



Explosive and Pyrotechnic Sites

GOOD PRACTICE REPORT

This good practice report is offered as a tool for planning Seveso inspections and implementing effective prevention and preparedness on explosive and pyrotechnic (E&P) sites. It highlights important issues and suggests questions that could be incorporated into site inspections and offers advice and recommendations about organising and managing inspection programmes associated with E & P sites. The content may also be applicable to E & P sites that are not covered by the Seveso Directive.

Explosive and pyrotechnic (E&P) sites make up about 6% of the more than 12,000 Seveso sites in European Union and Economic Area (EU/EEA) countries. (See **Figure 1** at right). Accidents involving explosives are still occurring regularly. Since 2000, two to four major accidents occur almost every year, recorded in the EU's eMARS database.¹ (See **Figure 2** on the next page.) In the last five years alone, there were twenty major accidents in Europe involving explosive substances.

E&P sites pose particular challenges for risk management and enforcement. As their name suggests, the substances on these sites are more likely, indeed often designed, to explode. The reactivity and possible instability of their components, products and degraded material means that there is often no warning between initiation and their explosive accidental effects with blast damage and projectiles over a very wide area, and the potential for domino effects.

This characteristic requires a proactive approach to risk management that puts particular emphasis on hazard identification and awareness, strict adherence to procedures for accident prevention, and passive mitigation measures that protect people and potential domino sources such as using distance separation or blast-resistant structures. Active mitigation involving human intervention is unlikely to be possible and could be lethal if attempted. The rapid progression of explosive accidents is critical, when considering emergency response.

Although the hazards of E&P are broadly similar, they cover different scales of both risks and consequences. This diversity is reflected in the different nature of the

This Seveso Inspection Series good practice report is a summary of a Seveso Inspection Series expert report of the same name. The full report can be found under Publications at: <https://minerva.jrc.ec.europa.eu>

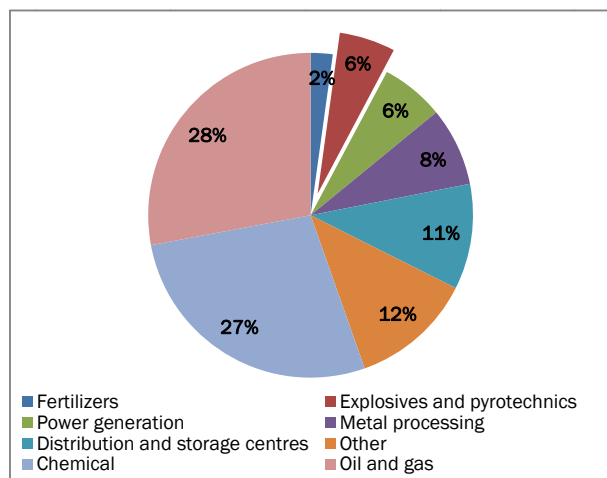


Figure 1. Explosive and pyrotechnic sites as a percentage of EU/EEA Seveso sites

substances, types of establishments, inventories, locations and processes involved. Moreover, some explosive sites are not covered by the Seveso Directive, but nevertheless, represent a significant part of the total major accident risk spectrum from E&P.

1. Mutual Joint Visit Workshop for Seveso Inspectors on Explosive and Pyrotechnic Sites

From 9th - 11th November 2016, the Norwegian Directorate for Civil Protection hosted a workshop on explosive and pyrotechnic sites under the EU programme of Mutual Joint Visit (MJV) workshops for Seveso inspectors, managed by the European Commission's Joint Research Centre. The purpose of the workshop was to share lessons learned and good practice for risk management and inspection of E&P sites within Seveso countries. This short report is intended to provide concise and early guidance for CAs and their front-line inspectors, about significant issues

