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## Seveso Inspection Series Volume 5

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**CHEMICAL HAZARDS  
RISK MANAGEMENT IN  
INDUSTRIAL PARKS AND  
DOMINO EFFECT ESTABLISHMENTS**  
Key points and conclusions  
for Seveso Directive enforcement  
and implementation



European  
Commission



Norwegian  
Directorate for  
Civil Protection



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## Preface

The inspection function has always been considered one of the most powerful and dynamic tools available to Member State authorities for enforcement of the Seveso II Directive. For this reason, the European Commission along with competent authorities responsible for Seveso II implementation have long held this area as a priority for EU level technical co-operation. There is a strongly shared commitment to continuing to work together to increase the effectiveness of inspection practices and to ensure a consistent approach with respect to interpreting Seveso requirements through inspections across the Member States.

The Seveso Inspections Series is intended to be a set of publications reflecting conclusions and key points from technical exchanges, research and analyses on topics relevant to the effective implementation of the inspection requirements of the Seveso II Directive. These publications are intended to facilitate the sharing of information about Member States' experiences and practices for the purpose of fostering greater effectiveness, consistency and transparency in the implementation of Article 18 of the Directive. The series is managed by the European Commission's Technical Working Group on Seveso II Inspections (TWG 2), consisting of inspectors appointed by members of the Committee of the Competent Authorities for Implementation of the Seveso II Directive (CCA) to represent Seveso inspection programmes throughout the European Union. The Technical Working Group is co-ordinated by the Major Accident Hazards Bureau of the European Commission's Joint Research Centre with the support of DG Environment.

This publication, "Chemical Hazards Risk Management in Industrial Parks and Domino Effect Establishments", is one of a series of publications that form part of the Seveso Inspections Publication Series. The publication series is one of a number of initiatives currently in place or in development to support implementation of the Directive and sponsored at EU level. In particular, a prime source of content for publications in this series is the Mutual Joint Visit (MJV) Programme for Seveso II Inspections. Launched in 1999, the European Commission's MJV Programme was intended to serve as a vehicle for promoting technical exchange among Member State Seveso II inspectors. The aim of the programme was to encourage the sharing and adoption of best practices for inspections through a system of regular information exchange. The visits would be hosted by different Member States (hence visits would be "mutual") and targeted for working inspectors of other Member States (and thereby "joint" visits) charged with assessing compliance with the Seveso II Directive in industrial



installations. The MJV Programme is managed by the Major Accident Hazards Bureau in consultation with the TWG on Seveso II Inspections.

Since 2005 the MJV programme has encouraged visits focusing on topics of specific interest for Seveso inspections as identified by the Technical Working Group. The conclusions and observations of inspectors participating in these workshops are published as part of the Seveso Inspections Series.

The mission of the TWG is to identify and recommend actions to promote exchange of information and collaborative research among the Member States for improving the quality and consistency of implementation of Seveso II obligations within the Seveso inspection authorities. The results of these efforts may also be published separately on the Seveso Inspections website, or combined with MJV summaries in the Seveso Inspections Series.

## Executive summary

Industrial parks and domino effect sites pose particular challenges for risk management to prevent industrial accidents because they create a situation in which there may be more than one operator responsible for measures necessary to prevent or mitigate consequences of a potential accident. Industrial sites that were once unified under one operator's management are now often divided into several companies according to different production and service activities. In this situation several separate organisations may be now working on the same site and share responsibility for certain prevention or mitigation measures. As one example, companies on the site may have made a common arrangement by agreement to outsource maintenance, internal emergency or other key site services. Hence, this situation and others like them raise the question as to who is taking full responsibility, both legally and practically, for ensuring that all necessary measures have been taken within these services to prevent and mitigate the effects of major accidents.

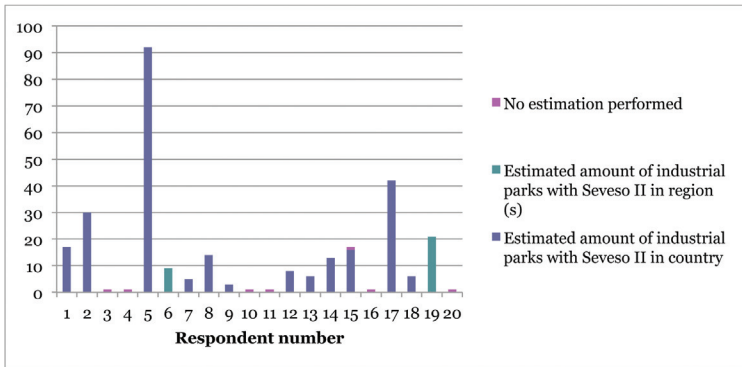


Figure 1: Number of industrial parks with Seveso II establishments (TWG 2 Survey - 2008)

A parallel circumstance exists in domino effect Seveso sites that are not necessarily in an industrial park with shared services. A domino effect is the cumulative effect produced when one event sets off a chain of similar events elsewhere. In other words the operations and services for each establishment are completely separate but an interdependency exists on the basis of an accident scenario. According to this scenario, the accident that may start on one site and include consequences causing a major accident on another site in the vicinity. An example of such an accident could be an explosion at one establish-

ment that results in a projectile piercing a tank holding a dangerous substance on a nearby site. Similar to industrial parks, responsibility for preparing for and mitigating the consequences of such an event are not solely under the control of one operators.

