OECD Guidance on
SAFETY PERFORMANCE INDICATORS

A Companion to the OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response

Guidance for Industry, Public Authorities and Communities for developing SPI Programmes related to Chemical Accident Prevention, Preparedness and Response

OECD

IOMC

(Interim Publication scheduled to be tested in 2003 - 2004 and revised in 2005)

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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This new *Guidance on Safety Performance Indicators* was prepared by an Expert Group under the auspices of the Working Group on Chemical Accidents that manages the OECD Programme on Chemical Accidents. The development of the *SPI Guidance* has been undertaken in close co-operation with other international organisations active in the area of chemical accident prevention, preparedness and response.

The Working Group agreed to the development of the *SPI Guidance,* as a companion document to the *OECD Guiding Principles on Chemical Accident Prevention, Preparedness and Response,* based on a proposal by Marcel Chapron, representative of France. *The SPI Guidance* benefited from the extensive knowledge and experience of members of the Expert Group, which consisted of representatives of OECD and observer countries, industry, labour, non-governmental organisations and other international organisations. The group, chaired by Kim Jennings (US EPA), met six times between 1999 and 2002, at the kind invitation of Canada, Italy, the US and the European Commission. Members of the Expert Group were: Wayne Bissett, Eric Clément, Jean-Paul Lacoursière and Robert Reiss (Canada); Jukka Metso (Finland); Marcel Chapron, David Hourtolou and Olivier Salvi (France); Frauke Druckrey and Mark Hailwood (Germany); Paola de Nictolis, Roberta Gagliardi, Giancarlo Ludovisi, Natale Mazzei and Raffaele Scialdoni (Italy); Jen-Soo Choi, Soon-Joong Kang, Jae-Kyum Kim, Ki-Young Kim, Hyuck Myun Kwon, and Sueng-Kyoo Pak (Korea); H.S. Hiemstra, Joy Oh and Eveline van der Stegen (the Netherlands); Mieczyslaw Borysiewicz and Barbara Kucnerowicz Polak (Poland); Josef Skultety (Slovak Republic); Anders Jacobsson (Sweden); David Bosworth (United-Kingdom); Kim Jennings, Kathy Jones and Robert Smerko (United-States); Juergen Wettig (European Commission); Sigal Blumenfeld (Israel); Simon Cassidy, Stephen Coe and Willem Patberg (BIAC); Ralph Arens, Roland Fendler, Angelika Horster, Apostoslos Paralikas and Mara Silina (EEB); and Reg Green and Brian Kohler (TUAC). In addition, Dafina L Dalbokova and Dorota Jarosinka (WHO-European Centre for Environment and Health) participated in the review process.

The three main sections of the *SPI Guidance* were drafted by Anders Jacobsson (Sweden) for Part A on Industry; Kim Jennings (US) for Part B on Public Authorities; and Jean-Paul Lacoursière, Robert Reiss and Eric Clément (Canada), for Part C on Communities.

Francine Schulberg (OECD Consultant) was responsible for writing the introductory sections, compiling the annexes and editing the document. Peter Kearns, Béatrice Grenier and Marie-Chantal Huet (OECD Secretariat) assumed an oversight role throughout the process, under the supervision of Robert Visser. The format was developed by Fatiha Caid-Lecland.

The web-based, interactive version of the *SPI Guidance* was developed with the support of the US EPA (led by Kim Jennings) with the assistance of Francine Schulberg.

A brochure for the promotion of the second edition of the *SPI Guidance* and the *Guiding Principles for Chemical Accident Prevention, Preparedness and Response* (published in May 2003) and was developed thanks to Dana Robinson, Kim Jennings, Kathy Jones and Francine Schulberg (US).

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ABOUT THE OECD AND THE IOMC

The Organisation for Economic Co-operation and Development (OECD) is an intergovernmental organisation in which representatives of 30 industrialised countries (from Europe, North America, and the Pacific) and the European Commission meet to co-ordinate and harmonise policies, discuss issues of mutual interest, and work together to respond to international concerns. Most of the OECD's work is carried out by more than 200 specialised committees and subsidiary groups made up of member country delegates. Observers from several countries with special status at the OECD, and from interested international organisations, attend many of the OECD's meetings. Committees and subsidiary groups are served by the OECD Secretariat, located in Paris, France, which is organised into Directorates and Divisions.

The work of the OECD related to chemical accident prevention, preparedness and response is carried out by the Working Group on Chemical Accidents (WGCA), with Secretariat support from the Environment, Health and Safety (EHS) Division of the Environment Directorate.

The objectives of the Chemical Accidents Programme include development of guidance materials related to chemical accident prevention, preparedness and response, exchange of information and experience, and analysis of specific issues of mutual concern in OECD member countries. In this context, more than fifteen workshops and special sessions have been held since 1989.

As part of its work on chemical accidents, the OECD has issued several Council Decisions and Recommendations (the former legally binding on member countries), as well as numerous Guidance Documents and technical reports. In particular, the OECD has published the 2nd edition of the *Guiding Principles for Chemical Accident Prevention, Preparedness and Response* (2003). Additional publications include *Guidance Concerning Chemical Safety in Port Areas* (a joint effort with the IMO); *Guidance Concerning Health Aspects of Chemical Accidents*; the joint OECD/UNEP/OCHA *International Directory of Emergency Response Centres*; and reports of the various workshops.

This publication was produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC). The IOMC was established in 1995 by UNEP, ILO, FAO, WHO, UNIDO and the OECD (the Participating Organisations), following recommendations made by the 1992 UN Conference on Environment and Development to strengthen co-operation and increase international co-ordination in the field of chemical safety. UNITAR joined the IOMC in 1997 to become the seventh Participating Organisation. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organisations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

Obtaining OECD Publications: The *Guidance on Safety Performance Indicators* and the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response* are available electronically, at no charge. For the complete text of this and many other EHS publications, consult the OECD's web page (www.oecd.org/ehs/) or contact: OECD Environment Directorate (Environment, Health and Safety Division), 2 rue André-Pascal, 75775 Paris Cedex 16, France. Fax: (33) 1 45 24 16 75. E-mail: ehscont@oecd.org.

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i. OVERVIEW/EXECUTIVE SUMMARY

Introduction

This Document was designed to serve as a tool to assist industrial enterprises, public authorities, and communities near hazardous installations world-wide develop and implement a means to assess the success of their chemical safety activities. The guidance does not define a precise methodology, but rather provides **guidance on how to develop and use safety performance indicators** including the general elements of Safety Performance Indicators (SPI) Programmes.

This Document is NOT prescriptive; rather, it provides suggestions related to the elements that might be included in a voluntary SPI Programme and provides general guidance on the process of establishing and implementing such a Programme**.** In reviewing this Document, it is important to keep in mind that not all elements of the guidance will be appropriate in each situation. **It is up to each reader to create a Programme that is appropriate for their particular organisation by:**

- **reviewing the guidance carefully;**
- **selecting those elements that are relevant in their circumstances;**
- **adapting the elements to be consistent with their organisations' vocabulary, policies and procedures; and**
- **developing metrics for measuring trends over time.**

Given the scope and length of this Document, it may appear that implementation of an SPI Programme is a daunting process. However, each enterprise/organisation should use only those parts of the Document that are useful to its own situation. Furthermore, an SPI Programme can be implemented in steps, starting with a limited number of subjects, and expanding the Programme as experience is gained.

The Document is a companion to, and builds on, the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response* (2nd edition, 2003).[1] In addition, it is intended to be consistent with, and complementary to, related international initiatives in the public and private sectors.[2]

What are Indicators?

For purposes of this Document, the term "indicators" is used to mean observable measures that provide insights into a concept – safety[3] - that is difficult to measure directly. Examples of two types of indicators are included in the Guidance: "activities indicators" and "outcome indicators":

- Activities indicators are designed to help identify whether enterprises/organisations are taking actions believed to lower risks (*e.g.*, the types of actions described in the *Guiding Principles*); and
- Outcome indicators are designed to help measure whether such actions are, in fact, leading to less likelihood of an accident occurring and/or less adverse impact on human health or the environment from an accident.

GENERAL OUTCOME INDICATORS FOR CHEMICAL SAFETY

The following is a list of general outcome indicators that apply to all stakeholders. These can, if measured over time, show if chemical safety has improved. When taken with other outcome indicators, it can present a picture of chemical safety in the broadest sense as well as show how industry, public authorities, and communities effect the improvement of chemical safety.

(i) Reduction of chemical risks at hazardous installations (as measured by, e.g.: risk assessments; reduction of chemical inventories; reduction of adverse impacts from accidents; improvement in processes and process techniques; reduction of vulnerability zones; and improved transportation).

(ii) Extent of interaction and collaboration of public authorities, industry, and communities leading to improved safety of hazardous installations and reduction of chemical risks to local communities.

(iii) Reduction of the frequency of accidents and near-misses, and their severity.

(iv) Reduction of injuries and fatalities from chemical accidents.

(v) Reduction of environmental impacts from chemical accidents.

(vi) Reduction of property damage from chemical accidents.

(vii) Improvement in response to chemical accidents (reduction of delay and increased efficiency).

(viii) Reduction of the impact zone of chemical accidents (distance).

(ix) Reduction of the number of people affected by chemical accidents (e.g., numbers subject to evacuation or shelter in place orders).

Key Stakeholders

As described more fully below, this Guidance Document has broad application for:

- industrial enterprises that produce, use, handle, store, transport or dispose of hazardous chemicals (whether publicly or privately owned);
- public authorities at all levels with responsibilities related to prevention of, preparedness for, or response to chemical accidents; and
- communities/public, in particular communities where hazardous installations are located and that may be affected in the event of a chemical accident.[4]

While enterprises have primary responsibility for the safety of the installations they operate, each of the three stakeholders groups (industry, public authorities and communities) have key roles in promoting chemical safety and implementing measures with the objective of reducing the likelihood of chemical accidents and/or improving accident preparedness and response. Although these measures are designed to improve safety, it is not simple to determine whether the desired objectives are being met.

To be able to assess their success in improving safety, the first step to be taken by industry, public authorities, and communities is to establish chemical safety goals and objectives for their organisations, as well as infrastructures for implementing those goals and objectives.

It is important to emphasise that implementing an effective SPI Programme requires a clear commitment by the management of an enterprise/organisation, along with an allocation of financial and human resources. It will involve representatives of different parts of the enterprise/organisation. Furthermore, it is not a one-time activity; an underlying premise of this Document is that an SPI Programme needs to be applied periodically in order to measure improvements and other changes over time. It is also important to review the SPI Programme and revise/update it as experience is gained.

Industry, public authorities, and communities should work together in a co-operative and collaborative way. Industry can then achieve the trust and confidence of the public that they are operating their installations safely, public authorities can stimulate industry to carry out their responsibilities to ensure the safe operation of their installations by encouraging risk reduction, and communities can provide chemical risk and safety information to the potentially affected public thereby providing a basis for motivating industry and public authorities to improve safety.

Value of an SPI Programme

Since it is difficult to directly measure the success of actions taken to improve safety, the *Guidance on Safety Performance Indicators* was designed to help enterprises/organisations develop alternative means to measure performance. In so doing, enterprises/organisations can help identify what actions have been (or are likely to be) successful in improving safety. It can also improve understanding of whether goals established (by law/regulation, corporate policies, or community objectives) are being met.[5]

Thus, the guidance provides a tool for prioritisation and a basis for improving effectiveness of spending on safety-related expenditures and allocation of human and other resources. In addition, experience has shown that just implementing an SPI Programme leads to improvements because it raises awareness and improves understanding of safety-related issues among staff.

From the perspective of industry, safety performance indicators can be used to assess whether they are implementing appropriate chemical safety programmes and policies, and to help determine the extent

to which such programmes and policies are making a difference. In addition, performance indicators can identify whether there is an appropriate emphasis on different aspects of safety management and help set priorities for future investment of resources. Safety performance indicators can even provide an "early warning" of potential safety problems.

The use of safety performance indicators can facilitate co-operation and co-ordination between industry and public authorities, as well as foster improved relationships between industry and local communities. In addition, safety performance indicators can assist industry in reviewing chemical safety goals and objectives and test whether these are realistic and are being implemented successfully.

From the perspective of public authorities, safety performance indicators can provide a tool to respond to the question: what is our contribution to improved safety or, in other words, to assess whether their activities are leading to overall improvements in terms of, for example, safer facilities, improved response capabilities, and a better informed public.

The use of safety performance indicators can facilitate public authorities' relationship with industry by, for example, providing a basis for motivating industry to improve safety, helping to establish priorities for inspections, and identifying the areas that should be considered during inspections and reviews. In addition, safety performance indicators might provide a basis for facilitating communication with communities/public and other stakeholders concerning safety and help to identify gaps in regulations and policies.

From the perspective of the community in the vicinity of hazardous installations, safety performance indicators provide tools for the community to measure their own performance with respect to accident prevention, preparedness, and response. The objective of the community indicators is not to measure the performance of public authorities or the industry, but rather to measure the performance of the communities themselves.

It is based on the premise that there is a role for community-based organisations or committees in providing a liaison between the public and other stakeholders, in establishing conduits of information, in educating the public, and in stimulating public participation in relevant fora.

The use of safety performance indicators can facilitate communities' relationship with industry and public authorities by, for example, providing a basis for motivating industry and public authorities to improve safety. In addition, safety performance indicators might provide a basis for facilitating communication with other stakeholders concerning safety and can help to identify weaknesses.

ii. OBJECTIVES AND SCOPE

General

The overall objective of this Document is to assist industrial enterprises, public authorities, and communities in the vicinity of hazardous installations to establish and implement SPI Programmes. This should help the three stakeholder groups to assess their performance in the context of chemical accident prevention, preparedness and response. Specifically, it gives these stakeholders tools with which they can design their own SPI Programme by identifying key elements (targets, activities indicators, and outcome indicators).

This guidance should be used on a voluntary basis, only to the extent appropriate, and only when adapted to particular circumstances.

The OECD Working Group on Chemical Accidents decided to prepare this Document, based on shared experience and insights on safety performance indicators. This should help to improve the ability of interested enterprises, public authorities and community organisations to measure whether the many steps taken to try to reduce the likelihood of accidents, and improve preparedness and response capabilities, truly lead to safer communities and less risk to human health and the environment.

The ultimate measure of performance is the reduction in the number of chemical accidents or near misses that occur. However, significant accidents/near misses are relatively rare events that have a wide range of possible impacts, and can be caused by a complex combination of technical, organisational, and human failings. Therefore, simply measuring accidents/near misses does not provide sufficient information about what actions are successful in terms of improving levels of chemical safety. Furthermore, there is no way to measure the accidents that did not occur as a result of actions taken to improve safety. Therefore, this Document was designed to help enterprises/organisations develop alternative means to measure performance.

The Working Group developed this Guidance Document in order to provide ***a tool*** to be used by stakeholders, ***to the extent appropriate,*** when establishing Programmes to:

- determine how successful they have been in developing and implementing appropriate requirements (external and internal), policies and procedures designed to reduce the likelihood of accidents and improve preparedness and response capabilities (including, for example, *the OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response*); and

- assess whether actions taken to implement these requirements, policies and guidance truly lead to ***continuously improving levels of safety over time.***

This Document does not define a precise methodology; rather it provides suggestions of how to develop SPI Programmes, along with lists of the elements that could be used in such Programmes, based on the collective experience of experts in this field.

The guidance was developed to be comprehensive, recognising that not all the elements of the guidance are applicable in all circumstances; in fact, it is expected all the provisions would not be applicable in all situations. For example, a major producer of chemicals might be interested in the bulk of the elements contained herein and may, in fact, conclude that additional elements should be developed in light of its circumstances. A user of limited quantities of chemicals may find that only a small number of elements are relevant.

The guidance is designed to be flexible, so that it can be helpful to the range of concerned industries, public authorities, and communities worldwide. It is intended to complement other related activities, including industry initiatives.

Target Audiences

The target audiences for this Guidance Document parallel that of the *Guiding Principles, i.e.*, the three members of the "safety stakeholder triangle".

For industries, this guidance is designed for any enterprise that poses a risk of a significant accident involving hazardous chemicals. This includes any fixed facility that produces, processes, uses, handles, stores, or disposes of a quantity of hazardous substances such that there is a risk of a fire, explosion, spill or other release of hazardous chemicals.[6] It is not a question of the size of the enterprise, or whether the installation is publicly or privately owned; rather, the premise is that all hazardous installations should be expected to comply with the same overall safety objectives – that is the same expectation of safety – irrespective of size, location, or whether the installation is publicly or privately owned. This includes, for example, installations that are not part of the "chemical industry" but which, nevertheless, use hazardous chemicals, and storage facilities managed by municipalities.

For public authorities, the guidance is designed to be used by authorities at all levels (local, regional and national) and by the range of authorities involved in prevention, preparedness and response (including regulatory authorities, public health authorities and health providers, local governments, and response personnel).

For communities near hazardous installations, it is designed for the range of possible formal or informal organisations that represent their communities, or some segment thereof, with roles and responsibilities related to prevention, preparedness and response to accidents. For example, there may be a local committee established to represent others in their community (see, *e.g.*, Annex I for guidance on the "Creation of a Citizens Committee"). In some other areas, a community might be represented by local officials; in others it might be a grass roots, non-governmental organisation such as an environmental or citizen's rights groups.

THE SAFETY STAKEHOLDERS TRIANGLE

WHY DO WE INVOLVE AND MEASURE THE PERFORMANCE OF COMMUNITIES?

Since the 80's, many regulations and voluntary programmes have been developed worldwide on prevention, preparedness and response to chemical accidents. These have focused mainly on roles and responsibilities of industry and public authorities. Despite those important initiatives, there's been no observable reduction in the frequency of major chemical accidents, at least in the Canadian chemical industry (based on statistics from the Canadian Chemical Producers Association). Moreover, public authorities' resources to monitor safety of hazardous installations are not unlimited and authorities are not able to inspect and follow every single installation. Finally, transparency of information concerning risks is being sought by the communities in many countries.

For these reasons, and since the public and the environment could be affected by a chemical accident, communities should have access to information and be involved in prevention, preparedness and response related to accidents involving hazardous substances. The active involvement of the communities in the elaboration of, for example, accident scenarios, communication, audits and inspections, preparedness planning, and response actions is already in place in some countries and is achieving good results. Better informed and involved communities will likely lead industry to make improvements and provide a stimulus for enhanced dialogue among stakeholders. In addition, if communities have a better understanding of the chemical hazards, the consequences of accidents and what to do in the event of an accident, they are more likely to take actions that lead to risk reduction. An improved communication process also allows the public to focus on important issues rather than perception.

Format of the Document

The introductory information in this Document is designed to help readers understand the purpose of establishing SPI Programmes and how such Programmes may be used by different target groups. The most important aspect is Section iii "How to Use the Guidance". This is a critical part of the Document, giving insights on how users can choose the parts of the guidance that are appropriate in their particular circumstances, and then adapt and implement these, including developing a means for measuring the indicators.

The main text of this Guidance Document is set out in three parts addressing Industry, Public Authorities, and Communities, respectively. The parts are divided into chapters, and subchapters, each addressing different subjects related to chemical accident prevention, preparedness and response. The subjects reflect the roles and responsibilities of the stakeholders and relate, in general terms, to the provisions of the *OECD Guiding Principles*.

Each (sub)chapter contains three tiers:

- "Introductory information": providing readers with insight into the subject area and a summary of the scope and objectives. It sets out broad, important concepts and their relevance to chemical emergency prevention, preparedness, and response. This tier is written in a narrative format. Reference is made to the relevant sections of the OECD *Guiding Principles*.

- "Targets": describing the ultimate objective that should be achieved within the subject area. It provides a basis for the user to develop more specific, short-term targets appropriate to their circumstances.

- "Guidance for developing outcome and activities indicators". This provides the readers with **suggestions for the types of measurements** that could be applied to help determine whether there are improvements over time. This tier is divided into two parts: outcome indicators and activities indicators.

    - *Outcome indicators* are measures of the extent of improvement in performance or, in other words, reduction in the risks to human health or the environment from chemical accidents[7]. The guidance has been developed to provide a basis for determining whether, over time, actions taken lead to real, measurable improvements. The outcome indicators are often expressed in terms of a percentage or ratio. An example of an outcome indicator is: "to what extent have injuries from chemical accidents been reduced as a result of the off-site emergency preparedness plan?"

    - *Activities indicators* are measures of actions taken in the context of chemical emergency prevention, preparedness, and response programmes, which should lead to improvements in safety (as measured by the outcome indicators). The actions are based, in large part, on the *Guiding Principles* (as well as other international guidance materials). Because of the difficulty in measuring actual reductions in risk, companies/organisations can measure whether they have in place the policies and programmes that are believed to lead to improved safety. The activities indicators will generally be in the form of a checklist. Examples of activities indicators include: **"**are the resource and capability needs for implementing the off-site emergency preparedness plan identified" and "are there systems for appraisal and feed-back to employees?"

The relative length of the Parts is proportionate to the extent of roles and responsibilities of the different stakeholders. Thus, the guidance related to Industry (Part A) is by far the largest section as enterprises have the primary responsibility for ensuring the safe operation of their hazardous installations.

The Annexes provides supporting materials including:

- "Examples of How to Apply the Guidance": These examples show how the guidance can be used by different stakeholders to develop an SPI Programme. These examples do not provide a blueprint for action It is important to remember that each user will need to find the way forward that works in his/her own circumstances.

- "Explanation of Terms Used": This list of terms describes how they are used for purposes of understanding and using this Document, and is identical to the list contained in the *Guiding Principles*. It is important to emphasise that these are not agreed definitions. It is recognised that there are differences in the way various critical terms are used in different countries and contexts.

- "Selected References" include a limited number of publications that may be helpful to readers. These references should be generally accessible.

- "Background" containing information on the OECD, the Working Group on Chemical Accidents, and the process that led to the development of the *Guidance on SPI*.

It is expected that this Guidance Document will be reviewed and revised, as appropriate. Therefore, the OECD would appreciate feedback on both the content of this Document, and its presentation.

Please see website (www.oecd.org/env/accidents or www.oecd.org/ehs/ then click on Chemical Accidents) for questionnaire or send comments to ehscont@oecd.org

iii. HOW TO USE THE GUIDANCE

As indicated above, this Document does not contain a programme that can be lifted out and applied as a whole. Rather, the guidance can only be effectively used if efforts are made to: decide which (sub)chapters are relevant under your particular circumstances; and to adapt these parts to your specific needs and objectives.

This section describes a process for using the guidance to develop an individual SPI Programme, that is both appropriate for your particular organisation and can provide a realistic assessment of changes in the level of chemical safety over time. See Figure 1, which summarizes the steps described below.

It should be kept in mind that it requires substantial thought, planning, and time to develop and implement an SPI Programme and make it work. Furthermore, an effective SPI Programme is not a one-time effort. By definition, it needs to be administered periodically in order to measure trends and changes in performance over time.

STEP ONE: Define your Goals/Objectives With Respect to Safety

The first step to be taken by an enterprise/organisation establishing an SPI Programme is to identify chemical safety goals and objectives for their enterprise/organisation, as well as an infrastructure for implementing those goals and objectives.

For purposes of this Document, "goals" are defined as general results that the organisation is working to accomplish and "objectives" are defined as the level of achievement expected from the implementation of the goals. Generally, objectives should be expressed in terms that are measurable.

As part of this step, it is important to gain the support of the highest levels of management for the implementation of an SPI Programme (whether in an enterprise, public authority or community/public organisation), along with the necessary resources for such a Programme. This includes the assistance of all relevant parts of the enterprise/organisation.

STEP TWO: Review the Guidance/Choose Relevant Parts

Each enterprise/organisation should choose the specific targets, outcome indicators, and activity indicators that might be relevant, taking into account the overall safety objectives and policies of the enterprise/organisation, and the key aspects to be measured.

The Guidance was designed to address all aspects of chemical accident prevention, preparedness and response, recognising that many of the subjects, and indicators, would not be relevant in the case of a particular enterprise/organisation. Furthermore, each enterprise/organisation should consider how best to approach the implementation of an SPI Programme. One possibility might be to do it in a step-wise fashion by starting with a limited number of indicators and then expanding the Programme over time.

For example, readers from the industrial sector should review the guidance taking into account such issues as:

- the nature of your industry/organisation (*e.g.*, does it relate to a chemical production facility, a manufacturer of electronic components that use chemicals, a transport interface, or even a local community that stores chlorine for use in swimming pools);
- your corporate safety culture and safety policies; and
- local laws and customs.

Public authorities should take into account factors such as the nature of responsibilities (regulatory, inspection/monitoring, emergency preparedness), the target of responsibility (workers, environment, transport), and the extent of responsibilities (national, regional, local), as well as local laws and customs.

Community organisations should consider, for example, which parts are useful based on the nature of the risks in their vicinity and the nature of their organisation, as well as their legal and cultural contexts.

It is important to choose indicators that should be able to identify both strengths and weaknesses of your enterprise/organisation; it does not make sense to apply only those indicators that paint a positive picture.

In this regard, it should be noted that the guidance was designed for developing SPI Programmes for internal use, to provide a means for gaining a greater understanding of an enterprise/organisation and a basis for establishing priorities. Thus, comparing different enterprises/organisations using performance indicators is outside the scope of this guidance. Furthermore, this Document was not developed for use in advertising success to the outside world. While SPI Programmes could, in principle, form the basis for broader uses including comparisons between industrial enterprises, this would require additional efforts to adapt and modify the guidance.

STEP THREE: Adapt and Define the Indicators

Each enterprise/organisation should adapt the chosen indicators so that they are consistent with local procedures and standards, using vocabulary and parameters that make sense to members of the enterprise/organisation. The choice of indicators, and how they are adapted, should be tied to the strategic plan, goals, and objectives of the enterprise/organisation.

In adapting the indicators, it is important that the key aspects to be measured are carefully defined and circumscribed, in order to be able to ensure the indicators being measured will show the progress within important areas of the enterprise/organisation and Programme. For example, if the indicator is intended to measure "extent the on-site emergency preparedness plans are operational and effective", it is important to restate this in terms that make sense in the enterprise/organisation. It is also important to clarify which specific elements of the plan are to be assessed to determine whether the plans are effective.

In addition, if the Guidance Document does not address some of the key aspects of the enterprise/organisation, it may be necessary to fill in any "gaps" by adding activities and outcome indicators.

Remember: the idea is to make the guidance work in your situation. The choice of indicators and how they are defined should be determined by relevant members of the enterprise/organisation and will need to be communicated to others in order to be useful; it will not be helpful if the scope and content of the indicators are not clear, or if the terms used are not understood by the individuals applying the guidance.

STEP FOUR: Identify what each indicator will measure and determine the appropriate metrics (or scale) for the performance indicators.

Each enterprise/organisation should clearly define each indicator and develop metrics that are both appropriate to the particular circumstances and can be easily applied, and therefore can reveal meaningful insights.

It is important to clearly describe what each indicator will measure before establishing the appropriate metrics or scale. The metrics/scale be should be developed specifically for the enterprise/organisation, taking into account local culture, laws, policies, and other relevant factors, as well as the types of indicators that will be measured.

The process followed, and metrics used, need to be clear and well documented, in order that the indicators can be applied in a consistent manner by different individuals over time and to be able to compare the results from one year to the next.

It may be useful to involve specialists with experience in the development and application of metrics.

In the Document, the Outcome Indicators have been worded in a way that implies quantitative measurements (using terms such as "percentage of –" or "extent of –" or "number or –"). Some indicators may be able to be easily and directly measured (for example, "number of complaints about working conditions received from employees"). Many, if not most, outcome indicators can only be measured indirectly, by use of surveys or through an assessment by an independent observer (for example, "extent to which procedures are understood and applied by employees").

The metrics could be expressed in a straightforward numerical statement: for example, numerical measures could be absolute such as a percentage of positive actions as compared with total actions. Alternatively, a scaled system could be applied using, for example, a scale of 1 to 10 with 10 being the best result. The measures could also be expressed in non-numerical terms such as poor, good, fair and excellent.

In the Guidance Document, Activities Indicators are worded as "yes/no" questions. In fact, it will likely be necessary to have a scaled system (what we have termed in Figure 1 as a "completion scale"), which provides some indication of how far the activities have been carried out. For example, one activity indicator is "Is the manning of the operations of the enterprise always adequate?" Answering just yes or no does not provide useful insights. More likely, manning is sometimes adequate and sometimes not and, therefore, a scale should be applied that would measure the extent to which manning is adequate. This could provide a basis for understanding whether the adequacy of manning improves over time.

Furthermore, several questions ask: "Is there a procedure for…?" It is not sufficient to answer yes or no, since it is also important to know "to what extent is the procedure followed" and "is the quality of the procedure good and appropriate?"

Thus, the metrics should reflect the fact that some of the suggested indicators are easy to determine and quantify, whereas others are more complex and subjective. In fact, many of the indicators will only have a chance to be reasonably measured by using a survey or employee interviews, or employing an external expert or some other type of independent resource.

For examples related to developing a process for measuring indicators (metrics), see Annex I.

STEP FIVE: <u>Apply the appropriate metrics (or scale) to the indicators</u>

Each enterprise/organisation should apply the metrics (or scale) to the indicators chosen and prepare a report analysing the results and the changes that occurred since the last evaluation. The report may also set targets for progress into the future and make recommendations for follow-up.

It is important to recognise that in most cases applying the indicators will not be purely quantitative and direct; there will also be a qualitative and subjective elements involved. In addition, due to the

nature of the indicators it is not possible for measurements to be precise or 100% correct. It is never possible to know all the information that would be useful to make the assessment.

With respect to analysing the results, it is necessary to decide what makes sense in your organisation in order to assess overall progress. For example, some of the subjects addressed by the guidance may be more important for your organisation than others. Consideration might also be given to applying a "weighting scale" to the measuring system so that certain indicators (*e.g.*, those that have a greater impact on the levels of safety) might be given a greater emphasis in the overall analysis of trends. In addition, you may find that it is more informative to keep different subject areas (or different types of indicators) separate and not try to aggregate them in the measuring system.

The examples in Annex I related to Part A (Industry) use both a scaled system and a weighting scale.

The results of implementing an SPI Programme do not provide an objective snapshot of the level of safety in an enterprise/organisation that would allow direct comparisons between organisations. Rather, application of the indicators should be a continuous process, in order to measure progress over time and to provide a basis for understanding whether actions taken are, in fact, leading to improvements in chemical accident prevention, preparedness and response.