¹ <https://minerva.jrc.ec.europa.eu/EN/emars/content>

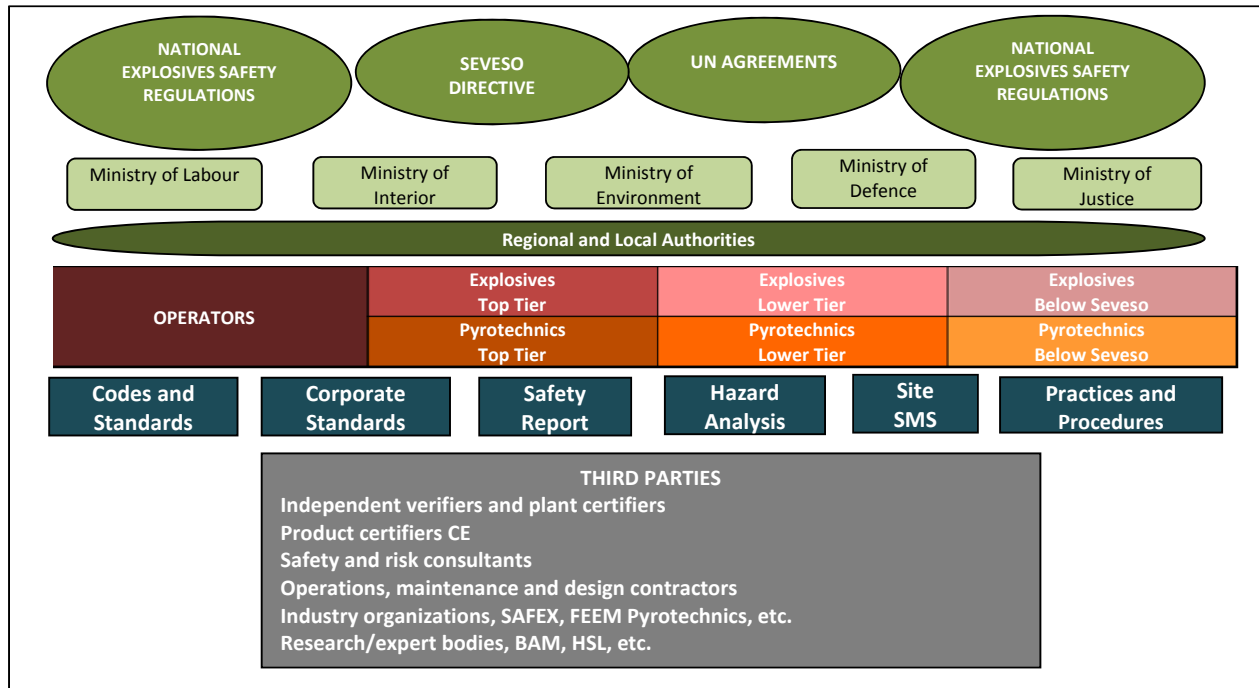


Figure 2: Organisations potentially involved in enforcement and standard-setting in EU countries

and information that arose at the MJV Workshop.

The full detailed record of the MJV can be found on the EC Europa website:

https://minerva.jrc.ec.europa.eu/en/shorturl/minerva/mjv_agenda_norway2

2. Regulatory context

There is a wide variety of different regulatory arrangements for inspecting and enforcing safety in E&P sites in the different Member States. Usually, the regulations are comprised of:

- A mixture of Seveso Directive Regulations together with some specific Explosive Acts, Regulations or Codes.

- Parallel regulations relating to the security of explosive sites and an interface with military use of explosives.

The complexity creates an opportunity for both confusion and gaps. The schematic in Figure 2 shows the parties that may be involved in managing and regulating the entire Explosives and Pyrotechnics industry in a country and the range of potential regulations that may apply.

3. Safety awareness on E&P sites

Most of the catastrophic accidents involving explosives in the last 20 years have involved the manufacture and storage of fireworks. On these accident sites, there appeared to be little perception of the risks and consequences, and the management of those risks in particular had been seriously deficient, if it existed at all.

