

OECD GUIDANCE ON SAFETY PERFORMANCE INDICATORS

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The Safety Performance Indicator guidance has been designed to serve as a tool when establishing programmes for industry, regulators and local communities to determine their success in implementing appropriate laws, policies, and guidance, and assess whether their actions lead to improved levels of chemical safety. The guidance does not define a precise methodology, rather provides information and suggestions for elements that can be adapted to produce a safety performance indicator system. It is designed to allow stakeholders to determine which part of the guidance is useful to their situation, adapt and define relevant indicators, identifying what each indicator will measure and how to apply the measures.

An interactive web-based version (web address www.oecd.org/env/accidents) has been developed which allows users to create a customised SPI programme based on their own input, which can be downloaded and saved in a MS Word document.

KEYWORDS: OECD, Safety Performance Indicators, Guiding Principles on Chemical Accident Prevention, Preparedness, and Response

The Organisation for Economic Co-operation and Development is an intergovernmental organisation that seeks to co-ordinate and harmonises policies, discuss issues of mutual concern, and works to respond to international problems.

In the area of chemical accidents it has a specialised working group of experts. The Working Group on Chemical Accidents consists of representatives from member countries and the European Commission as well as international organisations, industry, labour, and environmental groups. The mandate of the Working Group is to:

- Co-ordinate and exchange information and ideas related to chemical emergency prevention, preparedness, and response, and
- Develop guidance on prevention of, preparedness for, and response to accidents involving hazardous substances.

The Working Group has recently published a revised version of the OECD *Guiding Principles on Chemical Accident Prevention, Preparedness, and Response*, and to complement this has published guidance on Safety Performance Indicators (SPI). The objective of the SPI guidance is to help industry, public authorities (regulators, local authorities, health authorities and emergency services), and communities measure whether the many steps taken to reduce the likelihood of accidents, and improve preparedness and response capabilities, truly lead to safer communities and less risk to human health and the environment.

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

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

The guidance is thus aimed at:

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

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

The guidance is designed to serve as a tool to help stakeholders when establishing programmes, to determine their success in implementing appropriate laws, policies, and guidance, and assess whether the actions taken leads to improved levels of chemical safety. The guidance does not define a precise methodology, rather provides information and suggestions for elements to help stakeholders adapt their own safety performance indicator system. It is meant to be flexible so it can be helpful to a range of people with an interest in chemical safety worldwide. It is intended to complement other related activities.

To provide consistency and make the document as easy to use as possible, each subdivided section is set out to a standard format of

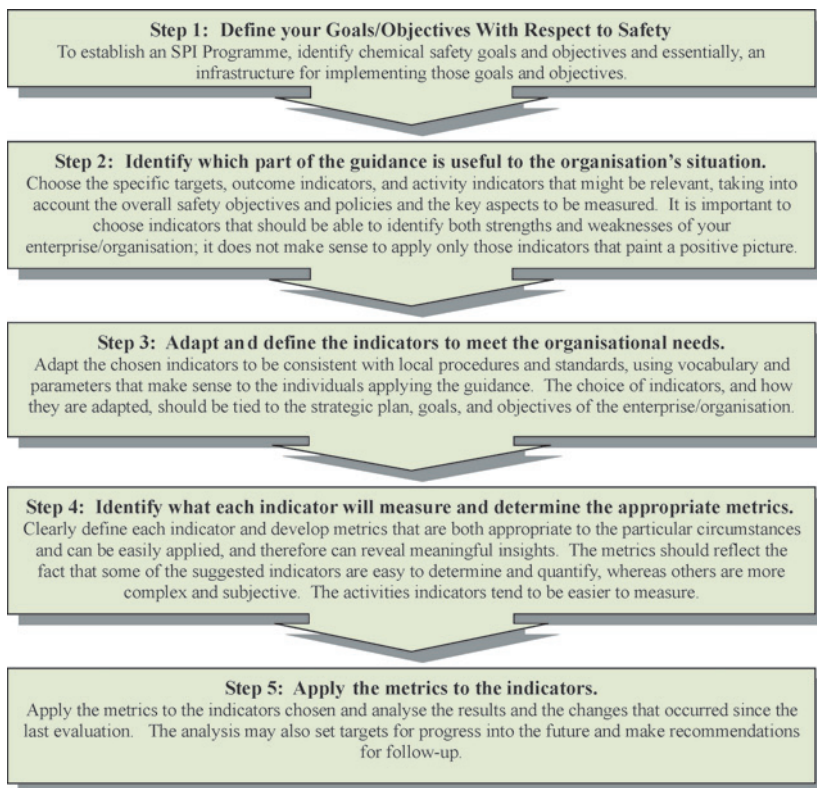
General information providing insight into the subject area, a summary of its scope and objective, some broad, important concepts related to the subject area and their relevance to chemical emergency prevention, preparedness, and response; and reference to relevant section of the *Guiding Principles*.