Follow-up and Evaluation

The SPI Programme, including the indicators and metrics, should be periodically reviewed and evaluated. It is important to remember that developing an effective SPI Programme is an iterative process; the Programme should be refined as experience is gained.

This will help to ensure that the indicators are well-defined and continue to correspond with the subjects that the enterprise/organisation wants to measure. In addition, it will provide the basis for determining whether the process and the metrics are appropriate for your organisation and the indicators provide the type of information needed for an understanding of trends over time.

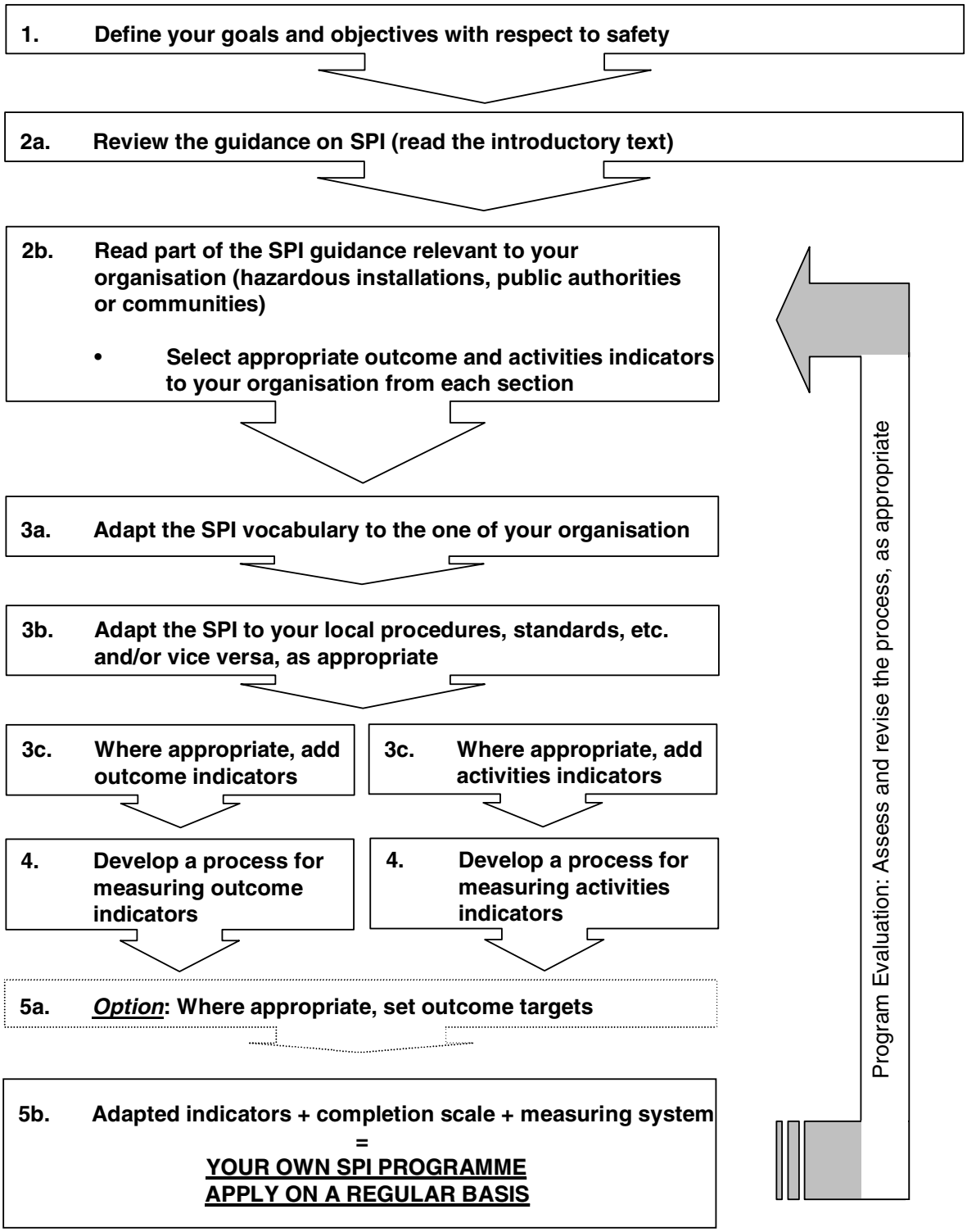
For example, it may be discovered that some indicators do not provide useful measurements for the enterprise/organisation, and that some important activities/outcomes are not being measured and new indicators need to be developed. In addition, the evaluation process may reveal that the metrics are not precise enough to recognise small but significant changes, or the metrics may have too many categories, or the categories are not sufficiently defined, so that it is not easy to determine how the metrics should be applied in specific cases.

It is up to each enterprise/organisation to:

- ***determine which elements are appropriate in their particular circumstances;***
- ***adapt the elements in light of internal policies and procedures and their local cultural and legal contexts;***
- ***apply the elements in a way which allows the enterprise/organisation to better understand whether their chemical safety activities are being implemented, whether these activities address the range of relevant issues, and whether actions taken actually lead to reduced risks of accidents; and***
- ***periodically review their SPI programme and revise it, as appropriate.***

Examples of how the Guidance on SPI can be applied by different stakeholders are set out in Annex I.

FIGURE 1 DEVELOPING YOUR OWN SAFETY PERFORMANCE INDICATORS (SPI) SYSTEM



iv. TO ASSIST THE READER

This publication was prepared as a companion document to the second edition of the OECD *Guiding Principles for Chemical Accident Prevention, Preparedness and Response*. Both publications are available in both hard copy and on the OECD web-site.

There are three Parts to the publication, addressing Industry, Public Authorities and Communities/Public respectively. To help the user, references are included to relevant parts of the *Guiding Principles*.

Several Annexes are included to help readers use this publication:

- **Examples of How to Apply the Guidance** (Annex I) provides several examples of how an enterprise or organisation might use the guidance to develop an SPI programme.

- An **Explanation of Terms Used** (Annex II). The terms included have been defined to facilitate understanding and use of this publication (and the associated *Guiding Principles)*; there is no attempt to reach agreement on the definition of terms for other purposes.

- **Selected References** (Annex III) lists some publications related to the development of safety performance indicators. These might provide some additional insight into the development and implementation of a safety performance indicator programme.

- **Background** (Annex IV) briefly describes the process/people involved in the development of the *Guidance for Developing Safety Performance Indicator Programmes* and provides a short overview of the OECD.

NOTES

[1] The *Guiding Principles* are available on the OECD Chemical Accidents website: www.oecd.org/ehs.

[2] Reference was made to the Responsible Care™ programme of the chemical industry as one such initiative.

[3] The word "safety" is used throughout this Document. For purposes of this Document, the word "safety" embraces health, personal and process safety and environmental protection (including property) to the extent they relate to chemical accident prevention, preparedness or response. As a general matter, protection of human health, protection of the environment, and other aspects of industrial safety and sustainable development are closely related, and it is beneficial for industrial organisations, public authorities, and other stakeholders to consider these issues in a co-ordinated or integrated way.

[4] For purposes of this document, *community(ies)* are defined as "individuals living/working near hazardous installations who may be affected in the event of a chemical accident". The term *potentially affected public* includes any individuals that might suffer adverse impacts as the result of an accident, which could include people who are not in the immediate neighbourhood of an installation (e.g., those living near, or earning a living from, a river polluted as the result of an accident at the hazardous installation). The word *public* is used to mean the general public.

[5] The use of safety performance indicators cannot substitute for checking compliance with legal obligations.

[6] While the focus of the guidance is on fixed facilities (including port areas and other transport interfaces), much of it is also relevant to the transport of dangerous goods.

[7] In some cases, improvements will be shown if the measure used increases, for example the objective is to increase the number of employees who pass the periodic assessment of training. On the other hand, for a number of indicators the objective is for the measure to decrease, such as the reduction of injuries from chemical accidents.

Part A

GUIDANCE FOR INDUSTRY
for
Developing Safety Performance Indicator Programmes

GUIDANCE FOR INDUSTRY
for
Developing Safety Performance Indicator Programmes

Introduction

This Section provides guidance for enterprises or other industrial organisations for developing and implementing a safety performance indicators (SPI) Programme. The guidance is designed to help enterprises/organisations assess their performance related to chemical accident prevention, preparedness and response.

Before trying to apply the guidance in the Section, it is recommended that you read carefully the introductory chapters of this Document, including the one on "How to Use this Document".

The introductory chapters explain that the ultimate measure of chemical safety is the reduction in the number of chemical accidents or near misses that occur. However, significant accidents/near misses are relatively rare events that have a wide range of possible impacts, and can be caused by a complex combination of technical, organisational, and human failings. Simply measuring accidents/near misses does not provide sufficient information for deciding what actions should be taken to improve chemical safety programmes. Furthermore, there is no way to measure the accidents that did not occur as a result of the actions taken.

Therefore, this guidance was developed to be used by enterprises or industrial organisations as an alternative means to measure performance. It contains two types of measures: "activities indicators" which help identify whether your organisation is taking actions believed to lower risks (*e.g.*, the types of actions described in the *Guiding Principles*); and "outcome indicators" which help measure whether such actions are, in fact, leading to less likelihood of an accident occurring and/or less adverse impacts on human health or the environment should an accident occur.

It is critical to realise that this guidance does not contain a Programme that can be lifted out and applied as a whole.

Rather, the guidance can only be effectively used if efforts are made to decide which elements are relevant under your organisation's particular circumstances, and steps are taken to adapt these elements to your organisation's specific needs and objectives.

Thus, the introductory chapters suggest a multi-step process for establishing an SPI Programme, which includes:

- developing a strategic plan (including planning of financial and human resources);
- reviewing the Guidance Document;
- selecting the activities indicators and outcome indicators relevant to your organisation;
- adapting the indicators to the vocabulary and procedures of your organisation;
- developing processes for measuring the indicators (metrics); and
- applying the indicators on a regular basis.

Furthermore, SPI Programmes should be reviewed periodically, and revised/updated as appropriate.

It is important to remember that developing and implementing an SPI Programme requires a significant commitment, with a corresponding allocation of human and financial resources.

General Outcome Indicators

In addition to the list of possible outcome and activities indicators set out below, by topic, the Group of Experts developed the following list of general outcome indicators that may be applicable to all stakeholders (*e.g.*, industry, public authorities, communities). These can, if measured over time, show if chemical safety has improved. When taken with other outcome indicators, they can present a picture of chemical safety in the broadest sense as well as show how industry, public authorities, and communities effect the improvement of chemical safety.

(i) Reduction of chemical risks at hazardous installations (as measured by, *e.g.*: risk assessments; reduction of chemical inventories; reduction of adverse impacts from accidents; improvement in processes and process techniques; reduction of vulnerability zones; and improved transportation).

(ii) Extent of interaction and collaboration of public authorities, industry, and communities leading to improved safety of hazardous installations and reduction of chemical risks to local communities.

(iii) Reduction of the frequency of accidents and near-misses, and their severity.

(iv) Reduction of injuries and fatalities from chemical accidents.

(v) Reduction of environmental impacts from chemical accidents.

(vi) Reduction of property damages from chemical accidents.

(vii) Improvement in response to chemical accidents (reduction of delay and increased efficiency).

(viii) Reduction of impact zone of chemical accidents (distance).

(ix) Reduction of the number of people affected by chemical accidents (*e.g.*, evacuation, shelter in place, etc.).

Chapter A1: POLICIES AND GENERAL MANAGEMENT OF SAFETY

Introduction to Chapter A1

Safety should be an integral part of the total business activities of an enterprise. This should be reflected in the overall management instruments for the enterprise and for the individual sites.

Furthermore, safety issues should be addressed as part of the overall corporate Safety, Health and Environment ("Safety") policies, as well as in the development of safety management systems and safety goals and objectives. In this regard, management should establish a corporate safety culture that is reflected in the Safety Policy and ensures all employees are aware of their roles and responsibilities with respect to safety.

Everybody involved in design and operation of a hazardous installation is responsible for preventing chemical incidents.[1] The top management develops and sets the policies and exerts its firm commitment to safety. The more detailed procedures should be developed and implemented by line management.

The most important factor for achieving a safe workplace is the belief by all personnel and others involved in the operation that safety is critical. This includes the intention to act consistently with this belief, and the genuinely safe behaviour by all. Such a result is founded in the safety culture created by management in co-operation with other employees[2].

A basis of the management of safety is the formal system as described in administrative procedures and documents, normally called the "safety management system".

The guidance set out in this chapter is designed to measure, to the extent possible, the commitment to safety in the organisation, as well as the resultant actions.

This guidance is also designed to measure the coverage and quality of the formal safety management system of the enterprise.

This chapter includes the following sub-chapters:

- A1.1 Overall policies
- A1.2 Safety goals and objectives
- A1.3 Safety leadership
- A1.4 Safety management systems
- A1.5 Personnel
  - a. Management of human resources
  - b. Training and education
  - c. Internal communication/information
  - d. Working environment
- A1.6 Safety performance review and evaluation

A1.1 Overall Policies

A critical element of a safety culture is that there should be a clear manifestation of that culture and the long-term objectives regarding safety from the top management, supported throughout the organisation (including the board of directors). This should be laid down in a Safety Policy. The Policy should provide standards and strategies designed to protect the health and safety of workers and the public, as well as the environment. The Policy should form support for the various strategies and guidance for detailed regulation related to safety. The Policy should not be affected by short-term changes in the economic situation of the enterprise. The Policy is also an important instrument to convey the corporate/company view on safety to external stakeholders.

See Guiding Principles document, paras.: 2.a.7 – 2.a.10, 2.a.12, 14.a.1

- **Target**

To develop a comprehensive safety policy with a commitment for its implementation by all employees throughout the enterprise, including top management.

- **Guidance for Developing Safety Performance Indicators:**

➢➢ *Outcome Indicators*

↳ i) Extent to which the Safety Policy has been received and understood by:

- Employees;
- Other persons working at the enterprise (contractors, etc.);
- Relevant external stakeholders (suppliers, customers, potentially affected public, etc.).

➢➢ *Activities Indicators*

i) Is the Safety Policy conveyed to all relevant stakeholders?

ii) Is the information repeated regularly?

iii) Has the Policy been reviewed and updated according to the established procedure?

iv) Does the Safety Policy include concrete commitments and clear objectives?

v) Is the Safety Policy clear that safety is a priority for the enterprise?

vi) Does the safety policy address all relevant issues including, *e.g.*:

- roles and responsibilities of different employees;
- technology and design;
- safety management and organisations;
- reporting and learning from incidents and other learning experiences;
- the role of checks, audits and management reviews;
- relationship to external stakeholders;
- Responsible Care and Product Stewardship;
- a mechanism for feedback/communication from all employees and the public.

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A1.2 Safety Goals and Objectives

The ultimate goal for every enterprise should be to have "zero incidents". This goal provides the incentive to achieve the best possible performance and ensures continuous vigilance towards greater safety. Seeking to achieve this goal and managing safety requires a constant effort that involves establishing safety-related objectives, implementing those objectives, and measuring and reviewing progress in meeting those objectives. This should be reflected in the long-term, overall Safety Policy. In order to ensure day-to-day implementation of the Policy, concrete goals and objectives should be established and agreed upon by the entire organisation.

The enterprise should have safety goals and objectives established, reviewed, and revised (as appropriate) on a regular basis.

See Guiding Principles document, paras.: 1.4, 2.a.2, 2.a.12

- **Target**

To establish and achieve meaningful goals and objectives for the enterprise at each level in order to help ensure day-to-day implementation of the enterprise´s Safety Policy.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent to which safety goals and objectives have been achieved.

ii) Extent to which safety goals and objectives are reviewed and updated in relation to the established procedures.

➢➢ *Activities Indicators*

i) Is there a system for establishing goals and objectives?

- Are there goals/objectives established at different levels of the organisation? Do they follow a chain with departmental goals/objectives being part of the superior goals/objectives, etc.? Are they adjusted to be meaningful at each operational level;
- Is there a fixed procedure for establishing goals/objectives (*e.g.*, with a formal approval body, at a specified time, etc.);
- Are the goals/objectives in written form;
- Are both long-term and short-term goals used;
- Do employees participate in setting goals;
- Does the community participate in setting goals.

ii) Are the goals/objectives appropriate to the specific circumstances?

- Are they relevant – for the company and the employee;
- Are goals/objectives related to the hazards/risks of the installation and to the corporate Safety Policy;
- Are they easy to understand and communicate;
- Are they concrete and measurable;
- Are they challenging but realistic;
- Do they reflect the experience and views of employees;
- Are there resources available to achieve the goals.

iii) Is there an action programme associated with every goal/objective in order to ensure implementation and follow-up?

- Are roles and responsibilities clearly expressed;
- Are there timetables and resource allocations established and approved;
- Are the action programmes in writing.

iv) Are follow-up procedures in place?

- Is there a formal forum or mechanism for this with a mandate for possible corrective actions;
- Is follow-up done at regular intervals;
- Is the progress monitored and information provided to employees.

A1.3 Safety Leadership

The management of the enterprise should ensure that there is a sound foundation, on which all work can be based, to ensure safety. There should be a true safety culture that is accepted by all levels of the organisation. The top management commitment to safety should be such that it is experienced in the rest of the organisation as genuine and not as "lip service" or empty words.

See Guiding Principles document, paras.: 2.a.2, 2.a.3, 2.a.4, 2.d.29, 2.d.44, 14.a.1

- **Target**

To develop and implement efficient safety leadership, with active management involvement and commitment to safety, and active employee participation and responsibility for safe performance.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent employees follow established procedures related to safety.

ii) Extent employees consider management a trusted source of information on:

- Chemical risks at the facility; and
- Safety related information.

iii) Extent management is involved in safety activities, *e.g.*:

- Management visibility in daily operations (number of visits, time spent, etc.);
- Number of meetings held periodically (per year, month etc.) with safety as a substantial item on the agenda.

iv) Extent suggestions and complaints from employees result in improvements in safety.

v) Amount of money or other resource spent per year for safety, relative to other expenditures.

- Comparison of this amount relative to other similar installations within the company/outside the company.

vi) Correlation between amount spent on safety and the level of risk at the installation (as measured by, for example, a risk assessment).

➢➢ *Activities Indicators*

i) Is the management actively committed to, and involved in, safety activities?

- Is the involvement of the management visible at the floor level;
- Are managers' actions good examples with respect to safety;
- Do managers take part in the follow-up of incidents;
- Do managers actively monitor the activity plans for safety goals and objectives;
- Is safety (always) on the agenda of the regular meetings (from board meetings to daily operational meetings);
- Is it obvious that safety is a decisive factor in the company decision-making;

- Is it obvious that safety takes priority in cases where there is a conflict between safety and operational goals;
- Are adequate resources for safe operations allocated in general budgets as well as promptly when there is an urgent need.

ii) Do managers and supervisors have the skills and resources so that that all members of their teams can work safely?

- Is there a mechanism in place to measure skills to ensure that all members of a team work safely;
- Are the necessary resources allocated to help ensure safety;
- Is there an atmosphere where all employees can take actions for reasons of safety without the fear of possible negative consequences.

iii) Is there a mechanism to measure employees' commitment to safety?

- Is compliance with safety procedures monitored;
- Do employees actively contribute to the development and implementation of safety policies and practices.

iv) Is there bench-marking with other companies to help identify areas for improvement?

A1.4 Safety Management Systems

All enterprises should have safety management systems, as part of their overall management of the enterprises (in fact, there is a clear correlation between safely-run enterprises and well-managed operations). A safety management system provides a structured approach to those arrangements needed to achieve good safety performance within an enterprise. It should be based on the Safety Policy. The system should define an ambition level that the enterprise considers adequate for its business, as well as the safety concerns and requirements specific to their sites. As a minimum, the requirements of the legislation and other imperative sources should, under all circumstances, be fulfilled.

The primary objectives of safety management systems are to regulate formally the activities of the enterprise in order that they are carried out safely, to continually improve safety performance, and to support a strong safety culture. Additional benefits of a safety management system include:

- *more efficient production and maintenance with fewer operating disturbances, releases, less absenteeism, etc.;*
- *more efficient project management and smoother start-up by incorporating safety considerations at an early stage;*
- *improved relations and increased reputation within the enterprise among employees and union organisations and with external stakeholders (public authorities, the public, the community, media, customers, other enterprises, etc.).*

See Guiding Principles document, paras.: 2.a.12, 2.a.14, 2.a.15

- **Target**

To develop and implement an efficient safety management system, which address the following subjects, *inter alia*:

- organisational structure (including the roles, responsibilities, training, education, qualifications, and inter-relationship of individuals involved in work affecting safety);
- identification and evaluation of hazards;
- facilities and operational control;
- management of change;
- planning for emergencies;
- monitoring performance (concerning the ongoing assessment of compliance with the Safety Policy and safety management system, and mechanisms for taking corrective action in the event of non-compliance);
- audit and review (addressing the periodic, systematic assessment of the Safety Policy and effectiveness and suitability of the safety management system); and
- accident investigation and learning from experience.

■ Guidance for Developing Safety Performance Indicators

➢➢ *Outcome Indicators*

i) *Improvement in efficiency of production and maintenance as a result of the implementation of a safety management system, measured e.g., as reduction of operating disturbances and releases, less absenteeism, etc.*

ii) Extent to which procedures are understood and applied by employees.

➢➢ *Activities Indicators*

i) Is there a management system for safety?

- Is it comprehensive, covering all the issues needed for controlling safety issues;
- Does it cover all the requirements for a management system in the relevant legislation at a minimum;
- Is it consistent with the corporate safety policy as well as its goals and objectives.

ii) Does the system include procedures, and is there an iterative process for continuous improvement, including:

- planning;
- implementation and operation with control and corrective actions;
- audit, management review and feedback.

iii) Are all the procedures in the system documented, easily identifiable, easily obtainable and transmitted to the staff?

iv) Are roles and responsibilities clearly expressed in the documents?

- Are the interrelationships of personnel involved in work affecting safety clearly defined;
- Are people appointed as responsible for the safety management system.

v) Are the procedures clear in their requirements and ambition level?

vi) Is the participation of employees to develop the system secured?

vii) Is there a system to ensure that management is aware of, and in compliance with, all legal obligations?

viii) Is there an ongoing mechanism for assessing compliance with the safety management system and improving safety performance?

ix) Is there a mechanism for taking corrective action?

x) Is there a process for revising the safety management system based on reviews and feedback?

A1.5 Personnel

a. Management of Human Resources

Management should establish systems to help ensure that:

- *all employees have a clear understanding of their job tasks;*
- *the staffing on all levels is adequate and with the right competence for both normal circumstances and during unusual circumstances or increased workload, without over-stressing the employees; and*
- *employees are given feed-back on safety-related aspects of their jobs.*

See Guiding Principles document, paras.: 2.d.10, 2.d.11, 2.d.18, 2.d..22 – 24, 2.d.26, 2.d.28 – 30, 2.d.45, 2.d.46

■ **Target**

To ensure appropriate levels, and competency/fitness, of staff.

■ **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent employees are satisfied with their safety situation.

ii) Extent of incidents attributed to problems related to human resources (*e.g.*, staffing levels, competency, etc.).

iii) Number of safety proposals per employee (number should normally be high, which shows commitment).

➢➢ *Activities Indicators*

i) Is the distribution of roles and responsibilities for all managers and other employees with safety-related jobs clear and adequate?

- Is the split between line and staff responsibility clear and are the mandates and responsibilities for specialists defined;
- Do all employees and positions have job descriptions and/or formal delegation documents which are of good quality regarding responsibility and authority including safety issues;
- Is it clear that employees are given the responsibility and means to carry out assigned tasks in a safe manner and, if not, that employees have adequate channels to redress any concerns;
- Is the representation for the employees according to legislation and adequate (*e.g.*, in safety committees, safety representatives*)*.

ii) Is the general competence level of the employees adequate?

- Is the basic education of the employees adequate and consistent with industry standards;
- Are there regular checks of capacity, adequacy, etc. (including, *e.g.*, alcohol/drug testing);

- Is there a procedure for employees to remove themselves, or be removed from safety-related work, when temporarily unfit for work (as determined by a manager or by the employee) without fear of possible negative consequences;
- Are employees involved in resolving safety-related problems that affect their activities.

iii) Is there enough specialist competence in the safety area?

- Is there an independent safety function and does it have the mandate, position, qualifications to exercise influence;
- Is there competence in all fields of safety (*e.g.*, process safety, industrial hygiene, etc.).

iv) Is there an adequate recruitment procedure?

- Are there adequate job requirement profiles established;
- Is there a matching of the employees and the relevant profiles in hiring and promotions;
- Is there any checking on safety performance at hiring;
- Are there adequate controls to help ensure against hiring individuals who may be unable to carry out their tasks due to health concerns;
- Does the interview process include participation of future colleagues.

v) Is the manning of the operations of the enterprise always adequate?

- Is it adequate during all periods of operation (including non-office hours);
- Do decisions on manning take into account that excessive overtime, excess workloads or stress could impact safety;
- Is there a procedure to help ensure that the staffing is adequate during start-up, down-sizing, increasing workloads and other periods of change.

vi) Are there systems for appraisal and feed-back to employees?

- Are there formal appraisal systems that include safety performance;
- Are there opportunities for employees to participate in safety planning and development sessions (with an "open" atmosphere). Is there a procedure for implementation and feedback from such sessions;
- Are there specific incentives for good safety performance.

vii) Are there programmes for the development of the employees for job enrichment and for job rotation in order to keep the work force alert?

viii) Are there procedures in place for dealing with non-compliance with safety related procedures?

b. Training and Education

Management has the responsibility to ensure that the full range of personnel are trained and able to use their knowledge for the safe performance of their jobs, and are competent to deal with emergencies.

See Guiding Principles document, paras.: 2.d.34 – 40, 2.i.1

- **Target**

To help ensure that all employees (including contractors), and others who handle hazardous substances at the enterprise, are appropriately trained and educated.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) The level of adequacy (extent and quality) of the total training.
- ii) Extent of employees that have been trained in accordance with the planned training programme.
- iii) Extent to which employees receive adequate safety-related information, and understand this information.
  - Reduction of complaints by employees related to failure to receive adequate safety-related information;
  - Extent to which safety information is used or applied, based on independent review of day-to-day activities.
- iv) Extent of employees who pass periodic assessment of training.
- v) Extent to which the workforce perform (*i.e.*, appropriate procedures being followed) during normal operations (based on spot checks, reviews, etc.).
- vi) Extent to which the workforce perform during emergency situations (based on tests or actual situations).
- vii) Number of incidents attributed to failure of training as a root or intermediate cause.

➢➢ *Activities Indicators*

i) Are clear, specific objectives established for training and education?

- Can these objectives be measured;
- Are the training and education objectives well-known within the organisation;
- Is there evidence that the objectives have support from the highest level of the organisation;
- Are "rewards" available for positive performance (*i.e.*, do employees' reviews recognise good safety performance).

ii) Are there training programmes for all categories of employees? Does this include:

- induction training of all employees;
- job training for workers (initial position and major changes or promotions);
- job training/retraining for workers for normal enlargement of job;

- job training of supervisors and managers;
- specific safety training (*e.g.*, fire fighting, emergency drills, first aid, etc.);
- training of contractors;
- other categories appropriate to the circumstances of the enterprise (including training of part-time and seasonal employees);
- safety training established in regulations;
- weekly, monthly and yearly programmes.

iii) Are there mechanisms to ensure that the scope, content and quality of the training programmes are adequate?

- Are the programmes based on an inventory of the competence requirements for each job category;
- Do programmes include topics for all skills needed for the job;
- Is there participation of the employees in developing the programmes;
- Is there a mechanism for feed-back from the employees built into the programmes;
- Is the quality of the training, trainers and the training material assessed regularly;
- Is there a formal checking of training results by an independent resource;
- Is there a review of training programmes following exercises of emergency plans and following incidents;
- Is there training in simulated operations (normal and abnormal, including emergency, situations) *e.g.*, on simulators or as table-top exercises.

iv) Is there a mechanism to check that the training is actually performed according to the training programme, and achieves desired results? In this regard, are the following aspects checked and are records maintained concerning the following:

- scope (is each element addressed);
- number of employees trained;
- period of time between retraining activities;
- individual results in terms of competence of the employee being trained.

v) Is there a training programme for outside parties who handle the enterprise's products?

c. Internal Communication/Information

Communication within the enterprise should be such that there is free and open, two-way exchange of information. The management should ensure that all relevant employees can provide input to, and have all the relevant information needed for, safety matters.

See Guiding Principles document, paras.: 2.d.19, 2.d.25 – 27, 2.d.33

- **Target**

To help ensure that:

- all employees are well-informed, and can participate in decision-making related to safety management; and
- there is an open atmosphere for co-operation and communication.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent ideas and suggestions from employees on safety are implemented within the enterprise.

ii) Extent of "open door" policy, "non-punishment" atmosphere relating to communication on safety issues.

➢➢ *Activities Indicators*

i) Is there a positive and productive atmosphere of co-operation maintained between the management and other employees?

- Are there informal discussions between all levels in the organisation;
- Is there a broad representation of managers and employees in regular meetings (daily, weekly, monthly) and working groups (project groups, safety rounds, risk analysis groups, safety audit teams) that address safety issues;
- Is there an opportunity for employees to relate safety concerns, ideas and suggestions to those with authority to take action, on an anonymous basis if preferred;
- Are there incentives for employees to provide input or suggestions related to safety issues.

ii) Do employees participate in the policy-making groups and in the development of safety (*e.g.*, in safety committees, works councils, management team)?

- Is there a mechanism for ensuring that the policy-making groups are informed of safety issues and concerns;
- Is there a mechanism for providing feedback from these groups to employees and their representatives.

iii) Are safety issues adequately addressed in regular meetings of employees?

iv) Is there a mechanism to ensure employees have access to all relevant safety-related information (material safety data sheets (MSDSs), safety instructions, etc.)?

v) Is there internal publicity for safety issues (for example on notice boards, newsletters, e-mail, targeted campaigns, incentive/award programmes)?

d. Working Environment

The working environment should be designed to provide good working conditions and to facilitate a safe way of acting, by taking into account the physical, psychological and mental capabilities and constraints of employees.

