GUIDANCE ON DEVELOPING SAFETY PERFORMANCE INDICATORS

related to Chemical Accident Prevention, Preparedness and Response

FOR PUBLIC AUTHORITIES AND COMMUNITIES/PUBLIC

(second edition, 2008)

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This publication is dedicated to the memory of Jim Makris, for his leadership, enthusiasm and dedication to international co-operation regarding chemical accident prevention, preparedness and response and, more specifically, to the OECD Chemical Accidents Programme.

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Safety Publications

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No. 18

GUIDANCE ON DEVELOPING SAFETY PERFORMANCE INDICATORS related to Chemical Accident Prevention, Preparedness and Response

GUIDANCE FOR PUBLIC AUTHORITIES AND COMMUNITIES/PUBLIC

Environment Directorate

ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

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This publication was produced within the framework of the Inter-Organization Programme for the Sound Management of Chemicals (IOMC).

The Inter-Organization Programme for the Sound Management of Chemicals (IOMC) was established in 1995 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. The Participating Organizations are FAO, ILO, OECD, UNEP, UNIDO, UNITAR and WHO. The World Bank and UNDP are observers. The purpose of the IOMC is to promote co-ordination of the policies and activities pursued by the Participating Organizations, jointly or separately, to achieve the sound management of chemicals in relation to human health and the environment.

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Acknowledgements

This new *Guidance on Developing Safety Performance Indicators* (2008) was prepared by an Expert Group with representatives of member and observer countries, industry, labour, non-governmental organisations and other international organisations. This Expert Group, under the auspices of the Working Group on Chemical Accidents (WGCA), was chaired by Kim Jennings (US EPA). The development of the *Guidance on SPI* has been undertaken in close co-operation with other international organisations active in the area of chemical accident prevention, preparedness and response.

The effort to develop this *Guidance on Developing Safety Performance Indicators* consisted of a number of stages, starting in 1998 with the establishment of an Expert Group (see below) to explore the possibility of developing a means for facilitating implementation of the *Guiding Principles*, and to help stakeholders assess whether actions taken to enhance safety in fact were achieving desired results. Some of the steps leading to the development of this *Guidance* included:

- In 2003, the WGCA developed and published the initial version of the *Guidance on Developing Safety Performance Indicators*. The WGCA agreed that this should be published as an "interim" document because it presented an innovative approach to measuring safety performance. (See text box on the next page.)
- The WGCA established a Pilot Programme to get volunteers from industry, public authorities and communities to test the *Guidance on SPI* and provide feedback.
- During the same period as the Pilot Programme, the UK Health and Safety Executive and the Chemical Industries Association worked with companies in the UK to develop a process for developing a generic model for establishing process safety indicators. In 2006, they published *Developing Process Safety Indicators: A step-by-step guide for chemical and major hazard industries*, setting out a six-step process that can be used by companies interested in establishing a programme for safety performance measurement.
- Following the Pilot Programme, the WGCA convened a small Group of Experts to review the comments received as well as to consider related developments, and to revise the *Guidance on SPI* accordingly.

The Pilot Programme

During the course of the Pilot Programme, feedback was received from participants representing the key stakeholders groups including industry, public authorities (at national, regional and local levels) and communities. The participants provided very constructive comments that led to significant changes from the 2003 version of the *Guidance on SPI*. The volunteers in the Pilot Programme who provided feedback included: Jean-Paul Lecoursière, Robert Reiss and Claude Rivet (Canada, public authority/community); Anne-Mari Lähde (Finland, public authority); Remi Parent (Switzerland, industry); Alberto Susini (Switzerland, public authority); Viki Beckett and Elizabeth Schofield (UK, public authority); Peter Metcalfe (UK, public authority/police); Jonathan Smith (UK, industry); Nigel Taylor and Graham Kirby (UK, public authority/fire service); Simon Webb (UK, industry); Ty Lollini (US, industry); and Randal L. Sawyer (US, public authority).

Group of Experts: Completing the Final Text

The Group of Experts reviewed the feedback from the Pilot Programme participants, and considered other related developments. As a consequence, they agreed that a number of substantial and editorial changes should be made to the 2003 *Guidance*, with the most important being:

- the addition of Chapter 2, setting out seven steps for implementing an SPI Programme (building on the experience in the United Kingdom);
- the creation of two separate publications: one for industry and one for public authorities and communities/public;
- the drafting of a separate chapter for emergency response personnel, as a subset of public authorities;[1] and
- the development of additional guidance on the use of metrics.

[1] The impetus for creating this chapter came from the extremely helpful comments from the representatives of the UK police and fire services. Peter Metcalfe from the police, who also participated in the Group of Experts, provided invaluable insights and guidance for the further development of the Chapter.

As a result, the bulk of the 2003 version is now contained in Chapter 3, amended to take into account experience gained during the four years since the interim *Guidance* was published.

The Group of Experts included: Jean-Paul Lacoursière and Robert Reiss (Canada, public authority and local community); Pavel Forint and Milos Palacek (Czech Republic, public authority); Anders Jacobsson (Sweden, consultant); Elisabeth Schofield and Ian Travers (UK, public authority); Peter Metcalfe (UK, Police); Neil MacNaughton (UK, industry); Nick Berentzen (UK, industry association); Kim Jennings (public authority); Walt Frank (US, industry); Tim Gablehouse (US, local community); and Bill Michaud and Francine Schulberg (US, consultants). In addition, Kathy Jones and Dorothy McManus of the US EPA helped to review and edit the text.

A small group was responsible for drafting the text: Chapter 2 and the Annex on metrics was prepared by Bill Michaud (US, consultant); and Chapter 3 was prepared by Anders Jacobsson (Sweden) for the Industry text; Kim Jennings (US) for the Public Authorities text; and Jean-Paul Lacoursière, Robert Reiss and Eric Clément (Canada), for the Communities text. Francine Schulberg was responsible for preparing Chapter 1, compiling the annexes and editing the document. Peter Kearns and Marie-Chantal Huet (OECD Secretariat) assumed an oversight role throughout the process, under the supervision of Robert Visser.

The preparation of the *Guidance on SPI* was made possible by extra-budgetary contributions from Australia, Austria, Canada, Finland, Germany, Italy, the Netherlands, Norway, Sweden, Switzerland and the United States.

The 2003 "Interim" Guidance on SPI

The impetus for developing this document was a suggestion in 1998 by the delegate from France (Marcel Chapron) that the Working Group should develop indicators to facilitate implementation of the Guiding Principles *and to better understand the impacts on safety of different elements of the* Guiding Principles.

The Working Group established an Expert Group on Safety Performance Indicators. This Group that developed the "interim" version of the Guidance on SPI *(2003), was chaired by Kim Jennings (United States), and included 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, Francine Schulberg and Robert Smerko (United States); Juergen Wettig (European Commission); Sigal Blumenfeld (Israel); Simon Cassidy, Stephen Coe and Willem Patberg (Business and Industry Advisory Committee to the OECD); Ralph Arens, Roland Fendler, Angelika Horster, Apostoslos Paralikas and Mara Silina (European Environmental Bureau); and Reg Green and Brian Kohler (Trade Union Advisory Committee to the OECD). In addition, Dafina L. Dalbokova and Dorota Jarosinka (World Health Organization-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 (United States) 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.*

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

This *Guidance on Developing Safety Performance Indicators ("Guidance on SPI")* was created as a complement to the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response (2nd ed. 2003) ("Guiding Principles").*

The Guiding Principles is a comprehensive document providing guidance to assist industry, public authorities, and communities worldwide in their efforts to prevent and prepare for chemical accidents, *i.e.*, releases of hazardous substances, fires and explosions. First published in 1992 and updated in 2003, the *Guiding Principles* contains best practices gathered from the experience of a wide range of experts, and has been internationally accepted as a valuable resource in the development and implementation of laws, regulations, policies and practices related to chemical safety.

Both the *Guidance on SPI* and the *Guiding Principles* are aimed at the same target audiences, recognising that industry, public authorities and communities all have important roles to play with respect to chemical safety and, furthermore, should work together in a co-operative and collaborative way. Through such co-operation, industry can 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 and work with communities to ensure proper preparedness, and communities can provide chemical risk and safety information to the potentially affected public and help to motivate industry and public authorities to improve safety.

The *Guiding Principles* include "Golden Rules," highlighting some of the most important concepts contained in the *Guiding Principles*. Annex III of this Document contains a complete copy of the Golden Rules. Some of the key responsibilities include:

Owners/managers of hazardous installations should:
- know what risks exist at their hazardous installations;
- promote a "safety culture," which is known and accepted throughout the enterprise;
- implement a safety management system, which is regularly reviewed and updated;
- prepare for any accident that might occur.

Workers at hazardous installations should:
- make every effort to be informed and to provide feedback to management;
- be proactive in helping to inform and educate the community.

Public authorities should:
- provide leadership and motivate stakeholders to improve chemical accident prevention, preparedness and response;
- develop, enforce and continuously improve regulations, policies, programmes and practices;
- help ensure that there is effective communication and co-operation among stakeholders.

The public should:
- be aware of the risks in their community and what to do in the event of an accident;
- co-operate with local authorities and industry in emergency planning and response.

Thus, the *Guiding Principles* provides insights on the policies, practices and procedures (including human resources and technical measures) that should be in place to reduce risks of chemical accidents and to respond should an accident occur. This *Guidance on SPI* was prepared to assist enterprises determine whether their own policies, practices and procedures operate as intended and achieve their desired results and, if not, what improvements should be made.

The full text of the *Guiding Principles* is available on-line, along with a searchable version (see: www.oecd.org/env/accidents). With the support of member countries, translations of the *Guiding Principles* are available on the website in a number of languages including Chinese, Czech, French, German, Hungarian, Italian and Korean.

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Related Guidance Concerning the Role of Industry

This *Guidance* for public authorities and communities/public is one part of a pair of documents prepared simultaneously. The other document is *Guidance on Developing Safety Performance Indicators for Industry*, recognising that industry has the primary responsibility for the safety of the installations it operates.

The *Guidance for Industry* is aimed at any enterprise worldwide that produces, uses, handles, stores, transports or disposes of hazardous chemicals (whether publicly or privately owned) in order to develop the assurance that risks of chemical accidents are under control.

(see: www.oecd.org/env/accidents)

Web-Based Version of the *Guidance*

The web-based version of this *Guidance* will be periodically updated and supplemented with further examples and new references.

(see: www.oecd.org/env/accidents)

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

Please send comments to ehs@oecd.org

Introduction

Safety Performance Indicators ("SPIs") provide important tools **for any party with responsibilities related to chemical accident prevention, preparedness and response**. Specifically, SPIs allow organisations to check whether actions they have taken to address risks (*e.g.*, implementation of policies, programmes, procedures and practices) continue to achieve their desired outcomes.

By allowing organisations to take a pro-active approach to help avoid potential causes of chemical accidents, gaps in planning or problems with response capabilities, SPI Programmes help public authorities and the public by providing an early warning of possible problems and identifying where improvements should be made. SPI Programmes also provide the insights needed to take appropriate steps to improve chemical safety. In addition, an effective SPI Programme helps to establish priorities recognising that limited resources require organisations to focus on the activities that are most effective in contributing to desired results (*i.e.*, fewer accidents, minimising harm to human health, reduced environmental impacts).

This *Guidance on Developing Safety Performance Indicators ("Guidance on SPI")* was prepared to assist organisations that wish to implement and/or review Safety Performance Indicator Programmes.[2] It is designed to measure the performance of the public authorities (broadly defined)[3] including emergency response personnel, as well as organisations representing communities/public (in particular communities in the vicinity of hazardous installations). While this *Guidance* recognises that industry has the primary responsibility for the safety of their installations,[4] the other stakeholders have important responsibilities with respect to accident prevention and to taking appropriate actions in the event of an accident in order to minimise adverse consequences to health, the environment and property.

This *Guidance* was developed by the OECD Working Group on Chemical Accidents,[5] bringing together experts from public and private sectors to identify best practices in measuring safety performance. It is a complement to the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response* (2nd edition, 2003)[6] (the *"Guiding Principles"*) and is intended to be consistent with, and complementary to, other major initiatives related to the development of safety performance indicators.

This *Guidance* is not prescriptive. In fact, each organisation is encouraged to consider how to tailor its SPI Programme to its specific needs and to use only those parts of the *Guidance* that are helpful in light of its own circumstances.

The three chapters in this *Guidance* are designed to help public authorities (including emergency response personnel) and organisations representing communities/public to better understand safety performance indicators, and how to implement SPI Programmes. Specifically:

- **Chapter 1** provides important background information on the *Guidance* and on SPIs more generally including (i) a description of the target audience for this *Guidance*, (ii) definitions of SPIs and related terms and (iii) insights on the reasons for implementing an SPI Programme.
- **Chapter 2** sets out a seven-step process for implementing an SPI Programme, along with three examples of how different types of organisations might approach the establishment of such a Programme. These seven steps build on the experience from the UK to develop a practical approach for applying performance indicators.[7]

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[2] The full text of this *Guidance on SPI*, as well as a searchable version, is available on-line at www.oecd.org/env/accidents.

[3] Public authorities are defined broadly in this *Guidance* to include government bodies, agencies, and officials at all levels, irrespective of location. The key criteria is whether the authority has some responsibility(ies) related to chemical accident prevention, preparedness or response. The following should consider developing SPI Programmes to review their own actions:

- *administrative, regulatory, planning and implementing agencies*, including those with responsibility for: developing and implementing legal frameworks; inspections; siting of hazardous installations; informing the public; or preparedness planning;
- emergency response personnel (*i.e.*, first responders such as police, firefighters, hazmat teams and emergency medical personnel); and
- *elected officials* responsible for locations where hazardous installations are located.

[4] There is a separate *Guidance on Developing Safety Performance Indicators for Industry*. See box on the previous page.

[5] For further information on the Working Group and its activities, see Annex VI.

[6] The full text of the *Guiding Principles*, as well as a searchable version, can be found at: www.oecd.org/env/accidents. Reference is made within Chapter 3 of this Document to relevant provisions of the *Guiding Principles*.

[7] Health and Safety Executive (UK) and Chemical Industries Association, *Developing Process Safety Indicators: A Step-by-step Guide for Chemical and Major Hazard Industries*, HGN 254, ISBN0717661806.

- **Chapter 3** provides additional support for the development of an SPI Programme by setting out a menu of possible elements (targets, outcome indicators and activities indicators). This menu is extensive in light of the different types of potentially interested organisations, recognising that each organisation will likely choose only a limited number of the elements carefully chosen to monitor its key areas of concern. Furthermore, it is understood that an organisation may decide to implement an SPI Programme in steps, focusing first on only a few priority areas, and then expanding and amending its Programme as experience is gained.

Annexes provide further support with an expanded explanation of metrics and a summary of targets, along with a glossary, a list of selected references and a copy of the *Guiding Principles'* "Golden Rules."

Chapter 1: OBJECTIVES AND SCOPE

This Chapter provides background information on safety performance indicators generally and, more specifically, on how to use the *Guidance* set out in Chapters 2 and 3. This Chapter addresses the following four questions: who should use safety performance indicators; what are safety performance indicators; why develop safety performance indicators; and how to use this *Guidance*.

Who Should Use Safety Performance Indicators ("SPIs")?[8]

Any public authority or organisation that has a role to play with respect to chemical accident prevention, preparedness and/or response should consider implementing a Safety Performance ("SPI") Programme. In addition, any organisation representing the public or communities in the vicinity of a hazardous installation should consider establishing an SPI Programme. An SPI Programme allows organisations to be pro-active in their efforts to reduce the likelihood of accidents, and improve preparedness and response capabilities (rather than being reactive in response to accidents or other unexpected events).

This *Guidance* recognises that chemical risks are not being created by the public authorities nor by communities/public, and that enterprises have primary responsibility for the safety of their hazardous installations. However, public authorities and communities/public have important roles to play in chemical accident prevention, preparedness and response. For authorities, these roles may include: developing a regulatory framework; monitoring and enforcement; providing information to the public; siting and land-use planning; off-site emergency planning; police, firefighters, hazmat teams and emergency medical personnel; and cross-boundary co-operation. For communities/public, their key roles involve: information acquisition and communication; and participation in decision-making and in the investigative processes.

Thus, this *Guidance on SPI* has been specifically designed to be used by:

- **Public Authorities**, broadly defined to include any governmental official, agency or body with responsibilities related to chemical accident prevention, preparedness and/or response. These include authorities at all levels (local, regional and national) and those with relevant mandates such as environmental protection, public health, civil protection, emergency response, occupational safety and industrial development. Examples of such authorities include:
    - national, regional and local regulatory authorities;
    - government inspectors;
    - civil defense agencies;
    - public health authorities and health providers;
    - city, county and provincial agencies responsible for public health and safety;
    - response personnel such as police, firefighters, hazmat teams and emergency medical personnel; and
    - elected officials at all levels.
- **Communities/Public**, and in particular organisations that represent communities in the vicinity of hazardous installations. This Guidance can be used by 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/or response to accidents. A community might be represented by, for example:
    - a local committee established by volunteers in order to represent others in their community in addressing chemical safety issues;[9]
    - an organisation established by statute or mandate, such as a Local Emergency Planning Committee (LEPC) in the US;
    - community advisory panels;

[8] The target audience for this *Guidance* (in conjunction with the *Guidance for Developing SPIs for Industry*) is the same as for the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response*. This is described in the Introduction to the *Guiding Principles*.
[9] See, *e.g.*, Chapter 3, Part C for guidance on the "Creation of a Citizens Committee."

- local officials; or
- a grassroots, non-governmental organisation such as an environmental or citizen's rights groups.

The information generated by an SPI Programme has proven to be valuable to a range of individuals within different organisations senior and middle managers, inspectors, legal/regulatory staff and others.

Another key target audience for this *Guidance* is the associations of public authorities (such as national fire associations, or organisations representing various local authorities in a country). There are a number of ways that these groups can help their constituents that are seeking assurance about their safety-related activities. Such groups can help their constituents, for example, by:

- helping to publicise and distribute this *Guidance*;
- using the *Guidance* to facilitate the efforts of their members through, *e.g.*, training courses or the preparation of supplementary materials;
- adapting this *Guidance* so that it is particularly relevant for, and targeted to, their members; and
- establishing a means for the exchange of experience among its members. This can result in reduced costs for individual organisations and allow each to benefit from best practices within their field.

Organisations should also seek to share experience with related bodies in order to learn from each other, reduce costs and improve results.

WHY DO WE INVOLVE AND MEASURE THE PERFORMANCE OF COMMUNITIES?

Since the 80's, many regulations and voluntary programmes have been developed worldwide related to chemical accident prevention, preparedness and response. These have focused mainly on the roles and responsibilities of industry and public authorities. Despite these important initiatives, accidents continue to occur and it is clear that an involved public can contribute to chemical safety and can help to mitigate the adverse impact of accidents. In addition, transparency of information concerning risks is being sought by the communities in many countries.

Since the public and the environment could be affected by a chemical accident, communities should seek out 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 accident scenarios, communication programmes, 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 stimulate 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 they face, 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 and mitigation of adverse effects of accidents. An improved communication process also allows the public to focus on the issues that are most important.

What are Safety Performance Indicators?

The term "indicators" is used to mean observable measures that provide insights into a concept – safety – that is difficult to measure directly.

This *Guidance* divides safety performance indicators into two types: "outcome indicators" and "activities indicators."

- *Outcome indicators* are designed to help assess whether safety-related actions (policies, programmes, procedures and practices) are achieving their desired results and whether such actions are leading to less likelihood of an accident occurring and/or less adverse impact on human health, the environment and/or property from an accident. They are reactive, intended to measure the impact of actions that were taken to manage safety and are similar to what are called "lagging indicators" in other documents. Outcome indicators often measure change in safety performance over time, or failure of performance.

  Thus, outcome indicators tell you *whether* you have achieved a desired result (or when a desired safety result has failed). But, unlike activities indicators, they do not tell you *why* the result was achieved or why it was not.

- *Activities indicators* are designed to help identify whether organisations are taking actions believed necessary to lower risks (*e.g.*, the types of policies, programmes, procedures and practices described in the *Guiding Principles*). Activities indicators are pro-active measures, and are similar to what are called "leading indicators" in other documents. They often measure safety performance against a tolerance level that shows deviations from safety expectations at a specific point in time. When used in this way, activities indicators highlight the need for action when a tolerance level is exceeded.

  Thus, activities indicators provide organisations with a means of checking, on a regular and systematic basis, whether they are implementing their priority actions in the way they were intended. Activities indicators can help explain why a result (*e.g.*, measured by an outcome indicator) has been achieved or not.

This *Guidance* does not specify which indicators should be applied by an individual organisation. Rather, as described below, this *Guidance* focuses on the process of establishing an SPI Programme and then provides, in Chapter 3, a menu of outcome indicators and activities indicators to help organisations choose and/or create indicators that are appropriate in light of their specific situation.

Why Develop Safety Performance Indicators?

This Guidance *has been developed for use on a voluntary basis, to the extent appropriate. It has been designed to allow users to adapt the* Guidance *to their particular circumstances.*

The primary reason for implementing an SPI Programme is to provide ongoing assurance (i) that the appropriate actions (*e.g.*, policies, programmes, procedures and practices) are being taken to help control risks associated with chemicals, and to prepare for and respond to any accidents that do occur and (ii) that these actions are achieving the desired results. In addition, a successful SPI Programme helps to identify priority areas for attention and the corrective actions that are needed.

It is important for organisations to be pro-active in order to help reduce the likelihood of accidents and to improve preparedness and response capabilities, rather than only be reactive in response to accidents or other unexpected events. Significant accidents/near-misses are relatively rare events that have a wide range of possible impacts, and can be caused by a combination of technical, organisational and human failings. Furthermore, accident response can be complex, involving a variety of organisations operating under stressful conditions. Therefore, simply measuring or reviewing past accidents/near-misses generally does not provide sufficient information about what actions are successful in terms of improving levels of chemical safety.

Often, there is an assumption that safety-related policies, programmes, procedures and practices continue to operate as intended and achieve the desired results. But, in fact, unexpected changes could occur over time due, for example, to complacency, changes in personnel, loss of institutional memory or inadequate training. Or there may be a discrepancy between what was planned and what is actually occurring.

SPI Programmes can provide the information needed to decide whether changes are needed to existing policies, programmes, procedures or practices in light of experience, changing priorities, a new understanding of the risks involved and availability of resources.

Furthermore, SPI Programmes can help improve understanding of whether goals (*e.g.*, established by law/regulation or policies) are being met and test whether the goals are realistic. SPI Programmes can also provide insights to improve the allocation of financial and human resources on safety-related matters and help to set priorities for future allocations.

Experience has shown that just implementing SPI Programmes may lead to overall improvements in chemical safety because it raises awareness and improves understanding of safety-related issues. The use of indicators can also facilitate communication and co-operation with industry, as well as foster improved relationships among all the stakeholder groups.

SPI Programmes should serve as a complement to, not a substitute for, other monitoring activities such as inspections and audits.

How to Use this *Guidance*

This *Guidance* was prepared to help organisations understand the value of Safety Performance Indicators, and to provide a plan for developing appropriate SPI Programmes specific to their circumstances. In addition, this *Guidance* can help those organisations that already have SPI Programmes in place by providing a basis for reviewing their Programmes and assessing whether improvements can be made or additional indicators would be useful.

This *Guidance* does not define a precise methodology; rather it sets out the steps that can be taken to create an effective SPI Programme based on the collective experience of experts in this field. This *Guidance* also provides a menu of key elements (targets, outcome indicators and activities indicators) that may be relevant to different authorities and organisations with responsibilities related to chemical accident prevention, preparedness and response. The goal is to help organisations develop an SPI Programme that meets their specific needs, reflects their roles and responsibilities and is consistent with their local culture.

This *Guidance* presumes that the organisations have in place some policies, programmes, procedures and/or practices designed to address chemical risks (such as regulatory measures, inspection programmes, permitting or land-use procedures, hiring policies, accident inspection practices or preparedness plans). This Document **does not** provide guidance on the specific actions that organisations should take to reduce the risk of chemical accidents or to effectively prepare for and respond to such accidents. This can be found in the companion document, the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response*.[10]

In order to be relevant to a broad array of organisations, the *Guidance* is inherently flexible in its application and, at the same time, comprehensive.

Chapter 2: "How to Develop an SPI Programme" sets out a seven-step approach for designing, implementing and revising an SPI Programme that can be adapted for use by any organisation. Specifically, Step One focuses on establishing the SPI team so that it includes the appropriate members of staff, has management support and has access to the necessary resources. Each organisation will need to decide what approach would work best for them, who will use the results of an SPI Programme, and how to include, or inform, other employees who might be affected by an SPI.

Step Two deals with identifying the key issues of concern for an organisation and priority-setting among issues. Since it is not possible to measure all aspects of their safety-related policies, programmes, procedures and practices, organisations need to consider which are the key areas of concern.

Steps Three and Four address how to define relevant outcome and activities indicators, respectively. These two steps refer to the menu of indicators in Chapter 3 to help organisations identify and adapt appropriate indicators. Since a key component of all indicators is the *metrics – i.e.*, the unit of measurement, or how an indicator will be measured – Chapter 2 also includes suggestions on developing metrics. Further information on metrics is available in Annex I.

Step Five involves collecting data and reporting the results of the SPI Programme. It points out that collecting the data needed for an SPI Programme is generally not burdensome because information gathered by organisations for other purposes often can be easily adapted to monitor safety.

Step Six focuses on taking action based on the findings, noting that the results of SPIs must be acted upon or there is little point in establishing an SPI Programme.

Step Seven relates to evaluating SPI Programmes to refine and, as appropriate, expand SPI Programmes based on experience gained.

[10] See Footnote 6 on page 1.

Chapter 3: "Choosing Targets and Indicators" was developed as a resource to support Steps Three and Four (Chapter 2), by providing a menu of possible outcome and activities indicators. The menu is extensive recognising that only a limited number of these elements would be applicable in any particular circumstance (and that an organisation might create indicators not included in the menu).

Chapter 3 is divided into three Parts:

- Part A addresses public authorities that are administrative, regulatory, planning or implementing agencies or are elected officials;
- Part B addresses emergency response personnel (which are also considered public authorities); and
- Part C addresses communities/public.

Each Part contains sections, and related sub-sections, based on the subjects of interest to the target audience. Each sub-section begins with a short introduction describing its relevance to chemical safety as well as references to related provisions of the *Guiding Principles*.[11] This is followed by a *target* which identifies the ultimate objective that might be achieved relative to the subject. Each subject then includes one or more outcome indicator(s) and a number of activities indicators.

The targets and indicators included in Chapter 3 are not meant to be used as a checklist, nor are they meant to be exclusive. Organisations should choose and adapt these to their circumstances and/or create their own indicators. It is up to each organisation to decide how extensive an SPI Programme makes sense in its situation and use only those parts of the *Guidance* that are helpful.

There are many factors that will influence which subject areas, and which indicators, will be included in an organisation's SPI Programme. These include: the priorities and mandate of the organisation; nature of risks being addressed; the accidents and incidents that have occurred in the past; the resources and information available; the interests of its constituency; and the organisation's safety culture and the local culture. As a general rule, an organisation will only address a limited number of subjects in its SPI Programme (perhaps no more than a dozen), carefully chosen to reflect its own needs and to monitor key policies, programmes, procedures and practices.

A compilation of the subjects with associated targets is set out in Annex II to help organisations identify which subjects may be of particular interest to them.

It is important to avoid choosing indicators because they make the organisation look good, or because they are the easiest to measure. It is also important to avoid complacency, thinking that since there has not been a problem in some time, nothing wrong can happen. Instead, organisations should focus on their safety-critical policies, programmes, procedures and practices, and ask questions (even if difficult or awkward) in order to identify areas of primary concern and gain the insights needed to take action to improve chemical safety.

Often, SPI Programmes will be implemented in steps, starting with a limited number of indicators. Once experience is gained, organisations might expand their SPI Programme, or adapt their Programme in light of shifting priorities.

[11] The *Guiding Principles* provides insights on best practices for chemical accident prevention, preparedness and response. This *Guidance on SPI* is not meant to provide information on what steps should be taken to improve chemical safety but rather provides a means to measure whether the steps that are being taken are effective in achieving their objectives.

Chapter 2: HOW TO DEVELOP AN SPI PROGRAMME
Seven Steps to Create an SPI Programme[12]

Introduction

This Chapter describes a step-by-step process for developing an SPI Programme that will help your organisation monitor key policies, programmes, procedures and practices. The process described in this Chapter is not a programme that can be lifted out and applied as a whole. Rather, it sets out a seven-step process which, along with the menu of indicators set out in Chapter 3, provides the building blocks to help you create an SPI Programme that meets your specific needs and objectives.

The goal is to have an SPI Programme that:

- provides your organisation with insights on which policies, programmes, procedures and practices are not operating as intended or are deteriorating over time;
- identifies corrective actions that might be needed; and
- is reviewed and updated, as appropriate.