Targets for each sub-heading describe the ultimate objective that should be achieved within the subject area and provides the basis for the user to develop more specific, short term targets appropriate to their circumstances.

Guidance for developing outcome and activity indicators which provides suggestions for the types of measurements that could be applied to help determine whether there are improvements over time.

- For outcome indicators the guidance proposes ways to measure the extent of improvement in performance and the reduction in risks to human health and the environment from chemical accidents. It provides a basis to determine whether, over time, actions taken lead to real, measurable results.
- For activity indicators consideration is given to measuring actions taken in the context of chemical emergency prevention, preparedness, and response. The indicators measure whether appropriate policies and procedures are in place which are believed to lead to improvements in chemical safety.

The guidance is expected to be used in a five step process for each stakeholder group:



The guidance is set out with an introductory section consisting of an overview, executive summary, objective and scope, and information on how to use the guidance to best effect. There are separate sections for industry, public authorities, and communities/public to allow stakeholders to determine which part of the guidance is relevant to them.

Industry can use the safety performance indicators guidance to:

- Assess whether they are implementing appropriate chemical safety programmes/policies;
- Help to determine whether such programmes & policies are making a difference;
- Identify whether there is appropriate emphasis on different aspects of safety management; and
- Set priorities for future investment of resources.

Public Authorities can use the guidance to:

- Assess whether their programmes and activities are leading to overall improvements in chemical safety;
- Facilitate their relationship with industry; and
- Provide a basis for facilitating communication with other stakeholders concerning chemical safety.

Local communities/public can use the guidance to:

- Provide a tool to measure their performance with respect to accident prevention, preparedness, and response.

For purposes of this paper the following section focuses on industry. Readers wishing to investigate SPI's for public authorities and local authorities are asked to refer to the full guide.

THE GUIDANCE FOR INDUSTRY HAS CHAPTERS ON POLICIES AND GENERAL MANAGEMENT OF SAFETY

Guidance on outcome and activity indicators to promote:

- Overall corporate safety policies supported throughout the organisation
- Safety goals and objectives reviewed and revised (as appropriate) on a regular basis
- Safety leadership as a culture accepted by all levels of the organisation
- Safety management systems providing a well supported, structured approach to achieving good safety performance
- Personnel Management ensuring competent staff with adequate staffing levels
- Training and education so that all staff have a clear understanding of their roles and action to take in normal operations and emergencies;
- Free and open two way internal communication with respect to safety matters,
- A safe working environment designed to foster a safe way of working,
- Regular safety performance review and evaluation of management and technical systems used to actively correct deficiencies and to set new improved goals and objectives.

ADMINISTRATIVE PROCEDURES AND SYSTEMS

- Hazard identification and risk assessment procedures to identify the properties and quantities of dangerous substances produced, handled or stored and the processes utilised in the installation.
- Documentation of risk assessments, systems of work and changes of operation are essential to convey information to all levels of an organisation.
- Procedures (including work permit systems) for safe operation, management of change and emergency response incorporated in staff information and training.
- Management of change according to a structured procedure from planning, implementation and review of completion. Changes of organisational structure that could impact on safety should also be covered.
- Contractors should receive adequate training and be able to apply the normal safety procedures
- Producers have a responsibility to promote product stewardship from design through and use to final disposal

