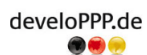


# Workbook

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Strategic Alliance:



In cooperation with:



Prepared by:





# Workbook

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## Workbook

### Welcome

Dear Reader,

Welcome to your personal workbook.

This workbook is part of the Factory Training Programme and supports your personal development and learning curve by allowing you to reflect on what you have learned during the Classroom Training and put it into practice.

This workbook covers all practical exercises which will be worked on during the Classroom Training. Furthermore, it provides you with all accompanying handouts and templates and gives space for your personal notes from discussion rounds and summary sections. At the end of the workbook you will find a section covering the instructions on how you best prepare for the on-site visits to your factory.

### How to use this workbook

The workbook structure follows the order of the Factory Training Material. All practical exercises are labelled with respective titles and symbols indicating the type of exercise. Below you will find an overview of all types of tasks displayed in your workbook. Exercises are numbered in a chronological order and indicate the respective training session (e.g. '(7-1) The Problem' – this is the first exercise of Session 7).



#### THE PROBLEM

- At the beginning of each Session you will find a section called 'The Problem' which leads to the topic of the session with an introductory question.
- The workbook displays the specific question and a section for you to take notes.



#### ACTIVITY

#### REFLECTION

- The section 'Reflection' displays the practical exercise for each of the sessions and provides you with information needed to successfully complete each exercise.
- You will find space in your workbook to work and document on each of the exercises.

#### CASE STUDY

- Here you will find all exercises that are case studies and space to work on and document your answers.



## Workbook

### ROLE PLAY

- Here you will find all exercises that are role plays and space to document your findings.

### Q&A

- The Question & Answer section allows you to clarify any outstanding questions.
- The workbook displays a notes section for you to document questions and answers.

### GROUP WORK

- Here you will find all group work exercises and a section to document your notes.



### DISCUSSION

- The section 'Discussion' displays all questions that will be discussed during the Classroom Training.
- The workbook displays the specific question and a section for you to take notes.



### SUMMARY

- This section is for you to note down a summary of each section and/or for you to make a note of the key learning of the session.

It is highly recommended to take notes in your workbook during the Classroom Training and to work on all exercises displayed to generate the best learning outcomes.

# Workbook

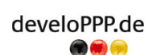
## Session 1

---

### Introduction to Chemical Management Framework



Strategic Alliance:



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Prepared by:





## Workbook: Session 1



### (1-1) REFLECTION

Team-up with colleagues of your facility.

Assess the maturity of the Chemical Management System in your facility.

**Notes:**





## Workbook: Session 1

### CMS Maturity Matrix

Chemical management system maturity matrix and score sheet.

<b>Company</b>		<b>Person(s) involved</b>		<b>On (date)</b>	
Address					

Which box best describes the current situation in the company with regard to chemical management:

	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>Score</b>
	<b>Getting started</b>	<b>Transitional</b>	<b>Progressing</b>	<b>Maturing</b>	<b>Excellent</b>	
1. Chemical inventorying	No chemical inventory available.	Basic list of chemicals used and available compiled.	An up-to-date inventory of all chemicals used or present in your company is available.	Chemical hazard/risk information included into the up-to-date inventory of all chemicals; responsible person(s) trained.	Procedure for maintained and use of companywide advanced chemical inventory established and maintained; responsible person(s) trained.	
2. Competence/skill development	No specific training on safe chemical management practices conducted; limited knowledge of concerned persons on chemical safety issues (PPE, hazards, labels, exposure, NPOs).	Basic standard training on chemical hazards, safe use of chemicals as well as PPE provided to a few selected (technical) persons engaged in handling of chemicals.	Comprehensive assessment of job and situation specific chemical management skills and required competences carried out and used for developing tailored chemical safety program.	General training on chemical safety (induction and refresher) for all staff members and workers, plus specific technical training for persons handling hazardous chemicals conducted.	CM training activities integrated into company's competence development plan, together with established system for continuous competence need/gap assessment and monitoring.	



## Workbook: Session 1

	0	1	2	3	4	Score
	Getting started	Transitional	Progressing	Maturing	Excellent	
3. Hazard identification & assessment	Hazard characteristics of available chemicals not known; no safety data sheets available.	Safety data sheets for some chemicals available and/or not up-to-date; safety data sheet not used for purpose of hazard identification and assessment.	Safety data sheets for most chemicals available and up-to-date; basic identification and assessment of chemical hazards taking place.	Comprehensive identification, assessment and classification of chemical hazards carried out; safety data sheets available for chemical in line with GHS format; responsible persons routinely refer to SDS.	Procedure for updating of safety data sheet as well as assessment and documentation of chemical hazards established and maintained; procedure for substituting hazardous chemicals implemented; responsible person(s) assigned and trained.	
4. Process efficiency management	Quantities of chemicals used not known; no awareness about chemical wastes (NPOs).	Approximate quantities of frequently chemicals used are known, but not documented; NPOs identified in a few areas.	The amounts of chemicals used and kept at hand are known and documented; process flows assess with NPOs being identified .	Comprehensive analysis and documentation of process flows and quantification of NPOs carried out.	Systematic material/ chemical flow cost accounting and NPO mgmt. approaches embedded into company's management practices.	
5. Chemical hazard communication	Labels and markings on most chemical containers missing or not legible.	Few chemical labels/ markings available on chemical containers; only few persons concerned know meaning of labels/markings.	GHS chemical labels/ markings available on all chemical containers; meaning of labels/markings known to all person handling chemicals.	GHS chemical labels/ markings available on all chemical containers, including temporary containers (e.g. used for internal transport)	GHS chemical/labeling and hazard information in safety data sheets systematically reflected in work instructions, warning signs.	



## Workbook: Session 1

	0	1	2	3	4	Score
	Getting started	Transitional	Progressing	Maturing	Excellent	
6. Chemical risk management	Risks of chemicals not assessed and/or known.	Situations where chemical hazards and exposure may be present have been identified and documented, including those in storage of chemicals.	Risk of chemical hazards and exposure in situations being assessed and documented on company wide basis; compatibility check of stored chemicals completed; basic exposure monitoring carried out.	Risk assessment used for identifying and addressing (root) causes as well as development of risk control and emergency action plans; storage of chemicals rearranged according to compatibility and maximum storage quantities; occupational health and industrial hygienists involved in assessing exposure.	Risk assessment and control approach embedded into company's management system, with according procedure established and maintained and supported by emergency management procedures: systematic exposure and health monitoring integrated into risk assessment process	
7. Chemical waste management	No or limited ad-hoc collection of chemical wastes; no or limited treatment of chemical containing effluents; disposal by (on-site) burning.	Collection and segregation of chemical wastes carried out; all chemical containing effluents sent to effluent treatment plant.	Company-wide inventory of chemical wastes prepared, with waste categorized and segregated by hazards and compatibility.	Treatment and disposal paths for different categories identified based on waste inventory and mapping.	Formal procedures for on- on off-site waste management established and maintained; final disposal of chemical wastes monitored.	
<b>Total</b>						<b>/ 28</b>

Credit: GIZ



## Workbook: Session 1



### (1-2) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

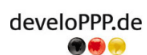
## Session 2

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### Working with Your Map



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In cooperation with:



Prepared by:





## Workbook: Session 2



### (2-1) THE PROBLEM

What problems might occur if you are not improving your environmental management system?

**Notes:**



## Workbook: Session 2



### (2-2) Q&A

Do you have any questions about the on-site assessments?

Do you have any questions regarding Management Action Plans?

**Notes:**



## Workbook: Session 2



### (2-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**



# Workbook

## Session 3

---

### Regulation and Compliance Framework



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 3



### (3-1) THE PROBLEM

What problems may occur if you are not aware of chemical regulations?

**Notes:**



## Workbook: Session 3



### (3-2) GROUP WORK

Form groups of 5-6 persons, mix with people from different facilities and professions.

As a team create an inventory of international and national regulatory requirements.

One group to present the results to the peers.

**Notes:**



**Regulatory Requirements Inventory Template**

No.	Title	Descriptions	Applicable to		Area of Applicability	Licenses / Compliance Records Required	Reviewed
			Company	Contractor / Supplier			



## Workbook: Session 3



### (3-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 4

---

### Chemical Flows



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 4



### (4-1) THE PROBLEM

What problems can occur if you do not know the chemical flow in your facility?

**Notes:**



## Workbook: Session 4



### (4-2) REFLECTION

Work in pairs and identify potential cost savings from the NPO examples shown on the pictures.

Present your results to the group.



**Cut-off of materials:**

**Energy (steam):**

**Process water and chemicals:**





**Workbook: Session 4**



**Energy:**



**Water:**



**Energy (hot water operations):**



## Workbook: Session 4



### (4-3) CASE STUDY

In groups of 6, review information provided to you and:

- Identify the location and flows of chemicals and chemical (containing) waste.
- Document the process flow.
- Identify possible NPOs.
- Present your findings to the management team – one process flow diagram, one eco-map.

Welcome to “Beautiful Colours”, a small textile company which specialises in dyeing and printing fabrics. The management of “Beautiful Colours”, has engaged you for helping them in chemical management. To better understand the situation at hand, you are organising a meeting with the company management and visit to the factory. During the first walk-through of the factory, you have observed and noticed the following:

There is a general storage area, where the raw material and chemicals are received. When chemicals are delivered by the suppliers, the company workers straight away place these in the store without any further quality control. One of the workers points out the red symbol with the black exclamation mark on a chemical bag wondering about its meaning, but the store supervisor does not know. The storage area is quite full. In the front yard, the workers have stored two containers with Aniline and Acetone.

All the dyes and chemicals are stored in bags and containers next to the fabric material, directly on the floor. Since the last rainy season, the roof of the storage area has been leaking. A few bags got wet and were put aside in a corner. New materials have already been ordered. John, the most skilled worker, is the only one who can identify different chemicals even though labels or markings on many chemical containers are damaged, missing or in a foreign language.

Because of his long experience, John hands out the chemicals needed in dyeing or printing process to each worker individually. In case of any questions regarding the chemicals everybody checks with him. When inquiring with him about material safety data sheets, he indicates that there seems to be a folder somewhere in the manager’s office but he does not know exactly. You see some chemical containers with acetic acid, and dye stuff such as reactive black and basic yellow.

Once the workers have received the chemicals they carry these in open and unmarked buckets to the respective production areas. In the dye kitchen the colour baths are prepared by mixing water with dyes and auxiliary chemicals. Jeff is responsible for the preparation of the chemicals used in these operations – a task which demands most of his time and which is done according to recipes based on long years of working experience. After all these years, Jeff is not very enthusiastic about his job and sometimes does not really pay attention to the mixing of the exact quantities of chemicals, adding more or less than “usual”. Sometimes he lets one of the helpers do the mixing. The staff keep a few open bags and containers of powdery dyestuffs and other chemicals in the mixing place. Sometimes, bags get spoilt when they have been lying on the wet floor for too long. To clean the dye kitchen from dust and spilt materials, the floor is swept by the cleaning personnel every week. When you leave the dye preparation area, you notice that your white shirt is covered with black dye particles.

Ben, who is responsible for dyeing the fabric, wears boots, saying it makes him feel better and safer, unlike his colleagues, who wear open sandals. During the dyeing process, Ben adds further auxiliary chemicals (salt) for colour fixation and he regulates the temperature of the heated dye bath in the machine. Dyeing is done in old, open machines, which use large amounts of water. Every now and then the machines start leaking. When the leakage in the machines gets too big, it just gets fixed in an improvised way by Richard, who is in charge of general maintenance. Occasionally, when the colouring vessels are filled to the top,



## Workbook: Session 4

liquids spill out of the vessels onto the floor. Lots of water and spillages end up on the floor, making it really slippery and keeping the cleaning staff very busy all day. Once the process is complete, the waste dye liquor is drained into the drainage going to the treatment plant. It is estimated that up to 40% of the dyes and 80% of the auxiliaries end up in the wastewater.

The cleaners also hose the floor, with the wash water flowing out into the sandy factory yard. The cleaning effluent goes directly into the nearby drainage. Several times the drainage is blocked by some old packaging and the cleaning effluent flows into the yard.

The next step after dyeing is drying of the fabric which is done outside in the open air, before going to printing. While you walk from the dyeing to the printing area, you slip several times on the wet floor.

In the printing area, you meet Jeff who is the production supervisor. At the entrance of the printing areas there is a small “colourful” area where a helper is mixing the printing paste as per instructions from Jeff. Apart from a container with 2-Naphthol and Sodium hydroxide, there is one more chemical container without a label, but some handwritten sign. You observe how several female workers carry out the manual screen printing. You immediately notice the solvent smell in the air. There is an exhaust fan mounted on the rear wall, which blows the air to the outside toward the neighbouring building. On the rear side of the room you also see some containers with dry printing paste lined up. When inquiring about the containers with the workers, they indicate that quite often they prepare too much printing paste. The left-over paste is collected and thrown out with the waste into the yard every now and then. Since you start feeling dizzy in the printing area, you proceed to the backyard.