This *Guidance* should be useful not only for establishing an SPI Programme but also for evaluating the effectiveness of your initial efforts and identifying how to adjust your SPI Programme to incorporate new knowledge and meet changing needs. Thus, if you already have an SPI Programme, this *Guidance* can provide a benchmark against which to assess your Programme and identify valuable improvements.

Figure 1 (on page 10) illustrates the seven steps in the process: (1) establish the SPI Team; (2) identify the key issues of concern; (3) define the relevant outcome indicator(s) and related metrics; (4) define relevant activities indicator(s) and related metrics; (5) collect the data and reporting indicator results; (6) act on findings from SPIs; and (7) evaluate and refine SPIs. As indicated in Figure 1, it is an iterative process which allows you to develop and maintain an effective and relevant SPI Programme.

In addition, an abridged version of the seven-step process for first responders (*e.g.*, police, firefighters, hazmat teams and emergency medical personnel) is set out on page 77.

The effort required to complete the seven steps and implement an SPI Programme will vary depending on a number of factors specific to your organisation including, for example, the nature of the organisation, the relevant roles and responsibilities, the resources available, the types of risks posed within the relevant jurisdiction, and the degree of precision required for the indicators to be useful.

It is presumed that your organisation has in place policies, programmes, procedures and practices related to chemical accident prevention, preparedness and response. As further explained in Step Two, the focus in developing an SPI Programme should be on identifying the key policies, programmes, procedures and practices to regularly assess. It is important to set priorities, recognising that it is not possible to continually measure everything of interest. To do this you may want to consider, for example: what is the most important role of your organisation with respect to chemical safety; where the greatest assurance is needed (*e.g.*, where there is greatest risk to human health and the environment); what data are available and where are the data gaps; where problems have occurred in the past; and where concerns have been identified.

To support Steps Three and Four, lists of possible outcome and activities indicators, along with related targets, are set out in Chapter 3. Walking through the steps should help you to identify which subjects set out in Chapter 3 are most relevant to your organisation, how to choose, adapt and create indicators so that the SPI Programme fits your particular circumstances, and how to develop metrics to measure the indicators.

[12] This process is based on the approach set out in the document developed by the Health and Safety Executive (UK) and Chemical Industries Association, (2006) *Developing Process Safety Indicators: A step-by-step guide for chemical and major hazard industries*, HGN 254, ISBN 0717661806. This "Step-by-Step Guide" was prepared following a pilot program with a number of hazardous installations in the UK, taking into account the first version of the *OECD Guidance for Safety Performance Indicators* published in 2003.

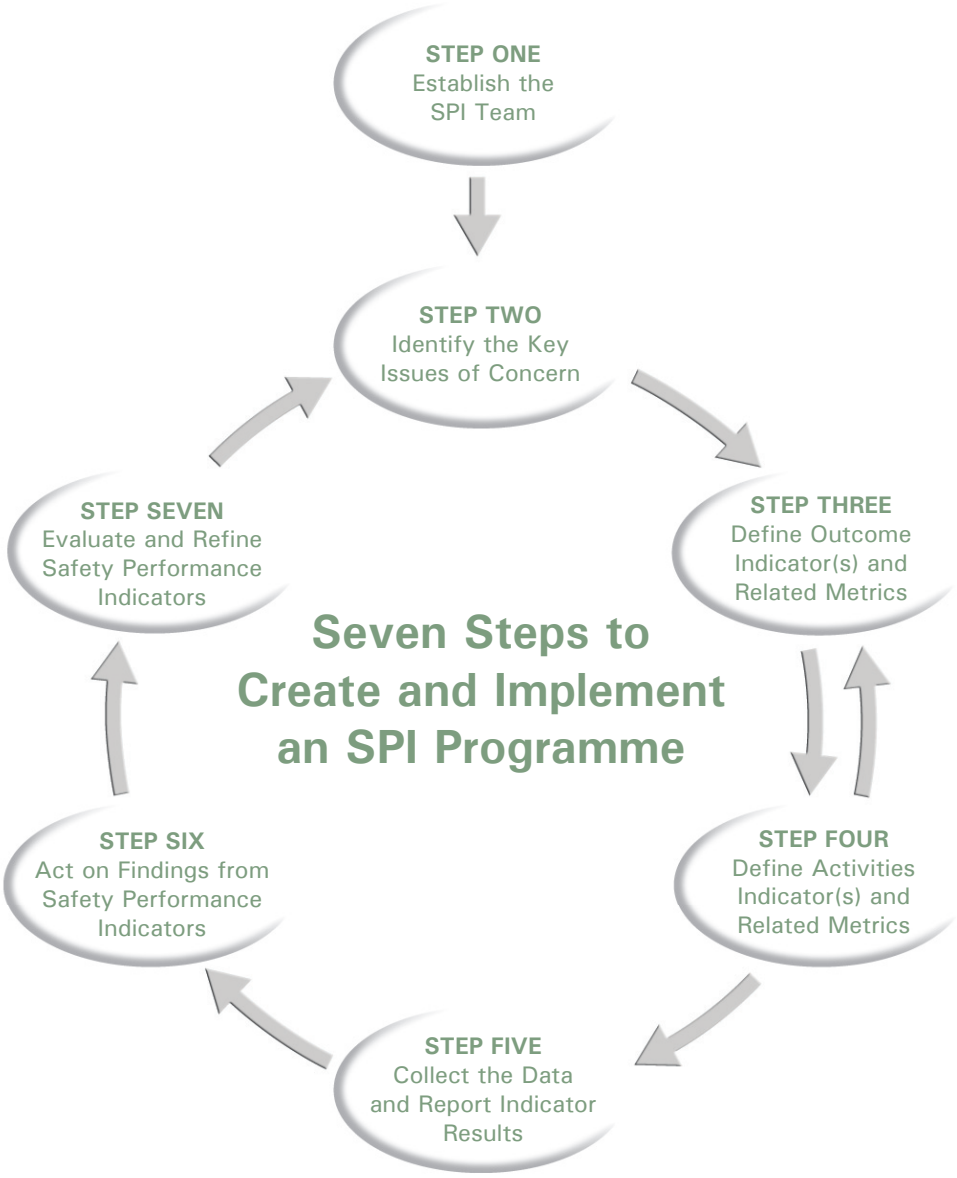
It is important to keep in mind that the scope of your SPI Programme, the indicators chosen, and the ways they are measured, need to be appropriate to your specific organisation. Different organisations have different roles and responsibilities and operate within different legal and cultural contexts. Therefore, each organisation needs to decide what makes sense in its own situation.

Step Seven describes how an SPI Programme should be reviewed periodically so that it can be revised based on changes in your organisation over time, changes in the nature of the risks being addressed by your organisation, and shifting priorities as well as the results and experience gained in using the SPIs.

Three examples are used throughout this Chapter to further explain each step. Each example addresses a different type of organisation. They are color-coded and labeled to help you follow the scenarios that are most helpful to you and include: a regulatory agency, a first responder and a community organisation.

These fictitious examples do not attempt to represent complete solutions or best practices; rather, they are intended to provide simple examples to help explain the concepts discussed in this Chapter.

FIGURE 1



Example Scenarios - Background

PUBLIC AGENCY

1

SCENARIO 1: The demands on a public agency's resources have been increasing for several years but its budget has not kept pace. The agency, responsible for establishing national policies related to hazardous installations and for inspections of such installations, routinely collects information for budgeting and management purposes. The agency decided to review this information collection approach to make sure that it provides the right information to help the agency focus its limited resources on activities that provide the greatest safety benefit. The agency decided to use the *Guidance on SPI* to review and update its information collection activities.

LOCAL FIRE DEPARTMENT

2

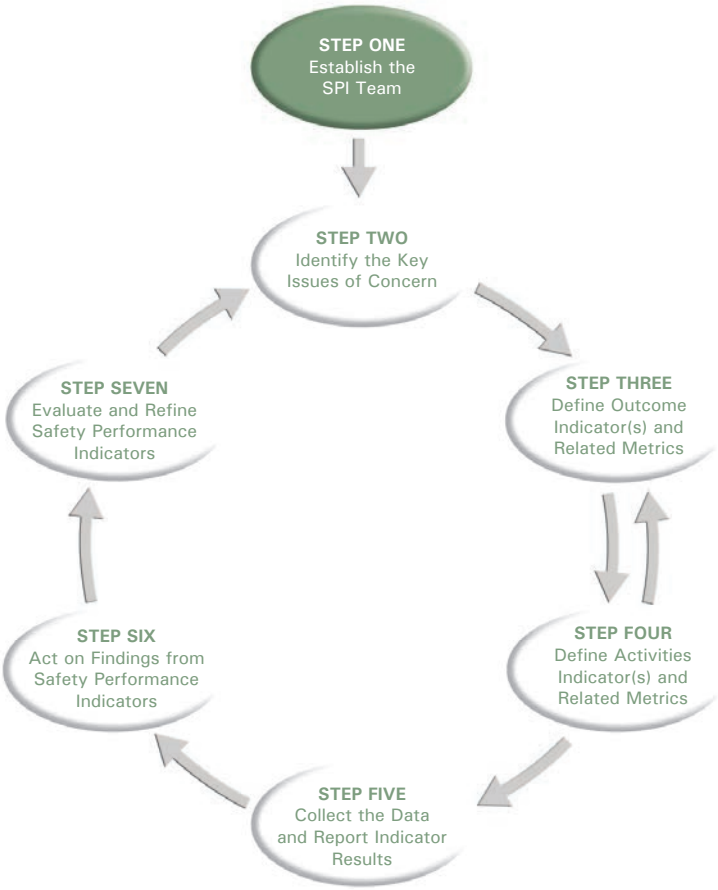
SCENARIO 2: A local fire department has recently undergone substantial growth and organisational change to address growing hazmat responsibilities. The fire chief wanted to make sure that the department continued to be focused on its main functions despite these new responsibilities and resulting organisational complexity. He also wanted to make sure that the department continued to operate efficiently while meeting its goals. The chief decided to develop SPIs to monitor the department's performance.

CITIZEN COMMITTEE

3

SCENARIO 3: Following a chemical accident several years ago in ABC town, a citizen committee was established to participate in preparedness planning and to provide information to the community so they could respond appropriately in the event of an emergency. At the beginning, a large number of ABC town residents actively participated in committee meetings and showed great interest. Over time, however, public interest has eroded. The committee decided to evaluate whether this lack of interest has impacted the public's emergency preparedness and to consider what should be done. The committee decided to use SPIs as a tool for this evaluation.

STEP ONE: ESTABLISH THE SPI TEAM



Identify SPI leader(s): The starting point for establishing an SPI Programme is to identify leader(s) to initiate the effort, promote and co-ordinate the introduction of the SPI Programme, ensure effective communication and generally oversee the Programme's implementation. This could consist of a single person or team of people, depending on the size of the organisation and availability of resources.

Involve management: It is critical to the success of the effort that the leaders of the organisation who are in a position to take action are committed to using the SPI Programme. To accomplish this, the SPI team should seek input from organisational leaders on the objectives and expectations of the SPI Programme. Following these initial discussions, organisational leaders should be kept informed on a regular basis of progress made and should be given opportunities to help steer the effort. The organisational leaders should receive the results of the SPI Programme and will be expected to take appropriate actions.

Involve experts and employees with hands-on knowledge: It is important that the indicators reflect a detailed understanding of the organisation's relevant policies, programmes, procedures and practices, as well as the types of data collected on a formal or informal basis. Therefore, the SPI team should include and/or have access to personnel with experience and appropriate knowledge of the relevant policies, programmes, procedures and practices as well as associated data. It is also important that the concept of the SPI Programme be communicated to others in the organisation, from the outset, in a manner that is consistent with the organisation's culture. This can help to address any concerns and help to ensure that the results of the Programme are accepted and utilised appropriately.

Commit resources: There needs to be sufficient support and resources to develop and implement the SPI Programme. To determine the appropriate level of resources, it may be useful to develop an analysis of the costs and benefits of the SPI as part of the budgeting process.

Establish a timetable: Finally, the SPI team should set a reasonable timetable, including milestones, to ensure adequate progress in developing the SPI Programme. Depending on the particular indicators selected, it may be useful to have a test period prior to full implementation. Timetables for reporting SPI results and for periodically assessing the SPI Programme are addressed in Steps Five and Seven.

Example Scenarios - Step One

PUBLIC AGENCY

1

SCENARIO 1: As a first step, the agency established an SPI working group consisting of a senior assistant to the agency director, representatives from different programmes within the agency, and representatives from the agency's major field offices. The assistant director was assigned to lead the effort.

LOCAL FIRE DEPARTMENT

2

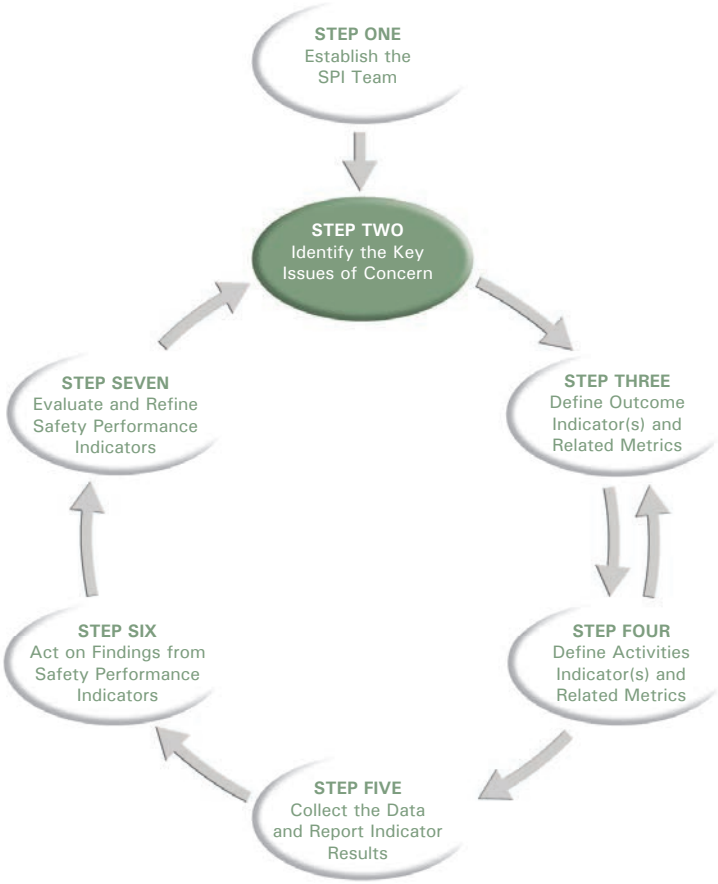
SCENARIO 2: The fire chief assigned a senior deputy with personnel and other management responsibilities to lead the SPI effort. The deputy was assigned to work with other officers and report periodically to the chief.

CITIZEN COMMITTEE

3

SCENARIO 3: The committee appointed a single advocate to co-ordinate its efforts and agreed to focus two regular meetings on developing an SPI plan. The committee discussed this idea with the local public authority and local industries, and it received a grant to hire a local university professor to provide support and advice during the process.

STEP TWO: IDENTIFY THE KEY ISSUES OF CONCERN



Clarify the scope of your SPI Programme: Once the SPI team and other arrangements are in place, the next step is to identify the subjects to be addressed in the SPI Programme. Each organisation will have different roles and responsibilities, and a different culture. Therefore, each organisation will need to decide on its own priorities, in order to choose the appropriate indicators and the way they will be measured.

It is important to first decide on the scope of your SPI Programme by identifying the issues of concern that would benefit most from SPIs. These include the key safety-related policies, programmes, procedures and practices that are most important for the protection of human health, the environment and/or property. Each organisation will need to decide what makes sense in its own context.

Set priorities: After identifying the issues of concern, it may be necessary to limit the SPI Programme to focus on a manageable number of indicators, gain experience and keep within resource constraints. If it is helpful, you can start with just a few indicators and increase the number of indicators as you gain more experience.

To determine priorities, it may be helpful to answer the following questions:

- Which of your safety-related policies, programmes, procedures and practices have the most direct impact on chemical safety and could do the most to reduce risks to human health, the environment and/or property?
- Have investigations/reports identified key areas of concern? Which of your safety-related policies, programmes, procedures and practices are most important for addressing these concerns?
- Will collecting and reviewing information about these safety-related policies, programmes, procedures or practices help you identify potential weaknesses that can be fixed?
- Are there any recent changes in laws, policies, technology or other circumstances that could influence the safety of hazardous installations? Which elements of your safety-related policies, programmes, procedures and practices address these new circumstances? Are there unanswered questions about how well these policies, programmes, procedures and practices will work that would benefit from SPIs?

Avoid pitfalls: During this Step, many organisations fall into the trap of asking what they *can* measure instead of what they *should* measure. This could result in identifying indicators that are most obvious and easy to measure rather than indicators that are most valuable for safety purposes. Therefore, at this step of the process, it is important to focus on what to monitor and avoid discussions of how to monitor. Questions about how to measure performance should be addressed after you have completed Step Two and have moved on to Steps Three and Four.

Example Scenarios - Step Two

PUBLIC AGENCY

1

SCENARIO 1: The SPI working group discussed how its different programmes supported the agency's mission relative to chemical accident prevention, preparedness and response. The working group identified a subset of programmes with the most direct links to chemical safety and asked those responsible for each of these programmes to identify the specific activities that have the most direct impact on chemical safety. A representative from each programme was asked to lead the effort, working with others in their programme, and to report back to the working group. For simplicity, the remainder of this example will focus on the development of SPIs for the agency's inspection programme for hazardous installations.

LOCAL FIRE DEPARTMENT

2

SCENARIO 2: The deputy officer reviewed the core capabilities of the department, including whether there were adequate staff, organisational procedures and equipment to meet the fire department's responsibilities. The officer evaluated whether and how these capabilities could deteriorate over time. He decided to propose SPIs to monitor the status of each of these areas relative to emergency response capability. For simplicity, the remainder of this example will focus on the development of SPIs for personnel.

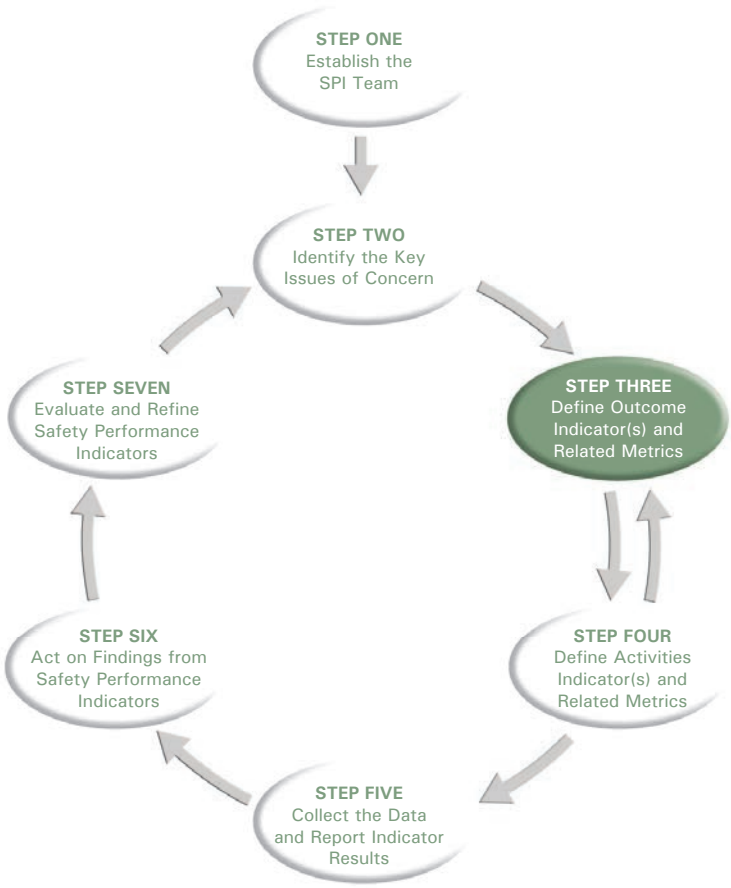
CITIZEN COMMITTEE

3

SCENARIO 3: The committee reviewed its core functions to identify the key issues of concern. In addition to supporting community preparedness and response, the committee participated in land-use planning, emergency planning and accident investigations. The committee could usually rely on a small but effective group to participate in land-use planning, emergency planning and accident investigations. However, community preparedness and response relied on the actions of all community members and would be most affected by the lack of public participation. Therefore, the committee decided to focus on community preparedness and response as the focus of its SPI Programme.

STEP THREE: DEFINE OUTCOME INDICATOR(S) AND RELATED METRICS

Steps Three and Four describe how to identify the appropriate *outcome* and *activities indicators*, respectively, for the key issues of concern identified in Step Two. The combination of outcome and activities indicators provides two perspectives on whether a particular policy, programme, procedure or practice is working as intended. (See page 5 for descriptions of the terms *"outcome indicators"* and *"activities indicators."*)



For clarity, the *Guidance* describes Steps Three and Four sequentially. Typically, however, SPI teams will define outcome and activities indicators (*i.e.*, conduct Steps Three and Four) for one issue of concern at a time, rather than identify outcome indicators (Step Three) for all issues of concern before moving on to Step Four. Defining outcome and activities indicators is usually an iterative process, and focusing on one issue at a time can be a more effective use of SPI team resources.

An effective safety performance indicator conveys clear information on safety performance to those with the responsibility and authority to take action.

Both outcome and activities indicators consist of two key components:

- A definition, which should clearly state <u>what is being measured</u> in terms that are meaningful to the intended audience; and
- A metric, which defines the unit of measurement or <u>how the indicator is being measured</u>, should be precise enough to highlight trends in safety over time and/or highlight deviations from safety expectations that require action.

a. Definition of Relevant Outcome Indicator(s)

Outcome indicators are designed to collect information and provide results to help you answer the broad question of whether the issue of concern (*i.e.*, safety-related policy, programme, procedure and practice that is being monitored) is achieving the desired results. Thus, an indicator can help measure the extent to which the targeted safety-related policy, programme, procedure and practice is successful.

Once you decide on the key issues of concern, you need to consider which outcome indicator(s) may be relevant. When choosing *outcome indicators*, it is useful to ask "what would success in implementing this element look like?" and "can this successful outcome be detected?" The answer to these questions should help the SPI team define in specific, measurable terms what the safety-related policy, programme, procedure and practice is intended to achieve, or, in the terminology of this *Guidance*, the "target."

Once you have answered the question, "what would success look like" you can review Chapter 3 (or the summary in Annex II) to identify the *target* or *targets* that most closely match your response. This will lead you to the sub-sections of the Chapter where you can identify useful outcome and activities indicators, and then you can consider how to adapt these to your circumstances, or you can create indicators that are tailored to your specific needs.

b. Metrics for Outcome Indicator(s)

Once you have identified the outcome indicators of interest, you then need to decide on the appropriate "metrics." The metric is the approach by which safety data will be compiled and reported for use in SPIs. Safety data provide the raw material for SPIs; metrics define the way in which data are used. Sound data are necessary for useful SPIs, but the ways in which the data are used, as defined by the metrics, determines whether the SPIs provide the insights necessary to assess and act on safety performance issues.

You will need to consider what metric is appropriate for each indicator in your SPI Programme. Types of metrics useful for safety performance indicators are described in the text box on page 20. More detailed information regarding measurement methods, data types and applicable metrics is presented in Annex I.

When developing metrics, it is important to look at data that are already collected by the organisation or readily available from other organisations and ask whether they might be useful for an SPI.

It is also important to review the "measurement culture" of the organisation – the ways in which the organisation collects and uses data – and align the SPI Programme with this culture. For example, if the organisation regularly surveys its employees or community members, additional questions could be added to the survey to collect data for an SPI. If an organisation produces annual reports, data for use with an SPI could be collected at the same frequency and added to these reports.

When existing data can be used, development of a new indicator will be simplified. However, in many cases, existing data will not be available or reliable enough to meet the needs of an SPI, and new data will be required. When this is the case, using data collection and reporting approaches that align with the organisation's "measurement culture" can also help simplify the introduction of an SPI Programme.

Before deciding that a certain outcome indicator cannot be measured, it is often useful to challenge yourself to think about how existing safety data could be used in new ways to support a desired indicator. This can lead to innovative uses of existing data and more efficient use of organisational resources.

To help you focus your choice of metrics for outcome indicators, consider the following questions:

- *Who will use the indicator to make decisions?*
  When defining a metric, consider who will use the SPI results and make sure that the metric will highlight the results necessary for decision-making in a format that will meet the end-user's needs. Users of SPI results include organisational leaders who are responsible for planning and managing resources to achieve safety goals (*e.g.*, senior managers of regulatory or implementing agencies, elected officials, chief officers and commanders of fire and police services, or officers and board members of community organisations) or staff responsible for development and implementation of relevant policies, programmes, procedures or practices.

- *How will the indicator be used to make decisions?*
  SPIs should be useful for improving safety-related policies, programmes, procedures or practices. It is not enough to collect information; if the results are not used, the SPI Programme will not meet its intended goal – improved safety. Therefore, it is important to be clear regarding how the results will be used to make decisions and to define the metric in terms that will support the SPI's intended function. SPIs can help assess the overall function of safety-related policies, programmes, procedures and practices, and help review staffing and budget priorities. SPIs can also be used to identify organisational issues requiring more immediate action.

- *How can the outcome be measured?*
  How an outcome can be measured will depend on what is being measured (*e.g.*, people, legal frameworks, physical state), data that are currently available or can be collected and resources available for collecting the data and reporting results. The subject of the SPI (what is being measured) will influence the data collection method that can be used, and the data collection methods will influence the types of data that can be collected. As a general rule, SPI metrics should use existing safety data to the extent that it meets the needs of the indicator and it produces valid results (*i.e.*, results that represent what they are intended to measure), and SPI metrics should be as transparent as possible.

Some additional considerations when developing metrics include:

- When evaluating appropriate metrics, it is sometimes necessary to adjust the definition of the indicator based on practical decisions regarding what data can be reasonably collected to support the indicator.
- In defining indicators and associated metrics, it is valuable to consider the type and quantity of results that are likely to be produced. Metrics should be designed such that the results not overwhelm the user but, rather, provide just enough information to provide necessary insights.
- SPI metrics should be as transparent as possible. Overly complex equations and scoring systems can mask safety trends and defeat the purpose of the indicator.
- When considering alternative indicators and metrics, focus on approaches that are likely to show change when change occurs. For example, an indicator such as "is there a mechanism to ensure appropriate and timely follow-up to inspections?" with a binary "yes/no" metric would not show change after the mechanism was put in place. This may be an important indicator to check the status of new inspection programmes. However, once the inspection programmes are established, it may be necessary to shift to a different indicator, such as "percentage of inspections where follow-up is conducted within X months." If designed properly, results associated with this indicator would vary with changes in how well the follow-up mechanism is working.

Annex I provides information to help identify the most appropriate metric for your indicators, taking into account the questions and considerations described above. Note that the answers to the questions will generally be different for different indicators. Therefore, SPI Programmes generally include different types of metrics (*i.e.*, it is unlikely that the same type of metric will be used for all your SPIs).

Example Scenarios - Step Three

PUBLIC AGENCY

1

SCENARIO 1: The inspection programme established its own SPI team to develop a recommendation for inspection-related SPIs. In response to the question, "what would success look like?" the inspection programme's SPI team decided that, ultimately, success would be fewer chemical accidents at hazardous installations. The programme team reasoned that inspections would result in better compliance with safety regulations, standards, and practices and, because of this, there would be fewer accidents.

After further discussions, however, the team decided that their existing data collection activities could not account for all of the main factors, in addition to inspections, that could affect accident rates. In addition, accident rates were fairly low. The team decided that monitoring compliance rates at facilities that had undergone inspections would be a good alternative. The team referred to the section of this *Guidance* entitled "Inspections" (see Section A.2 in Chapter 3) and identified "percentage of hazardous installations required to be inspected that have been inspected" as the best indicator for their needs.

LOCAL FIRE DEPARTMENT

2

SCENARIO 2: With regard to personnel, the deputy proposed to focus on training and competency. In response to the question, "what would success look like?" the deputy concluded that success would be a team of responders that are appropriately trained to meet requirements demanded by the risks associated with local chemical industries.

The deputy looked at this *Guidance* (Chapter 3, Section B.2, "Personnel") and decided that it would be useful to evaluate personnel performance during emergency situations as an indication of competence. The deputy evaluated whether it would be better to evaluate performance during exercises and drills or actual emergency situations. The deputy determined that exercises and drills were conducted frequently enough to collect good data. Therefore, he identified "Extent staff performs their roles and assigned tasks adequately during emergency response actions and during tests of emergency preparedness plans" as the proposed outcome indicator for personnel.

CITIZEN COMMITTEE

3

SCENARIO 3: In response to the question, "what would success look like?" the committee decided that if people were prepared and acted appropriately to protect themselves in case of an emergency, this would be success. Recognising that accidents were infrequent and that it would be too hard to measure people's actions during an emergency, the committee decided to focus on how well community members understood emergency preparedness and response information.

