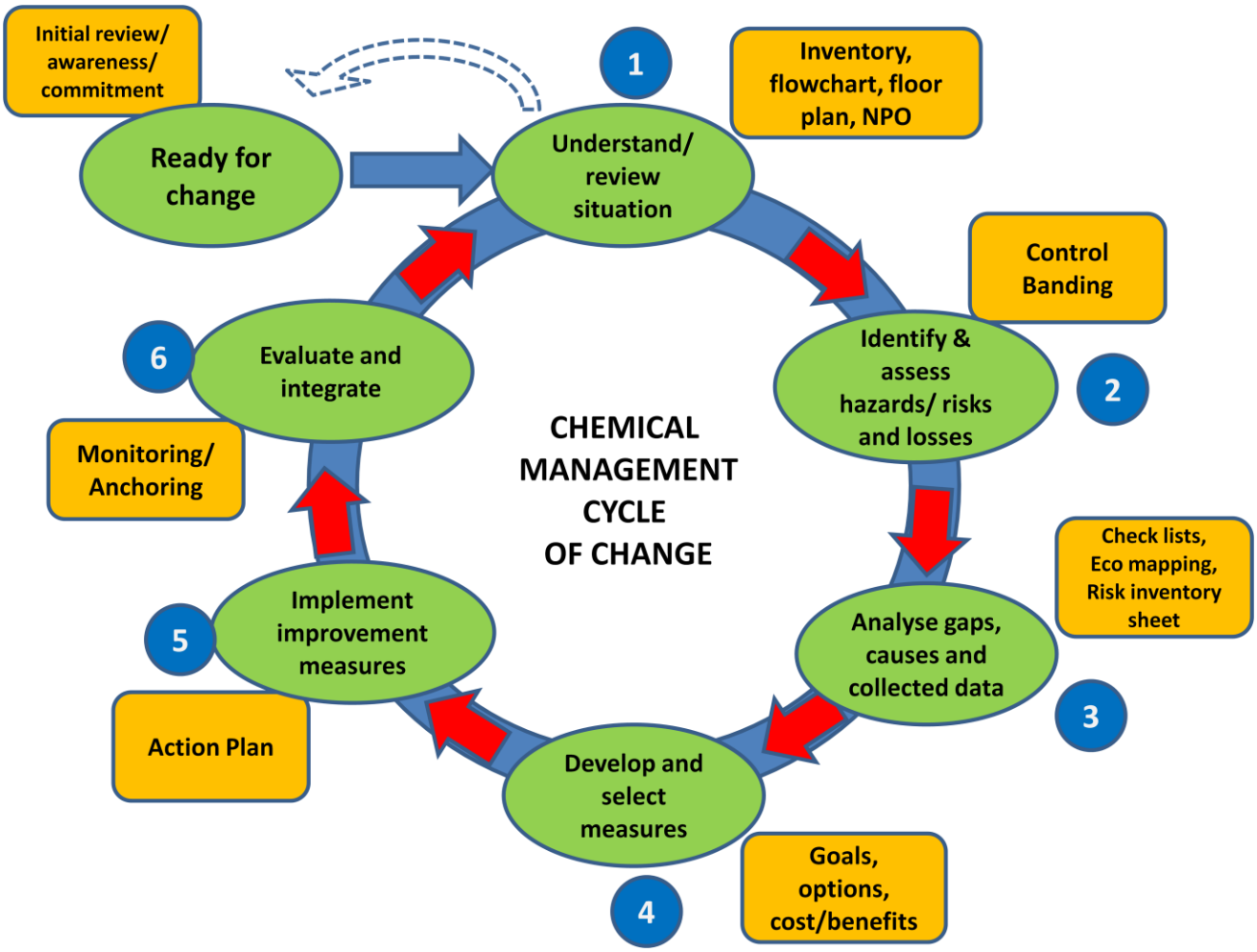
Chemical management involves a set of different measures and elements to track and control chemicals, identify and assess chemical hazards, manage the risks associated with the use of these chemicals as well as planning and preparing for any emergencies involving chemicals.

