RESPONSIBLE PRODUCTION TRAINING PACKAGE

Trainers support package on Responsible Production and Chemical Hazard Management for Small and Medium Sized Enterprises

December 2009

Contents

Users Guide

This is a trainers support package, and not a reference book. It does not give a systematic, comprehensive overview of Responsible Production (this is being provided in the Responsible Production Booklet and Toolkit that accompanies this package); rather, it focuses on some selected aspects that are central to chemical safety management and risk communication in Small and Medium Sized Enterprises (SMEs) along the value chain. The structure of this package allows further sections to be easily developed and added as additional modules.

This training package is written for trainers to provide them with support materials and ideas, rather than as a study book for students. The average trainee will only ever see a few pages or exercises reproduced from this document.

One of the purposes of this package is to provide some case studies and situation scenarios that can be used as a basis for interactive training, simulated planning and decision-making. However, the exercises only explore a small part of the potential of the case studies, and trainers are strongly encouraged to develop further exercises or tasks.

The package is intending at raising awareness to chemical hazards and risks, and to the benefits of systematical chemical safety management, within a value-chain approach. For teaching the factual knowledge base of the subject, trainers are referred to the reading lists in the bibliography.

Work exercises are predominantly based on interactive group work and a team approach to problem-solving. Such work needs to be guided by a tutor who is a recognized expert in the field. The exercises are oriented towards throwing light on useful approaches or management decisions than simply finding the "correct" answer. In some instances, answers are indicated. The "correct "answer depends on the context of the question. It is here that a tutor or external resource expert is useful.

Many trainers find this disturbing. They should remember that real decision-making depends on the wider circumstances surrounding the problem, and that an answer or approach that is socially unacceptable or administratively unworkable (even through accurate), is not in effect "correct".

The simulation of real life situations and decision-making that is the basis of this package makes it most suitable for senior students for professional training (or retraining) courses.

Finally, we must stress that this package does not cover all aspects of chemical safety management in SMEs and along the value chain. Its prime purpose is to lead trainers into this field, and to help and encourage them to develop their own material, appropriately tailored to their specific learning situation. UNEP is

prepared to work further with trainers who wish to extend this package into new directions, or to go into greater depths on some subjects.

HOW TO START A TRAINING ACTIVITY BASED ON THIS PACKAGE

1. Remember that this is a starters kit, and not a complete recipe book. Remember also that this training package aims to develop basic awareness, planning and decision-making, not to convey knowledge or facts.

2. Understand the needs of your trainees. What insights or skills do you intend to develop? Define your learning objectives.

3. Refresh your memory by reading the accompanying Responsible Production Booklet and Toolkit and by studying the suggested training materials.

4. Identify some expert resource persons who could be invited as tutors to help you in discussion sessions.

5. Select some of the exercises you wish to present to trainees.

6. Examine carefully the case studies or scenarios on which they are based. Be sure that you have at least one solution to the exercise that you can explain and defend.

7. Develop other exercises or questions yourself.

8. Develop your own local case study if you can, and use this instead of the ones in the package.

9. Prepare some background questions and preliminary exercises for trainers to carry out before they start the course.

10. In session, summarize the issues for trainees using the suggested slides, and others you may have. Discuss the problems and difficulties that workers, managers, and other decision-makers face. Discuss where factual information can be found to help in decision-making.

11. Commence the work sessions, preferably in small groups, and preferably guided by a tutor. Discuss and compare results. Be open to ideas and experiences from trainees, and discuss these.

12. Return to the learning objectives, and check that they have been achieved.

13 Consider how to follow up and reinforce the learning experience by establishing some ongoing projects, or periodic reunions.

Part I Introduction

1.1 BACKGROUND

In many developing countries, SMEs form the backbone of the industrial sectors where hazardous chemicals are manufactured, transported, repackaged and used. Unsafe manufacturing and handling operations in SMEs has documented environmental and health consequences. To set up effective internal safety management approaches and to start dialogue and ongoing communication with workers and nearby communities, SMEs need to be involved in initiatives involving other stakeholders, including larger companies, aimed at fostering chemical safety management and chemical risk information up and down the value chain.

For this, the Responsible Production approach aims at providing SMEs with the necessary tools for engaging businesses, supply-chains, distributors, traders and buyers in accident prevention and emergency preparedness in a manner that demonstrates companies' commitments to CSR core elements related to chemical risk reduction, environmental impact reduction, stakeholder engagement, community engagement and supply-chain management. The main focus is to increase overall chemicals safety and consequently reduce environmental emergencies in the operations of SMEs.

The training sessions in this package were designed to be easily adapted by users for the development and implementation of training programmes tailored to the needs of each company.

Target users of this package include technical institutes or similar organizations, industry (company management and staff) and people working with industries such as industry associations, consultants, non-governmental organizations, government agencies, research institutes, or academic institutions.

1.2 CONTENTS OF THIS PACKAGE

The purpose of this package is to provide guidance to trainers. The package explains:

- the objectives and target audience;
- trainers requirements;
- the aims of each session;
- how to best deliver each session (suggested approach and detailed guidance);
- how to assess participants; and
- how to evaluate the course.

This part contains advice on how to ensure maximum effectiveness as a trainer and how to organize effective training activities and presentations. This advice is provided before considering the technical materials

2.1 INTRODUCTION

Communication and organizational skills are just as important as a technical appreciation of the subject. Professional educators already understand this point, but teaching is a very individual matter, and interactive teaching can be very demanding on a busy person.

This section builds upon similar guidance previously published by UNEP within the scope of the Trainer Resource Package on Cleaner Production series of publications.

This text contains advice on:

- How to ensure maximum effectiveness as a trainer.
- How to organize effective training activities and presentations.

This advice is being provided before consideration of the technical materials, so that readers can remind themselves of the importance of the advice when choosing work exercises and training materials later in this package.

2.2 GENERAL TRAINER REQUIREMENTS

To ensure the success of the training, trainers' skills are as important as the training material. Each trainer has critical responsibility as he / she is the one interacting directly with participants. First of all, the trainer should have good facilitation and pedagogical skills to undertake a dynamic and interesting training session for participants. They should also have advanced command in the language in which this training package is written, and on the language used during the course.

The trainers should also have a good understanding of the Responsible Production Handbook as a whole, including the Responsible Production Booklet and Toolkit. Trainers can refer to these two elements of the Responsible Production Handbook and to other referenced materials and documents. Knowledge and experience on responsible production, safer production and emergency planning as well as in chemical safety would be an advantage, as the trainers could illustrate the presentations with concrete examples, thus increasing their credibility with the audience.

Technical expertise on particular subjects can be an asset depending on the sessions.

2.3 SUGGESTIONS FOR EFFECTIVE COMMUNICATION AND TRAINING

Communication

If the training is to be successful, effective communication is essential during all preparation steps and during the training itself.

Some simple communication considerations will help trainers to improve training outputs and undertake a successful training event:

- Communication amongst the course designers, writers, and event organizers and presenters is essential to be consistent in delivering the training.
- Discuss with companies and participants about their specific needs to adapt the training.
- Communicate with participants on the objectives and content of the training sessions (see below "Engage participants").
- Consider the time of the training. Make sure the training is not starting too early or lasting too long in order to keep participants' attention.
- Consider the local context and culture, local public holidays, social roles, etc.

Training

An effective training session depends directly on the level of preparation beforehand. Logistics and adequate training materials should be cared of in advance. The way to engage and approach participants is also something to consider carefully before initiating a training session.

The following suggestions will help trainers in adapting the suggested support materials in this package, and in preparing for delivering effective training sessions.

Preparing a good training session

Logistic needs:

- Choose the location for the training and book in advance.
- Participants should be provided with maps and transportation schedules to reach the location where the training session will take place.
- Make sure all facilities and equipment are in good working order.
- Arrange catering.

Training materials:

- Choose the materials for the session.
- Adapt materials to the needs of the participants, course agenda, and duration
- Prepare handouts on all materials covered, with references for further information. The participants can refer back to it during and after the meeting.
- Prepare extra copies.

- Eventually give the participants a "pre-event task" for interactive sessions. For example, when training company workers you can ask them to "list the chemical hazards handled in your plant" or "bring your company emergency plan if any". However, the trainers should not rely on participants' participation to pre-event tasks.
- Pre-event tasks should include the collection of the following materials (if available) by participants prior to the training:
  - layout maps and process diagrams;
  - area maps and information on routes used for the transport of chemical raw materials, products, by-products, and wastes;
  - lists of chemical raw materials, products, by-products, and wastes, and respective hazard classification where available;
  - list of suppliers, contractors, transporters and customers;
  - estimates of the quantities of the chemicals usually involved or present in each activity (including off-loading, storage, processing, transport);
  - final destination of chemical wastes;
  - purchasing records;
  - inventories (including chemical names, trade names / CAS numbers);
  - material safety data sheets (MSDS);
  - stock control records (including amount in use, where they can be found / stored / used);
  - other information on the locations of hazardous chemicals on site;
  - notes about chemical handling, use, storage, and disposal conditions etc;
  - results of previous risk analysis;
  - information on past accidents / emergencies;
  - numbers of workers undertaking activities where hazardous chemicals (raw materials, products, wastes) are involved;
  - information on existing communities / urban areas in company surroundings and along the routes used for the transport of chemical raw materials, products, by-products, and wastes;
  - information on the existence of other hazardous activities (other chemical companies, fuel storage facilities etc) in the surroundings and along the routes used for the transport of chemical raw materials, products, by-products, and wastes;
  - information on the existence of social infrastructures in the areas surrounding the company (existence of hospitals, schools, markets or shopping areas located nearby) and along the routes used for the transport of chemical raw materials, products, by-products, and wastes;
  - information on the existence of natural areas and resources in the areas surrounding the company (areas prone to flooding, agricultural areas, areas where drinking water is resourced, areas where water used for agricultural or recreational purposes are resourced, natural protected areas, etc.), and along the routes used for the transport of chemical raw materials, products, by-products, and wastes;
  - company emergency plans;

  - chemical control and monitoring plans;
  - hazard and vulnerability maps;
  - organizational charts and relevant job descriptions.
- Make provisions for conducting the suggested exercises in a situation where most of the above information is not available (familiarize yourself with the suggested mock case studies and / or develop specific case-studies to support sessions exercises).
- Prepare examples of outcomes of exercise sessions to guide participants.
- Be flexible in the preparation of the training sessions. Participants may already know about a topic covered in a given session.

Engaging participants

- Advertise the training.
- Once participants have signed up, provide additional information on training purpose and content, and how it will impact their activities.
- Establish a personal contact with some participants if possible, to better understand their expectations.
- Structure and adapt suggested presentations depending on the audience, agenda, and duration.

Undertaking a good training session

Keep in mind that you have to:

- Start the first session welcoming participants and if the audience is not too large, allowing for participants' introductions.
- Converse with your audience: participants should feel consulted, questioned, challenged. This is the way to catch their attention. Make participants feel appreciated for their participation.
- Use metaphors and give examples to deliver a lively training.
- Consider time management when delivering presentations. Keep in mind the timeframe of each session and announce the time dedicated to a presentation or a discussion.
- Take few minutes to sum up what has been said on a topic / session before beginning another session.
- Ask for feedback in order to better adapt to the audience (during coffee breaks for example).
- Ask for evaluation from the participants (refer to course evaluation forms under the "Course evaluation" section of each course). Be able to establish a training list to be addressed in future sessions.

3.1 TARGET AUDIENCE AND OBJECTIVES

Target audience: key staff from chemical companies including:

- Safety Officers (SOs) in chemical companies.
- Key company staff with responsibility for production safety.
- Key company staff with responsibility for risk communication and / or public relations.
- Key company staff with responsibility for procurement and / or storage of hazardous chemicals.

Objectives

The main objectives of this course are:

- To raise awareness of chemical hazards and risks and of the potential for work practices and accidents to lead to unsafe exposure to hazardous chemicals.
- To guide participants through the 5 steps of the Responsible Production approach and the associated tools in order to promote chemical safety along the value-chain and build the capacity for their practical application at work.

Expected Learning Outcomes

After going through the training sessions and suggested support exercises, participants should:

(a) understand the potential effects of exposure to hazardous chemicals at work;
(b) understand the 5-step approach of the Responsible Production approach and the way to use it for improving chemical safety and risk information management in their company's operations;
(c) understand the need to map the flow of their company's operations for identifying chemical hazards and risks, and produce a **Process Flow Diagram**;
(d) have developed a rough **Hazard Hotspots Map** and **Chemical Inventory** based on the chemical hazards and risks related to the operations being developed by their company;
(e) have prepared a basic **Legal Register** listing the main legal and regulatory requirements on chemical hazard control and accident prevention that are applicable to the operations being promoted by their company;
(f) be able to identify and map their stakeholders along the value chain and decide on the best way to engage to promote improved chemical safety;
(g) produce a **List of Stakeholders** relevant to their operations' hazards and risks;
(h) have identified basic actions for risk reduction and developed a draft **Chemical Control Action Plan;**
(i) have a basic understanding of possible tools for identifying and assessing training needs on chemical safety at the relevant organizational functions;
(j) be able to understand the basic elements of an **Emergency Plan**;

(k) have a basic understanding of the skills required for the development of **Best Practices Procedures**;
(l) be able to identify ways to improve risk communication processes;
(m) have developed the skills for undertaking a basic assessment of their organizations performance of the Responsible Production approach to chemical safety management through applying their own basic **Performance Assessment Checklists**, developed during this course.

3.2 SESSION GUIDANCE

The following session summaries provide guidance for each session of the Company Training Course, which should enable the trainer to deliver the sessions more effectively.

Training package session guidance	Training package slides / handouts	Toolkit
1 Introduction	1 Introduction	
2 Responsible Production	2 Responsible Production	
3 Chemical Hazards at Work	3 Chemical Hazards at Work	
4 Legal and Regulatory Requirements	4 Legal and Regulatory Requirements	Tool 1.5 Legal Register
5 Hazard Identification and Classification	5 Hazard Identification and Classification	
6 Process and Chemicals Flow	6 Process and Chemicals Flow Optional Support Handout*: • Exercise on mapping the chemicals flow (including background mock case-study) • ICSC – Ammonia • ICSC – Ethanol • ICSC – n-Propyl Acetate	Tool 1.1 Prepare process flow chart / diagram
7 Chemical Inventorying	7 Chemical Inventorying Optional Support Handout*: • Exercise on mapping the Chemical Inventorying (including background mock case-study) • ICSC – Ammonia • ICSC – Ethanol • ICSC – n-Propyl Acetate	Tool 1.2 Chemical Inventory and Hazard Classification

* These optional support handouts include background information on a mock case study (paint factory) to support suggested exercises in the case where participants have not been able to collect sufficient information before the event in order to apply the exercises to real life cases and information from their own companies

8 Risk Analysis, Hazard Prioritization, and Identification of Risk Reduction Actions	8 Risk Analysis, Hazard Prioritization, and Identification of Risk Reduction Actions	Tool 1.3 Identify Risks Tool 3.1 Identify Actions for Risk Reduction
9 Hazard Mapping	9 Hazard Mapping	Tool 1.4 Hazard Hotspots Map
10 Stakeholders Identification and Engagement	10 Stakeholders Identification and Engagement	Tool 2.1 Map Stakeholders Tool 2.2 Profile Stakeholders Tool 2.3 Select the Engagement Method
11 Chemical Control Action Plans	11 Chemical Control Action Plans	Tool 3.2 Risk Reduction Cost Analysis Tool 3.3 Set Goals, Objectives, Targets and Indicators Tool 3.4 Chemical Control Action Plan
12 Training	12 Training	Tool 3.5 Training Plan
13 Emergency Planning – Part 1	13 Emergency Planning – Part 1	Tool 3.6 Emergencies Plan
14 Emergency Planning – Part 2	14 Emergency Planning – Part 2 Optional Support Handout**: • Exercise on APELL and Emergency Planning • ICSC – TDI	
15 Best Practice Procedures	15 Best Practice Procedures	Tool 4.1 Best Practices Procedures
16 Basic Overview of other Responsible Production tools (risk communication, preparing product risk information, and procurement)	16 Basic Overview of other Responsible Production tools (risk communication, preparing product risk information, and procurement)	Tool 4.3 Risk Communication Tool 4.4 Product Risk Information Tool 4.5 Procurement Checklists
17 Performance Assessment and External Communication of Company Achievements	17 Performance Assessment and External Communication of Company Achievements	Tool 5.1 Performance Assessment Tool 5.2 Management Assessment Tool 5.3 External Communications Tool 5.4 Independent Assurance
18 Conclusion	18 Conclusion	

** This optional handout includes background information on another mock case study (plastic factory) to support suggested exercises. Trainers are encouraged to develop their own case-studies to support this exercise, adapted to the local context

The guidance for each session includes the following, when applicable:

- Session title
- Background
- Objectives
- Minimum duration
- Contents
- Suggested approach
- Suggested approach to the Group Exercise
- Assessment of participants
- Other comments
- References

Session title	1 INTRODUCTION
Background	• Engagement of training participants is built upon personal relations and sharing of experiences, where different participants discover common problems and shared interests through interaction.
Objectives	• To introduce participants to each other. • To introduce participants to course rationale and objectives. • To introduce participants to course contents and agenda.

Minimum duration	• 1 session of 1 hour and 30 minutes.
	  • 60 minutes: introductions. Take 5 minutes to present yourself, 5 minutes to present the course and 50 minutes for participants to present themselves and to briefly state their expectations and the reasons for attending the course.
	  • 30 minutes on introduction to:
	  (i) course rationale and objectives
	  (ii) course contents and agenda

Contents	• PPT presentation with:
	  • Introduction to the Company Training course rationale and objectives.
	  • Introduction to the Company Training course contents and agenda.
	  • Diagram of the 5 steps of the Responsible Production approach.
	• Hand-out with course agenda.
	• Handout with the flowchart of the 5 steps of the Responsible Production approach.

Suggested approach	• Ask participants to introduce themselves giving their name, organization and position, and their expectations of the course. If you have more than 15 participants, ask them to write their name organization and position on a paper in front of them. • Ask participants to write briefly on a paper if they have attended other courses on the subject, what is their expectation, if they know a lot about one topic in the agenda. This will be your "charter". • Invite some of the participants to briefly share similar training experiences and expectations with the group. You can build up on the selected participants' experiences and expectations to build momentum to introduce the course rationale and objectives (follow the presentation provided and present the course objectives and expected outcomes). • Briefly introduce the flowchart of the 5 steps of the Responsible Production approach and distribute it to the participants along with the course agenda. • Close up by highlighting the way the agenda is structured within the 5 steps of the Responsible Production approach which you will be explaining in the following session.

Session title	2 RESPONSIBLE PRODUCTION

Background	• The Responsible Production approach is build upon a 5 step model for assisting companies to improve chemical safety management and risk communication in their organization and among their stakeholders.
	• The practical approach is presented in the Responsible Production Toolkit, which includes practical guidance and tools for assisting companies in:
	  ◦ identifying and understanding the hazards and risks related to the company products and operations;
	  ◦ identifying opportunities for reducing risk and costs;
	  ◦ identifying and engaging with business partners and communities to improve safety and preparedness for accidents with chemical products;
	  ◦ promoting risk communication and product risk information along the value chain;
	  ◦ training workers and business partners in chemical safety;
	  ◦ improving procurement systems to include chemical safety management;
	  ◦ measuring and communicating performance in a transparent way.
	• The 5 steps of the Responsible Production approach are:
	  1. Identify Responsible Production Issues
	  2. Get the right people involved
	  3. Develop your plan
	  4. Put the plan into practice, train and communicate
	  5. Evaluate how well you did

Objectives	• To introduce participants to the 5 steps of the Responsible Production approach, and present the list of tools available in the Responsible Production Toolkit. • To introduce participants to the mock case study to be used during the course exercises.

Minimum duration	• 1 session of 1 hour and 30 minutes.
	  ◦ 1 hour and 15 minutes presentation including:
	  ▪ definition of Responsible Production and Chemical Product Stewardship;
	  ▪ discussion of the main aims, rationale, and target groups of the Responsible Production approach;
	  ▪ explanation of the 5 steps of the Responsible Production approach; and
	  ▪ 15 minutes: introduction to the mock case study.

Contents	• PPT presentations with:
	  ◦ Introduction to the Responsible Production approach.
	  ◦ Mock case-study.
	• Hand-out with description of mock case-study.

Suggested approach	• Follow the presentation provided for the introduction of the Responsible Production approach. • Introduce the definition of Responsible Production as a systematic and continuous improvement approach to:

	• Chemical safety along the value-chain • Understanding hazards • Controlling chemical exposure • Reducing accident risks • Engaging stakeholders • And promoting chemical product stewardship through risk communication aimed at preventing exposure to hazardous substances along the value chain. • Introduce the definition of Chemical Product Stewardship as: • "…the practice of making health, safety and environmental protection an integral part of the life cycle of chemical products." (ICCA Product Stewardship Guidelines, 2007) • Discuss the main aims and rationale of the Responsible Production approach by highlighting that: • There is a need to foster safe work practices and chemical safety information along the chemical industry value chain, thus not only the producers but also their suppliers, transporters, end customers, and other relevant business partners. • An integrated approach to chemicals safety and chemical product stewardship can not be implemented without the identification and engagement of the relevant stakeholders. This leads companies into the field of Corporate Social Responsibility (CSR), where community outreach and the establishing of partnerships is paramount. • Follow the presentation and discuss the target group of the Responsible Production approach. Emphasize the fact that although Small and Medium Sized companies (SMEs) in many developing countries form the backbone of the industrial sectors where hazardous chemicals are manufactured, transported, repackaged and used, there is still the need to come up with a simple but integrated guidance on safer production and safer chemicals handling specially addressed to SMEs and their business partners along the value-chain, including end customers and the affected communities. • Lead participants through the 5-step model and its guidelines on managing the risks and impacts associated with chemical hazards. Make sure to point out to participants: • The objectives and flow, activities and the tools available within each of the 5 steps of the approach. • That the approach is not meant to be a stand alone management system. It is meant to be integrated with existing management practices and procedures already existing in their companies. • The Responsible Production model approach is not intended to replace existing practices but to provide an additional approach to managing hazards and risks, within an wider concept of "risk objects" (i.e. other stakeholders in addition to company workers, such as business partners, customers and end users: the authorities and communities may be subject to risks posed by hazards in the companies operations). • Participants should be encouraged to engage during the presentation by sharing their own experiences with implementing management systems (occupational health and safety, environmental, quality, etc.) in their companies.

	• Go through each of the 5 steps of the Responsible Production approach by following:
	  • the questions that are posed at each section of the Responsible Production Toolkit, namely:
	  1) What is it that we have to do?
	  2) Why do we have to do it?
	  3) When should we do it?
	  4) How should we do it?
	  • Please note that you should not get into detailed description of the tools included in each section of the Toolkit, as these will be covered on other sessions throughout the course.
	• Make extensive use of the sequence diagrams for each step that are included in the support presentation.
	• After introducing the last step, make a quick review of the model, and sum up the scope and purpose of each step as follows:
	  • The FIRST STEP: **Identify Responsible Production Issues** - is all about understanding what it is companies have to manage. This means that companies have to identify those issues that are most important or **material** to their performance and success, and that they have to understand them as fully or **completely** as possible.
	  • The SECOND STEP: **Get the Right People Involved** - is all also about making sure that company understanding is as **complete** as possible. The key message to put across is that companies will not be able to develop fully this understanding unless they engage with their stakeholders. Companies need to be **inclusive** - they have to understand the issues and concerns of those people who will be affected by their products, actions and decisions or whose own actions and decisions can affect the company and its performance.
	  • The THIRD STEP: **Develop your Plan** - concerns planning for addressing the issues that were identified.
	  • The FOURTH STEP: **Put the Plan into Practice, Train and Communicate** - is about actually doing it and responding to the hazards and risks identified.
	  • The FIFTH STEP: **Evaluate how well you did** - is all about measuring, improvement and **transparency**. Involving stakeholders is not a one way street. If a company has involved stakeholders in helping to identify issues and plan responses, these will be expecting the companies to inform them on how they went about it.
	• Distribute to participants the hand-out with the description of the mock case-study, and use the presentation provided to present it and guide participants through the case-study.
	• Notes on the use of the mock case study:
	  • The objective of the case-study is to support some of the group exercises being proposed in the following sessions. Not all of these exercises require or make reference to the mock case study.
	  • Other exercises can either be applied with the case-study as support, or by having participants refer to situations in their own companies.

	• Trainers should decide the best way to use the case-study as they go along with the training, taking into account their perceptions of the capacity and knowledge of the trainees. • The case-study can and should also be used as a support to the sessions presentations on the various topics covered, to illustrate a particular point or situation • Finally, trainers are encouraged to adapt the given case and the proposed exercises to suit the target audience, and to develop additional exercises to extend the learning experience.
Assessment of participants	• During the session, ask participants to describe the 5 steps in a very simple way, with their own words. • Go back to a specific step you have already described and ask participants to recall the rationale behind it. • After presenting the 5 steps, ask participants to identify the steps related to the following tools of the Responsible Production Toolkit. • …Process Flow Diagram? [STEP 1] • …Chemical Inventory and Hazard Hotspots map? [STEP 1] • …Stakeholder List / Map? [STEP 2] • …Chemical Control Action Plan? [STEP 3] • …Best practices Procedures? [STEP 4] • …Risk Communication? [STEP 4] • …Performance Assessment? [STEP 5] • After the session, ask participants: • their opinion on the advantages and disadvantages of implementing each section of the toolkit. • their opinion on possible barriers to the implementation of specific tools in their companies. • what isolated steps of the Responsible Production Toolkit have their companies already pursued, and what could their companies benefit from moving further onto a more systematic approach. • what tool (or set of tools) they consider to be the most important to implement presently in their companies.
Other comments	• This session should allow participants to get a clear grasp of the 5 step approach. For this, participants should be encouraged to discuss and interact with the trainer on the rationale behind each of the 5 steps. • Optionally, participants could also be encouraged to think about the 5 step sequence and to question its adequacy. Discussion on the sequence of the 5 steps could be raised by encouraging discussion on: • What activities should be carried out before reaching the planning phase. • The importance of knowing who the relevant stakeholders are before the planning phase.