What Authorities Can Do to Make the Regulations Work

- Identify and familiarise yourselves with the national regulations relating to E&P and the national and local authorities with responsibility for their implementation
- Contact those who have responsibility regionally and nationally for regulating the import, transport, tracking manufacture and use of explosives, those who inspect factories and sites, and those who are responsible for local and national emergency response
- Share with them the requirements for notification regarding inventory and classification within the Directive, so they can disseminate this and help to identify other sites
- Work together to identify any sites which may come within the Directive but have not made a Seveso notification, and provided a MAPP
- Examine the notification and MAPP for lower-tier sites to identify and challenge those which may or are likely to exceed the thresholds or have undeclared activities which could increase the risk of an explosion. have the expertise in E&P to review the SMS and assess the hazards or do you need help from other agencies
- Coordinate inspection and enforcement activities on shared sites to maximize effectiveness and consistency.

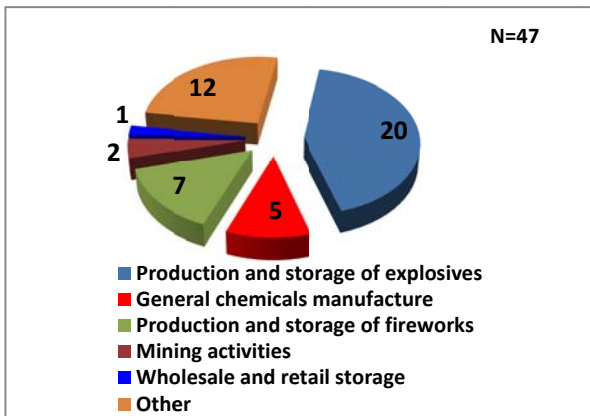


Figure 3: Number of major accidents involving explosives (Source: eMARS)

Inspectors have also reflected that operator and local authorities often demonstrate a general lack of awareness of the consequences of events, their severity and potential for escalation to involve the entire inventory on site, despite separation (and in some cases separate buildings). In many cases, there was an ignorance of the regulations, failure to notify, and/or a conscious decision to ignore the requirements. This was particularly prevalent from analyses of accidents on lower-tier and pyrotechnics sites, but it was also present in one large explosives upper tier site.

Explosion and pyrotechnic hazards can escalate unpredictably, quickly and catastrophically with effects far beyond the site boundary. Many of the fatalities at major explosions have been firefighters and other emergency personnel attempting to control the initial incident or guiding the public to safety. There has clearly been a perception that incidents might be controllable and that it is practical to do so with manual firefighting before they escalate. It is unlikely that there will be time to assess the situation and any active intervention is most unlikely to control fires in pyrotechnic or explosive products. This makes the need for prevention and ignition control paramount, together with passive mitigation, by segregation and blast-resistant buildings. In response to such an incident, the only viable emergency response strategy would be an early alarm and evacuation both of the site and the surrounding area. If the management and the local authority response do not appreciate this and treat the control of activities, plant & building integrity with appropriate rigor, then there is major cause for concern.

4. Planning Inspections and Inspecting E&P Sites

The contributions to the MJV showed that there were major differences between the Explosives and the Pyrotechnics industries and the best approach to inspection may be different.

Explosives companies. Explosives companies have a long history of applying good practice, sharing knowledge and operating with due caution and respect for the destructive power of the materials. There is an understanding of cause and effect. It is probable that the

- Possible process units on E&P sites**
- Raw materials storage
 - Black powder storage
 - Mixing-emulsions manufacturing
 - Grinding
 - Mixing
 - Pressing
 - Drying
 - Special explosives manufacturing (defence-military or space)
 - Semifinished products preparing
 - Semifinished products storage
 - Finished products packing
 - Finished products storage
 - Test-control
 - Product assembly particularly munitions and fireworks
 - Loading/unloading raw materials and products
 - Demonstration area
 - Offices

site will be part of a larger company which is an active member of one of the recognised bodies listed at the end of this good practice report. This gives a good prospect that the site will be well-run. These sites are not normally located near populated areas which further reduce the risks. The handling, manufacture and assembly of the explosives will be hazardous and will rely on the integrity and effective process control of the plant which will need to be confirmed. These sites may be upper-tier which require the safety report and the process of developing and writing it will contribute to the awareness of the hazards and their management. Inspection should confirm that the local management is applying the corporate standards and following good industry practice.

