## SAFETY CULTURE IN ITALY: THE LEGISLATION, INSPECTIONS, THE PERSPECTIVE OF AN INSPECTOR

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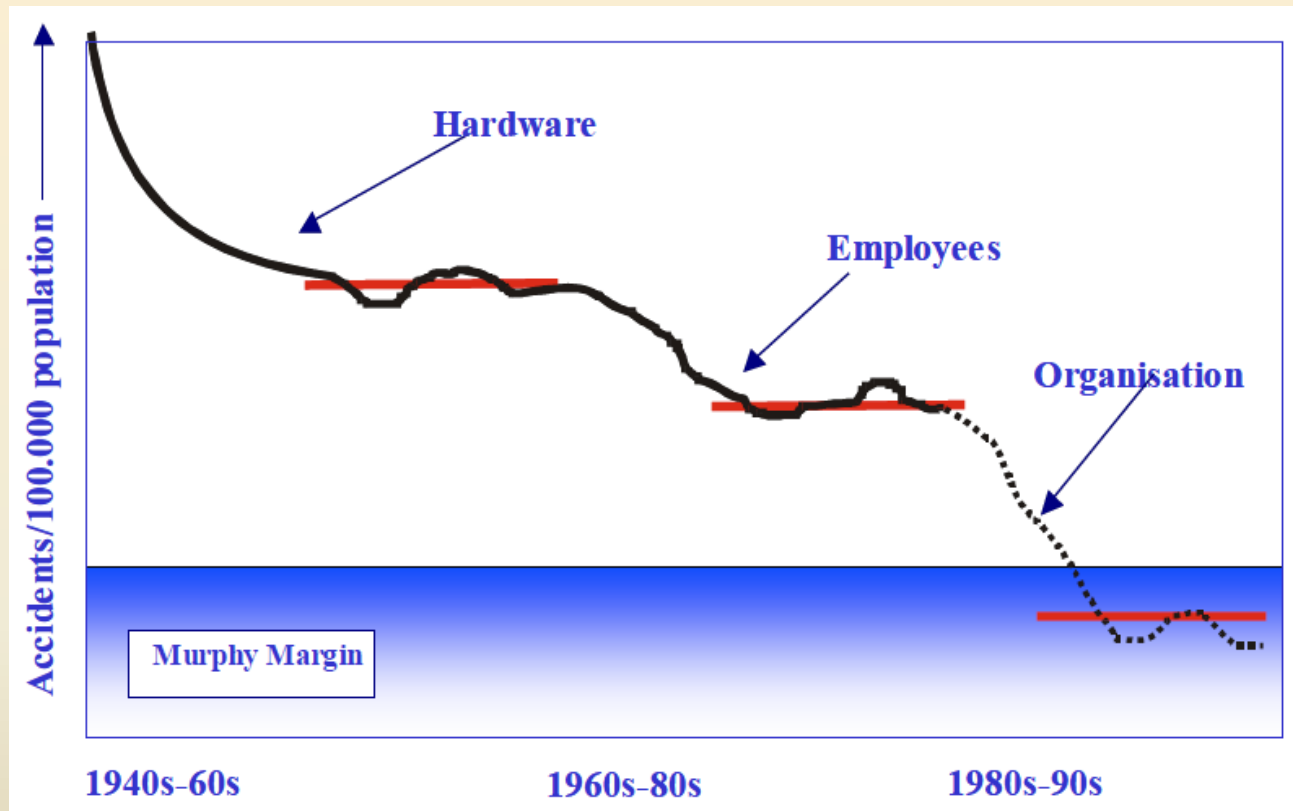ISPRA-Italian National Institute for Environmental Protection and Research

**AIM:**

Analyze the dissemination of the safety culture in Italy, using the historical experience during ten years of inspections on Safety Management Systems

Highlight the existence of strengths and weaknesses in the criteria for implementation of the regulatory requirements