See Guiding Principles document, paras.: 2.c.4, 2.c.6, 2.c.10 – 12, 2.c.16, 2.d.8, 2.d.20, 2.d.21

- **Target**

To develop and maintain good working environment, including the appropriate design of workspace and man-machine interfaces, and good house-keeping.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Results of measurements of exposure at work-places.
- ii) Number of complaints about working conditions received from employees.
- iii) Extent employees use appropriate safety equipment (*e.g.*, personal protective equipment, etc.) as prescribed in procedures.
- iv) Extent to which planned safety rounds/inspections are actually implemented.
- v) Percentage of incidents attributed to poor working environment as a root or intermediate cause.

➢➢ *Activities Indicators*

i) Is there a procedure for ensuring that the workspace, equipment, the man-machine interface and related systems are designed in an optimum way?

- Are the workspaces designed with safety in mind (do they support working according to safety procedures and not invite employees to take short-cuts);
- Do the emergency systems allow an operator to handle an emergency situation and stay in command (*e.g.*, without being drowned with information from alarms, etc.);
- Is there a good balance between manual and instrument/computer handling and intervention;
- Is there training based on simulations of various types of abnormal and emergency situations (especially when plant has been running without disturbances for longer periods);
- Are employees involved in the design of their workplaces and related systems;
- Is equipment easily accessible for maintenance and for regular checking or reading of instruments;
- Are computer work stations ergonomically designed (light, work position, lay-out of equipment, presentation on screens, etc.);
- Are systems in place to limit heavy lifting except where appropriate equipment or assistance is available.

ii) Is there a procedure for ensuring that house-keeping is good?

- Are roles and responsibilities clear;
- Is the standard checked regularly;
- Is there any incentive for the employees to follow good housekeeping practices.

iii) Are all relevant work places covered by safety rounds/inspections?

- Are safety rounds/inspections carried out regularly and often enough;
- Is there participation both from employees at the workplace and from safety experts;
- Are actions taken to address problems identified without unnecessary delay;
- Are all relevant aspects of safety covered.

iv) Are there procedures to control exposure of employees to hazardous substances?

- Is an inventory maintained of all possible exposures;
- Is there appropriate equipment and supplies for taking all relevant measurements;
- Are appropriate response actions taken without unnecessary delay;
- Is there efficient follow-up to identified problems or concerns.

v) Are there adequate fixed safety equipment installations (*e.g.*, safety showers) and are they maintained in good order?

vi) Are there procedures for ensuring that employees use personal protective equipment (PPE) to the extent appropriate?

- Are there clear and adequate rules which are documented and communicated;
- Do employees, in fact, use PPE in accordance with the rules;
- Are there activities that should be carried out in other ways (e.g., design changes) instead of requiring PPE.

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A1.6 Safety Performance Review and Evaluation

Regular review and evaluation of the safety performance of an enterprise is a necessary part of managing safety. It is essential to measure the organisation's commitment to safety, to assess the achievements relative to policies and the goals set, and recognise both good and inadequate or deteriorating standards of performance.

The performance reviews and evaluations should cover both managerial and technical aspects, normally carried out by different resources at different times.

The results of reviews and evaluations should be fed back to the management and the organisation, and should be used to actively correct deficiencies and to set new goals and priorities.

At least part of the performance review and evaluation should be in the form of audits, carried out by independent parties.

A safety performance indicator programme and an audit programme can be used as complementary tools for safety performance evaluation. Furthermore, information gathered from audits can be used as an input for the application of a safety performance indicator programme.

See Guiding Principles document, paras.: 1.6, 2.g.1 – 2.g.13

- **Target**

To develop and implement an efficient system for safety performance review and evaluation, which takes into account both general safety performance and employees' attitudes as well as fulfilment of requirements in formal procedures, in order to measure achievements and identify improvements to be made.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent of fulfilment of the enterprise's performance on the scale used in safety audits (measurement should be on relevant topics, not as an overall average).
- ii) Extent of fulfilment of the enterprise's performance on the scale used in technical reviews (measurement should be on relevant topics, not as an overall average).
- iii) Measurement of the trends and changes in performance.
- iv) Number of audits and technical reviews completed in relation to the number scheduled.
- v) Number of performance indicators that are measured in a timely fashion, in relation to the number scheduled for measurement (*i.e.*, frequency of measurement of each indicator).
- vi) Extent management implements the recommendations in the audit reports and technical review reports (*e.g.*, in terms of number of corrective actions completed on time).

➢➢ *Activities Indicators*

i) Is there a system in place for internal auditing of the safety management system (focusing on organisational and administrative matters), including

- a defined scope of contents;
- an unambiguous tool for measuring performance;
- a fixed schedule for regular auditing;
- inclusion of all units/departments;
- written reports;
- follow-up of action items
- broad competence participation in the audit team;
- adequate coverage of interview persons at all levels;
- adequate coverage of documents;
- adequate check at installations.

ii) Is there a system in place for external (independent) auditing of the safety management system (focusing on organisational and administrative matters), including the same aspects as in the previous point?

iii) Is there a system for technically focused reviews of technology and process equipment by both corporate specialists and external specialists, including the same aspects as in the previous points?

iv) Is there a system for reviews of mitigation facilities by external specialists, insurance companies etc., including the same aspects as in previous points?

v) Is there a system for regular review and follow-up by the management of all the auditing and technical reviews including:

- Penetration of reports (internal, external/audits, technical reports);
- Own spot checks;
- Formal report (open for all stakeholders) with statements;
- Setting new objectives;
- Review of policies and procedures.

vi) Is there a systematic appraisal or inspection of procedures and/or systems to determine compliance with applicable standards and legislation?

vii) Is there a procedure to communicate the results of audits, inspections and similar activities to the employees?

viii) Is there involvement by the members of the public in appropriate aspects of the audits, in cases where this is relevant?

NOTES

[1] For purposes of this text, incident" is defined to include accidents and/or near misses.

[2] For purposes of this text, employees include part-time and seasonal workers *as well as contractors employed by the enterprise.*

Chapter A2: ADMINISTRATIVE PROCEDURES

Introduction to Chapter A2

Although the success in regard to safety of an enterprise is determined primarily by the safety culture that the top management succeeds in creating through its commitment and policy-making, there is also a strong need for supporting and enforcing this by the use of formal procedures and systems.

Many of the procedures would form a part of the safety management system, others may be separate. Some of them will be of an administrative nature, others of a more technical nature. This chapter addresses the more administrative procedures.

Possibly the most important procedures relate to "hazard identification and risk assessment" because risk assessment is the basis for understanding risks at the installation and for establishing and implementing standards and goals for managing those risks. It is the foundation for all management of safety.

Particularly important is that hazard identification and risk assessment is carried out every time a process is modified or there is a change in management. Historical evidence suggests that procedures related to management of change is a key issue.

This chapter includes the following sub-chapters:

A2.1 Hazard Identification and Risk Assessment

All safety management should start with the identification of the hazards and the assessment of the risks at the hazardous installation. Procedures should be developed and adopted for hazard identification and risk assessment, arising from the properties and quantities of the substances produced and handled and the processes utilised in the installation, and should take into account representative and reasonable risk criteria. These procedures should be formal, systematic and written. They should reflect the need to involve specialists, the personnel concerned at the installation, and the responsible managers in order to guarantee the objectivity of the hazard identification and risk assessment.

See Guiding Principles document, paras.: 2.a.16, 2.a.17, 2.b.1 – 9

- **Target**

To develop and implement efficient systems for hazard identification and risk assessment.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent the installations within the enterprise have completed appropriate hazard identification and risk assessments using proper methods.

ii) Risk potential/Reduction of risk (over some period of time) as a result of risk assessments and actions from them (*e.g.*, number of people at risk, environmental impact, lowered probability of accidents, smaller risk zones, etc.).

iii) Extent of incidents related to unknown risks (*i.e.*, not identified in risk assessments).

iv) Number of risks, assessed as non-acceptable, that have not been resolved to an acceptable level.

➢➢ *Activities Indicators*

i) Are there systematic procedures for hazard identification and risk assessment? Do these procedures address:

- Criteria for deciding on whether to undertake an analysis;
- Requirements for hazard identification and risk assessments (documentation);
- Experience from incidents and lessons-learned;
- Consideration of the state-of-the-art/most effective methods;
- How hazard identification and risk assessments should be done (methods, stepwise depending on risk level);
- The roles and responsibilities of those involved in undertaking hazard identification and risk assessments;
- Requirements set by the legislation;
- Timing for hazard identification and risk assessments (addressing the various stages including planning, operations, and modifications of the installation);
- Requirements related to documentation of risk assessment reporting;
- Actions that should be taken based on the recommendations from the risk assessments.

ii) Is an incident case history record kept?

iii) Is there a range of suitable methods for hazard identification and assessment that address: technical matters, human factors and other aspects?

iv) Are there procedures available for calculation of consequences of selected scenarios for human health and for the environment?

v) Have adequate lines of defense against these scenarios been identified and implemented?

vi) Are there procedures available for calculation of probabilities of incidents occuring?

vii) Are all types of hazards and risks covered by suitable methods including?

- Safety, health and environment;
- Technical equipment, processes, storage facilities, utilities systems, projects, modifications, products, laboratory work, scale-up, etc.;
- Normal operation, start-up, shut-down, utility failures, other external disturbances, demolition, etc.;
- Human factors (at-risk behaviours identified);
- Other aspects (*e.g.*, "domino effects").

viii) Are there agreed criteria for risk tolerance for internal risk and external risk?

ix) Is there a procedure to secure that there are adequate resources, experience and skill to carry out the hazard identification and risk assessments?

x) Are there clear rules concerning the roles and responsibilities for participation of persons in hazard identification and risk assessments that address: leader of team; specialists; managers and other employees; and independent resources?

xi) Is there a procedure for keeping hazard identification and risk assessments updated?

xii) Is there a procedure to give feed-back from hazard identification and risk assessments to move towards improved safety?

xiii) Are there procedures for making relevant parts of the risk assessments and consequence analyses available to public authorities and the community?

A2.2 Documentation

All enterprises should have good and orderly documentation related to safety for many reasons, including:

- *Documentation is necessary for conveying information to various persons;*
- *Instruction-type documents are needed to specify the agreed way of performing certain activities;*
- *Documentation gives all employees access to the agreed rules and procedures;*
- *Documents provides the necessary, correct engineering record of the status of the plant;*
- *Documentation concerning risk assessments and other investigations about the safety of the installation allows everyone to be informed and to provide a basis for action;*
- *Records of findings in the enterprise during operations, maintenance, modifications, etc. should be filed.*

See Guiding Principles document, paras.: 2.c.11, 2.c.17, 2.c.18, 2.f.2, 2.i.10

- **Target**

To develop and implement efficient systems for ensuring information is well-documented and that all documentation is available as needed.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent of procedures reviewed and updated before their expiration date.

ii) Extent of engineering documents maintained up-to-date (per category).

➢➢ *Activities Indicators*

i) Is there a comprehensive documentation and filing system with easy retrieval of documents (either for safety documentation individually or with safety as an integrated part of a larger system)?

ii) Is there complete documentation related to:

- engineering;
- operational procedures and instructions?

iii) Is there a document control system? Does this system ensure that documentation is passed along as appropriate?

iv) Is there an updating mechanism for the documentation and filing system?

v) Does the documentation system address:

- objective (task of the document);
- scope (geographically, organisationally and/or the task);
- roles and responsibilities;
- principles and methods;
- references.

vi) Does the documentation system conform with the requirements of the management system?

vii) Is there a mechanism for keeping information in the documentation system updated?

- Is this implemented on a timely basis;
- Does this include all relevant types of information (including, for example, engineering information).

viii) Is there a document retention system?

A2.3 Procedures (including work permit systems)

All enterprises should develop safety-related procedures, which are agreed upon and circulated, trained and adhered to.

The procedures should be documented and include instructions for the safe operation of equipment, processes, and storage facilities and for other activities. The procedures should be based upon the assessment of the risks of the operations and should be one of the important elements related to the transfer of knowledge within the organisation.

See Guiding Principles document, paras.: 2.d.2 – 4, 2.d.9, 2.e.1

- **Target**

To develop and implement efficient procedures in order to ensure conditions necessary to satisfy the design intent of an installation and to carry out operations safely.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent of activities, which should have a written procedure or instruction, that are covered by such written documentation.

ii) Extent of the level of knowledge of the procedures by the affected operators, managers and other categories of employees.

iii) Extent of the number of incidents attributed to procedures due, for example, to:

- procedures lacking;
- procedures inadequate;
- procedures not followed.

iv) Extent the work permit system is followed:

- number of violations of the system.

v) Extent of incidents attributed to visitors as a root or intermediate cause.

➢➢ *Activities Indicators*

i) Are all operations, maintenance, laboratory, transport and other activities needing procedures covered by such (normally written), procedures?

- Are both routine work and more infrequent or isolated cases covered;
- Are all phases of operations covered, such as:
  - -- start-up
  - -- normal operations (including maintenance)
  - -- shut-down
  - -- abnormal and emergency situations
  - -- emergency activities
  - -- security
  - -- transport
  - -- housekeeping

- Are all aspects covered such as equipment (including safety equipment) and personnel involved with processing, handling and storage of hazardous substances;
- Are risk assessments used as basis for the procedures;
- Are safety instructions integrated in or co-ordinated with operating instructions.

ii) Is there a formal system for work permits, addressing:

- Hot work (welding, cutting, driving vehicles, etc.);
- Entry into confined spaces;
- Hazardous work (*e.g.*, opening of process systems, removal of pump, instrument jobs).

iii) Are there safety procedures for critical maintenance work, such as:

- Lock-out of rotating equipment;
- Tag-out of equipment;
- By-passing safety-critical alarms and interlocks.

iv) Are the procedures easily accessible for the users and other interested parties?

v) Is there a document control system for the procedures?

vi) Is there a means to ensure that relevant information is passed on from one stage to another and incorporated in procedures when developing or introducing new products, processes or equipment?

vii) Is there a means to ensure that procedures are being implemented?

viii) Is there a means to ensure that procedures are corrected when conflicting with other procedures or if not working properly?

ix) Is there a mechanism to ensure that the procedures are designed and written in a user-friendly way, making compliance attractive and non-compliance unattractive?

x) Is participation of the employees built into the development of procedures?

xi) Is there a system to ensure that users are informed and have learned about changes in the procedures?

xii) Is there a system for regular updating of the procedures?

A2.4 Management of Change

Based on historical evidence, inadequate reviews of changes in enterprises have resulted in accidents. The definition of what constitutes a change includes modifications in equipment, technology, or software, changes in personnel (including reducing and increasing staff size), and administrative/managerial adjustments.

In order to help ensure that changes in the operations and other activities in installations with hazardous substances are carried out without increased risk, there should be structured procedures for dealing with changes. The procedures should cover the entire process, from planning to implementation and follow-up, and should include safety controls such risk assessments, formal authorisation by competent personnel, review and follow-up, etc. Particularly important is to address the trend for new technology to go directly from the laboratory stage to commercial scale.

Changes in the organisational structure or in manning can be triggered by economic shifts.

See Guiding Principles document, paras.: 2.f.1 – 5, 2.d.17

- **Target**

To develop and implement efficient systems to help ensure that changes do not increase, or create, risks.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent technical modifications are carried out according to the precise procedures laid out in the management of change document (number of non-compliance as detected by audits or other).

ii) Extent of incidents attributed to management of change as a root or intermediate cause.

iii) Percentage of change requests that are processed as "emergency changes" (*i.e.*, requiring immediate attention for safety reasons).

➢➢ *Activities Indicators*

i) Is there a clear definition of a change (modification)?

ii) Are there procedures addressing the management of change, which cover all the necessary steps from planning to implementation and follow-up? Do the procedures address:

- Approval by the relevant responsible person before proceeding to the next step (the level of management approval necessary should be based on the associated level of risk);
- Risk assessment, as appropriate;
- Clear allocations of roles and responsibilities;
- A formal control form to steer and to keep track of the various steps in the procedure.

iii) Do the procedures apply to technical changes as well as changes of organisational or administrative character? Do they address modifications in the following areas:

- Technical, including changes in equipment and buildings (mechanical, instrumentation and control systems and other software, electrical, civil, etc.);
- Process parameters and recipes, including raw material and chemicals, utilities etc. (deviations from the approved "operating window");
- Organisation and management;
- Personnel (manning, working times, outsourcing, etc.);

iv) Do the procedures address permanent as well as temporary modifications (including pilot projects)?

v) Do the procedures provide for a risk assessment and/or other appropriate review including pre-startup review for relevant modifications? Does this address the need for competent personnel, independent from those directly responsible for the proposed change (recognising that depending on the complexity and risk level, external expertise may be needed)?

vi) Are there clear requirements related to the updating of technical and other documentation (*e.g.*, do they require updating before a modification is implemented)?

vii) Are there clear requirements for the updating of instructions/procedures and for information and training of employees before a modification is implemented?

A2.5 Contractor Safety

In many enterprises, contractors are used to carry out certain types of work affecting safety where the enterprise does not have sufficient resources or the correct specialists. The use of contractors has, in some cases, increased the risk of chemical incidents. This may be due to the fact that the contractors do not have sufficient knowledge or training in the enterprise safety policy and procedures, or there is not sufficient co-ordination with regular staff.

A basic principle should be that the contracted workforce receive the proper training for the installation, and should work under the same conditions as would employees, applying the normal enterprise safety policy and procedures.

See Guiding Principles document, paras.: 1.7, 2.c.21, 2.d.1, 2.d.2, 2.d.15, 2.d.16, 2.d.20, 2.d.34, 2.d.40, 2.e.1, 2.f.5, 2.h.1, 1.7a.7, 17.a.8

Target

To help ensure that contractors comply with the same safety requirements, policies, and procedures, as employees.

Guidance for Developing Safety Performance Indicators

➢➢ *Outcome Indicators*

- i) Extent the contractors act in accordance with the requirements and policies of the enterprise.
- ii) Extent of incidents attributed to contractors or visitors as a root or contributing cause.

➢➢ *Activities Indicators*

i) Are there procedures for the selection and hiring of contractors to help ensure safety? Do they address:

- General requirements and check for adequate professional competence;
- Check of contractors' previous performance regarding safety;
- Safety conditions included as part of the contract;
- Safeguarding that all equipment, materials and vehicles used by contractors meet relevant rules and standards and are only used by competent and, where relevant, certified individuals within the applicable limits.

ii) Are there procedures to help ensure safety in relation to contractors working on-site, including:

- Registration of each individual contractor when on site;
- Training of each individual with a check of knowledge including updating of training (*e.g.*, once per year);
- Regular designation of a company contact person responsible for the contractor;
- Clear channels of communication with management, with encouragement for the contractor to come up with suggestions;
- Periodic inspection of contractor performance and of contractor construction sites;
- Suspension of the contractor from the site following misconduct.

iii) Are contractors treated in the same way regarding safety as employees in all relevant aspects (safety requirements, incident reporting, etc.)?

iv) Is there a system for monitoring and giving appropriate information to contractors and visitors to the installation (recognising that different information may need to be given to different types of visitors)?

A2.6 Product Stewardship

Producers have a responsibility to promote the safe management of substances they produce from their design through production and use to their final disposal or elimination (including hazardous wastes), consistent with the principle of "product stewardship". Such producers should make special efforts to help prevent incidents during the handling, transport and use of a hazardous substance by downstream users as well as to prevent incidents during disposal.

See Guiding Principles document, paras.: 1.10, 1.19, 2.i.1, 2.i.2, 2.i.4 – 6, 14.c.2, 14.c.5

- **Target**

To help ensure the safe management of hazardous substances throughout their life-cycle.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Extent downstream users/handlers are satisfied with the enterprise's product stewardship policies and procedures.

↳ ii) Extent of incidents reported involving the enterprise's products (by downstream users).

↳ iii) Number of downstream users/handlers that have had a product stewardship assessment by the producer of the hazardous substances.

➢➢ *Activities Indicators*

i) Is there a policy regarding product stewardship and continual improvement in this respect?

ii) Is there a procedure for identification of all the relevant risks associated with the enterprise's products?

iii) Do all products containing hazardous substances have comprehensive material data safety sheets (MSDSs) and other information needed for safe handling and use of the products, *e.g.*, for transport, in all relevant languages?

iv) Is there a mechanism to ensure that the relevant information reaches downstream handlers and users of the products, including:

- distributors;
- customers;
- end-users;
- transporters;
- those responsible for disposal.

v) Are records kept of the provision, and receipt, of information by all downstream users/handlers of products?

vi) Is there a mechanism to check that downstream users/handlers of products containing hazardous substances have adequate facilities and know-how to safely and responsibly handle the products?

- Is there a mechanism to provide training for downstream users/handlers;
- Is there a mechanism for responding to inquiries from downstream users/handlers;
- If downstream users/handlers are found not to be not capable, is there a mechanism to resolve concerns or to refuse to sell or provide the products.

vii) Are the packaging for the products containing hazardous substances designed in such a way that the products can be handled in a safe and environmentally sound way?

viii) Is there active assistance to other companies (particularly small and medium-sized enterprises) related to:

- accident prevention;
- emergency preparedness;
- emergency response to accidents involving hazardous substances?

ix) Is there a system for reporting, receiving and distributing incident case histories?

x) Is the company prepared to assist with expertise in case of accidents with the company products during transport or during handling/use by customers or other downstream handlers/users?

Chapter A3: TECHNICAL ISSUES

Introduction to Chapter A3

Sound design, engineering and construction of technical systems are prerequisites for having safe installations. Once installed, they should then be maintained in such a way that the technical integrity is kept at an adequate level.

There should always be an aspiration for designing the processes and the installations as being inherently safe. When this is not possible, additional safety systems should be included to make the installation as safe as reasonably possible. Systems should be designed to be robust and to accept both human errors and individual component failures without creating unsafe conditions.

The technical installations should always be based on recognised and proven engineering standards and codes of practice for the relevant type of equipment. The same principles apply for the associated control systems and safety systems. A basic requirement is to design and maintain everything according to all statutory requirements.

The technical systems should be designed so that there is a harmony between the hardware equipment, the control system, the computer software system and the human interaction of the people operating the facility.

During the design process, there should also be adequate consideration to safety in site lay-out and land-use planning matters.

This chapter includes the following sub-chapters:

A3.1 Research and Development

All types of research and development – from scientific research to industrially applied research – need to be handled with care and responsibility.

Within industrial enterprises, the focus will be on applied research and development, especially for development of:

- *chemical products;*
- *processes for production;*
- *equipment for production; and*
- *research related to the safe use of chemicals.*

There is also research and development in safety proper. The industry is jointly responsible for carrying out such general safety research in order that technology and practices used are safe and sound. Individual enterprises normally do not carry out the research themselves, but it is paramount that they are engaged in this area by supporting the research via funding and participating in projects run by or co-ordinated by industry associations, public authorities, academia and intergovernmental organisations.

Individual enterprises should of course manage their safety according to the state-of-the-art of the general safety research and development.

See Guiding Principles document, paras.: 2.c.4, 2.d.9, 2.i.14, 4.c, 16.c.31

- **Target**

To help ensure availability of continually improving (in terms of safety) products, processes, and procedures/methods.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Average risk index (measure of inherent safety) of processes/syntheses that go through to pilot/commercial scale.

ii) Safety reviews (risk analysis) actually performed versus number of laboratory experiments carried out.

iii) Extent of funding for supporting general external safety research.

➢➢ *Activities Indicators*

i) Are there procedures for making risk assessments, including the aspects of inherent safety, early in the research and development process?

ii) Are there procedures for scaling up from laboratory to pilot and to commercial scale?

iii) Are gaps in knowledge and standards identified and documented during process development and scaling up, and are there procedures for hazard assessment of the identified gaps?

iv) Is there a procedure to incorporate lessons learned from incidents into research and development work?

v) Are there procedures for carrying out research work safely including, *e.g.*:

- good house-keeping;
- limitations of hazardous materials; and
- good working environment.

vi) Are there procedures for making safety reviews/risk analyses before laboratory experiments?

vii) Are there procedures for the safe handling of laboratory wastes?

viii) Are substances under development with still unknown properties, treated as hazardous?

ix) Is there active and regular support to external research and development in the safety area?

A3.2 Design and Engineering

The safety of an installation is founded in its design and engineering. Normally, the design should be based upon proven technology and knowledge. When new ground is broken, the uncertainties should be compensated for by other means in order to achieve an appropriate level of safety.

The selection of equipment, construction material, etc should follow the design parameters applying due safety margins and considerations. When necessary, redundant systems should be included, to achieve the predetermined level of safety.

The enterprise should use qualified human resources and computational techniques, together with relevant chemical and physical data, for proper calculation of the equipment and safety systems.

The design and engineering should include the human aspects, both with respect to the risk of human errors and the ergonomics for the employees. Employees should be invited to comment and influence the design.

In all design and engineering work, there should be independent checking as well as authorisation by responsible persons before implementation. As part of this, there should be risk identification/analysis. Bigger projects should have technical reviews.

All design and engineering should be documented, easily accessible in files and always kept up-to-date.

See Guiding Principles document, paras.: 2.c.4, 2.c.6 – 10, 2.c.12 – 14, 2.c.16, 2.c.17, 3.b.3

- **Target**

To help ensure that safety is appropriately taken into account in design and engineering of processes and equipment, and related human aspects, with respect to hazardous installations.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent of modifications needed after project completion to arrive at safe and well performing equipment.

ii) Extent of negative comments from various authorities when reviewing new projects.

iii) Extent of modifications necessary after performance of risk assessments.

iv) Extent of satisfaction by the employees of a newly built installation.

v) Extent of replacement of inferior components with safer ones (*e.g.*, seal-less pumps instead of pumps with seal systems).

➢➢ *Activities Indicators*

i) Is there a system to ensure that there is adequate competence within the organisation (or on a hired bases) for:

- process design (basic design);

- engineering (all disciplines such as mechanical, instrument & control, civil, etc.);
- construction materials selection.

Is there a quality assurance system for this?

ii) Are there all the necessary computational tools for design and engineering (*e.g.*, for stress calculation of piping, sizing of pressure relief valves)?

iii) Is there a system for access to reliable data for all relevant physical and chemical properties of the hazardous substances handled?

iv) Is there a procedure for incorporating general ergonomic and specific man-machine (operator interface) related aspects in the design and engineering?

v) Is there a procedure for selecting the most effective technology from a safety point of view, reducing the risks as far as is reasonably practicable, with the aim of designing inherently safer processes?

vi) Is there a procedure to incorporate and take advantage of the experience of employees in the design and engineering work?

vii) Is there a procedure with rules for on-site lay-out and equipment spacing, taking into consideration the hazards identified in risk assessment and the necessary mitigation and emergency response requirements in order to avoid an accident/incident to spread in an uncontrolled manner ("domino effects"). Is this procedure also linked to land-use issues?

viii) Is there a procedure to incorporate maintainability aspects and maintenance programmes in the design and engineering phases of a project or modification?

ix) Is there a general design rule applied that systems and components should in general be designed to be "fail-safe"?

x) Is there a complete engineering documentation system, with *e.g.*:

- process design specifications
- calculations of material and energy balances
- Piping & Instrument diagrams
- equipment specifications
- interlock systems

Is there a procedure for keeping all the documentation updated?

xi) Have all the areas been classified for handling of flammable material, when relevant, and all the equipment installed according to requirements?

xii) Are all utility systems designed for high and relevant reliability as compared with the demands of the actual process systems or other main system/activity? Do important safety systems have redundancy?

xiii) Is there a clear control strategy for the processes/activities, which is based on managing and avoiding possible risks?

xiv) Are sewer systems, especially underground systems, designed for safety?

xv) Is there a procedure that covers the design and engineering aspects with an independent review?

xvi) Is there a procedure for "management of change" with respect to design and engineering of processes, equipment and other related aspects?

xvii) Is there a clear strategy in selection of engineering components to have a high safety standard, such as *e.g.*:

- use of seal-less pumps;
- use of explosion proof equipment;
- use of "fire-safe" valves; or
- avoidance of weak details such as sight glasses and flexible couplings.

xviii) Is there a procedure for adequate design and engineering to take care of malfunctions or releases by inclusion of properly designed pressure relief systems, fire mitigation systems, extinguishing water collection systems, etc.?

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A3.3 Inherently Safer Processes

The concept of inherent safety means that the process or the chemical handling activity in itself is safe regardless of what happens. This can be attributable to the fact that:

- *only non-hazardous chemicals are involved, so even if they do escape from the system no harm results;*
- *the quantities of any harmful chemicals are so small that no real consequence can result;*
- *the process is conducted at such conditions that no serious consequence can occur.*

In reality, it is always difficult to fulfil any of these conditions completely. For chemicals to combine with each other to create desirable products, reactive chemicals are normally needed, which are often harmful to human health and/or the environment. However, enterprises should always strive to approach a totally inherently safe process.

If the process or activity cannot be made truly inherently safe, there are other ways to achieve safe conditions. Various types of barriers could be built around a process such as:

- *fail-safe emergency shut-down systems; and*
- *blowdown facilities and/or containments.*

Another important aspect for achieving safe installations is to design them as simple and with as much error tolerance as possible. See also "Design and Engineering".

See Guiding Principles document, para.: 2.c.4 – 8

■ **Target**

To develop and implement inherently safer processes and activities.

■ **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent of inherently safer processes in the enterprise as measured by appropriate technical methods (*e.g.*, index methods).

➢➢ *Activities Indicators*

i) Is there a procedure requiring the enterprise to consider the use of more inherently safer processes or design/engineering when new projects or modifications are being planned, using the principles of:

- Avoiding the use of hazardous chemicals, and substituting with those less hazardous;
- Reducing inventories of hazardous substances, both in process and in storage as much as possible; and
- Selecting operating/handling conditions as to minimise the risk (normally meaning reducing temperature and pressure).

ii) Is there a further procedure to minimise the risk by providing barriers, such as:

- Designing the system to withstand the worst possible accident without loosing its integrity;
- Using well designed safety integrity systems to stop the dangerous event to occur;

- Installing second containments to catch accidental releases; and
- Using adequate safety distances to protect people from consequences.

iii) Are there decision criteria based on a life-cycle concept (and not only short-term profit)?

A3.4 Industry Standards

Industry, and society in general, have gathered a lot of information based on experience on what is sound and safe design, engineering and construction. Much of this has been summarised in the form of commonly accessible standards, codes of practice and guidance. These should be regarded as one of the corner-stones in safety for industrial installations. Some of these standards should be considered as mandatory, others as recommendations.