Mainly a chemical management program can be composed of the following steps:

- Start (this mean guaranteeing management commitment as well as financial and time resources and the appointment of a responsible person for chemical management)
- Data collection (inventory of used chemicals, list of wastes and emissions, verifying the existence of: Safety Data Sheets, permits, work procedures, control measures in work routines)
- Chemical risk assessment (exposure of workers, personal protection, waste, emissions, storage of chemicals)
- Conclusions about the risks to health and environment, needed action, decision on the action (management involvement is required)
- Chemical risk management (procurement procedures, training and instruction, safe storage and prevention, good housekeeping and cleanliness, improvement if work routine and ventilation, waste management, monitoring of exposure, personal protection)
- Follow up of the chemical risk management (agreement of the follow-up procedure, re-evaluation of the needed action)

At first glance, incorporating chemical management into your company may look quite complex and difficult. The aim of the GIZ Chemical Management Toolkit is to break down the effort into smaller manageable pieces, proceeding on a simple step-by-step basis. Chemical management is not just a "change project" where an external consultant comes into your company, asks a lot of questions and delivers a report full of suggestions.

Chemical management means a change in the company culture, which eventually leads to a process of continuous improvement. In order to introduce such a continuous improvement, working in "cycles" is an appropriate approach. A series of implementation steps – building on each other – sets the framework for the application of successful and sustainable procedures in your company. Repeating theses steps again and again is equal to working in circular processes and becomes the basis for continuous improvement.



Key to Figure 3

Major processes and activities

Practical approaches in the GIZ CM Tool

Figure 3 – Chemical management cycle of change

Where and how to start?

All enterprises require various production inputs such as raw and auxiliary materials, energy and water. Only a part of these inputs ends up in the desired final product. The other part ends up as solid and/or liquid wastes, emissions to water, soil and air. This second part is also known as "Non-Product Output" (NPO).

The **Non-Product Output (NPO)** concept is our **main starting point for the chemical management**. But you can apply this concept to any of the different types of inputs as applicable to your company. First, identify different "Non-Product Outputs". For this purpose, take a look at the production set-up in your company and the flow of materials in the different processes.

- What do you use as an input and how much, for example which chemicals?
- What and how much comes out of the production process as intermediary or final product?
- What and how much comes out as non-product output?

The generation and disposal of NPOs involve non-value-adding activities and therefore cause **unnecessary costs** for the company. NPOs can block space and production capacity, thus resulting in a loss of production. Experience shows that NPO costs can account for up to 30% of total production costs. If not taken into account, such costs will obviously reduce the profitability and competitiveness of your enterprise.

Apart from such direct financial implications for your enterprise be aware of the other potential negative effects of NPOs. NPOs in the form of solid, liquid or gaseous pollution can be the cause of problems with your neighbours, authorities, clients and your workers, which in turn can affect the economic well-being of your enterprise as well. Unchecked pollution may result in fines from the authorities, possible closure of your enterprise, liability payments for clean-up, health compensation claims from affected workers and neighbours, loss of clients due to poor image and pressures from their customers.