Pyrotechnics companies. Pyrotechnics companies have had a number of major accidents in densely populated areas. They have a poor history of management of the risks and the majority of the following guidance is focussed upon them. It is possible that they are not aware of the need to notify under the Seveso Directive and may not understand their obligations. They may be complacent about the risks and have been operating for many years, allowing standards to slip and lacking the awareness of the need for effective controls on stocks, storage and site activities. The first site visit is likely to be a wakeup-call and they may need a graphic introduction to the potential for devastation.

Military ordinances. There appears to be a growing business with civilian companies handling military ordinance: manufacturing, storing, transporting and destroying ammunition and explosives. The companies which have been formed for this new business may have no history or experience with major hazards and may be relying on retired military expertise for their key personnel

Tips for planning the inspection

- Consider carrying out a joint inspection of the site and the surrounding area with other authorities who have relevant expertise and complementary responsibilities for the site, particularly if you think it is an undeclared Seveso site.
- Contact relevant authorities to ask about reports of unplanned ignitions, near-misses and other background information such as reports of fireworks demonstrations or other explosions.
- Review the area and consider the primary populations, schools, hospitals, care homes etc. and nearby hazardous industries which could escalate further.
- Plan to carry out your inspection when there may be particularly large quantities of E&P on site, such as before New Year for a fireworks site and consider making an unannounced visit.
- Plan how you will tour the site focusing on storage, manufacture and testing.
- Allow time to visit the apparently empty areas of the site where uncontrolled hazardous activity, dumping or informal storage might take place.
- If you think the site management, particularly those with pyrotechnics, may not appreciate the potential devastation of an explosion, bring a video of the Enschede explosion or bring a link to internet videos (You Tube has the Discovery Channel footage)
- Have a plan for enforcement action, particularly if you find conditions which may have an immediate risk of explosion and a site operator who might not be able to make it safe.

without the benefit of knowledge of civilian explosives requirements. They may not be aware of the Seveso III Directive or their obligations under it.

Disposal of munitions. Military explosives and munitions are found quite widely and not just on military sites. Even if military sites are not covered by the Seveso Directive, some competent authority may have authority to inspect military sites. There is also an increasing use of civilian contractors to manage military ordinance including the manufacture, storage and destruction of large quantities of munitions, especially older or ex-battlefield explosives.

Recently, a major accident with multiple fatalities occurred when landmines were being dismantled to dispose of them at a former military site. It is a rather special feature of military munitions (such as landmines) that they may be designed and constructed to make it difficult for them to be made safe. A particular feature of this accident was that there was no known or defined method for the making safe of these landmines at the site.

In another incident, explosives stored in shipping containers exploded when subject to a very high ambient temperature. This was a case where the civil storage facility was unaware of the nature of the contents of the containers.

Mobile explosive manufacturing units (MEMUs). For mining, tunneling and quarrying, there is a major move in the market towards using ammonium nitrate emulsion (ANE) produced on site instead of more traditional explosives. In the Scandinavian member states and Norway, over 60% is now generated in this way through the widespread adoption of MEMUs. They reduce bulk storage and transport of explosives, and only create the quantities that are needed, significantly reducing the traditional manufacturing site risks.

However, they may introduce new risks associated with the transport of the components in the same vehicle. Their transitory nature also presents problems for normal management controls, inspection, arranging adequate emergency response and land-use planning arrangements. Different countries have chosen different ways of regulating MEMUs, including issuing new regulations applying to MEMUs or, in at least one case, covering these operations under the Seveso Directive.