Propose actions for a further improvement of SMS

# THE WELL-KNOWN CHART:

From the first regulations of 1899, the tools of prevention that arise in the period between 1955 and 1956 in the historical pillars of health and safety at work are mainly based on prevention technology (safe equipment, prevention of human error through barriers), then moving, over the years, to improve the techniques of selection and qualification of personnel, ensuring that only trained operators can access to the work areas. It is in the early 90s, that the focus change towards a comprehensive safety system that places man, rather than machine, in the center of the new safety organization of the company, codifying the legal duties of information, training and active participation of workers in safety at workplace. It is time for the safety management systems, concerning :

•the safety and health of workers

•the prevention of major accidents.

It is immediately evident, as shown in the following figure, that the two safety systems (at work and for the prevention of major accidents) pursue two different objectives: the first, the worker's safety through the prevention of occupational injuries and professional diseases, the second, the safety for operators, the public and the environment. And the latter it is a legal requirement, not a voluntary adoption.

SMS

OH&S
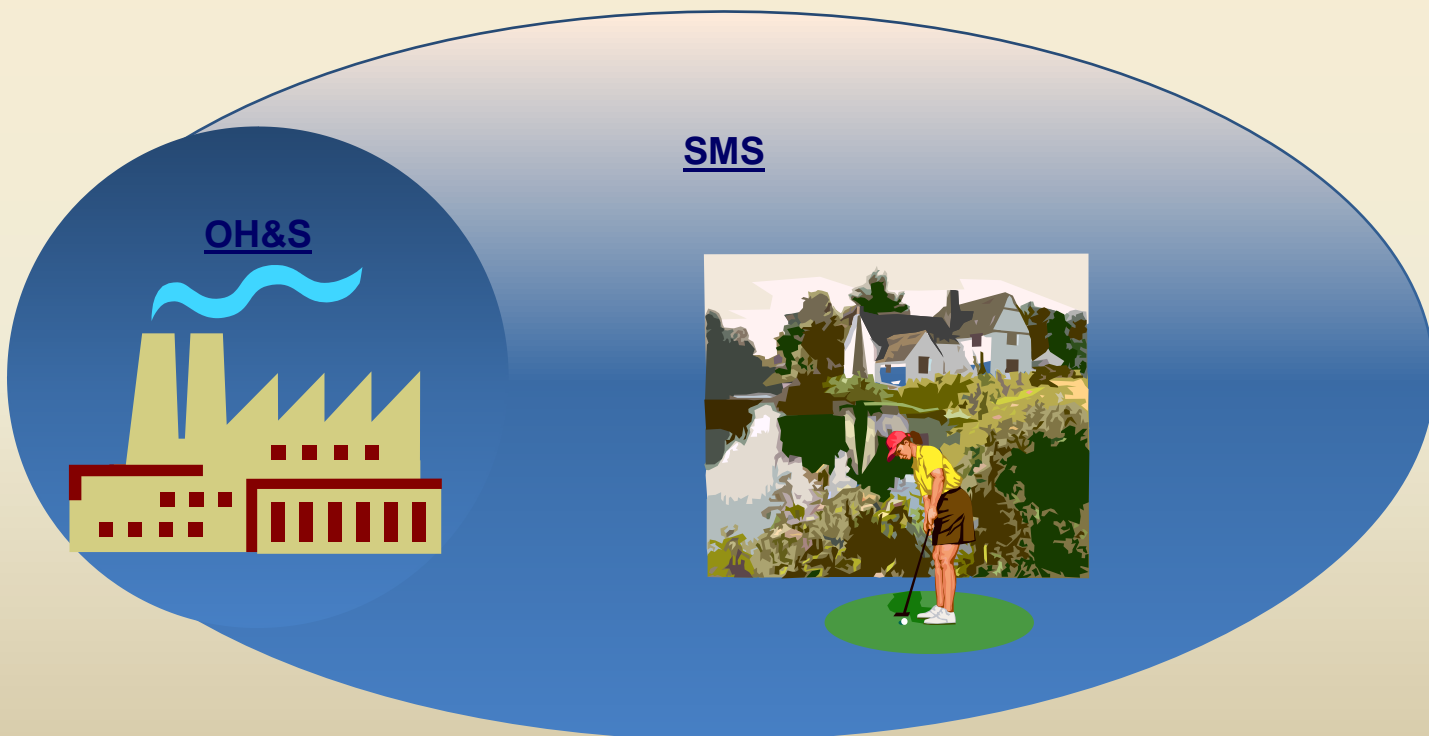
## HOW THE LEGISLATION TAKE INTO ACCOUNT THE SAFETY CULTURE WITHIN THE OBLIGATIONS FOR THE IMPLEMENTATION OF THE SMS