	• How well the sequence accommodates the consideration and implementation of immediate actions for risk reduction before reaching the planning phase.
References	• *Product Stewardship Guidelines (2007)*, International Council of Chemical Associations (ICCA) • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility)

Session title	3 CHEMICAL HAZARDS AT WORK
Background	• Understanding chemical hazards at work is the first step towards responsible chemical safety management.
Objectives	• To provide participants with a basic understanding on the concepts of "Hazard" and "Risk". • To provide participants with a knowledge base on the properties of hazardous substances, and on how these can come into contact with the body and cause injury or disease, how they may cause a fire or explosion in the workplace, and how a spill or leak may cause harm to the environment. • To provide participants with some basic information on safe handling of hazardous chemicals and potential off-site consequences of accidents with hazardous chemicals.

Minimum duration	• 1 hour and 30 minutes
	  • 10 minutes on definitions and chemical hazards
	  • 20 minutes on related risks with a focus on health risks due to accidental exposure at site level
	  • 40 minutes on relevant hazardous chemicals and their properties, inherent safety approach to hazard control, and safe handling
	  • 10 minutes on the potential effects of accidents with hazardous chemicals occurring off-site (community perspective)
	  • 10 minutes for discussion.

Contents	• PPT presentation on:
	  • Definition of hazard, risk and related concepts
	  • Chemical Hazards
	  • Health risks due to unsafe and accidental exposure to hazardous chemicals at work
	  • Relevant hazardous chemicals and their properties
	  • Incompatible chemicals, inherent safety approaches to hazard control, and basic measures for safe chemical handling
	  • Community impacts of accidents with hazardous chemicals

Suggested approach	• Follow the presentation provided for the session on chemical hazards.
	• Lead participants through the categories / classes of hazardous chemicals and the physical states that hazardous materials can be present at work.
	• Introduce participants to the concepts of "hazard" and "risk", and then ask them how they differ. Ask them to explain the concepts in their own words.
	• Build-up on the description of health risks due to unsafe and accidental exposure to hazardous chemicals by going through the following sequence (as per in the support presentation):
	  • Routes of exposure (Inhalation; Ingestion; Absorption; Injection)
	  • Symptoms of possible overexposure (Eye discomfort; Breathing difficulty; Dizziness; Headache; Nausea; Vomiting; Skin irritation)

- Keep on following the support presentation and introduce information on some relevant hazardous chemicals and their properties such as LPG, Ammonia, Chlorine, Acrylonitrile, Dimethyl Sulphate (DMS), Toluene Diisocyanate (TDI), and common organic solvents used in SMEs. Discuss their properties and common good practices in handling these substances. Encourage participants to share their experience in handling these substances at their own companies.
- On LPG, Ammonia, Chlorine, Acrylonitrile, and common organic solvents used in SMEs (such as benzene, toluene, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, dichloromethane and chloroform) you may wish to raise participants attention to the following hazards and risks:
  - LPG (generic name for commercial propane and commercial butane):
    1) If an LPG vessel is involved in a fire or if a major rupture occurs, for example due to vehicle impact, a fireball can result. In 1990, an explosion was caused by an LPG-containing truck accident in Bangkok which resulted in 63 people killed, and 90 injured.
    2) An LPG cylinder or tank, if involved in a fire, has the potential to undergo a BLEVE (boiling liquid expanding vapour explosion), causing a large fireball and multiple fatalities in the vicinity.
    3) Such scenarios are common to most industrial premises and, utilizing relevant good practice, the risk is suitably low. Such good practice includes:
       - Segregation of LPG storage from combustibles and other dangerous substances.
       - Burner controls which isolate the fuel if ignition is lost.
       - Inspection programmes for pressure vessels and piping.
       - Protection of vessels and piping from impact.
       (further guidance on LPG can be found at "Use of LPG in small bulk tanks" and "Small-scale use of LPG in cylinders", HSE).
  - Ammonia (NH3, it is normally encountered as a gas with a characteristic pungent odour).
    1) Ammonia used for agricultural applications (like fertilizers), refrigeration (primarily food production and storage), metallurgical applications, and medical applications.
    2) Ammonia is Highly Toxic due to its corrosive effects (Ammonia vapour primarily affects the mouth and upper airway, trachea, lungs, skin and eyes).
    3) Some accidents involving the transportation of ammonia:
       - 21 January 1997 (INDIA, Bhopal): Ammonia leakage during transportation resulted in 400 people injured.
       - 12 March 1995 (INDIA, Maharashtra): transport accident involving Ammonia gas resulted in 2000 people injured.
       - October 1991 (INDIA, New Bombay): transport accident involving ammonia gas resulted in 1 death and 150 injured.

	• Chlorine 1) Chlorine gas is used in making plastics, solvents for dry cleaning and metal degreasing, textiles, agrochemicals and pharmaceuticals, insecticides, dyestuffs, etc. It is also an important chemical used for water purification, in disinfectants, and in bleach. 2) Chlorine is a toxic gas that irritates the respiratory system. Because it is heavier than air, it tends to accumulate at the bottom of poorly ventilated spaces. Chlorine gas is a strong oxidizer, which may react with flammable materials.] 3) ABC Dry Chemical should never be used to fight a chlorine fire, as the resulting chemical reaction with the ammonium phosphate would release toxic gases and / or result in an explosion. 4) Chlorine gas reacts with the moisture in mucous membranes, such as eyes and the respiratory tract, to create acid, which burns the skin, and in sufficient concentration, can destroy the respiratory system after only a few breaths. 5) Some accidents involving the release of chlorine gas: ◦ January, 1997 (PAKISTAN, Lahore): transportation accident involving the release of Chlorine resulted in 32 deaths, 900 people injured, and 1000 people evacuated. ◦ April, 1994 (INDIA, Thane District): transportation accident involving the release of chlorine gas resulted in 4 deaths and 298 people injured. • Acrylonitrile 1) Acrylonitrile is an important monomer for the manufacture of useful plastics. It is used: ◦ as a raw material for the production of synthetic fibres, plastics and synthetic rubber; ◦ as a raw material for acrylic acid, acrylic esters, and acrylic amide; ◦ in the synthesis of compounds used for the production of adhesives, anti-oxidants, binders for dyestuffs and emulsifiers. 2) Overexposure to acrylonitrile includes headache, sleeplessness, nausea, vomiting, diarrhoea, fatigue, and irritation and inflammation of the eyes and respiratory tract including the nose and throat. In more severe cases, unconsciousness and convulsions may occur. 3) Exposure should be avoided by use of adequate ventilation and proper Personal Protective Equipment (PPE). 4) Acrylonitrile is highly flammable and toxic. It undergoes explosive polymerization. The burning material releases fumes of hydrogen cyanide and oxides of nitrogen. Acrylonitrile is classified as a recognized human carcinogen. 5) Some good practices in the use of Acrylonitrile (not exhaustive): ◦ Do not use the compound near sources of ignition. ◦ Do not use compressed air for filling, discharging, or handling. ◦ In case of fire, keep drums cool by spraying with water. ◦ Fire fighters should use self-contained breathing apparatus.

6) Well-known accidents involving Acrylonitrile include the 2001 accident in Thailand where a truck had an accident on an express way in Bangkok releasing Acrylonitrile onto the road and into the drainage.

- Dimethyl sulfate (DMS)
  1) Dimethyl sulfate DMS is a versatile chemical that can be used for a variety of processes in the production of many household and commercial chemicals. It is a strong methylating agent that reacts with active hydrogen and alkali metal salts to form substituted oxygen, nitrogen, and sulfur compounds.
  2) Dimethyl sulfate is used:
     - as a reagent for the methylation of phenols, amines, and thiols.
     - particularly in the dye industry and in the manufacture of organic chemicals, such as fabric softeners, and of pharmaceuticals.
  3) Very toxic, and may be fatal, if inhaled. Dimethyl sulfate is likely carcinogenic and mutagenic, poisonous, corrosive, environmentally hazardous and volatile (presenting an inhalation hazard). May act as a sensitizer. May cause reproductive damage. Some consider it a potential chemical weapon.
  4) Dimethyl sulfate is absorbed through the skin, mucous membranes, and gastrointestinal tract. Lachrymator. Very destructive of mucous membranes. Toxicity is manifested initially by mucosal inflammation of eyes, nose, oropharynx, and air-ways.
  5) Well known accidents involving Dimethyl sulfate include a gas leak that followed an eight-car crash on an expressway in central China that resulted in the rupture of a gas tank, leaving five dead and more than 50 sick. The chain of collisions ruptured a tanker carrying 27 tonnes of toxic dimethyl sulfate gas. The gas leak irritated the eyes, throat and skin of police, firemen and nearby villagers as well as the motorists.
- Toluene Diisocyanate (TDI)
  1) TDI is a synthetic organic chemical used in the production of polyurethanes for flexible foam applications. TDI-based polyurethane foams are widely used in the automotive and furniture industries, and in packaging and insulation.
  2) TDI is a toxic compound, and it should be treated as both a potential human carcinogen and as a known animal carcinogen. Exposure can lead to adverse effects on the respiratory tract, skin, eyes, and gastrointestinal tract.
  3) Well known accidents involving TDI include the Hebei Chemical Factory Blast in China in 2007. The company is one of the major TDI producers in China. Following an explosion in a nitration workshop that lead to the death of five workers, more than 2,000 residents in the village were evacuated for fear of possible toxic gas leak.
- Organic solvents: benzene, toluene, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, dichloromethane, chloroform, etc.)
  1) Solvents are substances which are used to dissolve or dilute other substances. Industrial solvents are often mixtures of several individual substances and they can be found under a variety of trade names.

	2) Some of the short-term health effects of exposure to solvents include: • irritation of eyes, lungs and skin; • headache; • nausea; • dizziness; and • light-headedness. Unconsciousness and even death can result from exposure to very high concentrations of solvent vapours. Amongst the most hazardous solvents are benzene, carbon disulphide and carbon tetrachloride 3) Most organic solvents are flammable or highly flammable, depending on their volatility. Exceptions are some chlorinated solvents like dichloromethane and chloroform. Mixtures of solvent vapours and air can explode. 4) Some solvents produce vapours which are heavier than air. These may move on the floor or ground to a distant ignition source, such as a spark from welding or caused by static electricity. 5) Some good practices in the use of solvents (not exhaustive): • The solvents which pose the most serious risk to health should be substituted by less hazardous ones. • If this is not possible, at least the conditions during handling should be adjusted so that there is no risk of skin contact and that the concentration of vapour in the air is kept low. • Ventilation is important and it should be considered carefully when using solvents. • Equipment (fire extinguishers, absorbent material, etc.) should be considered and provided for situations such as spillage or emergency. • Personal protective equipment such as aprons, gloves and masks with filters should be available where needed, and they should be used according to the recommendations. • Storage of this equipment should be in a clean place away from possible contact with solvent vapours. • Move onto to introduce the concept of chemical incompatibility giving real life examples on incompatible chemicals such as: • Flammables and oxidizers • Flammables and any ignition source • Acids and cyanides • Strong acids and strong alkalines • Concentrated acids and water • Organic solvents and corrosives • Corrosives and other reactive materials

	• Raise attention to inadvertent chemical reactions which may produce toxic gases such as:
	  • Cyanide + acid produces hydrogen cyanide (HCN)
	  • Hypochlorite + acid produces chlorine
	  • Bifluoride + acid produces hydrogen fluoride (HF)
	• At this point you may wish to further develop on a specific type of incompatibility taking into account the types of processes and chemicals being used at participants' companies.
	• You can encourage participation on the measures being implemented at participants companies for preventing accidents and assuring the safe handling of the above mentioned chemicals, and direct the presentation on the next two topics – inherent safety approach to hazard control and basic measures for safe handling of hazardous chemicals.
	• On inherent safety approaches to hazard control, lead participants through the following Inherent Safety Production (ISP) checklist items which should help companies to identify opportunities to reduce the hazards of chemicals, their transport and processing. These may also help to reduce the seriousness of potential fires, explosions, and sudden and accidental releases of (toxic) chemicals and to reduce the risk of chemical accidents.
	  • Minimise
	  1) Is there a specific quantity of a dangerous (especially toxic, explosive, flammable, reactive) chemical product (in storage or process) that could potentially cause a major accident?
	  2) Are there options to reduce that quantity? (e.g. by changes in procurement policy, storage in smaller units, by combining production and use on site, or by process intensification)
	  • Substitute
	  1) Is it possible to replace the most dangerous chemical(s) product by a less dangerous material?
	  2) Can suppliers provide more benign alternatives?
	  3) Are there alternatives for the most dangerous processes? (e.g. can the process be substituted by another process that is less dangerous?)
	  • Simplify
	  1) Is it possible to redesign the process or the handling or transport of chemical materials to reduce the complexity and foster simplicity?
	  • Moderate
	  1) Is it possible to change the process or the form of the chemical products so they are less harmful? (e.g. lower concentration or using pills instead of powders)
	  2) Can a (bio) catalyst help to process chemicals at lower temperatures and pressures, approaching ambient conditions?
	  3) Are there activities whereby chemical products are used in open air?
	  4) Can these activities be changed so that the chemicals are contained?

	• Improve logistics and layout 1) Can the lay-out of the facility be changed so that transport of chemical products becomes simpler and less risky? (supply, transit, transport of products, removal of wastes) 2) Can hot spots of chemical hazards be removed to greater distances from buildings or other places where many people come and go? • Follow the support presentation, and present basic measures for safe chemical handling. Encourage discussion with participants on importance given in their companies to: • Never eating, drinking, or smoking while using hazardous chemicals • Always using the appropriate Personal Protective Equipment (PPE) • Labelling and identification of hazardous chemicals • Avoiding smelling or tasting a chemical as a means to identify it • Storage of hazardous chemicals • Availability of Material Safety Data Sheets (MSDS) and chemical risk information at work • Keeping containers closed when not in use • Keeping flammable chemicals away from ignition sources • Avoiding contact between incompatible materials • Not using improvised containers when transferring hazardous chemicals • Cleaning up spills and disposing of waste properly. • Make note on issues raised during discussion and potential links with other steps, activities and tools in the Rsponsible Production approach, as you may want to come back to a particular issue being discussed to prove your point at other sessions, for example when delivering training sessions 2.5 Hazard Identification and Classification; 2.8 Risk Analysis; 2.9 Hazard Mapping; 2.12 Training; 2.15 Best Practices Procedures, etc. • Conclude the presentation by going through the slides on community impacts of well known chemical accidents with off-site consequences. Discuss with participants potential dangers related to accidental releases of hazardous chemicals such as fires, explosions, toxic clouds, contamination of soil and sources of drinking water, etc.
Assessment of participants	• During the session, ask participants about their knowledge on the properties of the chemicals handled in their companies. You can encourage discussion by asking some of the following questions: • *Which chemical substances being handled in your company are explosive? How are these being handled?* • *Are you storing or using compressed and liquefied gases in your company? How are these being used?* • *Which chemical substances being handled in your company are flammable? How are these being handled?* • *Which chemical substances being handled in your company are considered as oxidizing substances? (substances that by yielding oxygen, can cause or contribute to the combustion of other materials) How are these being handled?*

	• *Which chemical substances being handled in your company are self-reactive substances? How are these being handled?* • *Which chemical substances being handled in your company are pyrophoric substances? How are these being handled?* • *Which chemical substances being handled in your company are self-heating substances? (substances other than pyrophoric substances, which, by reaction with air and without energy supply, are liable to self-heat) How are these being handled?* • *Which chemical substances being handled in your company emit flammable gases when in contact with water? How are these being handled?* • *Which chemical substances being handled in your company are corrosive? How are these being handled?* • Ask participants about their knowledge on the health risks posed by the chemicals handled in their companies. • Ask participants about their perceptions on the knowledge company workers have about the properties of the chemicals they handle. • Ask participants about their knowledge on the potential effects of an accident involving hazardous chemicals in the communities located in the vicinity of their companies' operations. • Given the described properties and risks, ask participants for their opinion on what first steps could be taken towards risk reduction at their companies' operations. • No exercise is being considered in this session, but you can use the following short quizzes to highlight a specific point: • Two primary routes of exposure to hazardous chemicals are _____ and _____. [Answer: inhalation, ingestion, absorption, injection] • Three symptoms of overexposure to hazardous chemicals are _____, _____, and _____. [Answer: eye discomfort, breathing difficulty, dizziness, headache, nausea, vomiting and skin irritation] • The most likely chemical exposure during a release is by inhalation. True or False? [Answer: True] • Gas, liquids, and aerosols are the three states of hazardous materials. True or False? [Answer: False: Liquids, solids, gases, and vapours are the four states of hazardous materials] • Two dangerous incompatible materials are _____ and cyanides. [Answer: acids] • Flammables and oxidizers should never be stored together. True or False? [Answer: True: Flammables and oxidizers are incompatible and should never be stored together] • Flammables should always be used away from sources of _____. [Answer: ignition] • Other: create your own quizzes taking into account the types of processes and materials being handled at participants' companies.

Other comments	• This session should raise discussion on issues related to participants personal experiences with handling chemicals at work, and with the effects on accidents involving hazardous chemicals, both at site level and off-site.
	• This session should also raise discussion for the importance of understanding the properties of hazardous chemicals and of wearing the necessary Personal Protection Equipment (PPE).
	• Participants should be encouraged to explore and discuss the potential health effects of exposure to hazardous chemicals at their companies.
	• Participants should also be encouraged to discuss issues such as fire protection and environmental effects of accidents with hazardous chemicals.
	• One way to promote sharing and transparency of this type of information is to ask participants to discuss the above issues from a positive perspective; highlight near-misses / quasi-accidents, and stories of successful responses to accidents, rather than asking participants to share negative experiences, with which they most probably will not feel comfortable.
	• You may also feel that participants will still feel more comfortable talking about well-known chemical accident situations that happened at other companies than their own. This can also be a good way to encourage discussion on chemical hazards and risks at work, and the potential effects of accidents in nearby communities.
	• Finally, encourage discussion and sharing of well known stories of accidents that have occurred off-site and / or during transport of chemicals. If the opportunity arises for introducing the "value-chain / business partner" perspective, grab it and link it with the rationale for STEP 2 of the Responsible Production approach – GET THE RIGHT PEOPLE INVOLVED and / or with the following issues:
	  • Awareness raising and training needs of suppliers, transporters, clients, end-users, etc. on chemical hazards and risks.
	  • Risk communication and product risk information.
	You will not have to go into detail as these issues will be covered in later sessions in this Training Package, but you should raise attention to its link with the rationale for bringing in external stakeholders in the Responsible Production approach.

References	• *Risk and Hazard – How they differ*, European Chemical Industry Council (CEFIC) • *Safety and Health in the Use of Chemicals at Work – A Training Manual*, IPCS International Programme on Chemical Safety • *Chemical Safety Training Modules* (Part I: Introduction to Safety in the Use Of Chemicals), IPCS International Programme on Chemical Safety • *Chemicals in the Workplace*, International Labour Organization (ILO) • *Basic checklist for inherently safer production*, by Gerard I.J.M. Zwetsloot (TNO Quality of Life) • *COMAH Guidance for the Surface Engineering Sector*, Health and Safety Executive (HSE) • *Use of LPG in small bulk tanks*, Health and Safety Executive (HSE) • *Small-scale use of LPG in cylinders*, Health and Safety Executive (HSE)

	• *Guidelines for the distribution of Acrylonitrile / Revision 3 - January 2003,* European Chemical Industry Council) (CEFIC) • *Working safely with solvents - A guide to safe working practices*, Health and Safety Executive (HSE) • *Guideline for Industrial Provincial Officers (IPO) and Industrial Estate officers (IEO) on Advisory Services in Enhancing Safety Measures for SMEs (Draft August 2007)*, GTZ Thai-German project on Risk Management for the Handling of Hazardous Materials by SMEs in the Bangpoo Area

Session title	4 LEGAL AND REGULATORY REQUIREMENTS
Background	• Compliance of companies' operations with laws and regulations requires a good understanding of the main legal requirements on workers health and safety, labelling and classification of hazardous chemicals, provision of risk information to stakeholders, and reporting to the relevant authorities.
Objectives	• To provide participants with a basic understanding of the legal and regulatory requirements related to chemical hazard control and accident prevention relevant to the chemical industry in general, and to the operations being promoted by their companies.

Minimum duration	• 1 hour
	  • 20 minutes on identification of the main national and international laws and regulations that are applicable to importing, handling, storage, producing, transporting, labelling and classification of hazardous chemicals.
	  • 20 minutes on identification of the main national legal and regulatory requirements that are key for assuring full compliance with laws and regulations on workers health and safety, labelling and classification of hazardous chemicals, provision of risk information to stakeholders, and reporting to the relevant authorities.
	  • 20 minutes on group exercise: preparation of a Legal Register.

Contents	• PPT presentation on Legal and Regulatory Requirements, including:
	  • Brief overview of international laws, codes and regulations including the European Seveso II Directive, ILO Convention n° 174 on the Prevention of Major Industrial Accidents, UNECE Convention on the Transboundary Effects of Industrial Accidents, UNECE ADR, REACH, GHS, Responsible Care and Responsible Care codes of practice, Responsible Care Global Charter, Global Product Strategy, and Product Stewardship Guidelines.
	  • Identification of the main national laws and regulations that are applicable to importing, handling, storage, producing, transporting, labelling and classification of hazardous chemicals.
	  • Identification of the main national requirements related to the provision of risk information to stakeholders, and reporting to the relevant authorities.
	• PPT presentation and hand-out to support group exercise on preparation of a Legal Register.

Suggested approach	• NOTE: time available for this session will not allow trainers to present and go through all the regulations and codes of practice described in the suggested support presentation, which should be adapted to agenda constraints and to the level of knowledge of the participants. Trainers may also wish to focus only on national requirements and regulations, depending on the needs and expectations of the participants.

	• Follow the presentation provided for the session on Legal and Regulatory Requirements (guidance below covers the entire contents of the support presentation)
	• Refer to the need to regulate chemical emergency prevention and preparedness and briefly outline the objectives, structure and main requirements of the following legal diplomas:
	  • **European Seveso II Directive** - currently applied to thousands of industrial establishments in Europe where dangerous substances are present in quantities exceeding specific thresholds. The extension of the scope of the Directive implied the additional coverage of risks arising from storage and processing activities in mining, from pyrotechnic and explosive substances, and from the storage of ammonium nitrate and ammonium nitrate based fertilizers.
	  • **ILO Convention n° 174 on the Prevention of Major Industrial Accidents** – the purpose of this Convention is the prevention of major accidents involving hazardous substances and the limitation of the consequences of such accidents. It applies to major hazards installations, which are defined by the presence of quantities of hazardous substances that exceed a specific threshold. Ratifying states are allowed a large measure of discretion in identifying and designating the installations concerned, inasmuch as threshold quantities are to be prescribed in national laws and regulations.
	  • **UNECE Convention on the Transboundary Effects of Industrial Accidents** - designed for protecting human beings and the environment against industrial accidents, closely reflecting the content of the Seveso Directive, and some of the basic principles found in ILO Convention n° 174 (except for the fact that it focuses on transboundary effects).
	  • **UNECE "European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)"** - regulates the transnational transport of hazardous materials.
	  • **UNECE "Globally Harmonized System of Classification and Labelling of Chemicals (GHS)" ("Purple Book")** - system for standardizing and harmonizing the classification and labelling of chemicals. It is a logical and comprehensive approach to:
	  1) Defining health, physical and environmental hazards of chemicals
	  2) Creating classification processes that use available data on chemicals for comparison with the defined hazard criteria
	  3) Communicating hazard information, as well as protective measures, on labels and Safety Data Sheets (SDS).
	  • **Regulation (EC) No 1907 / 2006 of the European Parliament and of the Council of 18 December 2006 (REACH)** - under the REACH regulation ("Registration, Evaluation and Authorisation of Chemicals"), manufacturers and importers will be required to gather information on the properties of the substances they use and produce, and to register it in a central database. Among other requirements:
	  1) Depending on the risk characterisation of a material or chemical, authorisation may be required before it can be used or produced.

	2) Manufacturers will have to ensure that all relevant information on the hazards and risks posed by their products shall be passed down and up the supply chain, along with information on how to manage them. In this way, downstream users and distributors will be provided with the information they need to use chemicals more safely. (When briefly describing the main requirements under REACH, highlight the above requirement on the provision of risk information along the value chain that and link it to the rationale of the Responsible Production approach.) • Follow the sequence in the support presentation provided, and introduce **Responsible Care**. Refer the following points on Responsible Care (RC): • RC is a voluntary commitment of the chemical industry to go beyond legal requirements. • Under this framework, companies work together through their national associations in a continuous search to improve their health, safety and environmental performance, promoting communication with their stakeholders about products and processes. • With a focus on meeting and going beyond legislative and regulatory compliance, the Responsible Care framework comprises the specific commitment to cooperate with governments and organizations in the development and implementation of effective regulations and standards, and to provide help and advice to foster the responsible management of chemicals by all those who manage and use them along the product chain. • **Responsible Care Codes of Practice**: 1) Process Safety 2) Employee Health and Safety 3) Pollution Prevention 4) Emergency Response 5) Distribution 6) Product Stewardship (When briefly describing the RC Codes of Practice link it to the rationale of the Responsible Production approach.) • The new **Responsible Care Global Charter (RCGC)** was launched by the International Council of Chemical Associations (ICCA) at UNEP's International Conference on Chemicals Management in Dubai in February 2006, alongside with the new **Global Product Strategy (GPS)** initiative. • The Responsible Care Global Charter extends the original elements of Responsible Care, focusing on new and important challenges facing the chemical industry and society including sustainable development, the effective management of chemicals along the value chain, greater industry transparency and increased global harmonisation and consistency among Responsible Care programmes around the world. • Global Product Strategy (GPS) initiative - focused on product stewardship and in the extension of Responsible Care along the value chain.