Most EU and EEA countries<sup>1</sup> have a number of Seveso II establishments located in large industrial complexes (industrial parks, chemical parks) as well as areas where there is a high density of industrial operators creating a potential risk for domino effects (for example, port areas). When performing inspections in these Seveso establishments, inspectors are faced with challenges uniquely due to the proximity of neighbouring companies (both Seveso- and non-Seveso establishments). In particular it becomes a significant challenge for inspectors to obtain assurance that “all necessary measures” have been taken on each site to prevent accidents and limit their consequences, as required by the Directive. \

For this reason this project on chemical risk management in industrial parks and domino effects establishments was undertaken by the EU Technical Working Group on Seveso Inspections (TWG 2) to help countries learn from each other about their common challenges and to exchange on information on practices that could be considered effective for managing risk and enforcing Seveso compliance in industrial park and domino effect sites. Norway volunteered to lead the study of this topic which was identified as a priority by the TWG 2 in recent years. Norway first undertook a survey of the TWG 2’s inspectorate representatives (one per EU/EEA country) to confirm and clarify common challenges in the Seveso countries with implementation of Seveso in these two related areas. On the basis of the survey results, Norway propose to host a workshop on specific points highlighted in the findings within the framework of the EU’s Mutual Joint Visit Programme for Seveso Inspections. A second survey was conducted of workshop participants, consisting mainly of Seveso inspectors, to obtain additional information about their experiences in enforcing Seveso compliance on Seveso sites associated with industrial parks and domino effects.

The Mutual Joint Visit (MJV) workshop on Seveso inspections in industrial parks and domino effects was held on 18 to 20 November 2009 in Tönsberg, Norway. The MJV was hosted by the Norwegian Directorate for Civil Protection and Emergency Planning in Tönsberg and co-organised by the Major Accident Hazards Bureau of the European Commission’s Joint Research Centre (JRC-MAHB).

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<sup>1</sup> Countries of the European Economic Area (EEA) are obliged to adopt all EU legislation related to the single market, except laws on agriculture and fisheries. For the purposes of this document the «Seveso countries» are considered to include the 27 EU Member States, Norway and Iceland as EEA countries, and Croatia, an EU Candidate Country.

In total there were 30 participants to the MJV from 19 countries (including 1 EEA, 1 EFTA and 2 Candidate Countries) and industry not including the participants from the host country, Norway. Also, two representatives of the JRC-MAHB were present.

The goal of the MJV was to:

- Discuss challenges and practices in EU/EEA -countries.
- Exchange experiences regarding the handling of industrial parks and domino effects in EU/EEA-countries.
- Evaluate the need for establishing joint inspection check lists/question lists for inspectors.
- Conclude best practices and common understandings in a best practices document in the Seveso Inspection Series.

The workshop was based on the concept of small group discussions focused on various topics and subtopics within the theme of industrial parks and domino effects. To give the participants a common platform for further discussions, two plenary sessions also consisted of presentations to highlight accidents and experiences of inspectors that demonstrated typical concerns and challenges associated with this topic. The break-out themes were largely selected on the basis of responses of Seveso inspection authorities to two surveys conducted on the topic prior to the meeting. For group discussions, participants were given a number of questions to drive discussion on each topic / subtopic. A plenary session followed each break-out session and in this session each group presented the main points from their discussions.

The topics and subtopics were as follows:

- Session 1: Legal issues and organisation of industrial parks.
- Session 2: Inspection practices and tools for inspections.
- Session 3: Practices regarding joint documentation from industrial parks and authorities' co-operation.

The MJV led to the following general conclusions and recommendations about approaches regarding industrial parks and domino effects.

### **Number and types of industrial park and domino effect sites in Seveso implementing countries**

Not surprisingly, survey responses showed that there are a large number of industrial parks in the EU and other Seveso implementing countries. Some parks consist only of Seveso sites, while others have a mixture of Seveso and

non-Seveso sites. These numbers demonstrate how important it is to have an enforcement focus on industrial parks that allows a broad perspective inclusive of non-Seveso sites when necessary.

Using figures provided by 14 countries, 353 groups of establishments (282 in industrial parks) were identified as having the possibility of domino effects. These figures represent just about half of Seveso implementing countries, meaning that the number of Seveso domino effects sites within the EU and beyond could well exceed 400 (of which around 80% may be industrial parks).

Note that the survey responses indicate that not all countries have identified their domino establishments. This means that some Seveso authorities have work to do when it comes to identifying groups of establishments with a possibility of domino effects.

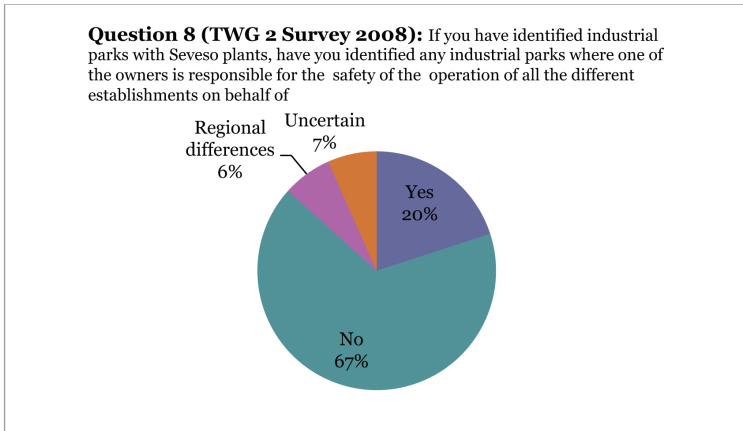


Figure 2

### Accidents in industrial park and domino effect sites

The following accidents/incidents were described by the workshop participants:

- A near miss in Aarhus (Denmark) in 2008 in which there was a fire involving palm oil next to an upper-tier establishment (it contained a storage of formalin and methanol).
- The explosion of an oxygen tank belonging to one Seveso company caused considerable damage to surrounding sites. The explosion was caused by a change in the material of the tank which did not resist the pressure swings

as well as before.