The committee looked at this *Guidance* (Chapter 3, Section C.2, "Information Acquisition and Communication") and identified "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" as the best outcome indicator for its needs. A survey would be undertaken to collect the necessary data.

TYPES OF METRICS USEFUL FOR SAFETY PERFORMANCE INDICATORS

The following types of metrics are useful for both outcome and activities indictors. These descriptions are intended to provide a starting point for considering alternative metrics for an individual indicator. These are not exclusive; there are other types of metrics that may be more appropriate for specific circumstances. See Annex I for additional information about metric types.

Descriptive Metrics: A descriptive metric illustrates a condition measured at a certain point in time. Descriptive metrics can be used by themselves but, more typically for SPIs, they serve as the basis for threshold or trended metrics (see below). Descriptive metrics include:

- Simple sums – Simple sums are raw tallies of numbers (*e.g.*, number of installations that have submitted safety reports; number of people who regularly participate in preparedness planning).
- Percentages – Percentages are simple sums divided by totals (*e.g.*, percentage of installations that have submitted safety reports, percentage staff whose performance during emergency response exercise was "good" or "very good").
- Composite – Composite metrics are descriptive metrics that involve more complex calculations using raw data or a combination of data types (*e.g.*, a percentage can be presented in two categories, such as percentage of inspected installations vs. percentage of non-inspected installations that have submitted safety reports).

Threshold Metrics: A threshold metric compares data developed using a descriptive metric to one or more specified "thresholds" or tolerances. The thresholds/tolerances are designed to highlight the need for action to address a critical issue. Threshold metrics include:

- Single threshold – A single threshold metric compares results developed using a descriptive metric to a single tolerance level. When the tolerance level is exceeded, this indicates that a specified action should be taken.
- Multiple threshold – A multiple threshold metric highlights the need for different types of actions based on different tolerance levels. For example, a first tolerance level could indicate the need for a review of procedures; whereas, a second (higher) level could indicate the need to also take specific actions.

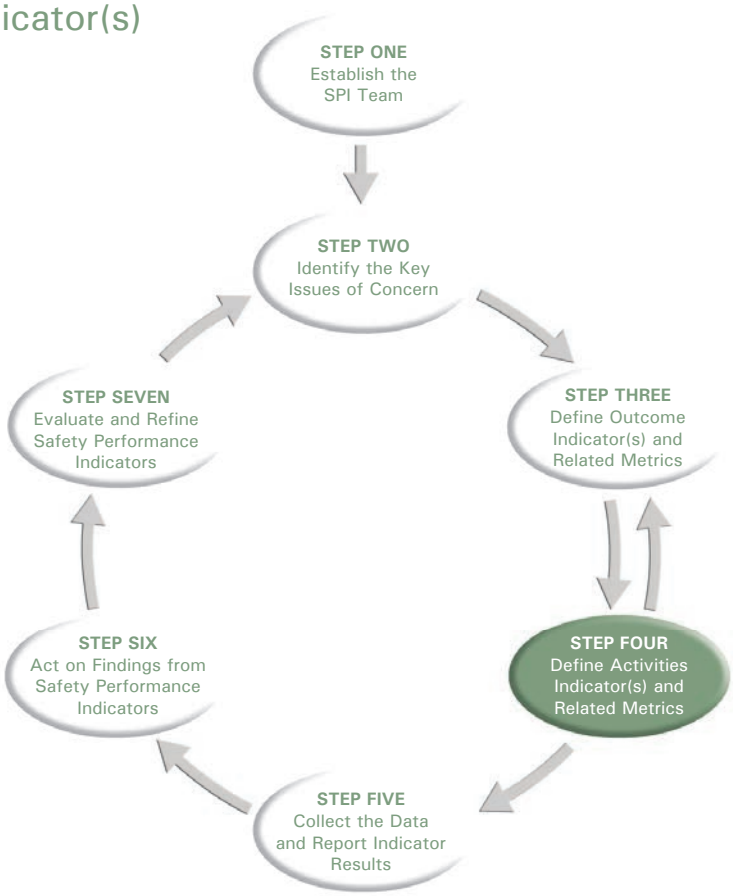
Trended Metrics: A trended metric compiles data from a descriptive metric and shows the change in the descriptive metric value over time. Trended metrics can present results in raw form (*e.g.*, bar chart showing annual number of reported incidents), as absolute or relative change (*e.g.*, annual difference in number of reported incidents) or rate of change (*e.g.*, percentage decrease in number of reported incidents from previous year). Trends can include simple changes in values over time or can index the data to capture the influence of outside factors to isolate safety performance, for example:

- Simple trend – Simple trends present the output from descriptive metrics at different points in time to show changes in safety results over time. Simple trends are not manipulated to account for outside influences on the safety result.
- Indexed on a variable – To account for outside factors, metrics can be indexed on one or more variable(s) that effect, but are not affected by, safety. For example, economic conditions resulting in decreased manufacturing could be solely responsible for fewer incidents. To isolate the influence of safety performance, an indicator of incident frequency could be indexed on production rates.
- Indexed on a data set – Metrics can also be indexed on a common data set. For example, where there is employee turn-over, changes in attitude could reflect changes in the employee population. To isolate the influence of safety-related activities on employee attitudes, an unchanging set of employees could be monitored over time (*i.e.*, a longitudinal survey).

Nested Metrics: Nested metrics are two or more of the above types of metrics used to present the same safety-related data for different purposes. For example, one metric may provide point-in-time results for comparison with tolerances (*e.g.*, to highlight specific deviations from programme expectations) and another metric may compile information in a condensed format for senior managers (*e.g.*, number of deviations from expectations within a given period).

STEP FOUR: DEFINE ACTIVITIES INDICATOR(S) AND RELATED METRICS

a. Definition of Relevant Activities Indicator(s)



The next step in developing your SPI Programme is to choose *activities indicators* to monitor the key issues of concern identified in Step Two.

Activities indicators relate to your identified outcome indicators and help to measure whether critical safety policies, programmes, procedures and practices are in place in order to achieve the desired outcomes. Whereas outcome indicators are designed to provide answers about whether you have achieved a desired outcome, activities indicators are designed to provide information about why or why not the outcome was achieved. Therefore, well-designed activities indicators provide insights needed to correct policies, programmes, procedures and practices when the desired outcome is not being achieved. (See page 5 for the definition of "activities indicators.")

To identify the appropriate activities indicator(s) for a specific outcome, identify the activities that are most closely related to the chosen outcome indicators and most critical to achieving the intended target. For example, you might consider:

- which activities must always be performed correctly (zero tolerance for error);
- which activities are most vulnerable to deterioration over time; and
- which activities are performed most frequently.

These considerations should help the SPI team focus on the activities that are most important.

As noted above, Chapter 3 provides a menu of possible outcome and activities indicators organised based on the safety-related roles and responsibilities of public authorities including elected officials (Part A), emergency response personnel (Part B) and communities/public (Part C). You can refer to the sections of Chapter 3 that you used to define outcome indicators in order to help identify the activities indicators that best fit your situation, and then adapt the indicators to your needs. You can also choose to develop your own activities indicators that are tailored to your specific needs.

When reviewing and evaluating alternative indicators, it is useful to ask whether a change in the underlying activity is likely to create a change in the outcome. If not, the activity may be too far removed from the outcome to be useful. For example, if you decide that "formal checking of training results by an independent means" was to deteriorate, there would be little evidence of this in the *extent to which staff performed their roles and assigned tasks adequately during emergency response actions and during tests of emergency preparedness plans*, then you may wish to consider activities that more directly affect the outcome. Your particular circumstance might suggest that a better indicator would be, "do training programmes include topics for all skills needed for the job?"

b. Metrics for Activities Indicator(s)

As in Step Three, once you have defined your activities indicators, the next step is deciding appropriate metrics, or measurement approach. Types of metrics useful for safety performance indicators are described in the text box on page 20.

To help establish metrics for each activities indicator you have chosen, you might consider the following questions:

- *Who will use the indicator to make decisions?* Consider who will use the SPI results and make sure that the metric will highlight results in a way that will meet the end-user's needs.
- *How will the indicator be used to make decisions?* Consider how SPI results will be used and make sure that the metric presents the appropriate type of information (*e.g.*, trends vs. point-in-time results).
- *How can the activity be measured?* Consider what is being measured, data that are currently available or can be collected, alternative collection methods and resources available for collecting data and reporting results.

When designing the specific metrics, consider opportunities to use existing data. If such data are not available, then you should consider how to collect and report data using methods that are consistent with the organisation's measurement culture. It is also useful to take into account:

- the type and quantity of results that are likely to be produced;
- the need to produce SPI results that provide insights into potential safety issues and help explain safety outcomes (*i.e.*, as measured by the associated outcomes indicator) without overwhelming the user; and
- whether a change in the activity will be reflected in the activities indicator since metrics should show change when change occurs.

Additional, more detailed guidance on metrics is provided in Annex I.

Example Scenarios - Step Four

PUBLIC AGENCY

1

SCENARIO 1: The SPI team reviewed the "Inspection" section of this *Guidance* and corresponding sections of the *Guiding Principles* and decided that a key aspect of the inspection programme was the timeliness of inspections (*i.e.*, duration between inspections of a facility). The team reasoned that compliance rates at facilities will change over time due to changes in equipment, processes and personnel. The team reasoned that more frequent inspections would make it more likely that facilities would remain in compliance over time.

The SPI team reviewed the menu of activities indicators in Section A.2 and, specifically, "does the inspection programme ensure that all required hazardous installations are inspected in a timely fashion?" Using this as a starting point, they adopted the activities indicator, "duration between inspections."

LOCAL FIRE DEPARTMENT

2

SCENARIO 2: The deputy reviewed Section B.2 of this *Guidance* corresponding to the selected outcome indicator and worked with other officers to identify the elements of a training programme that are most important to maintain a competent staff. Based on these discussions, the deputy decided to focus on the indicator, "is there a mechanism to check that the training is actually performed according to the training programmes, and achieves desired results?" Using this and the related sub-bullets as a starting point, the deputy proposed the following activities indicators:

- percentage of personnel receiving initial training related to job function (accounting for changes in job function);
- period of time between retraining activities;
- competence of the staff member based on post-training testing.

CITIZEN COMMITTEE

3

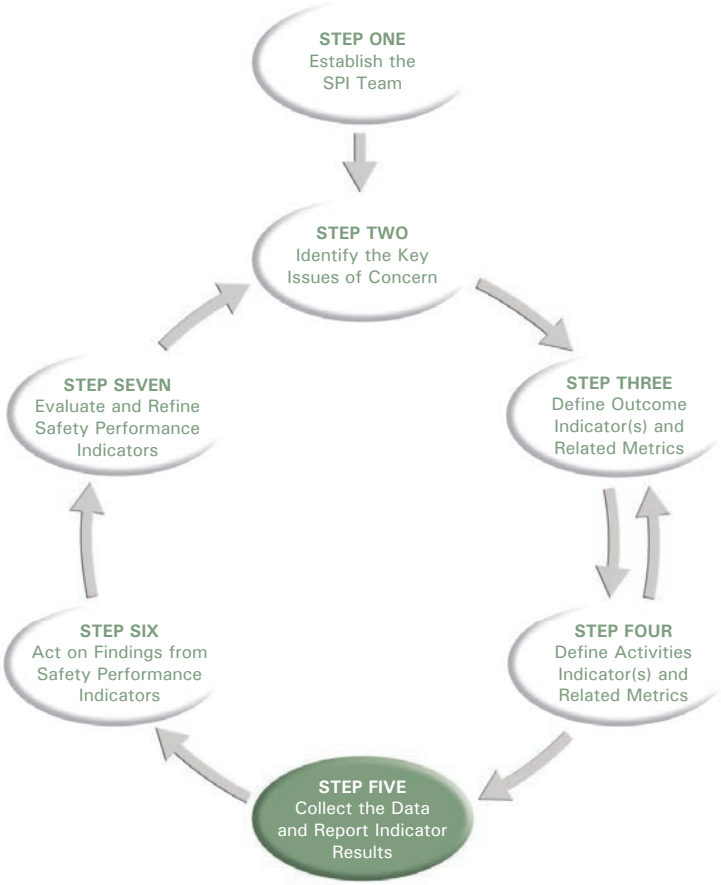
SCENARIO 3: The committee examined the different ways in which community members gained understanding and retained information on emergency preparedness and response. These included participation in public presentations, reading informational materials provided by the committee and local government agencies, and actively seeking information from industrial facilities.

The committee reviewed Section C.2 of this *Guidance* corresponding to the selected outcome indicator and agreed to monitor the following activities indicators:

- community participation in public meetings and hearings related to emergency preparedness and response;
- community efforts to monitor information on emergency measures and actions to be taken in the event of accidents involving hazardous substances;
- community efforts to proactively seek information on the emergency measures and actions to be taken in the event of accidents involving hazardous substances.

STEP FIVE: COLLECT THE DATA AND REPORT INDICATOR RESULTS

Once you have defined your SPIs, the next step is to decide how you will collect the data and report the safety performance results. Data collection approaches (*i.e.*, data sources, how the data will be compiled and how often, and what the reports will look like), as well as roles and responsibilities for collection and reporting, should be specified. Some of these issues will have been addressed when deciding on the metrics in steps Three and Four.



In evaluating data sources, it is often useful to review information that is already available and decide whether they could be used to support SPIs. Existing data may have been collected for the other activities such as budget planning or annual reports. If useful existing data are identified, it is important to evaluate whether the data are of adequate quality for the SPI and to organise and/or apply the data (*e.g.*, as one input to an indexed indicator) to achieve the purposes of the SPI Programme.

Data collection procedures should also consider the frequency with which data should be collected and results reported for each indicator. These considerations should take into account the function of the SPI. Data should be collected and results should be reported at a frequency necessary to ensure that they can detect changes in time for action to address safety issues. In addition, reports should be provided in a timely manner to those personnel with responsibility for acting on the specific issues addressed by the indicators.

For indicators that use threshold metrics, the procedures should specify thresholds or tolerances – *i.e.*, the point at which deviations in performance should be flagged for action. The procedures should also note specific actions to be taken when thresholds are exceeded. Note that the act of setting thresholds sometimes requires reconsideration of the metric chosen for an indicator. For example, if a metric using binary "yes/no" measurement was chosen for an indicator of system failure, but it is desirable to take action prior to failure, an alternative metric (*e.g.*, relying on ratio or ordinal measurements) may be more appropriate. The consideration of thresholds in setting metrics is addressed in Annex I.

The presentation of indicator results should be as simple as possible in order to facilitate understanding of any deviations from tolerances, and to identify any important trends. The presentation should also allow the reader to understand the links between outcome indicators and associated activities indicators.

The presentation should take into account the target audience. For example, if an organisation is tracking several indicators, it may be useful to identify a subset of the most critical indicators to be given greater emphasis for reporting to top-level management.

Example Scenarios - Step Five

PUBLIC AGENCY

1

SCENARIO 1: The team developed an approach for consistently rating safety compliance on a 5-point *Likert scale* ranging from "poor" to "excellent." The percentage of facilities rated in the different categories would be reported separately based on number of years since last inspection (*e.g.*, for all facilities last inspected 2 to 3 years ago, what percentage were rated as "very good").

The inspection programme representative presented these recommendations to the SPI working group, including the field office representative who would be responsible for data collection. The SPI working group adopted the recommendations, and field office representatives agreed that they would provide guidance to their inspectors regarding the rating approach. They would compile and submit the data on a quarterly basis. The information would be used to help determine whether the inspection programme was achieving the desired safety results.

LOCAL FIRE DEPARTMENT

2

SCENARIO 2: The deputy proposed the outcome and activities measures to the fire chief. They agreed that the organisation would begin using them and that they would evaluate how well they worked after six months.

The chief and deputy agreed to use outside observers to help run emergency exercises while observing and recording individual performance. Data from the training programme (numbers trained, time between retraining and post-training test scores) would be used for the activities indicators. The outside observers would also be asked to audit the training programme data to ensure accuracy and completeness.

CITIZEN COMMITTEE

3

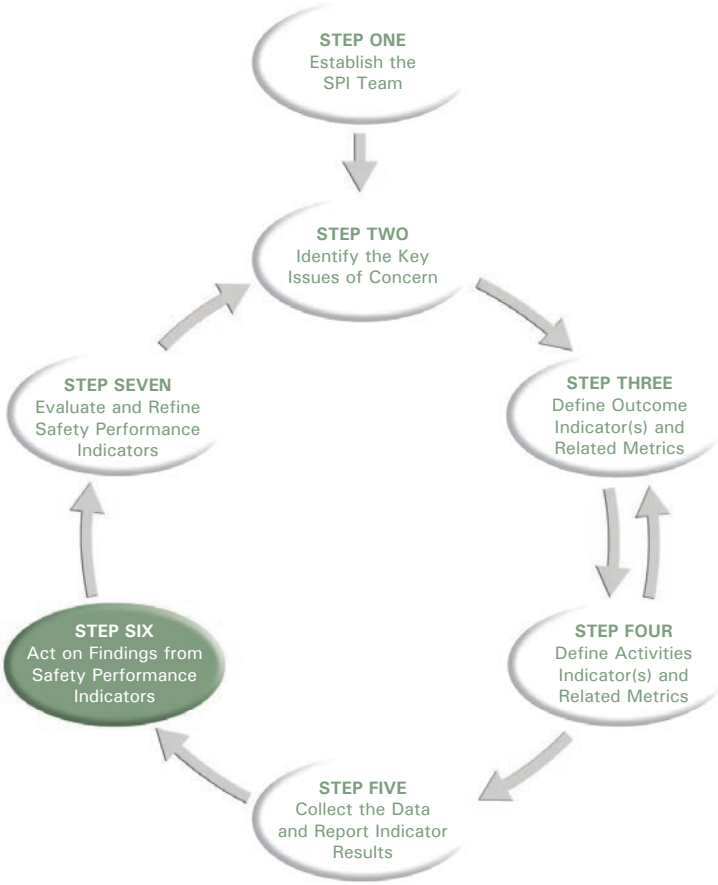
SCENARIO 3: The committee decided that, as a first step, they would conduct a survey of the community to determine the level of understanding of how to prepare for an accident as well as the actions to take in the event of a chemical accident. The committee decided that if the level of understanding was high, the committee would continue with its existing activities. If the level was low, this would be an indication that lack of public participation had eroded emergency preparedness, and the committee would take action to try to increase participation. A second survey would be conducted following these actions to evaluate whether they were effective.

The committee decided that they would include questions in the survey about how members of the public obtained information on emergency preparedness. The committee would collect data on the number of people attending public hearings and meetings. They would also work with local industries and government agencies to collect data on the number of requests received regarding measure to take in case of an emergency.

The survey was designed as a telephone survey of about 10% of the population selected at random. The committee worked with its university advisor to design and conduct the survey so that they could be confident that the results would be representative of the whole community.

STEP SIX: ACT ON FINDINGS FROM SAFETY PERFORMANCE INDICATORS

Results from SPIs (such as tolerances being exceeded, disturbing trends over time, inconsistent results) must be acted upon; otherwise, there is little point in implementing an SPI Programme. Relevant personnel should receive SPI results in a timely way and should follow up adverse findings to fix defects in the associated safety policies, programmes, procedures and practices.



When a deviation is noted, it may provide insights not only into the safety issue, but also the SPI itself – *i.e.*, whether it was defined well enough to detect the safety issue and whether improvements can be made. Thus, deviations detected using SPIs represent an opportunity for learning and adjusting SPIs (see Step Seven).

While implementing an SPI Programme, you may also encounter situations where outcome and activities indicators associated with the same subject provide contradictory results. When this occurs, it is an indication that one or both indicators are not working as intended. The indicators should be reviewed and redefined, as necessary.

For example, if your activities indicator shows good safety performance (relative to the activities being measured) but the associated outcome indicator shows poor results, the activities indicator should be evaluated to ensure that it is focused appropriately. The activities being measured may be too far removed from the outcome or the SPI and associated metric may not be defined well enough to capture critical information. Similarly, if your activities indicator suggests poor safety performance but the associated outcome indicator shows satisfactory results, either the poor performance relative to the activities being measured has yet to result in an unwanted outcome due to other factors or the activities indicator is not well focused. In any case, this type of finding warrants further review.

Example Scenarios - Step Six

PUBLIC AGENCY

1

SCENARIO 1: After a year of collecting SPI results, the agency did not see a clear relationship between safety compliance rates and duration since last inspection. Upon further review, inspection programme personnel suggested that this could be explained based on inspection priorities. Inspections were conducted more frequently for facilities with poor past performance as well as for facilities in industries with higher risk.

To test this idea, compliance data was categorised by: 1) past performance, where facilities were grouped according to compliance history; and 2) industrial sector. When reported by category, the SPI results showed that more frequent inspections did result in increased compliance rates. For example, when looking only at facilities with poor past performance, the SPI results showed that those inspected more frequently had better compliance rates. Based on this, the inspection programme confirmed the logic of its practice of more frequent inspections of facilities with poor past performance.

The SPI results also indicated that frequency of inspections had a much greater impact on compliance in certain industrial sectors. Upon review, it was determined that those sectors where frequency of inspection had the greatest impact were also those sectors that had been undergoing significant organisational and technological change. This suggested that the inspections were helping these industries manage the change. Based on this, the inspection programme decided to develop guidance and focus compliance assistance activities on these industries.

LOCAL FIRE DEPARTMENT

2

SCENARIO 2: The deputy reviewed the results for the first six months and found that all personnel had received the training or the refresher training that had been scheduled for this period. The results demonstrated that the training programme was functional. However, because all personnel had been trained, they could not be used to evaluate the impact of training on performance (*e.g.*, to look at differences between trained and untrained personnel).

The deputy did see a clear relationship between post-training test scores and performance during exercises. This suggested that the training was an important determinant of performance. Those who retained information from the training performed better in emergency situations.

Despite these clear relationships, the deputy noticed some anomalies in the results. He noticed that some personnel with high post-training test scores performed poorly during exercises. The deputy reviewed this information with the observers. They concluded that the anomalies could be explained by poor performance of a response team rather than poor performance of an individual (*e.g.*, the root issue was internal communication).

The deputy reviewed this information with the fire chief, and they decided to:

- expand the training programme to include supplemental requirements for personnel who scored low on post-training tests;
- work with the teams that showed signs of poor internal operation to improve response capabilities, and reorganise teams, as needed.

CITIZEN COMMITTEE

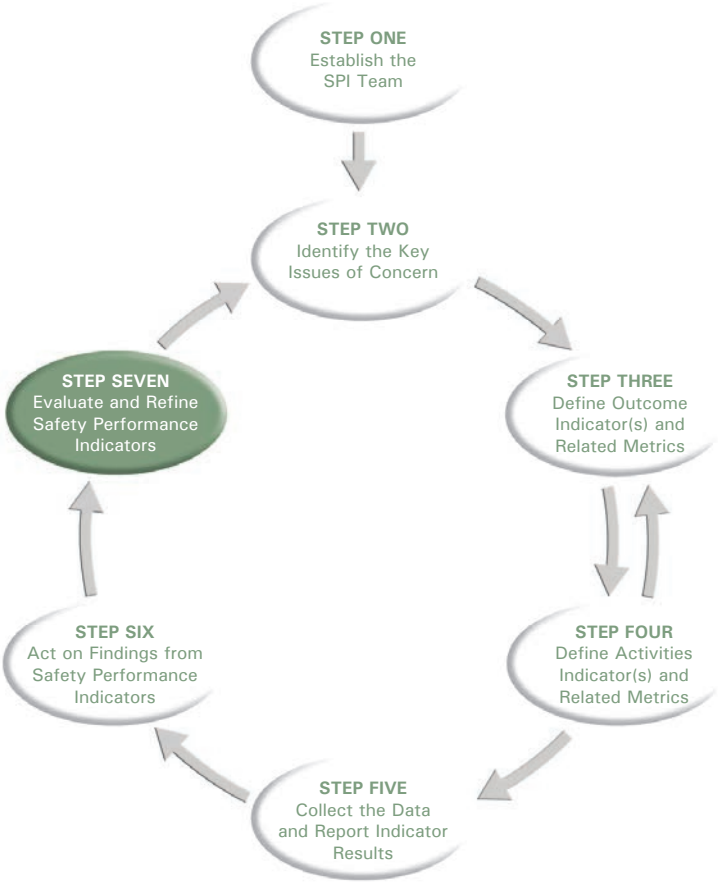
3

SCENARIO 3: As a result of the initial survey, the committee found that the level of understanding of actions to take in case of an emergency had declined significantly. Based on this, the committee decided to conduct an extensive public outreach campaign involving public meetings, updated information provided through local agencies and information provided through different media (*e.g.*, newspapers, radio).

Attendance in public meetings was relatively high, and the committee conducted a second survey within a month of the last meeting. The survey indicated that understanding of emergency measures was significantly improved. Further, the survey found that people who participated in meetings had a higher retention rate and were more likely to seek information from other sources. In addition, data collected from the local agencies and industries confirmed that public requests for information increased following the public outreach campaign.

The committee decided to conduct a third survey nine months after the last public meeting and asked the public agencies and industries to continue collecting data on information requests. The survey showed a decline in understanding, and there was a decrease in the number of information requests. The committee determined that more active public campaigns were necessary to retain a level of understanding and participation within the community. They decided that public meetings were critical to these efforts and decided to work with local education and business groups to encourage greater attendance.

STEP SEVEN: EVALUATE AND REFINE SAFETY PERFORMANCE INDICATORS



The SPI Programme, including the indicators and metrics, should be periodically reviewed and evaluated. Developing an effective SPI Programme is an iterative process, and the Programme should be refined as experience is gained, new safety issues are identified, there are changes in the nature of risk being addressed, or priorities change. Changes in priorities for an SPI Programme could result from improvements in programme implementation, changes in laws or policies, building of sensitive developments (such as a school or hospital) near hazardous installations, technological changes or changes in management and staffing.

Periodic reviews will help to ensure that the indicators are well-defined and provide the information needed to monitor safety-related policies, programmes, procedures and practices and to respond to potential safety issues. In addition, it will help to identify when specific indicators are no longer needed (*e.g.*, if monitoring has led to positive changes) and allow adjustments to the Programme to focus on the most important issues and indicators.

For example, it may be discovered that some indicators do not provide useful measurements for your organisation or that the metrics are not precise enough to recognise small but significant changes that require action. This may lead to the conclusion that new indicators are needed or the metrics should be refined. It may also be discovered that more important activities associated with a specific outcome (*i.e.*, activities that have a more direct effect on the outcome) are not being measured and, therefore, new indicators need to be developed.

You might also determine during the review process that it would be helpful to expand the SPI Programme as experience is gained, in order to include additional indicators or address other safety-related policies, programmes, procedures and practices.

Finally, you can incorporate the experience of others by sharing information with those who have implemented an SPI Programme. These can be other organisations in the same community (*e.g.*, police, firefighters, hazmat teams and emergency medical personnel within one town), or related organisations in different communities (*e.g.*, inspection services in different provinces or states).

Example Scenarios - Step Seven

PUBLIC AGENCY

1

SCENARIO 1: Based on their initial experience, the SPI working group decided to continue to use the compliance-based outcome indicator and duration-based activities indicator. The group decided that results would be routinely categorised and reported based on past performance and industrial sector for the following reasons:

- Accounting for the influence of past performance on frequency of inspections allowed the agency to monitor the overall effectiveness of its inspection programme.
- Focusing on sectors allowed the agency to identify sector-specific trends in compliance rates (positive and negative) to better target its limited resources.

Based on its initial experience, the agency also decided to explore a new activities indicator to help measure the impact of inspection quality on safety compliance rates. The agency also decided to research the connection between safety compliance and chemical incidents (accidents and near-misses) with the long-term goal of replacing the outcome measure with a measure relating inspections to incident rate.

LOCAL FIRE DEPARTMENT

2

SCENARIO 2: Based on initial findings, the fire chief and deputy officer agreed that the indicators generally worked well, and they decided to continue the effort with the following changes:

- Continue to use the outcome indicator, "extent staff performs their roles and assigned tasks adequately during emergency response actions and during tests of emergency preparedness plans."
- Continue to ensure that staff are trained and retrained according to procedures, but discontinue collecting this information for SPIs.
- Continue monitoring post-training test scores as an activities indicator. This would help monitor the effectiveness of the new requirement for supplemental training (*i.e.*, for personnel with low test scores).
- In addition to post-training test scores, consider an independent evaluation of the training programme, because the training programme was determined to be critical to the organisation's emergency response capabilities.
- Add an activities indicator regarding the quality of mechanisms for communicating internally during emergency response efforts.

CITIZEN COMMITTEE

3

SCENARIO 3: Based on initial findings, the committee decided to continue to monitor participation in meetings. In addition, local agencies and industries agreed to continue to provide information on the number of people who requested information on emergency preparedness and response measures.

The committee decided that it would conduct annual surveys for at least two more years to evaluate the relationships among participation, information seeking and understanding. The committee decided that if they could confidently conclude that levels of participation and information-seeking corresponded to levels of understanding and retention, they would conduct surveys on a less frequent basis. Rather, they would infer level of understanding and retention from data on number of people participating in meetings and seeking information from local agencies and industries.