With the previous decree of transposition, in 1999, it was already paid attention to the need for an SMS that guarantee the participation of staff at all levels in the process of continuous improvement, but it is with the current implementation of the Directive 2012/18/EU that Annex B "guidelines for the implementation of SMS" prompted the site manager to commit to disseminate, through the allocation of resources and responsibilities, training and communication, sharing knowledge and awareness, the safety culture at all levels of its own organization.

Since the 90s, the technical regulation was dealing to provide users with specific tools for the development of an effective SMS for the prevention of major accidents. To date, the technical standard is divided into:

- UNI 10617: Major accident process plants: Safety Management System essential requirement
- UNI 10616: Major accident process plants: Guidelines for the implementation of the UNI 10617
- UNI 10672: Major accident process plants: Safety assurance procedures for design
- UNI TS 11226: Major accident process plants: Procedures and requirements for safety audits

These standards are specifically mentioned in the decree transposing the Seveso Directive as "state of the art" in the field and are developed to meet both the requirements of the law, and also the structure of the UNI 14001 and OHSAS 18001.

## THE CHECKLIST FOR INSPECTION AND SPECIFIC CONTENT CONCERNED

To support inspectors in control activities was developed a specific checklist that leads to various aspects of the Safety Management System for the Prevention of Accidents, as defined in the decree implementing the Directive and that it consists of 8 elements, 27 points and 95 sub points. The operational guidelines for carrying out inspections, the format to use and relating tools for planning and programming of the control activities are now part of the transposing decree and represent a specific annex.
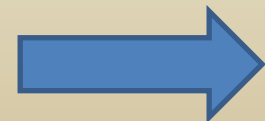
**THE CHECKLIST FOR INSPECTION AND SPECIFIC CONTENT CONCERNED**

**1    Document on major hazards prevention policy, SMS structure and its integration with the general management of establishments**

i          Definition of Prevention Policy

ii         Structure of the SGS adopted and integration with enterprise management

iii        Contents of the Policy Document

**2    Organization and personnel**

i          Definition of responsibilities, resources and activity planning

ii         Information activities

iii        Training activities

Iv         Human factors, operator-plant interfaces

**3    Evaluation and identification of major hazards**

i          Identification of hazardous substances, definition of criteria and security requirements

ii         Identification of possible accidents and safety analysis

iii        Planning plant and management improvement for the reduction of risks and update

**4    Operational control**

i          Identification of installations and equipment subject to checking plans

ii         Documents management

iii        Operating procedures and instructions in normal, hazardous and emergency conditions

iv         Maintenance procedures

v          Procurement of materials and services

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**THE CHECKLIST FOR INSPECTION AND SPECIFIC CONTENT CONCERNED**

**5    Management of change**

i                Technical, procedural and organizational changes

ii               Documents Update

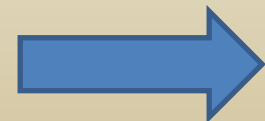**6    Emergency planning**

i                Consequence analysis, planning and documentation

ii               Roles and Responsibilities

iii              Checks and monitoring for the management of emergency situations

iv              Alarm systems, communication and support to external response

v                Assessment on systems related to the management of emergency

vi              Control room and/or emergency management center

**7    Monitoring performances**

i                Performance evaluation

ii               Analysis of accidents and near-misses

**8    Audit and review**

i                Audits

ii               Review of the prevention policy of SMS

Within the general elements, such as

- **Organization and personnel**
- **Evaluation and identification of major hazards**
- **Operational control**
- **Emergency planning**
- **Monitoring performances**