On the way to the backyard you pass the product storage area, the entrance to product storage area and the walkways are rather narrow, so workers carry heavy bundles of materials in and out. Apart from the final products and some spare parts, you also see a one container with citric acid and one container without any label.

The factory has a simple wastewater treatment plant (ETP) which has been built ten years ago located in the backyard. Richard, who is in charge of general maintenance, seems to be also responsible for running the effluent treatment plant. During the treatment process, the ETP staff add some chemicals to adjust the pH and some other chemical to help the settling of solids. You note that the electrical control panel is quite corroded and hangs on one hinge. It seems that it will fall off any time. Also, the railings of the walkways over the treatment tanks are quite corroded and partly missing. The treatment sludge from the wastewater treatment process is dried and stored in the factory yard and taken away for some land-filling. Some solid wastes, including the packages of some hazardous chemicals, collected every week by the local garbage collector.

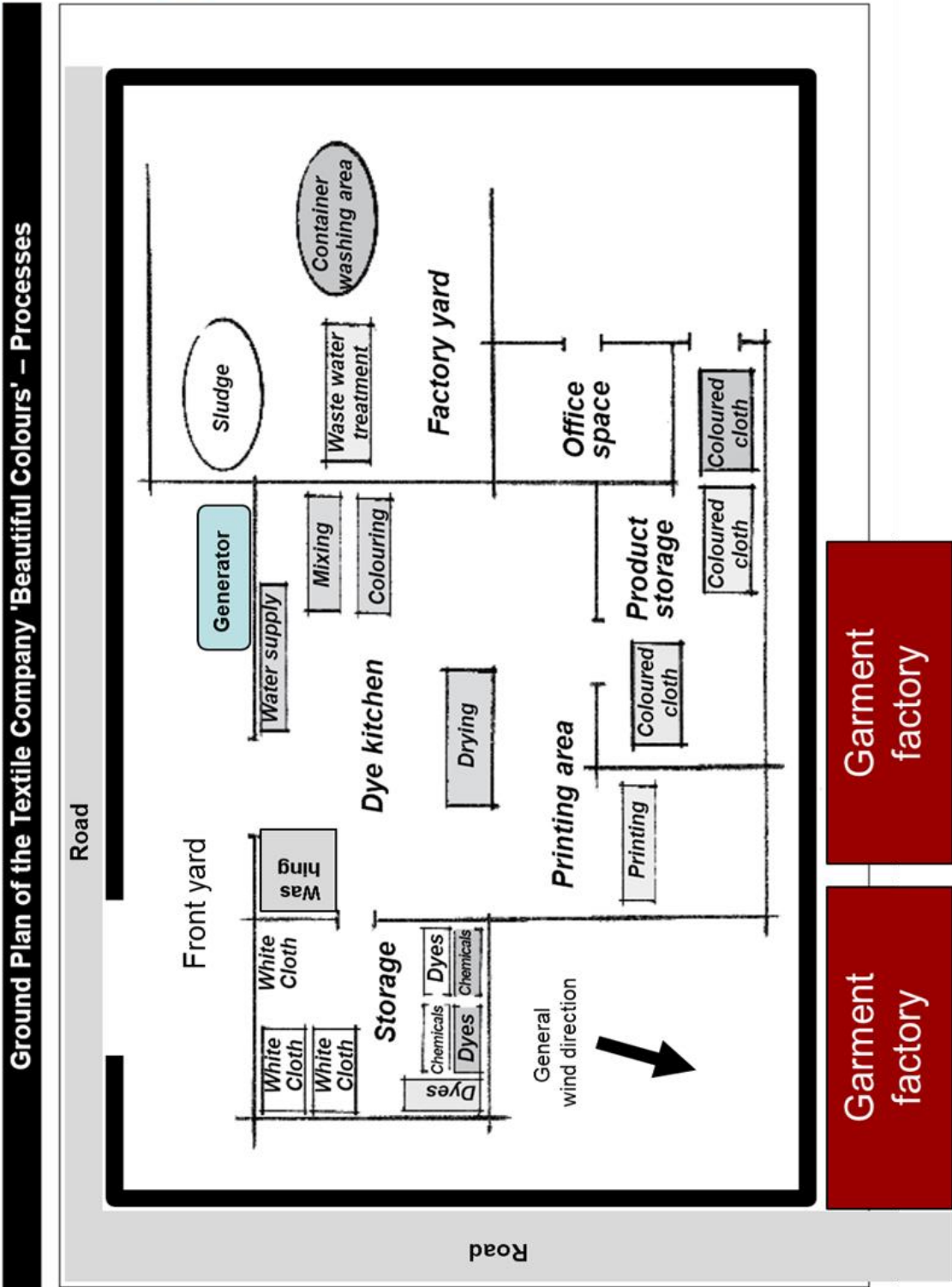
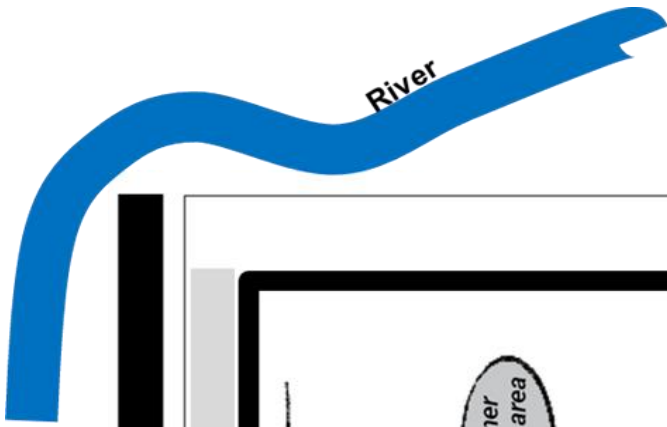
According to the manager, the company gets its process water from a ground well in its own compound. Electricity is provided through the company's own diesel generators. When the chemical containers in the storage area are empty, some of the workers take them home to use them as storage for drinking water. Before doing so, they do some basic cleaning the empty containers by washing off the remainder chemicals with tap water in the factory yard. Empty chemical bags are thrown out into the factory yard and burned in a corner of the yard from time to time together with other types of waste (e.g. plastic wrappings, office papers) collected from the different parts in the factory.

On your way home, you stop at the tea stall next to the factory and get in conversation with some local people from the neighbourhood who share their concerns about the daily colour changes of the river water and the chemical smell from the factory.



Ground Plan "Beautiful Colours"

Credit: GIZ







**Workbook: Session 4**

**On-Site Pictures “Beautiful Colours”**



**Washing room**



**Pre-treatment**



**Dyeing**



**Dyeing**



**Dyeing**



**Dyeing**

Credit: GIZ



## Workbook: Session 4

<p><b>Identify the location and flows of chemicals and chemical (containing) waste:</b></p>	<p><b>Document the process flow:</b></p>
<p><b>Identify possible NPOs:</b></p>	<p><b>Present your findings to the management team – one process flow diagram, one eco-map:</b></p>

<p><b>Notes:</b></p>
----------------------



## Workbook: Session 4



### (4-4) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 5

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### Identification and Labelling of Chemicals



Strategic Alliance:



In cooperation with:



Prepared by:







## Workbook: Session 5



### (5-1) THE PROBLEM

*What problems can occur if you cannot identify all chemicals in Your Facility?*

**Notes:**



## Workbook: Session 5



### (5-2) ROLE PLAY

You realise you are missing the Safety Data Sheet of your dyestuff "Reactive Black 5".

Act out the following role plays and discuss.

You work for the company "Black clothing Ink Ltd" based in Bangladesh. The company started to develop and implement a Chemical Management System. All employees were trained on the importance of SDS sheets, however the procurement manager was on leave and could not join the training session. A week after the training, the store manager conducted his regular store check and identified that he holds the SDS sheet for the dyestuff "Reactive Black 5" in German only.

Role Play 1	Role Play 2
<p>Two people: Store Manager &amp; Procurement Manager</p> <p><b>Instructions Store Manager:</b> Being fully trained, inform your procurement manager why you need the SDS. Build supportive arguments as to why SDS sheets are important.</p> <p><b>Instructions Procurement Manager:</b> You were on leave for two weeks and are very busy. Work piled up and you have hardly a spare minute. You were never trained on the importance of SDS sheets.</p> <p>Now, your store manager approaches you asking for the SDS in local language, while you already made sure a SDS is available for, "Reactive Black 5". Question your store manager, why he now needs the SDS in local language. Remain approachable and interested in well thought out and structured arguments.</p>	<p>Two people: Procurement Manager &amp; Chemical Supplier</p> <p><b>Instructions Procurement Manager:</b> Your store manager convinced you about the importance of having an SDS in the local language. You send two emails to your chemical supplier and the company requesting the SDS. You have not received a response. You requested a personal meeting with your supplier to discuss your partnership and your requirement for SDS in local language.</p> <p><b>Instructions Chemical Supplier:</b> You are a local chemical supplier, trying to achieve as much profit as possible, putting in as little work as possible. Profit is your key priority and you do not want to lose business. At the same time, you are very angry your business partner requested a personal meeting only to obtain a piece of paper.</p>



## Workbook: Session 5

Notes:



## Workbook: Session 5



### (5-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 6

---

### Setting up a Chemical Inventory



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Prepared by:





## Workbook: Session 6



### (6-1) THE PROBLEM

*What problems can occur if you are missing one source of information for any chemical in your facility?*

**Notes:**



## Workbook: Session 6



### (6-2) CASE STUDY

Assist the company Beautiful Colours to develop a complete inventory of all chemicals used and present your results to the group.

The owner of the textile company 'Beautiful Colours' is really annoyed. Today eight workers have not reported to work. His storage manager is the only one who knows that everyone has been hospitalized for a week with serious cough and breathing problems. He can easily get replacements for some of the absent workers, but three of them are working in positions which need require specific skills and understanding in the production process and the processing and handling of chemicals.

To make his day even more complicated, he has received a very high bill from his supplier of chemicals. Somebody has ordered substances which are still available in large amounts in the production area. He does not know who was responsible for this purchase.

Just last week they had to dispose of whole batches of poorly processed products; the quality and colour of the textiles was not what the customer ordered. If this situation continues, the owner fears that his company faces the risk of great losses in production and employment.

This makes the owner think of long term solutions. Good starting points are ideas for improvement which his production manager has brought from a chemical management workshop. The production manager taught the owner that certain products can cause serious health problems for humans and endanger the environment. He/ She is also aware that certain countries ban the import of textiles which contain dangerous residues. The company already implemented some changes, such as the repair of the leaking roof in the storage room and the installation of small ventilators to get rid of vapours, as well as the provision of personal protection equipment (overalls, boots, gloves, goggles and masks). But the owner has also observed that the workers hardly use this equipment.

The first step to overall improvement to management of chemicals was the nomination of 3 persons (deputy manager and some higher educated workers) to develop an inventory of all chemicals that exist in the factory, including a risk, cost assessment and identification of approaches to control chemicals.

As they have never done these tasks and do not know how to go about doing this, the owner hires you as consultants to support his staff.

Assist the company to elaborate a complete inventory of all chemicals used and present in the company 'Beautiful Colours'.



## Workbook: Session 6

Instructions for group work:	Materials:
<p>Take a (virtual) walk-through the company (as laid out in the workshop room) to get an idea of layout. Identify the following information into the inventory table:</p> <ul style="list-style-type: none"> <li>• Area/ Process.</li> <li>• Name.</li> <li>• SDS.</li> <li>• R-phrases/ Hazard statements.</li> <li>• Hazard type.</li> <li>• Hazard bands.</li> <li>• Amount.</li> <li>• Compile and analyse the information in the inventory table.</li> </ul>	<p>Floor plan of “BC”.</p> <ul style="list-style-type: none"> <li>• Information on chemical containers.</li> <li>• Safety data sheets.</li> <li>• Sample inventory table.</li> </ul>

## Chemicals Used at “Beautiful Colours”

Container	Quantity	Labels on container	Chemical name
	25 liters		Acetic acid
	1000 liters		Citric acid
	5 liters		No label
	10 liters remaining stock		Aniline
	15 liters		C.I. Basic Yellow Liquid (on hand written label)
	25 kg		Reactive black
	100 kg		2-Naphthol
	25 kg		Sodium hydroxide
	15 kg		Solid chemical – label with chemical name torn, but code H228 readable
	15 liters		Acetone







**Workbook: Session 6**

**Notes:**

A large, empty rectangular box with a thin black border, intended for taking notes.



## Workbook: Session 6



### (6-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

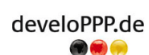
## Session 7

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### Team, Roles & Responsibilities and Expectations



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 7



### (7-1) THE PROBLEM

*What problems might occur if roles and responsibilities are not clearly defined?*

**Notes:**



## Workbook: Session 7



### (7-2) REFLECTION

Your company wants to develop a comprehensive chemical management system training programme for the workforce. Your task:

- Define the learning objectives for this training programme.
- Define the target group per learning objective.
- Suggest suitable training delivery mode.

Work in groups of 3 and present your answers to your peers.