	• ICCA Product Stewardship Guidelines - provided to assist companies in designing and implementing product stewardship programs built on a management systems approach. (When briefly describing the GPS initiative and ICCA's Product Stewardship Guidelines link it to the rationale of the Responsible Production approach.) • Follow the presentation provided and go through the national legal and regulatory requirements related to chemical safety and management of hazardous chemicals (see below examples of relevant regulations in Thailand): • **Factory Act 1992** - rules and regulations to be followed by factories while being set up and during the subsequent operations. With regards to the safety and safe production there are certain articles in the act to ensure that safety aspects are not overlooked. This act is under the purview of the Department of Industry, under the Ministry of Industries. Under Section 8 of the act it directs the factory owner to undertake measures to prevent, stop or mitigate the dangers or injuries that may be caused to person or property. Chapter 2 section 34-37 deals with what should be done in case of an accident which renders a person unable to work after 72 hours or causes the factory to close down for 7 days. • **Labour Protection Act 1998** - mainly under the purview of the Ministry of Labour and Social Welfare. It basically ensures the "Rights" of labour regarding wages, working hours etc. Chapter 8, section 100 to 107 of the act deals with the "work safety, occupational health and environmental conditions" inside the factory premises. It also empowers the labour inspectors to report and stop the working of the factory if he is not satisfied with the safety aspects of the operation in the factory. • **Hazardous Substance Act 1992** - three ministries (i.e. Ministries of Industry, Agriculture & Cooperatives and Public Health) sharing the responsibilities for executing in the act depending on the area of application with respect to their expertise. Under this act, a substance is defined as hazardous if it is any one of the following: 1) Explosives 2) Flammable substance 3) Oxidizing agent and peroxide 4) Toxic substance 5) Substance causing diseases 6) Radioactive substance 7) Mutant causing substance 8) Corrosive substance 9) Irritating substance 10) Other substances, either chemicals or otherwise, which may cause injury to persons, animals, plants, property, or environment. (Therefore nearly all the chemicals and chemical products are covered under the act.) Other requirements under this act direct the producer of a hazardous substance to be careful in handling, storing, transporting and the need to examine the reliability of the person accepting the delivery of the hazardous substance.

	• **Hazardous Substance Act (2nd Issue)** - it is an addendum to the first act of 1992, referred to above. Articles 5 to 14 of the act provide guidelines regarding the location of the buildings (factories) processing hazardous substances, and specifications for the building plan and for handling and storage of all kinds of solid, liquid and gaseous hazardous substances. • **Ministry of Industry notification of 2003 regarding to the rules pertaining to Land Transportation of Hazardous Substances** - translation in Thai language from the "Transport of Dangerous Goods, Model Regulation" by the United Nations, 2003. Similarly the Code for Packaging is adopted *in Ditto* from ADR, European Agreement concerning the International Carriage of Dangerous Goods by Road. • **Ministry of Industry notification of 2004 "Hazardous Waste Manifest System"** - defines that "Hazardous Substances" shall mean "Hazardous Waste" under authorization of the Department of Industrial Works (DIW). It also directs the generator, transporter, storage, and treatment and disposal facility to request for a 13 digit identification number. This number is unique in Thailand and each of the thirteen digits has a certain message in it, which would help in identification of the hazardous waste. Under Article 5 of the same notification, it is mandatory for the generator of the hazardous waste to have a written emergency and contingency plan and submit the same to DIW; the generator shall also arrange for the provision of sufficient equipments for emergency responses in the event of spill or release, fire or explosion.
Suggested approach to the Group exercise	• Finally, go through the support exercise provided (Group Exercise – preparation of a Legal Register) Note: this exercise does not require the support of the mock case-study. • The aim of this exercise is to make participants familiar with the necessary steps towards preparing a Legal Register, as per the related tool being provided in the Responsible Production Toolkit. • Depending on the numbers of participants you may wish to divide them in small groups. • Explain participants that the objective is to list all legal, code, regulatory and other requirements that are applicable to their company's products (including hazardous substances used as raw materials, additives, cleaning materials, fuel, etc.), processes and operations. • Criteria for forming groups should be similar processes or activities between participants' companies. None the less, it is not a problem if participants in the same group are coming from different organizations with distinct activities, as many of these will most certainly fall under similar requirements. In addition, this will foster participants understanding of the requirements of other stakeholders in the chemical industry value chain • **Give participants 10 minutes to go through the following activities of the exercise:** 1) Based on the information provided in this session, ask participants to make a list of existing regulation that may be applicable to the raw materials, products, and processes related to their companies' operations

	2) For this, ask them to take into consideration both national and international laws, regulations, codes of practice, customer requests and standards, industry (and company voluntary commitments) within the following areas: i) Chemical products ii) Environment (water, wastewater, air, waste, etc…) iii) Flammable and explosive products iv) Occupational health and safety and rescue services v) Transport of dangerous goods vi) Electrical equipment 3) Ask participants to identify all requirements present in their companies' licenses and permits related to: i) Water usage ii) Discharge of wastewater iii) Solid waste management iv) Transport of dangerous goods v) Occupational health and safety and fire inspection 4) Finally, ask them to build a table and rearrange the requirements identified within the following columns: i) Substance or Process activity ii) Law / Code / Regulation iii) Requirement / Obligation iv) Activities to undertake to assure compliance
Assessment of participants	• During the session, ask participants: • About their knowledge on the national legal and regulatory requirements related to chemical safety and management of hazardous chemicals • About their knowledge on national reporting requirements to the authorities • About their general knowledge on relevant international laws, codes and regulations that are applicable to the management of hazardous chemicals
Other comments	• This session should raise discussion on issues related to participants, personal experiences with inspections from the authorities, penalties and fines, and general resources and conditions needed for assuring full compliance of operations. • This session relates to the Tool 1.5 – Legal Register (from the Responsible Production Tool Kit).
References	• European and International: • European Seveso II Directive (Council Directive 96/82/EC, which was further extended by the Directive 2003/105/EC) • ILO Convention n° 174 on the Prevention of Major Industrial Accidents • UNECE Convention on the Transboundary Effects of Industrial Accidents • *European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)*, UNECE • *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)* ("Purple Book"), UNECE

	• Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18 December 2006 (REACH) • Responsible Care (RC) and the RC Codes of Practice on Process Safety, Employee Health and Safety, Pollution Prevention, Emergency Response, Distribution, and Product Stewardship • ICCA's Responsible Care Global Charter (RCGC), Global Product Strategy (GPS), and Product Stewardship Guidelines • National (example of relevant regulations in Thailand): • Factory Act 1992 • Labour Protection Act 1998 • Hazardous Substance Act 1992 • Ministry of Industry notification of 2003 regarding to the rules pertaining to Land Transportation of Hazardous Substances • Ministry of Industry notification of 2004 - Hazardous Waste Manifest System

Session title	5 HAZARD IDENTIFICATION AND CLASSIFICATION
Background	• Hazard identification and classification is a key step towards understanding which chemical, are dangerous and why, and establishes the basis for organizing hazard communication.
Objectives	• To provide participants with a knowledge base for easy identification of hazardous chemicals and their properties through information provided on recognized international label and classification systems.

Minimum duration	• 1 hour
	  • 40 minutes presentation on identification of hazardous chemicals.
	  • 20 minutes exercise on hazard identification (exercise divided in 3 parts of 5 minutes each – save the last 5 minutes to present participants with the correct answers to the 3 parts of the exercise).

Contents	• PPT presentation on hazard identification, classification and labelling, following the sequence below:
	  • Importance of labels
	  • Symbols used for labelling hazardous substances in the EU
	  • EU risk phrases and safety phrases for classification of substances for workplaces and storage areas
	  • The NFPA 704 Hazard Rating System ANSI/NFPA 704
	  • Labelling and hazard symbols according to the GHS
	  • Transport pictograms according to the UN Model Regulations
	  • Review of labels and their meanings
	• PPT presentation with 3-part hazard identification exercise and the list of correct answers to be shown to each group in the final of the exercise

Suggested approach	• Follow the presentation provided for the session on Hazard identification and classification and discuss the importance of labelling hazardous chemicals for risk communication.
	• Present the system and symbols used for labelling hazardous substances in EU countries. Explain that in EU countries labels must clearly show:
	  • the trade name
	  • the name and the address, including telephone number, of the manufacturer, the importer or the distributor
	  • the chemical name of the substance (in the case of a preparation, the chemical names of the hazardous components)
	  • danger symbols
	  • risk phrases (R-phrases) and safety phrases (S-phrases)
	  • the quantity of the contents of the package or container
	The labels should be in the national, official language(s) of the country.

- Continue through the presentation and present the following symbols and indications of danger used in the countries of EU as per the European Directive 67/548/EEC: (source: "*Chemical Safety Training Modules" (Part II: Identification, Classification and Labelling of Chemicals), IPCS International Programme on Chemical Safety*)

E

Explosive

O

Oxidising

F

Highly Flammable

F+

Extremely Flammable

T

Toxic

T+

Very Toxic

Xn

Harmful

Xi

Irritant

C

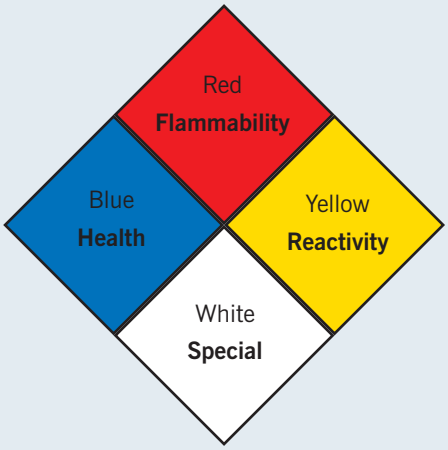
Corrosive

N

Dangerous for environment

- At this point, give some examples of chemical products bearing the above symbols. Some examples you can use include:
  - Explosive (E): Ammonium nitrate, ethylene oxide, organic peroxides
  - Oxidising (O): chlorine, hydrogen peroxide
  - Flammable (F and F^+): LPG, gasoline, toluene, kerosene, methanol
  - Toxic (T and T^+): Hydrogen cyanide, phosgene, chlorine, pesticides
  - Harmul (Xn): 1,1,1-Trichloroethane (solvent)
  - Corrosive (C): Sulphuric acid, battery acid
  - Dangerous for environment (N): Diesel, 1,1,1-Trichloroethane (solvent)
- Explain briefly what are the risk phrases (R-phrases) and the safety phrases (S-phrases), as per below:
  - R-Phrases: these indicate hazards. Many R-Phrases refer to health effects on humans while others describe environmental effects. Certain R-Phrases also indicate that certain chemicals can be explosive, or flammable, or react violently with water or oxidising substances.
  - S-Phrases: provide first advice for the safe handling of hazardous chemical substances and formulations.

- Follow the support presentation and introduce participants to the National Fire Protection Association (NFPA) NFPA 704 Hazard Rating System.
- Explain that the NFPA has developed a standard system (the ANSI/NFPA 704) for indicating the health, flammability, and reactivity hazards of chemicals. This system of identifying hazards associated with various materials was developed primarily for fire protection and emergency personnel but can be useful to anyone who needs to handle potentially hazardous material.
- As stated in NFPA 704, "This standard provides a simple system of readily recognizable and easily understood markings, which will give at a glance a general idea of the inherent hazards of any material and the order of severity of these hazards as they relate to fire prevention, exposure, and control".
- Explain to participants the system by going through the detailed description provided on the support presentation on:
  - Health (Blue)
  - Flammability (Red)
  - Reactivity (Yellow)
  - Special Precaution Symbols
  - Special Notice Key (White)



- Explain to participants what is the "Globally Harmonized System of Classification and Labelling of Chemicals" (GHS) and why it was developed.
- Indicate how the GHS provides a common and coherent basis to defining and classifying hazards and communicating information on labels and safety data sheets.
- Follow the support presentation and indicate what is the information required on a GHS label:
  - Pictograms
  - Signal words
  - Hazard statements
  - Precautionary statements and pictograms
  - Product identifier
  - Supplier information

- Briefly present the GHS hazard classes.
- Continue following the sequence of the support presentation and introduce the GHS pictograms relating them to the GHS hazard classes.

GHS Pictograms and Hazard Classes

- Oxidisers

- Flammables
- Self Reactives
- Pyrophorics
- Self-Heating
- Emits Flammable Gas
- Organic Peroxides

- Explosives
- Self Reactives
- Organic Peroxides

- Acute Toxicity (severe)

- Corrosives

- Gases Under Pressure

- Carcinogen
- Respiratory Sensitizer
- Reproductive Toxicity
- Target Organ Toxicity
- Mutagenicity
- Aspiration Toxicity

- Environmental Toxicity

- Irritant
- Dermal Senstizer
- Acute Toxicity (harmful)
- Narcotic Effects
- Respiratory Tract Irritation

- Continue following the sequence of the support presentation and introduce the GHS transport pictograms, which follow the background, symbol and colours currently used in the UN Recommendations on the Transport of Dangerous Goods Model Regulations, as per below:

Transport Pictograms

- Flammable Liquid
- Flammable Gas
- Flammable Aerosol

- Flammable Solid
- Self Reactive Substances

- Pyrophorics (Spontaneously Combustible)
- Self Heating Substances

- Substances which in contact with water emit flammable gases (Dangerous when wet)

- Oxidizing Gases
- Oxidizing Liquids
- Oxidizing Solids

- Explosive Divisions 1.1, 1.2, 1.3

- Explosive Division 1.4

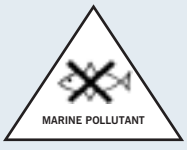
- Explosive Division 1.5

- Explosive Division 1.6

- Compressed Gases

- Acute Toxicity (Poison): Oral, Dermal, Inhalation

- Corrosive



- Marine Pollutant

- Organic Peroxides

	• Go through the support presentation and engage participants into identifying some of the labels and symbols being presented. You can engage participants by asking whether:
	  • a specific label is common in the chemicals being handled in their companies;
	  • they know what a specific label means;
	  • participants to give examples of chemical products that carry a specific type of label;
	• Finalize the presentation with a quick review of labels and their meanings, and then move onto the group exercise below.

Suggested approach to the Group exercise	• Go through the support exercise provided (Group Exercise – Hazard Identification) (Note: this exercise does not require the support of the mock case-study)
	• The aim of this exercise is to make participants familiar with the necessary labels used in the EU, and with the ones according to the GHS.
	• Depending on the numbers of participants you may wish to divide them in small groups.
	• The exercise is divided in 3 parts:
	  • Equation of dangers with the EU danger symbols
	  • Equation of GHS symbols with hazard classes
	  • Equation of GHS transport pictograms with the respective hazard classes
	• Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations with distinct activities. In addition, this will foster participants' understanding of the requirements of other stakeholders in the chemical industry value chain.
	• **Give participants 15 minutes to go through the following activities of the exercise:**
	  1) Explain to participants that the objective of the first part is to equate dangers with the EU danger symbols. For this exercise you will be giving each group of participants a pack with a list of dangers and a set of symbols for them to equate.
	  2) Explain to participants that the objective of the second part is to equate GHS symbols with hazard classes. For this exercise you will be giving each group of participants a pack with a list of the GHS hazard classes and a set of GHS pictograms for them to equate.
	  3) Explain to participants that the objective of the third and final part of the exercise is to equate GHS transport pictograms with the respective hazard classes. For this exercise you will be giving each group of participants a pack with a list of the hazard classes and a set of GHS transport pictograms for them to equate.
	• Finalize the exercise by showing the correct answers to the 3 parts of the exercise and invite participants to compare their results with the answers. Make sure to save a few minutes to sum up the conclusions on the exercise (highlight most common mistakes, and brief review some of the labels and their meanings).

Assessment of participants	• During the session, ask participants about:
	  • Their understanding and knowledge on the use of labels for identification of chemicals' properties and hazardous chemicals
	  • Their understanding of chemical properties and hazardous chemicals classification
	• After the exercise, groups should be asked to:
	  • Identify most common mistakes on hazard identification
	  • Identify which type of labels they are more familiar with, as related to their experience at work

Other comments	• This session should raise discussion on the use and utility of labelling in warning workers and users of the potential hazards of the chemicals being handled, the necessary precautionary measures (for example, the use of the adequate PPE) and what to do in case of an emergency. • This session should also raise discussion on issues related to participants personal experiences with accidental situations caused by lack of or improper hazard labelling. • Participants should be engaged in identifying and discussing what can done in their companies to improve labelling and hazard identification.
References	• *Read the Label – How to find out if Chemicals are Dangerous*, Health and Safety Executive (HSE) • *Safe Working with Flammable Substances*, Health and Safety Executive (HSE) • European Directive 67/548/EEC on classification, packaging and labelling of dangerous substances in the European Union • *European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)*, UNECE • *Globally Harmonized System of Classification and Labelling of Chemicals (GHS)* ("Purple Book"), UNECE • NFPA 704 Hazard Rating System ANSI/NFPA 704, National Fire Protection Association (NFPA) • *Chemical Safety Training Modules* (Part II: Identification, Classification and Labelling of Chemicals), IPCS International Programme on Chemical Safety • *Safety and Health in the Use of Chemicals at Work – A Training Manual*, IPCS International Programme on Chemical Safety • *Training Handbook on Classification of Dangerous Goods and Dangerous Substances*, GTZ Thai-German Dangerous Goods Project • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises – Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	6 PROCESS AND CHEMICALS FLOW
Background	• In order for participants to be able to identify the hazards and risks related to the chemical processes, products and activities being promoted by their companies, they need to follow a systematic step-by-step approach towards understanding the process flows of their companies' operations.
Objectives	• To help participants understand where hazardous chemicals are used and located within their operations, taking into account external operations that their companies can influence, including procurement of products and services, and transport and delivery of products to customers.

Minimum duration	• 1 hour
	  • 20 minutes on process flow mapping (meaning both the sequence of activities companies undertake internally, and the external activities they can influence, ranging from the products and services they procure, to the products and services that they directly provide to customer).
	  • 40 minutes on Group exercise: Preparation of a Process Flow Diagram.

Contents	• PPT presentation on Mapping the Process Flow, including:
	  • Definition and discussion of process boundaries
	  • Identification, listing and sequencing of steps and activities in the process flow, including activities undertaken by direct suppliers of hazardous chemicals, in the transportation and use of chemical products, by-products and waste materials
	• PPT presentation and hand-out to support group exercise on preparation of a Process Flow Diagram.

Suggested approach	• Follow the presentation provided for the session on Process and Chemicals Flow. • Present to the participants the definition of Process Flow as provided in the RP Toolkit, emphasizing that it covers both the sequence of activities being undertaken at a company, and the external activities that the same company can influence, ranging from the products and services procured, to the products and services the company provides. • At this point, you should encourage participants to discuss and comment of the boundaries of a process under this definition. Make sure to explain to participants that the point here is to make an effort to trace services and raw materials upstream, and products and services downstream, in order to gain a fuller knowledge of chemical hazards and risks along the value chain. Even if a company will not always be able to totally influence the activities identified upstream and downstream. • Point out to participants that some of the activities being undertaken along the value chain may influence their companies, even if they have limited or no influence over it, such as in the case of misuse of one of their companies' products.

	• Sum up the discussion on process boundaries by revisiting the concept of "chemical product stewardship" (presented on Session 2 Responsible Production) as the practice of making health, safety and environmental protection an integral part of the life cycle of chemical products (ICCA Product Stewardship Guidelines, 2007)
	• Explain to participants that moving towards chemical product stewardship requires understanding the entire flow of hazardous chemicals – from the procurement of raw materials to the disposal of wastes by end users. As a first step, companies need to fully understand where hazardous chemicals are used and located within their operations. Afterwards, companies need to take into account external operations that they can influence, including procurement of products and services, and transport and delivery of products to customers.
	• Promote interaction and ask participants to join you in brainstorming what can be the key functions in a chemical company that can influence the way hazardous chemicals are procured, handled, stored, used, processed, and transported.
	• For this, you will probably need a flip-chart to list participant's inputs. A comprehensive list should include at least the following key functions:
	  • Procurement
	  • Reception and unloading
	  • Warehousing
	  • Packing / repacking
	  • Formulation
	  • Production
	  • Laboratory
	  • Maintenance
	  • Office
	  • Sales / commercial
	  • Shipping / loading
	  • Transport / Distribution
	• Continue the brainstorming exercise and invite participants to join you in identifying all the key links that may be present in a chemical company value chain. A comprehensive brainstorming exercise should lead to the identification of at least the following links:
	  • Large scale producers
	  • Small scale producers (processing, repackaging, formulation, etc.)
	  • Importers
	  • Exporters
	  • Traders and distributors
	  • Transporters
	  • End users (ranging from industrial to the public)
	  NOTE: do not arrange these in any specific sequence. Rather, when you finish, ask participants for their input by joining you in mapping the local chemical industry value chain, and rearranging the list above into a logical sequence, based on the experience of the participants.

	• Participants now should have at least some basic idea of:
	  • The flexibility of "process" boundaries, under a framework of product stewardship.
	  • What the key functions are in their own companies that can influence the way hazardous chemicals are procured, handled, stored, used, processed, and transported.
	  • The local / regional / national chemical industry value chain.
	  • What functions in their own companies may provide them with the necessary information for developing a process flow diagram.

Suggested approach to the Group exercise	• Finally, go through the support exercise provided (Group Exercise – Preparation of a Process Flow Diagram)
	(Note: this exercise does not require the support of the mock case-study. Nonetheless, the mock case study includes enough information to be used as support if needed. The exercise below is described for the situation where participants will have enough knowledge of their companies operations or will be bringing enough information from their companies to allow them to use it in the exercise.)
	• The aim of this exercise is to make participants familiar with the necessary steps towards preparing a Process Flow Diagram, as per the related tool being provided in the Responsible Production Toolkit.
	• Depending on the numbers of participants you may wish to divide them in small groups.
	• Explain to participants that the objective is to clearly map the chemical flow in their companies operations, taking into account not only the sequence of activities undertaken at their company, but also the external activities that their companies can influence (ranging from the products and services procured, to the products and services being provided / marketed). (Optionally, refer to the information included in the mock case-study, as referred to above.)
	• Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group are coming from different organizations with distinct activities, as many companies will most certainly share some common organizational functions. In addition, the contrast with the way other companies are organized and conduct their activities will foster participants a better understanding of the chemical industry value chain.
	• **Give participants 15 minutes to go through the following activities of the exercise:**
	  1) Based on the information provided in this session, ask participants to list where the chemical raw materials used at their companies come from, what they are, and how they get to the company site.
	  2) Ask participants to list where their chemical products and services are being delivered to and for what purposes.
	  3) Ask them to list all of the steps and activities and arrange them in a sequence. Tell participants to make sure to include activities undertaken by direct suppliers, in the transportation of their chemical products, by-products and waste materials, and in their use by customers.

	4) When all activities have been listed, participants should draw arrows to show the flow of chemicals and activities. 5) Finally, participants should try to identify and mark in each step of their process flow diagram the following information: i) The chemicals involved ii) An estimate of the quantities of the chemicals usually involved or present for this activity. iii) The hazards associated with the chemicals and the activity - such as the likelihood of fire, explosion, corrosion, acute toxicity, skin or eye irritation and other health hazards, and damage to the environment. By doing this, participants should have a first feel of the "hazard hotspots" in the process flow, and mark them. • Ask each group to select one member to briefly describe his company's chemical flow – depending of the number of groups you will have to manage the remaining 25 minutes of the session. Make sure to leave some minutes to sum-up the main common issues identified, and to add or make amendments to the functions list and the chemical value chain map you produced before the exercise. • This exercise should raise attention to the "dark spots" or less known steps in the processes being discussed within the groups. • This session should also raise discussion between groups on issues related to participants personal experiences in finding in-house information on quantities and storage conditions of hazardous chemicals, along with information on the final destination of chemical products, by-products, and wastes.
Assessment of participants	• During the session, ask participants: • About their knowledge on the hazardous chemicals being managed or handled by their suppliers, contractors and transporters when doing business with their companies. • If they are fully familiar with the process flow in their companies. • If they know where their companies chemicals (products, by-products, and wastes) are being transported to, and their final use.
Other comments	• This session should raise discussion on issues related to participants personal experiences with the performance of their business partners (suppliers, contractors, transporters, customers, etc) in handling hazardous chemicals. • Participants should be engaged in identifying and discussing what can be the key functions in their own companies that: • can influence the way hazardous chemicals are procured, handled, stored, used, processed, and transported. • can provide them with the necessary information for developing a process flow diagram. • Participants should be encouraged to explore and discuss the barriers and opportunities for accessing information on their business partners' practices in handling hazardous chemicals. • This session relates to Tool 1.1 – Prepare a process flow chart / diagram (from the Responsible Production Toolkit.).

References	• *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises - Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	7 CHEMICAL INVENTORYING
Background	• Establishing an inventory of hazardous chemicals allows for a better understanding of where some of the main chemical hazards are located, providing also a first opportunity for identifying risk reduction actions through stock control and storage practices.
Objectives	• To build capacity of participants in the development of a chemical inventory for systematic identification of all chemical substances that are stored, handled and used at their companies, integrating information on quantities, type of storage, and hazard classification.