- In 2001, there was an explosion in a fertilizer plant in an industrial park in Toulouse (France) in which a large amount of ammonium nitrate residue detonated, causing devastating effects at the site and beyond. 30 people were killed, thousands were hospitalised, and there was enormous material damage. Fortunately, no notable domino effects occurred.
- In 2006 a pool fire located in a pipe rack in the Priolo industrial area (Italy) involved pipelines under the control of different operators. In addition to several injuries and high visibility in the media, the accident eventually exhausted the capacity of the fire fighting water line.
- The major explosion at the Buncefield fuel storage terminal in Hertfordshire (United Kingdom) in 2005 took place adjacent to an industrial park housing over 600 businesses. Of these 80 were either completely destroyed or were damaged to the point of being unusable.
- In 2008, a power failure in a Belgian refinery led to the collapse of the flare. Because of this collapse, little drops of hydrocarbons came out of the flare, and a hydrocarbon film was spread out in the surrounding area. One employee in a neighbouring site was sent to the hospital with respiratory problems. Two days later, an employee of a third site was seriously burnt on his arm by a (small) jet fire, while he was replacing a gas bottle of oxygen. The jet fire was caused by a hydrocarbon deposit on the gas bottle (probably coming from the refinery two days earlier), in combination with a little amount of the oxidizing oxygen that was still in the bottle.

### **Inspection practices and strategies**

Several countries have invested time and effort on refining practices and a number of innovative ideas were shared across the project through surveys and the workshop. It is clear that few authorities perform inspections targeted at the overall safety level in the industrial park. The inspections are mainly performed at Seveso establishments located within the park and most countries inspect each Seveso operator in the same industrial park separately.

The following are specific practices that were shared by various countries:

#### **Identification of the property and the management of some utilities, such as pipelines.**

This concerns utilities, for example, that go through the areas of different operators, is very critical. Therefore during the monitoring of industrial parks it is important to pay particular attention to the modality of the management of the interconnecting and the mutual utilities.



### **Requiring that a legal entity (person/company) be responsible for operating the industrial park**

In addition, a few other countries relied on voluntary or mandatory provisions for establishing contracts or agreements between sites on common services, such as emergency response.

### **Enforcing the establishments' duty to exchange information**

To fulfill this requirement, authorities made sure that nearby operators were provided with information concerning a Seveso site (or sites) that could be the source of a domino effect on their sites. Furthermore, operators were asked to agree on procedures by which the reciprocal exchange of information should be performed.

### **Checklists for inspections**

It is difficult to get a good picture of the safety situation in an industrial park since the establishments can be at different levels in regard to Seveso and in regard to overall safety culture development, have different inspection authorities, etc. The checklists can aid in producing a more consistent evaluation.

### **Dialogue between the competent authorities and joint inspections in large industrial parks**

In particular, authorities may get information about the risks of non-Seveso establishments by using environmental, work environmental and civil protection laws. The non-Seveso establishments could, for example, be inspected by the environmental authorities.

### **Conducting inspections targeting the overall safety level in the industrial park**

In some cases these inspections were somewhat routine and others and overall safety inspection was tied to special situations or particular accidents, or reserved only for large industrial parks. In other countries the inspectors performed an overall site safety check of the industrial park on one specific element. For example, inspectors would observe emergency plan test exercises or would check that adequate exchange of information had taken place between members of domino groups.

### **Evaluation of the possibility of domino effects of Seveso establishments on non Seveso establishments**

In more than one country, the non-Seveso establishments were considered as external risk sources and are examined in the safety reports.

### **Requiring establishments within an industrial park to have a joint emergency plan**

In addition, in one country domino effects for upper tier establishments are evaluated in the safety reports. In case of a joint safety report, the establishments were considered as one entity regarding the domino effects. Another country explained that if the operators did not prefer to make analysis of domino effects together, they were all asked to make analysis of how their installations could impact neighbouring installations, and then to compare their assessments.

### **Requiring different establishments within an industrial park to be involved in preparation of a joint analysis of domino effects**

Another country indicated that a joint emergency plan was not mandatory but the local authority responsible for preparing an off-site emergency plan was expected to take account of potential consequences of accidents at all establishments in close proximity and could choose to produce a generic plan for the entire industrial park. It was also noted that joint safety reports were allowed by some countries but in reality very few establishments have chosen this option.

### **Requiring establishments within an industrial park to have a joint emergency response organisation**

In some cases it would depend on whether all establishments were under Seveso II or on the hazard potential of the site.

### **Legal instruments and definitions**

Few countries have legal instruments that provide support to inspection and oversight of Seveso implementation in industrial parks. In the vast majority of the participating countries, there is not a legal definition of industrial parks; the legislation does not require that there be a legal entity responsible for operating the industrial park; and operators of Seveso sites are not legally required to

make a contract with the operator of the industrial park regarding emergency related tasks.