Learning objective	Target group	Training delivery mode



## Workbook: Session 7

Notes:



## Workbook: Session 7



### (7-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**



# Workbook

## Session 8

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### Policy Management



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 8



### (8-1) THE PROBLEM

*What problems can occur if policies are not covering key aspects of the Chemical Management System?*

**Notes:**



## Workbook: Session 8



### (8-2) REFLECTION

1. List all policies that need to be updated and/or drafted for your Facility.
2. Review your MAP. Which of your improvement areas are related to chemical procurement? Note down your first ideas on an effective management action.

**Notes:**



## Workbook: Session 8



### (8-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 9

---

### Good Chemical Procurement Practices



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## Workbook: Session 9



### (9-1) THE PROBLEM

*What problems in relation to hazardous chemicals can arise if procurement personnel have not been trained on them?*

**Notes:**



## Workbook: Session 9



### (9-2) REFLECTION

Review your MAP.

Which of your improvement areas relate to chemical procurement?

Note down your first ideas on effective management action.

**Notes:**



## Workbook: Session 9



### (9-3) REFLECTION

Partner with the person next to you and in pairs discuss:

- How are you currently working with your chemical suppliers?
- How can you improve your current ways of working?

**Notes:**





## Workbook: Session 9



### (9-4) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 10

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### Quality Control



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In cooperation with:



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## Workbook: Session 10



### (10-1) THE PROBLEM

*Which problems can occur if no credible quality control process of incoming chemicals takes place?*

**Notes:**



## Workbook: Session 10



### (10-2) ROLE PLAY

Your facility experiences a 4% chemical failure rate in final product from Heavy Metals. This means high financial losses for your facility.

Explain to your Factory Manager how the failure rate can be improved by installing a credible Quality Control Process and which steps are necessary.

**Notes:**



## Workbook: Session 10



### (10-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 11

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### Chemical Risk Assessment, Hazard Control and Emergency Management



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**(11-1) THE PROBLEM**

*What could occur if you are not aware of the risks from chemicals used in production?*

**Notes:**



## Workbook: Session 11



### (11-2) DISCUSSION

*What chemicals with potential hazards can be found in wet-processing units?*

**Notes:**





(11-3) REFLECTION

Let us together identify the risks of Sodium Dithionite and decide which control band to add. The amount in use is medium as well as the chance of exposure. In case of skin contact the duration of exposure would be short.

**Risk Inventory Sodium Dithionite**

Area / Section	Name	SDS Yes / no	R-phrases/ H-statements	P	H	E	Hazard group/ band	Amount per batch/ day	Dustiness/ volatility	Quantity on skin	Duration of exposure on skin	Risk / control band

**Notes:**



## Workbook: Session 11



### (11-4) CASE STUDY

The factory “Denim Sprayers“ has several employees suffering from dizziness and pains when breathing. Absenteeism has risen and action is necessary. They employed you as consultant to assess hazards and risks and identify any control gaps. They also ask you to suggest exposure control measures, including personal protection equipment. What will you advise them?

Work in groups of 4 and present your results to your peers.

The factory “Denim Sprayers“ has several employees suffering from skin burning, nausea and diarrhoea. Absenteeism has risen and action is necessary. They employed you as consultant to assess hazards and risks and identify any control gaps. They also ask you to suggest exposure control measures, including personal protection equipment.

What will you advise them?

The situation on site is the following:

- Potassium permanganate spray concentrations ranges from 5 grams per litre to 12.00 grams per litre.
- Workers are engaged 10 hour shifts in the spraying area, working for about six to eight hours a day, with one hour lunch break and one 15minute tea break each in the morning and afternoon and the rest of the time waiting for material to be moved.
- Most workers remain in the work area during the tea breaks
- Air quality measurement indicates average concentration of 0.4 mg/m<sup>3</sup> TWA, with peaks of 0.8 mg/m<sup>3</sup> in the work area and 1.5 at the point of spraying operation
- As per the SDS, TWA is 0.1 mg/m<sup>3</sup>.
- The spray areas are equipped with water curtains, but these are not switched on.
- The area is ventilated by large extraction fans mounted at the wall above the spraying booth which blow the exhaust air towards the neighbouring garment unit.
- The workers in the area wear surgical masks, which look new and fairly clean at the time of your visit.

**Notes:**



**Workbook: Session 11**

**On-Site Pictures “Denim Sprayers”**



**Notes:**



**Notes:**



**Notes:**



### (11-5) CASE STUDY

At “Beautiful Colours”, the management has called your team to discuss how “Beautiful Colours” could prepare for possible emergencies.

Review the situation described and complete the assigned tasks.

#### **A hot day at ‘Beautiful Colours’**

It is a hot summer day and work in “BC” is in full swing. One of the workers has noticed that in the store room of “BC” one of the barrels containing cleaning solvent has developed a leak. As it is only a small wet batch on floor, he does not pay any more attention to it. It seems that one of the other workers in the store had accidentally hit the barrel with the newly acquired forklift when reversing in the storage area.

The sun is shining onto the roof of the store room. The small wall mounted fan hardly makes a difference to ease the hot air inside. The store-in-charge has placed an old stand fan in the store to increase the air circulation. As he had not found a proper plug point, he had plugged the blank wires into a socket, near the chemical containers. Unknown by the store-in-charge, the barrel’s side has been cracked quite severely and more liquids are spilling out and collecting near the stand fan. Due to the heat the solvent is quickly evaporating.

Suddenly, there is a flash and the floor around the stand fan is on fire. Quickly the fire makes its way to the barrel with the solvent, which blows up in flames with a loud crackling sound. The store-in-charge rushes out into the open yard in panic. There is a fire extinguisher somewhere, which has been installed by the management some months ago. So far, he had not received any training on how to use it. Shouting loud he runs into the production areas to alert the other workers. Confused the workers try rushing to different exits from the work area. Eventually the production supervisor alerted by all the running around emerges from his office. Somehow is able to extract the information from the store-in-charge about what has happened. Quickly he runs back into the office and calls the fire brigade. Then he joins the other workers who have gathered outside the factory building in different locations. It appears that somebody is still inside the building...



## Workbook: Session 11

- Identify possible chemical emergency scenarios in the case study “Beautiful Colours” (use different documents you have prepared so far, in particularly floor plans, flow charts and inventory table).
- Decide what and where emergency equipment may be required in the company, in particular in terms of:
- Active and passive fire fighting facilities (e.g. type of fire extinguishers).
- Emergency leak control kits and provisions (e.g. drying, clean-up).
- Emergency vessels and containers to hold leaking material.
- Medical first aid provisions.
- General and special personal protective equipment for emergency personnel.
- Compile your group’s findings for presentation in the plenum.

### Notes:



## Workbook: Session 11



### (11-6) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

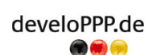
## Session 12

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### Safe Storage & Transport of Chemicals



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 12



### (12-1) THE PROBLEM

*What problems may occur if chemicals are not transported safely?*

**Notes:**





## Workbook: Session 12



### (12-2) REFLECTION

Review your MAP.

What areas of improvement have been identified in relation to chemical storage and transport?

Discuss appropriate actions with your peers.

**Notes:**



## Workbook: Session 12



### (12-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 13

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### Managing Chemical Waste



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 13



### (13-1) THE PROBLEM

*What problems can occur if you do not know how to handle the chemical waste in your company?*

**Notes:**



## Workbook: Session 13



### (13-2) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 14

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### Wastewater and Sludge



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## Workbook: Session 14



### (14-1) THE PROBLEM

*What problems can occur if you do not follow wastewater testing requirements?*

**Notes:**



## Workbook: Session 14



### (14-2) REFLECTION

Discuss your experience with wastewater testing.

What were your challenges?

What solutions have you found to positive test results?

**Notes:**





## Workbook: Session 14



### (14-3) GROUP ACTIVITY

Review the production recipe and the SDS of all chemicals provided.

Go through the SDS information and create the chemical inventory.

Calculate the approximate COD values of the water discharged to the equalisation tank (input of ETP).

Compare to the ETPs input and discharge information for COD and BOD with your calculations.

What does the information tell you?

#### Production Recipe:

**Material to Liquor Ratio:** 1:10 , **Weight of fabric:** 500 kg fabric, **Equalisation tank Volume:** 300,000 lit

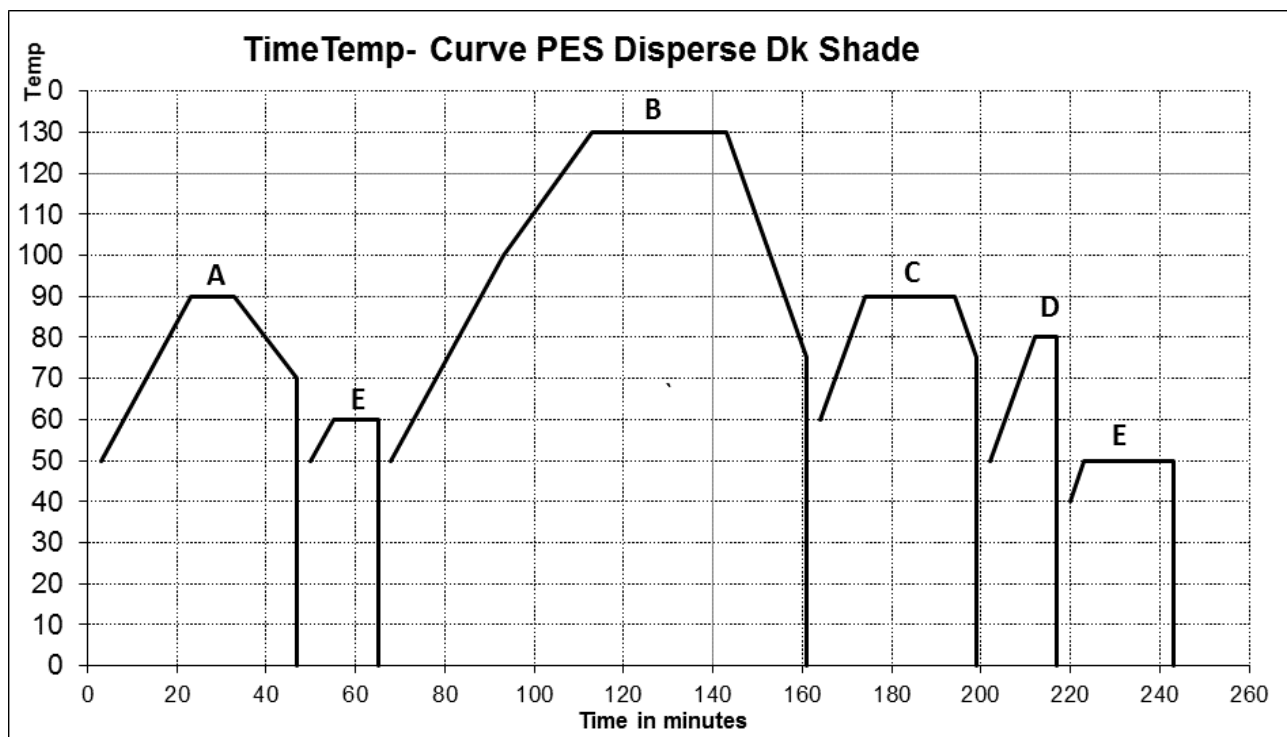
#### Polyester dyeing cycle

Pretreatment	Concentration	Unit	COD
Pret RN liq.	0.5	gpl	2.002 mg/g
Scour X liq.	0.2	gpl	1.897 mg/g
Soda ash	0.2	gpl	
Polyester Dyeing			
Disper FT liq	0.60	gpl	1.916 mg/g
Acetic acid	1.00	gpl	1.07 mg/g
Sodium Acetate	0.30	gpl	
Disperse Navy F	0.3	%	1.370 mg/g
Disperse Scarlet C	0.1	%	1.450 mg/g
Disperse Yellow Brown F	1.3	%	1.657 mg/g
Reduction Clearing			
Caustic Soda	0.9	%	
Hydros	1.2	%	
Hot wash			
Neutralizing			
Acetic Acid	0.3	gpl	1.07 mg/g



## Workbook: Session 14

### Time Temperature Curve PES Disperse DK Shade



Notes:

Safety Data Sheets will be provided as separate handouts.



## Workbook: Session 14



### (14-4) DISCUSSION

*What is your experience on reduction of waste through improved production planning?*

**Notes:**



## Workbook: Session 14



### (14-5) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 15

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### Substitution of Hazardous Chemicals



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## Workbook: Session 15



### (15-1) THE PROBLEM

*Why has “advancing towards zero discharge of hazardous chemicals” become a key topic in the textile industry today?*

**Notes:**



## Workbook: Session 15



### (15-2) DISCUSSION

Which chemicals from the 11 priority chemical groups have you substituted successfully?

Which chemicals from the 11 priority chemical groups are you working towards substituting?

**Notes:**



## Workbook: Session 15



### (15-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**



# Workbook

## Session 16

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### Critical Thinking and Problem Solving



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## Workbook: Session 16



### (16-1) THE PROBLEM

*What might be the consequences of not understanding a problem in detail?*

**Notes:**



**(16-2) GROUP WORK**

Consider the following situation in the factory. You see a worker handling Azo dyes without using personal protective equipment (PPE). There is a high chance that the worker may suffer from immediate lung problems.