5. Enforcement

The inspection may reveal conditions that are so dangerous that immediate action needs to be taken. The site operators of such sites may not have either the expertise or resources to deal with such an imminent risk. It is advisable for the CA to have a plan in place to deal with such situations, including access to specialists, possibly from the armed forces, to deal with the situation. A precautionary evacuation of the surrounding area may be appropriate. The following situations may arise:

- Operation without the Safety Report, including hazardous activities such as unsafe assembly, testing or disposal of explosives and pyrotechnics
- Dangerous processing conditions or plant requiring immediate shutdown
- Storage of excess quantities of explosive material, material of a higher classification, unsafe or unstable material
- A badly managed untidy site where there is no confidence in the managers or their ability to run it safely in the short term
- Processing that is unsafe through design, deterioration or lack of maintenance
- Storage buildings which hold a large explosive inventory which are not to an adequate specification or have deteriorated so that they may not contain or withstand expected blasts

6. Safety management systems on E&P sites

Many participants identified safety management systems as a weakness on E&P sites. Sites often did not just have one or two isolated failings, but appeared to operate without any reference to their MAPP, (if there was one at all) and supporting SMS or equivalent. Indeed, the accidents frequently revealed deficiencies activities, to record and manage hazardous stocks, to control ignition, lack of competent staff and overall lack of management responsibility & control. Italy presented results from a study of the interface between Seveso III and legal standards regarding safety procedures at E&P sites from a study of 35 accidents at such sites.² The analysis identifies areas that may not be covered by standards but may be addressed within the safety management system.

Location. The site should have dedicated areas for storage, production, assembly, packaging, delivery and shipping. Activities such as testing and destruction of inferior products should be at appropriate distances from storage and production areas to prevent potential domino effects. Separation both by enclosures and physical separation of potentially hazardous activities from the major inventories is critical. Open doors will allow escalation. Displays & demonstrations of fireworks for retail customers should take into account appropriate safety distances.

Access. There should be effective control of access to the site, both vehicles and people and control of their movements, in particular, to the primary storage areas.

Building design. Buildings should be specified, designed and maintained to fulfil a key role in the control of escalation. Buildings for primary storage may be required to contain and/or vent an explosion or to protect the contents from an external fire or fire and blast. Other buildings may be intended to contain the effects of explosions from production, testing or destruction. Areas may be dedicated at a remote part of the site. Normally-manned areas such as offices may require blast-protection, unless safe by location. The management system should clearly identify the buildings, their role and specification and document how they have been designed and maintained.

Notification/classification and labelling. One of the primary tasks of the inspectors should be to verify the site inventory against the records. The Enschede (NL) catastrophe of 20 May 2000 is a tragic example of how misclassification can lead to increased risk. Investigation findings suggest that it contributed to poor decisions by the government and operator alike, particularly in regard

² Della Quadri, F. 2016. Explosives/Pyrotechnics plants safety: SEVESO-TULPS requirements, interface and case studies. Presented at the Mutual Joint Workshop on Explosive and Pyrotechnic sites. Tønsberg, Norway. 9-11 November 2016.