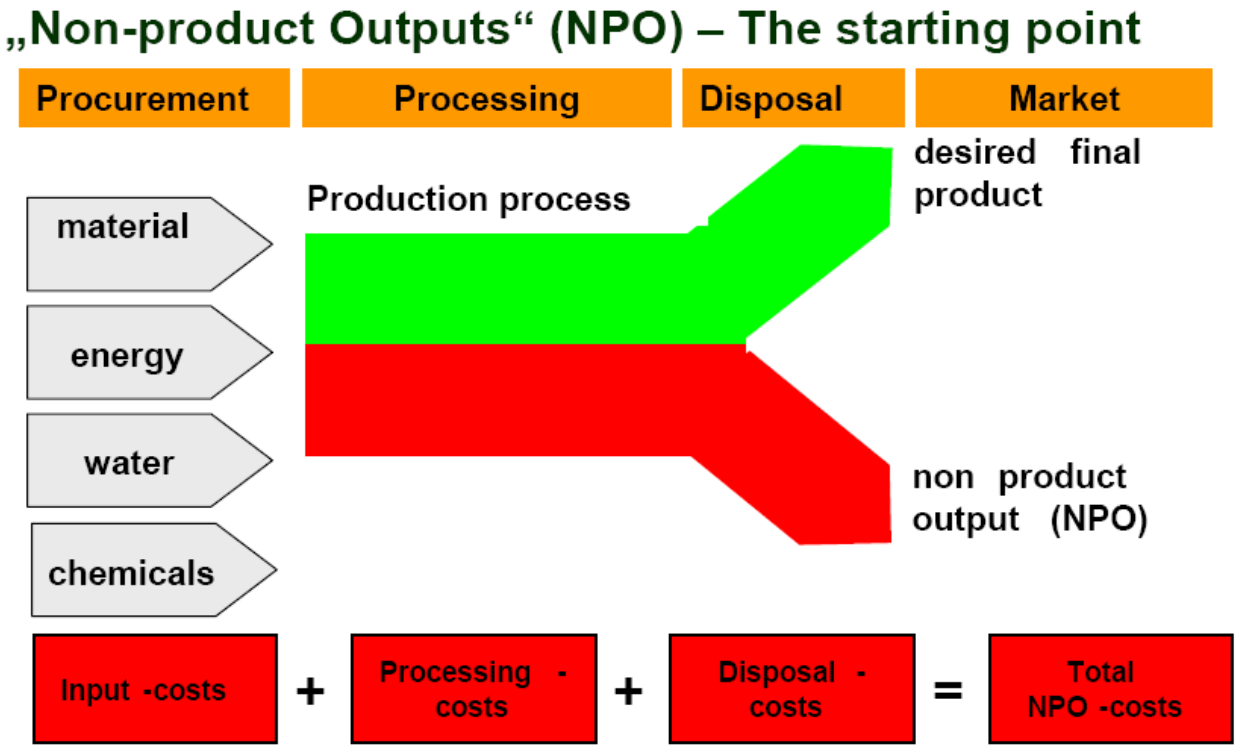


Figure 4 – The NPO Concept

Examples of NPOs

- Raw materials lost during storage, transport and processing in cutting, drilling and similar processes
- Waste-water, containing high concentrations of expensive processing materials that may be toxic to aquatic life and/or contaminate groundwater
- Energy lost in the form of heat or steam due to poor insulation or leaks
- Auxiliary materials, such as detergents and lubricants, discharged with waste water
- Goods of poor quality that have to be reprocessed
- Rejects that have to be discarded or sold cheaply
- By-products sold at less than their cost of production
- Excess packaging and packaging waste
- Materials and finished goods lost as a result of poor storage, handling or distribution

With the results of our method, the company will be able to demonstrate concrete efforts to improve its environmental performance. Our methodology can also be used as a tool to monitor the compliance with environmental regulations. It can be a step towards ISO 14000 certification or other management systems.

It can also increase the motivation of all company members to act more consciously with regard to the environmental aspects of the work process. As our method makes the production process more transparent this improves the communication between the different divisions. Product quality can often be increased due to process and product innovation.

Addressing NPOs will contribute to the improvement of your company`s performance in many respects, for example the environmental performance, image and standing of your company in the neighbourhood or as an attractive employer, as well as cutting down on unnecessary costs.

The process of identifying critical situations/hot spots will trigger general awareness about chemical management in your company. It enables your company to quickly spot opportunities to:

- Determine the necessary approaches to reduce the potential for harm
- Implement chemical control strategies
- Monitor and evaluate the results achieved.

The NPO concept and the underlying mitigation approach do not differ significantly from similar concepts like the basic ideas of cleaner production, resource efficiency and environmental management.