**Group A:** What actions do you suggest using the 5 Why method?

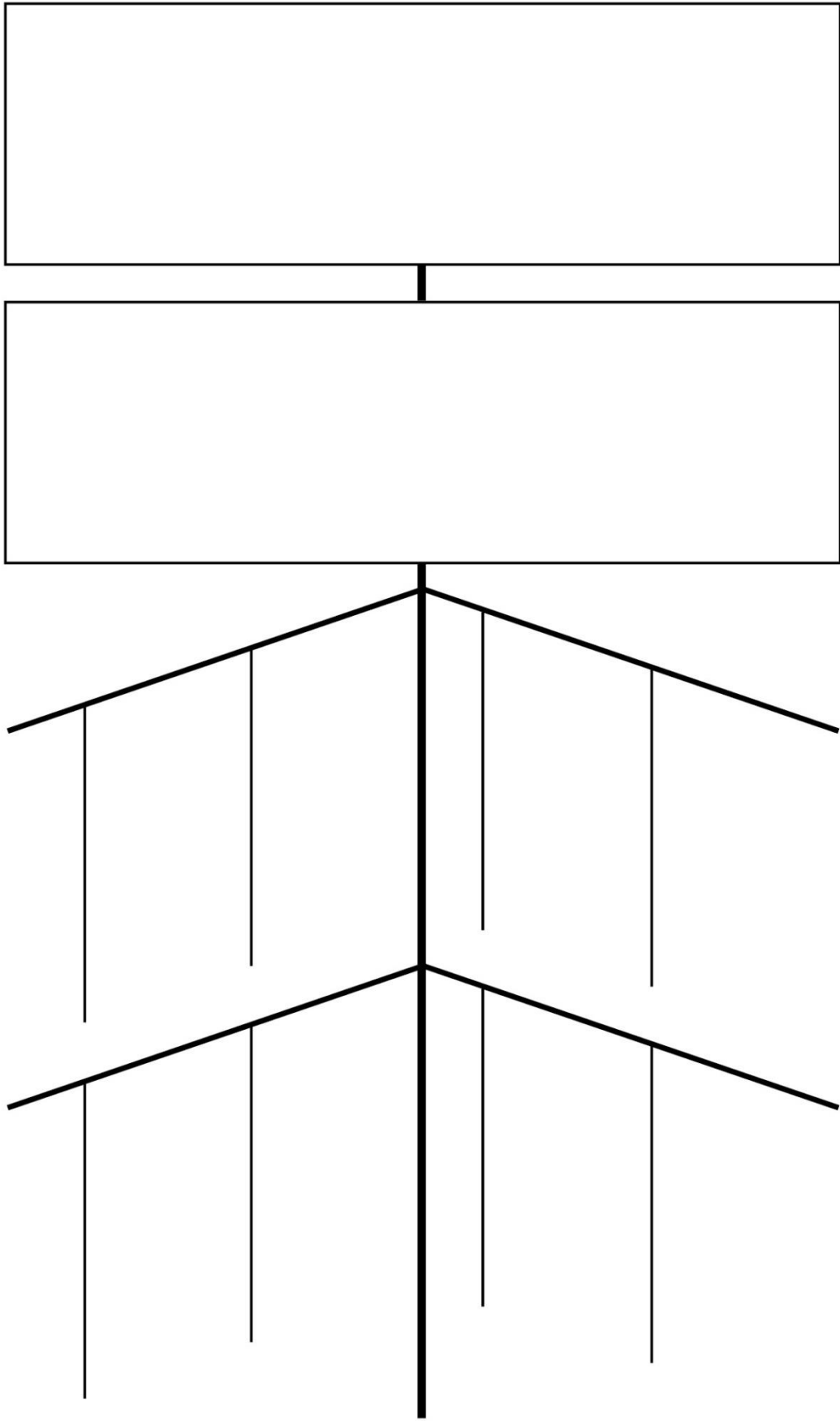
**Group B:** What actions do you suggest using the Fishbone diagram?

**Group A - 5 Why method:**

The diagram is a vertical sequence of five rows. Each row contains two boxes: a large empty box on the left and a smaller box on the right labeled "Action:". A black arrow points from the right side of the left box to the left side of the "Action:" box. To the left of each row, a blue arrow labeled "WHY?" points from the bottom of the left box of the row above to the top of the left box of the current row. This structure is designed for a student to write a cause-and-effect chain of five "Why" questions and their corresponding corrective actions.



Group B - Fishbone diagram:





## Workbook: Session 16



### (16-3) GROUP WORK

A university asks you to participate in a pilot project on waterless dyeing.

If the project is successful, you will be able to save water and chemicals, plus the time from drying. The dyeing process is twice as fast as your current process.

The project is subsidised heavily, however your investment still is at 1 million USD.

Could this be of interest for you? Use one of the methods to evaluate this case.

**Notes:**



## Workbook: Session 16



### (16-4) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 17

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### Performance Management



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Prepared by:






**(17-1) THE PROBLEM**

*What problems can occur if you are not measuring your progress?*

**Notes:**





 (17-2) REFLECTION

*Which of these KPIs are you already using?*

**Notes:**

*Which further KPIs could enhance your current reporting system?*

**Notes:**



**(17-3) SUMMARY**

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 18

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### Practical Session: Defining Meaningful Management Actions



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**(18-1) DISCUSSION**

Take your baseline assessment and your MAP. Let's discuss your results for each of the 40 questions. Let us choose one finding per question and discuss:

- What has been identified as your improvement area?
- What do you think is the root-cause?
- Do your peers have some different solutions?
- Let us together define some meaningful management actions

**Notes:**

# Workbook

## Session 19

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### Managing the Risk of Chemical Residues in Final Products



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## Workbook: Session 19



### (19-1) THE PROBLEM

*What problems can occur when you lack an overview of chemicals purchased and used?*

**Notes:**



## Workbook: Session 19



### (19-2) DISCUSSION

Note down which chemical failures you have experienced and link to the 11 priority hazardous chemical groups.

**Discuss:**

**What substitutes have you found?**

**Notes:**

**Which challenges remain?**

**Notes:**

**What is your approach to testing?**

**Notes:**



## Workbook: Session 19



### (19-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**



# Workbook

## Session 20

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### Environmental Management, Resource Efficiency and Continuous Improvement



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## Workbook: Session 20



### (20-1) THE PROBLEM

*What problems can occur if we do not manage resources efficiently?*

**Notes:**



## Workbook: Session 20



### (20-2) REFLECTION

*What actions have you taken in your facility so far to reduce your environmental impact?*

**Notes:**

*What worked well?*

**Notes:**

*What did not work so well?*

**Notes:**



## Workbook: Session 20



### (20-3) DISCUSSION

*Which Best Available Techniques have you applied?*

**Notes:**

*Which experiences have you made?*

**Notes:**

*Which further Best Available Techniques are you aware of?*

**Notes:**



## Workbook: Session 20



### (20-4) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 21

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### Practical Session: Tackling Implementation Challenges



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In cooperation with:



Prepared by:





## Workbook: Session 21



### (21-1) DISCUSSION

Share your progress since you have started the training programme:

- Management System.
- Water Use.
- Sustainability & Resource Efficiency.
- Chemical Management.
- Wastewater & Waste Management.

**Notes:**



## Workbook: Session 21



### (21-2) DISCUSSION

Let us discuss which questions you still have working towards closing your Management Actions.

- Management System.
- Water Use.
- Sustainability & Resource Efficiency.
- Chemical Management.
- Wastewater & Waste Management.

**Notes:**



# Workbook

## Session 22

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### Wastewater Treatment Plants: Design and Operation Aspects



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## Workbook: Session 22



### (22-1) THE PROBLEM

*What challenges might occur from insufficient wastewater treatment?*

**Notes:**



## Workbook: Session 22



### (22-2) ROLE PLAY

You are the Wastewater Treatment Plant Manager. Explain the benefits of effective wastewater treatment to your colleague in HR, who wants to understand how wastewater treatment links to the protection of the environment and substitution of hazardous chemicals.

**Notes:**



## Workbook: Session 22



### (22-3) REFLECTION

*Discuss the technology available in your company or that you have come across.*

**Notes:**

*Discuss your experiences with the group. What were the advantages and disadvantages of the technology you used.*

**Notes:**



## Workbook: Session 22



### (22-4) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

## Session 23

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### Monitor and Review



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## Workbook: Session 23



### (23-1) THE PROBLEM

*What problems can occur if you do not involve stakeholders?*

**Notes:**







## Workbook: Session 23

**Notes:**



## Workbook: Session 23



### (23-3) SUMMARY

*Every participant to feedback one key learning from this session.*

**Notes:**

# Workbook

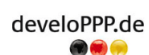
## Session 24

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### Practical Session: Tackling Implementation Challenges



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Session 24



### (24-1) DISCUSSION

Share your progress since you have started the training programme:

- Management System.
- Water Use.
- Sustainability & Resource Efficiency.
- Chemical Management.
- Wastewater & Waste Management.

**Notes:**



## Workbook: Session 24



### (24-2) DISCUSSION

Let us discuss which questions you still have working towards closing your Management Actions.

- Management System.
- Water Use.
- Sustainability & Resource Efficiency.
- Chemical Management.
- Wastewater & Waste Management.

**Notes:**

# Workbook

---

## On-Site Follow-up



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## Workbook: On-Site Follow-up



### ON-SITE FOLLOW-UP

#### Based on Classroom Training Day 1

- Check whether you hold SDS sheets in local language and request any outstanding SDS sheets from your supplier.
- Update / compile an inventory of regulatory requirements for your facility.
- Check Your Facility – have all chemicals been identified?
- Finalise your chemical process flow diagram or eco map.
- Define management actions for any relevant improvement areas as identified during your Baseline Visit and included in Your MAP. Work towards closing the management actions.

#### Based on Classroom Training Day 2

- Appoint Your Chemical Management System Team.
- Compile Your facilities' responsibility matrix.
- Identify any skills gaps.
- Develop a training plan to close any skills gaps.
- Inform your Chemical Management System Team which policies are required.
- Assign responsibilities for policy development and set deadlines.
- Investigate which QC process you have in place in your Facility and identify any options for improvement.
- Update / set-up a risk inventory for your Facility.
- Finalise your chemical process flow diagram or eco map and identify the risk.
- Assess the level of emergency preparation of your Facility using the Checklist "Emergency Preparation Work Floor".
- Define management actions for any relevant improvement areas as identified during your Baseline Visit and included in your MAP. Work towards closing the management actions.



## Workbook: On-Site Follow-up

### Based on Classroom Training Day 3

Take to your classroom training Day 5.

Set-up an alternative assessment process and the corresponding chemical control action plan for your facility.

Make yourself familiar with BATs, by:

**Option A:** Developing the business case on any type of BAT you would like to employ in your Facility and the potential benefits from it.

**Option B:** Introducing any type of BAT to your group you learnt about (literature, university, other facility) and find interesting.

**Option C:** Developing a Case Study of any type of BAT you have implemented in your Facility.

Share with the group on Day 5.



# Workbook

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## Status Assessment



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## Workbook: Status Assessment

### What Chemical Management Means in Practical Terms – Foundational Level

For the Supplier:

Assessment	Yes	No	Remarks
Does your facility have written statements from the senior level leadership of your company clearly communicating the organisation's goals and aspirations around Corporate Social Responsibility?			
Does your facility have a named point of contact for chemical management (this includes activities related to process chemicals and products used, chemical hazard [assessment], chemical safety and risk management, MRSL/RSL compliance, safer alternatives and sustainable chemistry) and have you shared that contact name with your supply chain partners?			
Has your facility's chemicals management point of contact documented the names and addresses of his/her counterparts for: a. All of your chemical suppliers? b. All of your brand/retail customers?			
Does your facility have a purchasing policy for chemicals (list of approved chemicals that are allowed on site)? Does your procurement department know what it can and cannot order?			
Does your facility have a documented inventory of chemicals purchased (including your supplier's manufacturing locations), stored (including their location) and used at your facility?			
Does your facility maintain an archive of current SDS of all currently stored and used chemicals (in English and the local language in the GHS format)?			
Does your facility maintain a database that includes the functional use of chemicals at your facility?			
Are you able to verify that your facility only utilises chemicals that are in compliance with: a. Regulations where your products are manufactured and sold? b. Your customer's MRSL/RSL? c. Contract obligations?			
Do you have a process to regularly implement updates and changes for: a. Applicable chemical use regulations? b. Retailer/brand RSLs?			
Does your facility have a communication process to timely respond to information requests related to chemicals used at your facility and potentially present in your products from: a. Brands/retailers b. Suppliers?			
Do representatives from your facility participate in RSL/MRSL education and training opportunities provided by brands/retailers?			
Does your facility have an occupational and environmental health and safety programme with documented procedures to protect workers, the community and the environment (including communicating the chemical hazards and training on how to safely handle, use and dispose of chemicals that are used)?			
Does your facility require your chemical suppliers to have an occupational and environmental, health and safety programme with documented procedures to protect workers, the community and the environment (including communicating the chemical			



## Workbook: Status Assessment

Assessment	Yes	No	Remarks
hazards and training on how to safely handle, use and dispose of chemicals that are used)?			
Do you engage with other communities of practice to share information and knowledge about chemical management, sustainable chemistry, business management systems, continuous improvement and public reporting best practices?			
Does your senior level management support the integration of chemical management into voluntary sustainability initiatives and trade association practices and do you use chemical management as an internal benchmarking tool?			