Reviewing and inspecting the MAPP, Safety Report and SMS

- Do the notification and MAPP give an adequate first impression of the hazards and how they are managed to allow you to make an initial judgement of the risks? Some questions to consider:
 - Did site personnel contribute substantially to the safety report?
 - Does the safety report give an accurate impression of the catastrophic nature of explosions?
 - If there is no safety report, is there a functioning SMS?
 - Is the SMS clearly specific to the explosive materials and activities within the site?
- If the site is located near other development (residential, businesses), is this reflected in the safety management system and/or risk assessment of accident scenarios?
- If there is a safety report, does it fully describe the storage and containment and means to prevent domino escalation within the site?
- Do the explosives companies use FEEM, SAFEX, BAM or other codes, standards, or procedures?
- What codes, standards and guidance, if any, do the fireworks companies use and are they sufficient to cover the operations on site?
- Is there an effective stock control system with clearly defined limits in accordance with the inventory notification for the site?
- Where is the site's primary source of raw material and stocks? Do you have confidence that it is shipped and labelled in accordance with the directives for the safe transportation of explosions and pyrotechnic articles?
- Is there effective control of the people and vehicles coming onto the site and particularly control of the opening of, and access to the primary stores?
- Are the arrangements adequate for the control of work that has potential to initiate an explosion, especially activities near or within storage units?
- Does the maintenance system ensure that buildings, electrical systems, production plant integrity and control systems, storage arrangements and site vehicles meet appropriate standards for their role in preventing and protecting against an explosion?
- Are there rigorous processes for the handling, storage, disposal and destruction of spilt, damaged, deteriorated and off-spec products and materials?
- Is there formal training and competence assurance for all personnel handling explosives?
- Are there systems to address static, particularly when handling and producing explosives?
- Is there an audit and lessons-learned process which examines the failures which have or could occur which are the precursors to an explosion?

Carrying out the inspection

- On arrival, is there effective access control for people/vehicles and a briefing about the hazards and safeguards?
- Identify who has overall responsibility for the management on the site. Can this person give an accurate picture of activities planned on the site that day?
- Are management and employees attentive to the real potential for harm from their processing and storage, including the scale and speed of escalation, or conversely, is there a widespread sense of complacency?
- Is there a site plan clearly designating where the explosives are stored and where hazardous activities are permitted or specifically banned?
- Is production and assembly well-separated from major storage areas? Are quantities of raw materials and finished goods in the production and assembly area sufficiently limited?
- Is there an incident log? Does it cover events that have the potential to escalate such as spillages, vehicle accidents, collapsed storage or accidental ignition?
- For an explosives site, when was the last process HAZOP carried out? Was it suitable for a batch (or non-continuous) production of explosives? Have the recommendations been addressed?
- If a pyrotechnics site, what type of risk assessment, if any, has been carried out?
- Has a risk assessment been conducted on non-routine hazardous activities, such as demonstrations, testing and destruction to ensure that escalation is avoided, particularly in or near the main stores?
- Do recorded risk assessments show control of the proximity to E&P, ignition sources, static and the restriction of other activities nearby?
- Does the site have a management of change process? Does the site keep records of changes and analysis of potential impacts of the change? Ask about or look for evidence of recent changes, and ask about them.
- Is there evidence of deliberate fires, testing of E&P, particularly fireworks? Are these close enough to significant quantities of E&P to escalate?
- Has there been a 3rd party inspection of the site, audit, insurance assessment or certification for products requiring CE marking? If so, what were the findings?
- Are there significant quantities of E&P stored in the open air or in places other than on the designated plan? Look for shipping containers and ask to see inside.
- Where does the site carry out assembly, testing and other activities involving the processing and handling of explosives? Are these physically and spatially separated from the main storage units?
- Is there evidence of other activity which has not been declared?
- Are the doors of the storage areas routinely left open for long periods?
- What is the condition of the buildings used for storage, looking particularly at structural integrity, protection from the weather and ATEX compliance? Have any venting arrangements been compromised?
- Is the storage arranged in an orderly, structurally secure and accessible arrangement? How is inventory identified? CE marking, bar code or labelling?
- How old is the oldest inventory and what is its condition?
- How are materials loaded, unloaded and transported around the site? Are the vehicles or forklifts suitable, in good condition, securely loaded and driven well? Who supervises it?
- Is there evidence of damaged packaging, deterioration due to moisture, out of date material, or spillage?
- How are bulk powders transported, handled and used for production? Are there effective controls of static both from equipment and people?
- What are the arrangements for dealing with spilt, damaged or degraded material? Where is this material handled and stored? Does the site record how the material is handled and where it is located?
- Does the production require a lot of workers present? Are there thorough procedures for processing and assembly? If so, are they followed and supervised, particularly for repetitive, boring and simple tasks?
- In processing and manufacturing plants, are inspection and maintenance of processes scheduled systematically for safety critical processes and equipment? Is critical equipment appropriately monitored to detect anomalies?
- Can processes shut down automatically before they reach a dangerous condition?
- Are there adequate escape routes and muster points? Are they clearly marked? Is there access for emergency vehicles and are they kept clear?