Minimum duration	• 1 hour
	  • 30 minutes presentation on chemical inventorying.
	  • 30 minutes of group exercise: preparation of a chemical inventory.

Contents	• PPT presentation on chemical inventorying, including:
	  • Benefits of chemical inventorying
	  • Review of potential sources of information on quantities, characteristics and location of chemicals stored and used at site
	  • Minimum information to include in a chemical inventory
	  • Format and design of a useful chemical inventory
	• PPT presentation and hand-out to support group exercise on preparation of a chemical inventory

Suggested approach	• Follow the presentation provided for the session on chemical inventorying
	• Present to participants the benefits of having an updated chemical inventory, highlighting that systematical chemical inventorying allows for:
	  • Identification of redundant products
	  • Identification of unknown substances, which can then be used before they expire, or can be properly disposed of
	  • Reducing losses due to the expiry of stored substances
	  • Checking the present state of the materials' packaging ((if in good condition, damaged, wet, leaking, etc.)
	  • Enhancing competitiveness by becoming aware of the use of banned or restricted chemicals that customers in international markets will not accept
	  • Avoiding rejection of products because of failure to meet certain buyer requirements (which often specify chemicals that can not be used)
	  • Identification of other possibilities of procuring products in less hazardous forms (e.g. granular forms are less hazardous than fine powders)
	  • Identification of other possibilities of procuring chemicals or formulations with higher boiling points (a substance with a higher boiling point is less volatile than one with a lower boiling point; but avoid substituting chemicals that, although less volatile, have a higher hazard rating)

	• An opportunity to investigate what kind of substitutes are available for particularly hazardous substances • Avoiding accidents, fires, and explosions from incompatible materials stored together or mixed inappropriately • Continue following the presentation and invite participants to join you in a brain-storming exercise on identification of potential sources of information on quantities, characteristics and location of chemicals stored and used at site, that they would need to gather in order to develop a chemical inventory in their companies. • For this, you will probably need a flip-chart to list participant's inputs. A comprehensive list should include at least the following sources of information for developing a chemical inventory: • Purchasing records • Stock control records • Inventories • Suppliers product information • Sales records • Most certainly, the brainstorming exercise will lead to the conclusion that the record listed above will not always be accurately enough or cover all the chemicals and their current quantities stored at site. • Continue following the support presentation and explain to participants the benefits of complementing information taken out of records by conducting a walk-through the company to identify all the places where chemicals are being used and stored. For this, it is useful to follow a Process Flow Diagram such as the one developed through the methodology presented on session 6 Process and Chemicals Flow, and to mark information on a site plan (this site plan will feed into a Hazards Hotspots Map that will be developed through applying the tool presented in session 2.9 Hazard Mapping) • Move onto describing to participants what the minimum information to include in a chemical inventory should be. Make sure to refer to the need for the chemical inventory to indicate the following elements for each chemical substance: • The chemical name, trade name / CAS number • Where it can be found, stored and / or used • Amount in use • R-Phrases / GHS classification • The MSDS availability in the company, in the language of the workforce • Notes about handling, use, storage, disposal conditions, etc. • Whether the chemical is an individual substances or mixtures (formulations) • Whether it is released as vapours during the handling of formulations or products • If it is generated during work activities (e.g. dust, fumes from welding) • Whether it is used as an auxiliary (e.g. fats, liquors, dyes, paints, adhesives) • Whether it is used for other purposes other than process, such as cleaning workplaces and maintaining machinery (e.g. detergents, disinfectants, solvents, greases, fuels) • Whether it is found in final products

	• Finish the presentation by showing a possible format of a chemical inventory table.
Suggested approach to the Group exercise	• Go through the support exercise provided (Group Exercise – preparation of a chemical inventory). (Note: this exercise does not require the support of the mock case-study. Nonetheless, the mock case study includes enough information to be used as support if needed. The exercise below is described for the situation where participants will be bringing enough information from their companies to allow them to use it in the exercise.) • The aim of this exercise is to make participants familiar with the necessary steps towards preparing a Chemical Inventory, as per the related tool provided in the Responsible Production Toolkit. • Depending on the numbers of participants you may wish to divide them in small groups. • Explain to participants that the objective is to develop a chemical inventory for their companies operations, taking into account the information they have gathered on the chemicals being handled, stored and used in their companies (names, quantities, hazard classification, etc.). Optionally, refer to the information included in the mock case-study, as referred to above. • Criteria for forming groups should be similar processes or activities between participants' companies. None the less, it is not a problem if participants in the same group are coming from different organizations with distinct activities, as many companies will most certainly be handling some similar chemicals. In addition, the contrast with the way other companies manage their inventories and have access to information on the chemical products they handle will provide opportunities for sharing lessons learnt and best practice cases among participants • **Give participants 20 minutes to go through the following activities of the exercise:** 1) Based on the information provided in this session, ask participants to list the information they been able to collect before the course by accessing purchasing records, stock control cards, inventories, suppliers product information, etc. 2) Ask participants to list all chemical substances in an inventory. Tell them to follow the Process Flow Diagram they have prepared in session 6 and begin with one department or process step and proceed on a step-by-step basis until they have a complete inventory for your whole operation onsite. 3) For this, participants should use a table in a format similar to the one included in the presentation. It will not be necessary to follow a special format if participants are sure to include all the elements listed above, and highlighted during the presentation. • This exercise should raise discussion between groups on issues related to participants' personal experiences in finding in-house information on quantities and storage conditions of hazardous chemicals. • Ask each group to select one member to briefly describe his experience on the barriers and opportunities for accessing the information needed in order to develop a chemical inventory.

Assessment of participants	• During the session, ask participants about their knowledge of:
	  • the quantities of hazardous chemicals being procured, stored, and used / handled at their companies.
	  • the locations and general storage conditions of hazardous chemicals at their companies.
	• During the exercise, groups should be asked to:
	  • List the types of chemicals being supplied to their companies.
	  • Identify the locations / process steps where hazardous chemicals can usually be found in their companies (direct participants to the Process Flow Diagram they have developed in session 6).
	  • Identify the locations / process steps where hazardous chemicals can usually be found in their companies, but are not actually needed.
	  • List the most relevant functions in their organization (for example, laboratory management, procurement, warehousing, maintenance, production, expedition, sales, customer relations, etc) where information can be found on the quantities and characteristics of hazardous chemicals being used in the company.

Other comments	• Participants should be engaged in identifying and discussing what can be the key functions in their own companies to provide them with the necessary information for developing a chemical inventory. • Participants should be encouraged to explore and discuss the barriers and opportunities for accessing the information needed to develop a chemical inventory. • This session relates to the Tool 1.2 – Chemical Inventory and Hazard Classification (from the Responsible Production Toolkit).
References	• *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AcccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises - Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	**8 RISK ANALYSIS, HAZARD PRIORITIZATION AND IDENTIFICATION OF RISK REDUCTION ACTIONS**
Background	• Risk analysis is an important process for protecting workers and company assets, allowing resources to be focused on the risks that really matter. • A risk analysis is simply a careful examination of what could cause harm to people at work, so that one can weigh up whether enough precautions have been taken or there is more to be done to prevent harm to workers and communities. • Outputs of a risk analysis should allow for prioritizing hazards leading to a preliminary identification of actions for risk reduction.
Objectives	• To provide participants with a knowledge base on preliminary risk analysis under the Responsible Production approach. • To build participants' capacity for the identification of risk reduction actions.

Minimum duration	• 1 hour and 30 minutes
	  • 45 minutes presentation on risk analysis
	  • 15 minutes presentation on identification of possible actions for risk reduction
	  • 30 minutes on group exercise: Risk Analysis and Prioritization of Hazards

Contents	• PPT presentation on risk analysis, including:
	  • Review of the concepts of 'Hazard' and 'Risk'
	  • What a risk analysis is, and what it is for
	  • Creation of a risk analysis team
	  • Preliminary risk analysis
	  • Preliminary risk analysis - definition of concepts such as:
	  1) Risk object
	  2) Hazard
	  3) Threatened object
	  4) Probability
	  5) Consequences
	  6) Risk
	  • Prioritizing hazards and risk by use of a Risk Matrix
	  • Identification of risk reduction actions
	• PPT presentation and hand-out to support group exercise on preliminary risk analysis and prioritization of risk reduction actions.

Suggested approach	• Follow the presentation provided for the session on Risk Analysis, Hazard Prioritization and Identification of Risk Reduction Actions. • Review the definitions of Hazard and Risk, as presented on Session 2.3 Chemical Hazards at Work.

	• Continue the presentation by introducing participants to the following definitions of risk analysis:
	  • "Risk analysis is the utilization or processing of available information in order to identifier dangerous phenomena or hazards, and to assess risk."
	  • "Risk analysis is the systematic identification and evaluation of risk objects and hazards."
	• Engage participants in discussion by inviting them to join you in a brainstorming exercise on the reasons for undertaking a risk analysis. Ask them:
	  • "Why should a company undertake a risk analysis?"
	• For this, you will probably need a flip-chart to list participant's inputs. A comprehensive list should include at least the following possible reasons for undertaking a risk analysis:
	  • To better understand the risks workers are subject to in the situation of an accident (e.g. chemical spill; fire; explosion; etc.) involving hazardous chemicals;
	  • To better understand the social and community risks posed by the hazardous chemicals the company is handling (e.g. likelihood of impacts on community, social and transport infrastructures in the case of an accident involving hazardous chemicals).
	  • To better understand the economic risks that may be related to an accident (e.g. chemical spill; fire; explosion; etc.) involving the hazardous chemicals being handled by the company.
	  • Tto better understand the environmental risks that may be related to an accident (e.g. chemical spill; fire; explosion; etc.) involving the hazardous chemicals being handled by the company (impacts on air quality, sources of drinking water, sources of water used for agricultural and recreational purposes, fisheries, natural protected areas, etc.).
	  • To better understand the environmental risks from mishandling (not necessarily an accident situation) of hazardous chemicals (poisoning of surface water and groundwater, soil contamination, etc.).
	• Introduce participants to the benefits of having a risk analysis team or working group.
	• Explain to participants that identification and understanding of the relationship between chemical hazards and the potential impacts of an accident onsite, the community, business partners, clients, and the environment is not a one man task.
	• For undertaking a successful risk analysis:
	  • Companies should involve staff and services with expertise or with daily contact with potential sources of industrial hazards / accidents.
	  • Companies might need external input such as supervision by independent experts.
	• Emphasize to participants that risk analysis is an opportunity for mutual information of participants and should be conducted as group work to enhance understanding of the process. Engaging representatives from relevant stakeholders can also be extremely helpful, particularly in subsequent iterations of the analysis.
	• Continue following the support presentation and introduce participants to the Preliminary Risk Analysis methodology.

- Explain to participants that this methodology:
  - Is frequently used for risk identification in the early stages (ie design) of a project process.
  - Can also be used in the case of a complex industrial system, offering a "preliminary" approach (to be further detailed by using complementary methods / tools).
  - Requires few exact / specific knowledge of the industrial system and consequently, does not require an extensive knowledge of the equipment / installation studied.
- Preliminary Risk Analysis (PRA) first requires identification of elements that are potential sources of threat. At the level of the companies participating in this training session, that means the main Hazard Hotspots.
- Based on this identification, the PRA approach seeks to identify situations whereby the occurrence of one hazard or more generates a threat for exposed assets.
- Steps of the PRA approach are as follows:
  - Identification of dangerous situations on the basis of:
    1) existing knowledge of industrial hazards
    2) properties of chemicals used
    3) description of functions of the industrial system
    4) past accidents, etc
  - Identification of the causes and consequences of each dangerous situation.
  - Assessment of hazard and risk in terms of gravity (seriousness) and frequency.
  - Identification of the safety barriers: existing ones and requested ones.
- Continue following the support presentation and discuss with participants the factors of interest and the drawbacks in the application of the PRA methodology, as per below:
  - Factors of Interest
    1) Fast identification of major risks.
    2) Preliminary phase before implementation of other methodologies for finer risk analysis.
  - Drawbacks
    1) Difficult definition of what a dangerous situation is.
    2) Theoretical impossibility to combine failures of industrial systems.
    3) Granularity (scale of analysis and level of detail) is too broad to allow for analysis of accidental factors / causes.
- The PRA approach is fit for systems with low complexity or for a broader analysis
- Before presenting an example of a PRA to participants, go through the following definitions:
  - Risk object – a facility containing one or more hazards.
  - Hazard – a threat which could cause an accident.
  - Threatened object – people, environmental objects or property which are at risk from an accident due to a risk object in the vicinity.
  - Probability – expected scale of events (accidents) within a certain period of time
  - Consequences – the results of an accident, expressed in quantitative or qualitative terms (severity / intensity).
  - Risk – the probability of an accident occurring within a certain time, together with the consequences for people, property and the environment.

	• Follow the presentation to explain how hazards and risks can be prioritized by use of a risk matrix.
	• Present the example of a PRA (included in the support presentation).
	• Move onto to the final part of the presentation on identification of risk reduction actions.
	• Risk reduction actions aim to prevent and reduce risks posed by the hazards that were prioritized by using tools such as the PRA approach above.
	• Lead participants through the following 3-step sequence provided in the Responsible Production Toolkit for identifying actions for risk reduction:
	  • STEP 1: REVIEW THE HAZARDS IDENTIFIED
	  Review the list of hazards and hazard hotspots identified and the risks prioritized.
	  • STEP 2: IDENTIFYING PREVENTATIVE MEASURES
	  Discussion with workers, supervisors, business partners and other external stakeholders (where appropriate) for identification of possible preventive actions.
	  • STEP 3: CHECKING OPPORTUNITIES FOR IMMEDIATE RISK REDUCTION ACTIONS
	  Review the process flow chart for identification of steps where actions for risk reduction can be implemented.
	• Conclude the presentation by discussing with participants the following opportunities for reducing risk:
	  • Eliminating hazards (by minimizing or avoiding toxic, flammable and explosive substances; eliminating or replacing chemicals with less hazardous ones; etc.)
	  • Enclosure or isolation of hazards (enclosing equipment and providing secondary containment; separating hazardous processes and hotspots from other processes, areas and ignition sources; segregating packages and containers in accordance with applicable segregation requirements both in storage and in transport; ensuring adequate and safe storage of hazardous chemicals; reducing losses of chemicals during operations; restricting the amounts of chemicals kept in certain areas).
	  • If applicable , ventilation of areas where the hazards are located (provision of general and local ventilation to remove or reduce concentrations of hazardous fumes, gases, vapours and mists).
	  • Improvement of housekeeping measures and disposal routines.
	  • Promoting the use of personal protection equipment.
	  • Raising awareness to hazards and risks (informing workers about hazards and properties of hazardous chemicals; making available MSDS, first aid procedures and other informational materials on chemical safety in the language of the workforce).
	  • Also pay attention to opportunities for avoiding the proximity of the threatened objects (people, environment, and property) you identified when applying Tool 1.3 in Section 1.
	  • Keeping non-authorized personnel away from hazards hotspots (improving awareness of hazards and risks; using hazard symbols, labels and warning signs; locking areas of restricted access).

	• Preventing public access to hazardous chemicals storage areas (fencing off / locking storage areas; appointing a responsible person to regularly check storage facilities; making sure that entry into storage areas is only allowed to authorized personnel). • Avoiding trespassing (guard and lock facilities) and implementing emergency alarms. • Re-evaluating routes used for the transport of hazardous chemicals (changing routes whenever possible to avoid driving through or in the vicinity of densely populated areas, schools and hospitals, natural protected areas, heritage areas, etc.). • Whenever applicable, providing police and / or emergency response teams escorts when transporting hazardous chemicals through communities or areas which present maximum risk. • Avoiding shipments of high-risk chemicals during rush hours to reduce accident probability and numbers of people exposed to risk. • Considering temporary restrictions on dangerous goods traffic during hazardous weather conditions: low visibility due to fog, high winds, or slipperiness due to heavy rain, snow or ice.
Suggested approach to the Group exercise	• Go through the support exercise provided (group exercise – risk analysis and prioritization of hazard hotspots). (Note: this exercise does not require the support of the mock case-study. None the less, the mock case study includes enough information to be used as support if needed. The exercise below is described for the situation where participants will be bringing enough information from their companies to allow them to use it in the exercise.) • The aim of this exercise is to make participants familiar with the necessary steps towards identifying health, environmental, social and economic risks, as per the related tool provided in the Responsible Production Toolkit. • Depending on the numbers of participants you may wish to divide them in small groups. • Explain to participants that the objective is to apply an approach similar to the PRA for identifying health, environmental, social and economic risks in their companies operations, taking into account the information they have gathered on the chemicals being handled, stored and used in their companies, the process flow diagrams they have developed during the group exercise on Session 2.6, layout maps, area maps, etc. (Optionally, refer to the information included in the mock case-study, as referred to above) • Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations with distinct activities as many companies will certainly be handling similar chemicals. In addition, if participating companies are located in the same area or industrial park, they will also be sharing similar threats and risks.

	• **Give participants 20 minutes to go through the following activities of the exercise:** 1) Based on the information provided in this session, ask participants to go back to the process flow diagram and the hazard hotspots they preliminarily identified. 2) Ask them to pay particular attention to areas or process steps where their companies may be storing or handling large quantities of hazardous chemicals, and to pose them selves the following questions: i) Are very toxic chemicals present? ii) Are fertilizers, herbicides and pesticides being stored or handled? iii) Are there any storage areas of waste chemical solutions? iv) Are there any steps or areas involving storage or handling of butane, propane, ammonia, or chlorine? v) Could hazardous chemicals react with other chemicals nearby, or with water in the atmosphere to create other hazardous chemicals? 3) Ask participants to review the hazards hotspots they preliminarily identified in their process flow diagrams, taking into account the above hints. 4) Ask participants to move onto identifying risk-prone and vulnerable groups, areas and assets in case of an accident involving chemicals being handled in their companies operations. 5) Explain to participants that this step concerns identifying threatened objects (people, environment, and property) in case of an accident. You can help participants here by asking them to think about and discuss the following questions among each exercise group: i) How many workers are undertaking activities where hazardous chemicals (raw materials, products, wastes) are involved? ii) How many workers are undertaking activities nearby areas where hazardous chemicals are being handled or stored? iii) Are activities taking place in an area of high population density? iv) Are there any hospitals, schools, markets or shopping areas located nearby? v) Are hazardous chemicals being handled, stored, processed or used in or nearby: • …areas prone to flooding? • …agricultural areas? • …areas where drinking water is resourced? • …areas where water used for agricultural or recreational purposes are resourced? • …natural protected areas? 6) After they have identified the possible threatened objects, ask participants to move onto identifying potential accidents related to the hazards hotspots and the threatened objects identified. 7) You can help participants here by telling providing examples of well past accidents that have occurred in the sector (or other sectors). You should also tell to participants to take into account information on past accidents that have occurred at their companies and nearby facilities.

8) Taking into account the types and quantities of hazardous chemicals involved in each of the steps on their process flow diagrams, participants should try to list potential accidents related to the hazards hotspots and threatened objects they have identified.
9) Suggest participants to consider the following types of accidents, and check if any of the hazards they have identified could have the potential to trigger or contribute to events such as:
   i) Containment failures due to corrosion, metal fatigue, creep, embrittlement or poor water management
   ii) Toxic release
   iii) Emission of toxic or irritant gases or fumes
   iv) Emission of expanding toxic and corrosive vapour cloud
   v) Explosions (expanding vapour explosion, chemical explosion, dust cloud explosion)
   vi) Explosion or fire from the handling of inflammable gases in liquid form
   vii) Chemical fire producing harmful gases
   viii) Chemical fire leading to polluted water escaping as a result of attempts to extinguish the fire
   ix) Leakage of hazardous chemicals from storage and process areas, or during transport
10) Now that participants have listed the potential accidents related to the hazards hotspots and threatened objects they have identified, ask them to estimate the severity of the related health, environmental, social and economic impacts
11) For this, participants should take into account:
   i) the quantities and characteristics of the hazardous chemicals involved in the process flow;
   ii) the threatened objects in case of a potential accident; and
   iii) the potential accidents that may occur

   and try to identify what could be the related health, environmental, social and economic impacts – both inside and outside their facilities.
12) Participants should try to assign a "severity" (importance) factor talking into account the scales below (you may wish to adapt the scales taking into account the characteristics of the companies attending the session course and the local context of the group):

Impacts on workers health	1. Negligible (temporary slight discomfort) 2. Limited (injuries resulting in temporary worker absence) 3. Serious (injuries resulting in temporary disablement) 4. Very serious (death or serious injuries resulting in permanent disablement of a worker) 5. Catastrophic (death or serious injuries resulting in permanent disablement of several workers)

	Impacts on community health	1. Negligible (temporary slight discomfort) 2. Limited (injuries resulting in temporary discomfort) 3. Serious (injuries resulting in temporary disablement of a person in the community 4. Very serious (death or serious injuries resulting in permanent disablement of a person in the community) 5. Catastrophic (death or serious injuries resulting in permanent disablement of several persons in the community; community evacuation)
	Impact on land use, agriculture and fisheries	1. Negligible (no contamination, localised effects) 2. Limited (simple contamination, localised effects, natural remediation) 3. Serious (simple contamination, widespread effects with need for simple remediation) 4. Very serious (heavy contamination, localised effects with need for remediation) 5. Catastrophic (very heavy contamination, widespread effects with need for remediation)
	Impact on water resources	
	Impact on quality of air	
	Impact on company image	1. Negligible (small disturbance with no consequences) 2. Limited (disturbance in the affected area of the company, without significant press coverage in the media) 3. Serious (partial evacuation of the company and/or negative press coverage in the local media) 4. Very serious (evacuation of the company and/or negative press coverage in the national media) 5. Catastrophic (evacuation of the community and/or negative press coverage in the international media)
	Impact on site facilities	1. Negligible (< 0.5) 2. Limited (0.5 – 1) 3. Serious (1 – 5) 4. Very serious (5 – 20) 5. Catastrophic (>20) (x 1,000 or M USD, THB, PEN as appropriate and to be adapted to each company)
	Impact on transport infrastructures	
	Impact on community and social infrastructures	

13) Tell participants to move onto to estimating the likelihood of each of the identified accident situations actually taking place. At this step of the exercise, participants will estimate the probability of occurrence of each identified accident situation taking into account the following scale:
    1. Practically impossible (not expected to happen during the lifespan of the operation)
    2. Unlikely (never happened, but could occur, perhaps during the lifespan of the operation)
    3. Rarely (expected to occur at least once every 10 years)
    4. Regularly (expected to occur at least once per year)
    5. Frequently (occurring more than once per year)
14) To conclude the exercise, participants should assign a risk factor to each hazard hotspot. For this they should use the risk matrix below and:
    i) Assign each hazard hotspot a risk factor from 1/1 (lowest) to 5/5 (highest), taking into account the risk matrix
    ii) Repeat this for each activity in the process
    iii) Mark the risk factor on their Process Flow Diagram.

Frequency 5	5/1	5/2	**5/3**	**5/4**	**5/5**
Frequency 4	4/1	4/2	4/3	**4/4**	**4/5**
Frequency 3	3/1	3/2	3/3	3/4	**3/5**
Frequency 2	2/1	2/2	2/3	2/4	2/5
Frequency 1	1/1	1/2	1/3	1/4	1/5
	Severity 1	**Severity 2**	**Severity 3**	**Severity 4**	**Severity 5**

Area where risks are considered unacceptable

Area where risks are critical and require monitoring/control

	15) Finally, participants should prioritize the hazard hotspots they preliminarily identified, taking into the account their assigned risk factors. • This exercise should raise discussion between groups on issues related to participants' personal experiences in finding in-house information for undertaking this type of risk analysis. • Leave the last 10 minutes for short group presentations. • Ask each group to select one member for a short presentation, and to briefly describe his experience on the barriers and opportunities for accessing the information needed to develop this type of risk analysis.

Assessment of participants	• During the session, ask participants:
	  • About their understanding of the potential consequences of accidents at their workplaces taking into account the threatened objects (people, environment, and property) in case of an accident.
	  • If their companies activities take place in areas of high population density, and if there are any hospitals, schools, markets or shopping areas located nearby.
	  • Whether they feel that their companies' workforce has enough perception of the underlying risks posed by the activities it carries out.

Other comments	• This session should foster discussion on the benefits of undertaking risk analysis, and on the adequacy / utility / comprehensiveness of the instructions being provided in the Responsible Production Toolkit for:
	  • identifying risk-prone and vulnerable groups, areas and assets in case of an accident
	  • identifying potential accident scenarios
	  • identify / estimating the severity of health, environmental, social and economic impacts in an accident situation
	  • estimating the likelihood of each of the identified accident situations actually taking place.
	• This session should also raise discussion on the capacity of companies and emergency services in addressing situations like the ones identified in the accident scenarios
	• This session relates to: Tool 1.3 Identify Risk and Tool 3.1 Identify Actions for Risk Reduction (of the Responsible Production Toolkit).

References	• Community Vulnerability Reduction: prevention and preparedness for disaster reduction – APELL training kit for local authorities, Module 3: Risk Assessment (UNEP) • Technical Report #12 *Hazard identification and evaluation in a local community* (UNEP-IE) • *International Chemical Control Toolkit*, International Labour Organization (ILO) • *Five Steps to Risk Assessment*, Health and Safety Executive (HSE) • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises - Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	9 HAZARD MAPPING
Background	• Only by knowing where the main hazard hotspots are located can companies change take decisions and change procedures and processes. Identification and mapping of hazards hotspots allows for a good overview of the most problematic areas and/or process steps to address.
Objectives	• To provide participants with a knowledge base for mapping their companies' hazard hot-spots on a site map.