Chapter 3: CHOOSING TARGETS AND INDICATORS

Introduction

Purpose of this Chapter: This Chapter provides a menu of possible outcome indicators and activities indicators (and related targets) to help you develop your SPI Programme. As noted in Chapter 1, this list is purposefully extensive, in order to include the range of possible subjects that could be of interest to the wide variety of organisations that are part of the target audience.

Thus, the lists of indicators contained in this Chapter may appear daunting and, in parts, irrelevant to your organisation. However, using these lists in conjunction with the steps set out in Chapter 2 (and, in particular, Steps Two, Three and Four) should help you focus on the limited number of subjects and related indicators that are most relevant to your organisation.

The objective is to start by identifying your organisation's key issues of concern, *i.e.*, the elements of your safety-related policies, programmes, procedures and practices that are most important for the protection of human health, the environment and/or property. These should be the initial focus of your SPI Programme.

It should be noted that many of the activities indicators are written as "yes/no" questions. However, this is not meant to dictate the metric that you should use; you will need to decide on the best metric for each of the indicators you choose. Guidance on metrics is available in Chapter 2 and in Annex I.

Format: This Chapter contains three Parts based on the target audience: Part A addresses public authorities in general (including administrative, regulatory, planning and implementing agencies and elected officials); Part B addresses emergency response personnel; and Part C addresses public/communities (See text box on next page).

In each Part, the outcome and activities indicators, along with associated targets, are organised by subject, based the usual roles and responsibilities for the target audience. Each Part has several sections, each with a number of sub-sections.

For each sub-section, there are three tiers of information:

- an *introduction* summarising the subject's relevance to chemical safety along with references to relevant paragraphs of the *Guiding Principles*;
- a *target* suggesting the overall objective that should be achieved relative to that subject; and
- *possible safety performance indicators* setting out suggestions for outcome indicator(s) and a number of activities indicators.

It should be noted that because of the way the Chapter is structured, there may be some duplication or similarity among indicators in different sub-sections.

This Chapter is set out in three Parts, based on the target audience:

- **Part A** addresses those public authorities that are administrative, regulatory, planning or implementing agencies, including government agencies and authorities at all levels (national, regional and local), with roles and responsibilities related to chemical accident prevention, preparedness and response (such as development and implementation of rules and regulations, monitoring and enforcement activities, licensing of hazardous installations, siting and land-use planning and preparedness planning). Public authorities also include public health authorities and government-run health providers.

- **Part A** also contains a textbox addressing elected officials. While the roles of such officials differ greatly depending on the level of government involved and local circumstances, they nonetheless have important roles to play, *e.g.*, in ensuring that other authorities fulfil their responsibilities and in facilitating co-operation among stakeholder groups. They are often a focal point for information should a significant accident occur.

- **Part B** focuses on emergency response personnel, such as police, firefighters, hazmat teams and emergency medical personnel. While these organisations are also public authorities, separate guidance has been prepared because of their more specific roles.

- **Part C** deals with the public and specifically communities in the vicinity of hazardous installations and those individuals who may be affected in the event of a chemical accident. In order to implement an SPI Programme, it is important to have an organisation, whether formal or informal, that can represent their community. Such an organisation might take the form of, for example, a local committee established by volunteers, an organisation established by statute or mandate, a community advisory panels, a group of local officials or a grassroots, non-governmental organisation.

PART A. PUBLIC AUTHORITIES: Administrative, Regulatory, Planning and Implementing Agencies

Section A.1 Internal Organisation and Policies

The basis of an effective chemical 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 a programme directed to external parties (industry, public), 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, so that the programme is consistent with political, organisational and other cultural values. Public authorities should also ensure their personnel understands and supports 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 Section focuses on the role of public authorities as it relates to establishing internal organisational goals and policies related to chemical accident prevention, preparedness and response.

This Section includes the following sub-sections:

- Organisational Goals and Objectives
- Personnel
- Internal Communication/Information

A.1.1 ORGANISATIONAL GOALS AND OBJECTIVES

See Guiding Principles document, para.:
- 1.12 Authorities to set objectives, establish a control framework, and ensure implementation

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.

TARGET
The organisation's goals and objectives effectively focus resources on the protection of human health, the environment and property from chemical accidents.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent organisational goals and objectives have been incorporated into policies, programmes, procedures and practices.
ii) Extent organisational goals and objectives have assisted in identifying programme priorities and focusing resources.

Activities Indicators

i) Have short- and long-term goals been established to address the protection of human health, the environment and property 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 policies, programmes, procedures and practices related to the safety of hazardous installations?
   - Does the infrastructure address all levels of government (*i.e.*, national, regional and local);
   - Are roles and responsibilities of the organisation's employees clearly defined.
iv) Is a process in place for evaluating progress toward the 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 relative to the organisation's goals and objectives? Has the programme been adjusted based on:
   - revisions and/or changes in the 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 the organisation's goals/objectives been co-ordinated with all appropriate public authorities
- within your country;
- with neighbouring countries?

A.1.2 PERSONNEL

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:

See Guiding Principles document, paras.:
- 3.a.18 Sufficient numbers of qualified, educated and trained staff
- 3.c.8 Train and equip inspectors
- 3.c.11 Sufficient resources and trained personnel for inspections
- 5.c.8 All involved in emergency response should be trained and educated on continuing basis
- 10.8 Responders should have information and skills needed to assess need for further support
- 15.a.4 Maximising integrity of evidence needed for investigations

- employees have a clear understanding of their role and responsibilities;
- the staffing at each level is adequate to accomplish the mission and has the right mix of expertise, knowledge and experience;
- management provides adequate support and resources in order to achieve the mission;
- 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.

Public authorities should ensure staff is appropriately educated (*i.e.*, they have the necessary knowledge, background and skills) and trained in order to carry out their identified roles and responsibilities. Based on the roles and responsibilities of each staff member, training and education should include both general and specialised training.

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 programme. 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.

TARGET
There are appropriate staffing levels, with employees who are competent, trained and fit for their job.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent public authorities have the appropriate staff to accomplished the goals and objectives of their mission (*i.e.*, does the public authority have the appropriate and sufficient staff including the right mix of technical and policy expertise and knowledge).
ii) Percentage of the required prevention, preparedness and response tasks (*e.g.*, inspections, audits, review of safety reports) completed through the appropriate management of staff and resources.
iii) Extent training has improved staff understanding, knowledge and behaviour.
iv) Extent staff performs their roles and assigned tasks adequately and meets their responsibilities.

Activities Indicators

i) Is there a process for recruiting and assigning the staff consistent with the needs of the organisation?
ii) Are roles and responsibilities for all staff clearly identified and articulated?
   - Do staff members have job descriptions that 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.

iii) Is the general competence level of the staff adequate?
- Does each staff member have the appropriate knowledge and expertise to meet the responsibilities of his/her job;
- Is there an appropriate mix of technical, policy and operational 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 in-house to carry out their goals and objectives, is there a system for obtaining that expertise through external consultants or industry.

iv) Are there systems for appraisal and feedback to the staff?
- Is there a formal mechanism for feedback between management and staff concerning performance;
- Are there incentives for exceptional or improved performance.

v) Are clear, specific objectives established for training and education?
- Is it clear how these will help the organisation meet its mission;
- Can these objectives be measured;
- Are the training and education objectives well-known within the organisation;
- Are there incentives to improve performance based on the training and education programme.

vi) Are there training programmes for all categories of employees? Does this include:
- orientation training of all staff;
- job training for workers including training related to an employee's initial position, significant job changes and promotions;
- job training for managers and supervisors;
- specific and/or technical training, as appropriate;
- training of contractors;
- other categories, as appropriate.

vii) 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, both on a regular basis and when there is new information concerning staff competence (*e.g.*, following exercises of emergency plans or accident response).

viii) Is there a mechanism to check that training is actually performed according to the training programmes, and achieves its desired results? In this regard, are the following aspects checked, and are records maintained, concerning:
- each element of the training programme;
- number of staff members trained;
- period of time between retraining activities;
- individual results in terms of the competence of the staff member being trained.

A.1.3 INTERNAL COMMUNICATION/INFORMATION

Public authorities have a wide array of activities that fall under their responsibility. Staff members 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
Key information is exchanged within a public authority, and there is effective two-way communication.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Extent of the effectiveness and efficiency of internal communication mechanisms, to avoid overlaps, gaps or conflicts within the organisation.

Activities Indicator

i) Are there mechanisms for communicating internally on day-to-day activities?
   - Are there different mechanisms for communication (*e.g.*, e-mail, memorandum, meetings, briefings) to allow the most appropriate to be selected;
   - Are the communication mechanisms designed so that they can identify overlaps, gaps and conflicts as soon as possible;
   - Does the staff receive the information they need to meet their responsibilities;
   - Do the mechanisms allow for two-way communication, both from management to employees and from employees to management;
   - Is there a means for ensuring people are using the mechanisms to communicate.

Section A.2 Legal Framework

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, the environment and property from accidents involving hazardous substances.

This Section includes the following sub-sections:

- Laws, Regulations and Standards
- Land-Use Planning
- Safety Reports
- Permits
- Inspections
- Enforcement

A.2.1 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, the environment and property. 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 Authorities to set objectives, establish a control framework and ensure implementation
- 3.a.1-21 Section on establishing a safety strategy and control framework
- 3.c.1 Authorities to establish programmes for monitoring installations' safety
- 3.c.2 Authorities to prepare guidance related to compliance obligations
- 4.e.4 NGOs should participate in legislative and regulatory processes
- 16.a.1 Cross-boundary exchange of information on legal requirements
- 17.a.13 Control framework should address transport interfaces
- 17.a.17-19 Consistent approach for modes of transport; harmonisation of laws on interfaces
- 17.b.1 Port authorities to develop local port rules on chemical safety

TARGET

There is a comprehensive legal framework that addresses all aspects of chemical accident prevention, preparedness and response and improves chemical safety.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent public authorities have implemented laws, regulations and standards (through, *e.g.*, enforcement measures, developing and providing guidance, technical assistance and training).

ii) Extent regulations are understood and accepted by industry and other target audiences.

iii) Percentage of hazardous installations in compliance with laws, regulations and/or standards.

iv) Extent laws, regulations and standards are consistent with international requirements and guidance (*e.g.*, the EU "Seveso II" Directive, the *OECD Guiding Principles on Chemical Accident Prevention, Preparedness and Response*, the UN/ECE Convention on the Transboundary Effects of Industrial Accidents).

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 laws and regulations;
   - Are the hazardous substances covered by the laws and regulations clearly defined;
   - Is the information to be reported clearly identified;
   - Is there a mechanism for reporting the required information to all appropriate stakeholders, including the public.

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

iv) 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.

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

vi) 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?

vii) 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?

viii) Is there a mechanism for periodic reviews and updates of the legal framework based on technical progress and newly-gained knowledge including lessons learned from accidents?

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

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

A.2.2 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 programmes to ensure installations are sited properly to protect human health, the environment and property. In addition, these programmes should, as appropriate, prevent the placing of housing, public facilities or other community developments near hazardous installations. Finally, these programmes should control inappropriate changes to existing installations.

See Guiding Principles document, paras.:
- 3.b.1-4 Section on role of authorities with respect to land-use planning and prevention
- 6.1-7 Chapter on land-use planning and preparedness/mitigation
- 16.a.2 Land-use planning for installations capable of causing transfrontier damage
- 17.a.1 Land-use planning for transport interfaces

TARGET
Land-use planning and siting decisions are made to protect human health, the environment and property, including prevention of inappropriate development (*e.g.*, new housing or public buildings) near hazardous installations.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent hazardous installations are located according to land-use planning requirements appropriate to the local community.
ii) Extent local communities have made adjustments (*e.g.*, relocation of schools) based on land-use planning requirements and/or information.
iii) Reduction in the number of people and sensitive environments who are at risk in the event of a chemical accident at a hazardous installation.

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 which new installations and modifications to existing installations 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.
iii) Is there a mechanism for evaluating compliance with land-use planning requirements?
iv) Is there guidance for the siting of individual hazardous installation (*e.g.*, safety distances)?
v) Is there a programme to identify existing hazardous installations not meeting current land-use planning standards?
vi) Is there a mechanism for enforcement of zoning and siting decisions? Is there a policy on what actions to take when land-use planning standards are not met?
vii) Are land-use planning activities co-ordinated among all relevant public authorities?
   - Do land-use planning authorities consult all relevant authorities, including emergency services, on proposals related to developments at, or in the vicinity of, hazardous installations.
   - Is the availability of external emergency response capabilities considered in land-use planning decisions.
viii) Does the public have easy access to information on land-use planning and siting of hazardous installations?

ix) 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?

A.2.3 SAFETY REPORTS

Safety reports are written documents containing technical, management and operational information concerning the hazards at a hazardous installation, as well as information related to the control of these hazards. 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 Authorities to establish criteria for identifying installations with accident potential
- 3.a.12 Authorities to establish system for safety reports

TARGET
There are clear guidelines for the submission, review, revision and assessment of safety reports, along with feedback to enterprises on the adequacy of their submissions.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of hazardous installations that have submitted safety reports within the specified time, and which contain all required information compared to those that are subject to the reporting requirements.
ii) Percentage of safety reports evaluated by the public authority following 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 good or best practice, including state of the art technology, as appropriate;
   - 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?

A.2.4 PERMITS

See Guiding Principles document, para.:
- 3.a.14 Establish license/permit process for certain installations meeting defined criteria

In some instances it is necessary to implement a process for approving a hazardous installation before it can operate. Criteria should be developed to identify those installations considered a high risk to the community and/or environment and, therefore, should only operate with prior and continuing approval by the public authority (*i.e.*, permitting process). Hazardous installation meeting the criteria should submit full details of all relevant aspects of its hazardous operations (*e.g.*, chemical processes, risk assessments) in order for the permitting authorities to review the application and determine whether to issue a permit. See also "Land-Use Planning."

TARGET
A permitting process is in place so that installations defined as high risk are required to receive prior and continuing approval to operate.

POSSIBLE 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) Number of hazardous installations with a permit which have had a chemical accident versus the number of hazardous installations without a permit which have had a chemical accident.
iv) Percentage of permit applications reviewed by public authorities which were accurate and correct based on the permitting criteria.

Activities Indicators

i) Is there a 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 public authorities in order to obtain a permit to operate?
iii) Are there criteria and procedures for the public authorities to evaluate and approve applications for permits to operate?
iv) Are there procedures for ensuring the quality of the permitting process and of the information submitted in connection with 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 its permit?
viii) Are there mechanisms to ensure that significant changes at the installation are subject to a review of its permit?

A.2.5 INSPECTIONS

Inspections by public authorities 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 relevant regulations, standards and practices, and whether safety management systems are in place and operating appropriately at the installations. Important additional benefits from inspections include: they provide an opportunity for sharing experiences; they provide insights for 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 Authorities to periodically inspect safety performance of hazardous installations
- 3.c.1-13 Section on safety performance review and evaluation
- 17.c.4 Maintaining the integrity of pipelines

TARGET
An effective inspection programme for hazardous installations is maintained in order to check compliance with requirements, ensure proper safety practices and share experience.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of hazardous installations required to be inspected that have been inspected.
ii) Percentage of safety improvements implemented at a hazardous installation as a result of an inspection (*i.e.*, based on safety improvements required or suggested by a public authority during an inspection).
iii) Number of inspected hazardous installations that have had a chemical accident, versus the number of hazardous installations which have not been inspected and have had a chemical accident.

Activities Indicators

i) Does the public authority have an inspection programme for hazardous installations that includes:
   - clearly defined goals, objectives and scope;
   - programme priorities, taking into account safety records of hazardous installations, the nature of the hazards at the installations, experience with industry, etc.;
   - schedules for inspections with co-ordination between different public authorities;
   - identification of personnel and training for inspectors;
   - guidance and protocols for completing an inspection;
   - procedures for follow-up;
   - 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;
   - 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 system for using inspection reports to promote sharing of the information within a country;
   - Is there a process for contact with employees or safety representatives as part of the inspections.

iv) Is there a mechanism to ensure appropriate and timely follow-up to inspections, so that identified problems 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 (to improve the efficiency of inspections and improve the ability of public authorities and industry to learn from each other)?
viii) Do public authorities encourage enterprises to share information on audit procedures and results with other enterprises in order to promote better co-operation among industry and promote sharing of experiences and lessons learned?

A.2.6 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.

Enforcement activities should complement other programmes implemented by public authorities to ensure industry complies with all appropriate laws and regulations (*e.g.*, incentive programmes, technical assistance, outreach).

See Guiding Principles document, paras.:

- 1.12 Authorities to set objectives, establish a control framework and ensure implementation
- 1.14 Authorities to periodically inspect safety performance of hazardous installations
- 3.a.7 Control framework should include provisions on enforcement
- 3.a.8 Authorities to provide guidance on how requirements can be met by industry
- 3.c.1-9 Section on safety performance review and evaluation
- 6.3 Land-use planning arrangements to include provisions for enforcement of siting and planning
- 6. 4 Land-use arrangements to clearly indicate standards to be met
- 17.a.13 Control framework should address transport interfaces
- 17.b.1 Port authorities to develop local port rules on chemical safety

TARGET

Enterprises comply with all legal requirements related to chemical accident prevention, preparedness and response and improve chemical safety at their hazardous installations.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) 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, that include:
   - defined goals and objectives;
   - established priorities;
   - overview of the 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;
   - appropriate follow-up?

ii) Is there a mechanism for instituting enforcement actions against enterprises that do not follow the requirements related to hazardous installations 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 that threatens the safety of the public?

iv) Do public authorities have the authority to enter hazardous installations in order to conduct inspections?

v) Do public authorities have the ability to take action when they find non-compliance or potentially hazardous situations that do not pose an immediate threat (*e.g.*, such as fines, legal orders)?

vi) Do public authorities make the enforcement policies and procedures available to hazardous installations?

vii) 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?
viii) Is the public made aware of all enforcement actions taken at hazardous installations within their community?

Section A.3 External Co-operation

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, the environment and property. 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 Section includes the following sub-sections:

- Co-ordination Among Relevant Authorities at all Levels
- Co-operation with Industry
- Co-operation with Other Non-Governmental Stakeholders
- Communication with Communities/Public

A.3.1 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 government bodies at local, regional, national 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, occupational safety, environmental protection, public health, planning and civil protection. With this large number of governing bodies, 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.

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders; co-operation among all parties
- 1.17 Sharing of information among authorities, industry associations and others
- 3.a.3 Public authorities to promote inter-agency co-ordination
- 3.a.4 Authorities to consult other stakeholders when setting objectives and control framework
- 3.a.6 Flexibility in the control framework concerning methods to meet safety objectives
- 3.a.9 Requirements and guidance should promote innovation and improved safety
- 3.b.4 Land-use planning activities of public authorities should be well co-ordinated
- 3.c.6 Sharing information and experience related to inspection methods and outcomes
- 3.c.12 Various authorities should co-operate and co-ordinate with respect to inspections
- 3.c.14 Consider co-ordination of various aspects of safety, health and environment
- 5.a.5 All involved in emergency response should be involved in planning process
- 5.a.9 Co-operation to ensure that medical personnel know about chemicals in the community
- 5.a.14 All parties to ensure people, equipment and resources needed for response are available
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.4 Integration of chemical emergency planning and planning for natural disasters
- 5.c.5 Identification of all parties who are expected in participate in an emergency response
- 5.c.17 Industry and authorities to facilitate sharing of medical resources in event of an accident
- 5.c.21 Co-ordination of emergency planning among potentially affected communities
- 6.2 Co-ordination of land-use planning activities of local, regional and national authorities
- 7.11 Consultation among authorities, industry and public concerning public information
- 7.17 Exchange of information on best practices for communication with the public
- 13.4 Sharing of information among health/medical professionals
- 14.a.1 Stakeholders to encourage voluntary information sharing on accidents and near-misses
- 15.a.13 Sharing of experience on approaches used for accident investigations
- 15.c.5 Co-ordination of agencies in accident investigations
- 16.a.1-9 Transboundary co-operation and consultation
- 17.a.2 Co-operation among all parties at transport interfaces
- 17.a.17-19 Consistent approach for modes of transport; harmonisation of laws on interfaces

TARGET

Relevant public authorities co-ordinate their activities with respect to the development of legal frameworks, interaction with hazardous installations and exchange of information.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Extent problems associated with 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 relevant public authorities?
   - Does this infrastructure identify the roles and responsibilities of each relevant public authority;
   - Does it include the local, regional, national and international levels of government;

- Has a public authority(ies) been identified as responsible for co-ordinating the efforts of the various public authorities with responsibilities related to chemical safety.

ii) Is there a process for co-ordination among relevant public authorities with respect to their interaction with industry *(e.g.*, in inspections, provision of assistance to enterprises, enforcement). Does the mechanism provide the ability to:
- co-ordinate policies and procedures;
- co-ordinate development of guidance documents;
- discuss and resolve issues concerning 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 help to minimise overlaps and redundancies in the various requirements;
- 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.

A.3.2 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 public authorities at all levels and the community/public. For accident prevention to be most effective, there should be co-operation among 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, and proactive approaches concerning 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 substances.

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders; co-operation among all parties
- 1.13 Authorities to co-operate with and stimulate industry to ensure safety
- 1.15 Local authorities should co-operate with enterprises in their community
- 1.17 Sharing of information among authorities, industry associations and others
- 1.19 Assistance to enterprises with limited resources such as SMEs
- 3.a.4 Authorities to consult other stakeholders when setting objectives and control framework
- 3.a.6 Flexibility in the control framework concerning methods to meet safety objectives
- 3.a.9 Requirements and guidance should promote innovation and improved safety
- 3.a.17 Authorities should facilitate information sharing on safety management systems
- 3.a.20 Additional activities such as technical assistance, research, training, public awareness
- 3.a. 21 Authorities to promote assistance to SMEs and others needing help
- 3.c.1 Authorities to establish programmes for monitoring installations' safety
- 3.c.2 Authorities to prepare guidance related to compliance obligations
- 3.c.3 Inspectors and related authorities to be publicly accountable
- 3.c.13 Inspectors and industry should co-operate in conduct of audits and inspections
- 5.a.5 All involved in emergency response should be involved in the planning process
- 5.a.6 Off-site and related on-site emergency plans should be consistent and integrated
- 5.a.7 Authorities and industry should co-operate on emergency planning
- 5.a.8 Co-operation between industry and response personnel
- 5.a.9 Co-operation to ensure that medical personnel know about chemicals in the community
- 5.a.14 All parties to ensure people, equipment and resources needed for response are available
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.2 Authorities to ensure off-site and on-site emergency plans in co-ordination with industry
- 5.c.17 Industry and authorities to facilitate sharing of medical resources in event of an accident
- 7.11 Consultation among authorities, industry and public concerning public information
- 14.a.1 Stakeholders to encourage voluntary information-sharing on accidents and near-misses
- 15.a.12 Relevant information in investigation reports to be shared
- 15.c.3 Investigation reports prepared by authorities should be published
- 17.a.2 Co-operation among all parties at transport interfaces

TARGET

Public authorities and industry co-operate to improve safety by: consulting on laws, regulations and guidance; exchanging information, experience and lessons learned; and promoting voluntary risk reduction activities through incentive programmes.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of regulated industry which consistently improves safety of hazardous installations beyond legal requirements as a result of government initiatives such as 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) Are there mechanisms to receive input from industry prior to and when developing goals, laws, regulations, policies, procedures and guidance?
   - Do the mechanisms allow for changes to be made based on comments and experience of industry;
   - Is there a process for industry to provide feedback based on experience in implementing requirements and guidance;
   - If amendments are made to 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 and guidance promote site- or industry-specific safety improvements and risk reductions;
   - Is industry encouraged to achieve a higher level of safety than would be achieved by adherence to established requirements 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 enterprises 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 appropriate benefits;
   - 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 to ensure that the incentive programme do not adversely effects regulations.

A.3.3 CO-OPERATION WITH OTHER NON-GOVERNMENTAL STAKEHOLDERS

All relevant stakeholders have important roles in helping to improve safety at hazardous installations. In addition to industry and public authorities, these stakeholders include trade associations, labour organisations, environmental groups, universities and research institutes, community-based groups/communities and other non-governmental organisations. These non-governmental organisations are in a unique position to provide objective chemical information to the public as well as to work with industry on innovative ways to improve safety. 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.

TARGET
Public authorities establish partnerships with different stakeholders in order to: share information, experience and lessons learned; get feedback; and facilitate communication with the public.

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders; co-operation among all parties
- 1.16 Establish multi-stakeholder groups to develop and disseminate safety information
- 1.17 Sharing of information among authorities, industry associations and others
- 3.a.4 Authorities to consult other stakeholders when setting objectives, control framework
- 4.e.4 NGOs should participate in legislative/regulatory processes
- 5.a.5 All involved in emergency response should be involved in planning process
- 5.a.12 Emergency plans should be tested, reviewed and maintained up-to-date
- 5.a.14 All parties to ensure people, equipment and resources needed for response are available
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.4 Integration of chemical emergency planning and planning for natural disasters
- 5.c 5 Identification of all parties who are expected in participate in an emergency response
- 7.11 Consultation among authorities, industry and public concerning public information
- 7.15 Public input into development of off-site plans
- 14.a.1 Stakeholders to encourage voluntary information sharing on accidents and near-misses
- 15.d.1 Public involvement in debriefing and accident investigations
- 16.a.6 Transboundary co-operation; public participation in licensing or siting procedures
- 17.a.2 Co-operation among all parties at transport interfaces

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent the potentially affected public clearly understand the chemical risks associated with hazardous installations in their community as a result of information being provided by public authorities and non-governmental stakeholders.

ii) Extent to which non-governmental organisations participate in decision-making processes and other opportunities to co-operate with public authorities in an effort to improve chemical safety.

Activities Indicators

i) Are there mechanisms to involve non-governmental stakeholders in the development of goals, laws, regulations, policies, procedures and guidance, and in relevant decision-making?
   - Do the mechanisms 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 quality 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.

A.3.4 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 to assist in understanding the chemical risks in their communities. This information should help the public understand 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. Additionally, public authorities should encourage communication between industry and the public.

See Guiding Principles document, paras.:

- 1.12 Authorities to set objectives, establish a control framework and ensure implementation
- 3.c.3 Inspectors and related authorities to be publicly accountable
- 5.a.5 All involved in emergency response should be involved in planning process
- 5.a.18 Emergency planning to include elaboration of means to inform the public
- 5.a.19 Qualifications of designated spokespeople for emergencies
- 5.c.20 Information to the public following an accident
- 5.c.23 Once alerted, response authorities should activate their emergency plans
- 6.7 Public input into decision-making related to siting of hazardous installations
- 7.1-7.17 Chapter on communication with the public
- 8.4 Qualifications of spokespeople who provide post-accident information

TARGET

The public understands chemical risk information, takes appropriate actions in the event of an accident and has an effective channel to communicate with relevant public authorities.

POSSIBLE 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 provided by the public on the information they have received.
iv) Extent the public considers public authorities a reliable 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 public 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 enterprises have communicated information on their hazardous installations to the public.
viii) Extent stakeholders have taken preparedness and prevention actions as a result of the public authorities' leadership. Such actions could include, for example:
   - community based groups/communities have established public action groups;
   - industry has established relationships with their community;
   - universities have expanded chemical safety research.

Activities Indicators

i) Is there a specific mechanism to share information between public authorities and the public openly and actively? Has this mechanism been designed in consultation with the public and other stakeholders?
ii) Is there a mechanism for the public to request information from public authorities and/or industry?
iii) Do public authorities provide information to the public on how to access information on chemical risks in their community?

iv) 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);
- Does 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 chemicals in their community.

v) Is there a mechanism for gathering public input related to the public authorities' efforts and activities concerning chemical accident 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 processes;
- Does the mechanism allow for public authorities to respond to questions from the public regarding hazardous installations and chemical risk information.

Section A.4 Emergency Preparedness and Planning

This Section deals with the role of public authorities in chemical emergency preparedness and planning. 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 in co-ordination with industry.

This Section includes the following sub-sections:

- Ensuring Appropriate Internal (on-site) Preparedness Planning
- External (off-site) Preparedness Planning
- Co-ordination Among Relevant Authorities at all Levels

A.4.1 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. One role of public authorities is to develop appropriate guidelines and standards to assist industry in producing on-site emergency preparedness plans. These guidelines and standards should include provisions for developing, implementing, testing and updating these 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 also help to ensure that the on-site emergency preparedness plans are developed and maintained and that the public is aware of on-site emergency preparedness plans.