Emergency Response

- Does the site ER plan address the precursors to an explosion, e.g., fire, spillage, a vehicle accident, etc.
- Are any offices or control rooms at immediate risk?
- What type and scale of incident could cause the local authorities to be notified?
- Could the initial incident affect the ability of on-site staff to raise an alarm or respond?
- Does the response plan recognise the speed and extent of escalation and overall potential for harm?
- Is there an onsite area for assembly of personnel, and/or a plan for evacuation of the site?
- Can the site warn the surrounding industry and residential populous directly and in time?
- Has the immediate risk to adjacent residential areas been adequately assessed and addressed in the SMS?
- Are their sufficient measures for the control and prevention of escalation of an incident?
- Have emergency response plans been reviewed and tested internally and with local fire and rescue services? Are plans updated with subsequent recommendations?
- Do the plans indicate how to manage members of the public who come to watch the incident?
- Is there a recovery plan to assess the site after a major incident and deal with unexploded material?

to land-use and emergency response. This accident gives evidence of a tendency for some sites to classify pyrotechnics as P1b improperly since this category has far fewer safety requirements than higher classification explosives. There are also cases of deliberate misclassification of foreign imports at source, particularly of fireworks, e.g., to reduce shipping costs.

The fireworks industry is particularly prone to fluctuating demand with very large quantities stored in preparation for seasonal events such as New Year celebrations. This leads to the potential for sites to periodically rise above notified quantities or creep unknowingly above the thresholds. Some inspectors may deliberately time their inspections to coincide with these periods. Inspectors should be aware that any alteration in the packaging can change the risk and classification. The materials and products should have complete documentation including safety data sheets and a description of the content, comply with storage standards for the relevant classification and expiration dates due to age.

Recordkeeping. An effective management system should keep an accurate record of all stocks, from import of raw materials or finished E&P through its processing, storage, sale or disposal. The storage locations should be specified including what can be stored (type and quantity), any required conditions of storage, and prohibited incompatible material. The material should be tracked and specific records kept of what is in the store and its age.

Control of Work. Any work involving the handling or use of explosives is hazardous and may be the initiator of an explosion, including movement and transport throughout the site, production, assembly, packaging, testing, destruction and demonstrations. There should be documented processes for the routine activities which are supported by a risk assessment, defining the activity, the people carrying it out and most importantly, where it is carried out. There should be a clear aim to segregate these activities away from the primary stores. Where this is not possible, such as accessing materials within the

stores with fork lift trucks, there should be effective procedures, equipment and supervision.

Competence. All manufacture and assembly of explosives requires competent people. Some parts of the industry, particularly the pyrotechnics industry, may involve considerable manual work with the potential for human error and static ignition from clothing. There may be a high turnover of labour with limited training, due to the repetitive and not particularly skilled nature of the task. Routine may also lead to deterioration in good practice and the bypassing of procedures.

Control of ignition. This is of primary importance on all explosives sites as many ignited incidents may not be controllable. The control of static is paramount, both from people, plant and materials, especially in the pyrotechnics industry where powdered materials predominate. There also need to be specific controls on the storage, assembly and use of igniters and detonators, if these are on-site. Vehicles should be suitable, if they are used in or near the primary stores. This not only applies to engines and ignition systems but to the accumulation and ignition of explosive residues on the vehicles. Systems should ensure that the specification and maintenance of electrical systems in any buildings in which E&P are stored, processed or assembled should meet the ATEX directive.

