The evaluation of the emergency response during the Seveso Inspections

Mutual Joint Visit Workshop for Seveso Inspections on External Emergency Planning-Coordination between authorities

Italian Competent Authorities and the European Commission-JRC

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Romualdo Marrazzo (HSE Senior Expert, Seveso and IPPC-IED Inspector)

Service for Risks and Environmental Sustainability of Technologies, Chemical Substances, Production Processes and Water Services and for Inspections (VAL-RTEC)

ISPRA – Italian National Institute for Environmental Protection and Research

The role of ISPRA for industrial control

ISPRA has a national role as a technical body supporting the Ministry of Environment in the national implementation of the Seveso Directives for the prevention of major accidents

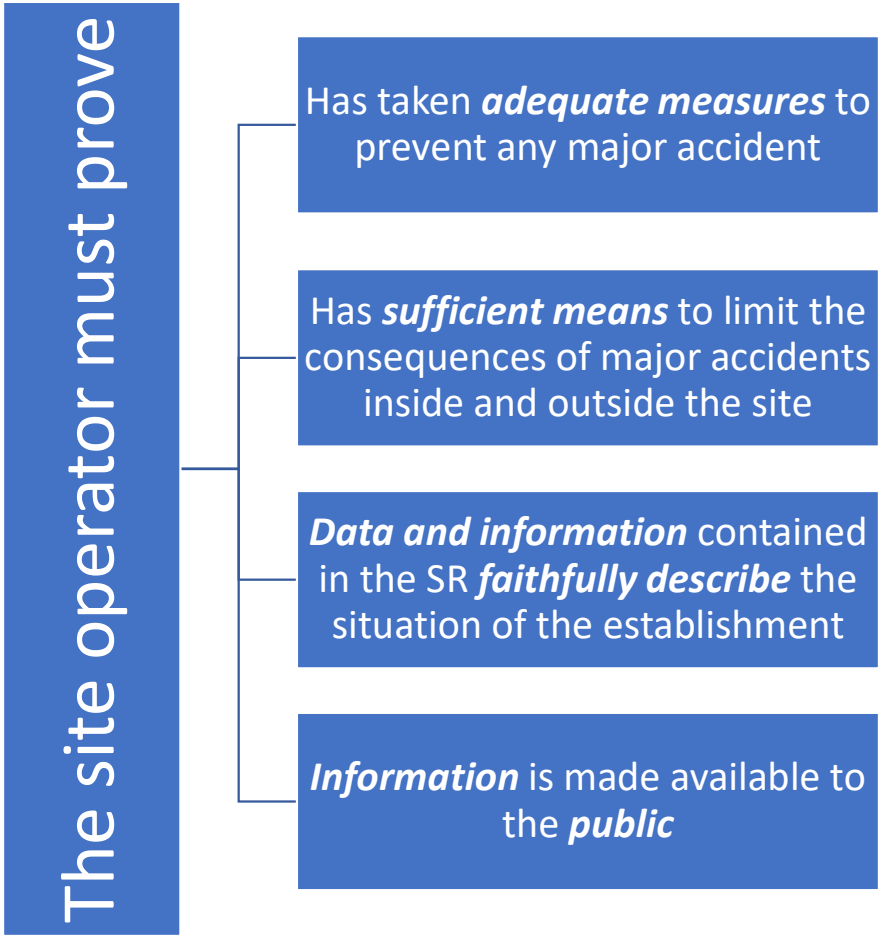
- Definition of technical contents of laws and decrees to control Major Accidents
- Set of the National Inventory of major accident hazards establishments and other related databases
- Inspections of establishments SMS-PMA (Safety Management System-Prevention of Major Accident) on a regular basis or after an accident
- Support for international activities (EU, OECD, bilateral cooperation)
- Technical coordination and addressing of Regional Agencies for the Protection of Environment (ARPA)
- Collaboration with other Authorities competent for industrial risk (Ministry of Home Affairs – National Fire Brigades; Department of Civil Protection; Ministry of Infrastructures)

Program and themes

1. The procedure for the SMS-PMA Inspections
2. The checklist for the verification: focus on the emergency planning element
3. Feedback and findings from “on-site” activities in a refinery
4. Final results: need for improvement and corrective actions

1. The procedure for the SMS-PMA Inspections

The site operator tasks



The Inspection Commission

A commission is charged by the Italian Authority for UT Establishments (Regional Fire Brigade):