See Guiding Principles document, paras.:

- 5.a.1 Authorities at all levels to have emergency planning related to chemical accidents
- 5.a.2 Planning to include elaboration of scenarios and identification of potential risks
- 5.a.6 Off-site and related on-site emergency plans should be consistent and integrated
- 5.a.7 Authorities and industry should co-operate on emergency planning
- 5.a.10 Emergency plans to identify roles of all concerned plus means to get resources
- 5.a.11 Emergency plans to provide guidance for flexible response to range of scenarios
- 5.a.12 Emergency plans should be tested, reviewed and maintained up-to-date
- 5.b.3 Employees to be informed of emergency plan, and what to do in the event of an accident
- 5.b.8 Management to work with authorities in developing off-site plans
- 5.b.9 Industry to co-operate with authorities and others to provide information to public
- 5.c.1 Authorities to establish guidelines for emergency plans
- 5.c.2 Authorities to ensure off-site and on-site emergency plans in co-ordination with industry
- 5.c.3 Authorities to ensure adequate off-site emergency plans

TARGET

There is effective on-site preparedness planning for all relevant hazardous installations, which includes co-ordination with off-site plans.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Increase in the number of hazardous installations with an effective emergency plan in place.

ii) Reduction in the magnitude and consequences of chemical accidents at facilities with preparedness plans versus facilities without preparedness plans.

iii) Reduction in the number of hazardous installations that have required multiple emergency responses by public authorities.

iv) Reduction of complaints from employees, the public and other stakeholders regarding lack of information on preparedness planning.

Activities Indicators

i) Have guidelines and standards been developed to assist industry in producing on-site emergency preparedness plans? Do these guidelines and standards address:
   - the respective roles and responsibilities of employees at hazardous installation and emergency response personnel during an accident;
   - evaluation of the hazards at the installation (*i.e.*, information of the types and amounts of hazardous substances and the situations in which they are produced, handled, 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;
- co-ordination with the off-site community plan.

ii) Do the guidelines and standards stipulate which hazardous installations should develop and implement on-site emergency preparedness plans?

iii) Is there a mechanism to check whether hazardous installations have appropriate emergency plans? Does this mechanism address whether:
- all the hazardous installations that are required to develop on-site emergency preparedness plans actually completed those plans;
- the on-site emergency preparedness plans include all the appropriate information;
- the on-site emergency preparedness plans are flexible enough to allow for response to a range of possible accidents and changes in the level of risk;
- the plans are tested and updated on a regular basis to ensure they address all possible accidents;
- relevant employees are aware of the on-site emergency preparedness plans and know what actions to take, if any, when an accident occurs at the hazardous installation.

iv) Is the public aware of the on-site emergency preparedness plans and do they know what actions to take, if any, when an accident occurs at the hazardous installation?

v) 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?

A.4.2 EXTERNAL (OFF-SITE) PREPAREDNESS PLANNING

See Guiding Principles document, para.:
- 5.c.1-23 Roles and responsibilities of public authorities related to emergency preparedness and planning

Accidents involving hazardous substances can affect not only workers and property on-site but also the public, the environment and property 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 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. The local officials responsible for the off-site emergency plan should work with the identified hazardous installations to develop this plan and ensure co-ordination with the installation's on-site emergency plan. 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. Off-site plans, including national and regional plans, should include provision for mutual aid so that resources can be made available to authorities for accidents that overwhelm their response capabilities. Such plans should promote overall co-ordination among, and support to, the various levels of responders and contingency plans.

TARGET
Adverse off-site effects of chemical accidents are effectively mitigated.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of local communities which have acquired or contracted for appropriate response resources based on the level of chemical risk.
ii) Percentage of hazardous installations that are included in off-site emergency preparedness plans.
iii) Extent to which public authorities, including emergency response personnel and local authorities, know what actions to take in the event of an accident.
iv) Percentage of the potentially affected public who know 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 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) 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 affected by an accident?
vi) 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?

vii) Are the resources and capability needs for implementing the off-site emergency preparedness plan identified?
- Have the authorities ensured these resources will be available when an accident occurs;
- Are the combined resources from industry and the community adequate to deal with all the foreseeable accident scenarios.

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 mechanisms in place to immediately activate off-site emergency preparedness plans when an accident occurs with the potential to impact people, the environment or property outside the installation?

x) Are there procedures in place to have exercises of the plan, with the participation of all parties that might be involved in a response including members of the public?

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?

A.4.3 CO-ORDINATION AMONG RELEVANT AUTHORITIES AT ALL LEVELS

It is important that there be effective co-ordination among relevant authorities with respect to emergency planning to minimise the adverse affects of accidents. Authorities in different localities need to co-ordinate since accidents involving hazardous substances do not respect boundaries such as hazardous installation property lines, locality boundaries or international borders. Authorities with varying responsibilities need to co-ordinate due to the complexity of accidents and the possibility of domino effects, as well as the potential for natural disasters causing technological accidents. Co-ordination helps to: avoid overlapping responsibilities; resolve complicated interfaces; ensure sharing of needed resources; avoid confusion and conflict during an emergency response; and learn from other's experiences in preparing for and responding to an accident involving hazardous substances.

See Guiding Principles document, paras.:

- 5.a.5 All involved in emergency response should be involved in planning process
- 5.a.7 Authorities and industry should co-operate on emergency planning
- 5.a.8 Co-operation between industry and response personnel
- 5.a.9 Co-operation to ensure that medical personnel know about chemicals in the community
- 5.a.10 Emergency plans to identify roles of all concerned plus means to get resources
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.2 Authorities to ensure off-site and on-site emergency plans in co-ordination with industry
- 5.c.5 Identification of all parties who are expected in participate in an emergency response
- 5.c.7 Emergency plans to address how various response groups should work together
- 5.c.21 Co-ordination of emergency planning among potentially affected communities

TARGET

There is effective co-operation and co-ordination among relevant authorities at all levels to improve emergency planning and response.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Reduction in delays in response time due to fewer conflicts over roles and responsibilities, better access to resources and/or improved capacity to co-ordinate among public authorities.

ii) Extent to which actions taken by responders or officials resulted in delays in mitigating the effects of the accident due to poor or lack of co-ordination among the relevant authorities.

Activities Indicators

i) Is there a mechanism to involve all relevant local public authorities in the development of off-site emergency preparedness plans?

ii) Are the roles and responsibilities for all relevant public authorities, including those 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 affected communities/countries in the development of relevant off-site emergency preparedness plans? Is there a mechanism to identify other communities/countries that might be effected in the event of an accident (*e.g.*, by assessing vulnerability zones)?

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 related to emergency response?
vi) Is there a system to update emergency plans based on experience from reviews of chemical accidents or tests of emergency plans?
vii) Is there a mechanism to measure the effectiveness of the actions taken by responders and officials, as well as of the overall response effort?

Section A.5 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, environment and property. A number of factors contribute to an efficient and productive response. First, emergency responders must be aware that an accident has occurred and they must receive this notification quickly. Once on the scene of the accident, emergency responders must be able to quickly assess the situation and deploy the resources needed to mitigate adverse effects. In order to make these decisions, emergency responders need information on the accident, the hazardous substances involved and available resources. Finally, the public needs to be kept fully appraised of the situation in order to protect themselves and their families.

TARGET
Response actions are timely and effective in mitigating the adverse effects of accidents.

See Guiding Principles document, paras.:
- 8.1-8.4 Emergency response—general principles
- 10.1 When alerted, response personnel should activate emergency plans
- 10.2 On-scene co-ordinator to decide on immediate actions to limit human exposure
- 10.3 On-scene co-ordinator to decide whether public to evacuate or shelter indoors
- 10.4 Response decisions should take account of long-term or delayed effects of exposure
- 10.7 Systems to be in place to obtain resources for response (*e.g.*, equipment, specialists)
- 10.8 Responders should have information and skills for assessing need for further support
- 10.9 Elaboration of information used to support response actions
- 10.18 National and regional authorities to support local response operations
- 10.19 Response personnel to document actions and decisions taken during response
- 10.20 Co-operation during transition between emergency response and clean-up
- 10.21 Use polluter-pays-principle to recover costs
- 14.b.1 Authorities should require notifications of accidents

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent of time between the report that an accident involving hazardous substances has occurred and response personnel taking the appropriate action to mitigate the effects of that accident.

ii) Extent of time between the report 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) Extent to which the response was carried out as planned, or as appropriate to the circumstances (judging by, *e.g.*, extent of communication and co-ordination, responsiveness to changing conditions, ability to protect people, the environment and property off-site).

iv) Extent of deficiencies in the off-site preparedness plan as revealed during an accident or test of the plan.

Activities Indicators

i) Have public authorities developed requirements for the prompt notification by the enterprise of an accident involving hazardous substances?

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, hazmat 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 emergency response and mitigation 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 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 taken during an accident response or an exercise in order to generate 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 clear written procedures for communication;
- Are the procedures available to staff and does the staff understand these procedures;
- Is there a means for ensuring appropriate mechanisms are being used to communicate during an emergency.

ix) Are there systems in place for communicating decisions (*e.g.*, shelter in place versus evacuation) and information to the public during and following an accident?
- Is there a system in place to warn the public that an accident involving hazardous substances has taken place and to inform them of the 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.

Section A.6 Accident/Near-Miss Reporting and Investigation

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 will 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 industry that proper steps are being taken following an accident to avoid future consequences to the potentially affected public and environment from similar accidents.

This Section includes the following sub-sections:

- Accidents/Near-Miss Reporting
- Investigations
- Follow-up, Including Sharing of Information and Application of Lessons Learned

A.6.1 ACCIDENT/NEAR-MISS REPORTING

Public authorities should ensure that requirements are in place for timely reporting of 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 and other "learning experiences," both within and among enterprises.

See Guiding Principles document, paras.:
- 14.b.1 Authorities should require notifications of accidents
- 14.b.2 Authorities to establish criteria and procedures for documentation of incidents
- 14.b 3 Authorities should establish national system for statistics and information on accidents

TARGET
Accidents, near-misses and other "learning experiences" are reported in accordance with the established system in order to improve safety.

POSSIBLE 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 accidents 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 enterprises?
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 and other learning experiences, 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 accidents involving hazardous substances?
viii) Is there a mechanism to analyse reports of accidents involving hazardous substances submitted by enterprises?

A.6.2 INVESTIGATIONS

See Guiding Principles document, paras.:

- 15.a.1 Management should investigate all incidents; authorities should investigate significant accidents
- 15.a.2-15.a.10 Elements of root cause investigations
- 15.c.1-5 Role of authorities with respect to accident 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, external factors and the chemical itself may all play a role. Public authorities should work with industry and labour to investigate key accidents to determine root and other causes that contributed to accidents, and public authorities should take action to address those causes. 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.

The investigation should also consider whether actions taken during the response to an accident contributed to any adverse impacts.

TARGET

Root causes, contributing causes and lessons learned are identified through investigations of key accidents and other unexpected events involving hazardous substances.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Extent investigations have identified the root and contributing causes of significant accidents involving hazardous substances based on specified criteria.

Activities Indicators

i) Do public authorities investigate major accidents to determine the cause of those accidents? Are there criteria to determine which accidents should be investigated?
ii) Does the appropriate group of experts conduct each accident investigation (*e.g.*, do the experts have experience with the type of installation being investigated or with the type of process involved in the accident)?
iii) Are all appropriate stakeholders (*e.g.*, industry, labour, local community) involved in accident investigations?
iv) Are accident investigations conducted in such a way to ensure an independent, unbiased report of the causes of an accident?
v) Are efforts made to determine all of the causes of the accident rather than just the apparent cause(s)?
vi) Is the impact of response activities taken into account in the accident investigations?
vii) Do public authorities develop and distribute an accident investigation report for each accident investigation?
viii) Do public authorities co-ordinate their accident investigations?

A.6.3 FOLLOW-UP, INCLUDING SHARING OF INFORMATION AND APPLICATION OF LESSONS LEARNED

While accident investigations are important for identifying the causes of accidents involving hazardous substances, it is critical to take the next steps in sharing information about accidents and applying the lessons learned from investigations to prevent similar accidents from taking place in the future.

See Guiding Principles document, paras.:
- 14.b.2 Authorities to establish criteria and procedures for documentation of incidents
- 14.b. 3 Authorities should establish national system for statistics and information on accidents
- 15.a.11-14 Sharing the results of investigations
- 15.c.3 Investigation reports prepared by authorities should be published

Public authorities have a responsibility to collect information on accidents/investigations and analyse that information to determine trends and possible corrective actions to take to prevent future accidents. Public authorities are in a unique position to disseminate findings from accident investigation reports and analyses to the widest possible audience. Authorities should also adjust regulations, emergency plans, inspection procedures, etc. based on lessons learned from accident investigations.

TARGET
Appropriate lessons learned from accidents and near-misses are shared with all relevant stakeholders, and effective corrective actions are taken as a result of lessons learned (*e.g.*, by amending relevant regulations, emergency plans, inspection procedures).

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent recommendations from accident investigations are implemented by authorities (including local authorities) and by enterprises.

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;
- Do the authorities share these reports internationally;
- Is the information in investigation reports provided in a useful format;
- Do the reports include steps to be taken to prevent future accidents.

ii) Do public authorities analyse accident investigation findings and distribute those finding to the appropriate enterprise(s) and authorities (including local authorities)?

iii) Is there a mechanism in place to determine if relevant enterprises have implemented the changes recommended in investigation reports?

iv) Where appropriate, have public authorities adjusted regulations, guidance, programmes, procedures, etc. based on the lessons learned from accident investigations?

v) Have public authorities established and maintained a structured national system for collecting and analysing information on accidents involving hazardous substances?
- Do they exchange information from this system and disseminate the results of the analyses;
- Do public authorities promote the international sharing and exchange of information on major accidents and near-misses;

- Are reporting structures co-ordinated among countries to facilitate the exchange of information;
- Are incidents and lessons learned reported to appropriate international reporting schemes (such as OECD, MARS, etc.).

vi) Do public authorities encourage the sharing of information related to near-misses (both within public authorities and within industry)?

Elected Officials: Special Concerns

Elected officials (including governors, mayors, city councils, provincial and regional officials) need to understand and be concerned about the chemical risks in their communities. While the formal responsibilities with respect to chemical accident prevention, preparedness and response will differ greatly among elected officials due to a number of factors (such as local culture, distribution of responsibilities, nature of their positions), they generally have several key roles and responsibilities. Therefore, they need to have the appropriate information and resources to fulfil these roles and responsibilities.

For example, elected officials:

- are often responsible for hiring or appointing the key managers of the public authorities responsible for prevention, preparedness and response. Thus, they need to have mechanisms in place to ensure that these managers are qualified and appropriately trained;
- may be in a position to ensure the availability of resources (including personnel), as established in emergency preparedness plans;
- should have knowledge and general understanding of relevant emergency response plans and their role in those plans;
- should be aware of the laws and regulations governing chemical accident prevention, preparedness and response;
- have the opportunity to convince the public to learn about the risks in their community and actions to take in the event of an accident;
- can facilitate co-operation among the various stakeholders (industry, public authorities, members of the public);
- can help to motivate all other stakeholders to carry out their roles and responsibilities; and
- are often among the primary spokespeople involved in communicating with the media and the public following significant accidents.

PART B. EMERGENCY RESPONSE PERSONNEL (*i.e.*, first responders such as police, firefighters, hazmat teams and emergency medical personnel)

This Part was developed because it was recognised that while emergency response personnel are considered "public authorities," they generally have a different structure and perspective than other authorities. In addition, emergency response personnel generally have a unique role relative to chemical accident preparedness and response and, therefore, the *Guidance on SPIs* and the types of applicable indicators should reflect that unique role.

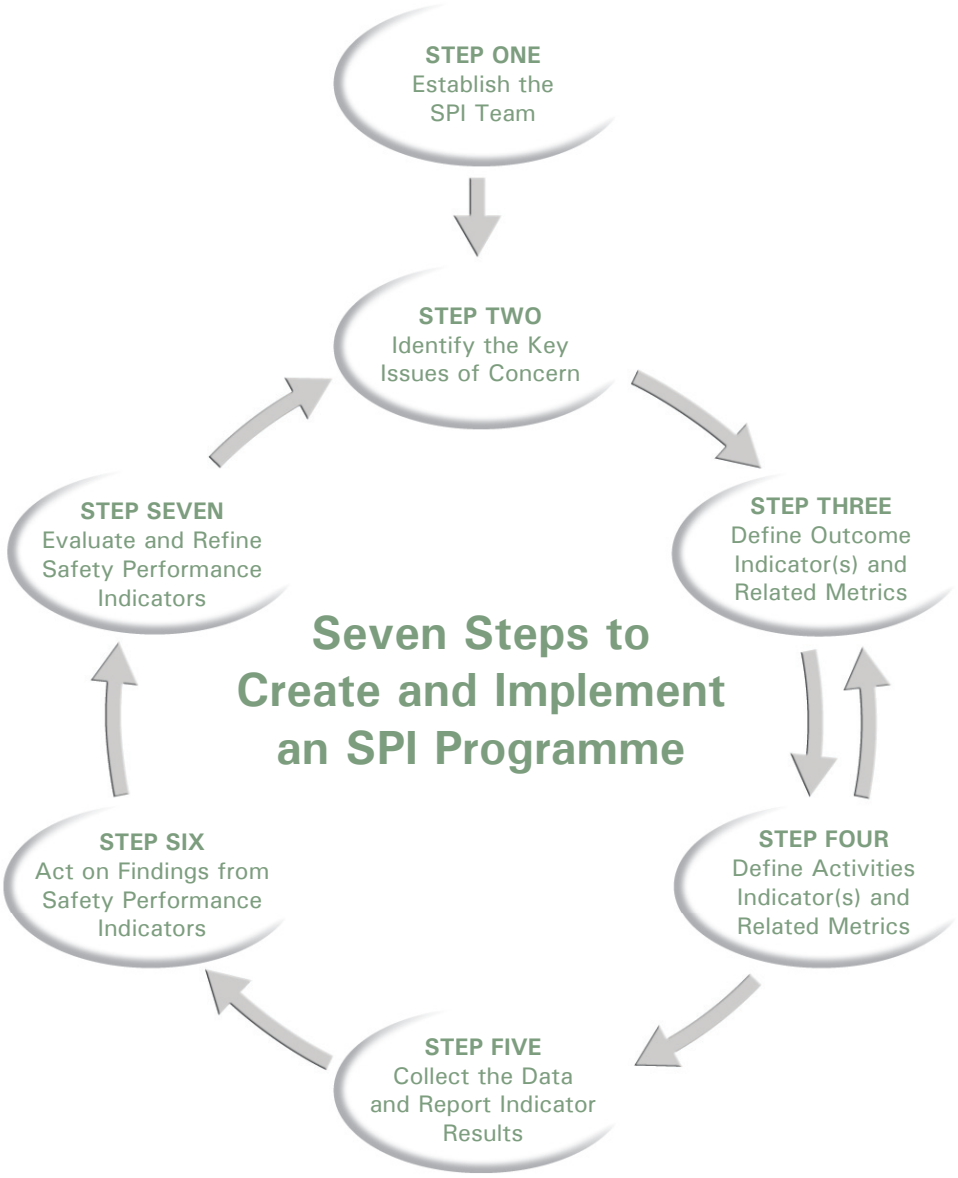
Set out below is a summary version of Chapter 2 ("How to Develop an SPI Programme"), followed by selected provisions of Chapter 3 ("Choosing Targets and Indicators") relevant to emergency response personnel.

How to Develop an SPI Programme: Seven Steps to Create an SPI Programme (summary version for emergency response personnel)

The following summarises the step-by-step process presented in Chapter 2 of the *SPI Guidance* as it applies to emergency response organisations, including police, firefighters, hazmat teams and emergency medical personnel. This shortened version of the step-by-step process is intended to focus more directly on the specific needs for emergency response organisations.

Not all emergency response organisations are the same, and this short version of the process may not address all of your particular roles and responsibilities. If this is the case, you are encouraged to use the full version of the step-by-step process presented in Chapter 2 of the *Guidance*, which provides further details about each of the seven steps.

The diagram below illustrates the seven steps in the process of developing an SPI Programme. The steps are described below in more detail.



STEP ONE: ESTABLISH THE SPI TEAM

- Identify a person or team of people to be responsible for development of SPIs for the organisation.
- Include senior officers with responsibility for managing personnel, equipment and other resources in the process and seek their advice and approval at key milestones.
- Seek ideas from personnel with different roles and levels of responsibility within the organisation. Different perspectives will often produce SPIs that provide meaningful, real-world information and are easier to implement.
- Budget adequate resources and time to develop and implement SPIs. Successful programmes often start simple and grow in complexity and usefulness over time. Some initial investment of time and resources will be required to start your Programme, and resources should be committed to ensure that your initial investment pays off.

STEP TWO: IDENTIFY THE KEY ISSUES OF CONCERN

- SPIs are intended to help you monitor the most critical safety issues that you might not otherwise detect with your existing procedures. Focus your SPI development efforts on those aspects of your organisation that:
  - address the greatest risks to the public, property and the environment;
  - are susceptible to deterioration without showing outward signs of deterioration.
- SPIs for emergency response organisations generally fall into one of the nine categories. Review the table on page 80 which lists these categories along with associated "targets" (*i.e.*, organisational goals or aspirations).
- Prioritise SPI categories according to the potential that they could deteriorate and the severity of the consequences if they did deteriorate. Identify the four to five highest priorities on which to focus your initial SPI efforts.

STEP THREE: DEFINE OUTCOME INDICATOR(S) AND RELATED METRICS

- Define outcome indicators (*i.e.*, indicators that tell you whether what you are doing is working to improve your preparedness and response capability) for each of the categories identified in Step Two, as follows:
  - For each issue identified in Step Two, answer the question, "what would success look like?" This will help you identify your organisation-specific target/aspiration/goal for the category.
  - Review the potential outcome indicators listed below corresponding to each priority category. Select an outcome indicator(s) directly from the text, or use the text as a starting point and develop indicators that fit your specific needs.
- Define the "metric" (*i.e.*, the approach for collecting, compiling and reporting the data) for each outcome indicator, as follows:
  - Answer the questions, "who will use the indicator?" and "how will the indicator be used to make decisions?" You can then review the metric definitions in on page 81, and select the type of metric that best fits your needs.
  - Ask whether the selected metric is likely to show change that will support action. If not, refine your metric. SPIs should be action-oriented.

STEP FOUR: DEFINE ACTIVITIES INDICATOR(S) AND RELATED METRICS

- Define activities indicators (*i.e.*, indicators that can tell you why what you are doing is working or not working to improve your preparedness and response capabilities) for each of the priority categories identified in Step Two, as follows:
  - For each outcome indicator identified in Step Three, answer the question, "if we are not achieving desired results, what information will be needed to understand the reasons and make corrections?" This will tell you the information that is most critical to be monitored using activities indicators.
  - Review the potential activities indicators listed below corresponding to each priority category (identified in Step Two). Select one or more activities indicators directly from the text, or use the text as a starting point and develop indicators that fit your specific needs.
- Define the "metric" (*i.e.*, the approach for collecting, compiling and reporting the data) for each activities indicator, as follows:
  - Answer the questions, "who will use the indicator?" and "how will the indicator be used to make decisions?" You can then review the metric definitions on page 81, and select the type of metric that best fits your needs.
  - Ask whether the selected metric is likely to show change that will support action. If not, refine your metric. SPIs should be action-oriented.

STEP FIVE: COLLECT THE DATA AND REPORT INDICATOR RESULTS

- Design your data collection and reporting approach.
  - Consider whether data already collected by your organisation could be used for the SPI, either in its existing form or in a new way. If data is not already available, collect data in a way which is consistent with your organisation's culture.
  - Specify the data collection method, how often the data will be collected, and by whom. Collect data at a frequency that will detect changes in time for action.
  - For indicators that use threshold metrics, specify thresholds or tolerances (*i.e.*, the point at which deviations in performance should be flagged for action) and associated actions.
  - Define how the SPI data will be presented, to whom, and how often. Reports should be timely, and the presentation should be as clear as possible to facilitate understanding and action.
- Implement your SPI data collection and reporting plan.

STEP SIX: ACT ON FINDINGS FROM SAFETY PERFORMANCE INDICATORS

- Review the SPI data and act accordingly. For SPIs using threshold metrics, take specified actions when tolerances are exceeded. For SPIs using descriptive or trended metrics, consider what the data are telling you, and act accordingly.
  - If outcome indicators suggest that safety results are not being achieved, review your associated activities indicators and try to identify the reasons. Adjust your actions to achieve the desired results.
  - If activities indicators show that you are not taking actions needed to achieve safety results, identify the reason why these actions are not being taken, and correct the problem. Do not wait for poor results to show up in your outcome indicators.
- If an activities indicator suggests good safety performance but the associated outcome indicator shows poor results, reconsider your activities indicator and make changes, if needed. It may be too far removed from the outcome or the metric may need to be redefined.

STEP SEVEN: EVALUATE AND REFINE SAFETY PERFORMANCE INDICATORS

- Review and evaluate your SPI Programme on a regular basis to ensure that the Programme continues to be relevant in light of changing conditions (*e.g.*, new installations, organisational changes, new technologies) and to incorporate improvements based on your experience with SPIs.
- Eliminate indicators that are no longer needed (*e.g.*, because the improvements made as a result of the indicators have resulted in long-term, stable improvements). Define new indicators to address changing conditions or to examine different potential safety issues within your organisation.
- Based on your experience and knowledge of your organisation, ask whether the indicators are providing reliable information. If not, reconsider your SPIs. Ask yourself and your team the following questions:
  - Are the issues that used to "keep you up at night" still troubling you or have the SPIs provided you with the information you need to understand and act on issues?
  - Are you measuring the activities that are most likely to affect your highest priority safety outcomes?
  - Are the metrics precise enough to recognise small but significant changes that require action?
- Incorporate experience by sharing information with others who have implemented an SPI Programme. This could include other emergency response organisations in your community or peers from different communities.

General SPI Categories - Emergency Response Organisations

SPI Category	Target/Goal/Aspiration	Ref. Section
Organisational goals and objectives	The goals and objectives effectively focus resources on the protection of human health, the environment and property from chemical accidents.	B.1
Personnel	There are appropriate staffing levels, with employees who are competent, trained and fit for their jobs.	B.2
Internal communication/Information	Key information is exchanged within an emergency response organisation.	B.3
External co-operation: Co-ordination among relevant authorities at all levels	Response organisations and other public authorities co-ordinate their activities and exchange information related to chemical accident prevention, preparedness and response.	B.4.1
External co-operation: Co-operation with industry	Emergency response organisations and industry co-operate to improve safety by exchanging information, experience and lessons learned by promoting voluntary risk reduction activities.	B.4.2
External co-operation: Co-operation with other non-governmental stakeholders including the public	Emergency response organisations facilitate communication with the public.	B.4.3
External (off-site) preparedness planning	Potential adverse off-site effects of chemical accidents are effectively mitigated.	B.5
Emergency response and mitigation	Response actions are timely and effective in mitigating the adverse effects of accidents.	B.6
Investigations	Root causes, contributing causes and lessons learned are identified through the investigation of key accidents and other unexpected events involving hazardous substances.	B.7

TYPES OF METRICS USEFUL FOR SAFETY PERFORMANCE INDICATORS

The following types of metrics are useful for both outcome and activities indictors. These descriptions are intended to provide a starting point for considering alternative metrics for an individual indicator. These are not exclusive; there are other types of metrics that may be more appropriate for specific circumstances. See Annex I for additional information about metric types.

Descriptive Metrics: A descriptive metric illustrates a condition measured at a certain point in time. Descriptive metrics can be used by themselves but, more typically for SPIs, they serve as the basis for threshold or trended metrics (see below). Descriptive metrics include:

- Simple sums – raw tallies of numbers (*e.g.*, number of staff who performed quickly and adequately during tests of the emergency preparedness plans).
- Percentages – simple sums divided by totals (*e.g.*, percentage of staff who performed quickly and adequately during tests of the emergency preparedness plans).
- Composite – descriptive metrics involving more complex calculations or a combination of data types (*e.g.*, percentage of junior staff who performed quickly and adequately during tests of the emergency preparedness plans, which combines a percentage metric with information about level of experience).

Threshold Metrics: A threshold metric compares data developed using a descriptive metric to one or more specified "thresholds" or tolerances, where thresholds/tolerances are designed to highlight the need for action to address a critical issue. Threshold metrics include:

- Single threshold – compares data from a descriptive metric to a single tolerance level. When the tolerance level is exceeded, specified action should be taken.
- Multiple threshold – A multiple threshold metric highlights the need for different types of actions based on different tolerance levels. For example, a first tolerance level could indicate the need for a safety review; whereas, a second (higher) level could indicate the need to also take specific actions.

Trended Metrics: A trended metric compiles data from descriptive metrics and show change over time. Trended metrics include:

- Simple trend – presents output from descriptive metrics at different points in time that show changes in safety data over time. Simple trends are not manipulated to account for outside influences on the safety result.
- Indexed trends – trended descriptive metrics indexed on one or more variables that affect but are not affected by safety. Indexed trends try to account for outside factors (*e.g.*, changes in the number of hazardous installations in a community) to isolate the influence of safety performance.

Nested Metrics: Nested metrics are two or more of the above types of metrics used to present the same safety-related data for different purposes. For example, one metric may provide point-in-time data for comparison with tolerances (*e.g.*, to highlight specific deviations from programme expectations) and the other metric may compile information in a condensed format for senior officers (*e.g.*, number of deviations from expectations within a given period).