TECHNICAL ISSUES

- Research and development including scientific, industrial research and development.
- Design and engineering to help ensure that safety is appropriately taken into account in design and engineering of processes and equipment, and related human aspects, with respect to hazardous installations.
- Inherently safer process such that the process or the chemical handling activity in itself is safe regardless of what happens. In reality this is almost always difficult to fulfil completely. For chemicals to combine with each other to create desirable products, normally reactive chemicals are needed, which are often harmful to human health and/or the environment. However, enterprises should always strive to approach a totally inherently safe process.
- Industry standards should be based on relevant standards and where appropriate develop and implement appropriate internal standards, taking into account all relevant external standards.
- Storage of hazardous substances to help ensure the safe storage of hazardous substances.
- Maintaining integrity/maintenance in such a way that an adequate safety level is kept continuously. The integrity of the installations should be maintained to the original design. A long-term maintenance policy should be established for this purpose. The focus should be on preventive maintenance, based on measurement of the condition of the equipment and the systems production and use to final disposal

EXTERNAL CO-OPERATION

External co-operation with all parties concerned with the safe handling of chemicals is desirable. Therefore, all parties are dependent on each other for information on how to

best handle the chemicals and for concrete assistance in situations of emergencies. The good co-operation between all parties concerned is of importance.

- Co-operation with public authorities. Good co-operation with public authorities, based upon mutual trust, openness, and responsiveness, is a prerequisite for smooth and successful safety at an enterprise. To facilitate this co-operation, information — of both long-term and short-term nature including information on reportable incidents — should be provided promptly to the authorities. Well-informed authorities are an asset for an enterprise.
- Co-operation with the public and other stakeholders (including academia) is essential to ensuring confidence in the safety of the enterprise. Among other stakeholders are representatives of the community, hospitals, schools, nursing homes, environmental groups and media. Co-operation with external stakeholders is not always an easy task and can only be reached if the enterprise acts in an open and pro-active manner, maintaining a continuous dialogue with interested parties.
- Co-operation with other enterprises including enterprises within the same geographical area, enterprises within the same sector of the industry, enterprises using similar types of manufacturing processes and/or using the same type of chemicals, and enterprises with a producer-user relationship

EMERGENCY PREPAREDNESS AND RESPONSE

Despite all the efforts to avoid accidents there must be a preparedness to deal with the possibility of emergencies and accidents. This is a responsibility both for the enterprise and for the public authorities. Therefore, emergency plans should be developed, including both an on-site emergency plan and an off-site emergency plan. These two plans should be co-ordinated with each other in order to be able to efficiently and properly deal with possible accidents.

- Internal (on-site) preparedness planning. The enterprise should prepare an on-site emergency plan for how to handle an emergency internally and with internal resources. This plan should be based on possible accident scenarios identified as a result of the hazard identification and risk assessments
- Facilitating external (off-site) preparedness planning by public authorities and on-site plans of other enterprises that may be affected in case of accidents
- Co-ordination (within industrial organisations) within industrial organisations with a view toward improved emergency planning and response.

ACCIDENT/NEAR-MISS REPORTING AND INVESTIGATION

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

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

- Investigations of accidents, near-misses and “learning experiences”, and to determine root and contributing cause(s).
- Follow-up (including application of lessons learned and sharing of information) to help ensure that effective corrective actions are taken as the result of lessons learned from accidents, near-misses and other “learning experiences”.

To facilitate the use of the guidance an interactive web-based version has been developed which allows users to create a customised SPI programme based on their own input (web site www.oecd.org/env/accidents).

Examples of outcome and activity indicators

Chapters	Guidance on outcome and activity indicators to promote	Examples	
		Outcome indicator	Activity indicators
Policies and General Management of safety	Overall corporate safety policies supported throughout the organisation	Extent to which the Safety Policy has been received and understood by employees, contractors and relevant external stakeholders (suppliers, customers, potentially affected public, etc.)	Is the Safety Policy conveyed to all relevant stakeholders?
	Safety management systems. . .	Improvement in efficiency of production and maintenance as a result of the implementation of a safety management system, measured e.g., as reduction of operating disturbances and releases, less absenteeism, etc.	Is there a comprehensive management system for safety that covers all the requirements for a management system in the relevant legislation at a minimum?
Policies and General Management of safety	Training and education. . .	Extent to which the workforce perform (i.e., appropriate procedures being followed) during normal operations (based on spot checks, reviews, etc.).	Is there a mechanism to check that the training is actually performed according to the training programme, and achieves desired results?
Administrative Procedures and systems	Hazard identification and risk assessment procedures. . .	Extent the installations within the enterprise have completed appropriate hazard identification and risk assessments using proper methods.	Are there systematic procedures for hazard identification and risk assessment?