They are, among others, contained the instructions for inspectors to assess the presence and level of sharing and awareness of the safety culture within the organization. Of course, not only the checklist can provide the background information, it is necessary that the inspector also has a good knowledge of technical regulations on accident prevention, helpful both for site managers for the implementation and improvement of SMS, and also for inspectors to verify its effectiveness.

## CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

The process safety culture of an organization is a significant determinant of how it will approach process risk control issues. Safety management system failures can often be linked to cultural deficiencies. Accordingly, enlightened organizations are increasingly seeking to identify and address such cultural root causes of process safety performance problems.

Every organization has developed its own concept of safety culture, but it is essential how these ideas are communicated, understood and kept active at all levels of personnel. The implementation of a process aimed at improving the safety culture has impacts on many aspects of SMS, including, primarily:
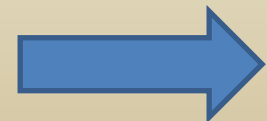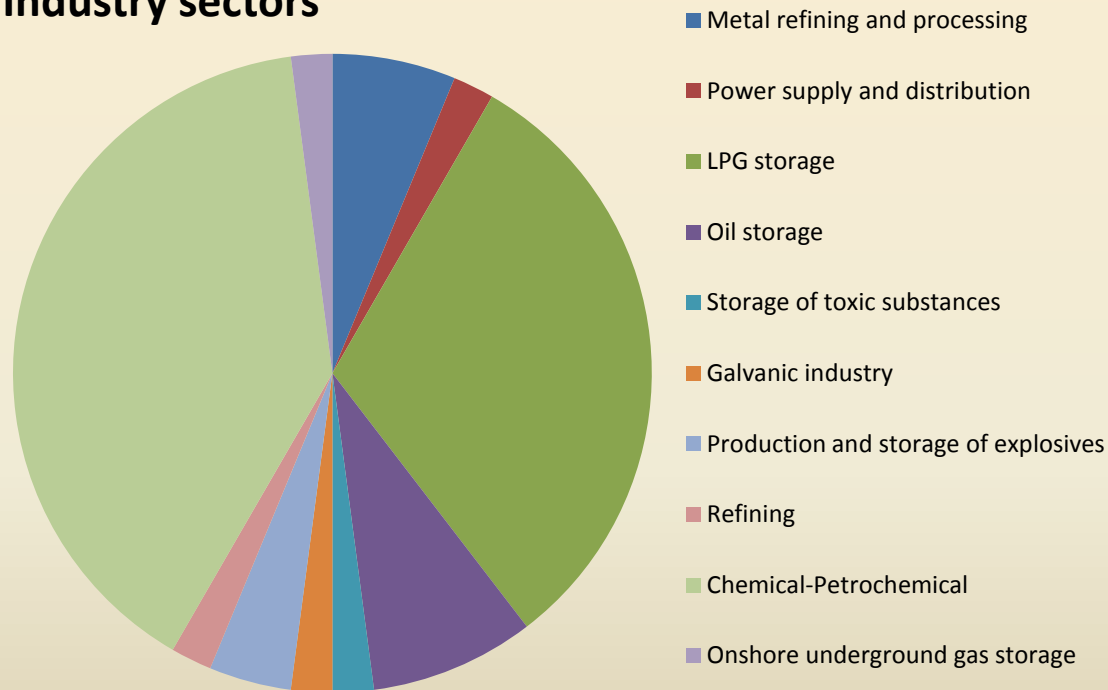
- Major hazard prevention policy
- Evaluation and identification of major hazards
- Processes and related documentation
- Process hazards management and identification of chritical lines and equipment
- Improvement of the process safety knowledge
- Objectives, targets and programs for the improvement of SMS.
- Resources, roles, responsibility and authority.
- Competence, training and awareness.
- Communication
- Management of change
- Monitoring and performance measurement
- Accidents, near-misses, non compliances, preventive and corrective actions

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**CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT**

The following chart represents the total number of inspections carried out over ten years of activity, grouped by type of industry sector.