Section B.1 Organisational Goals and Objectives

Emergency response personnel 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 emergency response personnel should define the path toward ensuring the protection of the public, the environment and property in the event of chemical accidents.

See Guiding Principles document, para.:
- 1.12 Authorities to set objectives and ensure implementation; should motivate others with respect to accident prevention

TARGET
The goals and objectives effectively focus resources on the protection of human health, the environment and property from chemical accidents.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent organisational goals and objectives have been incorporated into policies, programmes, procedures and practices.
ii) Extent the organisational goals and objectives have assisted in identifying programme priorities and focusing resources.

Activities Indicators

i) Have short- and long-term goals been established to address protection of human health, the environment and property 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 planning and mitigation;
   - improving prevention techniques;
   - providing public access to chemical hazards information;
   - obtaining involvement of all stakeholders.
iii) Is a process in place for evaluating progress toward these organisational goals and objectives?
iv) Is there a workplan in place that identifies the specific steps for accomplishing the goals and objectives?
v) Is there a mechanism for periodically evaluating and auditing the organisation's programme relative to the organisations goals and objectives? Has the programme been adjusted based on:
   - revisions and/or changes in the goals and objectives;
   - lessons learned in implementing the programme;
   - advancements in the safety of hazardous installations;
   - lessons learned from incidents.

Section B.2 Personnel

Emergency response organisations should ensure the availability of appropriate staff to carry out their roles and responsibilities with respect to chemical safety. In order to accomplish this, emergency response organisations 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 has the right mix of expertise, knowledge and experience;
- management provides adequate support and resources in order to achieve the mission;
- 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.a.18 Sufficient numbers of qualified, educated and trained staff
- 3.c.8 Train and equip inspectors
- 3.c.11 Sufficient resources and trained personnel for inspections
- 5.c.8 All involved in emergency response should be trained and educated on continuing basis
- 10.8 Responders should have information and skills needed to assess need for further support
- 15.a.4 Maximising integrity of evidence needed for investigations

Emergency response organisations 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. Based on the roles and responsibilities of each staff member, training and education should include both general and specialised training.

Emergency response organisations are responsible for developing emergency response plans and responding to accidents to mitigate their effects. They are also responsible for working with industry to prevent accidents. Therefore, preventing accidents, as well as preparing for and responding to accidents, should be included in the training and education programme. Additionally, staff members should understand generally prevention, preparedness and response systems, and should receive specialised training in their area of expertise. Staff members should also have full knowledge and understanding of the laws, regulations and standards, to the extent that they are relevant to the staff members' position.

TARGET
There are appropriate staffing levels, with employees who are competent, trained and fit for their jobs.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent emergency response organisations have the appropriate and sufficient staff to accomplish the goals and objectives of their mission, including the right mix of technical and policy expertise and knowledge.
ii) Percentage of the required prevention, preparedness and response tasks (*e.g.*, inspections, audits) completed through the appropriate management of staff and resources.
iii) Extent training has improved staff understanding, knowledge and behaviour.
iv) Extent staff performs their roles and assigned tasks adequately during emergency response actions and during tests of emergency preparedness plans.

Activities Indicators

i) Is there a process for recruiting and assigning the staff consistent with the needs of the organisation?
ii) Are roles and responsibilities for all staff clearly identified and articulated?
   - Do staff members have job descriptions that 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.

iii) 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, policy and operational 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.

iv) 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.

v) 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.

vi) Are there training programmes for all categories of employees?
- Does this include initial and on-going training;
- Does this include hazmat training for relevant employees.

vii) Are there mechanisms to ensure that the scope, content and quality of the training and education programmes are adequate?
- 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, for example, following exercises of emergency plans or accident response.

viii) Is there a mechanism to check that training is actually performed according to the training programmes, and achieves its desired results? In this regard, are the following aspects checked and are records maintained concerning:
- each element of the training programme;
- number of staff members trained;
- period of time between retraining activities;
- individual results in terms of the competence of the staff member being trained.

Section B.3 Internal Communication/Information

Emergency response organisations have a wide array of activities that fall under their responsibility. Staff members 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 an emergency response organisation is critical to ensure sharing and learning from each other's experiences as well as to avoid overlap of efforts.

TARGET
Key information is exchanged within an emergency response organisation.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Extent of the effectiveness and efficiency of internal communication mechanisms (in order to avoid overlaps, gaps or conflicts of effort within the organisation).

Activities Indicator

i) Are there mechanisms for communicating internally on day-to-day activities?
- Does the staff receive the information they need to meet their responsibilities;
- Are there different mechanisms for communication to allow the most appropriate to be selected;
- Do the mechanisms allow for two-way communication, both from management to employees and from employees to management;
- Is there a means of ensuring people are using the available mechanisms to communicate.

Section B.4 External Co-operation

This Section recognises the importance of emergency response personnel working together with other public authorities, as well as co-operating with industry and with other non-governmental stakeholders, in order to improve chemical accident prevention, preparedness and response.

This Section includes the following sub-sections:

- Co-ordination Among Relevant Authorities at all Levels
- Co-operation with Industry
- Co-operation with Other Non-Governmental Stakeholders Including the Public

B.4.1 CO-ORDINATION AMONG RELEVANT AUTHORITIES AT ALL LEVELS

There are a variety of emergency response organisations and other public authorities within a given jurisdiction concerned with the prevention and preparedness of, and response to accidents involving hazardous substances (as well as with preparedness and response). Therefore, there is a need to establish co-ordinating mechanism(s) in order to minimise overlapping and conflicting requirements and to help ensure that there is effective co-operation among emergency responders including police, firefighters, hazmat teams and emergency medical personnel.

TARGET
Response organisations and other public authorities co-ordinate their activities and exchange information related to chemical accident prevention, preparedness and response.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent problems associated with overlaps and conflicts among response organisations (and other public authorities) have been eliminated.

ii) Availability of effective communication mechanisms to address potential overlaps and conflicts.

Activities Indicators

i) Has a co-ordinating infrastructure been established for all the relevant emergency response organisations and other public authorities?
   - Does this infrastructure identify the roles and responsibilities of each relevant emergency response organisation.

ii) Is there a process for exchanging information among relevant response organisations and other public authorities?
   - Does this process include periodic meetings and discussions;

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders; co-operation among all parties
- 1.17 Sharing of information among authorities, industry associations and others
- 3.a.3 Public authorities to promote inter-agency co-ordination
- 3.a.4 Authorities to consult other stakeholders when setting objectives and control framework
- 3.a.9 Requirements and guidance should promote innovation and improved safety
- 3.b.4 Land-use planning activities of public authorities should be well co-ordinated
- 3.c.6 Sharing information and experience related to inspection methods and outcomes
- 3.c.12 Various authorities should co-operate and co-ordinate with respect to inspections
- 3.c.14 Consider co-ordination of various aspects of safety, health and environment
- 5.a.5 All involved in emergency response should be involved in planning process
- 5.a.9 Co-operation to ensure that medical personnel know about chemicals in the community
- 5.a.14 All parties to ensure people, equipment and resources needed for response are available
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.4 Integration of chemical emergency planning and planning for natural disasters
- 5.c.5 Identification of all parties who are expected in participate in an emergency response
- 5.c.17 Industry and authorities to facilitate sharing of medical resources in event of an accident
- 5.c.21 Co-ordination of emergency planning among potentially affected communities
- 6.2 (co-ordination of land-use planning activities of local, regional and national authorities
- 7.11 Consultation among authorities, industry and the public concerning public information
- 7.17 Exchange of information on best practices for communication with the public
- 13.4 Sharing of information among health/medical professionals
- 14.a.1 Stakeholders to encourage voluntary information sharing on accidents and near-misses
- 15.a.13 Improve sharing experience on methodologies for investigations
- 15.c.5 Co-ordination of agencies in accident investigations
- 16.a.1-9 Transboundary co-operation and consultation
- 17.a.2 Co-operation among all parties at transport interfaces
- 17.a.17 Consistent approach in control framework for different modes of transport
- 17.a.18 Harmonisation of laws and policies across countries for transport interfaces
- 17.a.19 Authorities to co-operate on harmonisation of requirements for different modes of transport

- 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 organisations in different countries.

B.4.2 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 (*e.g.*, industry, public authorities at all levels including emergency response personnel, the community/public). For accident prevention to be most effective, there should be co-operation among these stakeholders.

Emergency response organisations should co-operate with and stimulate industry to carry out industry's responsibility to ensure the safe operation of hazardous installations and to improve the quality of emergency response should an accident occur. In addition, response organisations should co-operate with enterprises in the development of on-site preparedness plans, as well on off-site plans. 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 substances.

TARGET
Emergency response organisations and industry co-operate to improve safety by exchanging information, experience and lessons learned and by promoting voluntary risk reduction activities.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Percentage of regulated industry that has improved safety of hazardous installations as a result of co-operation with emergency response organisations.

Activities Indicators

i) Are partnerships with industry and response organisations promoted to facilitate active dialogue and information exchange between these two stakeholder groups?

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders; co-operation among all parties
- 1.13 Authorities to co-operate with, and stimulate industry, to ensure safety
- 1.15 Local authorities should co-operate with enterprises in their community
- 1.17 Sharing of information among authorities, industry associations and others
- 1.19 Assistance to enterprises with limited resources such as SMEs
- 3.a.4 Authorities to consult other stakeholders when setting objectives
- 3.a.6 Flexibility in the control framework concerning methods to meet safety objectives
- 3.a.9 Requirements and guidance should promote innovation and improved safety
- 3.a.17 Authorities should facilitate information sharing on safety management systems
- 3.a.20 Additional activities such as technical assistance, research, training, public awareness
- 3.a. 21 Authorities to promote assistance to SMEs and others needing help
- 3.c.1 Authorities to establish programmes for monitoring installations' safety
- 3.c.2 Authorities to prepare guidance related to compliance obligations
- 3.c.3 Inspectors and related authorities to be publicly accountable
- 3.c.13 Inspectors and industry should co-operate in conduct of audits and inspections
- 5.a.5 All involved in emergency response should be involved in the planning process
- 5.a.6 Off-site and related on-site emergency plans should be consistent and integrated
- 5.a.7 Authorities and industry should co-operate on emergency planning
- 5.a.8 Co-operation between industry and response personnel
- 5.a.9 Co-operation to ensure that medical personnel know about chemicals in the community
- 5.a.14 All parties to ensure people, equipment and resources needed for response are available
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.2 Authorities to ensure off-site and on-site emergency plans in co-ordination with industry
- 5.c.17 Industry and authorities to facilitate sharing of medical resources in event of an accident
- 7.11 Consultation among authorities, industry and public concerning public information
- 14.a.1 Stakeholders to encourage voluntary information sharing on accidents and near-misses
- 15.a.12 Relevant information in investigation reports to be shared
- 15.c.3 Investigation reports prepared by authorities should be published
- 17.a.2. Co-operation among all parties at transport interfaces

- Is there co-operation in the development of on-site preparedness plans;
- Is there co-operation in the development of off-site preparedness plans;
- Is there co-operation to improve industry's responsibility for improving safe operation of hazardous installations;
- Is there co-operation to improve emergency response.

ii) Is there a mechanism for providing incentives for industry to go beyond the minimum requirements for improving chemical safety and reducing chemical risks (*e.g.*, reduced costs for industry, limitation of inspections)?

B.4.3 CO-OPERATION WITH OTHER NON-GOVERNMENTAL STAKEHOLDERS INCLUDING THE PUBLIC

Non-governmental 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 to work with industry and public authorities on innovative ways to improve safety of hazardous installations and reduce risk.

The public considers emergency response organisations a trusted source of information related to risks in their community. Thus, these organisations should help to ensure that the potentially affected public understand what actions to take should an accident occur. In this regard, it is important for emergency response organisations to work co-operatively with these non-governmental stakeholders to facilitate the dissemination of useful information and guidance and to avoid redundancy and conflicting messages being given to industry and the public.

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders; co-operation among all parties
- 1.16 Establish multi-stakeholder groups to develop and disseminate safety information
- 1.17 Sharing of information among authorities, industry associations and others
- 3.a.4 Authorities to consult other stakeholders when setting objectives and control framework
- 4.e.4 NGOs should participate in legislative and regulatory processes
- 5.a.5 All involved in emergency response should be involved in planning process
- 5.a.12 Emergency plans should be tested, reviewed and maintained up-to-date
- 5.a.14 All parties to ensure people, equipment and resources needed for response are available
- 5.a.20 Multi-national and regional co-operation on emergency planning among stakeholders
- 5.c.4 Integration of chemical emergency planning and planning for natural disasters
- 5.c.5 Identification of all parties who are expected in participate in an emergency response
- 7.1-7.17 Chapter on communication with the public
- 14.a.1 Stakeholders to encourage voluntary information sharing on accidents and near-misses
- 15.d.1 Public involvement in debriefing and accident investigations
- 16.a.6 Transboundary co-operation; public participation in licensing or siting procedures
- 17.a.2 Co-operation among all parties at transport interfaces

TARGET
Emergency response organisations facilitate communication with the public.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Extent members of the potentially affected public clearly understand the chemical risks associated with hazardous installations in their community as a result of information they receive from emergency response organisations and non-governmental stakeholders.

Activities Indicators

i) Are partnerships formed between response organisations and relevant non-governmental stakeholders to:
   - improve information dissemination and understanding of the nature of messages so they will be received by the target groups and that they will be 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 being given to the public or industry;
   - increase the quality of guidance provided to industry on meeting requirements as well as reducing risk.

ii) Do response organisations work with non-governmental stakeholders and other public authorities to provide information on chemical risks to the public? Does the information include:
- guidance for understanding risk and steps being taken 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.

Section B.5 External (off-site) Preparedness Planning

See Guiding Principles document, para.:
- 5.c.1-23 Roles and responsibilities of public authorities related to emergency preparedness and planning

Accidents involving hazardous substances have the capability to affect not only workers and property on-site but also the public, the environment and property outside the boundaries of the hazardous installation. For that reason, off-site emergency preparedness plans at all levels of government are necessary to mitigate potential harmful effects from accidents 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.

Emergency response organisations have critical roles and responsibilities related to the development of off-site emergency preparedness plans. It is important that response organisations (police, firefighters, hazmat teams and emergency medical personnel) co-ordinate in planning for first response activities and for ensuring appropriate communication capabilities. In addition, response organisations should co-ordinate with other public authorities involved in emergency planning, including organisations in neighbouring communities and countries that might be affected in the event of an accident.

TARGET
Potential adverse off-site effects of chemical accidents are effectively mitigated.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of hazardous installations that provide information to emergency responders to improve emergency preparedness.
ii) Percentage of the potentially affected public who know what to do when an accident occurs (as demonstrated during accidents and exercises).
iii) Extent to which emergency response personnel and other authorities know what actions to take in the event of an accident involving hazardous substances.
iv) Extent of deficiencies in the off-site emergency preparedness plan as revealed during an accident or test of the plan.
v) Extent to which tests of emergency response plans, and responses to accidents, reveal problems as a consequence of communication or co-ordination failures.

Activities Indicators

i) Is there a mechanism in place for emergency response organisations to work with other public authorities and industry to develop off-site emergency preparedness plans in order to avoid overlaps or conflicts in on-site and off-site emergency preparedness plans?
ii) 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;
   - special provisions to protect vulnerable populations (*e.g.*, schools, hospitals, homes for the elderly and sensitive environments that could be affected by an accident).

iii) Are the roles and responsibilities of all the parties involved in implementing the off-site emergency preparedness plan clearly identified? Is there the commitment and participation of each of the parties involved?

iv) Are mechanisms in place to activate off-site emergency preparedness plans when an accident occurs with the potential to impact people, the environment or property outside the installation?

v) Are the resources and capability needs for implementing the off-site emergency preparedness plan identified? Is there assurance that these resources will be available when an accident occurs?

vi) Are the combined resources from industry and the community adequate to deal with all the foreseeable accident scenarios?

vii) 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?

viii) 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?

ix) Is the public provided the opportunity to have input into the development of the off-site emergency preparedness plans?

x) 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?

Section B.6 Emergency Response and Mitigation

Key to a successful response is the establishment and implementation of a shared command structure. This structure should provide a common approach related to roles and responsibilities, processes, communication and terminology in order to enable those in the response community to work together in the mitigation of the human health and environmental effects from the incident. This command structure should be established during the planning process to ensure all those involved in a response are aware of their role and responsibilities.

See Guiding Principles document, paras.:

- 8.1-8.4 Emergency response – general principles
- 10.1 When alerted, response personnel should activate emergency plans
- 10.2 On-scene co-ordinator to decide on immediate actions to limit human exposure
- 10.3 On-scene co-ordinator to decide whether public to evacuate or shelter indoors
- 10.4 Response decisions should take account of long-term or delayed effects of exposure
- 10.7 Systems to be in place to obtain resources for response (*e.g.*, equipment, specialists)
- 10.8 Responders should have information and skills for assessing the need for further support
- 10.9 Elaboration of the information needed to support response actions
- 10.18 National and regional authorities to support local response operations
- 10.19 Response personnel to document actions and decisions taken during response
- 10.20 Co-operation during transition between emergency response and clean-up
- 10.21 Use polluter-pays-principle to recover costs
- 14.b.1 Authorities should require notifications of accidents

When an accident involving hazardous substances occurs, a quick and effective response is critical to ensure the protection of public health, the environment and property. A number of factors contribute to an efficient and productive response. First, emergency responders must be aware that an accident 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 the resources needed to mitigate adverse effects.

In order to make these decisions, emergency responders need information concerning the accident, the hazardous substances involved and available resources. Furthermore, is it important for emergency responders to co-ordinate with the on-site responders and personnel. Finally, the public needs to be kept fully appraised of the situation in order to protect themselves and their families.

TARGET

Response actions are timely and effective in mitigating the adverse effects of accidents.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Extent of time between the report that an accident involving hazardous substances has occurred and response personnel arriving at the scene.

ii) Extent of time between the report 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 in the number of deficiencies in an emergency response over time.

iv) Extent to which the preparedness plan worked as intended.

Activities Indicators

i) 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?

ii) Does each emergency responder have the required training and education and the appropriate experience to deal with the various types of responses to accidents?

iii) 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 to the accident?

iv) Is there a system in place to document all response and mitigation actions during an accident or an exercise of an off-site emergency plan in order to generate lessons learned and to update the plan?

v) Are there mechanisms 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 clear written procedures for the communication;
- Are the procedures available to all relevant staff and do they understand the procedures;
- Is there a means of ensuring the appropriate mechanisms are being used to communicate during an emergency.

vi) 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 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 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 impacts.

Section B.7 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, external factors 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. Investigations should also consider whether actions taken during the response to an accident contributed to any adverse impacts.

See Guiding Principles document, paras.:

- 15.a.1 Management should investigate all incidents; authorities should investigate significant accidents
- 15.a.2-15.a.10 Elements of root cause investigations
- 15.c.1-5 Role of authorities with respect to accident investigations

TARGET

Root causes, contributing causes and lessons learned are identified through the investigation of key accidents and other unexpected events involving hazardous substances.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

i) Extent investigations have identified the root and secondary causes that contributed to significant accident(s) involving hazardous substances, based on specified criteria.

Activities Indicators

i) Are there criteria to determine when an accident should be investigated?
ii) Do emergency response organisations investigate, or participate in investigations of, accidents to determine the cause of those accidents?
iii) Does the appropriate group of experts conduct each accident investigation, with participants having appropriate experience in the type of installation being investigated and/or with the type of process involved in the accident?
iv) Are all appropriate stakeholders (*e.g.*, industry, labour, emergency response organisations and other public authorities, local community) involved in accident investigations?
v) Are investigations conducted in such a way to ensure an independent, unbiased report of the causes of the accident?
vi) Are efforts made to determine all of the causes of the accident rather than just the apparent cause(s)?
vii) Is the impact of response activities taken into account in the accident investigations?
viii) Do emergency response organisations develop and distribute an accident investigation report for each accident investigation?
ix) Do emergency response organisations co-ordinate their accident investigations?

PART C. COMMUNITIES/PUBLIC
Overview

This Part addresses communities/public, and in particular organisations that represent communities in the vicinity of hazardous installations. 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 members of the public and communities themselves.

Without the existence of a relevant organisation, it could be difficult for a community to try to develop and implement an SPI Programme. There are a range of possible organisations – formal and informal – that might represent their community for this purpose. For example, interested members of the public might decide to create a local committee specifically concerned with the safety of local hazardous installations. This committee can facilitate the development of a safety culture within a community, as well as work on the SPI Programme. Set out on the next page is an example of "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).

The examples of outcome and activities indicators listed in this Part, along with associated targets, are organised by subject, based on the possible roles and responsibilities of communities/public. Specifically, it addresses:

- Prevention of Accidents
  - Information acquisition and communication
  - Influencing risk reduction (related to audits and inspections)
  - Participation in land-use planning and permitting
- Emergency Preparedness
  - Information acquisition and communication
  - Participation in preparedness planning
- Response and Follow-up to Accidents
  - Emergency response communication
  - Participation in debriefing and accident investigations

It is not expected that organisations will simply choose indicators and directly apply them. It is important to consider what aspects are most critical in your circumstances and then adapt or create the appropriate indicators.

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.

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 an SPI Programme, it is important to establish a structure to carry out the necessary steps. 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 fulfil their roles and responsibilities.

Although it is not exhaustive, the following highlights a number of issues to consider in order when creating 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 the 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).

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.

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).

Example of a Letter from an Enterprise Seeking to Establish 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 twenty years ago and has spread to 53 countries around 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 as well as with 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 our facility. Panel members do not take on any responsibilities beyond the provision of advice. We want to know what community, as well as with the issues are on your mind and particularly those that involve in some way the industrial sector in our local economy, and any specific concerns you or your neighbours might have 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 the panel to decide how frequent and when it 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

Section C.1 Prevention of Accidents

This Section 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 Section includes the following sub-sections:

- Information Acquisition and Communication
- Influencing Risk Reduction (related to audits and inspections)
- Participation in Land-Use Planning and Permitting

C.1.1 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, as well as with public authorities.

See Guiding Principles document, paras.:

- 1.2 Prevention is the concern of all stakeholders, including communities; co-operation among all parties
- 2.b.5 Representatives of the public should have a role in the risk assessment process
- 4.a.1 Potentially affected public should be aware of risks and know what to do if accident occurs
- 4.a.2 Communities representatives to serve as a link with other stakeholders and facilitate information exchange
- 4.a.3 Community representatives can help to educate public and provide feedback to authorities, industry
- 7.1-7.17 Chapter on communication with the public

TARGET

The community actively participates in obtaining information and providing feedback, resulting in a community with appropriate knowledge and understanding of the risks related to hazardous installations in their vicinity.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of the potentially affected public that know about and have an appropriate understanding of the chemical risks and consequences on human health and the environment.
ii) Percentage of understanding and retention by the community of information on chemical hazards and the consequences of accidents.
iii) Percentage of hazardous installations having been approached by members of the community for information on chemical risks and consequences on human health and the environment.
iv) Percentage of participation of members of the community in public hearings related to hazardous installations.
v) Number of initiatives related to chemical accident prevention, preparedness and response 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 along with other stakeholders (*e.g.*, public authorities, industry)?
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 visits to hazardous installations (to become familiar with the facilities)?
iv) Do members of the community have access to information on hazardous installations (such as 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 related to *e.g.*, the nature of the hazards at installations, accident scenarios) 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 e-mail, telephone, visits to the site, etc.)?
vii) Do members of the community assist (co-operate with) industry and 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 surveys concerning the knowledge of the community about 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 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)?

C.1.2 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 appropriate, 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.:
- 2.g.5 Consider including community representatives in audit activities
- 3.c.3 Inspectors and related authorities to be publicly accountable

TARGET
There is substantial participation by members of the public in audits, inspections and follow-up activities (*e.g.*, related to corrective measures).

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of audits/inspections that members of the community have taken part in, when 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 audit action plans or inspection 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 of audits and inspections of hazardous installations; the findings and conclusions of inspections undertaken by public authorities; and related enforcement actions?
ii) Do members of the community take part in audits and/or inspections when opportunities are available?
iii) Do members of the community use available channels to provide feedback or take action using existing channels, in light of recommendations and other information contained in the inspection reports?
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?

C.1.3 PARTICIPATION IN LAND-USE PLANNING AND PERMITTING

See Guiding Principles document, paras.:
- 3.a.14 Opportunity for public input into licensing decisions
- 6.7 Public input into decision-making related to siting of hazardous installations
- 16.a.6 Transboundary co-operation: public participation in licensing or siting procedures

Land-use planning is an essential element in an overall chemical accident prevention, preparedness and response programme. It is one of the necessary steps to limit the likelihood of an accident with off-site effects and to protect community health and safety. Members of the public have vital roles in land-use planning decisions, in the selection of a proposed site for a new hazardous installation and in permitting decisions relating to major modifications to an existing installation. Representatives of a community can provide important input into the planning process, to help ensure that there are no unacceptable risks to human health, the environment or property.

Likewise, members of the community should play an active role in the permitting process for those installations that are so potentially hazardous that they need approval by public authorities in order to operate. Public participation provides valuable input needed for evaluating permit requests.

TARGET
Members of the public actively participate in decision-making related to land-use planning, siting and permitting.

POSSIBLE 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 land-use planning processes for new hazardous installations or modifications to existing installations;
   - in the permitting procedures for hazardous installations;
   - in the assessment of the impact of new activities of the hazardous installations on public safety (acceptability for the public)?
ii) Do members of the community take part in decision-making processes designed to prevent the placing of new developments near hazardous installations?
iii) Do members of the community have access to records of planning permissions related to hazardous installations?

Section C.2 Emergency Preparedness

This Section applies to the roles and responsibilities of communities in helping to ensure adequate preparedness planning for accidents involving hazardous substances.

This Section includes the following sub-sections:

- Information Acquisition and Communication
- Participation in Preparedness Planning

C.2.1 INFORMATION ACQUISITION AND COMMUNICATION

For the members of the community, information acquisition means: receipt of information without request ("active information") including information on the actions to take in the event of a chemical accident; and having access to additional sources of information and to decision-makers to be able to gain further insights on both off-site preparedness planning (by public authorities) and on-site planning (by industry).

See Guiding Principles document, paras.:
- 5.c.20 Information to the public following an accident
- 5.d.3 Community involvement in developing and implementing programmes to communicate with the public
- 5.d.8 NGO role in increasing public awareness

In this context, there should be two-way communication between members of the community and other stakeholders to both receive and provide information. Generally, it will mean a role for the community representatives (e.g., organisation, committee) to pass the acquired information to the potentially affected public and to the hazardous installations. In this way, community representatives can facilitate information exchange between the community and the hazardous installations.

TARGET
The potentially affected public is prepared to take the appropriate actions in the event of an accident involving hazardous substances.

POSSIBLE 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 enterprises and by public authorities, which was reviewed by the members of the community.
iv) 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 public presentations (*e.g.*, public meetings or hearings) related to the development of preparedness plans?
ii) Do members of the community co-operate with industry and public authorities in giving the potentially affected public information on what should be done in the event of a chemical accident?
iii) Do members of the community assist (co-operate with) the enterprise and public authorities to help ensure effective communication related to emergency measures and actions to be taken in the event of an accident involving hazardous substances, when opportunities are available?
iv) Do members of the community have free access to off-site emergency plans related to of the hazardous installations?
v) Do members of the community receive or proactively seek information directly from hazardous installations on the emergency measures and actions to be taken in the event of accidents involving hazardous substances?

vi) Do members of the community monitor the information provided related to the emergency measures and actions to be taken in the event of accidents involving hazardous substances (and to see if the dissemination of such information to the potentially affected public is done in an easily understandable manner)?

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 that might provide assistance?

C.2.2 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, 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.

See Guiding Principles document, paras.:
- 5.a.18 Potentially affected public should be notified of warning systems
- 5.c.2 Development, implementation, testing and updating of response plans should include, as appropriate, community representatives
- 5.d.1–4 Community representatives to participate in development, review and testing of preparedness plans and development of risk communication programmes

TARGET
The community takes an active role in the development of emergency plans.

POSSIBLE 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 (based on an evaluation of the community responses during the exercise).
iv) Average time of implementation of recommendations made by representatives of the community following 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), when opportunities are available;
   - 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 affected communities?

Section C.3 Response and Follow-up to Accidents

This Section applies to the roles and responsibilities of the communities in helping to ensure adequate emergency response when accidents involving hazardous substances occur or threaten.

This Section includes the following sub-sections:

- Emergency Response Communication
- Participation in Debriefing and Accident Investigations

C.3.1 EMERGENCY RESPONSE COMMUNICATION

Communities should receive and understand the instructions provided as part of the preparedness planning and should follow those instructions when an accident occurs. It is necessary that the members of the community follow the instructions to help ensure an adequate and efficient emergency response.