Credit: ZDHC



## Workbook: Status Assessment

### What Chemical Management Means in Practical Terms – Progressive Level

For the Supplier:

Assessment	Yes	No	Remarks
Have you completed the Foundational Level assessment and answered all (most?) questions with YES?			
Can you verify that all chemicals in use and products you manufacture are in compliance with the most stringent global regulatory requirements?			
Can you verify that you have an established procurement process that makes MRSL/RSL compliance part of contractual obligations with all your chemical suppliers?			
Can you verify that your facility is in compliance with all of your customers' RSLs and do you have a process to implement corrective actions in case of non-compliance?			
Does your facility go beyond compliance with regulations and RSLs and has it implemented further restrictions on chemicals in use or chemicals in products? Do you have a documented business process for this implementation?			
Can you verify that you have a valid Certificate of Analysis for each chemical you use in your facility?			
Does your facility maintain a Bill of Chemical Substances to verify compliance and to identify opportunities for substitution?			
Have you shared the Bill of Chemical Substances (directly or via a third party) with your customers?			
Does your facility maintain a list of chemicals present in your final products?			
Can you verify that you have a process in place in which you regularly review the chemicals you use in your processes, and/or that can be found in your products, against published lists to identify chemicals of concern (e.g., REACH, SVHC, DTSC)?			
Have you provided your suppliers and your customers with consumer use information about your products, including (un)intended use and disposal?			
Do you follow a process in which you use chemical hazard assessment data to assess the potential risk of relevant human (i.e., worker, community and consumer) exposure through the product life cycle before you use a certain chemical?			
Do you follow a process in which you use chemical hazard assessment data to assess the potential environmental exposure through the product life cycle before you use a certain chemical?			
Do you collaborate with your suppliers and customers to prioritise and select chemicals from substances of concern and/or restricted substances lists for alternative's assessment?			
Do you provide information on potential safer chemical alternatives to your customer's list of prioritised chemical substances?			
Do you work with government agencies and/or advocate for chemical management framework implementation along supply chains (this includes advocating for policies and initiatives to understand product and process chemistry, assess hazards or risks of chemicals, conduct safer alternatives assessments and identify preferred substances)?			



## Workbook: Status Assessment

Assessment	Yes	No	Remarks
Do you make your alternative assessments (including the resources you used) publicly available?			
Do you promote transparency of sustainable chemistry information on an equal basis with the performance attributes of the material you purchase and the products you manufacture?			

Credit: ZDHC



## Workbook: Status Assessment

### What Chemical Management Means in Practical Terms – Aspirational Level

For the Supplier:

Assessment	Yes	No	Remarks
Have you completed the Foundational Level assessment and answered all (most?) questions with YES?			
Have you completed the Progressive Level assessment and answered all (most?) questions with YES?			
Do you have a business process to verify all chemicals in your processes and in the products you manufacture?			
Do you have a process, that is part of your selection and procurement decisions, which requires from your suppliers a Bill of Chemical Substances?			
Can you verify that you follow a process to assess all chemicals used against a defined and transparent set of human and environmental hazard criteria (e.g., CMR, PBT, ED) that helps to prioritise actions and encourages use of chemicals towards safer alternatives?			
Can you verify that you have a business process that factors hazard assessments into chemical supplier and procurement decisions?			
Can you verify that you have a business process that uses chemical hazard assessment data combined with your knowledge of the manufacturing processes to assess the potential risk of relevant human (worker and consumer) and environmental exposure routes in your product's life cycle?			
Do you collaborate with your customers (brands and/or retailers) and your suppliers to review the results of the chemical hazard assessment data to jointly identify opportunities for safer alternatives and to build a preferred substances list?			
Can you verify that you have implemented risk management actions as a result of the hazard, exposure and risk assessments conducted?			
Can you verify that you have a business process in place that factors your chemical supplier's risk management actions into chemical supplier selection and procurement decisions?			
Can you verify that you have a business process in place to evaluate alternatives (using the alternatives assessment process, including criteria for identifying preferred substances) in-line with your customer's (brand/retailer) expectations?			
Can you verify that you have a business process in place to collaborate with your customers (brands/retailers) and your chemical suppliers to implement substitutions or other actions agreed upon from the alternatives assessment?			
Can you verify that you have a business process in place to maintain and implement site-specific lists of preferred substances?			
Can you verify that you have a business process in place to verify the use of preferred substances and compliance from all your suppliers and communication to your customers (brands/retailers)?			
Do you collaborate with your suppliers and your customers (brands/retailers) to evaluate and document the impacts of existing and proposed alternatives on the product life cycle (e.g., water usage, energy usage, wastewater treatment requirements and disposal) at a functional unit level?			



## Workbook: Status Assessment

Assessment	Yes	No	Remarks
Can you verify that you have a business process in place to: a. Score the sustainability of the chemicals and intermediates you purchase? b. Give priority to those scoring higher as more preferable?			
Do you proactively share the results of the sustainability scoring with your customers (brands/retailers) and suppliers?			
Do you publicly engage in advocacy to encourage programmes to provide better information about product and process chemistry, how to assess the hazards and risks of chemicals and how to best provide information on safer alternatives?			
Can you verify that you have a business process in place to reward suppliers who employ sustainable chemistry in the design and manufacture of their products?			
Can you verify that you have a business process in place to score materials and intermediate products made with more sustainable production processes (documented and validated)?			
Can you verify that you have business goals, metrics and an audit programme to document the performance and continuous improvement of your chemicals management and sustainable chemistry efforts, including public reporting that communicates progress?			

Credit: ZDHC



## Workbook: Status Assessment

### REMC Quick Check Tool Verification

SL No	Question?	Means of verification
1	All chemicals used or present in your company are recorded in an up-to-date inventory/register.	<ul style="list-style-type: none"> <li>Ask the factory representatives to show you the chemical inventory</li> <li>During initial walk-through select five chemicals in process areas and/or in chemical store which bear hazard labels (e.g. health hazard, corrosive, flammable) and verify whether these are listed in the company's inventory</li> <li>Check date of latest revision and compare with date of latest purchase</li> <li>Verify whether the chemical inventory indicates additional information (columns) such as for (i) hazard band and (ii) RSL/MRSL certification</li> </ul>
2	The characteristics/hazard properties of all chemical substances (including chemical waste) that are stored and used in your enterprise have been identified and documented.	<ul style="list-style-type: none"> <li>Verify whether procedure is available (yes/no)</li> <li>Check in workplace whether SOPs refer to hazard type of chemicals</li> <li>Select 5 persons (2 stores, 3 production area) and ask them to (1) identify hazardous chemicals in their work area, (2) point out the most hazardous chemical in use in their area, (3) explain how they know that this was the most hazardous one</li> <li>Check whether chemicals in use are being verified against RSL/MRSL</li> </ul>
3	Up-to-date material safety data sheet (as per the Global Harmonised Systems - GHS) are available for all (hazardous) chemicals and substances.	<ul style="list-style-type: none"> <li>Check the availability of safety data sheets (SDS) for the five chemicals selected for Q1</li> <li>Verify whether the SDS are not older than three years</li> <li>Verify whether the SDS conform to GHS requirements (16 sections)</li> </ul>
4	All chemical (including those for temporary use) and chemical waste containers are labelled/marked (according to GHS) to allow clear identification of chemicals/contents inside and their hazardous properties.	<ul style="list-style-type: none"> <li>Verify the availability of labels on containers/ packaging for the five chemicals selected for Q1</li> <li>Check the labelling of temporary containers for these chemicals (at least name and hazard pictogram to be there)</li> <li>Check whether the labelling system is uniform and in line with GHS</li> </ul>
5	Potential effects and risks for all situations/ areas/ operations where chemical hazards are present (hazard means anything that has the potential to cause harm to people and/or the environment or cause damage by to fire, explosion or other reactions) have been assessed and documented.	<ul style="list-style-type: none"> <li>Select three to four work areas/tasks and verify whether the risk assessment has been carried out AND documented (lab, chemical mixing areas, chemical dosing area, hazard disposal yard, sample preparation)</li> <li>Ask process-in-charge to explain risk assessment in the respective production area</li> </ul>
6	All chemical risk control (general, local ventilation, segregation) and improvement measures (including selection of PPE) are being implemented in line with a documented hazard and risk assessment process.	<p>Refer to the SDS of the five selected chemicals in Q1 and verify whether the controls for these are in line with recommendations in SDS where (i) handled, (ii) stored and (iii) disposed in terms of</p> <ul style="list-style-type: none"> <li>Correct PPE used</li> <li>General or local exhaust ventilation in place and functioning</li> <li>Correct fire extinguisher available</li> <li>Storage practices (compatibility, storage condition such as temperature control and ventilation)</li> <li>Medical response provisions available (antidotes, safety shower...)</li> <li>Spill control provisions</li> </ul>





## Workbook: Status Assessment

SL No	Question?	Means of verification
7	Production sites/Operations specific work instructions are provided, wherever hazardous chemicals or their wastes are handled, (at least) providing guidance on safe chemical handling and personal protection in a form easily understood by the concerned staff and workers.	<ul style="list-style-type: none"> <li>In work areas where the five selected chemicals in Q1 are used, verify whether the work instruction are (1) available, (2) in local language, (3) chemical and task specific.</li> <li>Check whether these indicate at least the following information (1) Hazards prevalent (see also Q 2), (2) PPE to be used, (3) how to safely handle chemicals, (4) what to do in emergency</li> </ul>
8	All staff and workers are aware of the harmful nature and effects of the substances they use/handle at work and how they may be exposed to them, and know how protect themselves during regular work and what to do in case of emergencies.	<p>In work areas where the five selected chemicals in Q1 are used, select 10 workers and ask them to explain to you</p> <ul style="list-style-type: none"> <li>What effects do the specific chemicals have on their health?</li> <li>How these can enter their body (exposure path)?</li> <li>What they do if they have been exposed to these chemicals?</li> <li>Which training they have received on chemical safety and when (last time)?</li> </ul>
9	Everybody (including managers, supervisors, workers, visitors, and contractors) who is present in areas with possible exposure to hazardous chemicals follows safe work practices and uses appropriate control measures.	<ul style="list-style-type: none"> <li>Document whether a safety briefing has been given to you before the walk through</li> <li>Observe whether the PPE as prescribed by warning signs are actually used</li> <li>Check whether workers AND supervisors use the same PPE when in the same area</li> <li>Verify whether access to areas where hazardous chemicals are present or used is limited (sign boards)?</li> </ul>
10	All waste water, in particular containing chemicals, is sent to a functional effluent treatment or recovery facility before being discharged outside the company.	<ul style="list-style-type: none"> <li>Check whether the company has a functional ETP (check the method of treatment records, dates, frequencies of recording)</li> <li>Look at the final discharge point from ETP and see whether you see any flakes in the overflow (if in doubt ask company to take sample with beaker)</li> <li>Verify whether the chemical container washing area and the emergency drains in the chemical store are connected to the ETP</li> </ul>
11	All chemical wastes (especially solid/liquid hazardous) are segregated, labelled and safely disposed of according to local regulations.	<ul style="list-style-type: none"> <li>Verify whether the company (i) maintains a waste inventory and (ii) has a waste disposal plan including for treatment sludge (sludge management plan)</li> <li>Observes whether in the waste storage area, waste is segregated (compatibility), labelled and no residual chemicals area left in the empty containers ready for disposal</li> </ul>
12	Quantities and costs of chemical inputs and outputs of chemicals (including in form of waste) in use are known by the respective production manager and supervisors.	<ul style="list-style-type: none"> <li>Verify whether the company records the quantities of chemicals used (e.g. recipes, production records)</li> <li>Check whether the company uses a chemical requisition system (quantities are specified)</li> <li>Observe whether the company has a standardised dosing system in place (using weighing scales, automatic dosing system with calibration records of the same)</li> <li>Check whether the company has carried out a material flow cost accounting (at least have a process flowchart, showing input, outputs, processes, non-product outputs)</li> <li>Ask the company team to indicate the quantity of chemical waste generated</li> </ul>

# Workbook

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## Checklists and Tools



Strategic Alliance:



In cooperation with:



Prepared by:





## Workbook: Checklists and Tools

### Tool - SDS Quick View

Information you are looking for	Where to find in the SDS	Overview of other information in this section
Accidental Release	Section 6	Information on material spill response, containment and required spill response PPE.
Additional Information	Section 16	Provides other information about the chemical such as hazard ratings, preparation and revisions of the SDS, and label information.
Appearance	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Boiling point	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Chemical Product & name	Section 1	Provides the chemical name on the label to the SDS. Also listed is the name, address and the phone number of the company, manufacturer or distributor who provides the chemical.
Chemical Properties	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Chemical supplier/ manufacturer	Section 1	Provides the chemical name on the label to the SDS. Also listed is the name, address and the phone number of the company, manufacturer or distributor who provides the chemical.
Compatibility	Section 10	All potentially hazardous chemical reactions are identified in this section. Includes information on chemical stability, conditions to avoid, incompatibility, hazardous decomposition and hazardous polymerization
Composition	Section 2	Identifies all hazardous ingredients, permissible exposure limits (PEL) & Threshold Limit Values (TLVs).
Containment	Section 6	Information on material spill response, containment and required spill response PPE.
Disposal Considerations	Section 13	Information concerning proper chemical disposal, recycling and reclamation.
Ecological Information	Section 12	Information concerning the environmental impact if a chemical is released into the environment.
Exposure Controls	Section 8	Engineering controls & personal protective equipment to reduce chemical exposure.
Exposure limits	Section 2	Identifies all hazardous ingredients, permissible exposure limits (PEL) & Threshold Limit Values (TLVs).
Fire-Fighting	Section 5	Information on the explosive & fire properties, extinguishing agents and items and general fire-fighting information.
First Aid	Section 4	Provides first aid procedures for each route of entry.
Handling	Section 7	Information about chemical storage & handling and measures to prevent over-exposure
Hazard Identification	Section 3	Information about the health effects of exposure; description of the material appearance, potential symptoms & health effects, routes of entry & target organs.