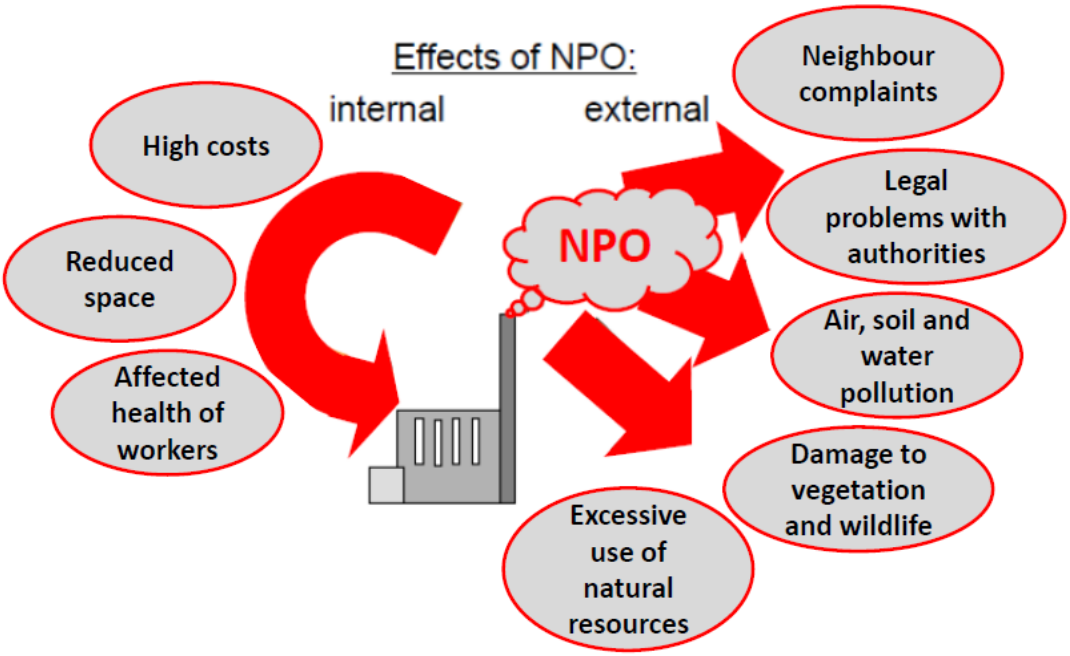


Fig 5 – Effects of NPO

3. How to use the GIZ Chemical Management Toolkit

This toolkit should support companies to implement chemical management in an easy way. The different steps towards sound chemicals management in your company are grouped together in three thematic modules. The overall structure and sequence follows the outline as shown in figure 6.

To achieve the maximum benefit, it is advisable to complete the different steps in the proposed sequence. Your company may already have certain elements of chemical management in place. In this case you can compare your existing practices or procedures with those suggested in this toolkit and see whether you want to make any modifications.

For each of these steps, there are corresponding training units, which will help you to understand and practice how to apply the different instruments. We suggest that you first try out these tools with the help of simple case studies and exercises in the toolkit, before you apply these in your company.

As the toolkit aims at assisting you with quickly implementing or enhancing the chemicals management in your company, it is important that you systematically try to replicate the measures in your company as demonstrated in the exercises. Share your insights with your colleagues and/or form a team with like-minded colleagues for this purpose. Start small to gain first hands-on experience before you go for scaling-up in your company. Select an area, production process or chemical substance you would like to start with.

Content and structure of the Toolkit

The sections in the modules of the toolkit correspond to the different steps towards establishing and maintaining sound chemical management. Each section consist of

(1) reading sections, which provide you with useful background information and links,

(2) training and guiding handouts and worksheets, which include practical approaches and exercises to complete the respective steps,

(3) blank forms, which you can readily use in your company or adapt to your specific requirements, and

(4) reference sheets for information which allows you to further deepen your knowledge of different aspects of chemical management.