See Guiding Principles document, paras.:
- 11.a.1 Public should be aware of warning systems and follow instructions if accident occurs
- 11.a.2 Public should seek information from public authorities following an accident

TARGET
In the event of an accident, members of the community follow the preparedness plan and response instructions.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicator

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 inform the appropriate officials when they notice an unusual situation?
ii) Do members of the community follow the preparedness and response instructions when an accident occurs and subsequently?

C.3.2 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 preparedness and response.

See Guiding Principles document, para.:
- 15.d.1 Public involvement in debriefing and accident investigations

TARGET
Members of the community participate actively in debriefing and accident investigations, and promote related improvements in risk reduction and emergency preparedness.

POSSIBLE SAFETY PERFORMANCE INDICATORS:

Outcome Indicators

i) Percentage of deficiencies identified by the public at the time of a response that were subsequently addressed.

ii) Extent to which the community takes relevant steps as a result of an emergency response, such as providing assistance to improve preparedness planning and information dissemination.

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;
- other follow-up and debriefing activities related to the accident and its investigation?

v) Do members of the community take appropriate steps to promote implementation of corrective measures, if they have not occurred?

ANNEX I: Further Guidance on Developing SPI Metrics

Introduction

This Annex provides detailed guidance on the selection of metrics when choosing outcome and activities indicators for an SPI Programme. It should be used in conjunction with Steps Three and Four of Chapter 2 *(How to Develop an SPI Programme)*.

Outcome and activities indicators consist of two inter-related parts: *what* is being measured (*e.g.*, staff competence) and *how* it is being measured (*e.g.*, number of staff scoring above 75% on a competency test). The "metric" associated with an indicator is focused on the question of *how* the indicator is being measured. For this *Guidance*, a *metric* is defined as system of measurement used to quantify safety performance for *outcome* and/or *activities* indicators.

This Annex contains definitions related to: indicator subjects; data collection methods; data types (measurement levels); and categories of metrics. The definitions are followed by four tables that will help you to choose a metric for an indicator, depending on your answers to the following questions: what is being measured; how will the data be collected; what type of data best fits your needs; and what category of metric best fits your needs? The logic for using the sets of definitions and tables for choosing a metric is set out in Figure 2 (Steps for Selecting a Metric) and Figure 3 (How to Use this Annex) on the following pages. Figure 2 provides an overview of the questions that a user should ask and address and the steps for selecting a metric. Figure 3 provides additional detail on how to use the information in the Annex to complete these steps.

FIGURE 2 - STEPS FOR SELECTING A METRIC

The purpose of this Figure is to help you select a metric for a particular outcome or activities indicator by determining four relevant elements: the subject of your indicator; the data collection method; the type of date you will collect; and the category of metric that is appropriate.

Before you start, try to answer these questions:

- Who will use the indicator?
- How will the indicator be used to make decisions?
- How can the outcome/activities be measured?
- What potentially useful data are already collected by the enterprise?

Answer the questions below, referring to the Step-by-Step guidance in Chapter 2 and the definitions on pages 118 through 121. Use your answers to the questions along with Table 1 and the appropriate version of Table 2 (2A, 2B or 2C) to complete the green boxes and choose a metric for your outcome or activities indicator.

What is being measured?
(*e.g.* people, organisations, legal/regulatory/ inter-organisational frameworks, physical state/ condition, hazard/risk)

- Identify the subject of the SPI.
- Refer to **Indicator Subjects - Definitions**, page 118.

INDICATOR SUBJECT:

How will the data be collected?
(*e.g.*, testing, surveys, interviews, document review, observations, combined methods)

- If generating new data for the SPI, identify data collection methods that fit the measurement culture of the enterprise.
- If using existing data for the SPI, identify data collection methods associated with the existing data.
- Refer to **Data Collection Methods - Definitions**, page 119.

DATA COLLECTION METHOD:

→

What type of data best fits your needs?
(*e.g.*, binary measures, categories, ordered measures, ratio measures)

- Based on your answers to "what is being measured?" and "how will the data be collected?" review **Table 1**, page 122 and identify the data type that best meets your needs.
- Refer to **Data Types (Measurement Levels) - Definitions** page 120.

DATA TYPE:

→

What category of metric best fits your needs – descriptive, threshold or trended?
What table (2A, 2B or 2C) represents that category?

- Identify the category of metric that seems to best fit your needs – descriptive, threshold or trended.
- Refer to **Categories of Metrics - Definitions**, page 121.
- Identify the metrics selection table, **2A (Descriptive)**, page 124, **2B (Threshold)**, page 125 or **2C (Trended)**, page 126, associated with the general type of metric that you identify.

CATEGORY OF METRIC:

TABLE 2A, 2B OR 2C:

→

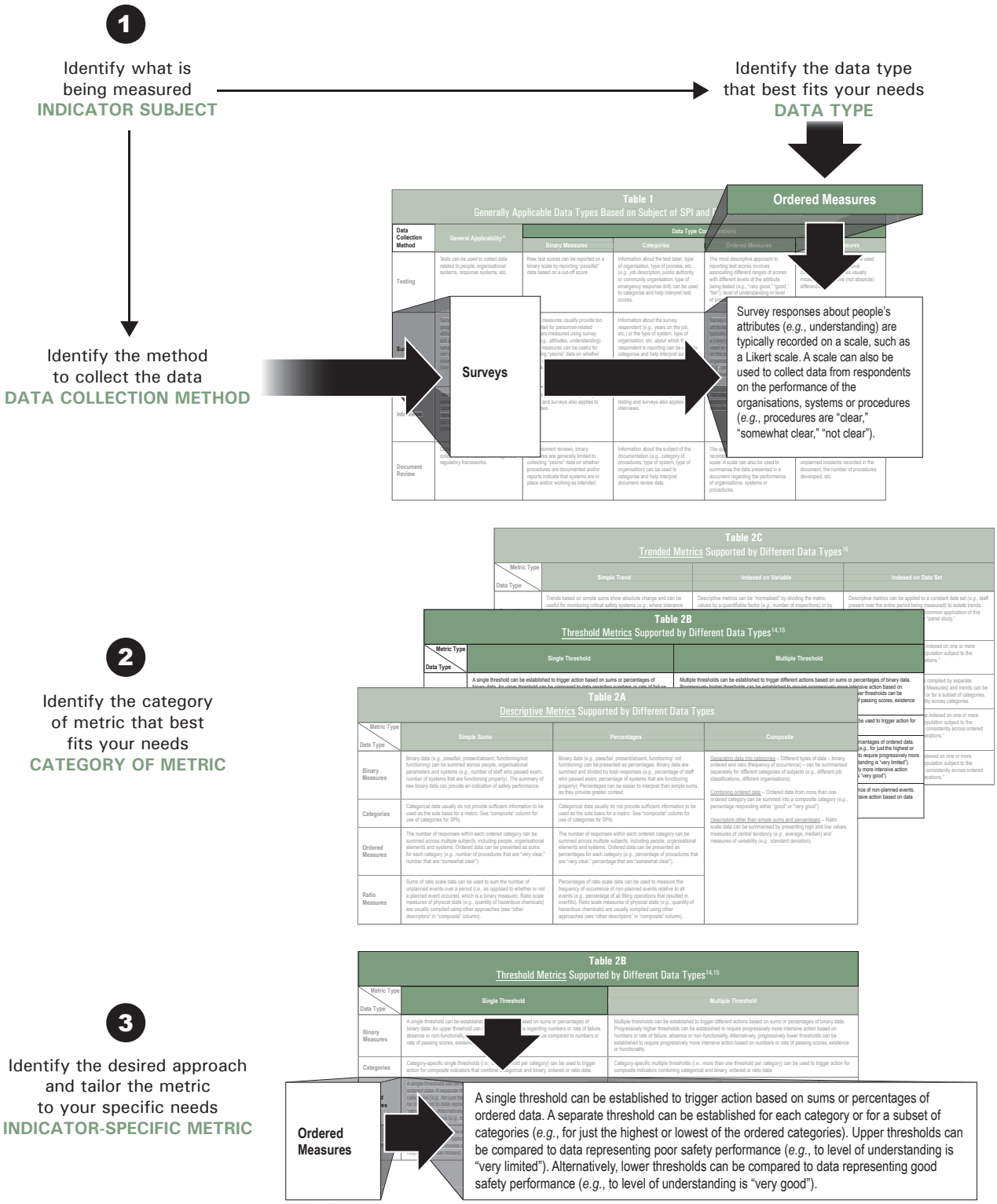
What is the best metric for your application?

- Find the entry in the metrics selection table (**Table 2A**, **2B** or **2C**) that corresponds to the data type identified using **Table 1**.
- Review the entry, identify the desired approach and develop the details for the metric to best meet your needs.

INDICATOR-SPECIFIC METRIC:

FIGURE 3 - HOW TO USE THIS ANNEX

The following is an example of how this Annex can be used to identify the best metric for your application. This example identifies a situation where a simple threshold metric will be used for an outcome/activities indicator that will rely on survey data. This example is for illustration only. Other metrics, appropriate to your specific circumstance, can be selected using a similar approach.



Indicator Subjects - Definitions

For purposes of defining metrics, safety performance indicators can generally be organised into five categories: people, organisations, systems/processes, physical plant/processes and hazard/risk:

People: Indicators can measure people's attributes, such as understanding, values, attitudes, capabilities and behaviour. People subject to SPIs could include public authority employees, emergency response personnel, community members and employees at hazardous installations. Examples of SPIs that measure people's attributes include:

- Extent to which each staff member has the appropriate knowledge and expertise to meet the responsibilities of their job.
- Extent to which employees at public authorities and emergency response personnel roles understand their respective roles and responsibilities of during an accident.
- Extent to which members of the community proactively seek information on the emergency measures and actions to be taken in the event of accidents.

Organisations: Similar to indicators of people's attributes, indicators can be used to measure an organisation's attributes. Analogous to people, organisations can demonstrate values, attitudes, capabilities, and behaviours, which will be reflected in organisational structure and staffing, systems and operations. However, measuring organisations is a fundamentally different task than measuring people, which has implications for the types of metrics that are most applicable. Examples of SPIs that measure organisational attributes include:

- Extent to which the mix of technical and policy expertise is appropriate in order to meet the mission of the organisation.
- Extent of the effectiveness and efficiency of internal communication mechanisms, such that no overlap, gaps, or conflicts of effort takes place within the organisation.
- Extent to which mechanisms are in place to ensure that the scope, content and quality of the training and education programmes are adequate.

Legal, regulatory, and inter-organisational frameworks: Indicators can also be used to measure attributes of legal, regulatory and inter-organisational frameworks, such as their existence, implementation status and effectiveness. In addition to laws and regulations, this category addresses guidance and formal and informal aspects of communication among public authorities, emergency responders, communities and hazardous installations. Examples of SPIs that measure legal, regulatory and inter-organisational frameworks include:

- Extent to which overlaps and conflicts in the requirements related to safety of hazardous installations have been eliminated among relevant public authorities.
- Extent to which the public is provided the opportunity to have input into the development of the off-site emergency preparedness plans.
- Extent to which systems are in place to gain immediate access to the necessary information to effectively respond the accident.

Physical state/condition: Indicators can be used to measure the state or condition of the physical environment. These could include measures of geography (*e.g.*, proximity of hazardous installations to residential areas), demographics (*e.g.*, population) and hazardous material quantities. Examples of SPIs that measure the physical state/condition include:

- Extent to which the number of people residing and working within the hazardous zone of a hazardous installation has been reduced.
- Extent to which the areas of vulnerable populations (*e.g.*, schools, hospitals, nursing homes) within the hazardous zone of a hazardous installation have been reduced.
- Reduction of impact zone of chemical accidents (distance).

Hazard/risk: SPIs are also used to monitor progress in attaining more complex measures of safety such as hazard or risk. These are more complex expressions of a physical state or condition. Examples of SPIs that address more complex measures of safety include:

- Reduction of chemical risks at hazardous installations.
- Improvements in safety of hazardous installations and reduction of chemical risks to local communities as a result of interaction and collaboration of public authorities, industry and communities.

Data Collection Methods - Definitions

When defining an SPI, it is important to identify what data are available already or could be obtained to support the indicator. For organisations that already have data that will support an indicator, defining the data by data type will help select the appropriate metric. For organisations that will need to collect new data to support an indicator, the collection method will influence applicable data types which, in turn, will influence the types of metrics that can be used. The following are common data collection methods used in the context of performance indicators:

Testing: Testing is a procedure whereby people or systems are subject to stimuli and conclusions are drawn based on an objective evaluation of responses. For example, people can be given tests to evaluate their understanding of organisational processes such as inspections and audits, and inter-organisational emergency response systems can be tested using incident exercises. Testing data can be reported in terms of raw test scores, test scores described on a scale (*e.g.*, below average, average, above average), or as pass/fail.

Surveys: Whereas tests require that test administrators draw conclusions based on responses, surveys ask respondents to directly self-report. A test may ask the taker a series of questions to gauge their understanding of opportunities for participation in emergency preparedness planning, while a survey may ask the respondent to directly characterise their level of understanding (*e.g.*, very good, good, fair, poor). Survey data are best reported on a scale, such as a "Likert scale."

Interviews: Interviews can be used to obtain the same types of data as testing and surveys. For example, rather than administer a written test, people can be asked a series of questions in an interview format. Although interviews can be more time-intensive and can require a greater level of expertise, they allow for immediate follow-up questions that can help an organisation better understand responses and obtain information needed to remedy a safety situation.

Document Review: Document review can be used as an element of performance indicators of legal and regulatory frameworks. Document reviews can include reviews of regulations, safety reports, inspection reports and permits. They can be used to collect data on numbers, for example, of inspections and enforcement actions. They can also be used to assess the quality of safety reporting and accident investigations.

Observations: Observations involve watching people as they perform normal safety-related tasks or as they respond to incidents or incident exercises. Observations can include elements of testing, where the observer "grades" subjects on pre-determined criteria. In addition, like surveys, observations allow the observer to note information that may not be captured in a limited set of test questions but that may be important to understand the overall setting and the appropriate response to remedy a safety situation.

Combined Methods: The above methods can be combined into a complementary data collection strategy. For example, survey questions can be included in a written test to gather data for scoring and to complement self-reported data. Interviews can be conducted following tests, surveys or document review to gather information to better understand the results of these activities and address safety concerns. When combining methods, care should be exercised to handle different data types in a way that does not violate their validity (*e.g.*, to avoid using survey data reported on a scale as part of a test-scoring approach).

Data Types (Measurement Levels) - Definitions

Different data types, or measurement levels, provide different kinds of information and can be manipulated in different ways. Data type can be a function of existing data that will be used for an SPI or can be selected based on the subject of the SPI and the data collection tool. Data type will affect the types of metric that can be used for an SPI. Performance measures typically rely on the followings data types, or measurement levels:

Binary measures: Binary measures can have one of two values, such as "yes/no," "pass/fail," or "functional/not functional." Binary measures are less descriptive than other types of measures, but they can be used to provide a simple, clear message. They can be useful for compiling more complex safety data into a summary message for senior managers.

Categories: Categories can be used to describe different emergency response roles, different job categories, etc., where the categories do not reflect a specific order (*e.g.*, the order in which categories are displayed does not indicate that one category is valued more highly than the next). Categorical data by itself is not useful for performance indicators. However, using categories to help interpret other types of data can provide useful insights. For example, if public agency personnel, emergency responders and community members are all asked the same question (*e.g.*, do you feel well prepared to react in the event of an incident?), categories can be used to separate the responses and identify differences among different groups. This can help focus subsequent safety improvement efforts.

Ordered measures: Ordered measures (also know as "ordinal measures") are used to order or rank data on a scale, such as a "Likert scale." Ordered data are grouped in categories that are both mutually exclusive and cover all possible values. Ordered data are useful for safety measurements that are harder to quantify, such as "level of understanding" or "competence." With ordered data, the difference between one category and the next (*e.g.*, the difference between "good" and "very good") is not constant, and approaches that assign "scores" to different categories should be avoided or used with caution.

Ratio measures: Ratio measures are used for data that can be expressed using common units (*e.g.*, meters, years) where there is a true zero value. When data meet these requirements, meaningful ratios can be calculated. Ratio measures are generally applicable for indicators measuring a physical state/condition (*e.g.*, number of qualified first responders) and tallies of unplanned events (*e.g.*, number of incidents) rather than personnel or organisational systems.

Categories of Metrics - Definitions

The following categories of metrics are useful for both outcome and activities indictors. (They are not exclusive; other metrics may be more appropriate for specific circumstances). These descriptions are intended to provide a starting point for considering which category of metrics is best for a specific indicator.

Descriptive Metrics: A descriptive metric describes a condition measured at a certain point in time. Descriptive metrics can be used by themselves but, more typically for SPIs, they serve as the basis for threshold or trended metrics (see below). Descriptive metrics include:

- Simple sums – Simple sums are raw tallies of numbers (*e.g.*, number of installations that have submitted safety reports; number of people who regularly participate in preparedness planning).
- Percentages – Percentages are simple sums divided by totals or normalised on a population (*e.g.*, percentage of installations that have submitted safety reports, percentage staff whose performance during emergency response exercise was "good" or "very good"); and
- Composite – Composite metrics are descriptive metrics that involve more complex calculations using raw data or a combination of data types (*e.g.*, percentage of inspected installations vs. percentage of uninspected installations that have submitted safety reports, which is a percentage presented in different categories).

Threshold Metrics: A threshold metric compares data developed using a descriptive metric to one or more specified "thresholds" or tolerances, where thresholds/tolerances are designed to highlight the need for action to address a critical issue. Threshold metrics include:

- Single threshold – A single threshold metric compares data developed using a descriptive metric to a single tolerance level. When the tolerance level is exceeded, this indicates that a specified action should be taken.
- Multiple threshold – A multiple threshold metric highlights the need for different types of actions based on different tolerance levels. For example, a first tolerance level could indicate the need for a programme performance review; whereas, a second (higher) level could indicate the need to take specific actions (*e.g.*, programme changes).

Trended Metrics: A trended metric compiles data from a descriptive metric and shows the change in the descriptive metric value over time. Trended metrics can present data in its raw form (*e.g.*, bar chart showing annual number of reported incidents), as absolute or relative change (*e.g.*, annual difference in number of reported incidents), or rate of change (*e.g.*, percentage decrease in number of reported incidents from previous year). Trends can include simple changes in values over time or can index the data to capture the influence of outside factors and isolate safety performance, for example:

- Simple trend – Simple trends present the output from descriptive metrics at different points in time to show changes in safety data over time. Simple trends are not manipulated to account for outside influences on the safety result.
- Indexed on a variable – To account for outside factors, metrics can be indexed on one or more variables that effect but are not affected by safety. For example, economic conditions resulting in decreased manufacturing could be solely responsible for fewer incidents. To isolate the influence of safety performance, an indicator of incident frequency could be indexed on production rates.
- Indexed on a data set – Metrics can also be indexed on a common data set. For example, where there is employee turn-over, changes in attitude could reflect changes in the employee population. To isolate the influence of safety-related activities on employee attitudes, an unchanging set of employees could be monitored over time (*i.e.*, a longitudinal survey).

Nested Metrics: Nested metrics are two or more of the above types of metrics used to present the same safety-related data for different purposes. For example, one metric may provide point-in-time data for comparison with tolerances (*e.g.*, to highlight specific deviations from programme expectations) and the other metric may compile information in a condensed format for senior managers (*e.g.*, number of deviations from expectations within a given period).

Table 1
Generally Applicable Data Types Based on Subject of SPI and Data Collection Method

Data Collection Method	General Applicability[13]	Data Type Considerations			
		Binary Measures	Categories	Ordered Measures	Ratio Measures
Testing	Tests can be used to collect data related to people, organisational systems, response systems, etc.	Raw test scores can be reported on a binary scale by reporting "pass/fail" data based on a cut-off score.	Information about the test taker, type of organisation, type of process, etc. (*e.g.*, job description, public authority or community organisation, type of emergency response drill) can be used to categorise and help interpret test scores.	The most descriptive approach to reporting test scores involves associating different ranges of scores with different levels of the attribute being tested (*e.g.*, "very good," "good," "fair"), level of understanding or level of preparedness, etc.	Raw test scores should not be used like ratio data for quantitative calculations. Test scores usually measure only relative (not absolute) differences.
Surveys	Surveys can be used to measure people's understanding, values and attitudes. They can also be used to ask people to self-report on their behaviour and capabilities. Surveys can also be used to collect observation or document review data (see "combined methods," below).	Binary measures usually provide too little detail for personnel-related indicators measured using survey data (*e.g.*, attitudes, understanding). Binary measures can be useful for collecting "yes/no" data on whether critical systems and procedures are in place and/or working as intended.	Information about the survey respondent (*e.g.*, years on the job, etc.) or the type of system, type of organisation, etc. about which the respondent is reporting can be used to categorise and help interpret survey data.	Survey responses about people's attributes (*e.g.*, understanding) are typically recorded on a scale, such as a Likert scale. A scale can also be used to collect data from respondents on the performance of the organisations, systems or procedures (*e.g.*, procedures are "clear," "somewhat clear," "not clear").	Surveys, as defined in this document, do not produce ratio scale data. They can be used as a mechanism to collect ratio scale data that is generated using other methods (see combined methods, below).
Interviews	Interviews can be used to obtain the same types of data as testing and surveys. Interviews also allow for immediate follow-up questions that can help an organisation better understand responses.	The above information regarding testing and surveys also applies to interviews.	The above information regarding testing and surveys also applies to interviews.	The above information regarding testing and surveys also applies to interviews.	The above information regarding testing and surveys also applies to interviews.
Document Review	Document review can be used to collect data for indicators of legal and regulatory frameworks.	For document reviews, binary measures are generally limited to collecting "yes/no" data on whether procedures are documented and/or reports indicate that systems are in place and/or working as intended.	Information about the subject of the documentation (*e.g.*, category of procedures, type of system, type of organisation) can be used to categorise and help interpret document review data.	The quality of documentation can be recorded on a scale, such as a Likert scale. A scale can also be used to summarise the data presented in a document regarding the performance of organisations, systems or procedures.	Document review can provide ratio scale data such as the number of unplanned incidents recorded in the document, the number of procedures developed, etc.

Table 1 (continued)
Generally Applicable Data Types Based on Subject of SPI and Data Collection Method

Data Collection Method	General Applicability[13]	Data Type Considerations			
		Binary Measures	Categories	Ordered Measures	Ratio Measures
Observations	People can be observed as they perform safety-related tasks. People and systems can also be observed as they respond during exercises or drills.	Observers can score performance by reporting "pass/fail" data based on pre-determined criteria.	Information about the observed party (*e.g.*, job description, years on the job) or type of system (*e.g.*, internal communications) can be used to categorise and help interpret observational data.	Observers can score performance by reporting level of ability or by describing behavior or performance on an ordered scale based on pre-determined criteria (*e.g.*, "very capable," "somewhat capable," "not capable").	Observations, as defined in this document, do not produce ratio scale data.
Combined Methods	• Survey questions can be included in tests (and *vice versa*) to provide both test score and self-reported data. When using a combined approach, survey responses reported on an ordered scale should not be assigned a value for test scoring but, rather, should be compiled and reported separately. • Physical (observed) and written tests can be combined to measure people's capabilities under normal operational situations and under different incident scenarios (*e.g.*, using incident exercises). Data can be compiled in a composite test score. • Observations can be used in conjunction with survey and test data to as a check on the ability of the test to measure the attribute (*e.g.*, competence in performing a task) and/or to check survey responses (*e.g.*, self-described capabilities). • Interviews can be used following tests, surveys and observations to better understand responses and develop approaches for addressing potential safety issues. • Surveys can be used as an instrument to collect observational and instrument-derived data. Surveys can be distributed to personnel who gather the necessary information and return the surveys to a central location for compilation. In this case, the survey is not the primary collection method. Information presented above regarding the primary method should be used to evaluate metric options.				

[13] See "Data Collection Methods – Definitions" on page 105 for further discussion of general applicability.

Table 2A
Descriptive Metrics Supported by Different Data Types

Metric Type / Data Type	Simple Sums	Percentages	Composite
Binary Measures	Binary data (*e.g.*, pass/fail, present/absent, functioning/not functioning) can be summed across people, organisational parameters and systems (*e.g.*, number of staff who passed exam, number of systems that are functioning properly). The summary of raw binary data can provide an indication of safety performance.	Binary data (*e.g.*, pass/fail, present/absent, functioning/ not functioning) can be presented as percentages. Binary data are summed and divided by total responses (*e.g.*, percentage of staff who passed exam, percentage of systems that are functioning properly). Percentages can be easier to interpret than simple sums, as they provide greater context.	Separating data into categories – Different types of data – binary, ordered and ratio (frequency of occurrence) – can be summarised separately for different categories of subjects (*e.g.*, different job classifications, different organisations). Combining ordered data – Ordered data from more than one ordered category can be summed into a composite category (*e.g.*, percentage responding either "good" or "very good"). Descriptors other than simple sums and percentages – Ratio scale data can be summarised by presenting high and low values, measures of central tendency (*e.g.*, average, median) and measures of variability (*e.g.*, standard deviation).
Categories	Categorical data usually do not provide sufficient information to be used as the sole basis for a metric. See "composite" column for use of categories for SPIs.	Categorical data usually do not provide sufficient information to be used as the sole basis for a metric. See "composite" column for use of categories for SPIs.	
Ordered Measures	The number of responses within each ordered category can be summed across multiple subjects, including people, organisational elements and systems. Ordered data can be presented as sums for each category (*e.g.*, number of procedures that are "very clear," number that are "somewhat clear").	The number of responses within each ordered category can be summed across multiple subjects, including people, organisational elements and systems. Ordered data can be presented as percentages for each category (*e.g.*, percentage of procedures that are "very clear," percentage that are "somewhat clear").	
Ratio Measures	Sums of ratio scale data can be used to sum the number of unplanned events over a period (*i.e.*, as opposed to whether or not a planned event occurred, which is a binary measure). Ratio scale measures of physical state (*e.g.*, quantity of hazardous chemicals) are usually compiled using other approaches (see "other descriptors" in "composite" column).	Percentages of ratio scale data can be used to measure the frequency of occurrence of non-planned events relative to all events (*e.g.*, percentage of all filling operations that resulted in overfills). Ratio scale measures of physical state (*e.g.*, quantity of hazardous chemicals) are usually compiled using other approaches (see "other descriptors" in "composite" column).	

Table 2B
Threshold Metrics Supported by Different Data Types[14,15]

Metric Type / Data Type	Single Threshold	Multiple Threshold
Binary Measures	A single threshold can be established to trigger action based on sums or percentages of binary data. An upper threshold can be compared to data regarding numbers or rate of failure, absence or non-functionality. Alternatively, a lower threshold can be compared to numbers or rate of passing scores, existence or functionality.	Multiple thresholds can be established to trigger different actions based on sums or percentages of binary data. Progressively higher thresholds can be established to require progressively more intensive action based on numbers or rate of failure, absence or non-functionality. Alternatively, progressively lower thresholds can be established to require progressively more intensive action based on numbers or rate of passing scores, existence or functionality.
Categories	Category-specific single thresholds (*i.e.*, one threshold per category) can be used to trigger action for composite indicators that combine categorical and binary, ordered or ratio data.	Category-specific multiple thresholds (*i.e.*, more than one threshold per category) can be used to trigger action for composite indicators combining categorical and binary, ordered or ratio data.
Ordered Measures	A single threshold can be established to trigger action based on sums or percentages of ordered data. A separate threshold can be established for each category or for a subset of categories (*e.g.*, for just the highest or lowest of the ordered categories). Upper thresholds can be compared to data representing poor safety performance (*e.g.*, to level of understanding is "very limited"). Alternatively, lower thresholds can be compared to data representing good safety performance (*e.g.*, to level of understanding is "very good").	Multiple thresholds can be established to trigger different actions based on sums or percentages of ordered data. Multiple thresholds can be established for each category or for a subset of categories (*e.g.*, for just the highest or lowest of the ordered categories). Progressively higher thresholds can be established to require progressively more intensive action based on data representing poor performance (*e.g.*, to level of understanding is "very limited"). Alternatively, progressively lower thresholds can be established to require progressively more intensive action based on data representing good safety performance (*e.g.*, to level of understanding is "very good").
Ratio Measures	A single threshold can be established to trigger action based on frequency of occurrence of non-planned events. Typically, thresholds involving ratio scale data measuring frequency of occurrence would involve use of upper thresholds representing poor safety performance (*e.g.*, frequency of near-misses).	Multiple thresholds can be established to trigger action based on frequency of occurrence of non-planned events. Progressively higher thresholds can be established to require progressively more intensive action based on data representing poor safety performance (*e.g.*, frequency of near-misses).

[14] Threshold metrics compare data developed using descriptive metrics to one or more specified thresholds or tolerances. Refer to Table 2A for discussion of descriptive metrics supported by different data types.
[15] Thresholds based on simple sums would not change with changes in totals. For example, if the threshold is two system failures per quarter, this will not change regardless of whether you have ten systems or one hundred systems that are tested. Thresholds based on simple sums can be useful for critical safety systems (*e.g.*, where the tolerance for failure is low). Thresholds based on percentages can adjust with changes in the population. For example, a threshold of 2% system failure rate will adjust to changes in the number of systems tested. Thresholds based on percentages are useful for measuring overall performance where totals (*e.g.*, number of staff, number of emergency drills) frequently change.