(Continued)

Chapters	Guidance on outcome and activity indicators to promote	Examples	
		Outcome indicator	Activity indicators
	Documentation of risk assessments, systems of work and changes of operation . . .	Extent of procedures reviewed and updated before their expiration date.	Is there complete documentation related to engineering and operational procedures and instructions?
	Procedures (including work permit systems) for safe operation, management of change and emergency response incorporated in staff information and training.	Extent of the number of incidents attributed to procedures (lacking, inadequate or not followed).	Are all operations, maintenance, laboratory, transport and other activities needing procedures covered by such (normally written), procedures?
Technical issues	Design and engineering . . .	Extent of modifications necessary after performance of risk assessments.	Is there a procedure for selecting the most effective technology from a safety point of view, reducing the risks as far as is reasonably practicable, with the aim of designing inherently safer processes?
	Storage of hazardous substances . . .	Level of risk at the hazardous installation based on, e.g., extent of hazardous material stored (absolute values or some index; per substance or possibly composite figures).	Is there a procedure for storage of various hazardous substances, including keeping certain substances which are incompatible, segregated from each other, limiting the amount per storage unit; having adequate containment for spills and installing adequate fire protection facilities.

(Continued)

Chapters	Guidance on outcome and activity indicators to promote	Examples	
		Outcome indicator	Activity indicators
External Co-operation with all parties...	Maintaining integrity/maintenance in such a way that an adequate safety level is kept continuously...	Extent of preventive maintenance versus corrective maintenance.	Is there a system for preventive maintenance with regular measurements of the condition of the equipment?
	Co-operation with public authorities...	Extent public authorities have confidence in the safety policies and procedures at the facilities.	Is there a specific policy/procedure for co-operation and communication with the authorities?
Emergency Preparedness and response...	Internal (on-site) preparedness planning.	Number of on-site emergency response exercises per year.	Does the on-site plan include an emergency organisation with clearly defined roles for all personnel involved, and with a clear hierarchy of responsibility?
Accident/ Near-Miss Reporting & Investigation...	Reporting of accidents, near-misses and other"learning experiences...	Number of reported incidents, totally.	Is there a comprehensive system for reporting incidents and other "learning experiences"?

With this system, users can list members of the team working on developing the organisation's SPI programme. The goals of the organisation and choose the appropriate indicators and measures for their organisation can be input into the system. The final customised system can be downloaded and saved as a MS Word document.

REFERENCES

- OECD Guiding Principles for Chemical Accident Prevention, Preparedness and Response (OECD 2003)
 OECD Guidance on Safety Performance Indicators (OECD 2003)

EXAMPLE FOR INDUSTRY FOR DEVELOPING SAFETY PERFORMANCE INDICATORS PROGRAMMES

INTRODUCTION

The following example has been prepared to describe the process that an industrial enterprise might follow if developing and applying a safety performance indicator (SPI) programme.

Prior to reviewing the SPI Guidance Document, representatives of the ABC Inc. have first:

- identified a team within their company representing various interests, including management;
- identified their company’s goals and objectives, as well as the infrastructure that exists for implementing their programmes designed to achieve these goals and objectives.

REVIEW THE GUIDANCE DOCUMENT

For the purposes of this example, the focus is on just one subchapter of the Guidance for Industry, *Training and Education* and, specifically on the outcome indicators in this subchapter. However, in using this Guidance Document, the ABC Inc. team would review all the chapters in Part A and decide which subchapters are relevant for their purposes. Specifically, the team would have:

- read the relevant parts of the entire Guidance Document to understand the overall approach of the guidance on SPI (including the introductory text and relevant annexes);
- reviewed each section of Part A related to Industry in the context of the company’s responsibilities; and
- decided which Chapters (and, in particular, which “targets”) are relevant for its work.

CHOOSE/ADAPT RELEVANT INDICATORS

Following the general review, the ABC, Inc. team chose and adapted the outcome and activities indicators relevant for their organisation.

The team has decided that the following five outcome indicators apply to their company’s activities as well as their goal and objectives:

- a. The level of adequacy (extent and quality) of the total training.
- b. Extent of employees that have been trained in accordance with the planned training programme.
- c. Extent of employees who pass periodic assessment of training.
- d. Extent to which the workforce perform (i.e., appropriate procedures being followed) during normal operations (based on spot checks, reviews, etc.).
- e. Number of incidents attributed to failure of training as a root or intermediate cause.