Minimum duration	• 1 hour and 30 minutes
	  • 30 minutes presentation on hazard mapping
	  • 30 minutes of group exercise: Preparation of a Hazard Hotspots Map
	  • 30 minutes of group presentations on exercise results and discussion

Contents	• PPT presentation on Hazard Mapping, including:
	  • Example of hazard hotspots map
	  • Advantages of hazard mapping
	  • Developing an hazard hotspots map
	• PPT presentation and hand-out to support group exercise on preparation of a hazard hotspots map.

Suggested approach	• Follow the presentation provided for the session on hazard mapping.
	• Present the example map and point to participants:
	  • All hazard hotspots identified on-site and off-site
	  • Threatened objects in case of an accident (people, environment, property, basic infra-structure, etc.)
	• Invite participants to join you in a brainstorming exercise on identifying of the advantages of hazard mapping
	• You will probably need a flip-chart to list participant's inputs. A comprehensive list should include at least the following:
	  • By going through the process of mapping chemical hazards one can identify hazard hotspots that has been overlooked.
	  • Overlapping hazards and potential threatened objects in a single map allows for a better understanding of risk.
	  • Visual aids such as hazard hotspot maps can help to identify opportunities for *onsite* risk reduction through:
	  i) changes in layout
	  ii) identifying priority areas to improve housekeeping
	  iii) identifying areas that should be kept off-limits
	  iv) vulnerable zones where fences/guarding should be improved
	  v) identifying zones where hazard warnings and signalling should be enhanced

	• Visual aids such as hazard hotspot map can help to identify opportunities for *offsite* risk reduction through: i) changes in transport routes ii) changes in transport times iii) identifying areas/target groups to be included in risk communication efforts iv) identification of overlooked risk scenarios to be considered when improving offsite emergency plans • Hazard maps can be used as powerful communication tools for raising awareness to hazards and risks. • Present the sequence being proposed in the Responsible Production Toolkit for mapping hazards hotspots, and move onto to the group exercise.
Suggested approach to the Group exercise	• Go through the support exercise provided (group exercise – Preparation of a Hazard Hotspots map). (Note: this exercise does not require the support of the mock case-study. None the less, the mock case study includes enough information to be used as support if needed. The exercise below is described for the situation where participants will be bringing enough information from their companies to allow them to use it in the exercise, like layout maps, area maps, etc). • The aim of this exercise is to make participants familiar with the necessary steps towards preparing a Hazard Hotspots map, as per the related tool being provided in the Responsible Production Toolkit and CD. • Depending on the numbers of participants you may wish to divide them in small groups. • Explain participants that the objective is to develop a Hazard Hotspots map for their companies operations, taking into account the information they have gathered on the chemicals being handled, stored and used in their companies (names, quantities, hazard classification, etc.), layout maps, area maps, and process diagrams. Optionally, refer to the information included in the mock case-study, as referred to above. • Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations with distinct layouts, as many companies will most certainly be organized in such a way as to include common elements such as loading/unloading areas, warehouses, process areas, laboratories, etc. In addition, the contrast with the way other sites are organized will provide opportunities for sharing lessons learnt and best practices among participants. • **Give participants 30 minutes to go through the following activities of the exercise:** 1) Based on the information provided in this session, ask participants to draw a simple ground plan of their company or use an existing company floor plan. 2) Ask them to mark the main areas and departments. 3) Participants should then locate on the map each internal activity in the process along with its associated chemicals, and assigned risk factor (risk factor should have been assigned in the session on risk analysis).

	4) Participants should now mark on the map all the locations where chemical substances are used, stored and transported. 5) Finally, they should identify the hazard 'hot spots'. 6) Encourage now participants to continue the exercise by focusing on mapping off-site hazard hotspots. 7) Participants should start mapping their off-site hazard hotspots by identifying and marking the location of their company on a plan of the region. 8) They should then identify the routes used by suppliers for delivering chemicals at their sites. 9) In a similar way, they should identify on the plan the routes used to transport chemical products, by-products, or waste materials generated at their companies to their final destinations (end-use/recycling/disposal). 10) Participants should then move onto locating in the plan each external activity in the process along with its associated risk factor. 11) Encourage participants to check if they have marked on the plan all the steps involving the transport of the chemical products, by-products, or waste materials generated in their companies to their final destinations (end-use / recycling / disposal). 12) Finally, they should identify the hazard 'hot spots' related to activities taking place off-site. • Save the last 30 minutes of the session for group presentations, and encourage discussion on possible risk reduction actions to be implemented on-site and off-site

Assessment of participants	• During the session, ask participants:
	  • about their knowledge on the main hazard areas in their companies.
	  • about their perception on workers knowledge on the main hazard areas in their companies.
	  • about their knowledge on the main hazard areas in the transport of their companies chemicals supplies and products.
	  • about their perception on the knowledge of drivers/transporters on the main hazard areas crossed in the transport of their companies chemicals supplies and products.
	  • to identify main barriers in improving layouts for improved hazard control at their companies.
	• During the exercise, encourage groups to present suggestions for improvement of the sequence proposed for the development of an hazard hotspots map.

Other comments	• This session should raise discussion on the use and utility of developing hazard hotspots maps in order to identify areas of concern and actions for risk reduction. • This session should raise discussion on practical ways to improve layouts, house-keeping, warehousing and hazard communication onsite towards risk reduction. • This session should also raise discussion on practical ways to improve the safety of transport operations, risk communication and emergency plans for reducing risks offsite. • This session relates to Tool 1.4 – Hazard Hotspots Map (from the Responsible Production Toolkit).

References	• *Chemical Safety Training Modules* (Part II: Identification, Classification and Labelling of Chemicals), IPCS International Programme on Chemical Safety • *Safety and Health in the Use of Chemicals at Work – A Training Manual*, IPCS International Programme on Chemical Safety • *Training Handbook on Classification of Dangerous Goods and Dangerous Substances,* GTZ Thai-German Dangerous Goods Project • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises - Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	10 STAKEHOLDERS IDENTIFICATION AND ENGAGEMENT
Background	• A first step towards fostering chemical safety management and risk information among a company's business partners and other stakeholders is identifying who these stakeholders are and establishing the best ways to engage them. • Stakeholders are relevant when they may be affected by what you do or when they can affect you. You must be able to distinguish between those stakeholders who are relevant from those who are not. You must also be able to understand the relative importance of relevant stakeholders. It is important to identify who the stakeholders are, whether they are relevant, and how best to engage them.
Objectives	• To provide participants with an understanding on the tools available in the Responsible Production Toolkit to identify and map stakeholders along the value chain and to decide on the best way to engage them to promote improved chemical safety and risk management.

Minimum duration	• 1 hour
	  • 30 minutes presentation on Stakeholder Identification and Engagement
	  • 30 minutes of group exercise: preparation of a list of stakeholders.

Contents	• PPT presentation on stakeholder identification and engagement, including:
	  • Definition of relevant stakeholders
	  • Identifying stakeholders
	  • Profiling stakeholders
	  • Engaging stakeholders
	• PPT presentation and hand-out to support group exercise on preparation of a list of (relevant) stakeholders.

Suggested approach	• Follow the presentation provided for the session on stakeholder identification and engagement.
	• Introduce the concept of "relevant stakeholders". To a company, relevant stakeholders are those who affect or are affected by the company, for example, those who:
	  • work for the company
	  • may have an interest on the company's activities or products
	  • may see their livelihoods or health affected by the company's activities
	  • are handling the chemical products being produced by the company
	  • provide services or supply raw materials to the company
	  • are responsible for licensing, regulating, or inspecting operations undertaken by the company
	  • as organizations are competing in the same market of the company
	  • represent community groups located in the vicinity of the company.

	• Invite participants to join you in a brainstorming exercise on the identification of relevant stakeholders, taking into account the following identification criteria. Relevant stakeholders are the ones that can:
	  • Influence how companies run their business;
	  • Influence what a company can do and how it does it;
	  • Have an influence on the success of the company as a business;
	  • Have significant impact on the success of a company as a business.
	• For this, you will probably need a flip-chart to list participant's inputs. A comprehensive list should include at least the following typical stakeholders:
	  • Suppliers
	  • Buyers
	  • Employees and employees representatives
	  • Contractors
	  • Transporters
	  • Customers
	  • Competitors
	  • Neighbouring industries
	  • Partners/joint ventures
	  • Industrial associations
	  • Local and regional authorities
	  • Government
	  • Community groups
	  • Non-Governmental Organizations (NGOs)
	  • Academic institutions
	• Continue following the support presentation and present the methods for stakeholder engagement proposed in the Responsible Production Toolkit.

Suggested approach to the Group exercise	• Go through the support exercise provided (group exercise – preparation of a list of stakeholders) Note: this exercise does not require the support of the mock case-study. Nonetheless, the mock case study includes enough information to be used as support if needed. • The aim of this exercise is to make participants familiar with the necessary steps towards preparing a list of stakeholders, as per the related tool provided in the Responsible Production Toolkit (Tool 2.1 Map Stakeholders). • Depending on the numbers of participants you may wish to divide them in small groups. • Explain participants that the objective is to develop a List of (relevant) Stakeholders, considering the brainstorming exercise on identification of relevant stakeholders that was carried out during the presentation. (Optionally, refer to the information included in the mock case-study, as referred to above.)

- Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations, as many companies will most certainly have similar types of relevant stakeholders such as those identified during the brainstorming exercise.
- **Give participants 15 minutes to go through the following activities of the exercise:**
  1) Based on the information provided in this session, participants should be able to identify the stakeholders that are relevant to their company's operations, that can affect or be affected by the way that their companies run their business, and that will be concerned about or potentially exposed to the chemical hazards and risks related to the company's products and/or activities.
  2) Ask participants to list all their stakeholders, taking into account the various organizations, institutions and groups of people their companies already engage with when doing business (suppliers, buyers, employees, contractors, partners, transporters, etc.), as well as local and governmental authorities, local community groups, local emergency response providers, NGOs, investors, etc.
  3) Participants should also take into account that some of their company's stakeholders will include people that are not usually engaged with, but that have a stake in the company's performance on chemical safety, as they may:
     - Be potentially exposed to the chemical hazards and risks related to the company's operations, products and activities;
     - Have their social and cultural infrastructures and amenities (roads, educational and religious centres, markets, etc) affected by an accident associated to the company's operations, products and activities;
     - Have their jobs and livelihoods (including agricultural land, fisheries and livestock) affected by an accident associated to the company's operations, products and activities.
  4) After they have listed all their stakeholders, ask participants to evaluate their relevance.
  5) For this participants should use the following ranking, as per the related tool in the Responsible Production Toolkit:
     1 = they can influence how companies run their business
     2 = they can influence what a company can do and how it does it
     3 = they can have an influence on the success of the company as a business
     4 = they can have significant impact on the success of a company as a business
  6) Finally, ask participants to rearrange their lists of stakeholders by priority / importance.
  7) Participants should be encouraged to conclude the exercise by trying to identify who are the representatives of the stakeholders they have listed, as these should probably be the focal points for any engagement effort.
- Save the last 15 minutes of the session for a short self-assessment, encouraging participants to compare their lists of relevant stakeholders with the flip-chart you produce during the brainstorming exercise, and by inviting them to answer questions like:
  Within the company:
  - Have you identified your employees and employee representatives (e.g. unions)?
  - Have you identified your shareholders?

	Along the supply-chain: • Have you identified all your suppliers of hazardous chemicals? • Have you identified the organization that is handling your chemical and package waste? • Have you identified your supplier of packages? • Are you storing diesel at site? If so, have you also identified the company that supplies you with diesel? • Have you identified as relevant stakeholders the companies that you are subcontracting for maintenance services (permanent and periodical)? • Are you using transport services to transport your products? What other companies are transporting their products alongside your products? *Within a wider perspective to stakeholder identification have you indentified:* • Your immediate neighbours? • Yout local authorities? • The relevant regulating and inspection authorities? • All those who have a financial stake in the company? • Those stakeholders who are dependent on you? • Those stakeholders on whom you are dependent? • Those who are trying to influence changes in legal requirements? • Those who represent peer and societal norms?
Assessment of participants	• During the session, ask participants: • If they are aware of the full range of organizations / entities / social groups that use the chemical products they produce / handle / market. • About the chemical hazards and risks related to their suppliers. • About the chemical hazards and risks related to their contractors. • About the chemical hazards and risks related to customers who use their products / services. • About their stakeholders' knowledge of the chemical hazards and risks posed by products and operations their companies develop. • If the communities neighbouring their installations know of the chemical hazards and risks posed in their operations.
Other comments	• This session should raise discussion on the use of understanding who the relevant stakeholders in a company are. • This session should raise discussion on current stakeholder engagement practice at the participant's companies. • This session should create discussion on practical ways to improve knowledge of the importance/relevance of stakeholders to the continuity of operations and success. • This session relates to: Tool 2.1 Map Stakeholders, Tool 2.2 Profile Stakeholders, Tool 2.3 Select the Engagement Method (from the Responsible Production Toolkit).

References	• *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *The Stakeholder Engagement Manual*, United Nations Environment Programme (UNEP) and AccountAbility • *AA1000 Stakeholder Engagement Standards*, AccountAbility

Session title	11 CHEMICAL CONTROL ACTION PLANS
Background	• Hazardous chemical management is never achieved without planning for systematization of risk reduction actions, responsibilities, timelines and resources. • 'Chemical Control Action Plans' establish the management basis for implementing measures, making improvements, and evaluating results.
Objectives	• To provide participants with a knowledge base for developing systematic chemical control action plan(s) with clear responsibilities and deadlines for implementation.

Minimum duration	• 1 hour
	  • 30 minutes presentation on planning for systematization of risk reduction actions, responsibilities, timelines and resources.
	  • 30 minutes of group exercise: preparation of a Chemical Control Action Plan.

Contents	• PPT presentation on chemical control action plans, including:
	  • What a chemical control action plan is, and what it is for
	  • Reasons for planning
	  • Developing a Plan
	  i) Identifying risk reduction actions
	  ii) Prioritizing actions, budgeting and setting objectives and targets
	  iii) Assigning responsibilities, timelines and resources
	  iv) Reviewing the plan for consistency and effectiveness
	  v) Getting top management endorsement
	  vi) Follow-up and managing the plan
	• Hand-out to support group exercise on preparation of chemical control action plans.

Suggested approach	• Follow the presentation provided for the session on chemical control action plans.
	• Explain to participants what a chemical control action plan is and what it is for. Use the following definitions and statements and engage participants in commenting it by asking what planning tools they have in their companies that cover the same aims:
	  • Chemical control action plans are task lists systematizing what needs to be carried out and where, by whom, with which resources, and in what timeframe in order to achieve a set objective towards improved chemical control.
	  • Chemical control action plans establish the management basis for implementing measures, making improvements, and evaluating results.
	• Continue following the support presentation and discuss with participants reasons for being systematic and for planning the implementation of risk reduction actions.
	• You may wish to raise attention to the following reasons for being systematical and for planning implementation of risk reduction actions:
	  • Being systematic implies starting from the beginning by defining what issues should be addressed, and what needs to be accomplished. Setting out objectives and targets is essential to avoid misguided efforts. Objectives should be ambitious, but achievable.

	• Risk reduction actions should be prioritized in order to address the most important issues as promptly and effectively as possible. • Depending on the type of action, if the proper resources are not allocated for its implementation, it will either not be implemented or insufficiently implemented. • Without being very clear on who shall do what, actions do not get done. Assigning responsibilities for implementing risk reduction actions goes hand in hand with the proper empowerment and allocation of resources. • Planning involves being systematic and thorough when it comes to time frames for implementation. • Developing a chemical control action plan should start with reviewing the outputs of previous exercises and initiatives, namely Process Flow Diagrams, Chemical Inventories, Hazard Hotspots Maps, and results from Risk Analysis (revert to the relevant sessions on these topics). • Continue following the support presentation and move onto the topic of identification of risk reduction actions. At this point you should make a link with the opportunities for reducing risk that were discussed with participants in Session 8, and with the following topics of the Inherent Safety Production (ISP) checklist that was presented in Session 3: • Minimize • Substitute • Simplify • Moderate • Improve logistics and layout • Tell participants that identifying risk reduction actions needs the involvement of the people who: • …are supplying a chemical company with its raw materials; • …are directly involved in handling the chemicals; • …will be the end users of the chemicals • …are not directly handling the chemicals but may be affected by the hazards posed by the chemicals. • Stress to the participants: • The importance of understanding all the possible implications of implementing risk reduction actions, including "negative" ones such as unexpected outcomes from changing procedures, introducing new equipment/tools, etc. • That actions should be prioritized by importance (e.g. hazards with the highest "risk factor") in order not to waste resources in scattered actions / efforts. • Actions should be budgeted by calculating the expected costs associated with implementation of each action, taking into account investment costs, maintenance/periodical costs, and labour costs. Expected savings should also be clearly identified, as they will help to sustain the rationale behind each proposed action. Explain to participants that accurate budgeting is essential for getting endorsement from top management.

	• Continue following the presentation and move onto the next topic: setting objectives and targets – this means asking oneself the following questions:
	  • "What is my goal?"
	  • "What do I want to achieve in general?"
	  • "What do I want to achieve with a proposed action?"
	• Objectives should be ambitious, but achievable. In parallel, the proposed actions should be sufficient to meet the set objectives.
	• Engage participants in discussing the consequences of planning actions without assigning clear responsibilities and selecting the right people.
	• Participants should be invited to share their experiences here, as they will surely be able to point out situations where nothing was done because no clear responsibility has been assigned, or because those designated as responsible did not have the necessary expertise, authority, or support to carry out a particular action.
	• Highlight the importance of setting out time-frames for action, deadlines, and follow-up actions for progress monitoring.
	• When, completed, plans should be reviewed for consistency and completeness. Teams involved in developing chemical control action plans should review their draft plans by going through the following self-assessment questions:
	  • "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?" (Teams should try to get pre-agreement on the deadlines being proposed to 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 all possible consequences – also negative ones – 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?" (responsibility for taking action should be given to specific individuals; if no individual is responsible, nothing will happen!)
	  • "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?"

	• Getting top management endorsement is the final stage to go through before starting to implement a chemical control action plan. Present to participants the following self-assessment checklist from Tool 3.4 of the Responsible Production Toolkit.
	  • "Why should we implement this action now and not next year?"
	  • "Can we partially implement this action and obtain the same results?"
	  • "Are you sure of the expected range of costs?"
	  • "Did you take into account idle time? And warehouse cost?"
	  • "How many suppliers did you consult?"
	  • "Will there be any overtime hours involved?"
	  • "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 will be extra costs involved?"
	  • "Have you discussed the feasibility of this action with this person?"
	  • "Why have you proposed him/her for the job?"
	  • "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, reputation, 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?"
	• Before moving onto the proposed group exercise, you should conclude the presentation by highlighting the fact that any plan should be followed-up and monitored. Plans that are not monitored will loose acceptance and credibility. In additional, planning is a dynamic activity requiring continuous iteration.

Suggested approach to the Group exercise	• Go through the support exercise provided (group exercise – preparation of a **chemical control action plan**). Note: this exercise does not require the support of the mock case-study. None the less, the mock case study includes enough information to be used as support if needed. • The aim of this exercise is to make participants familiar with the necessary steps towards preparing a chemical control action plan, as per the related tool being provided in the Responsible Production Toolkit (Tool 3.4 Chemical Control Action Plans). • Depending on the numbers of participants you may wish to divide them in small groups. • Explain to participants that the objective is to develop a rough chemical control action plan considering the approach presented during the session. For this, participants should refer to results from applying other tools during this course to the situations in their companies (namely the Legal Register, Process Flow Diagram, Risk Analysis, Hazards Hotspots Map, List of Relevant Stakeholders). (Optionally, refer to the information included in the mock case-study, as referred to above.) • Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations. Participants will be able to benefit from the sharing of experiences, particularly in the identification of risk reduction actions.

- **Give participants 30 minutes to go through the following activities of the exercise:**
  1) Review of existing information
     Ask participants to gather the outputs they have developed from applying other tools during this course to the situations in their companies (namely the Legal Register, Process Flow Diagram, Risk Analysis, Hazards Hotspots Map, List of Relevant Stakeholders).
  2) Identification of risk reduction actions (using the ISP checklist)
     Participants should move onto identifying risk reduction actions following the approaches discussed during this session. They should start by addressing burning issues such as the most relevant hazards (with the highest risk factor) and think how can they apply the Inherent Safety Production (ISP) checklist presented in Session 3:
     - Minimize
       i) Is there a specific quantity of a dangerous (especially toxic, explosive, flammable, reactive) chemical product (in storage or process) that could potentially cause a major accident?
       ii) Are there options to reduce that quantity? (e.g. by changes in procurement policy, storage in smaller units, by combining production and use on site, or by process intensification)
     - Substitute
       i) Is it possible to replace the most dangerous chemical(s) product with a less dangerous material?
       ii) Can suppliers provide more benign alternatives?
       iii) Are there alternatives for the most dangerous processes? (e.g. can the process be substituted by another process that is less dangerous?)
     - Simplify
       i) Is it possible to redesign the process, the handling or transport of chemical materials to reduce the complexity and foster simplicity?
     - Moderate
       i) Is it possible to change the process or the form of the chemical products so they are less harmful? (e.g. lower concentration or using pills instead of powders)
       ii) Can a (bio) catalyst help to process chemicals at lower temperatures and pressures, approaching ambient conditions?
       iii) Are there activities whereby chemical products are used in open air?
       iv) Can these activities be changed so that the chemicals are contained?
     - Improve logistics and layout
       i) Can the lay-out of the facility be changed so that transport of chemical products becomes simpler and less risky? (supply, transit, transport of products, removal of wastes)
       ii) Can hotspots of chemical hazards be removed to greater distances from buildings or other places where many people come and go?

     Ask participants to list the actions they have identified for each hazard on a table.

	3) Budgeting actions • Participants should then be asked to budget each action being proposed. For this they should be referred to Tool 3.2 Prevention and Risk Reduction Cost Analysis from the Responsible Production Toolkit. • They should be asked to use the tool to try and identify expected costs and savings for each action (one time capital cost; ongoing operating cost per year; average cost per year based on estimations from year 1 to year 3; one time capital saving; and ongoing operating saving per year based on estimations from year 1 to year 5). • Next, they should calculate the return on the investment by subtracting one time savings from one time costs (the capital investment), subtracting ongoing costs from ongoing savings (the impact on annual operating cost), and finally dividing capital investment by impact on annual operating cost (thus getting the years to return on investment). 4) Setting objectives and targets • For each action identified and listed, ask participants to define clear and realistic objectives and targets that they propose to achieve. • For this, participants may be referred to Tool 3.3 Prevention and Risk Reduction Cost Analysis from the Responsible Production Toolkit, if applicable. • Participants should also clearly indicate the anticipated improvement or benefit in terms of risk reduction. 5) Assigning responsibilities • Ask participants to identify responsibilities within their organisation for taking action and monitoring the results. 6) Setting out timeframes and deadlines • Ask participants to consider realistic time-frames considering: time for implementation; overlapping activities; resource conflicts; preceding actions; linked actions; and other similar constraints.
Assessment of participants	• During the session, ask participants • Who could join them as team members for the development of chemical control action plan for their companies, taking into account their companies' relevant stakeholders. • If they are familiar with existing risk reduction/chemical control plans in their companies. • What type of actions they consider to be more important in developing a chemical control action plan. • Comments and suggestions for getting endorsement of actions/plans from top management.
Other comments	• It should be mentioned at this session that planning is not a solitary activity. The right people should be involved – this could be as simple as a staff team, but it could also involve business partners, outside experts, consultants and stakeholders from local and governmental authorities, and the community. The objective is to develop the best plan possible to reduce the risks posed by products and operations along the value-chain and in the community, so it is very important to use the resources that will achieve that.

	• Plans should be repeated on at least an annual basis. Some companies have long terms plans and annual plans. Some companies have a rolling three year plan (a three year plan where as one year is finished a plan for a new year is added). • This session relates to the Tool 3.2 Risk Reduction Cost Analysis, Tool 3.3 Set Goals, Objectives, Targets and Indicators Tool 3.4 Chemical Control Action Plan (from the Responsible Production Toolkit).
References	• *Managing health and safety - Five steps to success*, Health and Safety Executive (HSE) • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises - Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	12 TRAINING
Background	• Awareness raising and training materials for improved chemical safety are very important but often their utility and impact can fall short of the objective if a training which needs assessment is not previously undertaken. • Knowing who needs to be trained and on what must be kept in mind before committing efforts and resources to it. Any successful training programme on chemicals safety management along the value chain will have to be based upon a clear understanding of the hazards and risks, and of the (internal and external) stakeholders involved.
Objectives	• To provide participants with a basic understanding for identifying and assessing awareness raising and training needs at the relevant organizational functions in their companies, within their business partners and other relevant stakeholders.

Minimum duration	• 1hour
	  • 30 minutes presentation on the rationale and objectives of awareness raising and training for improved chemical safety along the value chain
	  • 30 presentation and discussion on assessing training needs of workers and business partners on hazards and risks, and chemical safety, and on developing a training plan for improved chemical safety along the value chain.

Contents	• PPT presentation on training, including:
	  • Importance of training on chemical safety
	  • Identifying training needs along the value chain
	  • Defining priorities and training objectives
	  • Developing a training plan for improved chemical safety along the value chain
	  • Example of training plan

Suggested approach	• Follow the presentation provided for the session on training
	• Start by referring to the importance of training on chemical safety. Emphasize to participants that providing health and safety information and training to employees will help:
	  • Ensure that employees are not injured or made ill by the chemicals they handle;
	  • Develop a positive health and safety culture, where safe chemical handling becomes second nature to everyone;
	  • Find out how companies can improve chemical safety management;
	  • Companies meet their legal duty to protect the health and safety of employees.
	• Point out to participants that effective training will contribute towards making employees competent in health and safety thus avoiding accidents.
	• Re-introduce the value-chain dimension. Make participants reflect again on the list of relevant stakeholders they have identified in Session 10, and invite discussion by posing the following questions:
	  • Which suppliers, transporters, contractors and subcontractors should their company provide training to on chemical safety?