## Workbook: Checklists and Tools

Information you are looking for	Where to find in the SDS	Overview of other information in this section
Hazard statements	Section 15	Provides information about applicable federal regulations, risk (R) phrase, hazard statements (GHS), safety (S) phrase, precautionary statements (GHS)
Health effects	Section 3	Information about the health effects of exposure; description of the material appearance, potential symptoms & health effects, routes of entry & target organs.
Ingredients	Section 2	Identifies all hazardous ingredients, permissible exposure limits (PEL) & Threshold Limit Values (TLVs).
Odour	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Personal Protection	Section 8	Engineering controls & personal protective equipment to reduce chemical exposure.
pH	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Physical Properties	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Physical state	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.
Potential health symptoms	Section 3	Information about the health effects of exposure; description of the material appearance, potential symptoms & health effects, routes of entry & target organs.
Precautionary statements	Section 15	Provides information about applicable federal regulations, risk (R) phrase, hazard statements (GHS), safety (S) phrase, precautionary statements (GHS)
Reactivity	Section 10	All potentially hazardous chemical reactions are identified in this section. Includes information on chemical stability, conditions to avoid, incompatibility, hazardous decomposition and hazardous polymerization
Regulatory Information	Section 15	Provides information about applicable federal regulations, risk (R) phrase, hazard statements (GHS), safety (S) phrase, precautionary statements (GHS)
Risk phrases, R-phrases	Section 15/ Section 3	Provides information about applicable federal regulations, risk (R) phrase, hazard statements (GHS), safety (S) phrase, precautionary statements (GHS) / Hazards identification
Safety phrases, S-phrases	Section 15	Provides information about applicable federal regulations, risk (R) phrase, hazard statements (GHS), safety (S) phrase, precautionary statements (GHS)
Spill response	Section 6	Information on material spill response, containment and required spill response PPE.



## Workbook: Checklists and Tools

Information you are looking for	Where to find in the SDS	Overview of other information in this section
Stability & Reactivity	Section 10	All potentially hazardous chemical reactions are identified in this section. Includes information on chemical stability, conditions to avoid, incompatibility, hazardous decomposition and hazardous polymerization
Storage	Section 7	Information about chemical storage & handling and measures to prevent over-exposure
Toxicological Information	Section 11	Provides information such as acute data, carcinogen potential, reproductive effects, target organ effects, and other physiological aspects
Transport Information	Section 14	Shipping information includes the hazardous materials description, hazard class and the identification number (UN or NA numbers).
Vapour pressure	Section 9	This section tells about the physical and chemical properties of the chemical. Characteristics include appearance, odour, physical state, pH, vapour pressure, vapour density, boiling point, and freezing/melting point, solubility in water and specific gravity or density.

Credit: GIZ



## Workbook: Checklists and Tools

### Checklist: Control Approaches – Inhalation

#### Control approach 1 - General ventilation/Housekeeping

Name of the chemical: \_\_\_\_\_

In the case of controlling airborne chemicals and other contaminants, general ventilation is regarded as one of the best forms of control. The measures under control approach 1 provide good practice advice on the application of general ventilation at the workplace.

General ventilation is suitable for a range of small, medium and large-scale tasks involving solid and liquid chemicals. This control approach identifies minimum standards you need to apply to protect you and your workers' health. These recommendations should not be used to justify a lower standard of control than that which may be required for process control or control of other risks.

Individual Control Measures	Yes	No	Comments
<b>Access</b>			
Do you keep people away from the work area, whose presence is not required in the work process?			
Do you ensure that no one is working close by or downwind to the source of contaminants?			
<b>Design and equipment</b>			
Do you ensure that there is unrestricted access to fresh air? For example, this can be done by working outdoors. When working indoors, doors and windows may need to be opened or fresh air supply can be ensured by using powered fans.			
If you work inside a factory building, does a wall mounted fan remove the dirty air and airbricks or louvers or ceiling vents allow fresh, clean air into the workroom?			
Is the release of dirty (exhaust) air near the clean air intake avoided?			
Do you ensure, where possible, that clean air firstly flows past the worker and then past the work area?			
In the open, do you make sure that the wind blows dirty air away from you (upwind)?			
For factories, do you ensure that the size and number of fans is sufficient to remove the dirty air from the workplace (more than one fan may be needed)? Note: A minimum of 5 air changes per hour is recommended.			
<b>Maintenance</b>			
Do you keep fans and/or extractors in good working order?			
<b>Examination and testing</b>			
Do you check every day that the fans are working when they are switched on? Note: A ribbon strip attached to the exhaust side of the fan cage can be used as an indicator that the fan is working.			
<b>Cleaning/Housekeeping</b>			
Do you clean the work equipment and work area on a daily basis?			
Do you clean up spills immediately when they occur?			
Do you avoid cleaning up dust with a brush/ broom or compressed air, instead using a damp cloth or vacuum where possible?			



## Workbook: Checklists and Tools

Individual Control Measures	Yes	No	Comments
Do you put lids on containers immediately after use or when not in use?			
Do you store containers/bags in a safe place where they will not get damaged?			
Do you store volatile liquid containers away from direct sunlight or sources of high temperature?			
<b>Training and supervision</b>			
Do you tell your workers about the harmful nature of the substances they are working with and why they must use the controls provided?			
Do you teach and instruct the workers how to handle chemicals safely?			
Do you teach and instruct the workers how to check that controls (e.g. fans) are working?			
Do you teach and instruct the workers about what to do if something goes wrong?			
Do you have a system in place to check that the precautions you have put in place are being followed?			

Credit: GIZ



## Workbook: Checklists and Tools

### Control Approach 2: Local exhaust ventilation (LEV), the most common form of engineering control

Name of the chemical: \_\_\_\_\_

The measure gives good practice advice on the application of local exhaust ventilation, which is the most common form of engineering control. The trapped contaminants are conveyed by ducts to a collector (cyclone, filter house, scrubbers or electrostatic precipitators) where they are removed before the air is discharged into the outside environment. This is accomplished by a special exhaust system or by increasing the general ventilation.

Local exhaust ventilation can be applied to a range of small, medium and large scale tasks involving solids and liquids.

This measure identifies the minimum standards you need to apply to protect your health. It should not be used to justify a lower standard of control than that which may be required for process control or control of other risks.

Individual Control Measures	Yes	No	Comments
<b>Design and equipment</b>			
Do you consider the importance of the appropriate design for an exterior hood?			
Do the contaminants flow into the hood and are removed before they escape into the general workplace atmosphere?			
Do take into consideration other forces (e.g. cross drafts) and the distance between source and hood may be hindering the contaminant's proper extraction by the hood?			
To control the contaminant, is the velocity of the air flowing past the source high enough to overcome these influences and to capture the contaminant with the moving air? <sup>2</sup>			
Do you apply the local exhaust ventilation (LEV) at the source of the exposure?			
Is there a sufficient airflow to capture the dust or vapor before it disperses in the workplace?			
Have you measured the airflow at the origin of the dust or vapor with an anemometer? <sup>3</sup>			
Do you contain the source of dust or vapor as much as possible to stop it from spreading?			
Do you prevent workers from getting in between the source of exposure and the LEV? (Note: Otherwise he or she will be in the path of the contaminated air)			
Where possible, do you locate the work away from doors and windows to stop draughts from interfering with the LEV and spreading dust or vapors?			
Do you keep extraction ducts short and simple and avoid long sections of flexible duct?			
Do you provide an easy way of checking that the LEV is working (such as a ribbon strip attached to the output side)?			
Do you discharge extracted air in a safe place away from doors, windows and air inlets? (Note: Be careful that extracted air does not affect neighbors.)			
Do you keep the hood as close as possible to the source of exposure?			





## Workbook: Checklists and Tools

Individual Control Measures	Yes	No	Comments
<b>Maintenance</b>			
Do you keep the LEV system in good working order?			
<b>Examination and testing</b>			
Do you check every day that the extraction system is working when it is switched on before starting work?			
Do you check ducts once a week for signs of damage and repair when necessary?			
Do you have the system thoroughly examined and tested at least once a year?			

Credit: GIZ



## Workbook: Checklists and Tools

### Control Approach 3: Putting distance or shielding/containment between the substance and the worker

Name of the chemical: \_\_\_\_\_

Containment involves enclosing processing equipment in order to restrict spread of air contaminants to the workplace environment and isolating sources of heat (e.g. from open flames, from fuels). It is ideal for processes in which the worker has minimal chances of coming into contact with the chemical in question. Contact with hazardous chemicals can be reduced by isolation, which entails moving the hazardous process or operations to a remote location in the plant or constructing a barrier to separate them from other processes.

An example of isolation is separating a spray painting process from the other processes of the plant by means of a barrier or wall. A similar isolating effect can be obtained by the safe storage of hazardous chemicals and by restricting the amounts of these chemicals in the workplace to that required in a day or a shift. Such restriction is useful if the process can be carried out by a very small number of workers and when control by other methods is difficult or impossible. The workers engaged in this process however, should be given adequate personal protection.

The measure gives good practice advice on containment and describes the key points you have to follow to reduce exposure to an adequate level. Containment can be applied to a range of small, medium and large scale tasks involving solids and liquids. This control approach identifies the minimum standards you need to apply to protect your health. It should not be used to justify a lower standard of control than that which may be required for process control or control of other risks.

Individual Control Measures	Yes	No	Comments
<b>Access</b>			
Is the work area and equipment clearly marked?			
Is entry to the work area controlled?			
Are only workers actually needed and trained for that work process allowed into hazardous work areas?			
<b>Design and equipment</b>			
Is the material handling taking place in a closed system that separates the worker from the hazardous material by a solid barrier?			
In case limited breaches of the close system are permitted under controlled conditions, is the exposure times limited to a few minutes and the quantity of material handled small (for example for quality control sampling)?			
Is the design of the closed system so that it can be easily maintained?			
Where possible, do you keep equipment under negative pressure to reduce leakage?			
Do you vent any exhaust air in a safe place away from doors, windows, walkways and air inlets?			
Do you take care that the exhaust air does not affect neighbours or other work areas?			
Do you provide a sump or separate drainage system to prevent leaks and spills from contaminating communal drains and waterways?			



## Workbook: Checklists and Tools

Individual Control Measures	Yes	No	Comments
<b>Maintenance</b>			
Do make sure that all equipment used is well repaired if necessary and maintained in good and efficient working order?			
Do you adopt a 'permit to work' system for all maintenance work?			
Do you document and follow any special procedures that are needed before the system is opened or entered, e.g. during purging or washing?			
Do you prevent entry into any closed vessel until it has been checked for hazardous, toxic or flammable substances and sufficient oxygen (between 19.5% and 23.5%)?			
<b>Examination and testing</b>			
Do you check all the equipment once a week for signs of damage and repair when necessary?			
Do you have the system thoroughly examined and tested at least once a year?			
<b>Cleaning/Housekeeping</b>			
Do you clean the work equipment and work area on a daily basis?			
Do you clean up spills immediately when they occur?			
Do you avoid cleaning up dust with a brush/broom or compressed air, but use a damp cloth or vacuum where possible, instead?			
Do you put lids on containers immediately after use or when not in use?			
Do you store containers in a safe place where they will not be damaged?			
Do you store volatile liquid containers away from direct sunlight or sources of high temperature?			
<b>Personal Protective Equipment (PPE)</b>			
Do you avoid using Respiratory Protective Equipment (RPE) for routine tasks except for cleaning and maintenance activities and when dealing with spills?			
Are you aware that some maintenance tasks may involve entry into confined spaces where Supplied Air Respiratory Protective Equipment may be needed?			
Do you use such equipment in such situations?			