- *ISPRA (Institute for Environmental Protection and Research)/ARPA (SNPA)*
- *CNVVF (Local Fire Brigades)*
- *INAIL (Safety at Work Institute)*

The commission must verify the suitability of the operator MAPP and the implementation of the SMS, carrying out a planned examination of the systems being employed at the establishment, whether of a technical, organizational, or managerial nature

The national regulation

2 fundamental legislative instruments relevant to the SMS inspections

1) *D. Lgs. 105/2015 – Allegato B "Linee guida per l'attuazione del Sistema di Gestione della Sicurezza per la prevenzione degli incidenti rilevanti"*
   - MAPP and SMS structure: technical contents, deepness, training activities
   - State of the art: UNI 10617 (UNI10616), ISO 45000-ISO14000-EMAS (MAP)
2) *D. Lgs. 105/2015 – Allegato H "Criteri per la pianificazione, la programmazione e lo svolgimento delle ispezioni"*
   - Criteria and procedures for conducting inspections: procedures and formats (check-list, operational experience, critical systems) for SMS-MAPP inspections
   - Simplification of some items: for establishments with high standardization (depots, storage sites, transferring, etc.)

The verification elements

- **Operational experience**: recording of events that occurred at the establishment and similar establishments over the last 10 years
- **Checklist**: verification of SMS elements
  1. *Major Accident Prevention Policy and SMS structure*
  2. *Organisation and staff*
  3. *Identification and assessment of major hazards*
  4. *Operational control*
  5. *Management of change*
  6. *Emergency planning*
  7. *Performance check*
  8. *Control and review*
- **Events - measures**: events analyzed in risk analyses, highlighting prevention and protection systems

SMS inspections vs COVID-19

Health emergency from SARS - CoV - 2 has resulted in limitations in carrying out on-site inspections on the national territory

ISPRA, National Fire Brigade (CNVVF), Safety at Work Institute (INAIL) and Ministry of Environment (MASE), in compliance with D.Lgs. 105/2015, have introduced alternative methods for carrying out inspections

- Possibility of performing some phases remotely
- Identified what can be done through documentary examination and what must be done on site, with possible completion of documentary analysis

The new inspection procedure

I

- Remote start of the inspection, with the collection and analysis of documentary evidence
  - ✓Documentation made available with preliminary requests for inspection a/o sharing during VdC and discussion with site managers

II

- On-site visit and inspection
  - ✓Interviews with internal and external personnel, plants inspections and emergency drills

III

- Ending the activity remotely
  - ✓Inspection results with evidence of the non-compliances found

2. The checklist for the verification: focus on the emergency planning element

6.i Consequence analysis, planning and documentation

- Internal Emergency Plan (IEP) contains information about
  - *Accidental scenarios; MSDS; Emergency systems; Plans of the establishment with meeting points and escape ways; Emergency actions; Communication lines; Procedures for alert, alarm, and evacuation; Damages to operators, environment, population, plants and equipment*
- Accident scenarios in IEP are congruent with the safety analysis
- Consistency of the IEP with the EEP (External Emergency Plan)
  - *Scenarios and technical elements for emergency management; Modes of communication in relationship with the different hazard levels*
- The IEP has been reviewed/updated at intervals not exceeding three years, after consultation of the representatives of internal employees, including the “long term” third-party workers

6.ii Roles and responsibilities

- Responsibility of emergency management has been assigned
- Roles, tasks, and responsibilities have been assigned for any action
- Substitutes are identified in case of absence of the person in charge of the emergency management
- Adequacy of the emergency response team which can be mobilized in case of emergency, assuring its timely intervention

6.iii Checks and monitoring to manage the emergency situations

- Controls and inspections of the emergency systems, plants, and equipment for fire fighting and the mitigation of the consequences
- Protective equipment is made available to the personnel and is periodically checked in terms of availability and functionality
- Personnel has been trained concerning:
  - *Specific scenarios of emergency management; Use of the personal protective equipment (PPE); Placing of collective protection systems*
- Planning of the emergency drills for the accident scenarios considered in the safety analysis
- Outcomes of emergency drills are documented
  - *Response times and implementation of any action of improvement*
- Minimal composition of the emergency team is defined