ABC Inc. recognised that some of the proposed outcome indicators are rather straightforward to measure relatively objectively, whereas others are much more difficult, requiring the company to use independent surveys or reviews by experts.

For each of the indicators, ABC Inc. established parameters for measuring the indicators in terms that would be understood by all its employees. (see matrix on next page)

ABC Inc. has decided to apply a scale for the assessment of the outcome indicators from 0 to 10, with 10 being the best performance. In addition, in this example, ABC Inc. has decided to use a weighting system so that greater emphasis is placed on those parameters that are considered to be of greater significance. For example, within the first outcome indicator “extent of safety and health training” is given greater significance than “revision of programme”.

ABC, Inc. has chosen a matrix as a way of documenting the measuring process, and provided guidance, to help ensure that there is a consistent approach over time.

Outcome indicator		Score (example)		
(a) Level of adequacy (extent and quality) of the total training programme for employees		4.9		
Parameter	Guideline for giving points	Weight factor	Score per parameter	Weighted score
<ul style="list-style-type: none"> • Programme for each category of employees 	10 = detailed programmes for each category both long-range and per year 7 = most important categories covered both long-range and per year 4 = only short-term ad-hoc programmes for most important categories	0.2	6	1.2
<ul style="list-style-type: none"> • Based on inventory of actual requirements per category 	10 = detailed assessment of requirements for all categories 7 = most important categories treated in detail, others more generally 4 = only general type programmes	0.1	5	0.5
<ul style="list-style-type: none"> • Safety and health only, or also other professional skills 	10 = extensive inclusion of broad-based topics for detailed understanding 7 = some inclusion of broad-based topics as well 4 = only limited broad-based topics	0.1	5	0.5
<ul style="list-style-type: none"> • Extent of safety and health training 	10 = Equivalent to one week per year 7 = Equivalent to 2 days per year 4 = Equivalent to ½ day per year	0.3	5	1.5
<ul style="list-style-type: none"> • Participation of employees in developing programme 	10 = extensive and formal participation of a good representation of employees 7 = some participation of employees 4 = limited representation of employees	0.2	3	0.6
<ul style="list-style-type: none"> • Revision of programme 	10 = thorough and formal revision of all programmes every year 7 = some revision every year 4 = only infrequent revision	0.1	6	0.6
				4.9

Outcome indicator		Score (example)		
(b) Extent of employees that have been trained in accordance with the planned training programme.		5.0		
Parameter	Guideline for giving points	Weight factor	Score per parameter	Weighted score
• Operating staff	Percentage of employees who have participated fully in planned training programme (10 grade scale). Reduction for employees who have only participated partly. If there is no training programme, score will be 0.	0.3	8	2.4
• Maintenance staff		0.3	6	1.8
• Middle management staff		0.2	4	0.8
• Top management staff		0.2	0	0
				<u>5.0</u>

Outcome indicator		Score (example)		
(c) Extent of employees who pass periodic assessment of training.		6.5		
Parameter	Guideline for giving points	Weight factor	Score per parameter	Weighted score
• Operating staff	Percentage of employees who pass the periodic assessments (10 grade scale).	0.4	8	3.2
• Maintenance staff		0.3	7	2.1
• Middle management staff		0.2	6	1.2
• Top management staff		0.1	0	0
				<u>6.5</u>

Outcome indicator
(d) Extent to which the workforce perform during emergency situations (based on tests or actual situations).

Score (example)
?

Parameter	Guideline for giving points	Weight factor	Score per parameter	Weighted score
	Based on some independent resource making reviews. 10 = all personnel knew what actions to take during the emergency, and acted appropriately 5 = some employees did not know what to do, or did not take appropriate actions 0 = majority of employees did not know what to do or did not take appropriate actions			

Outcome indicator
(e) Number of incidents attributed to failure of training as a root or intermediate cause.

Score (example)
6.0

Parameter	Guideline for giving points	Weight factor	Score per parameter	Weighted score
	Simple measurement of number of incidents that after analysis have been found to have their root or intermediate cause in lack of or insufficient training. Could be converted to a 0 to 10 scale, where 10 = None 7 = say 5 (5%) 4 = say 20 (20%)			