Furthermore, some enterprises have developed detailed standards for their internal purposes, based on their experience and their specific requirements, which are used internally for design, engineering and construction.

See Guiding Principles document, para.: 2.c.5

- **Target**

To develop and implement appropriate internal standards, taking into account all relevant external standards.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent of engineering disciplines covered by updated internal standards (including incorporation of most recent external standards).

ii) Extent of deviations from internal standards discovered when reviewing projects or existing facilities (internally or by personnel from public authorities).

➢➢ *Activities Indicators*

i) Is there a process that incorporates into internal practices all relevant national (and where relevant international) standards, codes of practice and guidance from public authorities and other bodies?

- Is this available to, and used by, those concerned with design, engineering and construction.
- Is there a system to ensure compliance with binding standards.

ii) Are there internal standards in the following areas:

- engineering standards for equipment and components (*e.g.*, for piping);
- construction standards (*e.g.*, for welding);
- administrative standards (*e.g.*, for drawings).

iii) Is there a procedure for modifying an internal standard, including a review and a formal approval?

iv) Is there a procedure for making exceptions to an internal standard, including a review and a formal approval?

v) Is there a procedure for maintaining and regularly auditing the internal standards?

vi) Is the enterprise actively working on revising standards into safer ones?

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A3.5 Storage of Hazardous Substances (special considerations)

Storage of hazardous substances presents special risks or concerns that warrant additional guidance, in addition to that addressed to all hazardous installations.

Large amounts of hazardous chemicals are often stored in tanks and in ware-houses. Releases of products could lead to fires and other accidents with major consequences. Therefore, special precautions should be taken to avoid loss of containment.

Among important aspects when storing hazardous substances are:

- *Segregation of incompatible chemicals;*
- *Limitation of volumes, to the extent it improves safety;*
- *Proper storage conditions;*
- *Proper location;*
- *Second containment in case of release;*
- *Adequate fire protection;*
- *Proper marking and labelling.*

See Guiding Principles document, paras.: 2.c.14, 2.d.6

■ **Target**

To help ensure the safe storage of hazardous substances.

■ **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Level of risk at the hazardous installation based on, *e.g.*, extent of hazardous material stored (absolute values or some index; per substance or possibly composite figures).

ii) Extent of tanks or ware-houses containing hazardous substances that have second containment.

iii) Extent of tanks containing hazardous substances that have overfilling protection systems.

iv) Capacity of containment for contaminated fire water.

v) Extent of tanks/warehouses with fail-safe loading and unloading equipment.

➢➢ *Activities Indicators*

The following points apply both for tank storage and for warehouse storing.

i) Are the following basic requirements fulfilled?

- Relevant information on all hazardous substances available;
- Proper labelling on all packaging and tanks;
- Adequate security measures taken.

ii) Is there a procedure for storage of various hazardous substances, including a sound policy on:

- securing a high quality storage facility (both in terms of the conditions of the facility and the quality of handling substances at the facility);
- keeping certain substances which are incompatible, segregated from each other;
- limiting the amount per storage unit;
- proper storage (*e.g.*, limiting the height of storing bulk chemicals and small packaging chemicals);
- having adequate containment for spills;
- installing adequate fire protection facilities.

iii) Is there an ambition to minimise the amount of stored hazardous substances?

iv) Are all areas for loading and unloading hazardous chemicals appropriately equipped with facilities for containment of spills?

v) Are all areas with the possibility of a fire, and with the possibility of having contaminated extinguishing water, constructed to contain the water and route it to a place where it can be controlled?

vi) Are all storage areas located as to avoid the possibility for an accident to spread to other areas ("domino effects")?

A3.6 Maintaining Integrity/Maintenance

Installations should be maintained in such a way that an adequate safety level is kept continuously. The integrity of the installations should be kept at the intent of the original design. A long-term maintenance policy should be established for this purpose. The focus should be on preventive maintenance, based on measurement of the condition of the equipment and the systems.

The practical maintenance programmes should cover all sorts of important equipment (pressure vessels, piping, rotating equipment, instrumentation, safety systems, etc.) with regular tests and overhauls. Particularly important is the checking of special safety devices.

Maintenance work must be carried out under strict control in order not to provoke hazards.

See also "Contractor Safety"

See Guiding Principles document, paras.: 2.c.18 – 21, 2.e.1, 2.e.2

- **Targets**

To help ensure the integrity of the equipment and facilities through maintenance and inspection.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent of preventive maintenance versus corrective maintenance.
- ii) Extent of maintenance back-log for safety critical items (*i.e.*, actions not complete by "due dates").
- iii) Extent of safety devices (*e.g.*, safety trips, pressure relief devices) that do not function properly when tested.
- iv) Extent of testing of safety devices carried out versus testing planned.
- v) Number of unplanned shut-downs attributable to inferior maintenance.
- vi) Number of leakages attributable to inferior maintenance.

➢➢ *Activities Indicators*

i) Are there procedures to cover the safe construction of facilities by:

- Having inspection programmes to check the fulfilment of all standards;
- Using only reputable suppliers of equipment;
- Using only reputable contractors for installation.

ii) Is there a system for preventive maintenance with regular measurements of the condition of the equipment (based on an analysis if the criticality of various equipment for safety)? Does it include, *e.g.*:

- Tightness test of equipment and piping systems;
- Visual inspection of equipment;

- Lubrication and greasing of equipment;
- Vibration measurement of rotating equipment.
- Thickness measurement of vessels, tanks and piping (corrosion/erosion).

iii) Is there a system for testing of safety systems (interlock systems, overfilling protection, critical alarms, emergency shut-down, fire protection systems including such things as emergency power and water supply and sprinkling, safety showers, etc.)? Does it address, *e.g.*:

- Documentation on control method, test interval, responsibility, etc.;
- Feed-back to revise the need for testing depending on the result.

iv) Is there a procedure for identifying and logging needs for repair and control of equipment?

v) Is there a system for follow-up and documentation of maintenance work?

- Is this used for analysis of performance and reliability of the equipment?

vi) Is there a procedure for checking that installations are maintained according to the specified engineering documentation, following all the mandatory requirements and additional internal requirements?

Chapter A4: EXTERNAL CO-OPERATION

Introduction to Chapter A4

Handling of chemicals is often very complex and involves great responsibility for all parties concerned. Therefore, all parties are dependent on each other for information on how to best handle the chemicals and for concrete assistance in situations of emergencies, etc.
The importance of good co-operation between all parties concerned is obvious. The enterprise should therefore strive for co-operation with:

- Public authorities;
- The public and other stakeholders, including academia; and
- Other industrial enterprises (directly or within trade associations).

Key issues for success in this area are:

- Openness, pro-activeness and responsiveness;
- Ability to create confidence; and
- Exchange of knowledge, experience and accident/incident data.

This chapter includes the following sub-chapters:

A4.1 Co-operation with public authorities
A4.2 Co-operation with the public and other stakeholders (including academia)
A4.3 Co-operation with other enterprises

A4.1 Co-Operation with Public Authorities

Good co-operation with public authorities, based upon mutual trust, openness, and responsiveness, is a prerequisite for smooth and successful safety at an enterprise. Good personal relationships between the respective individuals are also critical for successful handling of safety matters.

To facilitate this co-operation, information - of both long-term and short-term nature including information on reportable incidents - should be provided promptly to the authorities. Well-informed authorities are an asset for an enterprise.

One specific subject related to co-operation with public authorities is land-use planning, an important strategic process for maintaining sufficiently safe conditions around industrial enterprises. The main responsibility for this activity lies with the public authorities. However, enterprises have a vital role when selecting a new proposed site for a hazardous installation or when proposing major modifications to an existing site. The enterprise is responsible for giving the information needed for decisions when delivering risk assessments and other relevant input.

Many of the relevant aspects for the land-use process have been dealt with in the chapters of "Design and Engineering and "Hazard Identification and Risk Assessment" in this guidance Document.

See Guiding Principles document, paras.: 1.2, 1.8, 2.c.1 – 3

- **Target**

To help ensure effective systems for co-operation with public authorities.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Extent public authorities have confidence in the safety policies and procedures at the facilities. This could be shown by, *e.g.*, the authorities granting incentives, providing greater flexibility in compliance within a controlled way with limiting inspections (*e.g.*, US Occupational Safety and Health Administration's "star system").

↳ ii) Reduction in numbers of inquiries from the authorities.

↳ iii) Quality of the assessment of safety-related issues, prepared in conjunction with land use and siting decisions (possibly as reflected in documentation for a project involving the land-use process).

➢➢ *Activities Indicators*

i) Is there a specific policy/procedure for co-operation and communication with the authorities?

- Are people specifically appointed for this task.

ii) Are there well-established and trustful channels for communication with the public (national) authorities, both formal and informal?

- Are there regular planning and information meetings;
- Is there a means to easily get advice from authority contact(s);
- Is there actual, regular communication with public authorities.

iii) Are there well-established and trustful channels for communication with the local authorities and community organisations, both formal and informal?

- Are there regular planning and information meetings;
- Is there a means to easily get advice from public authority contact(s);
- Is there actual, regular communication with local authorities and community organisations.

iv) Is there a means for ensuring compliance with public authorities' requirements and requests?

v) Is there an effective land-use planning process, including:

- Knowledge in the organisation and its key people of the external requirements;
- An inventory of all the risks posed by the enterprise on the people and the environment;
- Procedures for contacts with the public authorities and the public early in projects;
- Procedures for basing the land-use plan on risk analysis including consequence analysis;
- Procedures for including land-use planning aspects also when making modifications to the on-site facilities.

A4.2 Co-Operation with the Public and Other Stakeholders (including academia)

Creating and maintaining good and confident relationships with the public and other stakeholders is essential to ensuring confidence in the safety of the enterprise. Among other stakeholders are representatives of the community, hospitals, schools, nursing homes, environmental groups and media. Co-operation with external stakeholders is not always an easy task and can only be reached if the enterprise acts in an open and pro-active manner, maintaining a continuous dialogue with interested parties. Information should be shared concerning the chemicals and chemical processes at the enterprise, including the safety measures used to prevent chemical accidents/incidents. Top management should demonstrate to the public their personal interest and commitment to safety issues. This can be done in a variety of ways, for example, by appearing in media (newspapers, radio), participating in public meetings, etc. A strong, co-operative relationship with the media can facilitate these exchanges.

The employees of the enterprise should be well-informed so that they could act as ambassadors for the enterprise in their relations with friends and other members of the community.

Communication with the public is normally a prerequisite in the legislation of most countries.

See Guiding Principles document, paras.: 1.2, 2.a.11, 2.g.4, 7.11, 7.12

- **Target**

To help ensure effective co-operation with the public and other stake-holders.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent management is informed and aware of the opinion of the public.
- ii) Extent the public is informed about the risks of chemical accidents in their communities.
- iii) Extent of the relationship between the enterprise and its neighbours.
- iv) Extent of trusted two-way communication between industry and the media on safety issues, both formal and informal.
- v) Extent the public, environmental groups and other community-based organisations trust the information provided by industry.
- vi) Number of complaints from the public regarding safety performance of the enterprise.
- vii) Expenditure for promoting safety issues to the public and other stakeholders.

➢➢ *Activities Indicators*

i) Is there a specific policy/procedure for communicating with the community/public (sometimes in the form of a citizen committee) and other stakeholders?

- Are there employees responsible, and specifically trained, for this task;
- Is information provided to the public and other stakeholders in a format that is easily understood by the average citizen and by journalists;
- Is there co-operation with authorities and local officials when communicating with the public;
- Does the company participate in the community advisory panel (if there is one);
- Is there active participation of the top management in the process communication with the public.

ii) Is there a system for maintaining an ongoing dialogue with all the relevant people/groups in the neighbourhood (including, for example, housing areas, schools, nursing homes, commercial centres)?

- Does it involve direct communication with the public (through, for example, a local council/committee for co-operation in safety questions, regular "open house" arrangements; and/or seminars on the hazards and risks in the facility);
- Does it include regular reporting of incidents, etc.;
- Are there readily accessible lines for telephone and e-mail for the public to communicate with the enterprise.

iii) Is there a mechanism for checking that information has been well-received and understood?

iv) Is there a system for handling inquiries and complaints concerning safety issues from the public?

- Is it a formal system with documentation;
- Is feed-back given efficiently, as soon as possible, by a specially appointed person. Does it include additional feedback after preventive actions have been taken.

v) Is there a procedure to provide the media relevant and quick information (especially in the event of an incident)?

vi) Is there a well-developed system for communication and co-operation with the suppliers to the enterprise?

vii) Is there a well-developed system for communication and co-operation with the customers of the enterprise?

viii) Is there a system for giving training to local schools on the safety programme of the enterprise?

ix) Is there a system for supporting and funding external research on safety?

A4.3 Co-Operation with Other Enterprises

Co-operation in the interest of safety with other enterprises should occur in several ways and on various levels. It is obvious that problems of safety within one enterprise tend to spill over to others in the business, so there is a mutual interest to co-operate to avoid these kind of problems.
The benefits from co-operation are many, e.g.*:*

- *Learning from each other in general, especially to avoid accidents;*
- *Setting a general level of safety performance;*
- *Spreading knowledge of the state-of-the-art;*
- *Offering assistance to small and medium-sized enterprises (SMEs);*
- *Creating joint efforts and funding to address major concerns;*
- *Forming a joint speaking partner with the authorities.*

See Guiding Principles document, paras.: 2.i.3 – 6, 2.g.6, 2.g.14

- **Target**

To help ensure effective co-operation between enterprises including enterprises within the same geographical area, enterprises within the same sector of the industry, enterprises using similar types of manufacturing processes and/or using the same type of chemicals, and enterprises with a producer-user relationship.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent to which shared information (*e.g.*, learning experiences from incidents) are used by those in:

- Similar industries;
- Enterprises in the same geographic area; and
- Downstream users.

ii) Extent of participation in industry associations (local geographical, trade, professional etc.) that address safety-related issues.

➢➢ *Activities Indicators*

i) Is there a system for sharing information on safety related experiences (*e.g.*, accidents/near-misses):

- within the corporate enterprise, and
- with other enterprises.

ii) Does the enterprise actively co-operate with other enterprises in avoiding domino effects?

iii) Is there participation in co-operative work with respect to, *e.g.*:

- Setting up common safety objectives for the industry;
- Working with risk acceptance criteria;
- Systems for sharing information on accidents/near misses; and
- Systems for offering assistance to SME´s.

iv) Does the enterprise participate regularly in conferences/workshops for safety?

v) Does the enterprise participate in industry, professsional and trade associations (local, regional, etc.)?

vi) Does the enterprise participate in local co-operation groups related to safety?

Chapter A5: EMERGENCY PREPAREDNESS AND RESPONSE

Introduction to Chapter A5

Despite all the efforts to avoid accidents there must be a preparedness to deal with the possibility of emergencies and accidents. This is a responsibility for the enterprise, for public authorities, and for the communities/public.

Therefore, emergency plans should be developed, including both an enterprise-internal plan (on-site emergency plan) and an external plan by the public authorities (off-site emergency plan). These two plans should be co-ordinated with each other in order to be able to efficiently and properly deal with possible accidents.

Criteria for when to call in the external forces should be agreed between the enterprise and the relevant public authority.

A key point in emergency planning is the regular training of people in the implementation of the plans.

A close co-operation between enterprises and the public authorities is necessary both in establishing the plans and in the training of them. There should also be co-operation with the public and other stakeholders. The enterprise has a key role to facilitate such co-operation.

This chapter includes the following sub-chapters:

A5.1 Internal (On-Site) Preparedness Planning

The enterprise should prepare an on-site emergency plan for how to handle an emergency internally and with internal resources.

This plan should be based on possible accident scenarios identified as a result of the hazard identification and risk assessments. The plan should address subjects such as the internal emergency organisation, mitigation resources, alarming systems, emergency response centres, evacuation, information, etc.

See Guiding Principles document, paras.: 5.a.1 – 4, 5.a.12, 5.a.13, 5.a.17 – 19, 5.b.1 – 4, 8.1, 8.2, 8.4, 9.1 – 3

- **Target**

To help ensure effective internal (on-site) preparedness planning in order to mitigate adverse effects of accidents.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent of employees trained to actual mitigation competence.
- ii) Number of "table-top" exercises of the on-site plan per year.
- iii) Actual performance of plan and personnel in major test or in real emergency.
- iv) Number of on-site emergency response exercises per year.

➢➢ *Activities Indicators*

i) Is there an on-site emergency preparedness plan?

ii) Is the on-site plan based on a thorough identification of possible accident scenarios, covering the whole range from small and likely to major and unlikely scenarios?

iii) Does the on-site plan include an emergency organisation with clearly defined roles for all personnel involved, and with a clear hierarchy of responsibility?

- Are the internal resources of the emergency organisation adequate for carrying out its tasks, at any time of the day or the year;
- Is the system for calling in personnel at the specified time span adequate at all times.

iv) Is there a system for alarming within the enterprise in an emergency situation?

- from the field to the response resources without delay;
- alerting all personnel within the enterprise by sounding alarms and/or visually by lights.

v) Is there an internal emergency force for the immediate mitigation of emergencies?

- Is it adequately trained for its tasks;
- Does it have adequate (and regularly tested) equipment.

vi) Is there a system (and criteria) for alarming external response resources?

vii) Is there a system for giving alarm to the community (the public in the vicinity of the enterprise) when applicable?

viii) Is there an emergency control centre within the enterprise with adequate facilities including: communications equipment, which will always be operable; relevant plans and drawings of systems on the site; and call lists, personnel lists, etc.

- Is there an alternate centre in case the normal should become inoperable.

ix) Are there well-marked and clear evacuation routes leading to defined assembly points for personnel in case of an evacuation?

x) Is there a counting and reporting system for reporting missing people, covering all people on the site at the time of the emergency?

xi) Are there clear criteria in the emergency plan on when to trigger the off-site emergency plan?

- Has this been agreed with the authorities?

xii) Is the responsibility for communication with external parties clarified (company spokesman)? Is the person(s) appointed trained for this purpose?

xiii) Is there regular training and exercise of the on-site plan?

- Does it involve all the relevant forces in the community on a regular basis?
- Does it cover all employees (*e.g.*, on all shifts) on a regular basis?
- Is training performed during non-office hours to test the on-call system?
- Are "dry runs" performed?

xiv) Are all employees, contractors and other personnel at the site informed about the on-site plan?

xv) Does the on-site plan also include some preparedness for accidents outside the site with the products of the enterprise?

xvi) Is there a procedure for review and updating of the emergency plan?

- On a regular basis;
- After training of the plan.

xvii) Does the on-site plan consider external hazards?

A5.2 Facilitating External (Off-Site) Preparedness Planning

In case of a significant emergency at a hazardous installation, there will be a need to use the resources of the community for mitigation, rescue, hospitalisation, information, evacuation and possible other activities. For this to work in a real situation, thorough co-operative planning and training work must be done in advance.

It is the responsibility of public authorities to make the overall off-site planning and the responsibility of the enterprise to facilitate this as much as possible with relevant input and co-operation.

See Guiding Principles document, paras.: 5.a.7 – 10, 5.a.12 – 14, 5.b.8 – 10

- **Target**

To facilitate the development and implementation of appropriate external preparedness planning by public authorities and on-site plans of other enterprises that may be affected in case of accidents.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Quality, including completeness, of information and support provided by the enterprise in off-site preparedness planning, as expressed by the public authorities.

➢➢ *Activities Indicators*

The following activities should be actively pursued by the enterprise, although the formal responsibility for off-site planning will be with the public authorities:

i) Is there a joint group (industry, community and public authorities) for undertaking off-site planning?

ii) Are the responsibilities for the enterprise, the public authorities and other stakeholders (including the public) in an emergency clarified in detail?

iii) Is the off-site emergency plan based on possible risk scenarios identified in hazard identification and risk assessment work and on other relevant considerations?

iv) Has the enterprise given the public authorities (including, for example, response personnel, medical centres, environmental authorities, etc.) and enterprises that may be affected in case of accidents all the adequate information on *e.g.*:

- Data on the chemicals;
- Volumes and storage and process conditions;
- Possible by-products and combustion products formed in an emergency.

v) Are there regular visits from the public authorities to familiarise them with the installations?

vi) Is there a procedure for calling in assistance from other resources when needed?

vii) Is there regular training of the on-site emergency plan with participation of the external (public) resources?

viii) Is there assistance in setting up of on-site plans for enterprises that may be affected in case of accidents?

ix) Are the combined resources from the enterprise and the community adequate to deal with all the foreseeable scenarios?

A5.3 Co-ordination (within industrial organisations)

In case of a major emergency, too big for an enterprise affected to handle, the resources of enterprises located close to each other or with special qualifications to assist, should be used to mitigate the emergency.

There are also possibilities to co-ordinate on a more general level between enterprises dealing with similar facilities and products.

Aspects to consider include:

- *Sharing of equipment locally;*
- *Sharing of personnel for mitigation on a local level; and*
- *Joint personnel resources and equipment for mitigation of transport accidents.*

There are also other aspects that could be object of co-ordination and co-operation, e.g., guarding against outside threats, awareness of possible domino effects, etc.

The initiative to co-ordinate and optimise resources could either come from the enterprises themselves, but would normally be co-ordinated by some community or public authority.

Training and exercises in the anticipated joint efforts are essential.

See Guiding Principles document, paras.: 5.a.14, 5.b.10

- **Target**

To develop and implement efficient systems or plans for effective co-ordination within industrial organisations with a view toward improved emergency planning and response.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Actual performance of emergency plan and personnel (in respect of co-ordinated efforts) in major test or in real emergency.

ii) Reduction of time needed to mitigate an incident as a result of resources provided by nearby enterprises.

➢➢ *Activities Indicators*

i) Are there procedures for co-ordination/co-operation in case of emergencies, on a local, regional and/or national level? Does it include the issue of possible domino effects, when relevant?

ii) Do the procedures include sharing of equipment and personnel for mitigation?

iii) Do the procedures cover fixed installations and transport of hazardous substances?

Chapter A6: ACCIDENT/NEAR-MISS REPORTING AND INVESTIGATION

Introduction to Chapter A6

Learning from incidents[1] and other experience is absolutely fundamental for improving safety at hazardous installations. Therefore, enterprises should have a functioning system for reporting incidents, and for action and follow-up based on experience.

There should also be systems on a national level requiring enterprises to report more serious incidents for further handling by authorities/trade associations. Efforts should be made to facilitate sharing of information from incident case history among companies, both nationally and internationally.

This chapter includes the following subchapters:

A6.1 Reporting of accidents, near-misses and other "learning experiences"
A6.2 Investigations
A6.3 Follow-up (including application of lessons learned and sharing of information)

A6.1 Reporting of Accidents, Near-Misses and Other "Learning Experiences"

Each enterprise should have a system for reporting and dealing with all deviating events which differ from normal conditions and which could have adverse effects on safety, health or environment (called "incidents" for purposes of this Document). This is the basis from which the organisations can learn from experience to avoid repeating similar dangerous occurrences.

Events which actually lead to measurable consequences – damages to people, environment or property – should all be reported and handled promptly and efficiently. It would obviously be the objective to have as few as possible of these kind of events (accidents).

Events which do not lead to any measurable consequences, but which could have resulted in consequences, had the circumstances been different – "near-misses", or other "learning experiences" – should also be reported and handled in a similar way. The objective should also be to minimise such events; however, efforts should be made to have as many of them as possible reported. This is of particular concern because there is a tendency not to report events when there are no consequences.

It could be an advantage to separate the reporting of events with measurable consequences, and those without consequences, into two different categories. However, the principle of learning the maximum from each event to avoid a recurrence should be the same. Therefore, consideration should be given to having separate reporting systems for:

- *serious accidents (including fatalities or major environmental impact), Lost Time Incident (LTI's), accidents with significant environmental impact, and accidents involving first aid or other medical treatment.; and*
- *"near-misses" (deviations with no or little consequences) and other "learning experiences".*

See Guiding Principles document, paras.: 1.9, 2.d.31, 2.d.42, 14.a.1, 14.c.1 – 4, 15.b.1

- **Target**

To develop and implement efficient systems for reporting of accidents, near-misses, and other "learning experiences" in order to improve safety based on these experiences.

- **Guidance for Developing Safety Performance Indicators**

➢➢ ***Outcome Indicators***

i) LTI (Lost Time Incident) rate (and equivalent environmental accident rates).

ii) Rate of recordable incidents relating to personal injury (LTI´s, medical treatment cases, first aid injuries and equivalent accidents such as loss of primary containment).

iii) Rate of recordable incidents measured as releases (loss of primary containment), fires etc.

iv) Severity rate, *e.g.*, Lost Work Days Rate.

(To be comparable between time, these rates should be expressed per employee or per total working hours.)

v) Number of automatic emergency shut-downs.

vi) Abnormal releases from continuous or normal emissions.

vii) Number of reported incidents, totally.

viii) Number of days since last recordable incident.

It could be valuable to make separate indicators for employees in various parts of the enterprise in order not to dilute the results and hide problematic areas.

➢➢ *Activities Indicators*

i) Is there a comprehensive system for reporting incidents and other "learning experiences"?

- Are there definitions for "reportable events";
- Are there documented procedures on how to report;
- Are there clear responsibilities for co-ordination and maintenance of the system;
- Are all types of incidents and other learning experiences involving hazardous substances covered (including serious accidents, LTIs, medical treatment, environmental impact, near-misses, learning experiences);
- Does the reporting system include all incidents related to the activities of the enterprise including actions of contractors and transporters.

ii) Is there a clear procedure for reporting, with well-defined roles and responsibilities, and clear directions and reporting forms?

- Does this include reporting to third parties (authorities or trade associations);
- Are relevant parts of accident reports available to the public.

iii) Are all employees encouraged by the management to report and discuss incidents?

- Is there an open atmosphere, without fear of punishment;
- Are there incentives for reporting;
- Is there a history of employees willing to report their mistakes;
- Are there opportunities to discuss incidents, and ways to avoid similar situations in the future;
- Is there a formal mechanism for responding to employee reports, including taking action and giving feed-back to the individual;
- Is there a mechanism to share lessons learned throughout the company, and the industry.

iv) Is the reporting system regularly reviewed to ensure that it is functioning as intended?

- Is there a mechanism for assessing or measuring that reporting and follow-up actually leads to increased safety awareness;
- Are the findings of the review utilised to improve the reporting system.

A6.2 Investigations

It is important that accidents and other relevant incidents be promptly investigated after they have been reported in order to find the root and contributing cause(s), in order to learn from experience. Information from the investigation should be shared within the enterprise and throughout the industry.

Therefore, procedures should be in place for the investigation and analysis of incidents involving hazardous substances. A system should also be established for analysing the result of the investigation and taking corrective action, as appropriate. The extent of the investigation should be related to the seriousness of the incident, and the value of the incident for learning lessons.

*The objective of investigations should be to determine root and contributing cause(s) of incidents in order to avoid similar problems in the future. This goes beyond the immediate cause of the accident (*e.g.*, the operator failed to follow proper procedures). The root cause analysis seeks to determine the underlying reason for the failure (*e.g.*, the operator was not well-trained or had insufficient information, there was insufficient staff or there was extreme stress on the operator, or the design of the facility made it difficult for the operator to follow procedures). The same goes for analysing technical, organisations, and human causes.*

See Guiding Principles document, paras.: 15.a.1 – 10, 15.b.1, 15.b.2

- **Target**

To develop and implement efficient systems for investigations of accidents, near-misses and "learning experiences", and to determine root and contributing cause(s).

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent of incidents that are investigated in accordance with established procedures.
- ii) Extent of events where the investigators managed to find real root cause(s).

➢➢ *Activities Indicators*

i) Is there a procedure for investigation and analysis of incidents, with the following key features?

- Identification of roles and responsibilities of those involved in the investigations (ensuring that appropriate experts and staff are involved, including employees concerned in the event);
- Clear statement of criteria for determining which incidents should be subject to investigation, and at what level;
- Clear criteria for appointing investigating teams when relevant (with impartial members);
- Criteria for when external resources should be called in, *e.g.*, representatives of the community;
- Procedures for carrying out the investigation (including how to gather evidence from witnesses, documentation, technical reviews and other sources);
- Procedures for analysing evidence;

- Procedures for determining and analysing root causes, together with contributing causes;
- Procedures for developing conclusions and recommendations.

ii) Is there a system for follow-up of incident investigations in order to eliminate identified deficiencies?

- Is the analysis of the incident supplemented by a potential problem analysis of similar situations in other parts of the enterprise.

A6.3 Follow-Up (including application of lessons learned and sharing of information)

After incidents have been investigated and root causes found, appropriate corrective actions should be taken, as well as other follow-up activities such as dissemination of information and experience.

*In this regard, two separate categories for follow-up actions should be distinguished: one for each individual incident; and another for a collected number of incidents for a longer period (*e.g.*, a year).*

In addition to investigations of individual incidents, it is essential to carry out an overall analysis of all the incidents that happen within an enterprise in order to identify common underlying causes and trends. Based on statistics and trend analyses of incidents over a period of time, it will be possible to find systematic problems and instigate efficient programmes and measures for corrective actions.

See Guiding Principles document, paras.: 14.a.1, 14.c.5, 15.a.7, 15.a.11 – 14

- **Target**

To help ensure that effective corrective actions are taken as the result of lessons learned from accidents, near-misses and other "learning experiences".

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Amount of time needed for implementation of recommendations resulting from investigations.

ii) Extent the trend analyses and statistics reflect improvements, based on efforts to investigate and eliminate root and contributing causes.

iii) Number of appearances of same root cause.

➢➢ *Activities Indicators*

i) Is there a procedure for taking corrective actions as the result of individual incidents? Does this procedure address:

- Identification of roles and responsibilities for action;
- When, what, and how to take action;
- The need to consider technical and managerial actions.

ii) Is there a system for follow-up of incident investigations and related recommendations? Does this procedure address:

- Identification of roles and responsibilities for taking action;
- Time for implementation/deadlines;
- Documented follow-up to determine whether recommendations have been followed, what action has been taken and the reasons for such action.

iii) Is there a procedure for preparing statistical reports and trend analyses to identify common or systemic problems (such as weaknesses in training, procedures, maintenance or inadequate source of technology)?