Table 2C
Trended Metrics Supported by Different Data Types[16]

Metric Type / Data Type	Simple Trend	Indexed on Variable	Indexed on Data Set
General Considerations	Trends based on simple sums show absolute change and can be useful for monitoring critical safety systems (*e.g.*, where tolerance for failure of a single system is low). Trends based on percentage metrics adjust with changes in totals. Population variations should be considered when interpreting and reporting trends based on percentages.	Descriptive metrics can be "normalised" by dividing the metric values by a quantifiable factor (*e.g.*, number of inspections) or by separating values into different categories for categorical factors (*e.g.*, season). Metrics normalised in this way could then be trended.	Descriptive metrics can be applied to a constant data set (*e.g.*, staff present over the entire period being measured) to isolate trends associated with changes in safety. A common application of this approach is a "longitudinal survey" or "panel study."
Binary Measures	Simple sums, percentages, or composite metrics involving binary data can be collected at different points in time, and metric values from different points in time can be compared to show safety performance trends. See also "general considerations."	Metrics based on binary data can be indexed on one or more variables that effect but are not affected by safety, such as inspection rate, season, etc. See also "general considerations."	Metrics based on binary data can be indexed on one or more variables that effect the underlying population subject to the indicator. See also "general considerations."
Categories	Binary, ordered and ratio data can be compiled by separate categories (see Table 2A, Composite Measures) and trends can be reported for all categories separately or for a subset of categories.	Binary, ordered, and ratio data can be compiled by separate categories (see Table 2A, Composite Measures) and trends can be reported for all categories separately or for a subset of categories. Indexing should be applied consistently across categories.	Binary, ordered and ratio data can be compiled by separate categories (see Table 2A, Composite Measures) and trends can be reported for all categories separately or for a subset of categories. Indexing should be applied consistently across categories.
Ordered Measures	Simple sums, percentages or composite metrics involving ordered data can be collected at different points in time, and metric values from different points in time can be compared to show safety performance trends. See also "general considerations."	Metrics based on ordered data can be indexed on one or more variables that effect but are not affected by safety, such as inspection rate, season, etc. Indexing should be applied consistently across ordered categories. See also "general considerations."	Metrics based on ordered data can be indexed on one or more variables that effect the underlying population subject to the indicator. Indexing should be applied consistently across ordered categories. See also "general considerations."
Ratio Measures	Frequency of occurrence of non-planned events can be trended for established units of time (*e.g.*, weekly, monthly) to show changes in safety performance. See also "general considerations."	Metrics based on ratio data can be indexed on one or more variables that effect but are not affected by safety, such as inspection rate, season, etc. See also "general considerations."	Metrics based on ratio data can be indexed on one or more variables that effect the underlying population subject to the indicator. Indexing should be applied consistently across ordered categories. See also "general considerations."

[16] Threshold metrics compare data developed using descriptive metrics to one or more specified thresholds or tolerances. Refer to Table 2A for discussion of descriptive metrics supported by different data types.

ANNEX II: Summary of Targets (from Chapter 3)

PART A. PUBLIC AUTHORITIES: Administrative, Regulatory, Planning and Implementing Agencies

Section A.1 Internal Organisation and Policies

A.1.1 Organisational Goals and Objectives

TARGET: The organisation's goals and objectives effectively focus resources on the protection of human health, the environment and property from chemical accidents.

A.1.2 Personnel

TARGET: There are appropriate staffing levels, with employees who are competent, trained and fit for their job.

A.1.3 Internal Communication/Information

TARGET: Key information is exchanged within a public authority, and there is effective two-way communication.

Section A.2 Legal Framework

A.2.1 Laws, Regulations and Standards

TARGET: There is a comprehensive legal framework that addresses all aspects of chemical accident prevention, preparedness and response and improves chemical safety.

A.2.2 Land-Use Planning

TARGET: Land-use planning and siting decisions are made to protect human health, the environment and property, including prevention of inappropriate development (*e.g.*, new housing or public buildings) near hazardous installations.

A.2.3 Safety Reports

TARGET: There are clear guidelines for the submission, review, revision and assessment of safety reports, along with feedback to enterprises on the adequacy of their submissions.

A.2.4 Permits

TARGET: A permitting process is in place so that installations defined as high risk are required to receive prior and continuing approval to operate.

A.2.5 Inspections

TARGET: An effective inspection programme for hazardous installations is maintained in order to check compliance with requirements, ensure proper safety practices and share experience.

A.2.6 Enforcement

TARGET: Enterprises comply with all legal requirements related to chemical accident prevention, preparedness and response and improve chemical safety at their hazardous installations.

Section A.3 External Co-operation

A.3.1 Co-ordination Among Relevant Authorities at all Levels

TARGET: Relevant public authorities co-ordinate their activities with respect to the development of legal frameworks, interaction with hazardous installations and exchange of information.

A.3.2 Co-operation with Industry

TARGET: Public authorities and industry co-operate to improve safety by: consulting on laws, regulations and guidance; exchanging information, experience and lessons learned; and promoting voluntary risk reduction activities through incentive programmes.

A.3.3 Co-operation with Other Non-Governmental Stakeholders

TARGET: Public authorities establish partnerships with different stakeholders in order to: share information, experience and lessons learned; get feedback; and facilitate communication with the public.

A.3.4 Communication with Communities/Public

TARGET: The public understands chemical risk information, takes appropriate actions in the event of an accident and has an effective channel to communicate with relevant public authorities.

Section A.4 Emergency Preparedness and Planning

A.4.1 Ensuring Appropriate Internal (on-site) Preparedness Planning

TARGET: There is effective on-site preparedness planning for all relevant hazardous installations, which includes co-ordination with off-site plans.

A.4.2 External (off-site) Preparedness Planning

TARGET: Adverse off-site effects of chemical accidents are effectively mitigated.

A.4.3 Co-ordination Among Relevant Authorities at all Levels

TARGET: There is effective co-operation and co-ordination among relevant authorities at all levels to improve emergency planning and response.

Section A.5 Emergency Response and Mitigation

TARGET: Response actions are timely and effective in mitigating the adverse effects of accidents.

Section A.6 Accident/Near-Miss Reporting and Investigation

A.6.1 Accident/Near-Miss Reporting

TARGET: Accidents, near-misses and other "learning experiences" are reported in accordance with the established system in order to improve safety.

A.6.2 Investigations

TARGET: Root causes, contributing causes and lessons learned are identified through investigations of key accidents and other unexpected events involving hazardous substances.

A.6.3 Follow-up, Including Sharing of Information and Application of Lessons Learned

TARGET: Appropriate lessons learned from accidents and near-misses are shared with all relevant stakeholders, and effective corrective actions are taken as a result of lessons learned (*e.g.*, by amending relevant regulations, emergency plans, inspection procedures).

PART B. EMERGENCY RESPONSE PERSONNEL (*i.e.*, first responders such as police, firefighters, hazmat teams and emergency medical personnel)

Section B.1 Organisational Goals and Objectives

TARGET: The goals and objectives effectively focus resources on the protection of human health, the environment and property from chemical accidents.

Section B.2 Personnel

TARGET: There are appropriate staffing levels, with employees who are competent, trained and fit for their jobs.

Section B.3 Internal Communication/Information

TARGET: Key information is exchanged within an emergency response organisation.

Section B.4 External Co-operation

B.4.1 Co-ordination Among Relevant Authorities at all Levels

TARGET: Response organisations and other public authorities co-ordinate their activities and exchange information related to chemical accident prevention, preparedness and response.

B.4.2 Co-operation with Industry

TARGET: Emergency response organisations and industry co-operate to improve safety by exchanging information, experience and lessons learned and by promoting voluntary risk reduction activities.

B.4.3 Co-operation with Other Non-Governmental Stakeholders Including the Public

TARGET: Emergency response organisations facilitate communication with the public.

Section B.5 External (off-site) Preparedness Planning

TARGET: Potential adverse off-site effects of chemical accidents are effectively mitigated.

Section B.6 Emergency Response and Mitigation

TARGET: Response actions are timely and effective in mitigating the adverse effects of accidents.

Section B.7 Investigations

TARGET: Root causes, contributing causes and lessons learned are identified through the investigation of key accidents and other unexpected events involving hazardous substances.

PART C. COMMUNITIES/PUBLIC

Section C.1 Prevention of Accidents

C.1.1 Information Acquisition and Communication

TARGET: The community actively participates in obtaining information and providing feedback, resulting in a community with appropriate knowledge and understanding of the risks related to hazardous installations in their vicinity.

C.1.2 Influencing Risk Reduction (related to audits and inspections)

TARGET: There is substantial participation by members of the public in audits, inspections and follow-up activities (*e.g.*, related to corrective measures).

C.1.3 Participation in Land-Use Planning and Permitting

TARGET: Members of the public actively participate in decision-making related to land-use planning, siting and permitting.

Section C.2 Emergency Preparedness

C.2.1 Information Acquisition and Communication

TARGET: The potentially affected public is prepared to take the appropriate actions in the event of an accident involving hazardous substances.

C.2.3 Participation in Preparedness Planning

TARGET: The community takes an active role in the development of emergency plans.

Section C.3 Response and Follow-up to Accidents

C.3.1 Emergency Response Communication

TARGET: In the event of an accident, members of the community follow the preparedness plan and response instructions.

C.3.2 Participation in Debriefing and Accident Investigations

TARGET: Members of the community participate actively in debriefing and accident investigations, and promote related improvements in risk reduction and emergency preparedness.

ANNEX III: *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response:* Golden Rules

The "Golden Rules" were a new addition to the 2nd edition of the *Guiding Principles*. The objective of these is to highlight in several pages the primary roles and responsibilities of the major stakeholders with respect to chemical accident prevention, preparedness and response. It should be recognised that these points represent best practice, *i.e.*, objectives to be achieved over time. They are not one-time actions but rather require ongoing vigilance.

The Golden Rules are not meant to be a complete overview of the *Guiding Principles*; nor do they address the full range of issues discussed in this *Guidance*. In order to fully understand the points made in these Golden Rules, it is important to refer to the entire text of the *Guiding Principles*.

Role of All Stakeholders

- **Make chemical risk reduction and accident prevention, as well as effective emergency preparedness and response, priorities in order to protect health, the environment and property.**
  While the risks of accidents are in the communities where hazardous installations are located, requiring efforts by stakeholders at the local level, there are also responsibilities for stakeholders at regional, national and international levels.

- **Communicate and co-operate with other stakeholders on all aspects of accident prevention, preparedness and response.**
  Communication and co-operation should be based on a policy of openness, as well as the shared objective of reducing the likelihood of accidents and mitigating the adverse affects of any accidents that occur. One important aspect is that the potentially affected public should receive information needed to support prevention and preparedness objectives, and should have the opportunity to participate in decision-making related to hazardous installations, as appropriate.

Role of Industry (including management and labour)

Management

- **Know the hazards and risks at installations where there are hazardous substances.**
  All enterprises that produce, use, store, or otherwise handle hazardous substances should undertake, in co-operation with other stakeholders, the hazard identification and risk assessment(s) needed for a complete understanding of the risks to employees, the public, the environment and property in the event of an accident. Hazard identification and risk assessments should be undertaken from the earliest stages of design and construction, throughout operation and maintenance, and should address the possibilities of human or technological failures, as well as releases resulting from natural disasters or deliberate acts (such as terrorism, sabotage, vandalism or theft). Such assessments should be repeated periodically and whenever there are significant modifications to the installation.

- **Promote a "safety culture" that is known and accepted throughout the enterprise.**
  The safety culture, reflected in an enterprise's Safety Policy, consists of both an attitude that safety is a priority (*e.g.*, accidents are preventable) and an appropriate infrastructure (*e.g.*, policies and procedures). To be effective, a safety culture requires visible top-level commitment to safety in the enterprise, and the support and participation of all employees[17] and their representatives.

[17] For purposes of this publication, "employee" is defined as any individual(s) working at, or on behalf of, a hazardous installation. This includes both management and labour, as well as (sub)contractors.

- **Establish safety management systems and monitor/review their implementation.**
  Safety management systems for hazardous installations include using appropriate technology and processes, as well as establishing an effective organisational structure (*e.g.*, operational procedures and practices, effective education and training programmes, appropriate levels of well-trained staff and allocation of necessary resources). These all contribute to the reduction of hazards and risks. In order to ensure the adequacy of safety management systems, it is critical to have appropriate and effective review schemes to monitor the systems (including policies, procedures and practices).

- **Utilise "inherently safer technology" principles in designing and operating hazardous installations.**
  This should help reduce the likelihood of accidents and minimise the consequences of accidents that occur. For example, installations should take into account the following, to the extent that they would reduce risks: minimising to the extent practicable the quantity of hazardous substances used; replacing hazardous substances with less hazardous ones; reducing operating pressures and/or temperatures; improving inventory control; and using simpler processes. This could be complemented by the use of back-up systems.

- **Be especially diligent in managing change.**
  Any significant changes (including changes in process technology, staffing and procedures), as well as maintenance/repairs, start-up and shut-down operations, increase the risk of an accident. It is therefore particularly important to be aware of this and to take appropriate safety measures when significant changes are planned – before they are implemented.

- **Prepare for any accidents that might occur.**
  It is important to recognise that it is not possible to totally eliminate the risk of an accident. Therefore, it is critical to have appropriate preparedness planning in order to minimise the likelihood and extent of any adverse effects on health, the environment or property. This includes both on-site preparedness planning and contributing to off-site planning (including provision of information to the potentially affected public).

- **Assist others to carry out their respective roles and responsibilities.**
  To this end, management should co-operate with all employees and their representatives, public authorities, local communities and other members of the public. In addition, management should strive to assist other enterprises (including suppliers and customers) to meet appropriate safety standards. For example, producers of hazardous substances should implement an effective Product Stewardship programme.

- **Seek continuous improvement.**
  Although it is not possible to eliminate all risks of accidents at hazardous installations, the goal should be to find improvements in technology, management systems and staff skills in order to move closer toward the ultimate objective of zero accidents. In this regard, management should seek to learn from past experiences with accidents and near-misses, both within their own enterprises and at other enterprises.

Labour

- **Act in accordance with the enterprise's safety culture, safety procedures and training.**
  In the discharge of their responsibilities, labour should comply with all the procedures and practices relating to accident prevention, preparedness and response, in accordance with the training and instructions given by their employer. All employees (including contractors) should report to their supervisor any situation that they believe could present a significant risk.

- **Make every effort to be informed, and to provide information and feedback to management.**
  It is important for all employees, including contractors, to understand the risks in the enterprise where they work, and to understand how to avoid creating or increasing the levels of risk. Labour should, to the extent possible, provide feedback to management concerning safety-related matters. In this regard, labour and their representatives should work together with management in the development and implementation of

safety management systems, including procedures for ensuring adequate education and training/retraining of employees. Labour and their representatives should also have the opportunity to participate in monitoring and investigations by the employer, or by the competent authority, in connection with measures aimed at preventing, preparing for, and responding to chemical accidents.

- **Be proactive in helping to inform and educate your community.**
  Fully informed and involved employees at a hazardous installation can act as important safety ambassadors within their community.

Role of Public Authorities

- **Seek to develop, enforce and continuously improve policies, regulations and practices.**
  It is important for public authorities[18] to establish policies, regulations and practices, and have mechanisms in place to ensure their enforcement. Public authorities should also regularly review and update, as appropriate, policies, regulations and practices. In this regard, public authorities should keep informed of, and take into account, relevant developments. These include changes in technology, business practices and levels of risks in their communities, as well as experience in implementing existing laws and accident case histories. Public authorities should involve other stakeholders in the review and updating process.

- **Provide leadership to motivate all stakeholders to fulfil their roles and responsibilities.**
  Within their own sphere of responsibility and influence, all relevant public authorities should seek to motivate other stakeholders to recognise the importance of accident prevention, preparedness and response, and to take the appropriate steps to minimise the risks of accidents and to mitigate the effects of any accidents that occur. In this regard, the authorities should establish and enforce appropriate regulatory regimes, promote voluntary initiatives and establish mechanisms to facilitate education and information exchange.

- **Monitor the industry to help ensure that risks are properly addressed.**
  Public authorities should establish mechanisms for monitoring hazardous installations to help ensure that all relevant laws and regulations are being followed, and that the elements of a safety management system are in place and are functioning properly, taking into account the nature of the risks at the installations (including the possibilities of deliberate releases). Public authorities can also take these opportunities to share experience with relevant employees of the installations.

- **Help ensure that there is effective communication and co-operation among stakeholders.**
  Information is a critical component of safety programmes. Public authorities have an important role in ensuring that appropriate information is provided to, and received by, all relevant stakeholders. Public authorities have a special role in facilitating education of the public concerning chemical risks in their community so that members of the public are reassured that safety measures are in place, that they understand what to do in the event of an accident, and that they can effectively participate in relevant decision-making processes. Public authorities are also in a position to facilitate the sharing of experience (within and across borders).

- **Promote inter-agency co-ordination.**
  Chemical accident prevention, preparedness and response is, by nature, an inter-disciplinary activity involving authorities in different sectors and at different levels. To help ensure effective prevention, preparedness and response, and efficient use of resources, it is important that all relevant agencies co-ordinate their activities.

[18] For purposes of this publication, "public authorities" are defined to include national, regional and local authorities responsible for any aspect of chemical accident prevention, preparedness and response. This would include, inter alia, agencies involved in environmental protection, public health, occupational safety, industry and emergency response/civil protection.

- **Know the risks within your sphere of responsibility, and plan appropriately.**
  Public authorities are responsible for off-site emergency planning, taking into account the relevant on-site plans. This should be done in co-ordination with other stakeholders. In addition, public authorities should ensure that the resources necessary for response (*e.g.*, expertise, information, equipment, medical facilities, finances) are available.

- **Mitigate the effects of accidents through appropriate response measures.**
  Public authorities (often at the local level) have primary responsibility for ensuring response to accidents that have off-site consequences to help reduce deaths and injuries, and to protect the environment and property.

- **Establish appropriate and coherent land-use planning policies and arrangements.**
  Land-use planning (*i.e.*, establishing and implementing both general zoning as well as specific siting of hazardous installations and other developments) can help to ensure that installations are appropriately located, with respect to protection of health, environment and property, in the event of an accident. Land-use planning policies and arrangements can also prevent the inappropriate placing of new developments near hazardous installations (*e.g.*, to avoid the construction of new residential, commercial or public buildings within certain distances of hazardous installations). Land-use planning policies and arrangements should also control inappropriate changes to existing installations (*e.g.*, new facilities or processes within the installation). They should also allow for the possibility of requiring changes to existing installations and buildings to meet current safety standards.

Role of Other Stakeholders (*e.g.*, communities/public)

- **Be aware of the risks in your community and know what to do in the event of an accident.**
  Members of communities near hazardous installations, and others that might be affected in the event of an accident, should make sure that they understand the risks they face and what to do in the event of an accident to mitigate possible adverse effects on health, the environment and property (*e.g.*, understand the warning signals and what actions are appropriate). This involves reading and maintaining any information they receive, sharing this information with others in their household, and seeking additional information as appropriate.

- **Participate in decision-making relating to hazardous installations.**
  The laws in many communities provide opportunities for members of the public to participate in decision-making related to hazardous installations, for example by commenting on proposed regulations or zoning decisions, or providing input for procedures concerning licensing or siting of specific installations. Members of the public should take advantage of these opportunities to present the perspective of the community. They should work towards ensuring that such opportunities exist, whenever appropriate, and that the public has the information necessary for effective participation.

- **Co-operate with local authorities, and industry, in emergency planning and response.**
  Representatives of the community should take advantage of opportunities to provide input into the emergency planning process, both with respect to on-site and off-site plans. In addition, members of the public should co-operate with any tests or exercises of emergency plans, following directions and providing feedback, as appropriate.

ANNEX IV: Explanation of Terms

The terms set out below are explained for the purposes of the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response*, as well as this *Guidance on SPI* 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.

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.

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).

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, are 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
Indicators is used in this Document to mean observable measures that provide insights into a concept - safety - that is difficult to measure directly. This *Guidance* includes two types of safety performance indicators: "outcome indicators" and "activities indicators":

Outcome indicators are designed to help assess whether safety-related actions are achieving their desired results and whether such measures are, in fact, leading to less likelihood of an accident occurring and/or less adverse impact on human health, the environment and/or property from an accident. They are reactive, intended to measure the impact of actions that were taken to manage safety and are similar to what is called "lagging indicators" in other documents. Outcome indicators often measure change in safety performance over time, or failure of performance. Thus, outcome indicators tell you *whether* you have achieved a desired result (or when a desired safety result has failed). But, unlike activities indicators, do not tell you *why* the result was achieved or why it was not
.
Activities indicators are designed to help identify whether enterprises/organisations are taking actions believed necessary to lower risks (*e.g.*, the types of actions described in the *Guiding Principles*). Activities indicators are a pro-active measure, and are similar to what are called "leading indicators" in other documents. Activities indicators often measure safety performance against a tolerance level that shows deviations from safety expectations at a specific

point in time. When used in this way, activities indicators highlight the need for action to address the effectiveness of a critical safety measure when a tolerance level is exceeded.

Thus, activities indicators provide enterprises with a means of checking, on a regular and systematic basis, whether they are implementing their priority actions in the way they were intended. Activities indicators can help explain why a result (*e.g.*, measured by an outcome indicator) has been achieved or not.

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.

Likert Scale
A type of survey question where respondents are asked to rate attributes on an ordered scale (*e.g.*, extent employees follow procedures, where options could range from "never" to "always" with gradations in between such as "not very often," "somewhat often," and "very often"). Questions for use with Likert scales often posed in terms of the level at which respondents agree or disagree with a statement (*e.g.*, extent agree or disagree with the statement "employees follow procedures," where possible responses range from "strongly disagree" to "strongly agree"). Labels associated with different responses should represent more-or-less evenly spaced gradations.

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.

Metric
A system of measurement used to quantify safety performance for *outcome* and *activities* indicators.

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 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.

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.

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 one transport 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.

Warehouse keeper
The person responsible for a storage facility, whether on the site of a hazardous installation or off-site.

ANNEX V: Selected References

This Annex provides a list of publications that might be of interest to the readers of this *Guidance on Developing 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 VI: Background

This *Guidance on Developing 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-Organization 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.[19] 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, approximately 20 workshops and special sessions have been held since 1989.

One of the major outputs of this Programme is the *OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response* (2nd ed. 2003). The *Guiding Principles* set out general guidance for the safe planning and operation of facilities where there are hazardous substances in order to prevent accidents and, recognising that chemical accidents may nonetheless occur, to mitigate adverse effects through effective emergency preparedness, land-use planning and accident response. The *Guiding Principles* address all stakeholders including industry (management and other employees at hazardous installations), public authorities and members of the community/public. The *Guiding Principles* build on the results of the workshops, as well as the collective experience of a diverse group of experts from many countries and organisations, in order to establish "best practices."

For further information concerning the Chemical Accidents 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.

[19] The Environment, Health and Safety Division publishes free-of-charge documents in ten different series: Testing and Assessment; Good Laboratory Practice and Compliance Monitoring; Pesticides and Biocides; Risk Management; Harmonisation of Regulatory Oversight in Biotechnology; Safety of Novel Foods and Feeds; Chemical Accidents; Pollutant Release and Transfer Registers; Emission Scenario Documents; and the Safety of Manufactured Nanomaterials. More information about the Environment, Health and Safety Programme and EHS publications is available on the OECD's World Wide Web site (http://www.oecd.org/ehs).

Preparation of the *Guidance on Developing Safety Performance Indicators (SPI)*

This *Guidance on SPI* 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 led to improvements over time.

To help in the preparation of the *Guidance on SPI*, 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* (*i.e.*, addressing industry, public authorities and communities/public respectively). 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 Group of Experts began its work by collecting as much experience as possible on SPI and related activities. The first version of the *Guidance on SPI* was completed in 2003. The WGCA agreed that this should be published as an "interim" document because it presented an innovative approach to measuring safety performance. At the same time, the WGCA established a pilot programme to get volunteers from industry, public authorities and communities to test the *Guidance on SPI* and provide feedback.

During the course of the pilot programme, feedback was received from 11 participants (four companies, three federal government agencies and four local authorities and emergency response organisations). These participants provided very constructive comments that lead to significant changes from the 2003 version of the *Guidance on SPI*.

Following the Pilot Programme, a small Group of Experts was convened to review the comments received as well as to consider related developments, and to revise the *Guidance on SPI* accordingly. The Group of Experts agreed that a number of changes should be made to the 2003 *Guidance*, with the most important being:

- the addition of Chapter 2, setting out the steps for implementing an SPI Programme (building on the experience in the United Kingdom);
- the creation of two separate publications: one for industry and one for public authorities and communities/public;
- the drafting of a separate chapter for emergency response personnel, as a subset of public authorities; and
- the development of additional guidance on the use of metrics.

The bulk of the 2003 version is now contained in Chapter 3, which was amended to take into account experience gained during the Pilot Programme and additional feedback.

In addition to the text of this *Guidance on SPI*, there will be a searchable, more inter-active version available on-line at www.oecd.org/env/accidents.

Other OECD Publications Related to Chemical Accident Prevention, Preparedness and Response

Report of the OECD Workshop on Strategies for Transporting Dangerous Goods by Road: Safety and Environmental Protection (1993)

Health Aspects of Chemical Accidents: Guidance on Chemical Accident Awareness, Preparedness and Response for Health Professionals and Emergency Responders (1994) [prepared as a joint publication with IPCS, UNEP-IE and WHO-ECEH]

Guidance Concerning Health Aspects of Chemical Accidents. *For Use in the Establishment of Programmes and Policies Related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances* (1996)

Report of the OECD Workshop on Small and Medium-sized Enterprises in Relation to Chemical Accident Prevention, Preparedness and Response (1995)

Guidance Concerning Chemical Safety in Port Areas. *Guidance for the Establishment of Programmes and Policies Related to Prevention of, Preparedness for, and Response to Accidents Involving Hazardous Substances. Prepared as a Joint Effort of the OECD and the International Maritime Organisation (IMO)* (1996)

OECD Series on Chemical Accidents:

No. 1, Report of the OECD Workshop on Risk Assessment and Risk Communication in the Context of Chemical Accident Prevention, Preparedness and Response (1997)

No. 2, Report of the OECD Workshop on Pipelines (Prevention of, Preparation for, and Response to Releases of Hazardous Substances (1997)

No. 3, International Assistance Activities Related to Chemical Accident Prevention, Preparedness and Response: Follow-up to the Joint OECD and UN/ECE Workshop to Promote Assistance for the Implementation of Chemical Accident Programmes (1997)

No. 4, Report of the OECD Workshop on Human Performance in Chemical Process Safety: Operating Safety in the Context of Chemical Accident Prevention, Preparedness and Response (1999)

No. 5, Report of the OECD Workshop on New Developments in Chemical Emergency Preparedness and Response, Lappeenranta, Finland, November 1998 (2001)

No. 6, Report of the OECD Expert Meeting on Acute Exposure Guideline Levels (AEGLs) (2001)

No. 7, Report of the Special Session on Environmental Consequences of Chemical Accidents (2002)

No. 8, Report of the OECD Workshop on Audits and Inspections Related to Chemical Accident, Prevention, Preparedness and Response (2002)

No. 9, Report of the OECD Workshop on Integrated Management of Safety, Health, Environment and Quality, Seoul, Korea, 26-29 June 2001 (2002)

Internet Publication, Report of CCPS/OECD Conference and Workshop on Chemical Accidents Investigations (2002)

Special Publication, International Directory of Emergency Response Centres for Chemical Accidents (2002, revision of 1st edition published in 1992)

No. 10, Guiding Principles for Chemical Accident Prevention, Preparedness and Response: Guidance for Industry (including Management and Labour), Public Authorities, Communities and other Stakeholders (2003, revision of 1st edition published in 1992)

No. 11, 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 (Interim Publication scheduled to be tested in 2003-2004 and revised in 2005) (2003)

No. 12, Report of the Workshop on Communication Related to Chemical Releases Caused by Deliberate Acts, Rome, Italy, 25-27 June 2003 (2004)

No. 13, Report of the OECD Workshop on Sharing Experience in the Training of Engineers in Risk Management, Montreal, Canada, 21-24 October 2003 (2004)

No. 14, Report of the OECD Workshop on Lessons Learned from Chemical Accidents and Incidents, Karlskoga, Sweden, 21-23 September 2004 (2005)

No. 15, Integrated Management Systems (IMS)-Potential Safety Benefits Achievable from Integrated Management of Safety, Health, Environment and Quality (SHE&Q) (2005)

No. 16, Report of the OECD-EC Workshop on Risk Assessment Practices for Hazardous Substances Involved in Accidental Releases, 16-18 October 2006, Varese, Italy (2007)

No. 17, Report of Survey on the Use of Safety Documents in the Control of Major Accident Hazards (2008)

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