**Industry sectors**

- Metal refining and processing
- Power supply and distribution
- LPG storage
- Oil storage
- Storage of toxic substances
- Galvanic industry
- Production and storage of explosives
- Refining
- Chemical-Petrochemical
- Onshore underground gas storage

**Any non-compliance, depending on the level of severity, detected by inspection commissions is classified in minor or major**
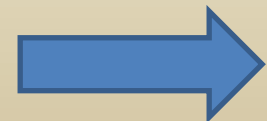
## CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

In order to fully understand what is a "minor" and a "major" non-compliance, it is certainly useful to clarify their true meaning in the framework of national legislation

**major**: an evidence of substantial not-compliance with legal requirements, technical standards taken as reference for the SMS or corporate standards. A minor non-compliance not corrected (for example, identified during the last inspection and not taken into consideration by the operator), may also become a major non-compliance during the subsequent inspection;

**minor**: an evidence of formal aspects not adequately fulfilled (for example, the requirement for a standard adopted voluntarily not completely satisfied, due to lack of adequate supporting documentation, an element of the SMS adopted by the operator but without adequate documentation to support it, etc.).

# CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

The following chart, purely indicative, shows the total of shortcomings found during inspections, with reference to the basic elements of SMS.
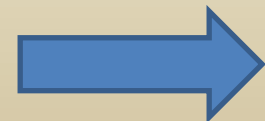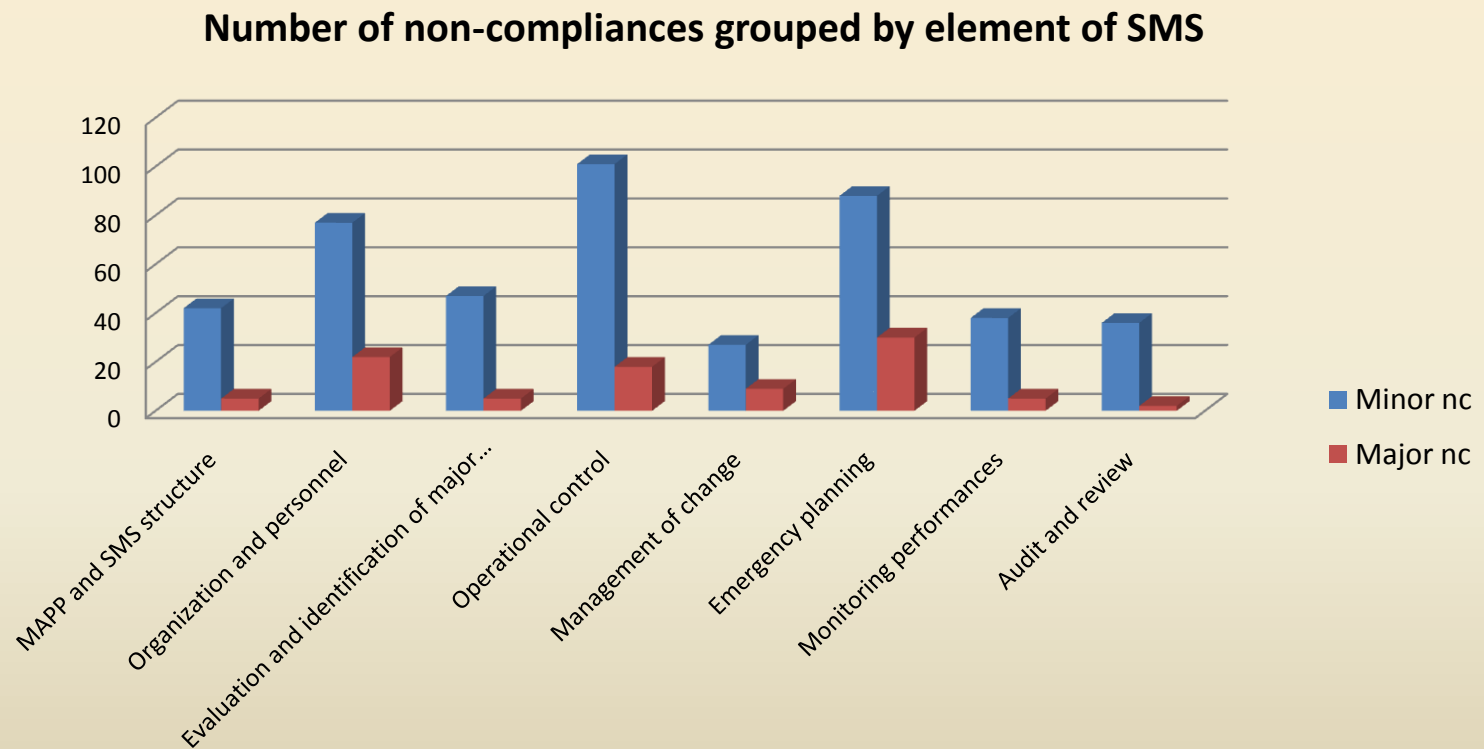
**Number of non-compliances grouped by element of SMS**

## CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

Simply viewing the chart we understand what are the most critical aspects. For example:

- organization and personnel (roles, training, awareness, communication);
- assessment and identification of hazards (risk management process, improvement of knowledge and risk reduction);
- operational control (operating procedures, maintenance, permits to work);
- emergency planning (emergency drills, use of PPE);

they were detected areas for improvement in the management of the safety culture within the organization.

It is necessary to specify that during the inspections were not always found completely positive or completely negative aspects. Considering the complexity of the requirements for the implementation of an SMS, in most cases there was an overlap of them, limited to specific requirements.

## Strengths and weaknesses most recurrent in terms of content, beyond the statistical analysis

**Document on major hazards prevention policy, structure of the SMS and its integration with the enterprise management**

### Strengths

• It was found that most of the organizations have adopted an integrated SMS, generally with environment and safety at work management systems, supported by the adaptation of the system developed by the corporate to the national law and requirements.

• Positive aspect is the sharing of the "Document" on MAPP with all personnel, through information campaigns, following its setting up with the consultation of workers' representatives (a law requirement in Italy).

### Weaknesses

• Although a good level of implementation of the National requirements have been reached, there are still shortages in both formal and practical aspects, with regard to the involvement and consultation of workers' representative.

**Organization and personnel (roles, training, awareness, communication);**

**Strengths**

•It was found that, especially in the case of medium-large sized companies, they have been established clear roles, tasks and responsibilities for all personnel. There are structured training programs involving all staff and put in place mechanisms to ensure two-way communication at all levels. In some particular cases there are active systems to improve the safety awareness of the processes, generally based on BBS techniques. It is paid much attention to the qualification of contractors.

**Weaknesses**

•Is missing a clear allocation of responsibilities, training plans are usually generic and static and do not take into account the suggestions of workers, through their representatives. Furthermore, they are not specific to the different operational tasks. The communication is generally limited to the up-down direction and therefore can happen, especially interviewing operators, that they are poorly informed about the nature of the processes and risks involved.

# CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

**Evaluation and identification of hazards (risk management process, improvement of knowledge and risk reduction);**

## Strengths

•It was found that an in-depth risk assessment not only is useful to set up the safety report, but also these results are used for planning plant and management improvement aimed to improving safety and knowledge of industrial processes. In some cases, there is a system that allows workers to participate in the mechanisms for identifying potential problems and the implementation of solutions.