	• Which suppliers, transporters, contractors and subcontractors has their company needed to provide training for on chemical safety? • Which suppliers their companies are working with have provided training to company workers on safe handling of hazardous chemicals and/or safety measures in the use/maintenance of specific process equipment? • Can companies always rely on the availability of (already) trained business partners? • When demanding adequate skills on Terms of Reference for the provision of goods and services, should companies accept that general skills are sufficient? • What about hazards and risks related to their specific facilities? Should companies expect that professional goods and services providers will always have the necessary knowledge to undertake operations inside specific company facilities? • What about customers? Should they be provided with training? (e.g. some coatings manufacturers provide training for professional painters) • What about other (relevant) stakeholders? Should local emergency services be provided with training on the specific hazards and risks exiting in their companies? • Should the community be trained? If so, on what? • Before carrying out awareness raising or training programmes, it is of the utmost importance to clearly identify training needs. This will help to prevent misallocation of scarce resources. • To identify the skills and knowledge needed for workers (and other relevant stakeholders) to handle chemicals in a safe and healthy way, a *gap analysis* is needed. This analysis is carried out by comparing stakeholders' current skills and knowledge with the skills needed for a particular (set of) task(s), and/or for lowering exposure to chemical risks. • Continue following the suggested support presentation and list the following essential elements in the required *gap analysis*: • Process flow Diagram • Chemical inventory • Hazard hotspots map • Conclusions from risk analysis carried out • Chemical control action plans • List of relevant stakeholders • Undertaking a gap analysis on training needs requires the comparison of: • The required skills for safely addressing the identified chemical hazards and risks along the value chain. • Current/expected skills of stakeholders along the value chain (including not only company workers but also business partners, customers, authorities and the community). • Keep following the suggested support presentation and discuss with participants potential sources for listing all required skills. Sources could include MSDS; emergency plans and procedures; work instruction and procedures; equipment manuals; customer requirements; information from suppliers on the use and safe handling of hazardous chemicals; etc.

	• After the required skills have been listed, companies should go through the following self-assessment exercise:
	  • Do managers, supervisors, and support staff have the required skills for addressing the chemical hazards and risks identified?
	  • Do employees have the required skills for addressing the chemical hazards and risks identified?
	  • Have employees (and other relevant business partners such as suppliers, in-house contractors, transporters) received training on handling chemical hazardous substances including:
	  • Explanation of what an MSDS is and how to use and obtain one?
	  • MSDS contents for each hazardous substance or class of substances?
	  • Location of physical and health hazards in particular work areas and the specific protective measures to be used?
	  • Details on the hazard communication system implemented in the company, including how to use the labelling system and MSDSs?
	  • Explanation of the appropriate methods for recognizing tasks and other activities that may involve unsafe exposure to hazardous chemicals?
	  • Explanation of the use and limitations of methods that will prevent or reduce exposure, including appropriate engineering controls, work practices and PPE?
	  • Information on the types, proper use, location, removal, handling, decontamination and disposal of PPE?
	  • Explanation of the basis for selection of PPE?
	  • Information on the appropriate actions to take and persons to contact in an emergency involving hazardous chemicals?
	• Do the relevant public authorities (such as firemen, police, public health officers, environmental officers, etc.) have the relevant skills for addressing the chemical hazards and risks identified?
	• Continue following the suggested support presentation and introduce the section on defining priorities and training objectives.
	• Promote interaction and ask participants to join you in brainstorming on criteria for setting training priorities and objectives.
	• For this, you will probably need a flip-chart to list participant's inputs. Criteria for defining training objectives should include at least the following:
	  • Provide adequate training on chemical hazards and risks onsite to relevant employees who lack the necessary skills.
	  • Provide adequate training on chemical hazards and risks at site to relevant suppliers / contractors / subcontractors / transporters (the ones that undertake operations onsite and / or have to enter the company's facilities to provide a particular product or service).
	  • Provide training on chemical hazards and risks offsite to relevant employees who lack the necessary skills.
	  • Provide training/raise awareness on chemical hazards and risks offsite to relevant local authorities and communities.

	• Provide training/raise awareness on hazards and risks (related to the chemical products being marketed) to transporters, retailers, and customers. Acknowledge to participants that training an entire value chain is completely out of proportion. At the same time, companies do have a role to play in raising relevant stakeholders awareness on chemical hazards and risks related to their products and operations. But a fine balance must be found. Some companies actually train their direct customers on safe handling of their chemical products. On the other hand, in many situations, raising awareness on safety issues down the chemical industry value chain can be carried out by providing adequate product risk information. • Continue the brainstorming exercise and invite participants to join you in identifying criteria for defining training priorities. A comprehensive brainstorming exercise should lead to the identification of at least the following criteria: • Top priorities would include those where lack of information and/or training might result in serious harm, and those which benefit the largest numbers of workers and other relevant stakeholders. • Address first employees whose jobs are related to the hazards hotspots identified and mapped, and for which the highest risk factors have been assigned. • Address other stakeholders that may be exposed to the hazards for which the highest risk factors have been assigned. • Make sure to prioritize specific training being required by law. • Training for new recruits and for people changing jobs or taking on new responsibilities where they will have to handle hazardous chemicals should always be a priority. • Young employees are particularly vulnerable to accidents and there is a need to pay particular attention to their needs, so their training should be a priority. It is also important that new, inexperienced or young employees are adequately supervised and / or are provided with additional on-the-job training. • Some people's skills may need updating by refresher training. • Follow the suggested draft presentation and present to participants the minimum elements that should be considered when planning training activities aimed at improved chemical safety along the value chain. • Main hazards and risks providing the rationale for the training/awareness raising activities • Consultation of employees or their representatives for their views • Clear definition of target-groups • Training / awareness raising objectives • Expected learning outcomes • Trainer requirements and availability • Training methods and resources needed • Training course dates, duration, agenda and venue • Evaluation and follow-up of training results • On evaluating training results, you may wish to raise participants attention to the following self-assessment questions that may be considered: • Do employees understand what is required from them?

	• Do they now have the knowledge and skills needed to handle hazardous chemicals safely and without risk to health? • Are they actually working as they have been trained? • Has there been any improvement in the company's health and safety performance? • What feedback is being received from line managers and the people who have been trained? • Is further information and/or training needed? • Was the most suitable training method used? • What improvements can be made? • Has there been a change in behaviour and practice? • Conclude the presentation by presenting the example of a training plan on improved chemical safety along the value chain, that is included in the suggested support presentation.
Assessment of participants	• During the session, ask participants: • What training is provided to employees on the hazards of chemicals and chemical processes their companies work with? • If being provided, • does it include training on the controls that are most appropriate for those hazards? • how frequently is this training provided? • what is the frequency of refresher training provided for affected employees? • is this training kept current? • is training effectiveness measured? If so, how? • What training is provided at their companies to supervisors and managers on management of hazards arising from chemical storage and use? • Are Safety Officers or other chemical safety support staff sufficiently familiar with facility operations? Do they participate in routine inspections, assessments, and audits; in training; and in the categorization, analysis and development of corrective actions for occurrences? Do they participate in overseeing the implementation of selected controls and in follow-up inspections of those controls? • What training / awareness raising is being provided by their companies specially aimed at external stakeholders?
Other comments	• Participants should be encouraged to engage during the presentation so that issues like (i) learning capacity of business partners, (ii) allocation of resources to eternal training/awareness raising activities, (iii) local availability of qualified trainers, and (iv) expected reactions of external stakeholders to awareness raising initiatives on hazards and risks can be discussed at length. • This session relates to the Tool 3.5 Training (from the Responsible Production Toolkit)
References	• *Health and safety training – What you need to know*, Health and safety Executive (HSE) • *Small Business Handbook*, US OSHA Department of Labor • *Chemical Management Handbook,* US DOE Department of Energy • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility)

Session title	13 EMERGENCY PLANNING – PART 1
Background	• Preparedness for emergencies that may result in off-site consequences requires the development and implementation of an integrated emergency response plan, assuring the necessary linkages with the roles of relevant external stakeholders in emergency preparedness and response. • Course participants should already have had a brief introduction to the APELL process in the Awareness Raining Course.
Objectives	• To fully explain the 10 steps of the APELL process and the way that it structures the necessary activities for establishing a fully integrated emergency, through a multi-stake-holder participation process involving industry, local authorities, and the community.
Minimum duration	• 1 hour • Presentation on APELL, emergency preparedness through the 10 steps of the APELL Process, and the role of the APELL Co-ordinating group.

Contents	• PPT presentation on emergency planning, including:
	  • Emergencies and disasters (notable emergencies/disasters, common elements, environmental and offsite impacts, and lessons learnt)
	  • Emergency prevention and preparedness
	  • UNEP Awareness and Preparedness for Emergencies at Local Level (APELL) Programme and Process
	  • Goals and benefits of implementing the APELL Process
	  • The 10 steps of the APELL Process
	  • Roles of industry, local authorities and of the APELL co-ordinating group in the implementation of the APELL Process
	  • APELL application worldwide (region/country, sector)

Suggested approach	• Follow the presentation provided for the session on Emergency Planning (Part 1).
	• Introduce the topic of emergencies and disasters by stressing that accidents and disasters involving chemical substances can affect everyone.
	• Refer to the examples in the presentation, and also to the relevant information included in Session 2.3 Chemical Hazards at Work, namely the accidents in the transportation of Ammonia and Acrylonitrile. You may also want to adapt/build up this topic with examples of other well-known accidents involving chemicals that have occurred in the country/region/ community.
	• Pose the following questions to participants, in order to get them to think on what can be learned from emergencies and disasters:
	  • Was the risk understood?
	  • Who was responsible for the disaster?
	  • What did the public know, understand?
	  • Was there an emergency plan?
	  • Was the response adequate?

	• What would have prevented the accident? • What would have mitigated its consequences? • Keep following the presentation and discuss with participants some common elements/conclusions that can be drawn from most accidents/disasters case-studies: *Fixed installations/major chemical accidents:* • Frequently released chemicals: ammonia, chlorine, acids, alkalis • Sources of release: large volume industry, manufacturing facilities, chemical producer and users • Quantities released: wide range, from 25 Kg to 25 tonnes • Causes of release: Commonly more than one cause • Where from: storage, piping, process vessels • Which installations: routine processing, (un)loading and maintenance *All types of installations:* • Low awareness to risks • Low levels of preparedness • Insufficient co-ordination of rescue services • Accidents/disasters could have been prevented, or their damages lessened • People were living too close to risk areas • Accidents/disasters affect all countries • Accidents/disasters have consequences for personal, social, environmental, economic fabric • Natural and technological disasters often combine • Human development often occurs in hazardous areas • Society is more sensitized to rescue needs than prevention • Raise attention to the environmental impacts of chemical accidents and disasters, and their direct and indirect effects on natural resources and ecosystem services. You may want to mention and give examples of health risks and disease, water and air pollution, chemical risks to people and biota, waste disposal problems (debris), and land degradation. • Build-up the case on impacts of chemical accidents offsite, highlighting the fact that industrial chemical accidents can affect the public as well as workers, and that they can have severe impacts on community health and livelihoods. These can be caused by: • toxic gas • water pollution • physical harm • fires/explosions • crushing during mass panic • hazards during clean-up • Present some lessons learnt from well-known disasters, and move onto the topics of prevention and preparedness. Follow the suggested support presentation and highlight the following main elements in emergency preparedness: • Hazard/risk identification and assessment • Prevention of hazards • Safety training and fostering of a safety culture at work

	• Workers and community information on chemical hazards and risks • Early warning and preparedness • Emergency response planning, practice and drills • Key factors for emergency preparedness include the co-ordination of emergency services, the provision of emergency infrastructure/equipment, and that people know how to react correctly. • Go on to present the UNEP Awareness and Preparedness for Emergencies at Local Level (APELL) Programme. As a *Programme*, APELL depends on a higher level framework of: • National emergency strategy and administration; • 'Right to know' legislation and transparency; • Culture and practice of community involvement; • Interagency cooperation' • Assistance in hazard identification; • Promotion of APELL process from higher up. • Make sure to clarify to participants what is the role of UNEP in the promotion of the APELL Process. Namely: • APELL strategy and co-ordination • Catalytic role (not intervention) • Information support • Initiation of demonstration projects at local level • Assistance in national training seminars/workshops • Support to creation of national APELL centres • Maintaining a regional/international APELL network • Encouraging the application of the APELL Process in new sectors • Keep following the suggested draft presentation and provide participants with the definition of APELL as a *Process*. • "*It is a multi-stakeholder dialogue tool that establishes adequate coordination and communication in situations where the public might be affected by accidents and disasters*" • Highlight the "local level", "multi-stakeholder", and "open communication" aspects of the process, and its main stakeholder groups: (i) industry, (ii) community, and (iii) local authorities • You may wish to give participants some of the following examples of potential APELL partners under these 3 stakeholder groups, at national and local levels: • *At national level* • Ministry of Industry (or equivalent) • Ministry of the Interior (or equivalent) • Ministry of Environmental Protection (or equivalent) • Ministry of Defence (or equivalent) • Public services/works • Department of Occupational Health (or equivalent) • National Safety Council (or equivalent) • Associations of Chemical Manufacturers • Chambers of Industry/Commerce • Others

	At local level • Province, district, and municipal authorities • Local authorities: (public services, fire department/civil defence, police, first aid/hospitals, and social health services) • Industry within the area: manufacturing or processing companies, transport/storage companies, industrial associations and societies • Local community and interest groups: community services, news/media, business community, environmental groups, and schools/educational groups • Point to participants that the main goal of the APELL Process is the development of integrated emergency response plans through a multi-stakeholder participatory approach involving industry, the communities and local authorities. • The main objectives of the process are to protect lives and the environment, by reducing the occurrence and the potential impacts of industrial accidents/disasters. This is achieved by: • Promoting better preparedness at the local level. • Raising awareness of potentially affected communities. • Working through a structured 10-step process (multi-stakeholder dialogue). • Benefits of implementing the APELL Process include: • Local community is aware of potential risks and impacts and prepared to respond correctly in the event of an accident. • Emergency services become coordinated and prepared to respond to any disasters and are able to provide coordination. • Continue following the suggested support presentation and introduce (and briefly describe) the 10 steps of the APELL Process, namely: • Step 1: Identify participants and their roles • Step 2: Evaluate and reduce risks offsite • Step 3: Review existing plans and identify weaknesses • Step 4: Task identification • Step 5: Match tasks and resources • Step 6: Integrate individual plan into overall plan and reach an agreement • Step 7: Draft final plan and obtain endorsement • Step 8: Communication and training • Step 9: Testing, review and updating • Step 10: Community education • Highlight the importance of Step 2, which is a key step in the APELL Process. This process is all about: • Identifying and evaluating all risks that may affect the community. • Agreeing upon and introducing measures for risk reduction.

	• Move onto discussing the roles of the industry, the local authorities and of the APELL co-ordinating group in the implementation of the APELL Process, making sure to point to:
	  • *Industry responsibilities*
	  i) Assure safe work practices
	  ii) Assure personal safety of employees and visitors
	  iii) Establish safety programmes
	  iv) Protect lives and property on-site
	  v) Co-ordinate all plant personnel during an emergency
	  vi) Develop plans and procedures to respond to emergencies
	  vii) Provide security, safety equipment, training, and information on chemical hazards
	  • *Local Authorities (local government)*
	  i) Provide a safe community
	  ii) Assure the safety and the well-being of all residents and transients within the community
	  iii) Establish public safety programmes
	  iv) Protect lives, as well as private and public property
	  v) Co-ordinate community emergency response
	  vi) Develop plans and procedures to respond to emergencies
	  vii) Conduct training, drills, and exercises with other response agencies within the community, area, or state
	  viii) Maintain communication channels with national government
	  • *APELL Co-ordinating Group*
	  i) Open communication lines
	  ii) Information sharing
	  iii) Co-ordinate emergency response plans and procedures
	  iv) Interact with other emergency response agencies
	  v) Joint education and training
	  vi) Common problem solving
	  vii) Mutual aid assistance
	• Conclude the presentation with a focus on the worldwide implementation of the APELL process, making sure to refer to the following aspects:
	  • Region / country implementation: India, Thailand, Sri Lanka, Indonesia, China, Russian and the Baltic countries, South-Eastern Europe/Balkans Region, Czech Republic, Romania, Morocco, Egypt, Tunisia, Jordan, Argentina, Brazil, Chile, Peru, Colombia, etc.
	  (APELL implementation in chemical industrial parks in Brazil, Colombia, Argentina, Morocco and Sri Lanka.)
	  • Sector implementation: chemical and other industries, fuel storage, mining, transport, port areas, and tourism.

Assessment of participants	• During the session, ask participants:
	  • Who could be their potential stakeholders in an emergency.
	  • Who could be the adequate internal and external emergency response participants in an accident situation in their companies.
	  • What type of training with respect to hazardous material accident handling does the fire brigade of a typical industrial area in the region/country receive?
	  • Who can most effectively start a Coordinating Group in their location? How?
	  • Which authorities in their community/region are responsible for:
	  • …public safety and health?
	  • …occupational safety and health?
	  • …industrial safety?
	  • …safety in transportation and storage?
	  • …public emergencies like fires, explosions, gas emissions, etc.?
	  • …the environment?

Other comments	• Participants should be encouraged to engage during the presentation of each step of the APELL process, so that the methodology can be better understood. The contrast with real existing conditions will help to better absorb the underlying ideas and objectives behind each step of the process. • This session relates to the Tool 3.6 Emergencies Plan (from the Responsible Production Toolkit).
References	• *APELL Handbook*, UNEP • *APELL Training Kit for Local Authorities*, UNEP • *Responsible Production Toolkit,* UNEP and AccountAbility • *Management of Industrial Accident Prevention and Preparedness – A Training Resource Package*, UNEP

Session title	14 EMERGENCY PLANNING – PART 2
Background	• An emergency plan can vary largely according to the hazards and risks the community is exposed to. A well conceived plan is concise, structured and includes sufficient details to allow rapid access to the crucial required information. It also includes the types of scenarios on which the response systems are based. Although each disaster is unique, they all have common elements.
Objectives	• To provide participants with an understanding on the elaboration of an Emergency Plan • To provide participants with an understanding of the basic elements of an Integrated Emergency Plan developed through a multi-stakeholder approach using the APELL Process.

Minimum duration	• 1 hour and 30 minutes
	  • 30 minutes presentation on emergency planning, and basic elements of an emergency plan.
	  • 40 minutes on group exercise: APELL and Emergency Planning.
	  • 20 minutes on presentation and discussion of exercise results.

Contents	• PPT presentation on Emergency Planning, including:
	  • Emergency planning (rationale, and basic aims of an emergency plan).
	  • Elaboration of an Emergency Plan
	  • Organization and first stage
	  • Risk Assessment
	  • Inventory of the means
	  • Operational tools
	  • Alarm and information of the population
	  • Creation of an emergency structure
	  • Maintenance of the emergency plan, exercise, trainings
	  • Basic elements of an Emergency Plan
	• PPT presentation and hand-out to support group exercise on APELL and Emergency Planning.

Suggested approach	• Follow the presentation provided for the session on Emergency Planning (Part 2). • Introduce participants to the session by reminding them that planning is essential for any successful operation, especially an emergency one. A carefully prepared emergency plan is vital for any operation that handles hazardous chemicals. The lack of an emergency plan can lead to severe losses such as multiple casualties and possible financial collapse of an organization, even from a single accident. • You may want to point to the following practical reasons for emergency planning: • Planning can reduce the initial stage of confusion, and even the impacts of an emergency by preventing fatalities and injuries, and reducing damage to property and the environment.

	• For any emergency response to work well, it is vital that all operators, managers and other relevant stakeholders have access to written procedures on what to do, and have had the opportunity to test them. • Emergency plans thus provide important guidance during an emergency. • Emergency planning allows for discovering unrecognized hazardous conditions that would aggravate an emergency situation. The planning process may bring to light deficiencies, such as the lack of resources (equipment, trained personnel, supplies), or items that can be rectified before an emergency occurs. • Emergency planning promotes safety awareness and shows the organization's commitment to the safety of workers and community. • Keep following the suggested support presentation and highlight the main aims of emergency planning, which are to: • assure that all relevant stakeholders know what do in the case of an accident. • enable a swift and effective response to be made to contain or minimize the effects of an accident. • restore normality as soon as possible. • At this point you may wish to engage participants by asking them if, according to their perception, company workers, emergency response authorities and neighbouring facilities have a basics understanding on what to do in the case of an emergency at their company. Ask them if written emergency procedures and plans do exist and if they have been made available to all relevant stakeholders. • Move on with the presentation and explain to participants that an emergency plan can vary largely according to the hazards and risks workers and communities are exposed to. A well conceived plan is concise, structured and includes sufficient details to allow a rapid access to the crucial required information. It also includes the types of scenarios on which the response systems are based. • Although each emergency is unique, they all have common elements. There are several kinds of emergency plans, for example those: • prepared by industries, the so called on-site emergency plans • prepared by a community or the authorities, the external emergency plans or offsite. • In both cases, the planning process for emergency situations requires to be an effective co-operation between the various parts, in particular the rescue services, the medical services, the industry, and the representatives of the public and the media. • Emergency plans should be: • drawn up in consultation with all those directly involved in its implementation both on and off the site • as simple as possible and easy to use • complete in itself and should not entail reference to a number of other documents; • valid 24 hours a day, every day, and flexible enough to be applicable to any emergency that may arise • structured to allow for the response to be stepped up in the event of escalating circumstances • known and understood by everybody involved • regularly tested and amended in the light of experience.

- Keep following the suggested support presentation and introduce the following steps for the elaboration of an emergency plan:
  - Organization and first stage
  - Risk assessment
  - Inventory of the means
  - Operational tools
  - Alarm and information of the population
  - Creation of an emergency structure
  - Maintenance of the emergency plan, exercise, trainings
- Conclude the presentation by going through the following list of basic elements of an emergency plan. This list suggests items which might usefully be documented in a written emergency plan.
- Not everything listed here would necessarily be included or, alternatively, different things may be required in some cases. The order is also not very important. The list has been compiled from a number of sources and is intended as an aid; it should be applied flexibly.
  - *Purpose / objectives / scope*
    - Under this item, state the objectives of the plan, when the plan is to be used and by whom, define emergencies and emergency scenarios covered.
    - Refer to any other elements included in the document.
    - Include the date of the plan and frequency of updates.
  - *Plant/area risk evaluation and emergency scenarios*
    - Under this item, identify the types and locations of hazards that workers and the community can face, identify zones of impact and number of people at risk, and classify severity of impact in accordance with the level of emergency response that will be needed.
    - The quantity, location, and properties (MSDS sheets) of hazardous chemicals should be included under this item.
    - Include also the location of isolation valves, special fire fighting procedures (if any), and special handling requirements.
    - Regarding neighbouring communities and nearby industrial plants, make sure to include information on properties of hazardous materials at nearby plants, nearby residence and population centre, contacts at other sites, and established procedures for notification of chemical releases at other sites in the area.
  - *Emergency organization*
    - Under this item, identify the participants and describe the role of each, identify by title the person in charge of the emergency response; define the relationships among key participants including who takes the lead for which actions; describe organizations outside the community that could be called upon for additional assistance; define the authority / responsibility interfaces between government and industry.
    - Make sure to clearly identify designated persons in charge/alternates, functions of each key individual and group telephone numbers (office and home) for key people/alternates.

	• *Notification Procedures and Communication Systems*
	  • Under this item, identify 24-hour notification means to first responders (e.g. telephone) and officials; describe communications systems and redundancy; describe the mutually agreed format and content for initial notification message; describe resources for emergency responders to call for additional assistance; describe resources and formats for notifying the public; and describe how the organization will ensure that the public understands and responds to the signals.
	• *Emergency Equipment and Facilities/Resources*
	  • Under this item, identify command posts for response groups; describe available facilities; list the available emergency response equipment; describe hazardous material monitoring equipment available; list protective equipment available; and list written agreements for mutual aid.
	  • Make sure to list fire fighting equipment, emergency medical supplies, toxic gas detectors (where needed), wind direction/speed indicators, self-contained breathing apparatus, protective clothing, containment capabilities, and other on-site equipment (to be specified according to local conditions).
	• *Emergency scenarios and emergency response procedures*
	  • Under this item, identify who can authorize evacuation or sheltering; describe the procedure to be used to determine if protective actions are required; identify responsible groups and resources for evacuation, describe arrangements for special facilities (e.g. schools) and for reception centres/shelters for evacuees; and describe the method to determine when protective actions are no longer needed.
	  • Make sure to identify communication procedures; medical procedures (include handling of multiple injuries); special procedures for toxic gas releases (chlorine, etc.); natural disaster procedures; utility failure procedures; individual unit emergency procedures; and sabotage threat procedures, etc.
	• *Procedure for returning to normal operations*
	  • Under this item, identify the person(s) responsible for determining that the emergency is over and for authorizing re-entry; describe methods to ensure that un-authorized entry will not occur; describe the method to be used to determine that the emergency is over; describe procedures to be used to return to normal conditions i.e. recovery including responsibility for clean-up; describe methods to continue monitoring an affected area; and describe methods for investigating and documenting the emergency and evaluating the response.
	  • Make sure to identify here interface and lines of communication with off-site officials on procedures for returning to normal operations
	• *Training and Drills*
	  • Under this item, identify the key participants who must be trained and how this should be undertaken; describe annual training programmes; describe the exercises schedule; describe training for using protective equipment; describe how the plan is tested periodically; describe frequency and extent of public notification tests and evaluation of its effectiveness; and describe the frequency and extent of training and update briefings on hazardous materials for first responders.