Credit: GIZ



## Workbook: Checklists and Tools

### Control Approach 4: Special advice

Name of the chemical: \_\_\_\_\_

Control Approach 4: Special advice - means you have a situation where you need more specific and specialist advice than provided in the other three control approaches.

Here we refer you to the electronic version of 'COSHH Essential' ([www.coshh-essentials.org.uk](http://www.coshh-essentials.org.uk)) for further details. The advice may come from a more detailed Health/Safety/Environment Guidance document, or you may need to involve an expert, such as a qualified occupational hygienist. An occupational hygienist can give you site-specific advice on your risk assessment or the possibility of **substituting** the chemical you are using for a less hazardous one and control measures.

#### Some remarks about elimination or substitution

Try to reduce the risk by eliminating the chemical hazard or replacing the chemical with a less hazardous one.

The most efficient way to reduce chemical hazards is to avoid using toxic substances or substances that pose a risk of fire or explosion. The selection of the substituting chemical substance should be made at the design and planning stage of the process. For existing processes, the substitution method should be used wherever hazardous substances or processes may be replaced by others that are less hazardous. The choice of alternative substances may be limited, especially where the use of that particular substance is unavoidable if specific technical and economic requirements are to be met. It is always useful to look for alternative substances by learning from experience in similar circumstances/processes, sectors.

#### Substitution is nothing else than a certain type of innovation!

Substitution unfortunately is not always chosen by enterprises. Main reasons for this are:

- No priority given at enterprise. Dealing with the existing problems is already too laborious.
- Companies want no additional problems which might occur with a new, innovative approach
- Uncertainty in risk assessment
- Substitutes are often less tested in practice integration in the production chain makes an innovation beyond enterprise borders necessary
- Technological or economic difficulties

#### Try to be innovative whenever possible.

If you are really engaged in chemical management you will understand that sooner or later you have to substitute your most hazardous chemicals.

Not substituting the hazardous chemicals means that you also will have problems when managing their disposal. And disposal of hazardous chemicals is expensive and has implications on the environment and on generations to come.

Credit: GIZ



## Workbook: Checklists and Tools

### Checklist: Control Approaches - Skin Contact

#### Control approach "Low"

Name of the chemical: \_\_\_\_\_

Low Control Measures	Yes	No	Comments
Is the workplace tidied up and equipment kept clean?			
Are splashing of liquids, the release of dusts or mists as well as skin injuries resulting from cuts or perforations avoided by means of proper working techniques?			
Are leaked or spilled chemical agents removed immediately by suitable means?			
Are chemical-agent residues on the outer surfaces of containers or packaging removed, particularly in the case of dust-forming, liquid or sticky products?			
Are wastes and used cleaning cloths collected in the containers provided for that purpose?			
Do you/the workers use long-sleeved working clothes to ensure the general protection against skin contact?			
Are distinguishable cleaning cloths for machines and the hands made available and used?			
Are good washing facilities (including soap and clean towels) provided, particularly in the vicinity of work place where skin contact of chemical may occur?			
Do workers wash their hands before and after eating, drinking and using the lavatory?			
Prior to using new chemical agents, are workers instructed with regard to the necessary protection and hygiene measures during their handling?			
Does the information on the risk to skin and on the use of skin-protection, skin-cleansing and skin-care products form part of the work instructions?			
If necessary, are these instructions repeated on a regular basis?			
Do you have a system in place to check that the precautions and instructions you have put in place are being followed?			



## Workbook: Checklists and Tools

### Control approach “Medium”

Name of the chemical: \_\_\_\_\_

Medium Control Measures	Yes	No	Comments
Do you check the Material Safety Data Sheet or ask your supplier to find out what PPE (type, material, compatibility) is needed?			
Do you ask your protective equipment supplier for written recommendations on the PPE that is suitable for your operations?			
Do you ask the supplier to train you and your workers in how to use, maintain and store the equipment?			
Does the information on the risk to skin and on the use of personal protective equipment form part of the work instructions?			
Do you look after your personal protective equipment?			
When not in use, do you keep PPE clean and store it in a clean and safe place?			
Do you change your protective equipment at recommended intervals or when it is damaged?			
Do you have a system in place to check that the precautions and instructions you have put in place are being followed?			

### Control approach “High”

Name of the chemical: \_\_\_\_\_

In addition to the measures listed under control approach “low and medium” the following measures should be implemented if a high level of control is needed (this is for instance true for corrosive substances as well as for toxic substances which can be absorbed by the skin).

High Control Measures	Yes	No	Comments
Have you considered elimination or substitution of harmful substances?			
Have you considered isolating the process, so that the workers have no contact with the hazardous chemicals?			
If you cannot avoid exposure by substitution or containment do you provide/use suitable tools, instruments, devices or work techniques to prevent or at least significantly reduce any contact of the skin with the hazardous substances?			
If this is not possible, do you provide/use personal protective equipment (e.g. chemical protective gloves, protective aprons and protection suits)?			
Have you verified that you also have followed all recommendations included in the checklists for low and medium control approaches for skin hazards?			

Credit: GIZ



## Workbook: Checklists and Tools

### Checklist - Emergency Preparedness Work Floor

Emergency preparedness aspect	Your assessment
Emergency scenario assessment conducted to determine what emergencies might arise	
Emergency plans and procedures developed for potentially catastrophic events such as	
<ul style="list-style-type: none"> <li>• Fires</li> </ul>	
<ul style="list-style-type: none"> <li>• Blasts and explosions</li> </ul>	
<ul style="list-style-type: none"> <li>• Leaks and spills</li> </ul>	
<ul style="list-style-type: none"> <li>• Floods</li> </ul>	
<ul style="list-style-type: none"> <li>• Tsunami</li> </ul>	
<ul style="list-style-type: none"> <li>• Earthquake</li> </ul>	
<ul style="list-style-type: none"> <li>• Civil unrest (mob attack)</li> </ul>	
Emergency plans provide for procedures for extinguishing different types of fires, which might occur in the factory/office	
Emergency plans include evacuation and recovery procedures for each type of emergency	
Roles and responsibilities assigned in the plan to specific persons during emergencies	
These persons aware of their responsibilities	
Persons qualified/trained to carry out necessary actions (Training records/certificates available)	
Qualified emergency personnel designated and on station during and after office/working hours	
Different communication channels assigned to support emergency measures	
Emergency phones available in all relevant sections, with important numbers clearly displayed	
Plans for evacuating personnel from each factory/office area in event of emergencies prepared	
Evacuation routes and warning signals information posted in each factory/office area	
Evacuation routes and exits marked	
Emergency plans and procedures posted in prominent areas	
All personnel trained in emergency procedures	
Drills on simulated emergencies being conducted periodically (at least once a year) for all personnel (Lessons learned documented)	
Existing escape provisions adequate (doors, stairways, elevators) for the evacuation	
All doors open in the proper direction (in direction of escape) to facility escape of personnel	



## Workbook: Checklists and Tools

Emergency preparedness aspect	Your assessment
Procedures to prevent obstructions to personnel or access routes or areas prepared and communicated	
Provision available to allow personnel follow escape routes from factory/office areas in the dark or dense smoke	
Emergency assembly points established and clearly marked	
Procedure for post evacuation head-count in place	
Emergency equipment as required by emergency procedures available at the facility and operational	
Easy access to emergency equipment	
Self-contained warning systems installed (sirens, loudspeaker, etc.) and tested periodically	
All personnel familiar with the meaning of warning signals and the required action to be taken	
Procedure in place to make outside persons (visitors, contractors, suppliers, customers) aware of the emergency procedures	
Firefighting equipment located near flammable or hazardous areas (e.g. generator area, fuel storage tank, and transformer)	
Firefighting equipment in clearly marked and easily accessible locations	
Firefighting equipment appropriate to control the respective type of fire in these locations	
First-aid kits available in designated and clearly marked areas	
Procedure established and maintained to check and replenish content of first aid kits (e.g. designated persons in-charge of first aid box)	
Certified first aiders available in each section/agency during and after office/working hours	
Names and locations of first aid personnel indicated on first aid boxes	

Credit: GIZ





## Workbook: Checklists and Tools

### Checklist - Safe Chemical Storage

		Yes	Further Action Needed	No Action Needed	What Action Do You Propose?
	<b>Responsibilities Assigned</b>				
C	Have you assigned a person exclusively being in charge of the chemical store(s)?				
2.	Do you know the qualification this person?				Please specify for your own reference!
3.	Is the person regular employee? Chemical supply:				
4.	Do you verify that only properly labelled chemical containers are being allowed into your factory?				
5.	Do you use mechanized means of unloading the chemicals? (e.g. forklift, crane) If not, do you use an elevated unloading platform with a ramp?				
6.	Are the chemicals being unloaded by your own workers?				
7.	Are the workers being supervised by an experienced supervisor or person in charge of chemical store while handling chemicals?				
8.	Are the workers unloading the chemicals experienced and trained in handling the substances?				
9.	Are the workers (regardless your own or external) provided with personal protective gear when unloading the chemicals?				
10.	Do the workers use the personal protective gear while unloading the chemicals?				
	Storage organization and inventory				
11.	Do you keep track of the chemical movement and shelf lives of all the chemicals in your storage in a separate chemical inventory?				
12.	Are the chemical requisitions from the various workplaces being recorded in the chemical store and the respective workplace?				
13.	Does your supplier provide you with the chemical/ material safety data sheets for all the chemicals?				
14.	Do you keep the chemical safety data sheets in a separate file for easy reference?				
15.	Do the workers have access to this information?				
16.	Have you or your supervisor informed the workers unloading or				



## Workbook: Checklists and Tools

		Yes	Further Action Needed	No Action Needed	What Action Do You Propose?
	<b>Responsibilities Assigned</b>				
	handling chemicals on the hazardous nature of chemicals?				
17.	Do all the chemical containers/bags/ drums/ barrels have proper labels attached - clearly indicating the following:				
	content				
	trade name				
	name/ address/telephone number of the supplier				
	hazard symbols				
	specials risks associated				
	safety and emergency procedures				
18.	Do you or persons assigned by you take samples to check whether the chemicals comply with your quality specifications?				
19.	Do have access to and use facilities to analyses quality/purity of chemicals?				
	Storage layout				
20.	Is the storage area being locked?				
21.	Do you keep incompatible chemicals in different storage places? (Criteria: incompatible chemicals have to be stored in separate storage places)				
					Check with your compatibility chart or with section 10 in respective MSDS.
22.	Do you store chemicals chemical-wise in separate places/on separate pallets?				
23.	Are the heavier chemical containers stored on the lower racks?				
24.	Are the hazardous liquid chemicals stored on the lower racks?				
25.	Are the designated storage places clearly indicated by separate boards or labels?				
26.	Do you store sulphide containing chemicals in air tight containers?				
27.	Does the supplier take the containers/barrels/drums back?				
28.	Do you dispose empty chemical containers, barrels as per clearly established procedures or legal requirements?				
29.	Do you clean/rinse all container/barrels before disposing?				



## Workbook: Checklists and Tools

		Yes	Further Action Needed	No Action Needed	What Action Do You Propose?
	<b>Responsibilities Assigned</b>				
30.	Is the storage building isolated from the factory workplace, welfare installations, power house, and water supply system?				
31.	Does the chemical storage have separate emergency drainage and collection system? (Please note: Also this drainage should be connected to a treatment facility!)				
	Chemical storage emergency procedures:				
32.	Do you have facilities in place to deal with chemical spillage and/or leakage? (e.g. do you keep one spare container/ barrel/etc. for each hazardous substance, bucket of sand...)				
33.	Does the storage area have separate firefighting equipment?				
34.	Do you know which chemicals are being considered hazardous? (Please note: Mixing of different chemicals can generate even more hazardous combinations!)				
35.	Have you listed out and displayed hazardous chemicals in the store?				
36.	Are the workers dealing with chemicals trained in safe handling them?				
37.	Do the workers use special tools for taking out chemicals from original storage container? (Spatula, spoons, taps, etc.)				
38.	Do use a separate space/room/location outside chemical storage for preparing chemicals (mixing, diluting...)				
39.	Do you prepare correct chemical mixes/dosages before transporting to workplace?				
40.	Are proper containers used for transferring chemicals from storage to workplaces?				
41.	Do you transport the chemicals on a special trolley/cart instead of carrying by hand?				
42.	Have the workers handling the chemicals at each stage been informed and trained about the hazards involved in handling the chemicals?				
43.	Are these workers trained and capable to take necessary				



## Workbook: Checklists and Tools

		Yes	Further Action Needed	No Action Needed	What Action Do You Propose?
	<b>Responsibilities Assigned</b>				
	emergency measures to cope with chemical hazards?				
44.	Have you conducted refresher training during the last six months?				
	Personal protection and hygiene				
45.	Do the workers wear all the protective gear (goggles, gloves, footwear, apron, face mask...) as prescribed on the chemical safety data sheets while handling hazardous chemicals?				
46.	Are washing facilities provided to the worker in the staking yard?				
47.	Is a separate first-aid box provided in the storage area?				
48.	Are relevant emergency procedures visibly displayed and understood by each worker in the storage area?				