6.iv Alarm systems, communication, and support to external response

- Information for the people and workers about the risks of a major accident of the establishment is sent to city mayors
- Modes of cooperation with external authorities are established
- Documents are prepared for the External Emergency Plans and to support the actions to protect the environment and the population
- The plan of emergency management includes the responsibility of cooperating with the external operators after a major accident
- A procedure is put in place for post-accident analysis, including the reporting and the safeguarding of the objective evidence
- Efficiency of the lines of communication inside and outside the site

6.v Assessment on systems related to the management of emergency

- Conditions of accessibility, escape ways and meeting points, location of equipment, wind-cones in case of release of toxic substances
- Availability of the technical support documentation to be used in case of emergency
  - *MSDS; IEP; Emergency Instructions; Procedures for the safety of plants*
- Systems to count the number of persons present in the establishment

6.vi Control room and/or emergency management center

- Efficiency of the indicators of critical process parameters, alarms, warning systems and anything else required for emergency
- Availability of technical documentation during the emergency in the control room
  - *Operating manuals, MSDS, IEP, P&ID, drawings and schemes of the plants*

3. Feedback and findings from “on-site” activities in a refinery

Description of the establishment

The production cycle is carried out through the distillation process: crude oil is separated into different cuts (*gas, LPG, naphtha, kerosene, diesel*)

The semi-finished products represent the charges for the conversion plants. Gasoline and diesel undergo desulfurization processes using hydrogen, to be transformed into finished products

It has a storage facility suitable for the type of crude oils and products according to the market: LPG, gasoline, kerosene, diesel, fuel oils

The movement of the products takes place by sea through two piers, or by land through tankers and pipeline that connect to the power plant

The inspection mandate: specific checks on the «Emergency Management»

…The Commission shall conduct a planned and systematic examination of the technical, organizational, and management systems applied in the establishment, to verify the adoption by the operator of the measures and means for the prevention of major accidents and for the limitation of their consequences…

- ✓ To assess the compliance of the SMS-PMA with point 6 of the inspection checklist, regarding the methods of communication, collaboration, and support with external authorities, the commission shall carry out a specific emergency drill preferably involving the local Fire Brigade Command

The drill on the accident scenario

The members of the Commission attended, as observers, an emergency drill of the type "RELEASE OF FLAMMABLE GAS FROM THE COMPRESSOR DELIVERY (TOPPING plant)"

- *The drill subsequently included the triggering of the toxic release with the generation of Jet fire, with the (hypothesized) presence of an injured person assigned to the emergency management team*

The event and the scenario in the risk analysis

Area	Top-Event	Accident scenario	Maximum quantity involved	Scenario Frequency	Damage distances
Topping	Release of flammable gas from the compressor delivery	Toxic Release	0,3t	8,8*10-6 ev/y	• 14m (LC50/30') • 188m (IDLH)
		Jet-Fire		2,2 * 10-6 ev/y	• 8m (12,5 kW/m2) • 9m (7; 5 kW/m2) • 10m (3 kW/m2)

Top-Event	**Measures taken**			
	To prevent the hypothesized event		***To mitigate the hypothesized event***	***To follow the evolution of the event***
	Technical systems	***Organizational systems***	***Emergency response means***	***Systems for collecting data and reconstructing the event***
Release of flammable gas from the compressor delivery	• Design standards • Adoption of line classes	• Control of lines and equipment based on RBI analysis • Maintenance of rotating and alternative equipment • Department Emergency Plan • Training for on-site personnel • Management of equipment for emergencies	• HC detectors • Closing of the gas replenishment • Depressurization towards BD system • Fixed nebulized water system • Fixed cooling for accumulators and column • Company fire brigade team	DCS system with the recording of significant operating parameters in the Control Room

Development of the emergency drill: activity on the plant

- ✓ HC detector alarm near the topping (third-party operators with sample cylinder): the optical-acoustic alarm signal was activated on-site
- ✓ Alarm button from the company fire station with activation of the IEP
- ✓ Once the release was confirmed, start of the emergency via siren and site intercom
- ✓ Implementation of site operating instructions for process management and fire-fighting activities
- ✓ First-aid team intervention to rescue the company firefighter who fell while getting out of the vehicle
- ✓ Emergency team of the topping to verify the actual dispersion of flammable material and Electrical safety team
- ✓ First response team of company firefighters from the fire station