Brief description of the modules

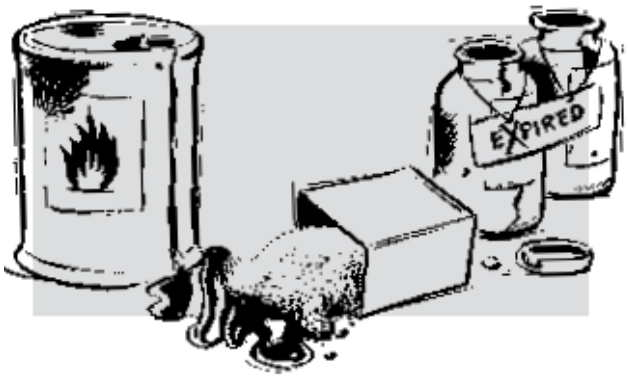
The steps grouped together into the **first module "Inventory and Risk assessment"** will help you to get an overview of the use and flow of the chemicals in your company. It will also allow you to already identify areas with significant chemical NPOs.

The first module involves the following steps:

Start	**Get ready for change**
	• Conduct initial review • Ensure commitment (time, resources) in your company • Get your team together
Step 1	**Understand and review the situation in your company (Data collection)**
	• Analyse material flows (particularly of chemicals) in your enterprise and identify NPOs • Identify areas for immediate improvement ("hot spots") • Systematically identify and document all chemical substances stored and used in your enterprise
Step 2	**Identify and assess the hazards and risks of the different chemicals in use (Chemical risk assessment)**
	• Classify chemicals by hazards • Assess hazards and risks • Create a structured information base in the form of a chemical inventory • Identify recommended control approaches

The second module "Managing the chemical risks in your company- control measures and gap analysis" builds on the information gathered during the various steps in module 1.

You will be able to further identify and assess critical situations/critical areas/ hot spots in your company. Based on an analysis of divergences between recommended and existing control methods for the hazardous chemicals in your company, you will be able to identify opportunities for the reduction of associated risks and costs. In this section you will also find guidance on how to set goals, targets and indicators as well as how to prepare an action plan. This also includes ideas and suggestions on how to manage chemical emergencies, how to identify training needs for your staff, how to plan training and communication as well as how to adjust work instructions.



Step 3	**Conclusions about risk to health and environment and management involvement**

- Identify control gaps and losses
- Assess the situation on-site
- Analyse gaps' causes for preparation of action plan

Step 4	**Develop and select measures (Chemical risk management)**

- Prepare action plan with specific measures
- Identify control gaps and losses
- Set priorities

Step 5	**Implement and monitor corrective action (Chemical risk management)**

Step 6	**Evaluate and integrate (Follow-up)**

- Review results
- Plan next (cycle of) steps
- Integrate results into your company

In the course of these two modules your company will be able to strive for reducing waste in your production as much as possible, gradually reducing the NPOs and reaping the economic and environmental benefits by managing chemicals in sound manner.

Rounding off the process**, the third module** "**Managing the wastes"** will help your company deal with the residual NPOs, especially the hazardous waste, which cannot be avoided despite all other efforts. In the different sections of this module you will set-up a system to manage the hazardous waste on-site on a sound basis before further outside disposal. This includes understanding the hazard properties of waste, how to classify and segregate, collect and safely handle the waste in your company.

Time required

The timeframe for implementing these modules and steps will largely depend on your own situation, systems already in place and available resources such as skilled personnel and time at hand. In case your company is going to implement sound chemical management in connection with an individual or group training program, supported by an external facilitator, the usual timeframe for completing the corresponding training cycle will be between four to eight months. A typical sequence of such group training is given in the figure below. Each module takes approximately 3 – 4 days. Each training block will be followed by a progress review and network meeting of half day for further guidance