	• Make sure to consider training for improved knowledge of chemicals (properties, toxicity, etc.), on procedures for reporting emergencies; on alarm systems; on location and use of fire fighting equipment, on use of protective equipment (respirators, breathing air, clothing, etc.); on decontamination procedures for protective clothing and equipment; and on evacuation procedures • Make sure to consider frequent, documented simulated emergencies. • *Regular tests of emergency organization and procedures* • Under this item, consider provisions for simulated emergency procedures, frequent tests of fire fighting equipment, evacuation practice, and on-going emergency preparedness committee • *Plan maintenance and updates* • Under this item, identify who is(are) responsible for maintaining an updated plan, describe the method for annual review and revision, describe the method for incorporating lessons learned from exercises and tests into the plan. • Plan maintenance should be annual or more frequent if needed, and reflect results of drills and tests • *Detailed operating manuals* • Under this item, if applicable, describe start-up/shut-down emergency procedures; analysis of potential incidents; and specific emergency response and action to be taken • *Public information and education* • Under this item, identify the principal spokesperson for each key group who will communicate with the media and the public during the emergency; describe the method for disseminating information to the media and the public; and describe the public education and community awareness programme to be conducted periodically in order to ensure that the public fully understands how to respond to an emergency situation.
Suggested approach to the Group exercise	• Go through the support exercise provided (Group Exercise – APELL and Emergency Planning). (Note: this exercise does not require the support of the mock case-study introduced in Session 2 Responsible Production and used throughout the course. Nonetheless, the group exercise proposed here requires the use of the specific mock case-study on the plastics factory "Apellastics" that is provided as support to this session, along with background information on "Apellania". • The aim of this exercise is to make participants familiar with the APELL process for integrated emergency planning • Depending on the numbers of participants you may wish to divide them in small groups. • Explain to participants that the objective is to go through the proposed group assignments and prepare a final one-page summary with their answers to be presented and discussed at the end of the group exercise. • For this participants should refer to the background information provided on "Apellastics" and "Apellania" for the group exercise.

- Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations.
- **Give participants 40 minutes to go through the following assignments/questions:**
  1) Ask participants to refer to the scenario of Apellastics. Which partners are important here? Ask them to list each partner, and to give reasons.
  2) Ask participants to indicate who can most effectively start a coordinating group? How?
  3) How could information on risks from the plastics factory installation best be provided to the local community:
     - by industry?
     - by local government?
  4) How can/should information on emergency preparedness planning (or emergency measures) be included in this information?
  5) Who from Apellastics should respond to questions from the local community about hazards? Ask participants to sketch out a public query arrangement that should be in place.
  6) Where can a member of the public find information about:
     - the chemicals used in the processes in the factory?
     - the factory operations which are the most hazardous?
     - the consequences of an accident?
  7) We know from the MSDS that TDI reacts violently with water. What recommendations do you have for combating:
     - a spill?
     - a small fire of TDI?
  8) Can water be used in any way?
  9) What first aid measures are appropriate for a worker who has TDI splashed in his face?
  10) Assume you are a resident close to the factory. You are at home, and you have heard that there has been a spill of five tonnes of toxic chemicals, including TDI, nearby. What do you do?
  11) As the plant manager, through what means would you inform the employees of the factory about what to do in case of a TDI spill?
  12) What devices and aids would you need at the plant which can facilitate the response to a spill?
  13) What information about what risks would you disseminate among the local community to prepare them for, and make them aware of, a possible accident?
  14) What means would you use to disseminate this information among the local community?
  15) How do you prepare an emergency preparedness plan for "Apellastics"? List the main items and information that should be included in an emergency plan for "Apellastics".

Assessment of participants	• During the session, ask participants if:
	  • They know of the existence and contents of local/regional emergency plans.
	  • They are familiar with their company emergency plan.
	  • They know if their emergency plans (if any) are articulated with the relevant authorities.
	  • Emergency plans or procedures are regularly tested in their companies.

Other comments	• Participants should be encouraged to engage during the presentation on the steps and basic elements for emergency planning. Discussion should be fostered among participants, particularly on the main perceived hindrances and opportunities for the successful elaboration and implementation of emergency plans at site, and implementation of off-site integrated emergency plans through the APELL process.
References	• *APELL Handbook*, UNEP • *APELL Training Kit for Local Authorities*, UNEP • *Management of Industrial Accident Prevention and Preparedness – A Training Resource Package*, UNEP • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility)

Session title	15 BEST PRACTICE PROCEDURES
Background	• Best practice procedures, work instructions and other written work documents provide workers and general users of chemicals with clear instructions on best practices in chemical safety, thus complementing and clarifying the information on MSDS, and adapting it to the processes and equipments being used, levels of understanding and literacy of users, and local cultural context. • Best practice procedures aim at providing the necessary support for the integration of risk reduction actions in day-to-day operations, in a systematic and practical way.
Objectives	• To provide participants with a basic understanding of the approach provided in the Responsible Production Toolkit for the development of company specific best practice procedures.

Minimum duration	• 1 hour and 30 minutes
	  • 45 minutes presentation on preparation of best practice procedures
	  • 35 minutes on group exercise: preparation of best practices procedures
	  • 10 minutes on presentation and discussion of exercise results

Contents	• PPT presentation on best practices procedures, including:
	  • Best practices procedures for improved chemical safety
	  • Elaboration of best practices procedures
	  • Implementation and communication of best practices procedures
	• PPT presentation and hand-out to support group exercise on preparation of best practices procedures.

Suggested approach	• Follow the presentation provided for the session on best practices procedures.
	• Introduce participants to the session by discussing the aims and rationale behind the development of written best practices procedures.
	• Best practices procedures establish a standard course of action. In other words, they are written guidelines that explain what is expected and required to undertake a specific action while following the best practices in chemical safety.
	• Point out to participants that the aim of best practices procedures is to explain in a simple but precise way the best practices to follow in the handling of each chemical or equipment, and should contain the necessary information to undertake operations in a safe way, under normal, start-up, shut-down, and abnormal (such as accident) conditions
	• Best practices procedures are usually needed in order to ensure that:
	  • What is expected and required of workers and other relevant stakeholders during emergency response and non-emergency activities is clearly spelled out, with no ambiguity.
	  • The communication of legal and administrative requirements for improved chemical safety in a clear and practical way, understood by all.
	  • Chemical safety requirements and expectations are clarified and presented in a format that can be understood by all and readily applied at work.

	• Explain to participants that best practices procedures do not necessarily describe how to perform a particular task (technical skills); they describe the company's rules for doing the task (procedural guidance) in such a way that minimizes risks.
	• Implementation of best practices procedures (BPPs) allows a company:
	  • To describe and document what is expected of workers for the safe handling of chemicals in the performance of their duties. As such, they provide a benchmark for personnel, an objective mechanism for evaluating operational performance, and a tool for promoting a safety culture within the company.
	  • To standardize activities. BPPs identify planned and agreed-upon roles and actions for risk reduction. This information helps standardize activities and promote coordination and communications among workers and other relevant stakeholders. They also simplify decision-making requirements under potentially stressful conditions such as accidents.
	  • A framework for training programs, drills, and exercises. These activities, in turn, improve the understanding of safety requirements and help identify potential problems. A comprehensive set of BPPs also serves as a self-study and reference document for workers.
	  • To analyze current work practices and identify opportunities for improving safety practices. Feedback from stakeholders can help to identify potential problems and innovative solutions.
	  • Communicate safety requirements to external stakeholders.
	• Continue following the suggested support presentation and present to participants the approach included in the Responsible Production Toolkit for the development of best practices procedures.
	• The first step in developing best practices procedures is to gather existing information on hazards and risks, control measures, and risk reduction actions. Make sure to refer to the following outputs of applying the relevant tools included in the Responsible Production Toolkit:
	  • Legal Register
	  • Process Flow Diagram
	  • Chemical Inventory
	  • Risk Analysis
	  • Hazard Hotspots Map
	  • List of Relevant Stakeholders
	  • Chemical Control Action Plan
	  • Emergency Plan
	• One important consideration at this point is that the development of best practices procedures should be the result of a team effort. For this, all affected viewpoints should be represented on team. Members of the team may include selected representatives from relevant (internal and external) stakeholders such as:
	  • Workers and supervisors;
	  • Employees representatives;
	  • Suppliers
	  • Buyers/customers

	• Contractors • Transporters • External experts • Other relevant stakeholders may be involved by consultation only, depending on the context in each company, and on the type of best practices procedures being developed: • Competitors • Neighbouring industries • Partners/joint ventures • Industrial associations • Developing best practices procedures that will include interfaces with authorities and communities will necessarily require cooperation with local and regional authorities, community groups, mutual-aid and regional response agency representatives etc. • After the team is set, the next step is to decide on what activities and/or process steps specific best practice work procedures should be provided. For this, companies should: • Select the activities and/or process steps where they were able to identify the presence of chemical hazards. • Decide which activities and or process steps require the provision of specific information on the best practices to follow (taking into account the types of chemicals and equipment being used, their hazards and potential risks, the skills and level of education of the workforce, information on past accidents, etc.). • Make sure to include the ones where you the higher risks were identified. • Make sure to include the ones where specific equipment or instrumentation is being used. • Typical activities and/or process steps for which best practices procedures should be developed include specific activities involving off-loading, transfer operations, storage, and transport of hazardous chemicals (under normal, start-up, shut-down, and abnormal conditions). • Point to participants that in some situations it will be more useful to create more than one best practices procedure for each activity/process selected. This will allow for developing short and simpler procedures, aimed at specific tasks/actions. • Some considerations at this stage include: • Making sure to include the relevant safety information and other supplier information on hazards and risks of chemicals, equipments, and processes. Main sources for the development of best practices procedures are the information contained in the MSDS and in the instructions and manuals provided with the equipment being used. • Re-checking safety instructions with chemical suppliers. • Realizing that chemicals posing different types of hazards will necessary require different Best Practice Procedures. • Taking into account that the hazards posed by some chemicals are so specific that often it will be necessary to provide separate procedures for each. • Continue following the suggested support presentation and move on to the actual development of the best practices procedures. Explain to participants that these should provide concise information in a simple, direct and clear way. Format is very important,

	length of BPPs should be kept to a maximum of two A4 pages, when possible. Other format considerations are: • Inclusion of drawings or photographs; • Inclusion of powerful words and phrases to highlight or emphasize a specific point; • Balancing the level of detail with users level of education, skills and experience; • Use of clear and simple statements; • Use of an "outline" or "bulleted" style instead of a continuous narrative. • When deciding on what information to include in the BPPs, companies should consider the actual needs of the users. For this, useful sources of information include surveys and interviews of the workforce, post-accident analysis, conclusions from emergency drills, complaints, etc. Typical information to include in BPPs: measures for safe chemical handling; basic equipment operating instructions; personal protective equipment; first-aid and clean-up instructions; control measures; and general house-keeping. • Highlight to participants that this process is often carried out with external technical support. When developing BPPs, companies often engage the services of outside experts for conducting a thorough risk assessment of operations and providing recommendations for best practices. • Continue following the suggested support presentation and discuss with participants the importance of testing and discussing draft BPPs with supervisors and relevant personnel - particularly the ones that will be using them. This is the time to identify needs for final adjustments, and training / awareness raising of those who will be using the BPPs. • Conclude the presentation by going through the following points that should be considered in the implementation and communication of BPPs: • Best practice procedures should be made available to the stakeholders in the value chain, if and when applicable (some BPPs developed at site should definitely be made available to relevant suppliers, contractors and transporters undertaking operations at site such as loading and off-loading of hazardous chemicals, maintenance and construction, etc). • Best practice procedures should be made available at the place of use, accompanying the relevant MSDS. It should be noted that BPPs do not replace the use of the MSDS. • Best practice procedures should be placed in a way that they will be well visible. • Best practice procedures should be protected to prevent their deterioration. • Best practice procedures should be delivered to users when working for the first time with a particular hazardous chemical or high risk process. • Implementation of Best Practice Procedures should be accompanied by awareness raising and training. In particular, users should be made to understand that disregarding the instructions in the BPPs can result in accidents and serious injuries.
Suggested approach to the Group exercise	• Go through the support exercise provided (Group Exercise – Preparation of Best Practices Procedures). (Note: this exercise does not require the support of the mock case-study introduced in Session 2.2 Responsible Production and used throughout the course. Nonetheless, the group exercise proposed here requires the use of the specific mock case-study on the plastics factory "Apellastics" that is provided as support to session 2.14 and to this session).

	• The aim of this exercise is to make participants familiar with the approach proposed in the Responsible Production Toolkit for the development of best practice procedures. For this, each participant/group of participants will be asked to develop a best practice procedure for specific operations in "Apellastics", taking into account the support information provided in the case study. • Depending on the numbers of participants you may wish to divide them in small groups. • Explain group participants that the objective is to prepare sample best practice procedures based on the case-study and exercise instructions, and present them at the end of the group exercise. • Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group are coming from different organizations. • **Give participants 35 minutes to go through the following assignments:** 1) Development of best practice procedure(s) for unloading of TDIs at site and transfer to storage 2) Development of best practice procedure(s) for cleaning spills involving TDIs at site 3) Development of best practice procedure(s) for cleaning spills involving TDI off-site during transport by suppliers.
Assessment of participants	• During the session, ask participants: ◦ If they know of the use of best practice procedures (or equivalent documents such as work procedures/instructions) at their companies. These could be chemical safety procedures and/or general procedures including chemical safety rules and requirements. ◦ If workers at their companies are generally familiar with the chemical safety requirements associated to the tasks they perform. ◦ If workers at their companies are generally able to read and understand the contents of MSDS.
Other comments	• Participants should be encouraged to engage during the presentation on the rationale and aims of best practice procedures. Suggestions on alternatives to the implementation of written best practice procedures should be welcomed but careful compared with the advantages provided by implementing best practice procedures. • Discussion should be fostered among participants on the main perceived hindrances and opportunities for the successful implementation of best practice procedures at site, taking into consideration local cultural context, level of education of workforce, and literacy issues. • This session relates to the Tool 4.1 Best Practices Procedures (from the Responsible Production Toolkit)
References	• *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises – Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006 • *Guide to Developing Effective Standard Operating Procedures for Fire and EMS Departments*, Federal Emergency Management Agency, United States Fire Administration, 1991

Session title	**16 BASIC OVERVIEW OF OTHER RP TOOLS (RISK COMMUNICATION, PREPARING PRODUCT RISK INFORMATION, AND PROCUREMENT)**
Background	• Risk communication materials are aimed at promoting stakeholders' understanding on the potentially dangerous properties of chemicals being handled at a particular operation, and their associated risks. • The aim of preparing chemical product risk information is to ensure that all of the information needed to ensure proper use and minimum risk is communicated to all stakeholders. For this, chemical product risk information should be as complete and transparent as possible while at the same time being clear and simple to understand. • In its wider context, sustainable procurement is about the process of purchasing goods and services that take into account the social, economic and environmental impact that such purchasing has on people and communities. Taking chemical safety and environmental protection issues into consideration in purchasing decisions allows companies to move towards sustainable procurement.
Objectives	• To provide participants with a basic understanding of the approach provided in the Responsible Production Toolkit for Risk Communication, Preparing Product Risk Information, and Procurement.

Minimum duration	• 1 hour
	  • 20 minutes presentation on Risk Communication
	  • 20 minutes presentation on Preparing Product Risk Information
	  • 20 minutes presentation on Procurement

Contents	• PPT presentation on risk communication, including:
	  • Aims and rationale of risk communication
	  • Responsible Production approach for providing risk information to stakeholders
	  • Assessing stakeholders needs and concerns
	  • Developing risk communication materials
	  • Communicating information on chemical risks
	• PPT presentation on preparing product risk information including
	  • Identifying needed product risk information
	  • Establishing information standards and regulations
	  • Developing a product information plan
	• PPT presentation on procurement including
	  • Sustainable procurement of chemical products and related services
	  • Example of procurement checklists for supply and transport of hazardous chemicals

Suggested approach	• Follow the presentation provided for the session on: Basic Overview of other Responsible Production Tools (Risk Communication, Preparing Product Risk Information, and Procurement). • Introduce participants to the session by discussing the aims and rationale behind risk communication. • Chemical risk communication includes all exchanges among relevant stakeholders about health and environmental concerns related to chemical substances.

	• In a broad sense, risk communication materials are aimed at promoting stakeholders understanding on the potentially dangerous properties of chemicals being handled at a particular operation, and their associated risks.
	• Explain to participants that any interested stakeholder group may initiate risk communication activities. However, it is industry and governments, which have an explicit duty to engage in good risk communication practices in a timely fashion. This duty derives from their associated responsibility to manage risks in the public interest. Some of the specific areas of responsibility are as follows:
	  • The chemical industry and its representing associations have the primary responsibility for risks associated with chemical products, the processes that produce them, and the substances they contain.
	  • Governments have co-responsibility for those products and process risks that are the subject of regulations, and primary responsibility for all public health risks and environmental risks broadly considered, especially where multiple causative factors may be involved.
	  • Public interest groups, as well as non-governmental organisations, have a responsibility to alert public officials, industry, and consumers about potential risks and to communicate their evaluations of risks and practices to the various actors involved.
	  • The media and public educators have a responsibility to convey the messages that they receive or that they have actively investigated to their targeted audiences.
	  • Finally, consumers have a responsibility to be aware of the risk communication information about products, and to notify appropriate authorities of their concerns about possible harmful effects, which they associate with product usage. Consumers should inform industry and public authorities promptly about such concerns, so that potential risks can be evaluated and, if necessary, corresponding management measures taken.
	• Continue following the suggested support presentation and discuss the following potential benefits that may result from mutual risk communication efforts:
	  • First, consumers may be better informed of how to protect themselves and how to distinguish between reliable and unreliable information.
	  • Second, managers can gain a better idea of the concerns and preferences of consumers, stakeholders, and other public partners.
	  • Third, through effective risk communication, early warning signals can be delivered to the appropriate agencies enabling them to take actions that can limit any occurring damage.
	  • Finally, ongoing continuous multi-party risk communication enhances an atmosphere of trust and mutual respect that is essential for co-operation and joint problem solving, in particular in crisis situations.
	• The Responsible Production approach differentiates two types of efforts for providing adequate risk information to stakeholders:
	  • Risk communication; and
	• Product risk information
	• Whilst product risk information focuses mainly on products and consumers, risk communication addresses all stakeholder groups.

	• Taking this into account, there are two tools within the Responsible Production Toolkit which, while related, have different focuses:
	  • Tool 4.3 Risk communication:
	  • focuses on both internal and external stakeholders needs; industry-driven, and process-oriented.
	  • aims to provide adequate risk information to each relevant stakeholder (along with information on best practices and control measures) on the chemicals being handled, produced and marketed in a company's operations.
	  • Tool 4.4 How to prepare product risk information:
	  • focuses on consumers; industry-driven, and product and consumer-oriented.
	  • aims to provide consumer product information, within the relevant standards or regulations that control the use of words, phrases and symbols in product risk information.
	• Keep following the suggested support presentation and guide participants through each of these two tools.
	• Start with the approach proposed by Tool 4.3 Risk Communication and guide participants through each of its 3 steps. These fall basically under the following sets of activities:
	  • Assessing stakeholders needs and concerns
	  • Developing risk communication materials
	  • Communicating information on chemical risks
	• Explain to participants that – as the other tools in the Responsible Production Toolkit, Tool 4.3 Risk Communication builds upon the outputs of applying previous tools. To review the needs and concerns of stakeholders, companies should go through some of the information already produced by applying the tools in Sections 1 and 2 of the Responsible Production Toolkit, namely:
	  • Risk Analysis
	  • Hazard Hotspots Map
	  • List of Relevant Stakeholders
	  • Chemical Control Action Plan
	  • Emergency Plan
	• At this point companies may want to take into consideration two broad groups of stakeholders for which they may need to develop risk communication materials:
	  • Internal stakeholder such as workers and permanent or long-term contractors; and
	  • External stakeholders ranging from suppliers, transporters, neighbouring facilities, adjacent communities, and end customers.
	• Explain to participants that stakeholder evaluation and profiling will help companies to better focus on which stakeholders should be considered/ prioritized when preparing risk communication materials.
	• As for the developing of the materials, explain to participants that companies may have to develop specific risk communication messages for each of the relevant (internal and external) stakeholder groups, and take into account their concerns and needs, particularly with regard to the risks that they may be exposed to as a direct or indirect effect of the company's operations and products.

	• Continue following the suggested support presentation and present the following general rules for all types of risk communication challenges:
	  • Simplify messages as much as possible without being inaccurate.
	  • Assume absence of technical knowledge about the issue.
	  • Anticipate the interests and needs of target groups and design risk communication messages to match their needs.
	• When dealing with specific risk issues, consider the following rules:
	  • Place risk in the social context. Relate risk information to the real world of the audience.
	  • Be cautious with using risk comparisons in the message.
	  • Address the qualitative characteristics that people associate with risk.
	  • Point out the importance of exposure and dose when communicating about risks.
	• Be sure to include all the relevant information in the risk communication messages. In particular, one may want to:
	  • Distinguish clearly between hazard (the type(s) of possible harms) and risk (the likelihood to suffer those harms).
	  • Specify what is known about exposures and whether sensitive populations (especially children) are likely to be exposed.
	  • Provide a justification for what is thought to be a tolerable or acceptable level of risk in this case.
	  • Provide a clear and compelling justification for the type of action response that has been chosen or recommended to address a particular risk.
	• The last step is making the risk communication messages available to the stakeholders Some communication methods include:
	  • Bulletins, letters, brochures, and reports
	  • Provide product risk information, guidance on self-handling and disposal on the company website
	  • Speeches, participation in conferences and public presentations.
	  • Open houses and facility tours
	  • One-to-one meetings
	  • Public meetings and workshops
	  • Stakeholder advisory forums
	  • Providing the contact information for a responsible person within the company who will be available to answer questions about the company's chemicals
	• Move on to the presentation on 'Preparing Product Risk Information'.
	• Explain to participants that communicating risk appropriately to consumers is a very challenging task, as consumers are often unfamiliar with the approaches used to assess the risk posed by a product.
	• By providing effective product risk communication companies can:
	  • Ensure that consumers are aware of the risks associated with a product and thereby use it safely.
	  • Build public confidence in appropriate risk management decisions and the associated related risk/benefit considerations.
	  • contribute to the public's understanding of acceptable risks.

	• Provide fair, accurate, and appropriate information, so that consumers are able to choose among a variety of products that can meet their own "risk acceptance" criteria. • It is important that participants are aware that product information is often subject to standards or regulations that control the use of words, phrases and symbols. Companies should take into consideration the applicable legal and normative requirements and consult their suppliers, customers and industry associations if needed. Standards, industry codes, laws and regulations must be met in order to successfully market company's products. • Continue following the suggested support presentation and guide participants through the tool provided in the Responsible Production Toolkit for Preparing Product Risk Information. This tool considers the following sets of activities: • Identifying needed product risk information. • Establishing information standards and regulations. • Developing a product information plan. • For identifying needed product risk information, companies should take into consideration: • Product specification information, including hazardous material information and emergency response information. • Product labels, brand names and logos. • Instructions for transport, storage, use and disposal. • Customer service contact information. • As for establishing information standards and regulations, point out to participants that companies should careful consider: • Information requirements under national and international regulations and codes such as REACH and the GHS. • Fair trading practice standards and regulations. • Standards and regulations for the use of words, phrases and symbols (e.g. product labelling standards, product certification requirements etc). • Finally, application of the tool provided in the Responsible Production Toolkit leads to the development of a product information plan. This plan should aim at making the product easy to understand and use, and meet all information standards requirements and contractual requirements (brands, logos etc). • Conclude the presentation on preparing product risk information by going through the list of information the plan should aim at providing for each product: • Information to be included on the packaging. • Information to be included on the product itself (if required). • Information to be included with the product (e.g. instructions). • Information that can be used for sales and marketing purposes. • Information that can be used for public relations purposes. • Information that can be used by customer services. • Move now to the final presentation under this session – on sustainable procurement of chemical products and related services

	• Follow the suggested support presentation and guide participants through the tool provided in the Responsible Production Toolkit for preparing the Procurement Checklist. This tool considers the following sets of activities:
	  • Establishing a procurement policy
	  • Complying with legal and regulatory requirements
	  • Preparing procurement checklists
	• Explain to participants that a procurement policy should be drafted and discussed it with top management. The draft should integrate the need for safety considerations and environmental protection requirements in the procurement of chemicals and related services.
	• It is very important that all legal and regulatory requirements are complied with when buying chemical products, and related services. Participants should have in mind that often companies and/or sectors may be subscribing to some code of practice with specific requirements for procurement systems. These should clearly be reflected in the procurement policy.
	• Keep following the suggested support presentation and discuss with participants the following guidelines for preparing procurement checklists:
	  • Taking the commitments expressed in the company procurement policy, procurement checklists should be prepared for each hazardous chemical and service contracted related to the supply, transport or processing of chemicals at company's operations.
	  • For this it is very important that each chemical product and service the company is procuring is carefully evaluated.
	• Invite participants to discuss with you the following general questions and guiding principles, and engage them in reflecting upon some of the principles below in procurement practices and checklists:
	  • Do you really need this product in the first place or could you use less? The best environmental option is to purchase and use less.
	  • Procure goods and services, which reflect up-to-date specifications or standards for environment and sustainability.
	  • Prohibit the use of products that are potentially damaging to the environment where a less environmentally damaging alternative is available.
	  • Specify products that are the most energy efficient, both in their manufacture and operation.
	  • Specify products that cause minimal damage to the environment in their manufacture, distribution, use and disposal.
	  • Is the product excessively packaged? This wastes resources but it also costs to dispose of it.
	  • Will the product require special disposal arrangements?
	  • Where possible purchase local products and services.
	  • Does the product come with full information?
	  • Where possible use products with recognized certification marks.
	• Most of the time companies will not be able to discontinue the procurement of hazardous chemicals nor find available alternatives, so procurement checklists will need also to take into account specific measures for reducing risks that can not totally be avoided.