In fact, only two countries could provide legal definitions of industrial parks. Several difficulties in creating a common definition were noted by workshop participants. Creating a definition of industrial parks that properly included all locations relevant in nature to the true meaning of industrial parks and excluded those that were not relevant, proved to be a particular challenge. Moreover, though enforcement of the Directive can be particularly challenging in industrial parks, workshop participants generally felt that specific legal definitions or other provisions in order to aid Seveso enforcement, are unnecessary. Most countries seem to be satisfied with existing regulations provided that the regulations can be adapted a more flexible way.

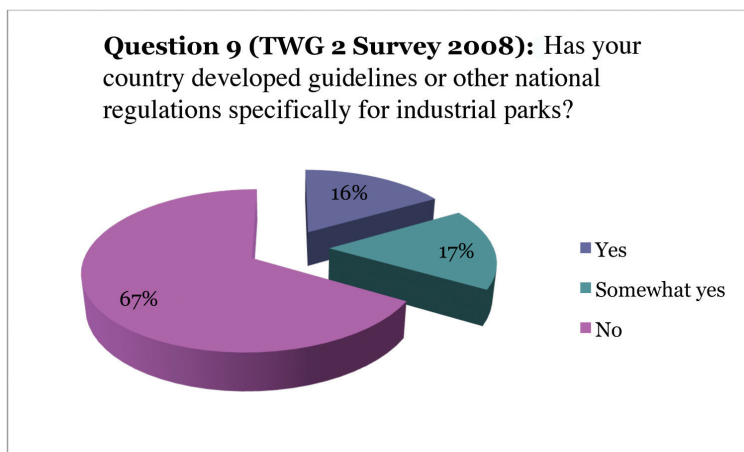


Figure 3

### Inspection checklists and other tools

Many of the participating countries did not cite specific tools (guidelines, checklists, models, software) used for inspecting industrial parks and/or assessing domino effects. Several of them use general checklists or question lists. However, the surveys provided a long list of questions inspectors could ask during inspections in industrial parks in addition to the “normal” Seveso inspection questions. These can be sorted into the following categories:

- communication and exchange of information between operators
- co-operation between operators

- personnel safety
- domino effects
- emergency planning
- infrastructure

As for the tools inspectors of industrial parks would like to have, the workshop participants listed:

- (better) checklists and guidelines
- joint international inspections with a learning process afterwards
- access to independent, competent management expertise
- the power to serve an order to produce an improvement plan
- an expert institute on analysing risk and consequence

## Questions to ask when inspecting industrial park or domino effect sites

### Communication and exchange of information between operators

- What information is exchanged between operators, how is this done, what is the frequency of this contact, and is it formalized? What routines are in place?
- Is the necessary information about risks being exchanged?
- Is there a periodic meeting where information about changes in risks, emergency devices, etc. can be shared?
- Are emergency plans being shared between operators?
- Questions about information exchange regarding domino effects
- What procedures have been established to facilitate communication and information exchange procedures in case of an emergency?

### Co-operation between operators

- How do the operators co-operate in the areas of risk analysis ? emergency response? alarms and control systems? fire brigades and equipment? organisation of rescue services?
- Are responsibilities between the establishments clearly defined and if so, how are they defined?
- Have the operators themselves identified any unclear areas regarding shared responsibilities, and how have these been dealt with?
- How are common routines developed?
- How do the operators deal with the hiring of common personnel and sub-contractors and their safety training?
- Are there any common procedures (e.g., personal safety practices, emergency response, etc.) for the companies?
- Are there common exercises and emergency drills?
- Has a joint committee been established to oversee co-operation on shared responsibilities? What are its conclusions?
- Questions regarding joint risk evaluations and joint emergency preparedness.

### Personnel safety

- Are there evacuation directions for personnel and vehicles?
- Do the employees have the correct emergency clothing and devices for dealing with dangerous substances? How is this organised so they can get to them in case of an emergency?
- Other occupational safety and health related questions.

### More checklist questions ...

**Domino effects**

- Have the risks of major accidents related to domino effects been identified?
- What measures have been taken to decrease the risks connected with domino effects?
- Are the industrial sites near the establishment impacted by domino effects?
- What kind of activities are taking place in nearby sites? Are dangerous goods involved? If so, what accident scenarios have been foreseen? What information has been provided and when did the last information exchange take place?

**Emergency planning**

- Are there established procedures in case of a major accident?
- Is there periodic testing with the fire brigades?
- Who communicates an emergency situation to neighbouring sites, what information will be given, and how will this be done?
- Is there a shared alarm or fire control system? Who is responsible and how is it used?
- How do the operators contact one another and share information in case of an emergency?
- How will the overall emergency response be co-ordinated?
- Are emergency plans being shared between operators?
- Ask for documentation about the testing of emergency services.
- How does the individual operator's on-site plan and with the off-site emergency plan?
- How do operators co-operate in preparing and executing emergency drills and common training exercises?

**Infrastructure**

- Have the operators defined hazard control and maintenance responsibilities in regard to common infrastructure?
- What risks are associated with "interconnecting" features such as pipelines?
- Who is legally accountable for the safe management of pipelines?
- How is information on the status of common infrastructure (such as pipelines and utilities) communicated? What is the procedure for reporting and addressing problems?
- How is management of change addressed for common infrastructure?