## Weaknesses

•It was found that the risk assessment is not always supported by an adequate procedure that takes into account the results of operational experience and possible suggestions that may come from operational units. The safety report is therefore limited to being a document to be transmitted to the competent authority. In relation to what pointed out, risk reduction activities have been planned without considering all the possible input elements.

## CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

**Operational control (operating procedures, maintenance, permit to work);**

**Strengths**

•It was found the existence of detailed operational procedures and instructions, subject of training for the operators concerned and periodically updated. In some cases, especially in recent years, it was noticed a management of maintenance activities based on engineering criteria, supported by the specific identification of critical equipment and components. The permit to work is understood by the personnel performing maintenance as the essential tool for carrying out the work safely.

**Weaknesses**

•The correct identification of the critical equipment, supported by procedures that define the requirements for their classification, based on the results of the risk assessment is not yet an established starting point for all the organizations. For this reason, it was not effectively defined the periodicity for proper maintenance of the equipment in order to avoid unexpected failures. There were some cases of misuse of the permit to work, which limited its effectiveness.

## CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

**Internal Emergency Plan, organization, drills**

The verification that the inspected establishment have an effective emergency planning is a very important point for the inspection commissions. It is now a well established criteria to ask the operator to perform at least one emergency drill and to test the results, in order to check the response of the emergency team, personnel and systems of prevention and mitigation. So the findings in this case concerned formal and operational aspects.

**Strengths**

•The organizations' response was positive as far as concerns the set up of an IEP consistent with the accident scenarios in the safety report, the allocation of roles and responsibilities for the emergency team members and, in most cases, the planning of emergency drills.

**Weaknesses**

•From a formal point of view in some cases is still lacking the involvement of workers' representatives, both internal and contractors (mandatory!).

•With regard to operational aspects, sometimes from emergency drills emerged behaviors of the team not corresponding to what is set in the procedures, i.e. in terms of use of specific PPE required by emergency situations, as well as deficiencies in the recording of the outcomings of the drill, and in the analysis and developing of appropriate corrective actions.

## CONSIDERATIONS ON EXPERIENCE GAINED AFTER TEN YEARS OF ACTIVITY:-STRENGTHS AND WEAKNESSES, OPPORTUNITIES OF POSSIBLE IMPROVEMENT

**Accidents, near misses, non-compliance, corrective and preventive actions**

**Strengths**

•In most cases, organizations have a system for collecting information on accidents and near-misses, including the analysis and the preparation of corrective actions. Over the last few years it has been also developed a methodology for reporting anomalies, as well as methods of cross surveillance of "correct behavior", structured on all levels of staff, which allowed also to employees to contribute in the improvement of the system.

**Weaknesses**

•In some cases, compared to a proper procedure it is not followed an appropriate response of the personnel (from the top management to the operating personnel) that, not properly trained and aware, has not been able to effectively recognize and report abnormal events in order to prepare adequate improvement plans. In addition, the collection of accidents was limited only to the establishment, without taking into account the information coming from similar processes.

## CONCLUSIONS

- No real dividing line between SMS where is developed an effective safety culture and others totally lacking.

- Rather, there are different levels of implementation with more or less faults and therefore with different opportunities for improvement.

- Over the years, in fact, it has been an increasing attention towards the development, dissemination and maintenance of a model of safety culture

- In particular in medium-large sized organizations, which can rely on more human resources available for developing an SMS aimed to the continuous improvement.