Development of the emergency drill: intervention of the FFT

- ✓ Sprinkler system at the plant section to dilute the toxic cloud and mitigate the thermal and radiation effects of the subsequent jet fire
- ✓ Collaboration of the refinery with the team of the local fire brigade, which intervened following the call made by the Internal Coordination Group established at the control room (External Coordination Group)
- ✓ Laying of flexible fire hoses by the first response team and activation of those of the Fire brigade, to put out the initial phase of the Jet-Fire
- ✓ Verification and remediation of the area following the event, by measuring "on-site" for the presence of H2S
- ✓ Return of the plant to the operator by the Fire brigade to restore operating conditions
- ✓ Closure of the emergency was signaled by the siren, by the operator

The personnel involved: the final debriefing meeting

- Composition of the first response team
  - *Production Manager*
  - *Topping shift leader*
  - *2 Topping operators*
  - *Fire-fighting shift leader and substitute*
  - *3 Fire-fighting operators*
  - *2 Power-plant operators*
- Electrician on duty
- Head of fire department
- 2 console operators in the control room
- Internal and External Coordination Groups
- Other personnel present on-site

Team of the Local Fire Brigade

- *Driver (responsible for the vehicle)*
- *Team leader*
- *1 firefighter coordinator*
- *2 firefighters to manage the intervention*

The judgment of the inspection commission on the drill

- The operational figures have demonstrated that they know the sequence of operations to be implemented in the emergency phase
- The procedures have been implemented appropriately for the plant's operational phase and fire intervention
- The emergency management systems in the area affected by the event have been activated in the correct sequence
- The event has been adequately managed from the control room, including the internal coordination and communication phases, collaboration and support to external authorities

4. Final results: need for improvement and corrective actions

Operational aspects of the site emergency management

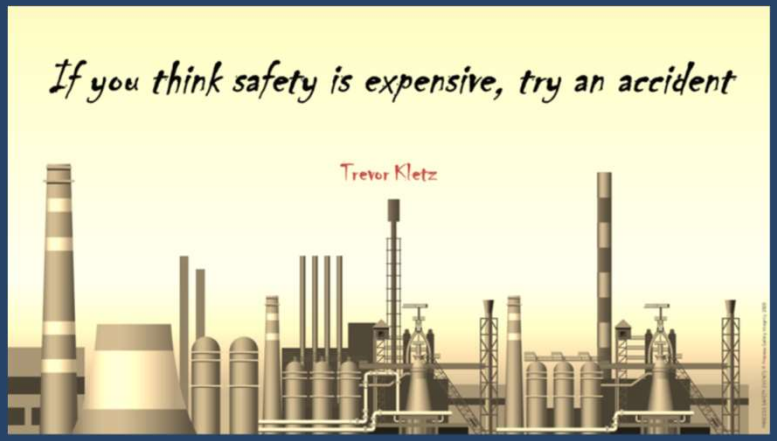
- Make it clear that the Department Emergency Plans represent operational tools for implementing the general procedure indicated in the IEP
- Specify the figures who carry out the main operations, on the systems (auxiliary firefighters) and of an emergency nature (firefighters), correctly allocating the responsibilities of the first response team
- Complete the operational sheets with all the “on-site” verification activities, for the post-emergency (exposure meters, sirens, etc.)

Communication and support for external intervention

- Identify the minimum set of information to be provided to External Authorities (telephone call to the Local Fire Brigade Command), concerning the specific emergency in progress and the site's conditions, to best direct the intervention and rescue activities
- Check the audibility level of the alarms via the plant intercom, considering the background noise and wind direction, to guarantee uniform sound distribution within all areas of the plants
- Participation, in the debriefing meetings, of an observer of the work of third-party companies within the plants, to represent the actual involvement and any related needs and observations

Final considerations

- Within the planned and systematic verification activities, the evaluation of the prevention and mitigation measures emerging from the risk analysis and established in the IEP plays a key role
- To assess compliance with the "emergency management" element of the SMS-PMA, as a completion of documentary analysis, it is necessary to carry out specific emergency drills
  - *Sequence of operations to be implemented by the response teams*
  - *Appropriate implementation of operating procedures*
  - *Activation of emergency management systems*
- The involvement of the local Fire Brigade allows us to focus on methods of collaboration and support with external authorities
  - *Management from the control room, including the internal coordination and communication phases, as well as the activities carried out "on-site"*



Thanks for the attention!

Questions…???...

romualdo.marrazzo@isprambiente.it