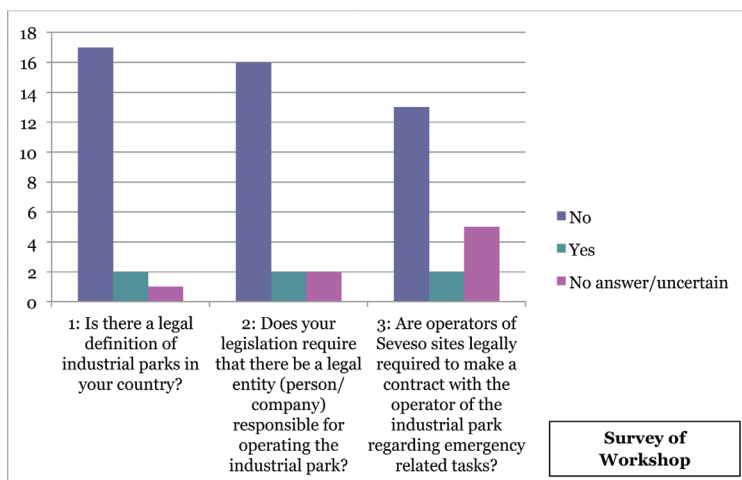


Figure 4

### Ongoing challenges in assuring compliance

Many countries still have questions about what strategies and techniques would be most effective in enforcing the Directive in industrial parks and for promoting prevention and emergency preparation in regard to domino effects.

Most workshop participants indicated that they had limited ability to recognise potential risks or enforce more appropriate protection measures associated with non-Seveso neighbours. It was noted that risk based prioritisation of inspections focuses on Seveso-plants rather than on the neighbouring non-Seveso facilities. Even information exchange with non-Seveso neighbours on potential risks is a challenge due to differences in technical knowledge and differences in business contexts and company culture.

The following challenges were highlighted:

- Maintaining adequate resources, knowledge and expertise.
- Lack of joint risk analysis and joint incident control plans for whole industrial parks, and support from the legislation to be able to demand this. How to integrate domino effects in risk analysis.
- Communication and interaction: between the authorities and the establishments, between domino establishments, between Seveso and non-Seveso establishments, and the need to develop intervention strategies that the

authorities can use to promote a continuous and open exchange of information between establishments.

- Lack of criteria for identification of establishments which are obliged to exchange data due to their proximity and possibility of domino effects.
- Different challenges regarding inspections:
  - the need for guidelines or other inspection tools specific for industrial parks, and specifically for domino effects;
  - achieving a more comprehensive and robust enforcement;
  - how to combine Seveso and non-Seveso inspections;
- The change of site ownership from one owner to multiple owners and keeping track of changes in owner relationships. This can cause changes in safety policy over time and significant risk of loss of knowledge and experience. In this situation an inspector often may not know whether previous findings still apply.
- Responsibility issues – both among the competent authorities and the members of the industrial parks.
- Employing more appropriate and effective measures to avoid accidents.
- Ensuring that risk is reduced to a level as low as reasonably practicable and that the establishments are more active on a common basis to really increase the safety situation at the site.
- Co-ordination of emergency organisation related to such establishments. Specifically, a need for joint fire brigades was indicated.

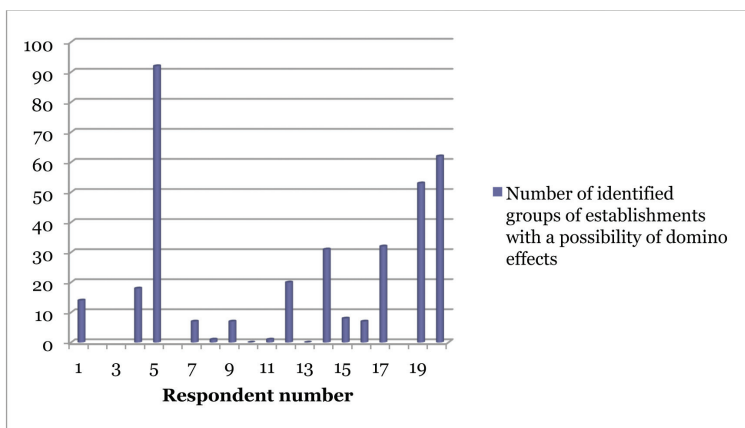


Figure 5

### **Identifying and establishing controls for domino effect sites**

The authorities usually decide whether the potential for domino effects exists. Most authorities identify and monitor potential domino effects establishments through the evaluation of safety reports, through site inspections, use of digital maps and notifications from the establishments. Evaluation of possible domino effects is either performed as part of the safety report assessment, or as a separate process. However, some countries have encountered establishments that do not always agree that they are domino establishments.

Most Seveso authorities have little control of the local permission procedures leading to the location of new high risk establishments. This can result in new domino effect establishments, since consideration of possible domino effects is seldom addressed in land-use planning. The workshop participants listed some proposals for approaches on how to reduce the possibility of domino effects:

- good land-use planning, also addressing domino effects
- incentives to stimulate relocation of the establishments
- strengthening lines of defence through addition of appropriate safety equipment, instrumentation, etc.
- authorities request operators to revise their risk assessment in order to identify risk reducing measures

### **Co-operation between establishments**

Several countries require or recommend Seveso sites within an industrial park to share or co-ordinate certain risk management information, such as:

- safety reports
- safety management systems
- internal emergency plans
- risk assessment
- emergency communication systems
- industrial park emergency plans
- information about domino effects

The following topics were suggested as the highest priority for co-operation between Seveso and non-Seveso establishments for risk management:

- hazard identification

- risk assessment
- assessment of domino effects
- management of changes that affect shared risks
- emergency response planning
- process shut-downs

Approaches suggested for encouraging establishment co-operation included:

- Extensive inspections from authorities combined with information and inducement.
- Checklists for use by both Seveso and non-Seveso establishments
- worked out in co-operation with authorities.
- Conferences or meetings where authorities and establishments
- meet and exchange information.
- Asking companies to share safety reports and work towards making them more homogenous.