7. Emergency planning and response

Explosion and pyrotechnic hazards can escalate unpredictably, quickly and catastrophically with effects far beyond the site boundary. Many of the fatalities at major explosions have been firefighters and other emergency personnel attempting to control the initial incident or guiding the public to safety. But in a majority of cases the incidents might not be controllable and it is not practical to count on manual firefighting to prevent escalation. It is unlikely that there will be time to assess the situation and any active intervention is most unlikely to control fires in pyrotechnic or explosive products.

Common Success Factors for an Inspection

- The site risk management demonstrates an awareness of the destructive potential of the site by management.
- There is effective access control to the site, with briefing and supervision of all visitors.
- The site is clean and tidy with no evidence of unauthorised or uncontrolled hazardous work being carried out or storage outside designated areas.
- There is a strict quality control system for checking incoming materials and stocks and verifying the quality and certification of products.
- There is a rigorous stock control system and spot checks confirm that the records are correct.
- There is strict control of movement and transfer of stocks around the site using correct vehicles driven carefully.
- The primary E&P storage units are kept shut and access is controlled and monitored.
- There is evidence of rigorous control of static both in regard to mechanized and human interactions .
- There are effective processes in place for the recovery, handling, disposal and destruction of deteriorated or nonconforming material and waste.
- The manufacturing process is stable and well-maintained so that process upsets/unplanned shut downs are rare.

Incidents may be initiated by activities such as production, assembly, testing, demonstrations, loading, unloading and material transfer within the site. These events might be controllable but only if there is a realistic plan based on what actually happens on site and the people and resources to control it safely in the early stages. The activity may be associated with entry to or activity within stores leaving the doors open and the containment breached. They may also be caused by poor storage conditions resulting in both deterioration of the explosives and pyrotechnics and the storage building or packaging integrity.

Generic rules for hazard distances for lower-tier sites may underestimate the severity and damage radius, particularly with pyrotechnics sites or operations where the control of stocks may be questionable. Multiple storage warehouses and bunkers may give domino effects if located in close proximity to each other, if they are open or are not of sufficient robustness to withstand blast and fire. Fireworks incidents in particular may draw people into the danger area to watch and take pictures. Both explosives and pyrotechnics have the potential for far-range blast effects and projectiles.

This situation makes the need for prevention and ignition control paramount, together with passive mitigation, by segregation and blast-resistant buildings. In response to such an incident, the only viable emergency response strategy would be an early alarm and evacuation both of the site and the surrounding area. If the management

and the local authority response do not appreciate this and treat the control of activities, plant & building integrity with appropriate rigor, then there is major cause for concern.

Emergency response plans should still be in place both onsite and with the local emergency authorities. It is critical that the site emergency plan is regularly co-ordinated and tested with all relevant authorities involved in response, such as fire fighters, police, etc. (at no more than 3 year intervals as indicated by the Seveso Directive and more often if warranted by organizational or process changes). They should be realistic in accordance with an expectation of rapid escalation. Plans should recognise that no one on site may have time to respond, raise alarms, assess the incident, take action to prevent escalation or give advice to the fire and emergency services. Assessment of a major event and its potential for further escalation may be difficult, particularly if no site personnel are available. Site plans should focus on identifying and managing an incident which has the potential for ignition and explosion such as a spillage, storage upset or a vehicle accident. It is debatable whether firefighting would be effective once explosives are involved, but the assessment of the risk of escalation to the primary stores is critical followed by the sealing of those stores. Local authority plans should focus on raising the alarm and evacuating people both on site and in the vulnerable surrounding area.

JRC Mission

As the Commission's in-house science service, the Joint Research Centre's mission is to provide EU policies with independent, evidence-based scientific and technical support throughout the whole policy cycle.

Contact

For more information on exchanges on lessons learned and good risk management practice for Seveso implementation, please contact

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