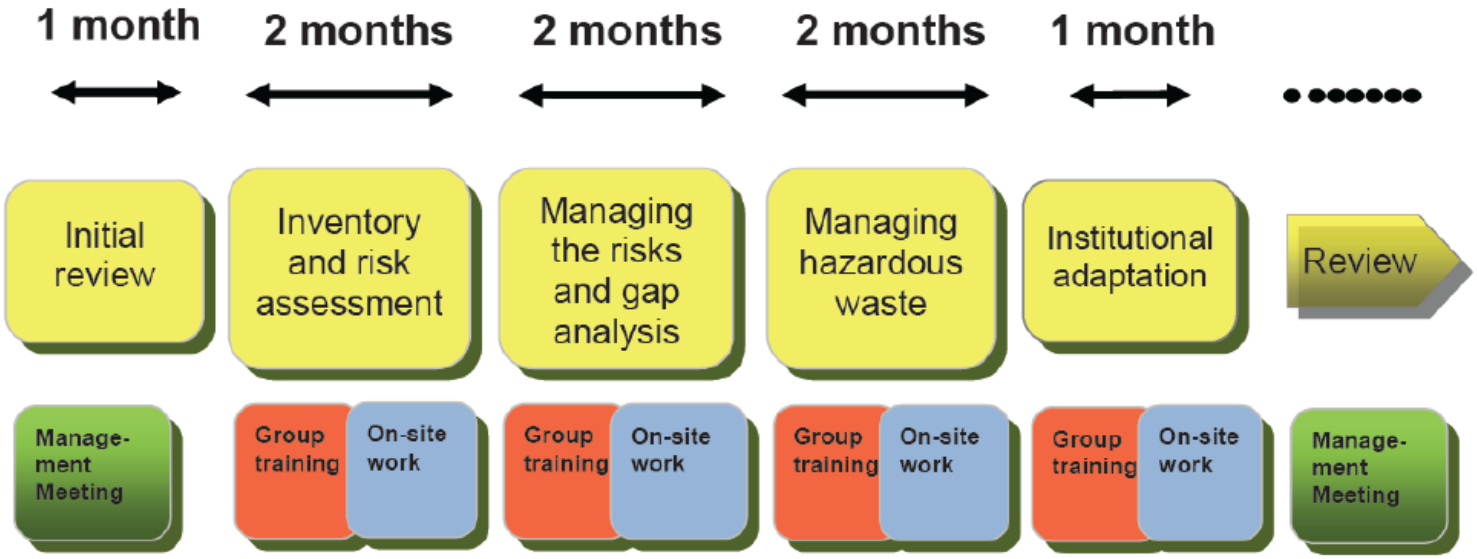


Fig 6 – Timeframe of GIZ practical chemical management

Ready? Then let us start!

Find out where you stand

Use the checklist below to carry out brief self-check and quickly assess where your company might stand with regard to chemical management. The indicators in the following quick-check describe what successful chemical management implies.

	Chemical management indicators in your enterprise	Yes	Partly correct	No
1	An up-to-date inventory of all chemicals used or present in your company is available			
2	The characteristics/hazard properties of all chemical substances (including chemical waste) that are stored and used in your enterprise are known and documented (e.g. in the form of safety data sheets)			
3	The amounts of frequently used chemicals kept at hand are known and documented			
4	All chemical and waste containers are labelled / marked to allow clear identification of chemicals inside and their hazardous properties			
5	Situations where chemical hazards may be present (hazard means anything that has the potential to cause harm to people and/or the environment or cause damage e.g. due to fire, explosion or other reactions) have been identified and assessed for their potential risks			
6	Based on this assessment, improvement measures are implemented			
7	Work instructions are provided in the production sites, where hazardous chemicals or their wastes are handled, and include information at least on safe chemical handling and personal protection			
8	The workers are aware of the harmful nature of the substances they use/handle at work and how they may be exposed to them			
9	Everybody (including managers, supervisors, workers, visitors) who is present in areas with possible exposure to hazardous chemicals knows as well as follows safe work practices and uses the control measures correctly			
10	Waste water, in particular containing chemicals, is sent to a functional treatment facility before being discharged outside the company			
11	Costs and quantities of chemicals applied are known			
12	Wastes and especially solid/liquid hazardous wastes are segregated, labeled and safely disposed of according to local regulations			

Published by:
Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

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Convention Project Chemical Safety

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Layout: Harald Flohr
Photos: © Stone Images; © GIZ /Wolfgang A. Schimpf
Illustrations: © Wedha and Stöber

Bonn, October 2011