### **Common services in industrial parks that may be critical for safety**

The most common gap noted for industrial parks in relation to safety-critical services appeared to be unclear accountability among establishments in regard to the maintenance and the running of common installations, equipment and property.

The common service elements considered to be most critical for risk management were:

- emergency preparedness and response
- utilities and their back-up
- security and admission control
- safety critical maintenance
- infrastructure
- hazardous waste
- co-operation in health safety and environment matters
- information to contractors working at the site

### **Joint safety reports and emergency plans**

In most countries, the individual operators make their own safety reports. However, in some countries, different practical approaches have been tried to allow and sometimes promote a joint report. However, the workshop confirmed that other countries do not encourage or accept joint safety reports. In any case, there are no laws that can force industrial parks to make joint safety reports. The production of a joint safety report by establishments is generally voluntary in countries where such reports are accepted.

Most countries do not have specific legal requirements for joint emergency plans in industrial parks or for domino effects. However, many countries can enforce the establishment of joint emergency planning, preparedness and response in industrial parks on a case by case basis. In many countries, each establishment in an industrial park has its own emergency plan. Still many countries reported having a mix of individual and integrated emergency plans, with a clear majority of individual plans. In many countries, industrial parks voluntarily develop joint emergency plans.

The highest priorities in inspecting an emergency plan of an industrial park were identified as follows:

- Clarity of roles and responsibilities;
- Consideration of the relevant scenarios and plans about how to attack different situations. The actions to be taken first depend on the hazards and chemicals involved, and knowledge of the hazardous materials and the resources available is therefore crucial;
- First response: education and training of internal first response personnel. A short first response time (5 minutes is being mentioned) is important in order to limit the consequences until the external help arrives;
- Internal communication: The other establishments must have accurate information to make sure they know how to respond. A good communication and alarm system is fundamental;
- External communication: communication with the police, the health authorities, the fire brigade – and the public. Public relations: it is important to have a controlled relation to the media, with designated persons to communicate with them.

### **Co-operation between authorities**

Co-operation between authorities varies greatly between countries for industrial parks and domino effect establishments. Some countries have no need

for co-operation since they have one authority; others have many authorities and have established more or less formal ways to co-operate. A few countries have established joint Seveso inspection teams, and all Seveso inspections are performed as joint inspections.

### **General conclusion**

Because of the potential total risk associated with the aggregation and proximity of operations in industrial park or areas with potential domino effects, it is of great importance that responsibilities regarding safety and emergency preparedness are clearly defined, and that factors that could lead to the escalation of accidents between establishments are identified and properly dealt with in order to minimize eventual domino effects. Lack of clarity regarding collective risks and accompanying responsibilities of affected establishments (Seveso and non-Seveso alike) can result in certain accident risks being overlooked or inadequately addressed. While significant challenges remain in regard to managing risks and ensuring compliance associated with industrial parks and domino effect sites, a number of innovative strategies have been employed by inspection authorities to encourage co-operation between establishments and focus attention on elevated risks when dangerous establishments are in close proximity to each other and other business interests.





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# 1. Introduction

The basis for the compilation of this document is an initiative of the Mutual Joint Visit (MJV) Programme for Seveso Inspections co-ordinated by the European Commission with the competent authorities. It consisted of two survey of inspection authorities followed by a workshop that took place on 18 to 20 November 2009 in Tonsberg, Norway. The initiative was led by the Norwegian Directorate for Civil Protection and Emergency Planning in Tonsberg in co-operation with the European Commission's Joint Research Centre (JRC).

The European Commission's MJV programme for Seveso Inspections is managed by the JRC Major Accident Hazard Bureau (MAHB) with the advice and support of the EU Technical Working Group on Seveso Inspections (TWG 2). The TWG 2 consists of representatives of inspection authorities of Seveso implementing countries (EU Member States, Candidate Countries and EEA/EFTA countries). The JRC is the group's secretariat. The group meets once a year to discuss and develop initiatives to address common high priority topics for Seveso inspectorates in Europe

The topic of industrial parks and domino effects was originally a priority topic of the EU Technical Working Group on Seveso Inspections (TWG 2). Norway volunteered to lead the study of this topic assisted by the JRC. First, a survey of the topic was conducted to confirm and clarify common challenges in the Seveso countries with implementation of Seveso in these two related areas. On the basis of survey results, it was recommended to host an MJV workshop on specific points highlighted in the findings. A second survey was conducted of workshop participants to obtain additional information about the experiences of individual inspectors in enforcing Seveso compliance on Seveso sites associated with industrial parks and domino effects.

## 1.1 Importance for Seveso implementation

Most EU and EEA – countries have a number of Seveso II establishments located in large industrial complexes (industrial parks, chemical parks) as well as areas where there is a high density of industrial operators creating a potential risk for domino effects (for example, port areas). Because of the potential total risk associated with the aggregation and proximity of operations in such areas, it is of great importance that the responsibilities regarding safety and emergency preparedness are clearly defined, and factors that can lead to the escalation of accidents between establishments are identified and properly dealt with in

order to minimize eventual domino effects. Lack of clarity regarding collective risks and accompanying responsibilities of affected establishments (Seveso and non-Seveso alike) can result in that certain accident risks are overlooked or are inadequately addressed in such industrial complexes.