- Is there a procedure for taking corrective actions as a result of such studies.

iv) Is there a system for analysis of reported incidents, addressing *e.g.*:

- Type of incidents involved (amount of chemical released, notification time, response time, extent of injuries, etc.);
- Why numbers going up or down.

v) Is there an efficient and effective system for disseminating the results of accident investigations, statistical reports and trend analyses? Does this provide for dissemination:

- Inside the enterprise to all concerned;
- To other companies within the industry;
- To stakeholders outside the enterprise (including, *e.g.*, public authorities, media, neighbours, the public).

NOTES

[1] For purposes of this Document,"incident" means any event which differs from normal conditions (deviation) and which has caused or could have caused harm to health or the environment. Therefore, incidents include accidents (events which have caused injuries, illnesses, environmental damages, third party damage, property damage, product losses or interruption of operations) and near-misses (events without the consequences of accidents but which, under other circumstances or left to continue, may have developed into accidents).

Part B

GUIDANCE FOR PUBLIC AUTHORITIES
for
Developing Safety Performance Indicator Programmes

GUIDANCE FOR PUBLIC AUTHORITIES
for
Developing Safety Performance Indicator Programmes

Introduction

This Section provides guidance for public authorities for developing and implementing a safety performance indicators (SPI) Programme. The guidance is designed to help organisations assess their performance related to chemical accident prevention, preparedness and response.

Before trying to apply the guidance in the Section, it is recommended that you read carefully the introductory chapters of this Document (including "How to Use this Document").

The introductory chapters explain that the ultimate measure of chemical safety is the reduction in the number of chemical accidents or near misses that occur. However, significant accidents/near misses are relatively rare events that have a wide range of possible impacts, and can be caused by a complex combination of technical, organisational, and human failings. Simply measuring accidents/near misses does not provide sufficient information for deciding what actions should be taken to improve chemical safety programmes. Furthermore, there is no way to measure the accidents that did not occur as a result of the actions taken.

Therefore, this guidance was developed to be used by public authorities as an alternative means to measure performance. It contains two types of measures: "activities indicators" which help identify whether your organisation is taking actions believed to lower risks (e.g., the types of actions described in the *Guiding Principles*); and "outcome indicators" which help measure whether such actions are, in fact, leading to less likelihood of an accident occurring and/or less adverse impacts on human health or the environment should an accident occur.

It is critical to realise that this guidance does not contain a Programme that can be lifted out and applied as a whole.

Rather, the guidance can only be effectively used if efforts are made to decide which elements are relevant under your organisation's particular circumstances, and steps are taken to adapt these elements to your organisation's specific needs and objectives.

Thus, the introductory chapters suggest a multi-step process for establishing an SPI Programme, which includes:

- developing a strategic plan (including identification of goals and objectives and planning of financial and human resources);
- reviewing the Guidance Document;
- selecting the activities indicators and outcome indicators relevant to your organisation;
- adapting the indicators to the vocabulary and procedures of your organisation;
- developing processes for measuring the indicators (metrics); and
- applying the indicators on a regular basis.

Furthermore, SPI Programmes should be reviewed periodically, and revised/updated as appropriate.

IT IS IMPORTANT TO REMEMBER THAT DEVELOPING AND IMPLEMENTING AN SPI PROGRAMME REQUIRES A SIGNIFICANT COMMITMENT, WITH A CORRESPONDING ALLOCATION OF HUMAN AND FINANCIAL RESOURCES.

General Outcome Indicators

In addition to the list of possible outcome and activities indicators set out below, by topic, the Group of Experts developed the following list of general outcome indicators that may be applicable to all stakeholders (e.g., industry, public authorities, communities). These can, if measured over time, show if chemical safety has improved. When taken with other outcome indicators, they can present a picture of chemical safety in the broadest sense as well as show how industry, public authorities, and communities effect the improvement of chemical safety.

(i) Reduction of chemical risks at hazardous installations (as measured by, e.g.: risk assessments; reduction of chemical inventories; reduction of adverse impacts from accidents; improvement in processes and process techniques; reduction of vulnerability zones; and improved transportation).

(ii) Extent of interaction and collaboration of public authorities, industry, and communities leading to improved safety of hazardous installations and reduction of chemical risks to local communities.

(iii) Reduction of the frequency of accidents and near-misses, and their severity.

(iv) Reduction of injuries and fatalities from chemical accidents.

(v) Reduction of environmental impacts from chemical accidents.

(vi) Reduction of property damages from chemical accidents.

(vii) Improvement in response to chemical accidents (reduction of delay and increased efficiency).

(viii) Reduction of impact zone of chemical accidents (distance).

(ix) Reduction of the number of people affected by chemical accidents (e.g.,evacuation, shelter in place, etc.).

Chapter B1: INTERNAL ORGANISATION AND POLICIES

Introduction to Chapter B1

The basis of an effective internal accident prevention, preparedness, and response programme is the establishment and implementation of clear and broad organisational goals, objectives, policies, and procedures. Before public authorities at the national, regional, and/or local level implement an external chemical accident prevention, preparedness, and response programme, they should develop and clearly state what goals they would like to accomplish with the programme and the internal policies and procedures needed to meet those goals. Thus, public authorities should establish internal goals and objectives for their programme as well as a process for auditing and evaluating that programme to reflect political, organisational, and similar changes. Public authorities should also ensure their personnel understands and support the organisational goals and objectives, has appropriate training and education to implement the programme, and institutes a mechanism to communicate all necessary information within the organisation. This chapter focuses on the role of public authorities as it relates to establishing internal organisational goals and policies. It addresses organisational goals and objectives, personnel management, and internal communication and information exchange.

This chapter includes the following sub-chapters:

- B1.1 Organisational goals and objectives
- B1.2 Personnel
  - a. Management of human resources (including staffing/recruitment/selection)
  - b. Training and education
- B1.3 Internal communication/information

B1.1 Organisational Goals and Objectives

Public authorities should ensure that appropriate internal organisational goals and objectives are established as part of their short- and long-term strategy. For this purpose, "goals" are defined as general results that the organisation is working to accomplish, while "objectives" are defined as the level of achievement expected from the implementation of the goals. Generally, objectives should be expressed in terms that are measurable. The goals and objectives for public authorities should define the path toward ensuring the protection of the public, the environment, and property from chemical accidents and implementing programmes to ensure the safety of hazardous installations.

- **Target**

To develop, implement, and periodically evaluate internal organisational goals and objectives.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Extent the organisation's chemical accident prevention, preparedness, and response programme has been audited and evaluated based on revisions and/or changes in the organisational goals and objectives, lessons learned from implementing the programme, input from stakeholders, advancements in chemical safety, and/or lessons learned from stakeholders (e.g., industry, other public authorities, other countries, national/international organisations, etc.)

↳ ii) Extent organisational goals and objectives have been met.

➢➢ *Activities Indicators*

i) Have short- and long-term goals been established for the public authority's organisation to ensure protection of human health, property, and the environment from the risks of accidents involving hazardous substances?

ii) Have specific objectives with measurable outcomes been defined based on the short- and long-term goals for:

- reducing accidents;
- reducing vulnerability zones and accident potential;
- improving emergency response and mitigation;
- improving prevention techniques;
- providing public access to chemical hazards information;
- obtaining involvement of all stakeholders.

iii) Has an infrastructure been established to support chemical accident prevention, preparedness, and response and for implementing and enforcing the safety of hazardous installations policies and procedures?

- Does the infrastructure include all levels of government (*i.e.* national, regional, and local);
- Are roles and responsibilities clearly defined.

iv) Is a process in place for evaluating progress toward these organisational goals and objectives?

v) Is there a workplan in place, which identifies the specific steps for accomplishing the goals and objectives?

vi) Is there a mechanism for periodically evaluating and auditing the organisation's chemical accident prevention, preparedness, and response programme? Has the programme been adjusted based on:

- revisions and/or changes in the organisational goals and objectives;
- lessons learned in implementing the programme;
- advancements in the safety of hazardous installations;
- national or international developments;
- lessons learned from incidents.

vii) Have these goals/objectives been co-ordinated with all appropriate public authorities?

- within your country;
- with neighbouring countries.

B1.2 Personnel

a) Management of Human Resources (including staffing/recruitment/selection)

Public authorities should ensure the availability of appropriate staff to carry out their roles and responsibilities with respect to chemical safety. In order to accomplish this, public authorities should establish and implement policies and procedures that ensure:

- *employees have a clear understanding of their role and responsibilities;*
- *the staffing at each level is adequate to accomplish the mission and of the right mix of expertise, knowledge, and experience;*
- *employees are given and receive feedback related to performance from subordinates, management, and peers; and*
- *employees receive appropriate acknowledgement and awards for doing their job well.*

See Guiding Principles document, paras.: 3.1.18, 3.c.11

■ **Target**

To establish a competent staff with clearly defined roles and responsibilities.

■ **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent public authorities have the appropriate and sufficient staff (including the right mix of technical and policy expertise and knowledge) to ensure all the goals and objectives of their mission is accomplished.

ii) Percentage of the required inspections, audits, and safety reports completed.
- Percentage of these reports completed within a given timeframe.

iii) Percentage of appropriate prevention requirements (e.g., reviewing of safety reports, inspections) completed by staff within a given timeframe.

➢➢ *Activities Indicators*

i) Are roles and responsibilities for all staff clearly identified and articulated?

- Do staff members have job descriptions, which identify their responsibilities;
- Are job descriptions in written form;
- Does management discuss with each staff member their roles and responsibilities;
- Is there a system in place to ensure staff members understand their roles and responsibilities.

ii) Is the general competence level of the staff adequate?

- Does each staff member have the appropriate knowledge and expertise to meet the responsibilities of their job;
- Is there an appropriate mix of technical and policy expertise in order to meet the mission of the organisation;
- Is there a system in place to ensure compliance with all legal obligations related to the competence levels of the staff;

- Is there an adequate recruitment procedure that ensures the appropriate matching of staff with job descriptions;
- If expertise in not available to carry out their goals and objectives, is there a system for obtaining that expertise through external consultants or industry.

iii) Are there systems for appraisal and feedback to the staff?

- Is there a formal mechanism for feedback between management and staff of performance;
- Is there a mechanism for staff to provide feedback to their management on their performance;
- Are there incentives for exceptional or improved performance.

b) Training and Education

Public authorities should ensure staff is appropriately educated (i.e., appropriate knowledge, background, and skills) and trained in order to carry out their identified roles and responsibilities. Public authorities are responsible for working with industry to prevent accidents. They are also responsible for developing emergency response plans and responding to accidents to mitigate their effects. Therefore, preventing accidents as well as preparing for and responding to accidents should be included in the training and education system. Additionally, staff members should understand generally the prevention, preparedness, and response systems, as well as receive specialised training in their area of expertise. Staff members should also have full knowledge and understanding of the laws, regulations, and standards, established by the public authorities, to the extent that they are relevant to the staff members' position. Thus, based on the roles and responsibilities of each staff member, training and education should include both general and specialised training. Public authorities should also strive to hire staff with the appropriate qualifications (i.e., engineering degree, on-the-job experience, etc.).

See Guiding Principles document, paras.: 3.a.18, 3.c.8, 3.c.11, 5.c.8, 10.8, 15.a.4

- **Target**

To have a well-trained and educated staff.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Percentage improvement of staff competency.
- ii) Extent staff performed quickly and adequately during emergency response actions and mitigated, as much as possible, the effects of the accident.
- iii) Extent staff performed quickly and adequately during tests of the emergency preparedness plans.

➢➢ *Activities Indicators*

i) Are clear, specific objectives established for training and education?

- Can these objectives be measured;
- Are the training and education objectives well-known within the organisation;
- Are there incentives to improved performance based on the training and education programme.

ii) Are there training programmes for all categories of employees? Does this include:

- orientation training of all staff;
- job training for workers including initial position, major changes in job, and promotions;
- job training for managers and supervisors;
- specific and/or technical training, as appropriate;
- training of contractors; and
- other categories, as appropriate.

iii) Are there mechanisms to ensure that the scope, content, and quality of the training and education programmes are adequate?

- Are the programmes based on the competence requirements for each job description;
- Do programmes include topics for all skills needed for the job;
- Is there participation of the staff in developing the programmes;
- Is there a mechanism for feedback from the staff built into the programmes;
- Is the quality of the training, trainers, and the training materials assessed regularly;
- Is there a formal checking of training results by an independent means;
- Is there a review of training programmes following exercises of emergency plans or accident response.

iv) Is there a mechanism to check that the training is actually performed according to the training programmes, and achieves desired results? In this regard, are the following aspects checked and are records maintained concerning:

- each element of the scope being addressed;
- number of staff members trained;
- period of time between retraining activities; and
- individual results in terms of the competence of the staff member being trained.

B1.3 Internal Communication /Information

Public authorities have a wide array of activities that fall under their responsibility. Staff member are responsible for working with industry as well as other stakeholders in the prevention of, preparedness for, and response to accidents involving hazardous substances. Thus, internal communication and information exchange within a public authority is imperative to ensure sharing and learning from each other's experiences and non-overlap of efforts.

- **Target**

To ensure adequate exchange of information and experience within a public authority.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

└► i) Extent of the effectiveness and efficiency of internal communication mechanisms, such that no overlap, gaps, or conflicts of effort takes place within the organisation.

➢➢ *Activities Indicators*

i) Are there mechanisms for communicating internally on day-to-day activities?

- Are there several means of communication (e.g., e-mail, memorandum, meetings, briefing, etc.);
- Do these mechanisms allow for changes in activities if overlap, gaps, or conflicts in effort are discovered;
- Does the staff receive the information they need to meet their responsibilities;
- Is there a means of ensuring people are using the mechanisms to communicate;
- Is there a person responsible for overseeing internal communications.

Chapter B2: LEGAL FRAMEWORK

Introduction to Chapter B2

A legal framework plays an important role in ensuring the safe operation of hazardous installations. Using means such as laws, regulations, and standards as well as safety reports, a permitting structure, inspections, and enforcement actions, public authorities can continuously monitor industry to secure the safety of the public, property, and environment from accidents involving hazardous substances.

This chapter includes the following sub-chapters:

B2.1 Laws, Regulations and Standards

The primary objective of a chemical accident prevention, preparedness, and response programme is to prevent accidents from taking place. It is recognised, however, that accidents may occur, thus a chemical safety programme must also include provisions to mitigate the effects of such accidents on human health, property, and the environment. Public authorities should, therefore, develop laws, regulations, and standards that address both prevention as well as mitigation of accidents. The laws, regulations, and standards should allow industry flexibility in meeting the requirements based on their own situations and circumstances. Additionally, public authorities should develop mechanisms and guidance for assisting industry in understanding and complying with the laws and regulations.

See Guiding Principles document, paras.: 1.12, 3.a, 3.c.1 – 2, 4.e.4, 16.a.1, 17.a.13, 17.a.17 – 19, 17.b.1

- **Target**

To develop and implement a legal framework, to help ensure the safety of hazardous installations as well as to assist and monitor hazardous installations.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent regulations are understood and accepted by industry and other target audiences.
- ii) Extent public authorities have implemented laws, regulations, and standards.
- iii) Percentage of hazardous installations in compliance with laws, regulations, and standards.
- iv) Extent laws, regulations, and standards are consistent with international requirements and guidance (e.g., the EU "Seveso II" Directive, OECD Guiding Principles on Chemical Accident Prevention, Preparedness, and Response, UNECE Convention on the Transboundary Effects of Industrial Accidents, etc.)

➢➢ *Activities Indicators*

i) Is there a mechanism to define goals and objectives for improvement of safety performance when developing new laws and regulations?

- Are estimates for performance improvements included;
- Is a measurement and evaluation system for the relevant safety performance trends included.

ii) Has a clear and concise regulatory framework been established?

- Does the framework establish criteria to determine which hazardous installations will be required to comply with the laws and regulations;
- Are the hazardous substances covered by the laws and regulations defined;
- Is the information to be reported clearly identified;
- Is there a mechanism for reporting the required information.

iii) Is there a mechanism for public authorities to consult with, and receive feedback from, industry, the public, and other stakeholders before and during the development of regulations related to chemical accident prevention, preparedness, and response?

iv) Do the public authorities understand their responsibilities to establish regulations and guidance designed to protect human health, property, and the environment from accidents involving hazardous substances and to implement and enforce those regulations?

v) Does the regulatory framework allow for flexibility in the methods industry can use to comply with the laws and regulations?

- Are enterprises allowed to establish the methods for meeting the requirements that are best-suited to their particular circumstances;
- Is the specific situation of small- and medium-sized enterprises taken into account.

vi) Are there mechanisms and guidance documents to assist industry in understanding and complying with the laws and regulations?

- Are there guidance documents for specific industries and hazards (e.g. ammonia refrigeration hazardous installations, water treatment plants, etc.);
- Are there guidance documents to assist small- and medium-sized enterprises;
- Is there a mechanism for enterprises to seek information and assistance from public authorities.

vii) Does the regulatory framework include provisions for monitoring whether hazardous installations are in compliance with the laws and regulations, as well as a means for enforcing those requirements?

viii) Are requirements established by public authorities applied fairly and uniformly to ensure all hazardous installations, regardless of size and type, are required to meet the same overall safety objectives?

ix) Is there a mechanism for periodic review and update of the legal framework based on technical progress and newly gained knowledge?

x) Are there guidance documents to assist the public in understanding the regulatory framework as well as information generated as a result of the regulations?

- Is adequate time provided for enterprises to understand, implement, and comply with revised laws and regulations.

xi) Are the laws, regulations, and guidance documents readily available and easily accessible to the public (e.g., via internet, libraries, publication mailings, etc.)?

B2.2 Land-Use Planning

Land-use planning is an essential element in the overall chemical accident prevention, preparedness, and response programme and strategy of public authorities. It is one of the necessary steps in controlling the potential for an accident with significant off-site effects. Public authorities should establish land-use planning requirements to ensure installations are sited properly to protect human health, property, and the environment. In addition, these requirements should, as appropriate, prevent the placing of communities or community developments near hazardous installations. Finally, these requirements should control inappropriate changes to existing installations.

See Guiding Principles document, paras.: 3.b.1 – 4, 6.1 – 7, 16.a.2, 17.a.1 – 2

- **Target**

To ensure the appropriate siting of hazardous installations to protect human health, property, and the environment and prevent (community) development near hazardous installations.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Extent land use planning requirements and/or policies exists for hazardous installations.
- ii) Extent hazardous installations are located according to current land use planning requirements.
- iii) Extent local communities have made adjustments (e.g.,. relocation of schools, etc.) based on land use planning requirements and/or information.
- iv) Extent the number of people residing and working within the hazardous zone of a hazardous installation has been reduced (e.g., reduction of size of hazardous zones, reduction of people residing within the hazardous zone area, etc.)
- v) Extent the areas of vulnerable populations (e.g., school, hospitals, nursing homes, etc.) within the hazardous zone of a hazardous installation have been reduced (e.g., reduction of hazardous zone, reduction of sensitive populations in hazardous zones, reduction of environmentally sensitive areas in hazardous zones, etc.).

➢➢ *Activities Indicators*

i) Are there land-use planning requirements within the regulatory framework, which provides a clear indication of the standards to be met?

- Do these standards include evaluation procedures for public authorities to use in siting new hazardous installations and for proposed developments near existing installations.

ii) Are there guidelines for public authorities to identify new installations and modifications to existing installations, which may increase the risk of an accident?

- Do land-use planning decisions by public authorities take into account the cumulative risk of all hazardous installations in the vicinity;
- Is the availability of external emergency response capabilities considered in land-use planning decisions.

iii) Is there a mechanism for evaluating compliance with land-use planning requirements?

iv) Is there a mechanism for enforcement of zoning and siting decisions?

v) Are land-use planning activities co-ordinated among all relevant public authorities?

vi) Does the public have easy access to information on land use planning and siting of hazardous installations?

vii) Is the public given the opportunity to provide input into the decision-making processes related to land use planning and siting of hazardous installations? Is the public provided access to the final siting decisions and risk zones?

viii) Is there guidance for the siting of individual hazardous installation (e.g., safety distances)?

ix) Is there a programme to identify existing hazardous installations not meeting current land-use planning standards?

x) Is there a policy on how to handle the situation when land-use planning standards are not met?

B2.3 Safety Reports

Safety reports contain all safety-related information on the various processes at a hazardous installation and related equipment. Public authorities are responsible for ensuring policies and regulations are in place regarding specific requirements for safety reports. Additionally, public authorities should make certain a feedback loop is in place to inform enterprises on the adequacy of safety reports.

See Guiding Principles document, paras.: 3.a.11 - 12

- **Target**

To establish a system for developing and implementing criteria related to safety reports, reviewing reports, disseminating information, and improving understanding of chemical risks.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of hazardous installations that have submitted safety reports containing all required information compared to those that are subject to the reporting requirements.

ii) Percentage of safety reports evaluated by the public authority with specific criteria within a specific time frame.

➢➢ *Activities Indicators*

i) Is there a mechanism for industry to provide detailed chemical hazard and risk information in the form of a safety report?

ii) Do the requirements for submitting a safety report specify:

- A list of hazardous substances subject to the reporting requirements;
- Different categories or levels of hazardous installations.

iii) Is specific information required to be reported in the safety report, such as:

- Description of the hazards at the installation (including chemicals involved and processes used);
- Demonstrations that appropriate steps are being taken to prevent accidents;
- Possible consequences of accidents, and measures in place to limit the consequences should an accident occur;
- Results of a risk assessment;
- Description of the methodology for hazard identification and risk assessment;
- Information on compliance with state of the art processes;
- Accident case history and follow-up measures.

iv) Are there policies and procedures for the evaluation of the safety reports to examine their completeness?

v) Are there policies and procedures for verifying the information in safety reports through on-site inspections?

vi) Is there a mechanism to provide the information from the safety reports to the public?

B2.4 Permits

In some instances it is necessary to implement a structure for approving hazardous installations to operate. If, based on criteria within this structure, an installation is considered a high risk to the community and environment and should only operated with prior and continuing approval by the public authority, that installation should be subject to a permitting process. In such cases, the hazardous installation should submit full details of all relevant aspects (e.g., process, risk assessments) of its hazardous operations in order for the permitting authorities to review the application and determine whether to issue a permit.

See also "Land-Use Planning."

See Guiding Principle document, para.: 3.a.14

- **Target**

To establish a permit process to help ensure hazardous installations are operated safely.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Percentage of hazardous installations required to have a permit, which have received a permit.
- ii) Percentage of hazardous installations that are constructed and operating according to their permit.
- iii) Percentage of permit applications reviewed by public authorities within a specified timeframe.
- iv) Percentage of permits instituted by public authorities that were overruled by courts.

➢➢ *Activities Indicators*

i) Is there a permit process that identifies the specific hazardous installations required to have permits to operate? Do stakeholders have an input into the development of this process?

ii) Is there guidance for industry that outlines the specific information to be provided to the public authorities for obtaining a permit to operate?

iii) Are there criteria and procedures for the public authorities to evaluate and approve applications by hazardous installations to receive a permit to operate?

iv) Are there procedures for ensuring the quality of the permitting process and information submitted for permits?

v) Is there a mechanism for the public to provide input into permitting decisions?

vi) Is there an integrated permitting process among relevant public authorities?

vii) Is there a mechanism for ensuring a hazardous installation is constructed and operated according to their permit?

viii) Are there mechanisms to ensure the permit situation has not changed?

B2.5 Inspections

Inspections are an essential element to ensure the overall safe operation of hazardous installations. Inspections serve a number of purposes including determining whether hazardous installations are complying with appropriate or relevant regulations, standards, and practices and whether safety management systems are in place and operating appropriately at the installations. There are additional important benefits from inspections, such as they provide an opportunity for sharing experiences and developing guidance for improving safety at hazardous installations, and they provide a basis for improving public confidence about the safety of such installations.

See Guiding Principles document, paras.: 1.14, 3.c.1 – 13, 17.c.4

- **Target**

To establish an inspection programme to help ensure hazardous installations are operating according to requirements and best safety practices.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of hazardous installations, required to be inspected, which have been inspected.

ii) Percentage of hazardous installations in compliance with all appropriate laws, regulations, etc. based on inspections of such installations.

iii) Percentage of safety improvements implemented at the hazardous installation as a result of an inspection (*i.e.*, based on safety improvements required or suggested by a public authority during an inspection).

➢➢ *Activities Indicators*

i) Is there a inspection programme for hazardous installations in place within the public authority, including:

- Clearly defined goals, objectives, and scope for each public authority;
- Established priorities of the programme, taking into account safety records, experience with industry, etc.;
- Schedules for inspections with co-ordination between different public authorities;
- Identification of personnel and training needs for inspectors;
- Guidance and protocols for completing an inspection;
- Procedures for follow-up; and
- Procedures for allowing public input into general policies on inspections.

ii) Is there a mechanism for ensuring an inspection programme is adequate?

- Does the inspection programme address all relevant laws, regulations, and other requirements;
- Does the inspection programme ensure that all required hazardous installations are inspected in a timely fashion.

iii) Is there a mechanism to implement the inspection programme?

- Is the scope of the inspection (e.g., check of compliance with requirements, enforcement of laws and regulations, on-site validation of safety reports) identified to the hazardous installation prior to the inspection;
- When establishing priorities, are the following taken into account: the past performance of hazardous installations with respect to safety, the nature and extent of hazards at the installations, and the hazard potential at the installations;
- Are the appropriate experts used to carry out the inspections, with respect to the specific hazards at the hazardous installation;
- Have standard protocols been established for inspections to ensure a common approach and measurable results among different inspection teams;
- Do inspectors communicate with each other regarding similar hazardous installations;
- Is there a filing system for inspection reports to promote sharing of the information within a country.

iv) Is there a mechanism to ensure appropriate and timely follow-up to inspections to make certain problems identified are addressed and there is verification of actions taken?

v) When third parties (independent organisations delegated to undertake technical or systems inspections on behalf of public authorities) are used, is their quality ensured through certification or accreditation schemes?

vi) Is the public made aware of the inspection and inspection reports within their community?

vii) Is there a mechanism for public authorities to co-ordinate with industry on audits and inspections, which improves the efficiency of inspections and improves the ability of public authorities and industry to learn from each other.

viii) Do public authorities encourage industry to share information on audit procedures and results with other hazardous installations in order to promote better co-operation among industry and sharing of experiences and lessons learned?

B2.6 Enforcement

Laws and regulations should contain penalties for hazardous installations that are not in compliance. Therefore, public authorities must be prepared to enforce these penalties. To achieve this, a strong enforcement policy is needed. This not only helps to ensure industry will comply with all appropriate laws and regulations, it also builds trust with the public.

See Guiding Principles document, paras.: 1.12, 1.14, 3.a.7 – 8, 3.c.1 – 9, 6.3 – 4, 17.a.13, 17.b.1

- **Target**

To ensure hazardous installations comply with all requirements.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Change in number of enforcement actions at inspected hazardous installations.
- ii) Change in number of cited violations at inspected hazardous installations.
- iii) Percentage of hazardous installations that are cited for violations of the same requirements on more than one occasion.

➢➢ *Activities Indicators*

i) Are there policies and procedures for instituting enforcement actions against hazardous installations, including:

- Defined goals and objectives;
- Established priorities;
- Overview of process for implementing enforcement actions;
- Specific procedures for all enforcement requirements and policies;
- Identified roles and responsibilities of personnel involved in enforcement actions (e.g., inspectors, attorneys, management)
- Specific training requirements for all enforcement personnel; and
- Appropriate follow-up.

ii) Is there a mechanism for instituting enforcement actions against hazardous installations, which do not follow the requirements as set out in laws, regulations, and permits?

iii) Do public authorities have the ability to immediately shut down a hazardous installation if it is operating in an unsafe manner, which threatens the safety of the public?

iv) Do public authorities have the authority to enter hazardous installations in order to inspect the facility?

v) Do public authorities make the enforcement policies and procedures available to hazardous installations?

vi) Has guidance been developed and distributed to industry which identifies how regulated hazardous installations can best comply with the requirements and satisfy their obligations to operate safely?

vii) Is the public made aware of all enforcement actions taken at hazardous installations within their community?

Chapter B3: EXTERNAL CO-OPERATION

Introduction to Chapter B3

All stakeholders have a role to play in chemical accident prevention, preparedness, and response. Therefore, co-ordination among those stakeholders is important to protecting the public, property, and environment. Public authorities are in a unique position to establish and foster mechanisms to ensure this co-ordination, since it is their role to ensure the effective implementation of the legal framework for chemical safety and to ensure that information is provided to the public on chemical risks. Thus, public authorities should work with each of the stakeholder groups to implement successful efforts to improve chemical safety.

This chapter includes the following sub-chapters:

B3.1 Co-ordination among Relevant Authorities at all Levels

There are a variety of public authorities concerned with the prevention of accidents involving hazardous substances (as well as with preparedness and response). The scope of public authorities includes all government bodies at national, regional, local, and international levels with the authority to issue licenses, regulations, standards, or other instructions having the force of law. It includes a wide range of ministries, departments and agencies including, for example, those responsible for industry, labour, environment, health, planning, and civil protection. With this large number of governing bodies involved in regulating industry, it is imperative that there is a means for these authorities to work together. Therefore, a co-ordinating mechanism should be established where more than one competent public authority exists, in order to minimise overlapping and conflicting requirements from various public authorities.

See Guiding Principles document, paras.: 1.2, 1.17, 3.a.3 – 4, 3.a.6, 3.a.9, 3.b.4, 3.c.6, 3.c.12, 3.c.14, 5.a.5, 5.a.9, 5.a.14, 5.a.20, 5.c.4 – 5, 5.c.17, 5.c.21, 6.2, 7.11, 7.17, 13.4, 14.a.1, 15.a.13; 15.c.5, 16.a.1 – 9, 17.a.2, 17.a.17 – 19.

Target

To establish an infrastructure for effective co-ordination among relevant authorities with respect to the development of legal frameworks, interaction with hazardous installations, and exchange of information.

Guidance for Developing Safety Performance Indicators

➢➢ *Outcome Indicators*

i) Extent overlaps and conflicts in the requirements related to safety of hazardous installations have been eliminated among relevant public authorities.

➢➢ *Activities Indicators*

i) Has a co-ordinating infrastructure been established for all the relevant public authorities?

- Does this infrastructure identify the roles and responsibilities of each relevant public authority;
- Does it include the national, regional, local, and international levels of government;
- Has a public authority within each level of government been identified as responsible for co-ordinating the efforts of relevant public authorities related to assisting and overseeing hazardous installations.

ii) Has a mechanism been established for co-ordinating among relevant public authorities the provision of assistance to and overseeing of hazardous installations safety efforts? Does the mechanism provide the ability to:

- co-ordinate policies and procedures;
- co-ordinate development of guidance documents;
- discuss and resolve issues related to overlapping roles related to the safety of hazardous installations
- co-ordinate inspections of hazardous installations.

iii) Is there a mechanism for reviewing the laws and regulations developed by various public authorities?