- In other cases, the limit is implementing a system primarily focused to the safety at the workplace that sometimes does not lead to the root of the problem of accidents caused by human error, which can be only reduced through the development of a series of activities including at least:

- Visible commitment for safety from the Top Management;

- Trust and good relationship between workers and company managers;

- Good communication at all levels of the organization;

- Commitment of the company to ensure the development and maintenance of competences;

- Analysis of previous accidents and identification of critical behaviors;

- Involvement of employees at all levels of the organization;

- Improvement plan for the reduction of the residual risks identified;

- A system for monitoring the performance of the activities

**GO TO PROPOSED ACTIONS FOR A FURTHER IMPROVEMENT OF SMS**

**CONCLUSIONS**

## Relevant and essential elements of the SMS implemented in a surely positive way:

•sharing with all levels of the procedures that substantiate the SMS and bidirectional communication "top-down and bottom-up" between top management and personnel;

•the commitment to organize training activities and operational practices to improve awareness and knowledge of the risks for workers (human-machine interfaces and operator-plant);

•the participation of workers, through their supervisors (using their knowledge of the problems related to the operation of the plant) to improving changes involving installations and processes;

•planning of maintenance activities based on the awareness of the importance of setting up a permit to work system;

•proper management of all changes (plant, organizational, procedural, temporary);

•the preparation of an IEP consistent with the top events evaluated in the safety report, supported by regular emergency drills, the proper use of PPE and the follow-up that may come from the emergency team;

•the provision of a system of analysis of accidents and near misses that promotes the cooperation of all levels of the organization, in particular the operators, for the reporting activity.

**Leadership, resources, roles and responsibilities for improving safety culture and communication at all levels of the organization**

•Every organization within its SMS should establish clearly which are the roles, tasks, responsibilities and resources to implement and maintain a policy related to the sharing of safety culture. The safety management system should identify key positions at all levels of the organization. It should also define the interfaces among the key positions, between them and the senior management and all staff involved in activities relevant for safety, including the involvement of worker's representatives. The lack of a proper definition of these aspects can create misunderstandings or interruptions in the flow of information towards the operators, with the result of a loss of the contribution that can provide the operating units.

## Competence, training and awareness of personnel

•The sharing of the operational experience (accidents, studies or tests and anything else made about changes to plants and/or conduction) acquired over time by operators and supervisors at all levels of the organization provides important elements for improving operating conditions and safety. For this reason, the essential purpose of training activities shall be to ensure that all personnel involved in the design, operation and maintenance of a plant has the required knowledge of the implications of their activities on safety, that such information is constantly updated and that staff keep a suitable professional qualification and operational capabilities.

## The prevention of human error in plant operation

•The prevention of human error should be considered a fundamental aspect of safety management process. For this purpose, on the one hand it is necessary that the performance of employees (from managers to operators and not only for those who are at the operating departments but for all personnell at the plant, including contractors) is highly reliable. The capability by the operators to manage the anomalies during the operation and/or emergency situations should be verified both in real conditions of occurrence and in simulations and drills to determine any deficiencies related to the human factor.

**Lessons learned from accidents, near misses, anomalies and implementation of corrective actions**

•The analysis and evaluation of lessons learned as a result of accidents, near misses, anomalies, as well as sharing with the personnel at all levels is of basic importance to improve the safety culture. Similarly, the involvement of workers in pointing out problems and finding solutions, allow an effective improvement of the safety performance of SMS. In order to obtain the maximum effectiveness in the analysis of accidents/near-misses and ensure the detection of any critical event from the staff, the identification of the responsibility, for disciplinary purposes or other, shall be the purpose of other possible lines of investigation . The analysis of non-compliance related to procedures, regulations, operating instructions found after  inspections and/or accidents/near misses linked to human error can put into evidence deficiencies related to the behaviour of workers, the senior management or the organization and work environment . These deficiencies should be subject to appropriate corrective actions.

**Process risk management and identification of possible improvements**

•The process risk management shall ensure the systematic identification, assessment and control of risks, in terms of frequency and consequences, which can occur during operation throughout the plant lifecycle, including dismantling (decommissioning). Without a complete understanding of risks, and the options available to mitigate them, the organization is not able to make effective decisions. Organizations that do not actively make an effort in qualitative and quantitative analysis of "what can go wrong?", or that do not implement the recommendations arising from the risk assessments carried out, are not able to effectively manage the risks and establish appropriate improvement plans.

THANK YOU FOR YOUR ATTENTION