When performing inspections in these Seveso establishments, inspectors are faced with challenges uniquely due to the proximity of neighbouring companies (both Seveso- and non-Seveso establishments).

## 1.2 The goal of the MJV workshop

In light of the recognised challenges associated with major hazard control in industrial parks or otherwise high density industrial areas, the goal of the MJV was to:

- Discuss challenges and practices in EU/EEA-countries.
- Exchange experiences regarding the handling of industrial parks and domino effects in EU/EEA-countries.
- Evaluate the need for establishing joint inspection check lists/ question lists for inspectors.
- Conclude best practices and common understandings in a best practices document in the Seveso Inspection Series.

## 1.3 Organisation and programme of the MJV workshop

The workshop was based on the concept of small group discussions focused on various topics and subtopics within the theme of industrial parks and domino effects. To highlight the importance of the theme of industrial parks and domino effects, two plenary sessions also consisted of presentations to highlight accidents and experiences of inspectors that demonstrated typical concerns and challenges associated with this topic. The break-out themes were largely selected on the basis of responses of Seveso inspection authorities to two surveys conducted on the topic prior to the meeting. For group discussions, participants were given a number of questions to drive discussion on each topic / subtopic. A plenary session followed each break-out session and in this session each group presented the main points from their discussions.

The topics and subtopics were as follows:

### Session 1: Legal issues and organisation of industrial parks

- Legal issues

- Involving non-Seveso establishments in the enforcement of Seveso II
- Different ways of organising (or managing) common services in an industrial park
- Co-operation between establishments

### **Session 2: Inspection practices and tools for inspections**

- Inspection practices in an industrial park
- Inspection practices regarding domino establishments

### **Session 3: Practices regarding joint documentation from industrial parks and authorities' co-operation**

- Joint emergency planning/ preparedness
- Joint risk assessment/ risk assessment domino effects and land-use planning
- Joint safety reports

Annex 3 lists the participants of each group and identifies the chairs and rapporteurs.





## 2. Methods and structure

### 2.1 Surveys

In order to establish appropriate discussion points for an MJV workshop regarding the topic of industrial parks and domino effects, the TWG2 undertook a pre-MJV survey. This survey identified, confirmed and clarified common challenges in the Seveso countries with implementation of Seveso in these two related areas. On the basis of the survey results, it was recommended to host an MJV workshop on specific points highlighted in the findings. The result of the survey was then used for the development of a good programme for the MJV, and relevant questions for the working group sessions.

Closer to the MJV, a second survey was conducted of workshop participants to obtain additional information about the experiences of individual inspectors in enforcing Seveso compliance on Seveso sites associated with industrial parks and domino effects.

### 2.2 Presentations

An important part of the MJV was to establish a common level of understanding amongst the participants. The results of the surveys were presented as an important basis for the discussions, alongside information in areas relevant to the subject.

As a foundation, the work of Dr. Christian Jochum on behalf of the EPSC was very important, and it was accepted by EPSC that his report "Process Safety / Risk Management of Chemical Parks in Europe" was provided beforehand to all participants. As a kick off to the MJV, prof. Dr. Jochum presented the main conclusions of his report.

As a supplement to this, a representative for the largest industrial park in Norway talked about their challenges and experiences, and furthermore there were presentations regarding accidents and effects of accidents in chemical parks and industrial parks, experiences from the largest chemical park in The Netherlands and information regarding German practices regarding the handling of domino effects.

### 2.3 Working groups

Workshop participation consisted of 39 participants from 21 countries. A list of participants and their organisations is contained in Annex 2. The workshop was planned mainly by a Technical Advisory Group of experts from Seveso countries as well as the Major Accident Hazards Bureau (MAHB) of the European Commission's Joint Research Centre together with Norway as host of the MJV.

Participants were divided into five groups, with the intention of limiting groups to approximately 7-9 participants. There were four break-out sessions in total divided into 2-4 subtopics. To stimulate discussion a list of relevant questions for each topic was prepared by the Technical Advisory Team and distributed to participants. Each group was instructed to focus on a different subtopic. Since the number of groups always exceeded the number of subtopics, there was always more than one group focusing on one or more subtopics. Groups were instructed to complete discussion on the questions provided for their designated subtopic. If more time was available after discussion on the subtopic was exhausted, the groups were to move to discussion of another subtopic of their choice. Therefore, for most of the break-out sessions each subtopic was discussed by more than one group.

Group discussion outcomes were presented in a plenary following each break-out session. Each group had a chairperson to lead the meeting and facilitate group discussion. A rapporteur took notes and helped prepare the group's presentation of discussion outcomes for the subsequent plenary session. This document highlights the main points and conclusions of all the sessions.

## 3. Survey results and conclusions

### 3.1 Pre-MJV Surveys of inspection authorities and MJV participants

Two surveys were conducted in the preparation for this MJV. The first survey was aimed at Seveso inspection authorities generally and was conducted to shape the content of the MJV and confirm general interest in the topic. The second survey was distributed to MJV participants. Its main purpose was to engage the perspective of participants in the topics on an individual basis and obtain additional information that could be useful for other Seveso inspection authorities.