- Does this mechanism ensure the minimisation of overlap and redundancy in the various requirements from relevant public authorities;
- Is there a means for resolving differences between the various requirements.

iv) Is there a process for exchanging information among relevant public authorities?

- Does this process include periodic meetings and discussions;
- Does this include means for electronic exchange of lessons learned, new policies and procedures, technical information, guidance documents, etc.;
- Does this process include exchange of information among countries.

B3.2 Co-operation with Industry

The responsibility for the safety of hazardous installations lies FIRST with industry. However, the prevention of accidents is the concern of all stakeholders, including industry as well as public authorities at all levels and the community/public. For accident prevention to be most effective, co-operative efforts should be undertaken between these stakeholders. Public authorities should attempt to co-operate with and stimulate industry to carry out industry's responsibility to ensure the safe operation of hazardous installations. This co-operation should be based on a policy of openness, which includes frequent dialogues and information exchanges with industry and proactive approaches to the safety of hazardous installations and accident prevention. This type of co-operation will help increase public confidence that appropriate measures are being taken to limit the risks from hazardous chemicals.

See Guiding Principles document, paras.: 1.2, 1.13, 1.15, 1.17, 1.19, 3.a.4, 3.a.6, 3.a.9, 3.a.17, 3.a.20 – 21, 3.c.1 – 3, 3.c.13, 5.a.5 – 9, 5.a.14, 5.a.20, 5.c.2, 5.c.17, 7.11, 14.a.1, 15.a.12, 15.c.3, 17.a.2.

- **Target**

Use partnership with industry to improve safety by: consulting on laws, regulations, and guidance; exchanging information and experience; and promoting voluntary risk reduction activities.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Percentage of regulated industry which consistently goes beyond established requirements to voluntarily improve the safety of hazardous installations and reduce chemical risk as a result of incentive programmes.

↳ ii) Comparison of reduction in cited violations of regulations at hazardous installations that participate in incentive programmes versus hazardous installations that DO NOT participate in incentive programmes.

➢➢ *Activities Indicators*

i) Is there a mechanism to receive input from industry prior to and when developing laws, regulations, policies, procedures, and guidance?

- Does the mechanism allow for changes to be made based on comments and experience of industry;
- Is there a feedback process for industry to provide input after the establishment of these requirements based on experience in implementing these requirements and guidance;
- If amendments are made to the requirements, is sufficient time provided for implementation and compliance by industry.

ii) Do the requirements and guidance established by public authorities stimulate innovation and promote the use of improved safety technology and practices?

- Do the requirements promote site or industry specific improvements in the safety of hazardous installations and risk reductions;
- Is industry encouraged to achieve a higher level of safety that would be achieved by adherence to established standards and guidance.

iii) Do public authorities facilitate and promote the sharing of information and experience related to accident prevention and risk reduction with industry and among industry groups, nationally and internationally?

iv) Are partnerships with industry and public authorities promoted to facilitate active dialogue and information exchange between these two stakeholders?

v) Is there a mechanism for providing incentives (*e.g.,* reduced costs for industry, limitation of inspections) for industry to go beyond the requirements for improving chemical safety and reducing chemical risks?

- Are there clear objectives and measures for each incentive programme;
- Are the incentive programmes periodically reviewed to ensure they provide the benefit outlined by the scope and objectives of the programme;
- Is industry provided the opportunity to comment on incentive programmes or suggest new incentive programmes;
- Are there procedures within the incentive programmes to ensure that the independence of the public authorities is not compromised nor their ability to enforce laws;
- Are there procedures within the incentive programmes to ensure that the incentive programme do not adversely effects regulations.

B3.3 Co-operation with Other Non-governmental Stakeholders

Prevention of accidents is goal of all relevant stakeholders from public authorities to industry to the public. These stakeholders, which include trade associations, labour organisations, environmental groups, universities and research institutes, community- based groups/communities, and other non-governmental organisations, have an important role in helping to improve safety at hazardous installations. These stakeholders are in a unique position to provide objective chemical information to the public as well as work with industry on innovative ways to improve safety of hazardous installations and reduce risk. Therefore, it is important for public authorities to work co-operatively with these organisations to ensure useful information and guidance is provided to industry and the public and to avoid redundancy and conflicting messages being given to industry and the public.

See Guiding Principles document, paras.: 1.2, 1.16 – 17, 3.a.4, 4.e.4, 5.a.5, 5.a.12, 5.a.14, 5.a.20, 5.c.4 – 5, 7.11, 7.15, 14.a.1, 15.d.1, 16.a.6, 17.a.2.

- **Target**

To establish partnerships with relevant stakeholders by: consulting on laws, regulations, and guidance; exchanging information and experience; and promoting and supporting voluntary risk reduction activities.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent the potentially effected public clearly understand the chemical risks associated with hazardous installations in their community as a result of information being provided to the public by non-governmental stakeholders.

➢➢ *Activities Indicators*

i) Is there a mechanism to involve non-governmental stakeholders in the development of goals, laws, regulations, policies, procedures, and guidance, and in relevant decision-making?

- Does the mechanism allow for changes in laws, regulations, and guidance to be made based on comments and experience.

ii) Are partnerships formed between public authorities and relevant non-governmental stakeholders to:

- improve information dissemination and understanding of the nature of messages so they will be received, understood and remembered;
- increase public confidence in the information being provided to them related to the risks of hazardous installations and the actions taken for their safe operation;
- avoid conflicting messages to the public or industry;
- increase the authenticity of guidance provided to industry on meeting requirements as well as reducing risk.

iii) Do public authorities work with non-governmental stakeholders to provide information on chemical risks to the public? Does the information provided include:

- guidance for understanding risk and steps industry and public authorities are taking to reduce risks;
- actions to be taken by the public to help prevent accidents and mitigate consequences of accidents;
- training, seminars, and workshops on understanding chemical risks and how to work with industry and public authorities to reduce those chemical risks.

B3.4 Communication with Communities/Public

Creating and maintaining open and honest communication with the public is essential to ensuring confidence in the efforts of, and information from, public authorities. Public authorities should ensure that the public is provided with relevant information and guidance. This information should help the public understand the risks from accidents involving hazardous substances and what to do in the event of such an accident. It should also help to develop confidence in the public authorities and the regulatory framework. The communication between public authorities and the public should be two-way, providing an opportunity for public input to the authorities as well as providing information to the public from authorities. Such communication will allow the public and authorities to learn from each other.

See Guiding Principles document, paras.: 1.12, 3.c.3, 5.a.5, 5.a.18 – 19, 5.c.20, 5.c.23, 6.7, chapter 7, 8.4.

- **Target**

To establish a two-way system for communication with the public.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent the public understands and remembers the chemical risk information that has been provided to them by public authorities.

ii) Extent the public is satisfied with chemical risk information provided to them by public authorities.

iii) The number and quality of comments received by the public on the information they have received.

iv) Extent the public considers the public authorities a good source of information on chemical risks.

v) Extent the public seeks access to information via the internet, as exhibited by the number of hits on pubic authorities' websites.

vi) Comparison of the relationship between the level of community involvement versus the level of risk to the local population and environment.

vii) Extent hazardous installations (for which chemical information is available) have communicated that information to the public.

viii) Extent stakeholders have taken preparedness and prevention actions as a result of the public authorities' leadership (in addition to legal requirements). Such actions could include:

- community based groups/communities have been established public action groups;
- industry has established relationships with their community; and/or
- universities have expanded chemical safety research.

➢➢ *Activities Indicators*

i) Is there a specific mechanism designed, in consultation with the public and other stakeholders, to share information between public authorities and the public openly and actively?

ii) Do the public authorities provide information to the public on how to access information on chemical risks in their community?

iii) Is there a specific policy/procedure to ensure provision of chemical risk information by industry to the public?

- Does this policy/procedure include provision of general information on the nature, extent and potential off-site effects of possible chemical accidents on the local community? (related to, e.g., installation location, chemicals on-site, and accident potential of chemicals);
- Do the policy/procedures include provision of specific and timely information on the proper actions and safety measures the public should take in the event of an accident;
- Is additional information and guidance available to the public to assist them in understanding the risks associated with the chemical in their community.

iv) Is there a mechanism for gathering public input related to the public authorities efforts and activities related to chemical emergency prevention, preparedness, and response?

- Does this mechanism facilitate consultation with the public on the type and nature of information they would like to receive and how they would like to receive it;
- Is public input collected prior to making decisions concerning hazardous installations (e.g., siting and use, licensing) and during the development of community emergency preparedness plans;
- Are community groups established to solicit input from the public in the decision-making process;
- Does the mechanism allow for public authorities to respond to questions from the public regarding hazardous installations and chemical risk information.

Chapter B4: EMERGENCY PREPAREDNESS AND RESPONSE

Introduction to Chapter B4

Solid and effective chemical emergency preparedness and response programmes are the last defence in protecting the public, the environment, and property from the consequences of accidents involving hazardous substances. The objective of emergency preparedness and response programmes is to localise any accident involving hazardous substances that may occur and mitigate the harmful effects of the accident on human health, the environment and property. In order to ensure the most efficient and effective response to an accident involving hazardous substances, public authorities should establish emergency preparedness plans focused on such accidents. This chapter deals with the role of public authorities in chemical emergency preparedness and response. It addresses: ensuring appropriate internal (on-site) planning; external (off-site) preparedness planning; co-ordination among relevant authorities at all levels; and emergency response and mitigation.

This chapter includes the following sub-chapters:

B4.1 Ensuring Appropriate Internal (On-Site) Preparedness Planning

Industry has the primary responsibility for limiting the consequences of accidents involving hazardous substances on human health, the environment, and property. Proper emergency planning (addressing response and mitigation techniques) is important to protect workers and the surrounding public, the environment and property. To assist industry in producing on-site emergency preparedness plans, public authorities should develop appropriate guidelines and standards. These guidelines and standards should include provisions for developing, implementing, testing, and updating on-site emergency preparedness plans. Public authorities should also ensure that the management of hazardous installations identifies and assesses all the chemical risks at their installations.

Public authorities should ensure that the on-site emergency preparedness plans are developed and maintained. In developing the plans, industry should include all levels of management and employees. Industry should also ensure the public is aware of on-site emergency preparedness plans and industry should co-ordinate with the public in developing off-site emergency preparedness plans.

See Guiding Principles document, paras.: 5.a.1, 5.a.2, 5.a.6 – 7, 5.a.10 – 12, 5.b.3, 5.b.8 – 9, 5.c.1 – 3.

- **Target**

To facilitate the development and implementation of appropriate on-site preparedness plans by industry.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Reduction in the number of hazardous installations that have required multiple emergency responses by public authorities.

↳ ii) Reduction of complaints from employees regarding lack of information on preparedness and response actions and efforts.

➢➢ *Activities Indicators*

i) Have guidelines and standards been developed to assist industry in producing on-site emergency preparedness plans? Do these guidelines and standards have recommendations for the following provisions to be included in the on-site emergency preparedness plan:

- roles and responsibilities of employees at hazardous installation and emergency response personnel during an accident;
- evaluation of the hazards at the hazardous installation (*i.e.*, information of the types and amounts of hazardous substances and the situations in which they are produced, used, or stored);
- assessment of response capabilities and resources;
- back-up systems including alternative communication lines, relief for key personnel, and alternate command centres;
- testing and updating the on-site emergency response plan.

ii) Do the guidelines and standards stipulate which hazardous installations should develop and implement on-site emergency preparedness plans?

iii) Have all the hazardous installations required to develop on-site emergency preparedness plans completed those plans?

iv) Do those on-site emergency preparedness plans include all the appropriate information?

v) Are the on-site emergency preparedness plans flexible enough to allow for response to a range of possible accidents and changes in the level of risk?

vi) Are the plans tested and updated on a regular basis to ensure they address all the possible accidents?

vii) Are the employees aware of the on-site emergency preparedness plan and do they know what actions to take, if any, when an accident occurs at the hazardous installation?

viii) Is the public aware of the on-site emergency preparedness plan and do they know what actions to take, if any, when an accident occurs at the hazardous installation?

ix) Is there a mechanism in place to ensure co-ordination of on-site emergency preparedness plans between operators of hazardous installations within close proximity of each other as well as co-ordination and testing of on-site and off-site emergency preparedness plans?

B4.2 External (Off-Site) Preparedness Planning

Accidents involving hazardous substances at hazardous installations have the capability to affect not only workers and property on-site but also the public, property, and environment outside the boundaries of the hazardous installation. For that reason, off-site emergency preparedness plans at all levels of government are necessary to mitigate the harmful effects from accidents involving hazardous substances on the community surrounding the hazardous installation. The community or local plans (off-site plans) should identify the hazardous installations and their chemical risks and establish emergency response procedures in the event of an accident involving hazardous substances. Additionally, these plans should have procedures for including public comments and providing information to the public on actions to take if an accident involving hazardous substances occurs. National and/or regional plans should provide a co-ordinating mechanism for national and/or regional response during major accidents involving hazardous substances that overwhelm local jurisdictions. Such plans should promote overall co-ordination among, and support to, the various levels of responders and contingency plans.

See Guiding Principles document, para.: 5.c.1 – 23

- **Target**

To develop effective off-site emergency preparedness plans considering the risks from chemical accidents that could affect the public, the environment and property.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

- i) Reduction of complaints from the hazardous installations regarding lack of information on preparedness and response actions and efforts.
- ii) Percentage of hazardous installations that are included in off-site emergency preparedness plans.
- iii) Percentage of the potentially affected public who knows what to do when an accident occurs (as demonstrated during accidents and exercises).

➢➢ *Activities Indicators*

i) Have public authorities ensured that there are adequate off-site emergency preparedness plans in local communities where hazardous installations are located?

ii) Have national/regional public authorities established general principles to assist local authorities in producing off-site emergency preparedness plans? Do these general principles clearly identify who is responsible for developing and implementing the plans?

iii) Is there a mechanism in place for public authorities and industry to work together in developing off-site emergency preparedness plans in order to avoid overlaps or conflicts in on-site and off-site emergency preparedness plans?

iv) Do the off-site emergency preparedness plans include:

- relevant information on each hazardous installation;
- evaluation of the hazards that may result from an accident at a hazardous installation;
- emergency response procedures to be followed in the event of an accident.

v) Are the roles and responsibilities of all the parties involved in implementing the off-site emergency preparedness plan clearly identified? Have the local authorities gained the commitment and participation of each of the parties involved?

vi) Are mechanisms in place to immediately activate off-site emergency preparedness plans when an accident occurs?

vii) Are the resources and capability needs for implementing the off-site emergency preparedness plan identified? Have the local authorities ensured these resources will be available when an accident occurs?

viii) Are mechanisms in place for obtaining additional personnel and resources (e.g., from other communities or industry) when needed for responding to an accident, including:

- hazardous material and chemical specialists;
- emergency responders from neighbouring communities and countries;
- emergency response equipment and materials;
- funding;
- resources for medical treatment.

ix) Are the combined resources from industry and the community adequate to deal with all the foreseeable accident scenarios?

x) Do the off-site emergency preparedness plans take into account and make special provisions for vulnerable populations (e.g., schools, hospitals, homes for the elderly) and sensitive environments that could be effected by an accident?

xi) Are there procedures in place for testing and updating off-site emergency preparedness plans based on lessons learned from testing the plans or responding to an accident?

xii) Is the public provided the opportunity to have input into the development of the off-site emergency preparedness plans?

xiii) Do the off-site emergency preparedness plans provide guidance to the public on what actions to take if an accident involving hazardous substances occurs? Is there a mechanism in place to provide initial and continuous information to the public when an accident takes place?

B4.3 Co-ordination among Relevant Authorities at All Levels

Accidents involving hazardous substances do not respect invisible boundaries such as hazardous installation borderlines, locality boundaries, or international borders. Additionally, different types of complex accidents involving hazardous substances may occur within a community, including domino effects, overlapping risks, and natural disasters causing technological accidents. Therefore, when an accident involving hazardous substances occurs, planners and responders from within the hazardous installation and from the surrounding communities and possibly countries may be involved in the mitigation and response efforts. All of these issues are motivating factors for co-ordination among public authorities. Thus, to avoid overlapping responsibilities and resolve complicated interfaces, and to prevent and/or mitigate detrimental effects on surrounding communities, on-site and off-site emergency preparedness plans (including the off-site emergency preparedness plans of neighbouring communities and countries) must be co-ordinated by those responsible for developing those plans. This co-ordination is necessary to ensure sharing of needed resources, avoiding confusion and conflict during an emergency response where several organisations have jurisdiction, and learning from each other's experiences in preparing for and responding to an accident involving hazardous substances.

See Guiding Principles document, paras.: 5.a.5, 5.a.7 – 10, 5.a.18, 5.a.20, 5.c.2, 5.c.5, 5.c.7, 5.c.21

- **Target**

To ensure co-ordination among relevant authorities at all levels with respect to emergency preparedness and response activities.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Percent reduction of conflicts over the roles and responsibilities, when accidents occur or emergency preparedness plans are tested, among:
- relevant authorities; and
- public authorities in neighbouring countries.

↳ ii) Reduction in delays in response time due to fewer conflicts over roles and responsibilities, better access to other resources, and/or improved capacity to co-ordinate with other public authorities.

➢➢ *Activities Indicators*

i) Is there a mechanism to involve all relevant local public authorities in the development of the off-site emergency preparedness plans?

ii) Are the roles and responsibilities for all relevant public authorities, including outside the immediate community, clearly identified in the off-site emergency preparedness plan? Is there a person identified as being in charge of emergency response activities?

iii) Where an accident could affect neighbouring communities/countries, do the local authorities involve those potentially effected communities/countries in the development of relevant off-site emergency preparedness plans?

iv) Where an accident could affect neighbouring communities/countries, does the off-site emergency preparedness plan include procedures for co-ordinating the emergency response efforts between the communities/countries?

v) Are there signed agreements between public authorities in neighbouring communities and countries, which identify the appropriate roles and responsibilities?

vi) Is there a system to ensure recommendations from resulting from the review of previous chemical accidents, or tests or emergency plans, are implemented?

B4.4 Emergency Response and Mitigation

When an accident involving hazardous substances occurs, a quick and effective response is imperative to ensure the protection of public health, property, and environment. A number of factors contribute to an efficient and productive response. First, emergency responders must be aware that an accident involving hazardous substances has occurred and they must receive this notification quickly to minimise consequences. Once on the scene of the accident, emergency responders must be able to quickly assess the situation and deploy resources to mitigate the adverse effects. In order to make these decisions, emergency responders need information on the accident, the hazardous substances involved, and available resources. Experience and training play an important role in the success of the emergency response efforts. Finally, the public needs to be kept fully appraised of the situation in order to protect themselves and their families.

See Guiding Principles document, paras.: 8.1 – 8.4, 10.1.4, 10.7 – 9, 10.18 – 21, 14.b.1.

- **Target**

To be able to effectively respond to an accident involving a hazardous substance in order to mitigate adverse effects on human health, the environment and property.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Extent of time between provision of information that an accident involving hazardous substances has occurred and response personnel arriving at the accident.

ii) Extent of time between provision of information that an accident involving hazardous substances has occurred and appropriate information is provided to the public regarding what actions to take to protect themselves.

iii) Reduction of complaints from the public and hazardous installations on preparedness and response actions and efforts.

iv) Extent of deficiencies in the off-site preparedness plan highlighted during an incident or test of the plan.

➢➢ *Activities Indicators*

i) Have public authorities developed requirements for the prompt reporting of an accident involving hazardous chemicals by the hazardous installations?

ii) Is the following information promptly provided to the appropriate public authorities following an accident involving hazardous substances?

- The amount and type of chemical(s) released;
- The location of the accident at the installation;
- A description of accident;
- The number of deaths and/or injuries;
- The extent of property and/or environmental damage;
- The type of response and corrective action being taken;
- A list of all other parties notified (e.g., local community, fire department, hazardous material response team);

- The cause of the accident;
- The actions taken to prevent reoccurrence of the accident or the occurrence of similar accidents.

iii) Have the roles and responsibilities for all personnel involved in the emergency response and mitigation efforts been identified and are those roles and responsibilities understood and respected by all appropriate personnel?

iv) Does the off-site emergency response plan clearly indicate when and how the national public authorities would assume responsibility for the emergency response actions and mitigation efforts, if those efforts exceed the ability of the local and regional response organisations?

v) Does each emergency responder have the required training and education and the appropriate experience to deal with the various types of responses to accidents?

vi) Are systems in place to gain immediate access to the necessary information (e.g., types and amounts of chemicals within the hazardous installation, how to deal with those chemicals) to effectively respond the accident?

vii) Is there a system in place to document all response and mitigation actions during an accident involving hazardous substances response or exercise for lessons learned and to update the off-site preparedness plan;

viii) Is there a mechanism for communicating internally during emergency response efforts?

- Are systems used to ensure the quick delivery of time-sensitive accident information;
- Are paths of communication clearly delineated to ensure emergency responders are not overwhelmed with similar information requests from different sources;
- Are there procedures for the communication mechanisms in written form and available to staff;
- Does the staff understand these procedures;
- Is there a means of ensuring staff is using the mechanism to communicate during an emergency.

ix) Are there systems in place for communicating decisions (shelter in place versus evacuation) and information to the public during and following an accident?

- Is there a warning system in place to warn the public of an accident involving hazardous substances has taken place and steps to take to minimise the effects on human health, the environment and property;
- Is there a mechanism for providing the media with continuous access to designated officials with relevant information to ensure essential and accurate information is provided to the public;
- Is there a system in place to provide follow-up information to the public including information on off-site effects, clean-up efforts, and long-term health and environmental effects.

Chapter B5: ACCIDENT/NEAR MISS REPORTING AND INVESTIGATION

Introduction to Chapter B5

Accident reporting and investigation by public authorities play an important role in ensuring the safe operation of hazardous installations. The lessons learned from the investigation of an accident assist all hazardous installations in preventing similar accidents from taking place in the future. Additionally, accident investigations and reports help to instil public confidence in public authorities and hazardous installations that proper steps are being taken following an accident to avoid future consequences to the potentially affected public and environment from similar accidents.

This chapter includes the following sub-chapters:

B5.1 Accident/Near-Miss Reporting and Analysis

Awareness that an accident involving a hazardous substance has taken place is a key component to understanding and analysing that accident. Therefore, public authorities should ensure that requirements are in place for reporting information on accidents involving hazardous substances to the appropriate public authorities. This notification should include information on the type and amount of chemicals released, injuries and deaths that may have occurred, and emergency response actions. Additionally, public authorities should encourage the reporting and sharing of information related to near misses, both within and among enterprises.

See Guiding Principles document, paras.: 14.b.1 – 3.

Target

To ensure reporting and analysing of accidents involving hazardous substances and to promote the reporting of significant near-misses.

Guidance for Developing Safety Performance Indicators

➢➢ *Outcome Indicators*

- i) Extent of change in the reporting of accidents involving hazardous substances and near misses.
- ii) Extent of completeness of reports on accident involving hazardous substances and near-misses.
- iii) Extent public authorities apply lessons learned from analyses of accident reports.

➢➢ *Activities Indicators*

i) Have public authorities developed requirements for the reporting of accidents involving hazardous substances by the hazardous installations?

ii) Is the following information required to be reported?

- The amount and type of chemical released;
- The location of the accident at the installation;
- A description of accident;
- The number of deaths and/or injuries;
- The extent of property and/or environmental damage;
- The type of response and corrective action taken;
- A list of all other parties notified (e.g., local community, fire department, hazardous material response team);
- The cause of the accident;
- The actions taken to prevent reoccurrence of the accident or the occurrence of similar accidents.

iii) Do public authorities ensure the procedures for reporting are well-known and easy to use?

iv) Is there a provision for protecting confidential information?

v) Do public authorities encourage the reporting of information related to near-misses, both within and among enterprises, and to relevant authorities?

vi) Do public authorities encourage voluntary reporting of accidents and near-misses, which go beyond the notification required by legislation and/or regulation?

vii) Is there a mechanism for public authorities to co-ordinate reporting policies and procedures concerning their accidents involving hazardous substances?

viii) Is there a mechanism to analyse reports of accidents involving hazardous substances submitted by hazardous installations?

B5.2 Investigations

Causes of accidents involving hazardous substances are many, complex and interrelated. Regulations, management practices, worker skills and knowledge, training, operating policies and procedures, equipment, technical processes, and the chemical itself may all play a role. By understanding what has gone wrong in the past as well as what could go wrong in the future, steps can be taken to identify and correct systemic weaknesses which lead to accidents involving hazardous substances. Public authorities should work with industry and labour to help prevent those accidents by determining all the causes that contributed to the accident through accident investigations and then addressing those causes.

See Guiding Principles document, paras.: 15.a.1 – 10, 15.c.1 – 5.

- **Target**

To investigate all appropriate accidents involving hazardous substances for root and contributing causes and lessons learned.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Extent public authorities have identified causes that contributed to a significant accident involving hazardous substances, based on the specified criteria.

➢➢ *Activities Indicators*

i) Are there criteria to determine when an accident is investigated?

ii) Do public authorities investigate major accidents to determine the cause of those accidents?

iii) Does the appropriate group of experts conduct each accident investigation with experience in the type of installation being investigated or with the type of process involved in the accident?

iv) Are all appropriate stakeholders (e.g., industry, labour, local community) involved in the accident investigation?

v) Is the investigation conducted in such a way to ensure an independent, unbiased report of all the causes of the accident?

vi) Are all efforts made to determine all of the causes of the accident rather than just the apparent cause(s)?

vii) Do public authorities develop and distribute an accident investigation report for each accident investigation?

viii) Do public authorities co-ordinate their accident investigations?

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B5.3 Follow-Up including Application of Lessons Learned

While conducting an accident investigation is an important step in identifying the causes of accidents involving hazardous substances, applying the lessons learned from an investigation is imperative to preventing future similar accidents from taking place. Public authorities are in a unique position to distribute information from accident investigation reports, analyse and disseminate accident investigation findings, and adjust regulations, emergency plans, inspection procedures, etc. based on lessons learned from accident investigations.

See Guiding Principles document, paras.: 15.a.11 – 14, 15.c.3.

- **Target**

To ensure lessons learned from accidents involving hazardous substances response and investigations are applied.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Extent recommendations from accident investigations are implemented at hazardous installations.

↳ ii) Reduction of accidents with similar processes or in similar installations as those which were the subject of accident investigations (*i.e.*, causes had been determined, investigation report shared and steps taken to address prevention, both in the short and long term).

➢➢ *Activities Indicators*

i) Do public authorities publish and distribute all relevant parts of accident investigation reports? Have reports been made available to the public?

ii) Do public authorities analyse accident investigation findings and distribute those finding to the appropriate enterprise(s) and local authorities?

iii) Is the information provided in a useful format and does it include steps to be taken to prevent future accidents?

iv) Is there a mechanism in place to determine if enterprises have implemented the suggested changes within their hazardous installations?

v) Where appropriate, have public authorities adjusted regulations based on the lessons learned from accident investigations?

B5.4 Sharing of Information

Sharing information about accidents involving hazardous substances and near-misses, and lessons learned as a result of those incidents, is vital to preventing future accidents. Major accidents do not take place every day and, therefore, lessons learned as a result of accidents should be disseminated to the widest possible audience. Public authorities have a responsibility to collect information on accidents and analyses those accidents to determine trends and possible corrective action steps to take to prevent future accidents.

See Guiding Principles document, paras.: 14.b.2 – 3 and 15.a.11 – 12.

Target

To share or facilitate the sharing of all appropriate information related to accident and near miss lessons learned with all relevant stakeholders.

Guidance for Developing Safety Performance Indicators

➢➢ *Outcome Indicators*

- i) Extent enterprises have implemented recommendations from accident investigations within their hazardous installations.
- ii) Extent local authorities have implemented lessons learned and recommendations from accident investigations by adjusting their local emergency plans appropriately.

➢➢ *Activities Indicators*

i) Have public authorities established and maintained a structured national system for collecting and analysing information statistics on accidents involving hazardous substances in order to facilitate exchange of information and dissemination of the results of the analyses?

ii) Do public authorities encourage the sharing of information related to near-misses with public authorities, as well as both within and among enterprises?

iii) Do public authorities promote the international sharing and exchange of information on major accidents and near-misses as well as accident investigation findings? Are reporting structures co-ordinated to facilitate the exchange of information?

iv) Are incidents and lessons learned reported to appropriate international reporting schemes (such as OECD, MARS, etc.)?

Part C

GUIDANCE FOR COMMUNITIES/PUBLIC
for
Developing Safety Performance Indicator Programmes

GUIDANCE FOR COMMUNITIES/PUBLIC
for
Developing Safety Performance Indicator Programmes

Introduction

This Section provides guidance for communities for developing and implementing a safety performance indicators (SPI) Programme. The guidance is designed to help communities assess their performance related to chemical accident prevention, preparedness and response.

For the purpose of this document, the term "community" means the individuals living/working near hazardous installations who may be affected in the event of a chemical accident.

The term "members of the community" includes:

- Local citizens;
- Non governmental organisations that are representative of the community;
- Employees at the hazardous installations;
- Industry neighbours;
- Community advisory panels (CAPs);
- Business and political leaders;
- Educators;
- Community activists.

An optimum method for implementing this guidance is to create a local committee or organisation concerned with the safety of hazardous installations that is representative of the community. This committee will facilitate the development of a safety culture within a community, as well as facilitate the development and implementation of a safety performance indicator programme. Without the existence of a committee (or other structure), it could be difficult for a community to set goals and objectives and fulfill their roles and responsibilities. See Annex I for guidance on "How to Establish a Citizen Committee related to Chemical Accident Prevention, Preparedness and Response". See also the UNEP "Awareness and Preparedness for Emergencies at Local Level" (APELL) programme (http://www.uneptie.org/pc/apell/home.html).

It is important to understand that this guidance is NOT designed to measure the performance of enterprises, or of public authorities, but rather the performance of the communities themselves.

Before trying to apply the guidance in this Section, it is recommended that you read carefully the introductory chapters) of this Document (including "How to Use this Document").