	• Present the following requirements as examples that could be included in a procurement checklist for the supply and transport of hazardous chemicals. ☐ Hazardous chemicals should only be purchased from dependable, reputable manufacturers, suppliers and distributors who assure the health and safety of their employees, and operate in such a way as to prevent accidents that may affect the public and the environment. ☐ A procurement contract should be developed and signed between parties. Proper procurement of hazardous chemicals through an appropriately structured procurement contract will ensure that risks associated with the distribution, transportation and off-loading of hazardous chemicals are effectively controlled and managed. ☐ Product delivery documentation should correctly identify the hazardous chemicals being carried in order to ensure that proper response action can be taken in cases of vehicle accidents and that proper off-loading, placement and storage at final destination can occur. ☐ Guarantees should be obtained from suppliers and/or distributors, that packaging and transport containers comply with specifications under national legislation on road transport of dangerous goods, and that containers are leak free and watertight, to prevent spillage into the environment and public domain. ☐ Off-loading agreements should be established specifying the requirements needed to ensure the safe transfer of hazardous chemicals from the supplier delivery vehicle into the storage facility. ☐ Effective communication systems and procedure need to be in place to allow for changes to agreed delivery schedules. ☐ Procurement contracts should include the supply of risk assessments of routes to be used for delivery of the hazardous chemicals by supplier and distributors. ☐ Where suppliers and distributors subcontract a transporter to distribute the hazardous chemicals, guarantees should be obtained that this service is performed by a competent and safe operator. • Invite participants to comment, discuss and add onto the provisions of the generic checklist above, and to present their views on the obstacles and opportunities for implementing these type of checklists, and other supply-chain management tools already being implemented at participants' companies. • Conclude the presentation by highlighting that when developing procurement checklists, companies should be careful not to specify sustainable products by brand name. Particular brands may only be available from one source and this would be anti-competitive. Instead it should be specified what products do as this will allow all contractors equal opportunity to supply products that meet the required specification.
Assessment of participants	• During the session, ask participants: ◦ For examples of initiatives from their companies regarding risk communication (including communication approaches, stakeholders addressed, obstacles to communication, and measurement of results). ◦ On what standards and regulations their companies are required to follow in order to prepare product risk information.

	• If they know of chemical safety requirements being considered in their companies' procurement practices. • For their opinion on the capacity of their companies' suppliers and contractors in upgrading their safety practices to respond to stricter procurement policies.
Other comments	• Participants should be encouraged to engage during the presentations. Engagement of participants can be fostered by posing them with questions and inviting their opinions on the topics being presented. In particular, issues such as (i) "risk communication vs. community resistance to operations"; (ii) "Improved product risk information vs. cost-control"; and (iii) "improving procurement practices vs. capacity of suppliers and service providers" should foster participants' engagement in discussion. • Discussion should be fostered among participants on the main perceived hindrances and opportunities for the successful implementation of risk communication efforts, product risk information schemes, and improved procurement practices. • This session relates to the Tool 4.3 Risk Communication, Tool 4.4 Product Risk Information, and Tool 4.5 Procurement Checklists (from the Responsible Production Toolkit).
References	• *Guidance Document on Risk Communication for Chemical Risk Management,* Organisation for Economic Co-operation and Development (OECD), 2002 • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *GTZ Chemical Management Guide for Small and Medium Sized Enterprises - Improve Chemical Management to Gain Cost Savings, Reduce Hazards and Improve Safety*, GTZ, 2006

Session title	**17 PERFORMANCE ASSESSMENT AND EXTERNAL COMMUNICATION OF COMPANY ACHIEVEMENTS**
Background	• Conducting periodic assessments of performance allows for the provision of an overall picture of performance and to support continual improvement. • Periodic performance assessment is supposed to take place in addition to ongoing monitoring, and form the basis for communicating achievements to stakeholders. This in turn plays an important role in gaining and maintaining public trust and engagement. • External communication on performance and achievements requires a clear understanding of the stakeholders being addressed, their information requirements, and of the best way to present it. • Finally, it is one thing to communicate, it is quite another to do it in a transparent and credible way. More and more organizations are using independent assurance to validate what they are saying.
Objectives	• To provide participants with a basic understanding of the approach provided in the Responsible Production Toolkit for performance assessment, external communication of achievements, and independent assurance.

Minimum duration	• 1 hour
	  • 20 minutes presentation on performance pssessment
	  • 20 minutes presentation on external communication of company achievements, and independent assurance
	  • 20 minutes group exercise: preparation of basic performance assessment checklists

Contents	• PPT presentation on performance pssessment, including:
	  • Aims and rationale of assessing performance.
	  • Responsible Production approach for performance pssessment.
	  • Indicators for assessing performance chemical safety management along the value chain.
	• PPT presentation on external communication of company achievements, and independent assurance:
	  • Aims and rationale of communicating company achievements.
	  • Targeting stakeholder groups.
	  • Selection of communication media.
	  • Developing a performance report.
	  • Engaging on an independent assurance process.
	• Hand-out to support group exercise on preparation of basics performance assessment checklists.

Suggested approach	• Follow the presentation provided for the session on performance assessment and external communication of company achievements. • Introduce participants to the session by discussing the aims and rationale of assessing company performance.

	• Explain to participants that periodical assessing of performance:
	  • Allows companies to timely detect deviations and non-compliances with best practices, standards, and regulations.
	  • Documents lessons learnt and achievements on chemical safety.
	  • Raises awareness of workers, business-partners, and other relevant stakeholders to procedures and best practices.
	  • Supports monitoring of performance objectives.
	  • Feeds into companies' planning on chemical safety management.
	  • Supports continual improvement.
	  • Provides data for external communication efforts.
	• Keep following the suggested support presentation and move onto the Responsible Production approach to evaluating performance and management practices.
	• Move onto the slide with the proposed assessment chart under Tool 5.1 Performance Assessment Protocol of the Responsible Production Toolkit, and discuss it with participants.
	• Do the same for the proposed assessment chart under Tool 5.2 Management assessment protocol.
	• Note to participants that the approaches above are strongly based upon and linked to the implementation of the chemical control action plan developed according to the Responsible Production approach, and therefore consist mainly of generic tools for following-up and managing performance and management objectives.
	• To fully evaluate performance and achievements on promoting chemical safety management along the value-chain, companies need to have developed objectives and targets, and to develop indicators suitably tailored to their type of operations and facilities. These in turn can assist managers in further defining/framing objectives and targets that can be evaluated by applying the above tools.
	• Keep following the suggested support presentation and present to participants the following list of generic indicators that can be considered:
	  • Reduction of chemical inventories as measured by:
	  • Quantities of hazardous chemicals in storage and shop-floor areas.
	  • Types of hazardous chemicals in storage and shop-floor areas (using the Chemical Inventory prepared within the approach provided in the Responsible Production Toolkit).
	  • Reduction of chemical risks as measured by:
	  • Risk factor (assigned using the risk analysis tool provided in the Responsible Production approach).
	  • Number of dangerous chemical(s) product substituted by less dangerous materials.
	  • Number of process steps simplified to reduce complexity.
	  • Number of process steps moderated (i.e. changes to processes or to the form of chemical raw materials/products so they are less harmful; introduction of catalysts to help process chemicals at lower temperatures and pressures approaching ambient; etc.).
	  • Number of improvements to logistics and layout aimed at simplifying the transport of chemical products, separating personnel from the most hazardous areas, etc.

	• Extent of interaction and collaboration with business partners. • Extent of interaction and collaboration with public authorities communities and other relevant stakeholders leading to improved chemical safety and reduction of chemical risks to local communities. • Improvement in workers knowledge on chemical hazards and risks (measured by number of employees trained on chemical hazards and risks, results of training sessions, etc.). • Improvement in business partners knowledge on chemical hazards and risks (measured by number of employees trained on chemical hazards and risks, results of training sessions, number of awareness campaigns and related results from surveys and questionnaires, etc). • Availability of tools for fostering improved chemical safety along the value-chain (measured by number of Best Practice Procedures developed and implemented, etc.) • Reduction of the frequency of accidents and near-misses, and their severity. • Reduction of injuries and fatalities from chemical accidents occurring at site and along the company's chemical product value chain. • Reduction of environmental impacts from chemical accidents occurring at site and along the company's chemical product value chain. • Reduction of property damage from chemical accidents occurring at site and along the company's chemical product value chain. • Improvement in response to chemical accidents occurring at site and along the company's chemical product value chain (reduction of delay and increased efficiency). • Reduction of the impact zone of chemical accidents occurring at site and along the company's chemical product value chain (distance). • Reduction of the number of people affected by chemical accidents occurring at site and along the company's chemical product value chain (e.g., numbers subject to evacuation or shelter in place orders). • Risk information provided along the company's chemical product value chain (measured by the number of risk communication messages prepared and delivered to relevant stakeholders, the number of products with complete risk information, etc. • External communication on chemical safety management (measured by the number of performance reports developed and published, etc.) • Move onto the suggested support presentation on external communication of company achievements and independent assurance • Discuss with participants the aims and rationale for communicating company achievements. Involving stakeholders is not a one way street. If companies have involved stakeholders in helping to identify issues and plan for improved chemical safety along the value-chain and in the community, these will be expecting feedback from the companies on progress and results. • Highlight to participants the following reasons for communicating company achievements to external stakeholders: • Companies need to respond to the stakeholders they have engaged.

	• Companies need to build stakeholders' trust in their capacity for assuring that chemicals and operations are handled in a safe way. • Companies need to be accountable for both shortcomings and successes. • Companies should promote efforts for annual communication on their performance to external stakeholders. At the same time, companies do not need to wait until there is a good story to tell or fully implemented systems. • Explain to participants that once companies have begun to engage stakeholders these will want to know where companies are on the journey for improved chemical safety and what was achieved. Stakeholders will want an honest statement of the current state of a company's chemical safety practices. If companies wait too long they will lose their stakeholders trust and willingness to engage. • The first thing to do is to identify and target the relevant stakeholder groups. Companies need to decide what audiences they need to communicate with. This will reflect their priority stakeholders. For this, companies should review their list of relevant stakeholders. • It is very important for companies to be aware of the expectations, capacity and access of their audiences, and tailor communications accordingly. • Keep following the suggested support presentation and discuss with participants the following items that should be considered when selecting communication media: • Level and type of information different audiences may want: • Information on company goals, objectives and targets and general assertions of performance? • Detailed technical data? • Forms of communications audiences may have access to: • The internet? • Public media (newspapers, TV and radio)? • Printed publications? • Public presentations? • Forms of communication audiences may see as credible: • Marketing materials? • Brochures and flyers? • Public announcements, press releases? • Assured report? • At this point in the presentation you may wish to engage participants by questioning them on: • What types of communication media listed above could work within their companies external communication efforts taking into account the relevant target audiences. • What types of communication media are their companies using in their external communication efforts (if any). • It is important for companies to assess if they will be able to use the same communications for all audiences (e.g. an annual report on chemical hazard performance, included as part of other annual reporting), or if they will need to develop different communications for different audiences.

	• Today most organizations have a communications plan that addresses the needs, level and access of different audiences in different ways – but this is typically supported by an authoritative independently assured report:
	  • The full annual report is typically published on a web site.
	  • A summary report is printed.
	  • Additional flyers, presentations and information in the public media are tailored for different audiences but are based on the information and data in the main report.
	• Continue following the suggested support presentation and move onto the topic on developing company performance reports. Point to participants that often companies will need to prepare additional materials to meet the needs of important stakeholders that will not be met by an annual report.
	• The first stage in developing a performance report is to ensure the availability of good quality information. By implementing the previous tools of the Responsible Production Toolkit, companies should have already identified the issues of main concern, developed goals, objectives, targets, plans and procedures for improved chemical safety, and implemented them. It is time now to "tell the story" to the relevant stakeholders.
	• To generate quality data for reporting on objectives and targets companies will need to evaluate management performance (objectives) and operational performance (targets).
	• Refer to participants the two evaluation protocols already mentioned in this session, which build on other Responsible Production tools and provide companies with the means to conduct periodic evaluations of the implementation of the Responsible Production approach. This information will provide the backbone for company communications. As stated before, it will also provide the pathway to continual improvement, the updating of objectives and targets and the revision of plans and procedures towards improved chemical safety management along the value-chain.
	• Move onto the next slide and present to participants the following list of elements that should be part of the company performance report:
	  • A statement of commitment from the CEO or equivalent.
	  • A review of the nature of the business.
	  • An explanation of how the company determined what issues are needed to manage and an explanation of the issues.
	  • An explanation of how stakeholders were involved.
	  • A description of company goals, objectives and targets.
	  • Information on how has the company performed against the goals, objectives and targets.
	  • A statement on future plans for improvement.
	  • A statement of future goals, objectives and targets.
	  • A statement on any standards or guidelines used for reporting.
	  • An independent assurance statement.
	• Explain to participants that the objective of independent assurance is to provide an independent assessment of the credibility of public communications about company performance. The outcome of independent assurance is typically a public assurance statement signed by the assurance provider and attached to the company public communication.

- Assurance provides significant internal benefits by providing an independent view of performance and the underlying systems and processes. This turns it into an excellent learning tool.
- Finally, conclude the presentation by briefly going through the following steps (as per the Responsible Production Toolkit) which companies may wish to consider when engaging on an independent assurance process:
  - STEP 1: DECIDING IF ASSURANCE IS IMPORTANT
    - Does the company need assurance to build credibility with external stakeholders?
    - Does the company need assurance as an internal learning tool?
  - STEP 2: DECIDING WHO THE AUDIENCE FOR ASSURANCE IS.
    - This will be related to the relevant stakeholder groups that comprise the company audience for communications (built upon the list of relevant stakeholders).
  - STEP 3: DECIDING WHAT TYPE OF ASSURANCE PROVIDER IS MOST CREDIBLE IN THE EYES OF THE AUDIENCE.
    - Assurance is typically provided by the following:
      i) Assurance providers working for accounting firms (e.g. the people who provide financial audits)
      ii) Assurance providers working for certification bodies (e.g. the people who provide ISO 14001 certification)
      iii) Assurance providers working for sustainability consultancies and NGOs (e.g. people who are known for their subject matter knowledge)
      iv) Expert panels made up of a diverse range of people who know the company business and its impacts.
  - STEP 4: IDENTIFICATION AND EVALUATION OF POSSIBLE PROVIDERS
    - Companies should evaluate assurance providers according to:
      i) Their knowledge and competence
      ii) Subject matter knowledge (chemical hazards and associated risks and impacts)
      iii) Assurance procedure knowledge
      iv) Sector and market knowledge
      v) Their experience – have they done this before
      vi) The credibility and reputation
      vii) Their independence and impartiality (they must be free from conflict of interest)
      viii) Their availability
      ix) Their cost
  - STEP 5: ENGAGING AN ASSURANCE PROVIDER
    - For this, companies should:
      i) Invite proposals
      ii) Evaluate the proposals
      iii) Select a provider

- STEP 6: NEGOTIATING THE CONTRACT
  - Companies should agree on the standards to be used for the engagement (e.g. AA1000AS).
  - Companies should agree on the scope of the assurance:
    - i) The subject matter to be covered
    - ii) The criteria to be used
    - ii) The organizational boundaries
    - iv) The time boundaries
  - Agreeing on the assurance team
  - Agreeing on the depth of investigation and level of effort (time to be allocated by the team)
  - Agreeing on the start and completion dates
  - Agreeing on the cost
  - Agreeing on dispute resolution procedures
  - Agreeing on what must be contained in the statement
- STEP 7: CONDUCTING THE ASSURANCE
- STEP 8: FINALISING AND PUBLISHING THE ASSURANCE STATEMENT
  - The assurance statement should include the following:
    - i) Title - Independent Assurance Statement
    - ii) Note on audience - If there is no list of intended users provided in the report, the organization leading the assurance engagement should consider identifying the agreed audience of the report in the assurance statement. Otherwise, a reference to the location of the list in the report can be useful to readers.
    - iii) Note on roles and responsibilities - The roles and responsibilities of the assurance provider and reporting organization should be clearly stated. The lead provider as well as the other experts on the team should be identified. The organization should identify who within the organization commissioned the engagement.
    - iv) Description of the scope of the assurance engagement - The statement should state which sections of the report are the subject of the assurance engagement. Any exclusions and limitations should be explained.
  - The statement should state how the report has defined:
    - i) the organizational boundaries;
    - ii) the period of time covered; and
    - iii) the subject matter covered (the identification of material issues is the responsibility of the organization).
  - Note on criteria - The statement should identify the criteria used for the engagement, their suitability and their source.
  - Disclosure of methodology - The statement should provide a description of the methodology used during the engagement. This should include:
    - i) The identification of the standards and principles used and how they were used (e.g. for reference or as the basis for determining compliance) including any limitations to use.

	ii) Commentary on the level of assurance obtained by the provider; iii) The evidence sought (quantity and quality of information); iv) A description of the evidence gathering methods, including the depth of investigation; and v) Any constraints or limitations on the access to or sufficiency of evidence. • Conclusions concerning the principles – At a minimum this should include conclusions on: i) The robustness of the process and systems used by the organization to determine material issues; ii) Any material omissions or misstatements; iii) The robustness of the process and systems used to understand as completely as possible the impacts and opportunities associated with material issues; iv) The reliability of the data and information; v) The robustness of the process and systems used to identify responses; vi) The responses provided (i.e. objectives, targets) in relation to stakeholder interests. • Findings, commentary and recommendations – This should include: i) Findings concerning assertions relating to compliance to agreed standards, codes, regulations and policies; ii) Commentary and recommendations on areas of past and future improvement; iii) Commentary and recommendations on current and future values & strategy; iv) Commentary and recommendations on report and assurance scope. • Disclosure on competencies, impartiality and independence – This must be provided for all assurance providers and experts involved in the assurance process. • Signature – name of the lead assurance provider, date and location of the organization
Suggested approach to the Group exercise	• Go through the support exercise provided (group exercise – preparation of basic performance assessment checklists). Note: this exercise does not require the support of the mock case-study introduced in Session 2 Responsible Production and used throughout the course. • The aim of this exercise is to make participants familiar with the approach proposed in the Responsible Production Toolkit for the development and implementation of performance and management assessment. • For this, each participant/group of participants will be asked to develop a basic performance assessment checklists, taking into account: • The chemical control action plan developed under Session 11 (chemical control action plans) of this course. • The tools proposed in the Responsible Production Toolkit for assessing company performance and management (Tools 5.1 Performance Assessment Protocol and Tool 5.2 Management Assessment Protocol presented and discussed in this session).

	• The list of generic indicators presented in this session. • Depending on the numbers of participants you may wish to divide them in small groups. • Explain to group participants that the objective is to prepare performance assessment protocols/checklists based on the rough chemical control action plans they have developed under 11 of this course. • Criteria for forming groups should be similar processes or activities between participants' companies. Nonetheless, it is not a problem if participants in the same group come from different organizations. • **Give participants 20 minutes to go through the following tasks:** 1) Review of chemical control action plans 2) Listing of objectives and targets in the relevant assessment protocols 3) On the performance assessment protocol assume the following rates of performance, and think of follow-up actions that could be required • 25%; 50%; 100% 4) On the management assessment protocol think of some areas where objectives may have not been achieved, and then think of follow-up actions that could be required
Assessment of participants	• During the session, ask participants : • On their companies practices on performance assessment. • If their companies have issued performance reports aimed at external stakeholders. • If their companies have used independent assurance of their performance report. • For their opinion on the advantages and disadvantages of communicating performance to external stakeholders.
Other comments	• Participants should be encouraged to engage during the presentations. Engagement of participants can be fostered by posing them with questions and inviting their opinions on the topics being presented, and in particular: • On the applicability to their companies of the Responsible Production approach for external communication of performance. • On the user-friendliness and usefulness of the performance assessment charts made available in the Responsible Production Toolkit. This session relates to the Tool 5.1 Performance Assessment, Tool 5.2 Management Assessment, Tool 5.3 External Communications, and Tool 5.4 Independent Assurance (from the Responsible Production Toolkit).
References	• *Guidance on Safety Performance Indicators* (2003) Organisation for Economic Co-operation and Development (OECD) • *Responsible Production Toolkit*, United Nations Environment Programme (UNEP and AccountAbility) • *AA1000 Assurance Standard* (2003), AccountAbility • *The Future State of Assurance* (2005), AccountAbility and ACCA • *G3 – Sustainability Reporting Guidelines* (2006), Global Reporting Initiative (GRI)

Session title	18 CONCLUSIONS
Objectives	• To evaluate the course and provide opportunity for participants' feedback on course materials and approach, usefulness of tools and technical materials, and ways for improving and better adapting the Responsible Production approach to the local context.

Minimum duration	• 1 hour
	  • 10 minutes closing the meeting: short summary and thanks.
	  • 15 minutes for participants course evaluation.
	  • 25 minutes discussion of participants feedbacks.
	  • 10 minutes on wrap-up and summary of actions for way ahead.

Contents	• Closure: last remarks, short summary and acknowledgments. • Filling of course evaluation questionnaires. • Discussion of participants feedbacks. • Way ahead: actions for improving the tools and technical materials, forthcoming trainings and implementation of the Responsible Production approach in the companies.
Assessment of participants	• Course evaluation form and discussion of participants feedbacks. • Ask participants on what actions will they take for implementing the relevant tools of the RP approach in their companies.

Other comments	• Participants should be encouraged to provide feedback on:
	  • barriers and opportunities for reaching out and engaging the value-chain in improved chemical safety management.
	  • the overall applicability of the Responsible Production approach in promoting chemical safety management along the value-chain.
	  • the overall applicability to their companies of the Responsible Production approach;
	  • barriers and opportunities for implementation of selected steps and tools of the RP approach at their companies.
	  • barriers and opportunities for identification and engagement of relevant stakeholder along the chemical industry value-chain.
	  • ways to improve the RP approach and its tools to better suit company needs for promoting chemical safety management and risk information along the value-chain.
	  • additional tools participants would like to see provided in the Responsible Production toolkit.
	  • adequacy of training materials, quizzes and exercises, training agenda, and examples provided during the course.

3.3 SUGGESTED PRESENTATIONS AND HANDOUTS

The suggested presentations and optional support handouts are attached to this file.

3.4 COURSE EVALUATION

Evaluation: Company Training Course

Kindly take a few moments to fill in this Evaluation Form. It will help us in assessing the usefulness of this training session. Do feel free to ask for any assistance if the need arises. Please be as specific as possible. Additional sheets will be provided to you if required. Thank you!

Information on the participant:

Name (optional): . . . . . .

Organization (optional): . . . . . .

Designation (optional): . . . . . .

Contact details at workplace (optional): . . . . . .

Date of course: . . . . . .

Have you had any previous exposure to the concepts being presented under the sessions that comprise this course?: Yes / No

If the answer to the above question is "Yes", please state which and how so?: . . . . . .

. . . . . .

For each statement below, mark the circle on the scale that corresponds to your opinion.

"1" indicating a "very poor" rating and "5" indicating an "excellent" rating.

1) Did the course meet your expectations?

	1	2	3	4	5	
No	○	○	○	○	○	Yes

Comments: . . . . . .

2) Will this course help you carry out your job?

	1	2	3	4	5	
No	○	○	○	○	○	Yes

Comments: . . . . . .

3) Were the course handouts adequate?

	1	2	3	4	5	
No	○	○	○	○	○	Yes

Comments: . . . . . .

4) For each course session, please rate the quality of the session, if the topic was treated in sufficient detail and what was learned.

Trainer	Quality of session					Knowledge gained or improved					Relevance to participants' occupation				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Introduction															
Responsible Production															
Chemical hazards at work															
Legal and regulatory requirements															
Hazard identification and classification															
Process and chemicals flow															
Chemical inventorying															
Risk analysis, hazard prioritization and identification of risk reduction actions															
Hazard mapping															
Stakeholders identification and engagement															
Chemical control action plans															
Training															
Emergency planning – Part 1															
Emergency planning – Part 2															
Best practices procedures															
Basic overview of other RP tools (risk communication, preparing product risk information, and procurement)															
Performance assessment and external communication of company achievements															
Conclusion															

Comments on course sessions

5) Which part of the course did you like most? . . . . . .

. . . . . .

. . . . . .

6) Which part of the course did you like least? . . . . . .

. . . . . .

. . . . . .

7) Were the exercises / case study useful?

	1	2	3	4	5	
No	○	○	○	○	○	Yes

Comments: . . . . . .

8) What can be done to improve the course?

Comments: . . . . . .

9) Would you recommend this course to others?

	1	2	3	4	5	
No	○	○	○	○	○	Yes

Comments: . . . . . .

10) What is your opinion on the advantages and disadvantages of implementing each section of the Responsible Production approach and Toolkit?

. . . . . .

. . . . . .

11) What possible barriers do you expect to find for the implementation of specific Responsible Production tools at your company?

. . . . . .

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12) What isolated steps of the Responsible Production Toolkit has your company already pursued? Would it be beneficial to move further onto a more systematic approach?

. . . . . .

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. . . . . .

13) What tool (or set of tools) do you consider to be the most important to implement presently at your company?

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14) What other tools would you like to see provided in the Responsible Production Toolkit? What formats would suit better your company needs?

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15) What do you perceive as the main barriers to successfully involving your company's relevant stakeholders for improved chemical safety and risk information along the value-chain?

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