Credit: GIZ



## Workbook: Checklists and Tools

### Tool - Chemical Control Action Plans

<b>STEP 1: GATHER EXISTING INFORMATION</b>	
Gather the information you have collected and developed on hazards, control measures, possible risk reduction actions, and legal obligations related to the control of chemicals and costs (draw on information generated using the tools you applied in Section 1)	
<b>STEP 2: DECIDE HOW MANY CHEMICAL CONTROL ACTION PLANS YOU WILL NEED</b>	
Distinguish between one-off actions and periodic actions	
Decide if it will be more useful to create one or more than one plan. (for example, you may want to have separate plans for (i) all high priority/immediate one-off actions, (ii) normal priority one-off actions, and (iii) periodic/repetitive actions such as the ones related to maintenance, monitoring or reporting/legal obligations)	
In most organizations, obtaining senior management endorsement for one single chemical control action plan will be easier. It will also be easier to follow-up one single plan.	
<b>STEP 3: CREATE YOUR CHEMICAL CONTROL ACTION PLAN(S)</b>	
Plan(s) should contain the following elements:	
<ul style="list-style-type: none"> <li>• a list of the 'hot spots' you identified (refer to the notes you made during the walkthroughs)</li> <li>• a description of the measures that you propose for dealing with each hazard</li> <li>• a definition of clear and realistic objectives and targets that you want to achieve with this measure, indicating the anticipated improvement or benefit in terms of optimising chemical use, reducing health risks for workers, reducing environmental damage, improving product quality</li> <li>• a description of the specific activities to be undertaken to achieve the desired improvement or benefit</li> <li>• the expected costs associated with implementation of the action, taking into account investment costs, maintenance/periodical costs, labour costs</li> <li>• the person who is responsible for taking action and monitoring the results</li> <li>• the time period within which action should be completed</li> <li>• the expected results (indicates the eventual benefits achieved vis-à-vis cost savings, risk reduction, etc.)</li> </ul>	
<b>STEP 4: REVIEW YOUR PLAN FOR CONSISTENCY AND EFFECTIVENESS</b>	
<b>Review question</b>	<b>Notes</b>
Have you reviewed your plan carefully before trying to seek endorsement from senior management?	
Have you discussed draft plans with all the people that may be involved, particularly the ones that you believe should be responsible for each assigned action? In particular, try to get their pre-agreement on the deadlines you will be proposing to your senior management.	
Have you consulted the people who are directly involved in handling chemicals about the proposed actions in order to understand the implications for changing procedures?	
Have you thought about possible consequences – both positive and negative – before implementing action?	
Have you checked that the proposed actions are sufficient to meet the stated objectives and targets?	
Have you verified that the actions to be undertaken are clearly understood by those who will be involved?	
Have you assigned clear responsibilities for each action? Give the responsibility for taking action to specific individuals. If no individual is responsible, nothing will happen!	



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Have you made sure that those designated as responsible have the needed expertise and authority to carry out the proposed action?	
Have you been specific about who must do what and how?	
Have you established a realistic time-frame for who should do what by when?	
Have you made provisions in your plan so that all workers affected by changes to the current way of doing things will have an opportunity to be properly informed and trained in the new procedures?	
<b>STEP 5: GET ENDORSEMENT</b>	
Present the agreed plans to your senior management, clearly explaining the expected benefits from implementing the actions proposed.	
Prepare yourself beforehand and be ready to provide justification for each proposed action. Be particularly attentive to possible questions like:	
<ul style="list-style-type: none"> <li>• Why should we implement this action now and not next year?</li> <li>• Can we partially implement this action and still obtain the expected results?</li> <li>• Are you sure of the expected range of costs?</li> <li>• Did you take into account idle time? And warehouse cost?</li> <li>• How many suppliers did you consult?</li> <li>• Will there be any overtime hours involved?</li> <li>• You will need to involve one of our permanent contractors/suppliers to implement this action. Are you taking their assistance for granted? Have you checked what extra costs will be involved?</li> <li>• Have you discussed the feasibility of this action with this person?</li> <li>• Why have you proposed him/her for the job?</li> <li>• Why are you proposing this action to start 6 months from now? We are presently non-complying. What are the costs of non-compliance with this obligation (contractual, reputational, legal) vis-à-vis the investment and operational costs of this action now? Have you taken into account potential fines, or loss of customers/orders?</li> <li>• Other: _____ (list possible questions you may be asked)</li> </ul>	

Source: UNEP Responsible Production



## Workbook: Checklists and Tools

### UNEP RP Tool 3.3

Setting Goals, Objectives, Targets, and Performance Indicators:

SETTING GOALS, OBJECTIVES AND TARGETS		
<b>STEP 1: ESTABLISH YOUR GOAL</b>	<b>1 = strongly disagree</b> <b>2 = disagree</b> <b>3 = neither agree nor disagree</b> <b>4 = agree</b> <b>5 = strongly agree</b>	
This is the overall strategic goal for the organisation in relation to chemical safety management.		
	<b>Score</b>	<b>Explain</b>
Chemical safety management is related to the company's strategic priorities.		
Improved chemical safety management can effectively be aligned with the company's current business goals		
Improved chemical safety management can help to address your company's current key business challenges		
Your company has a responsibility to demonstrate "best-in-class" performance, as per any code of practice or sector policy it subscribes to		
<b>Average Score (total divided by 4)</b>		
<b>Scores:</b> <b>4.2 – 5 Your goal should be to become a learning organisation and to demonstrate best in class and to show leadership in the sector.</b> <b>3 – 4.1 Your goal should be to become a learning organisation and to have effective systems and processes in place to effectively manage all chemical hazards and related risks and impacts.</b> <b>1 – 2.9 Your goal should be to become a learning organisation; to address the highest priority issues at the moment and establish systems that allow for continual improvement over time.</b>		
<b>STEP 2: SET OBJECTIVES</b>		
Objectives are commitments regarding what you will manage and how you will manage. They can cover a number of impact or risk areas.		
Set overall objectives for the following <ul style="list-style-type: none"> <li>• Procurement</li> <li>• Storage</li> <li>• Process</li> <li>• Marketing and sales</li> <li>• Transport</li> <li>• Use</li> <li>• Disposal</li> </ul> Objectives should be statements such as: <ul style="list-style-type: none"> <li>• To ensure that all chemical hazards and associated risks and impacts are identified and fully understood.</li> <li>• To ensure that all chemicals are stored, processed, transported and used according to approved plans and procedures.</li> <li>• To ensure that all staff are adequately trained on safe handling of chemicals.</li> </ul>		



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- To ensure that the appropriate risk information is made available to business partners and other stakeholders
- To ensure that all incidents involving hazardous chemical substances are recorded and reported to the responsible person immediately.
- To ensure that all incidents involving hazardous chemical substances are responded to and causes addressed immediately according to approved procedures.
- To ensure that response procedures are reviewed and improved after all incidents.

### STEP 3: SET TARGETS

Targets are commitments related to specific actions, risks and impacts.

- Refer to the hazard hotspots and associated risks you have identified in Section 1. Review the opportunities for immediate risk reduction actions you have spotted.
- Set targets using SMART (specific, measurable, accurate, reliable, and timely) indicators for all relevant risks, impacts and actions related to chemical hazards (see Step 4 below).

You may want to set targets for risks, impacts and actions related directly to your products and operations:

- Availability of risk information, risk awareness and training
- Substitution of hazardous chemicals
- Reducing inventories of hazardous substances both in process and in storage
- Selection of operating/handling conditions to minimise risk, like reducing temperature and pressure
- Protection against vessels overfilling, ensuring containment and general prevention of chemical spills
- Reducing chemical waste, loss of chemicals, and quantities of spoiled or expired chemicals
- Prevention of dust clouds
- Adequate labelling and sealing of packages/containers
- Prevention and elimination of damaged packaging
- Proper use of packaging
- Implementation and frequent testing of emergency preparedness and response
- Fire protection, risks of fire, action against explosions and other related incidents
- General storage conditions
- Health problems
- Availability and use of proper tools and personal protection equipment

These targets should be clearly stated in your Chemical Control Action Plans (see tool 3.4 below). Action plans should ensure that objectives and targets can be met.

Now review your stakeholders list and select the ones you have profiled as having a lack of knowledge regarding the chemical hazards and risks posed by your products and operations, whilst actually being exposed to these.

For the stakeholders with whom you are doing business and who are part of your value-chain (suppliers, transporters, distributors, customers, end users) you may want to set targets for risks, impacts and actions related to:

- Availability of risk information to suppliers, transporters, distributors, customers, and end users
- Risk awareness and training of direct business partners
- Improvement of package design for improved safety in chemicals handling
- Establishing hotlines or other systems for customer assistance
- Emergency preparedness and response

For other relevant stakeholders you may have identified - as well as local and governmental authorities, community groups, academic and technical institutions and NGOs that have a stake in your chemical safety performance - you may want to set targets for risks, impacts and actions related to:

- Availability of risk information to the local communities and general public, regarding your products and operations





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- Complaints received from the local community/general public regarding the safety of your products and operations
- Participation in community panels and meetings
- Dialogue with local people/groups in the community (such as housing areas, schools, nursing homes, temples, commercial centres, etc.)
- Requests, warnings and/or fines from the authorities
- Co-operation with the authorities and local officials on chemical safety issues
- Establishing a system or procedure for handling inquiries and complaints from the public/the community
- Emergency preparedness and response

### SETTING PERFORMANCE INDICATORS

#### STEP 4: SET PERFORMANCE INDICATORS

You must find a way to measure your progress towards each of the targets you have set yourself. The best way to ensure that you will be able to measure your progress is to make sure that there is a way to quantify each of the targets over a time frame and/or assign them a performance level.

Please find below some examples of indicators you may wish to consider for targets you have set related to the risks of your products and operations:

- Number of internal risk awareness campaigns, training sessions, or workers trained on chemical safety issues
- Number of hazardous chemicals replaced
- Quantity of hazardous chemicals stored
- Changes to operating procedures for improving chemical safety
- Number of chemical raw materials with/without Material Safety Data Sheets (MSDS)
- Number of chemical products with/without Material Safety Data Sheets (MSDS)
- Number of unlabelled containers
- Number of storage vessels containing hazardous substances with no containment or overfilling protection systems
- Extent of warehouses containing hazardous substances, that have secondary containment
- Capacity of storage facilities/warehouse/site to contain contaminated fire water
- Quantity of chemical and package waste sent to disposal or stored at site
- Number of emergency drills
- Extent of planned provisions for accidents occurring off-site (surrounding area, nearby facilities, transport)
- Number of accidents and near-misses and their severity
- Number of injuries and fatalities from chemical accidents
- Costs related to chemical accidents (loss of product, liabilities, fines, property damage)

Please find below some examples of indicators you may wish to consider for additional specific targets related to chemical accident prevention:

- Number of emissions (sudden and accidental releases)
- Number of accidents related to unforeseen risks (not identified in the Risk Assessment)
- Number of accidents attributed to contractors or visitors as a root or contributing cause.
- Number of accidents reported involving raw materials being supplied to the company (upstream)
- Number of accidents reported involving the company's products (downstream)

Please find below some examples of indicators you may wish to consider for targets you have set related to awareness raising and training:

- Extent that workers and management wear the appropriate personal protection equipment (PPE) for the hazards involved
- Extent that relevant staff are trained in Risk Assessment



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- Extent that workers are trained on chemical hazards and risk, and on emergency response
- Please find below some examples of indicators you may wish to consider for targets you have set related to the people with whom you are doing business and who are part of your value-chain:
- Extent of participation in industry associations and programmes that address safety and environmental-related issues.
- Extent of participation in local networks that address safety-related issues (mutual aid groups and safety circles)
- Extent that other companies provide support during an emergency response or exercise.
- Requests for risk information from suppliers, transporters, distributors, customers, and end users
- Number of external risk awareness campaigns, training sessions, or business partners trained on chemical safety
- Number of complaints and of calls to customer assistance hotlines
- Number of emergency drills involving business partners
- Number of accidents and near-misses involving your business partners, and their severity
- Number of injuries and fatalities from chemical accidents involving your business partners
- Costs related to chemical accidents (loss of product, liabilities, fines, property damage)

Please find below some examples of indicators you may wish to consider for the targets you have set regarding your relations with local and governmental authorities, local community groups, academic and technical institutions and NGOs that have a stake in your chemical safety performance:

- Participation in voluntary initiatives promoted by the authorities
- Extent and quality of support to public authorities and others involved in off-site preparedness planning
- Requests of risk information from representatives of local communities and the general public, regarding your products and operations
- Number of inquiries and complaints received from the local community/general public regarding the safety of your products and operations
- Number of requests, warnings and or fines from the authorities concerning the safety of your products and operations
- Number of emergency drills involving local and governmental authorities, and the community
- Number of accidents and near-misses involving the community/general public, and their severity
- Number of injuries and fatalities from chemical accidents involving the community/general public

Source: UNEP Responsible Production Guidance and Toolkit