The introductory chapters explain that the ultimate measure of chemical safety is the reduction in the number of chemical accidents or near misses that occur. However, significant accidents/near misses are relatively rare events that can have a wide range of possible impacts, and can be caused by a complex combination of technical, organisational, and human failings. Simply measuring accidents/near misses does not provide sufficient information for deciding what actions should be taken to improve chemical safety programmes. Furthermore, there is no way to measure the accidents that did not occur as a result of the actions taken.

Therefore, this guidance was developed to be used by communities as an alternative means to measure performance. It contains two types of measures: "activities indicators" which help identify whether

your community is taking actions believed to lead to lower risks (e.g., the types of actions described in the *Guiding Principles),* and "outcome indicators" which help measure whether such actions are, in fact, leading to less likelihood of an accident occurring and/or less adverse impacts on human health or the environment should an accident occur.

It is critical to realise that this guidance does not contain a Programme that can be lifted out and applied as a whole.

Rather, the guidance can only be effectively used if efforts are made to decide which elements are relevant under your community's particular circumstances, and steps are taken to adapt these elements to your community's specific needs and objectives.

Thus, the introductory chapters suggest a multi-step process for establishing an SPI programme, which includes:

- developing a strategic plan (including planning of financial and human resources),
- reviewing the Guidance Document,
- selecting the activities indicators and outcome indicators relevant to your community,
- adapting the indicators to the vocabulary and procedures of your community,
- developing processes for measuring the indicators (metrics), and
- applying the indicators on a regular basis.

Furthermore, SPI programmes should be reviewed periodically, and revised/updated as appropriate.

IT IS IMPORTANT TO REMEMBER THAT DEVELOPING AND IMPLEMENTING AN SPI PROGRAMME REQUIRES A SIGNIFICANT COMMITMENT, WITH A CORRESPONDING ALLOCATION OF HUMAN AND FINANCIAL RESOURCES. EACH COMMUNITY NEEDS TO DETERMINE AN APPROPRIATE MEANS FOR OBTAINING THESE RESOURCES.

General Outcome Indicators

In addition to the list of possible outcome and activities indicators set out below, by topic, the Group of Experts developed the following list of general outcome indicators that may be applicable to all stakeholders (e.g., industry, public authorities, communities). These can, if measured over time, show if chemical safety has improved. When taken with other outcome indicators, they can present a picture of chemical safety in the broadest sense as well as show how industry, public authorities, and communities effect the improvement of chemical safety.

(i) Reduction of chemical risks at hazardous installations (as measured by, e.g.: risk assessments; reduction of chemical inventories; reduction of adverse impacts from accidents; improvement in processes and process techniques; reduction of vulnerability zones; and improved transportation).

(ii) Extent of interaction and collaboration of public authorities, industry, and communities leading to improved safety of hazardous installations and reduction of chemical risks to local communities.

(iii) Reduction of the frequency of accidents and near-misses and their severity.

(iv) Reduction of injuries and fatalities from chemical accidents.

(v) Reduction of environmental impacts from chemical accidents.

(vi) Reduction of property damages from chemical accidents.

(vii) Improvement in response to chemical accidents (reduction of delay and increased efficiency).

(viii) Reduction of impact zone of chemical accidents (distance).

(ix) Reduction of the number of people affected by chemical accidents (e.g., evacuation, shelter in place, etc.).

Chapter C1: PREVENTION OF ACCIDENTS

This chapter applies to the roles and responsibilities of the communities with respect to prevention of accidents involving hazardous substances. It provides guidance for establishing a programme to assess the performance of a community related to the prevention of accidents involving hazardous substances. This chapter contains:

- "Targets" to help users to determine what might be the expected results for the activities and the programmes that may be implemented by the communities;
- Suggested "Activities Indicators" related to roles that the communities could undertake leading to safer facilities and communities;
- Suggested "Outcome Indicators" to help assess whether the achievements of the suggested activities lead, in fact, to the attainment of the expected targets.

This chapter includes the following sub-chapters:

C1.1 Information acquisition and communication
C1.2 Influencing risk reduction (related to audits and inspections)
C1.3 Participation in land-use planning and permitting

C1.1 Information Acquisition and Communication

For the members of the community, information acquisition means both an active seeking of the information (on the hazards and the possible consequences of accidents in its area), as well as having access to decision-makers and receiving information and feedback from other stakeholders.

In this context, communication consists of representatives of the community establishing a relationship - a link - with other stakeholders to both receive information and to provide relevant information to them. Generally, it will mean a role for the community representatives to pass the acquired information to the potentially affected public and to the hazardous installations. In this way, members of the community can facilitate information exchange between the community/public and the hazardous installations.

See Guiding Principles document, paras.: 1.2, 2b.5, 4a.1 – 3, chapter 7

- **Target**

For the community to participate actively in chemical risk reduction and to help resolve issues through a better knowledge and understanding of the risks concerning hazardous installations in their vicinity.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of the potentially affected public that know and understand chemical risks and consequences on human health and the environment.

ii) Percentage of understanding and retention of information on chemical hazards and the consequences of accidents by the community.

iii) Percentage of hazardous installations having been approached by members of the community for acquisition of information on chemical risks and consequences on human health and the environment.

iv) Percentage of participation of members of the community in public hearings of hazardous installations in its area.

v) Number of initiatives coming from the public.

➢➢ *Activities Indicators*

i) Have members of the community participated in the development of a communication and information acquisition network on hazards and consequences of accidents with the community and all stakeholders?

ii) Do members of the community participate in any public presentations (e.g., public meetings or hearings) related to hazardous installations?

iii) Do members of the community participate in any visits to the hazardous installations (to become familiar with the facilities) if these are arranged?

iv) Do members of the community have access to information on hazardous installations (*e.g.,* safety reports) including information on installations in other states with possible transboundary effects?

v) Do members of the community maintain their own records on hazardous installations (including nature of hazards at installations, the accident scenarios, etc.) and are these records regularly updated?

vi) Do members of the community acquire information on the hazards and the consequences of accidents directly from the hazardous installations (by email, telephone, visits to the site, etc.)?

vii) Do members of the community assist (co-operate with) the hazardous installations and the public authorities to help ensure that the information on the hazards and the consequences of accidents is appropriate and can be understood by the community?

viii) Do members of the community monitor whether the information on the hazards and the consequences of accidents is disseminated and well received by the community?

ix) Do members of the community take part in the development and implementation of community surveys concerning the knowledge of the community of the hazards and the consequences of accidents in the vicinity?

x) Do members of the community have input in the development of safety related laws, regulations, standards or other guidance?

xi) Do members of the community pass any concerns received from other members of the public to the hazardous installations?

xii) Do members of the community disseminate the safety-related information obtained to those potentially affected in the event of an accident?

xiii) Do members of the community analyse any available performance results to assist with evaluating the chemical safety of the hazardous installations?

xiv) Do members of the community publish their evaluations of any safety performance results issued by hazardous installations?

xv) Do members of the community take part in the development and implementation of an education and outreach programme of the potentially affected public on chemical hazards, including effects on health, safety and the environment in the event of a chemical accident?

xvi) Do members of the community co-operate with industry and public authorities in providing the potentially affected public with information on chemical risks and consequences on human health and the environment and the measures to be taken in the event of an accident?

xvii) Do members of the community participate with other stakeholders in the development of agreed criteria for risk identification and risk acceptability/tolerability related to hazards in the community?

xviii) Do members of the community exchange information with other communities (networking)?

C1.2 Influencing Risk Reduction (related to audits and inspections)

A community has a right to expect appropriate prevention measures to be in place and for audits and inspections to be followed, as necessary, by corrective measures. The community should be given the opportunity to participate in the development and implementation of such corrective measures.

See Guiding Principles document, paras.: 2g.5, 3c.3

- **Target**

The community has effective input into audits, inspections and follow-up to ensure that the required prevention measures are in place and corrective measures following audits and inspections are taken.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of audits/inspections that members of the community have taken part in the year where they have the opportunity to participate and requested to do so.

ii) Percentage of inspection reports obtained from public authorities by members of the community, where these are publicly available.

iii) Percentage of action plans or programmes for hazardous installations, developed with input from members of the community.

➢➢ *Activities Indicators*

i) Do members of the community request or acquire information on the planning or audits and inspections, the findings and conclusions of inspections of hazardous installations undertaken by public authorities, and related enforcement actions?

ii) Do members of the community take action using existing channels based on recommendations and action plans of inspection reports?

iii) Do members of the community take part in audits and/or inspections when opportunities are available?

iv) If members of the community consider that a public authority has failed to meet its responsibilities, do they take appropriate actions through existing channels to try to rectify the situation?

C1.3 Participation in Land-use Planning and Permitting

Land-use planning is an essential element in the overall chemical accident prevention. preparedness, and response programme. It is one of the necessary steps in controlling the potential for a chemical accident and protecting community health and safety. A community (and the public) have vital roles in land-use planning decisions and in the selection of a proposed site for a new hazardous installation or major modifications to an existing hazardous installation necessitating further planning permission. Representatives of a community have a role in providing input into the process to help ensure that there are no unacceptable risks to human health and the environment.

In some instances, within compliance systems, it is necessary to obtain a permit in order to operate implement a structure for approving hazardous installations to operate. If an installation is so potentially hazardous that it should not be allowed to operate without approval by the public authorities, it should be subject to a specific permitting process. The community should play an active role in the permitting process by giving input for evaluating and approving the hazardous installations to operate.

See Guiding Principles document, paras.: 3.a.14, 6.7, 16.a.6

- **Target**

To help decision makers reach appropriate decisions on land-use planning, siting and permitting so that new installations or modifications to existing installations do not create unacceptable risks to human health and the environment.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Ratio of land-use planning reviews (or applications) where the members of the community took part (number and percentage).

↳ ii) Ratio of planning permission procedures where the members of the community took part (number and percentage)

➢➢ *Activities Indicators*

i) Do members of the community participate:

- in the land-use planning process for new hazardous installations or modifications to existing installations;
- in the permitting procedures hazardous installations;
- in the assessment of the impact of new activities of the hazardous installations on the public safety (acceptability for the public) through existing channels.

ii) Do members of the community take part in decision-making processes designed to prevent the placing of new communities or community developments near hazardous installations?

iii) Do members of the community have access to records of planning permissions of the hazardous installations?

Chapter C2: EMERGENCY PREPAREDNESS

This chapter applies to the roles and responsibilities of communities in helping to ensure adequate preparedness planning for the risks in their vicinity. It provides guidance for establishing a programme to assess the performance of a community related to its preparedness in case of an accident involving hazardous substances. This chapter contains:

- "Targets" to help users to determine what might be the expected results for the activities and the programmes that may be implemented by the communities;
- Suggested "Activities Indicators" related to actions that the communities could undertake to be well-prepared and to react efficiently in the event of an accident;
- Suggested "Outcome Indicators", to help assess whether the achievement of the suggested activities lead, in fact, to the attainment of the expected targets.

This chapter includes the following sub-chapters:

C2.1 Information Acquisition and Communication

For the members of the community, information acquisition means both active communication (seeking/receiving information on the actions and measures to be taken in the event of a chemical accident), as well as having access to decision makers and receiving information and feedback from other stakeholders related to preparedness plans (including on-site planning by industry and off-site planning by public authorities).

In this context, communication consists of members of the community establishing a relationship, a link, with other stakeholders to both receive information and to provide relevant information to them. Generally, it will mean a role for the members of the community to pass the acquired information to the potentially affected public and to the hazardous installations. In this way, members of the community can facilitate information exchange between the community and the hazardous installations.

See Guiding Principles document, paras.: 5.d.3, 5.c.20, 5.d.8

- **Target**

The potentially affected public understands what actions to take in the event of an accident involving hazardous substances.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of the potentially affected public informed about emergency measures and actions to be taken in the event of accidents involving hazardous substances.

ii) Percentage of the information transmitted to the potentially affected public by the hazardous installations and the public authorities, which was reviewed by the members of the community.

iii) Percentage of understanding and retention of the information on emergency measures and actions to be taken by the potentially affected public to protect itself in the event of accidents involving hazardous substances (by survey results).

iv) Percentage of the potentially affected public who did not take appropriate action during emergency exercises and chemical accidents.

➢➢ *Activities Indicators*

i) Do members of the community participate in any public presentations (e.g., public meetings or hearings) related to the development of preparedness plans?

ii) Do members of the community have free access to off-site emergency plans relevant to the risks of the hazardous installations?

iii) Do members of the community receive or proactively seek information on the emergency measures and actions to be taken in the event of accidents involving hazardous substances directly from hazardous installation?

iv) Do members of the community monitor the information on the emergency measures and actions to be taken in the event of accidents involving hazardous substances, and the dissemination of such information to the potentially affected public in an easily understandable manner?

v) Do members of the community co-operate with industry and public authorities in giving the potentially affected public information on what must be done in the event of a chemical accident?

vi) Do members of the community assist (co-operate with) the hazardous installations and the public authorities to ensure effective communication of the emergency measures and actions to be taken in the event of an accident involving hazardous substances, when opportunities are available?

vii) Do members of the community co-operate with efforts to co-ordinate off-site preparedness planning with neighbouring communities that could be affected by accidents or where they can be of assistance?

C2.2 Participation in Preparedness Planning

Communities should, via their representatives and other interested individuals, take an active role in the development of emergency plans. The purpose is to ensure that the concerns of the community are presented, considered, discussed and evaluated with other stakeholders and integrated, as appropriate, in the emergency plans.

Communities should also participate in emergency exercises with the purpose of testing the various elements of the emergency plans aimed at reducing the consequences of accidents on human health and the environment.

See Guiding Principles document, paras.: 5a.18, 5c.2, 5d.1 – 5

- **Target**

Ensure the community takes an active role in the development of emergency plans.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of on-site emergency plans of hazardous installations that were evaluated by members of the community, when the opportunity is available.

ii) Percentage of the off-site emergency plans that were evaluated by members of the community.

iii) Improvement in the community's reaction during emergency exercises (evaluation of the community responses during the exercise by a mixed committee of stakeholders (public authorities, industry and the public).

iv) Average time of implementation of the recommendations applicable to representatives of the community following the emergency exercises (in days).

➢➢ *Activities Indicators*

i) Do members of the community participate:

- in the on-site preparedness planning at hazardous installations;
- in the off-site preparedness planning;
- in the planning and implementation of emergency exercises (on-site and off-site);
- in the identification of solutions to the weaknesses identified at the time of the emergency exercises.

ii) Do members of the community take part:

- in the evaluation of the emergency plan(s) (off-site) and help ensure that the plan(s) are appropriate in light of risks in the vicinity;
- as observers, in emergency exercises (on-site and off-site), where opportunities arise;
- in each major emergency exercise;
- in the debriefing following an emergency exercise (with all stakeholders) when opportunities are available.

iii) Do members of the community monitor the integration, in emergency plans, of corrective measures identified in any debriefing following emergency exercises?

iv) Where an accident could affect neighbouring communities, do members of the community help co-ordinate preparedness planning efforts between the potentially effected communities?

Chapter C3: RESPONSE AND FOLLOW-UP TO ACCIDENTS

This chapter applies to the roles and responsibilities of the e communities in helping to ensure adequate emergency response when accidents involving hazardous substances occur or threaten. It provides guidance for establishing a programme to assess the performance of a community related to emergency response in case of an accident involving hazardous substances. This chapter contains:

- "Targets" to help users to determine what might be the expected results for the activities and the programmes that may be implemented by the communities;
- Suggested "Activities Indicators" related to actions that the communities should undertake to react efficiently when an accident involving hazardous substances occurs;
- Suggested "Outcome Indicators" to help assess whether the achievement of the suggested activities lead, in fact, to the attainment of the expected targets.

This chapter includes the following sub-chapters:

C3.1 Information Acquisition and Communication

Communities should receive, understand, and follow the instructions provided in the event of accidents as part of the preparedness planning. It is necessary that the members of the community apply those instructions to help ensure an adequate and efficient emergency response in order to mitigate consequences on human health and the environment.

See Guiding Principles document, paras.: 11.a.1, 11.a.2,

- **Target**

In the event of an accident, members of the community follow the preparedness and response instructions, to mitigate the consequences for human health and the environment.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

↳ i) Effectiveness of the community's reaction during emergency response (e.g., evaluation of the community reaction during the response by a committee of stakeholders).

➢➢ *Activities Indicators*

i) Do members of the community notify the appropriate officials when they notice an unusual situation?

ii) Do members of the community seek information when an accident occurs?

iii) Do members of the community follow the preparedness and response instructions when an accident occurs and subsequently?

C3.2 Participation in Debriefing and Accident Investigations

Communities should participate actively in debriefing activities and accident investigation(s) following an accident involving hazardous substances. The experiences gained can be used to improve prevention of future accidents, as well as the state of preparedness and response.

See Guiding Principles document, para.: 15d.1

- **Target**

Members of the community participate actively in debriefing and accident investigation and promote related improvements in risk reduction and emergency preparedness.

- **Guidance for Developing Safety Performance Indicators**

➢➢ *Outcome Indicators*

i) Percentage of deficiencies identified by the public at the time of a response that were subsequently addressed.

ii) Average time of implementation of the recommendations applicable to the members of the community following emergency response (in days).

➢➢ *Activities Indicators*

i) When opportunities are available, do members of the community take part:

- in debriefing activities and accident investigation(s) following emergency response;
- in suggesting solutions to any deficiencies identified at the time of the emergency response.

ii) Do members of the community receive a copy or have access to relevant debriefing and accident investigation reports?

iii) Do members of the community participate in any public hearing(s) held after an accident has occurred?

iv) Do members of the community monitor:

- the implementation of corrective measures coming from the debriefing and accident investigations;
- the updating of emergency plans following debriefing activities and accident investigation conclusions.

v) Do members of the community take appropriate steps to promote implementation of corrective measures if they have not occurred?

ANNEX I

EXAMPLES OF HOW TO APPLY THE GUIDANCE

Introduction

To help readers use this *Guidance on Developing Safety Performance Indicators*, members of the OECD Drafting Group developed some simplified examples of how SPI programmes might be applied (*i.e.*, by following practical steps to use the guidance in an industrial organisation, public authority or community).

This Annex contains a small number of examples; there are a wide variety of ways that an SPI programme might be developed. The OECD will be collecting examples of practical experience during 2003 – 2004 in order to provide additional and more elaborate examples in the final publication of this guidance.

The examples provided are not models that can be extracted and used wholesale. It is important to recognise that a reader should not simply take one of these examples and use it in their own agency/organisation. It is critical for each agency/organisation to develop its own SPI programme, choosing and adapting activities and outcome indicators, taking into account its goals and objectives, priorities, culture and other local circumstances.

Examples related to Part A

Guidance for Industry for developing Safety Performance Indicators Programmes

Example No. 1 related to Part A

Introduction: The following two examples have been prepared to describe the process that an industrial enterprise might follow if developing and applying a safety performance indicator (SPI) programme.

For purposes of the first example, we are assuming that the enterprise is a company called ABC Inc.

Prior to reviewing the SPI Guidance Document, representatives of the ABC Inc. have first:

- identified a team within their company representing various interests, including management;
- identified their company's goals and objectives, as well as the infrastructure that exists for implementing their programmes designed to achieve these goals and objectives.

Review the Guidance Document: For purposes of the first example, we have focused on just one subchapter of the Guidance for Industry, *i.e.*, subchapter 1.5(b) *Training and Education* and, specifically on the outcome indicators in this subchapter. However, in using this Guidance Document, the ABC Inc. team would review all the chapters in Part A and decide which subchapters are relevant for their purposes. Specifically, the team would have:

- read the relevant parts of the entire Guidance Document to understand the overall approach of the guidance on SPI (including the introductory text and relevant annexes);
- reviewed each section of Part A related to Industry in the context of the company's responsibilities; and
- decided which Chapters (and, in particular, which "targets") are relevant for its work.

Choose/Adapt Relevant Indicators: Following the general review, the ABC, Inc. team chose and adapted the outcome and activities indicators relevant for their organisation.

The team has decided that the following seven outcome indicators from subchapter 1.5(b) apply to their company's activities as well as their goal and objectives:

a. The level of adequacy (extent and quality) of the total training.
b. Extent of employees that have been trained in accordance with the planned training programme.
c. Extent to which employees receive adequate safety-related information, and understand this information.
d. Reduction of complaints by employees related to failure to receive adequate safety-related information;
e. Extent to which safety information is used or applied, based on independent review of day-to-day activities.

f. Extent of employees who pass periodic assessment of training.
g. Extent to which the workforce perform (*i.e.*, appropriate procedures being followed) during normal operations (based on spot checks, reviews, etc.).
h. Extent to which the workforce perform during emergency situations (based on tests or actual situations).
i. Number of incidents attributed to failure of training as a root or intermediate cause.

ABC Inc. recognised that some of the proposed outcome indicators are rather straightforward to measure relatively objectively, whereas others are much more difficult, requiring the company to use independent surveys or reviews by experts.

For each of the indicators, ABC Inc. established parameters for measuring the indicators in terms that would be understood by all its employees. (see matrix on next page)

ABC Inc. has decided to apply a scale for the assessment of the outcome indicators from 0 to 10, with 10 being the best performance. In addition, in this example, ABC Inc. has decided to use a weighting system so that greater emphasis is placed on those parameters that are considered to be of greater significance. For example, within the first outcome indicator "extent of safety and health training" is given greater significance than "revision of programme".

ABC, Inc. has chosen a matrix as a way of documenting the measuring process, and provided guidance, to help ensure that there is a consistent approach over time.

Outcome indicator ***(a) Level of adequacy (extent and quality) of the total training programme for employees***			Score(example) **4.9**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
• Programme for each category of employees	10= detailed programmes for each category both long-range and per year 7= most important categories covered both long-range and per year 4= only short-term ad-hoc programmes for most important categories	0.2	6	1.2
• Based on inventory of actual requirements per category	10= detailed assessment of requirements for all categories 7= most important categories treated in detail, others more generally 4= only general type programmes	0.1	5	0.5
• Safety and health only, or also other professional skills	10= extensive inclusion of broad-based topics for detailed understanding 7= some inclusion of broad-based topics as well 4= only limited broad-based topics	0.1	5	0.5
• Extent of safety and health training	10= Equivalent to one week per year 7= Equivalent to 2 days per year 4= Equivalent to ½ day per year	0.3	5	1.5
• Participation of employees in developing programme	10= extensive and formal participation of a good representation of employees 7= some participation of employees 4= limited representation of employees	0.2	3	0.6
• Revision of programme	10= thorough and formal revision of all programmes every year 7= some revision every year 4= only infrequent revision	0.1	6	0.6 4.9

Outcome indicator ***(b) Extent of employees that have been trained in accordance with the planned training programme.***			Score(example) **5.0**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
• Operating staff	Percentage of employees who have participated fully in planned training programme (10 grade scale). Reduction for employees who have only participated partly. If there is no training programme, score will be 0.	0.3	8	2.4
• Maintenance staff		0.3	6	1.8
• Middle management staff		0.2	4	0.8
• Top management staff		0.2	0	0
				5.0

Outcome indicator ***(c) Extent to which employees receive adequate safety-related information, and understand this information.***			Score(example) **?**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
• Reduction of complaints by employees related to failure to receive adequate safety-related information	10= significant reduction of complaints over previous period (relative to number of employees) 5= small reduction of complaints 3= same number of complaints 0= increase in number of complaints			
• Extent to which safety information is used or applied	Based on independent review of day-to-day activities 10=no significant deviations from safety instructions or procedures 5= limited number of deviations 0= significant number of deviations			

Outcome indicator ***(d) Extent of employees who pass periodic assessment of training.***			Score(example) **6.5**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
• Operating staff	Percentage of employees who pass the periodic assessments (10 grade scale).	0.4	8	3.2
• Maintenance staff		0.3	7	2.1
• Middle management staff		0.2	6	1.2
• Top management staff		0.1	0	0
				6.5

Outcome indicator ***(e) Extent to which the workforce perform (i.e., appropriate procedures being followed) during normal operations (based on spot checks, reviews, etc.).***			Score(example) **?**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
	Based on some independent resource making reviews. Based on independent review of day-to-day activities 10=no significant deviations from safety instructions or procedures 5= limited number of deviations 0= significant number of deviations			

Outcome indicator ***(f) Extent to which the workforce perform during emergency situations (based on tests or actual situations).***			Score(example) **?**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
	Based on some independent resource making reviews. 10=all personnel knew what actions to take during the emergency, and acted appropriately 5= some employees did not know what to do, or did not take appropriate actions 0= majority of employees did not know what to do or did not take appropriate actions			

Outcome indicator ***(g) Number of incidents attributed to failure of training as a root or intermediate cause.***			Score(example) **6.0**	
Parameter	**Guideline for giving points**	Weight factor	Score per parameter	Weighted score
	Simple measurement of number of incidents that after analysis have been found to have their root or intermediate cause in lack of or insufficient training. Could be converted to a 0 to 10 scale, where 10= None 7= say 5 (5 %) 4= say 20 (20 %)			

Example No. 2 related to Part A

The following example uses a slightly different system of metrics to measure both outcome and activities indicators. It focuses on issues related to risk identification and analysis. In this case, the company (XYZ Inc.) has developed reviewed the guidance and decided to develop their own activities and outcome indicators to fit their situation. The company then developed a matrix system for quantifying information and has assigned relative importance to aspects of each of the issues.

ACTIVITIES INDICATORS

Table 1 : Example of table used by XYZ Inc. to assess the level of accident risks at a high-risk site.
These relate to the subject of identification and evaluation of major accident risks.

Identification and evaluation of risks		Means of controlling the activity																Activity control
		Coordination (1/4 of total)				Competence (1/4 of total)				Tools (1/4 of total)				Co-operation (1/4 of total)				
		0%	33%	67%	100%	0%	33%	67%	100%	0%	33%	67%	100%	0%	33%	67%	100%	0 - 100 %
Activity Indicators	Analysis of past incidents used to implement risk analysis and evaluation.																	
	Internal hazard identification is carried out for each stage of installation (design, building, operation, shut-downs)																	
	Identification of external hazards is carried out (natural, transportation facilities, neighbouring industrial facilities, sabotage)																	
	Severity and likelihood each identified event is evaluated																	
	Major hazards are listed and assessed for their consequences on population and environment																	
	For each major hazard, safety barriers (both technical and organisational) are defined or suggested																	
	Criteria are defined to assess the risk acceptability																	

Table 2 : Assessment criteria of an activity indicator linked to the four main categories of means allocated by an organisation.

Issues		0% - 25%			25% - 50%			50% - 75%			75% - 100%		
		0%	13%	25%	25%	38%	50%	50%	63%	75%	75%	88%	100%
Co-ordination	Roles and responsibilities	Role and responsibilities not well identified →									Role and responsibilities clearly distributed and fitted to employee's competences		
	Communication	Employees are unable to transfer iInformation (e.g., due to a fault of transmitter or receiver means, or distribution channel) →									Good control both of distribution channels and transmitting, receiving processes		
	Decision making	Employees are unable to negotiate satisfactory solutions →									Employees are each time able to negotiate satisfactory solutions applicable by everyone		
Competence		Important gaps in employees knowledge, know-how and/or safety culture →									Good control both of employees' knowledge, know-how and safety culture		
Tools		Tools do not apply well to the objective aimed by the employees →									Tools apply well and simplify the achievement of employee's objective		
Co-operation		Employees develop a wrong safety strategy combined with a low safety margin →									Employees develop a good safety strategy combined with a satisfactory safety margin		

Table 3 : Example of outcome indicators used by XYZ, Inc. in relation to ”identification and evaluation of major accident risks”.

		Local management responsibility		Top management responsibility	
Outcome indicators	Number of incidents analysis used during risk analyses	Number			
	% of incidents that were not identified in risk analyses	%			
	Number of new events identified in risk analyses	Number			
	% of the installations that have completed an appropriate risks assessment	%			
	Number of risk reduction actions achieved			Number	
	% of major risks identified as non-acceptable and not tackled yet.			%	

Examples related to Part B

Guidance for Public Authorities for developing Safety Performance Indicators Programmes

Example No. 1 related to Part B

Introduction: The following two examples have been prepared to describe the process that a public authority (at national, regional or local level) might follow if developing and applying a safety performance indicator (SPI) programme.

For purposes of the first example, we are assuming that the authority is a provincial environmental agency (called "PEA").

Prior to reviewing the SPI Guidance Document, representatives of the PEA first:

- identified a team within their agency representing various interests, including management;
- identified their organisations's goals and objectives, as well as the infrastructure that exists for implementing their programmes designed to achieve these goals and objectives.

Review the Guidance Document: For purposes of this example, we have focused on just one subchapter of the Guidance for Public Authorities, *i.e.*, subchapter 4.1 *Ensuring Appropriate (On-site) Preparedness Planning*. However, in using this Guidance Document, the PEA team would have reviewed all the chapters in Part B and decided which subchapters are relevant for their purposes. Specifically, the team would have:

- read the relevant parts of the entire Guidance Document to understand the overall approach of the guidance on SPI (including the introductory text and relevant annexes);
- reviewed each section of Part B related to Public Authorities in the context of the authority's responsibilities; and
- decided which Chapters (and, in particular, which "targets") are relevant for its work.

Choose/Adapt Relevant Indicators: Following the general review, the PEA team chose and adapted the outcome and activities indicators relevant for their organisation.

The team decided that the following general and specific outcome and activities indicators from subchapter 4.1 are relevant to their areas of responsibilities, and their agency's goal and objectives:

Outcome Indicator[1]

a. Reduction in the number of hazardous installations that have required multiple emergency responses by public authorities (outcome indicator 4.1.ii).

Activities Indicators

b. Have all the hazardous installations required to develop on-site emergency preparedness plans completed those plans? (activities indicator 4.1.iii).

c. Do those on-site emergency preparedness plans include all the appropriate information? (4.1.iv).

d. Are the on-site emergency preparedness plans flexible enough to allow for response to a range of possible accidents and changes in the level of risk? (4.1.v).

e. Are the plans tested and updated on a regular basis to ensure they address all the possible accidents? (4.1.vi).

f. Are the employees aware of the on-site emergency preparedness plan and do they know what actions to take, if any, when an accident occurs at the hazardous installation? (4.1.vii).

g. Is the public aware of the on-site preparedness plan and do they know what actions to take, if any, when an accident occurs at hazardous installations? (4.1.viii).

The outcome indicator identified above, along with the general outcome indicators, were chosen by PEA for two reasons:

- these indicators are related to the goals that PEA is trying to reach; and
- the PEA currently collects information on on-site deaths, injuries, property/environmental damage, and response actions.

PEA recognised that the outcome indicators will be affected by the extent and quality of on-site preparedness plans in their jurisdiction (*i.e.*, having on-site preparedness plans for all relevant sites which fully address the risks at the hazardous installations). PEA also recognised that other factors can affect the results of measuring the indicators and should be taken in account in an organisation's overall SPI programme. For example, the development and implementation of an effective and efficient off-site preparedness plan by local public authorities may also mitigate the effects of a chemical accident and reduce on-site deaths and/or injuries as well as on-site property damage. Additionally, coordination and cooperation between industry and local public authorities may lead to improvements in on-site plans and a reduction of necessary multiply response actions.

The PEA understood that they can measure the first four activities indicators (those related to on-site preparedness plans) through on-site audits of the hazardous installations in their jurisdiction. The last two activities indicators, *i.e.*, those which measure employee and public actions when a chemical accident occurs, would need to be measured through independent surveys or reviews by experts.

The objective is to determine whether there are improvements in performance over a period of time. In this case, the PEA has decided to measure the activities and outcome indicators on an annual basis.

As set out in the following matrix, the PEA has recognised that it in order to support implementation of its SPI programme, there are several tasks or steps the agency should take. Those tasks include identification of the hazardous installations in their jurisdication that are required to have on-site plans, developing guidance for industry, developing an audit programme, conducting audits, etc. In addition, the PEA recognised the need to co-ordinate its activities with other stakeholders, including national and local authorities.

Developing Metrics and Applying the Indicators: The following page contains a matrix of the above outcome and activities indicators, along with an example of how the PEA plans to measure the indicators and its related timeframe.

Review and Revision of the SPI Programme: PEA recognised that it should review its SPI programme on a regular basis to collect and analyse results, develop annual reports, and determine if any adjustments are to be made to the SPI programme. Such a review will also help it identify areas where further work may be needed and give guidance on how to set priorities. The PEA has concluded that it would review its programme on an annual basis.

NOTES

[1] In addition to the outcome indicators from subchapter 4.1, the PEA decided that two of the general outcome indicators are useful for its SPI programme, *i.e.*:
- Reduction of death(s) and/or injuries from chemical accidents; and
- Reduction of on-site property/environmental damage from chemical accidents.

	The following represents how the PEA might apply Part B, subchapter 4.1 of the Guidance Document		
Target	The target is to facilitate development and implementation of appropriate on-site preparedness plans by the hazardous installations in the jurisdiction of the PEA.		
Expected Outcome	Reduction in the on-site consequences of chemical accidents.		
	Outcome	*What it measures*	*Target for specified timeframe*
Outcome Indicator	4.1.ii. % reduction of multiple emergency response actions by public authorities.	Improvement in on-site plan to respond to on-site risks and chemical emergencies.	X percent reduced in one year.
Activities Indicators (note: these are set out as ratios)	4.1.iii: # of haz. installations with on-site plans (divided by) # of haz. installations required to have on-site plans	Rate of compliance with regulations and standards requiring hazardous installations to have on-site plans.	X percent compliance in one year
	4.1.iv and 4.1.v: # of on-site plans with all approp. info. & flexibility (divided by) # of on-site plans audited	Completeness of on-site plans including determination whether all required provisions are in the on-site plan.	X percent complete on-site plans in one year.
	4.1.vi: # of on-site plans tested (divided by) # of haz. Installations with on-site plans	Whether hazardous installations keep their on-site plans up-to-date to include all new chemical risks.	X percent on-site plans tested per year.
	4.1.vii: # of employees who know what actions to take when an accident occurs (divided by) total # of relevant employees	Awareness by employees of the on-site plan and actions to take in an emergency.	X percent aware employees per year.
	4.1.viii: # of the public who know what actions to take when an accident occurs (divided by) total # of the public within area surrounding facility (*i.e.*, "potentially affected public")	Awareness by the public of the on-site plan and actions to take in an emergency. (this could be measured by surveys, or during exercises of emergency plans)	X percent aware public per year.
Tasks that should be undertaken by the public authority to support the implementation of their SPI programme.	Develop guidelines and standards for use by hazardous installations; these should assist the installations in meeting requirements for on-site preparedness plans and give guidance on best practice.		
	Identify universe of hazardous installations within your jurisdiction required to have on-site plans.		
	Develop and implement an audit programme. This will provide the basis for your authority to review completeness and quality of on-site preparedness plans developed by hazardous installation,		
	Conduct audits of hazardous installations with on-site preparedness plans. (Kim: isn't this redundant with the previous one?)		
	Develop and implement guidance for hazardous installations to assist them in making employees and the public aware of what actions to take if a chemical accidents occurs at the installation.		
	Develop and provide guidance to hazardous installations on how to test and update their on-site preparedness plans.		

Example No. 2 related to Part B

Introduction: For purposes of this second example, we are assuming that the authority is a national social welfare (called "SWA") with responsibility in protecting employees against risks, including risks associated with chemicals. SWA undertakes various activities to minimise the probability of uncontrolled releases of chemicals, and minimise the potential consequences on workers.

Prior to reviewing the SPI Guidance Document, representatives of the SWA first:

- identified a team within their agency representing various interests, including management; and
- identified their organisations's goals and objectives, as well as the infrastructure that exists for implementing their programmes designed to achieve these goals and objectives.

Review the Guidance Document: In using this Guidance Document, the SWA team reviewed all the chapters in Part B and decided which subchapters were relevant for their purposes. Specifically, the team would have:

- read the relevant parts of the entire Guidance Document to understand the overall approach of the guidance on SPI (including the introductory text and relevant annexes);
- reviewed each section of Part B related to Public Authorities in the context of the authority's responsibilities; and
- decided which Chapters (and, in particular, which "targets") are relevant for its work.

Criteria for a performance indicator. The SWA first identified five criteria for choosing performance indicators:

- An indicator must be *used* by policy makers as a means to measure success over time (including areas for improvement). It is recognised that performance indicators are not meant for defending the 'status quo'.

- An indicator must be *simple to understand* by the entire organisation. If not, there will be little enthusiasm to respond to its outcome.

- An indicator must be *transparent and auditable*. If not, benchmarking will result in an endless debate on the whereabouts of data.

- An indicator must be sensitive to whatever it is measuring. If not, it will not respond to focused improvement programmes.

- An indicator should be *specific* to whatever it is measuring. If not, there will be information that is not helpful.

In other words, the SWA decided that it is important to use simple logic.

The choice of Performance Indicators for SWA

Following performance indicators were chosen to measure the effectiveness of the SWA policy related to chemical hazards:

a. The percentage of facilities that is subject to legislation (in this case, the EU "Seveso II" Directive article 9 requirement to issue a safety report), that in fact has an approved and updated safety report.

   Objective of this indicator: should there be more or less emphasis on enforcing the law?

b. What percentage of facilities that are not subject to article 9 of the Seveso II Directive (do not have to issue a safety report) has been reviewed by SWA for their facility layout, with the objective to minimise the number of workers within the areas of risk.

   Objective of this indicator: should there be more or less emphasis on this area of SWA's responsibilities.

c. What percentage of the Seveso II facilities involved SWA in the mandatory emergency exercises (should be done every 3 years)?

   Objective of this indicator: should there be more or less emphasis on organisation.

d. What percentage of workers read and understand safety labels for chemical products?

   Objective of this indicator: should there be more or less emphasis on the dealing with individuals within an organisation.

e. The number of times actual loss of containment is reported in environmental reports.

f. How many comments to safety reports were received from public or press (per year)?

   The objective of this indicator is to measure public concern: more questions would be an indication that over-all efforts related to 'Major Hazards' should be increased.

Example related to Part C

Guidance for Public/Communities for developing Safety Performance Indicators Programmes

How to Establish a Citizen Committee related to Chemical Accident Prevention, Preparedness and Response

In order for a community to be able to effectively develop and implement a safety performance indicator programme, it is important to establish a structure to carry out the steps necessary. One possible structure is a committee with members representing the varied interests of the community. Without the existence of a committee (or other structure), it could be difficult for a community to set goals and objectives and fulfill their roles and responsibilities. Therefore, it becomes very difficult to measure the performance of this community.

Although it is not exhaustive, the following highlights a number of issues to consider in order to create a functional and representative committee.

The membership of the committee is important, as the committee should reflect the interests of the community. The members should come from different areas of the community, as well as from different backgrounds. For example, in the US and Canada, such committees generally include representatives of local industry, municipal authorities, non-governmental organisations, and employees of nearby installations, as well as educators, community activists, and unaffiliated citizens.

To facilitate the start-up of the committee, an external and neutral consultant could be hired. The hazardous installations could help the process by identifying target groups within the community and inviting them to participate. (see example, on next page, of a letter that has been developed for use by an enterprise in Canada to initiate the establishment of a committee).

In order to get effective participation from local citizens, the committee might try to attract individuals with relevant skills. One way to do this is to include retirees (e.g., retired lawyer, engineer, environmental specialist, etc.).

Normally, the members of the community who participate in the committee do so on a voluntary basis. Given this, it is important to facilitate participation (e.g., by holding meetings at convenient times and locations) and to find ways to express appreciation for the efforts of participants. In addition, the atmosphere should reflect a sense of shared purpose, and be friendly and relaxed where people can learn to work together. This will facilitate communication and help to develop a high level of trust between stakeholders.

The committee should establish its mandate and its objectives (in consultation with relevant stakeholders), and identify its own activities to attain these objectives. This should be done taking into account local circumstances, and the abilities of committee members. Consideration should be given to having a neutral mediator (paid or not) to facilitate meetings of the committee.

The management of hazardous installations and representatives of public authorities should treat the members of the committee as partners. Paternalistic behaviour from representatives of local enterprises or public authorities could harm the relationship and degrade the exchanges between stakeholders.

Financing should be provided to the committee to ensure its viability. However, to keep the independence of the committee, this financing should only cover the expenses of the committee. The financing could come from various sources including, for example, the management of hazardous installation(s), trade/industry associations, and public authorities.

A network for exchanging information and for communication should be developed within each committee. In addition, means should be developed to allow different committees to share experiences.

Example of a Letter from a Company
Seeking to establishing a Community Committee

Company letterhead

Dear Sir or Madam:

As Chemical Producer, our company participates actively in a programme called Responsible Care® that was started in Canada more than fifteen years ago and has spread to 39 countries in the world. This programme is all about the responsible management of chemicals at all phases in the life cycle. One important part of Responsible Care® involves community awareness – that is working to make sure that our neighbours have an understanding of the potential risks involved in the site operation, and the processes that we use to manage these materials in a safe manner.

To begin this dialogue, we want to explore the idea of starting up a community advisory panel. A number of chemical companies in Canada have started community advisory panels – often called CAPs – over the past few years and have found it beneficial to work with neighbours on matters of mutual concern and common interest. We have talked about this idea with our employees who live in the community and the public authorities, and they think it is an excellent idea. They helped us develop a list of names of people drawn from various walks of life who are active in community affairs – of which one was yours.

A community advisory panel is a bridge between the community and the plant. Panel members do not take on any responsibilities beyond the provision of advice. We want to know what community issues are on your mind and particularly those that involve in some way the industrial sector in our local economy, and any specific concerns about our site. We see many issues that arise about the role of chemicals in our society and we want to get your opinions about how we can do a better job in prevention and emergency planning. We would like to know how we can better communicate with our neighbours and the community.

Some of these panels meet as often as once a month. It is our view that the kinds of risks presented by our site would not require that much involvement in meetings – so we were thinking that three or four meetings a year would be ample. However, it will be up to you to decide how frequent and when the panel will meet.

We are asking up to six people to come out and join us for a session at the plant to explore the idea. This meeting will start at 5:00 p.m. and last 2-2.5 hours. It will include a light supper. During this time, we will explore the idea of a panel and ask you to select the members of that group if you think we should go ahead.

We hope that you will attend and we are anxious to work with you on this issue that is important to us and to the community.

Truly yours,

Plant Manager

Establishing and Implementing an SPI Programme for Communities

Introduction: Once an appropriate structure (e.g., committee) has been established in an interested community, efforts will be needed to develop its objectives and build local acceptance. It will also need to establish necessary infrastructure (e.g., funding, leadership, roles and responsibilities of members, set out a work plan, etc). Once it is operational and has carried out activities in furtherance of its objectives, the committee may wish to measure its performance. This example describes a process that a local committee might follow if developing and applying an SPI programme. For purposes of this example, we are assuming that the committee is a "community advisory panel" or "CAP" established to represent the community in the vicinity of a chemical producer.

Prior to reviewing the SPI Guidance Document, representatives of the CAP first:

- identified a team within their committee representing various interests;
- identified the committee's goals and objectives, and the means established for carrying out these goals and objectives.

Review the Guidance Document: The CAP team would have reviewed all the chapters in Part C and decide which subchapters are relevant for their purposes. Specifically, the team would:

- read the relevant parts of the entire Guidance Document to understand the overall approach of the guidance on SPI (including the introductory text and relevant annexes);
- review each section of Part C related to Communities/Public in the context of the authority's responsibilities; and
- decide which Chapters (and, in particular, which "targets") are relevant for its work.

Choose/Adapt Relevant Indicators: Following the general review, the CAP team would choose and adapt the outcome and activities indicators relevant for their organisation. For purposes of this example, the focus will only be on subchapter C.1 "Information Acquisition And Communication".

The CAP team has chosen the following general and specific outcome and activities indicators from subchapter C.1, and amended the text to be relevant to their situation. The indicators were chosen by the CAP because they are related to one of the primary goals of the CAP (*i.e.*, that members of the community have information about local risks and understand this information). In addition, it was important to the CAP that the indicators chosen can be measured using the tools available and would not require a large amount of financial or human resources.

Outcome Indicators

a. Percentage of the local community that know and understand chemical risks and consequences on human health and the environment. The community is defined by geographic boundaries established taking into account the risk assessments of the relevant hazardous installations.

b. Percentage of the community that understands and retains information on chemical hazards and the consequences of accidents.

c. Percentage of hazardous installations in the vicinity that have been approached by members of the community for information on chemical risks and consequences on human health and the environment.

Activities Indicators

d. Do members of the community have access to information on hazardous installations (e.g., safety reports)?

e. Do members of the community acquire information on the hazards and the consequences of accidents directly from the hazardous installations (by email, telephone, visits to the site, etc.)?

f. Do members of the community co-operate with the local hazardous installations and local authorities to help ensure that the information on the hazards and the consequences of accidents is appropriate and can be understood by the community?

g. Do members of the community take part in the development and implementation of community surveys concerning the knowledge of the community concerning the hazards and the consequences of accidents at hazardous installations in the vicinity?

h. Do members of the community take part in the development and implementation of education and outreach activities related to chemical hazards?

i. Do members of the community co-operate with industry and public authorities in providing the potentially affected public with information on chemical risks and consequences on human health and the environment and the measures to be taken in the event of an accident?

Since the objective of the SPI programme is to determine whether there are improvements in performance over a period of time, the CAP decided to measure the activities and outcome indicators on an annual basis. The results of the SPI programme will be used to set priorities for the future work of the CAP. The CAP has also agreed to review their SPI programme on a regular basis (*i.e.*, every 3 years) to see if improvements can be made.

ANNEX II

EXPLANATION OF TERMS USED

This Annex was prepared for use in reading the OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response, as well as this publication. The terms set out below are explained for the purposes of these two documents only, and should not be taken as generally agreed definitions or as terms that have been harmonised between countries and organisations. To the extent possible, common definitions of these terms are used.

Most of the terms included below are not used in this Guidance on Safety Performance Indicators, but have been included because of their use in the Guiding Principles.

Acceptability/tolerability of risk:
A willingness to live with a risk in order to secure certain benefits.

Accident or chemical accident:
Any unplanned event involving hazardous substances that causes, or is liable to cause, harm to health, the environment, or property. This excludes any long-term events (such as chronic pollution).

Activities Indicators:
See "Indicators".

Affiliates:
Enterprises in which another enterprise has minority voting rights and no effective operational control.

Aid agency:
Aid agencies include: bilateral assistance/development agencies of individual countries that provide technical and/or financial assistance to developing countries and countries with economies in transition; and multilateral organisations providing such assistance (e.g., World Bank and regional development banks).

Audit:
A systematic examination of a hazardous installation to help verify conformance with regulations, standards, guidelines and/or internal policies. This includes the resultant report(s) but not subsequent follow-up activities. Audits can include examinations performed either by, or on behalf of, management of a hazardous installation (self or internal audit), or an examination by an independent third party (external audit).

Berth:
Any dock, pier, jetty, quay, wharf, marine terminal, or similar structure (whether floating or not) at which a ship may tie up. This includes any plant or premises, other than a ship, used for purposes ancillary or incidental to the loading or unloading of hazardous substances.

Berth operator:
Any person or body of persons who has (for the time being) the day-to-day control of the operation of a berth.

Bulk:
Cargoes which are intended to be transported without any intermediate form of containment in a cargo space.

Cargo interests:
A shipper, carrier, forwarder, consolidator, packing centre, or any person, company or institution involved in any of the following activities: identification, containment, packaging, packing, securing, marking, labelling, placarding, or documentation, as appropriate, of cargoes involving hazardous substances, and having control over the cargo at any time.

Chemical accident:
See "Accident".

Chemical industry:
Enterprises that produce, formulate and/or sell chemical substances (including basic and specialty chemicals, consumer care products, agrochemicals, petrochemicals, and pharmaceuticals).

Community(ies):
Individuals living/working near hazardous installations who may be affected in the event of a chemical accident.

Contractors:
Includes all contractors and subcontractors.

Consequence:
Result of a specific event.

Emergency preparedness plan (or) emergency plan:
A formal written plan which, on the basis of identified potential accidents together with their consequences, describes how such accidents and their consequences should be handled, either on-site or off-site.

Employee:
Any individual(s) working at, or on behalf of, a hazardous installation. This includes both management and labour, as well as (sub)contractors.

Enterprise:
A company or corporation (including transnational corporations) that has operations involving production, processing, handling, storage, use and/or disposal of hazardous substances.

Ergonomics:
A discipline concerned with designing plant, equipment, operation and work environments so that they match human capabilities.

Hazard:
An inherent property of a substance, agent, source of energy or situation having the potential of causing undesirable consequences.

Hazard analysis:
Identification of individual hazards of a system, determination of the mechanisms by which they could give rise to undesired events, and evaluation of the consequences of these events on health, (including public health) environment and property.

Hazardous installation:
A fixed industrial plant/site at which hazardous substances are produced, processed, handled, stored, used or disposed of in such a form and quantity that there is a risk of an accident involving hazardous substance(s) that could cause serious harm to human health or damage to the environment, including property.

Hazardous substance:
An element, compound, mixture or preparation which, by virtue of its chemical, physical or (eco)toxicological properties, constitutes a hazard. Hazardous substances also include substances not normally considered hazardous but which, under specific circumstances (e.g., fire, runaway reactions), react with other substances or operating conditions (temperature, pressure) to generate hazardous substances.

Human factors:
Human factors involve designing machines, operations and work environments so that they match human capabilities, limitations and needs (and, therefore, is broader than concerns related to the man-machine interface). It is based on the study of people in the work environment (operators, managers, maintenance staff, and others) and of factors that generally influence humans in their relationship with the technical installation (including the individual, the organisation and the technology).

Human performance:
All aspects of human action relevant to the safe operation of a hazardous installation, in all phases of the installation from conception and design, through operation, maintenance, decommissioning, and shutdown.

Incidents:
Accidents and/or near-misses.

Indicators:
Activities Indicators
A means for measuring actions or conditions which, within the context of a programme related to chemical accident prevention, preparedness and response, should maintain or lead to improvements in safety (e.g., reduction in risk, improvements in safety management and safety culture, mitigation of adverse effects in event

of an accident). These indicators generally take the form of a non-exclusive checklist providing examples of actions/conditions that are believed to contribute to improvements in safety. Users are expected to choose those elements of the checklist that are appropriate to their situation, and add other elements as appropriate.

Outcome Indicators
A means for measuring the results, effects or consequences of activities carried out in the context of a programme related to chemical accident prevention, preparedness and response. For purposes of this document, outcome indicators are designed to measure whether actions taken are achieving the intended results (*i.e.*, a measurable quantitative or qualitative opinion about improvements in safety performance relating to the likelihood of an accident occurring, and/or the extent of impacts on human health and the environment from accidents that do occur).

Safety performance indicators
A means for measuring the changes over time in the level of safety (related to chemical accident prevention, preparedness and response), as the result of actions taken. For purposes of this document, safety performance indicators are based on both activities indicators and outcome indicators.

Information:
Facts or data or other knowledge which can be provided by any means including, for example, electronic, print, audio or visual.

Inspection:
A control performed by public authorities. There may be (an)other party/ies involved in the inspection, acting on behalf of the authorities. An inspection includes the resultant report(s) but not subsequent follow-up activities.

Interface:
See "Transport interface".

Labour:
Any individual(s) working at, or on behalf of, a hazardous installation who are not part of management. This includes (sub)contractors.

Land-use planning:
Consists of various procedures to achieve both general zoning/physical planning, as well as case-by-case decision-making concerning the siting of an installation or of other developments.

Local authorities:
Government bodies at local level (e.g., city, county, province). For purposes of this document, these include bodies responsible for public health, rescue and fire services, police, worker safety, environment, etc.

Management:
Any individual(s) or legal entity (public or private) having decision-making responsibility for the enterprise, including owners and managers.

Master:
Any person, other than a pilot or watchman, having charge of a ship.

Monitor (or) monitoring:
Use of checks, inspections, tours, visits, sampling and measurements, surveys, reviews or audits to measure compliance with relevant laws, regulations, standards, codes, procedures and/or practices; includes activities of public authorities, industry and independent bodies.

Near-miss:
Any unplanned event which, but for the mitigation effects of safety systems or procedures, could have caused harm to health, the environment or property, or could have involved a loss of containment possibly giving rise to adverse effects involving hazardous substances.

Outcome Indicators:
See "Indicators".

Pipeline:
A tube, usually cylindrical, through which a hazardous substance flows from one point to another. For purposes of this publication, pipelines include any ancillary facilities such as pumping and compression stations.

Port area:
The land and sea area established by legislation. (Note: some port areas may overlap. Legal requirements should take account of this possibility.)

Port authority:
Any person or body of persons empowered to exercise effective control in a port area.

Probability:
The likelihood that a considered occurrence will take place.

Producer(s) (chemical):
Enterprises that manufacture or formulate chemical products (including basic and specialty chemicals, consumer care products, agrochemicals, petrochemicals, and pharmaceuticals).

Product Stewardship:
A system of managing products through all stages of their life cycle, including customer use and disposal (with the objective of continuously improving safety for health and the environment).

Public authorities:
Government bodies at national, regional, local and international level.

Reasonably practicable:
All which is possible, subject to the qualification that the costs of the measures involved are not grossly disproportionate to the value of the benefits obtained from these measures.

Risk:
The combination of a consequence and the probability of its occurrence.

Risk assessment:
The informed value judgment of the significance of a risk, identified by a risk analysis, taking into account any relevant criteria.

Risk communication:
The sharing of information, or dialogue, among stakeholders about issues related to chemical accident prevention, preparedness and response including, e.g.: health and environmental risks and their significance; policies and strategies aimed at managing the risks and preventing accidents; and actions to be taken to mitigate the effects of an accident. For purposes of this document, risk communication includes dialogue and sharing of information among the public, public authorities, industry and other stakeholders.

Risk management:
Actions taken to achieve or improve the safety of an installation and its operation.

Root cause(s):
The prime reason(s) that lead(s) to an unsafe act or condition and result(s) in an accident or near miss. In other words, a root cause is a cause that, if eliminated, would prevent the scenario from progressing to an accident. Root causes could include, for example, deficiencies in management systems that lead to faulty design or maintenance, or that lead to inadequate staffing.

Safety management system:
The part of the an enterprise's general management system that includes the organisational structure, responsibilities, practices, procedures, processes, and resources for determining and implementing a chemical accident prevention policy. The safety management system normally addresses a number of issues including, but not limited to: organisation and personnel; identification and evaluation of hazards and risks; operational control; management of change; planning for emergencies; monitoring performance; audit and review.

Safety performance indicators:
See "Indicators".

Safety report:
The written presentation of technical, management and operational information concerning the hazards of a hazardous installation and their control in support of a justification for the safety of the installation.

Ship:
Any seagoing or non-seagoing water craft, including those used on inland waters, used for the transport of hazardous substances.

Stakeholder:
Any individual, group or organisation that is involved, interested in, or potentially affected by chemical accident prevention, preparedness and response. A description of stakeholders groups is included on in the Introduction to this publication under "Scope".

Storage facilities:
Warehouses, tank farms and other facilities where hazardous substances are held.

Subsidiaries:
Enterprises in which another enterprise has majority voting rights and/or effective operational control.

Transfer of technology:
The movement of process and other safety-related technology from one country to another, embracing not only the actual transfer but also the application of the technology and the operation of the plant.

Transboundary accident:
An accident involving hazardous substances that occurs in one jurisdiction and causes adverse health or environmental consequences (effects), or has the potential to cause such consequences, in another jurisdiction (within a country or across national boundaries).

Transport interface:
Fixed (identified) areas where hazardous substances (dangerous goods) are transferred from onetransport mode to another (e.g., road to rail, or ship to pipeline); transferred within one transport mode from one piece of equipment to another (e.g., from one truck to another); transferred from a transport mode to a fixed installation or from the installation to a transport mode; or stored temporarily during transfer between transport modes or equipment. Thus, transport interfaces involve, for example, loading and unloading operations, transfer facilities, temporary holding or keeping of hazardous substances during cargo transfer (e.g., warehousing), and handling of damaged vehicles or spilled goods. Examples include: railroad marshalling yards, port areas, receiving/loading docks at hazardous installations, terminals for roads and for intermodal transport between road and rail, airports, and transfer facilities at fixed installations.

Triage:
The assessment of the clinical condition of exposed individuals, with the designation of priorities for decontamination, treatment and transportation.

Warehouse keeper:
The person responsible for a storage facility, whether on the site of a hazardous installation or off-site.

ANNEX III

SELECTED REFERENCES

This Annex provides a list of publications that might be of interest to the readers of this *Guidance on Safety Performance Indicators.* This list is NOT intended to be comprehensive; rather, it was developed from suggestions by the OECD Working Group on Chemical Accidents and the Group of Experts on SPI. The purpose was to make reference to publications that are relevant, may provide further guidance on developing SPI programmes and that are easily available to the public.

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ANNEX IV

BACKGROUND

This *Guidance on Safety Performance Indicators* has been prepared as part of the OECD Chemical Accidents Programme, under the auspices of the expert group established to manage the Programme, the Working Group on Chemical Accidents (WGCA).

This publication was produced within the framework of the Inter-Organisation Programme for the Sound Management of Chemicals (IOMC).

The OECD

The Organisation for Economic Co-operation and Development is an intergovernmental organisation in which representatives of 30 industrialised countries (from Europe, North America, and the Pacific) and the European Commission meet to co-ordinate and harmonise policies, discuss issues of mutual concern, and work together to respond to international concerns. Much of OECD's work is carried out by more than 200 specialised Committees and subsidiary groups made up of member country delegates. Observers from several countries with special status at the OECD, international organisations, and non-governmental organisations (including representatives from industry and labour) attend many of the OECD's workshops and other meetings. Committees and subsidiary groups are served by the OECD Secretariat, located in Paris, France, which is organised into Directorates and Divisions.

The Chemical Accidents Programme

The work of the OECD related to chemical accident prevention, preparedness and response is carried out by the Working Group on Chemical Accidents, with Secretariat support from the Environment, Health, and Safety Division of the Environment Directorate.[1] The general objectives of the Programme include: exchange of information and experience; analysis of specific issues of mutual concern in member countries; and development of guidance materials. As a contribution to these objectives, more than 15 workshops and special sessions have been held since 1989. For further information concerning the Programme, as well as a list of the guidance materials and other publications prepared as part of this Programme, see: www.oecd.org/env/accidents.

The work of the WGCA has been undertaken in close co-operation with other international organisations. A number of these organisations, including the International Labour Office (ILO), the International Maritime Organization (IMO), the United Nations Environment Programme (UNEP), the UN Economic Commission for Europe (UNECE), the World Health Organization (WHO), and the United Nations Office for the Coordination of Humanitarian Affairs (through the Joint UNEP/OCHA Environment Unit), are very active in the area of chemical accident prevention, preparedness and response and have prepared guidance materials on related subjects.

Development of the Guidance on Safety Performance Indicators

This Guidance Document has been prepared as a companion to the OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response (2nd ed). The Working Group agreed that it would be valuable to develop guidance to facilitate implementation of the *Guiding Principles*, and to help stakeholders assess whether actions taken to enhance chemical safety in fact lead to improvements over time.

To help in the preparation of the second edition, the WGCA established a Group of Experts, with representatives of member and observer countries, industry, labour, non-governmental organisations and other international organisations. Experts from Sweden, the US and Canada agreed to be the lead authors of the three parts of the Guidance Document. A list of participants in this Group can be found on the Acknowledgements page.

The Working Group specified that the Group of Experts should develop guidance, rather than precise indicators, to allow flexibility in application, and stated that the guidance should address both measures of activities/organisation of work and measures of outcome/impact. The guidance was originally envisaged as addressing industry and public authorities; it was subsequently expanded to include guidance for communities.

The Group of Experts began its work by collecting as much experience as possible on SPI and related activities, through a survey, in order to build on this experience.

Once it developed draft text, the Group tested its approach, using one chapter of the guidance for industry and one for public authorities. Several companies and authorities volunteered to participate in this test. The test proved very valuable. The test volunteers indicated, as a general matter, that the approach developed is useful, while providing valuable suggestions for improving the text.

Because the Guidance Document presents an innovative approach to measuring safety performance, it was agreed that the *Guidance on SPI* should be published as an "interim" document, with as broad distribution as possible, seeking feedback from users. The Guidance would be reviewed, and updated, within a couple of years.

NOTES

1. The Environment, Health and Safety Division undertakes work in a range of subjects related to chemical safety, safety of biotechnology, and pesticides, and prepares publications in six areas in addition to Chemical Accidents. These are: Testing and Assessment; Good Laboratory Practice and Compliance Monitoring; Emission Scenario Documents; Pesticides; Risk Management; and Harmonisation of Regulatory Oversight in Biotechnology.

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