#### The pre-MJV survey of inspection authorities

This survey first established definitions for the terms “industrial parks” and “domino effects” relevant for Seveso. Although a common definition of industrial parks (e.g., Wikipedia) is “an area zoned and planned for the purpose of industrial development”, it was considered inadequate for the purposes of Seveso. Rather, throughout the survey and workshop, the term “Industrial Park” was defined to include chemical parks, multi-operator sites and industrial parks that accommodate several chemical facilities in close proximity to one another. The facilities on these sites have different owners but share infrastructure services, which may be provided by one of these facilities or one or several third parties, and they usually (but not always) share a fence.

For this survey, the term “domino effect” was defined as stated in the Seveso II Directive, and “quasi domino effect” in the cases where accidents in Seveso plants affect non-Seveso plants or vice versa.

#### The MJV participant survey

In order to prepare the participants for the MJV, a second survey was sent to all the workshop participants. This survey was intended to serve as a follow-up to the first questionnaire. In addition, it provided an opportunity for the views of inspectors’ participating in the workshop to be solicited including countries or regions that had not been included in the first survey. The goal was to obtain a general overview of the practices within participating countries regarding implementation and enforcement of Seveso obligations. The answers from this

questionnaire were also to serve as an additional basis for the discussions during the workshop. All participants were asked to complete the survey, except for the cases where more than one participant came from the same competent authority, in which case they could submit a joint response. 23 replies were received from 21 countries.

### 3.2 Results of the Pre-MJV survey of inspection authorities

This survey was distributed to the inspection focal points of all EU and EA countries. 25 replies were received from a total of 20 countries (seventeen Member States, one Candidate Country, and two EEA countries). Six (6) of 25 replies were from the regions in Holland, and have been counted as one. The responding authorities represented authorities with competence: 4 employment/labour safety, 3 civil protection, and 13 environmental authorities.

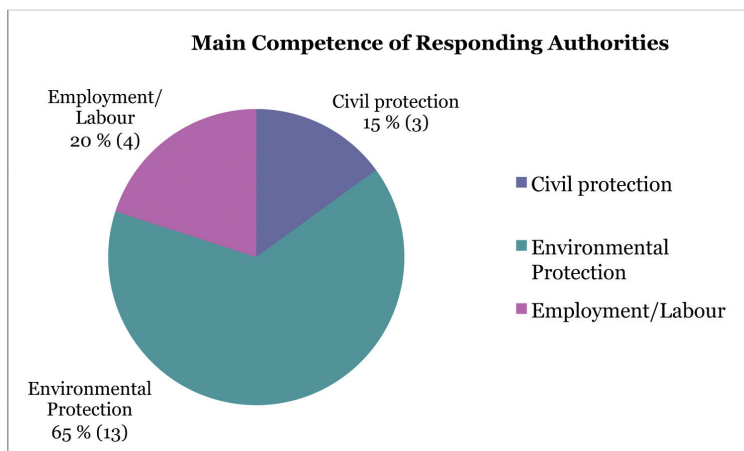


Figure 6

The following is a presentation and discussion of results for each survey section, followed by overall conclusions.

#### Survey part 1A – Industrial parks – country profiles

**Questions 1 and 2 combined: Does your country have industrial parks with Seveso establishments, and is the number of industrial parks concluded or estimated for the whole or parts of the country?**

Seventeen out of the twenty responding countries answered that they have industrial parks (IP's) with Seveso establishments, using the definition provided.

As noted in Figure 6, 14 of the 17 countries with industrial parks gave an exact or estimated number of industrial parks for the whole of their country, or parts of the country. The sum total from all responding countries adds up to 282 industrial parks. However, taking into account that half of the countries also indicating the presence of industrial parks did not provide any numbers, and the total lack of response from some countries, one can therefore easily assume that the number of industrial parks in Europe is well above 300.

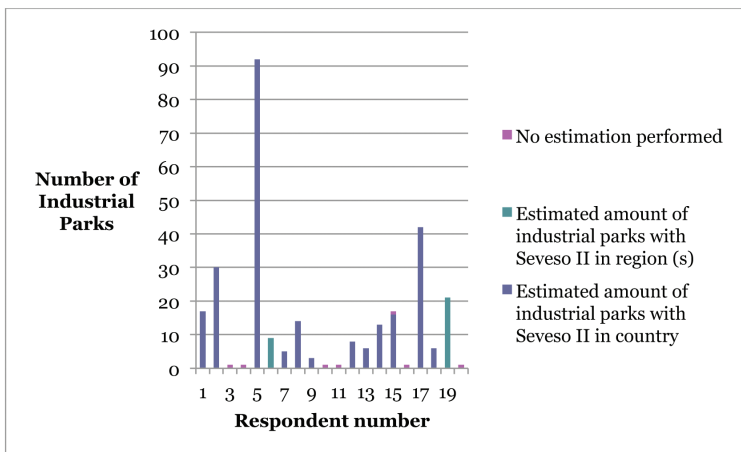


Figure 7: Number of industrial parks with Seveso II establishments.

### Question 3: Describe types of industrial parks in your country, and if possible indicate the numbers of each type:

To this question, 13 countries answered that they have knowledge of what sort of establishments are located within their industrial parks. 8 countries reported a mix of pure Seveso II industrial parks and industrial parks with both Seveso II and non-Seveso establishments. 1 country reported that they only have “pure” Seveso industrial parks, while 3 countries replied that they only have industrial parks with a mix of Seveso and non-Seveso establishments, see fig. 2.

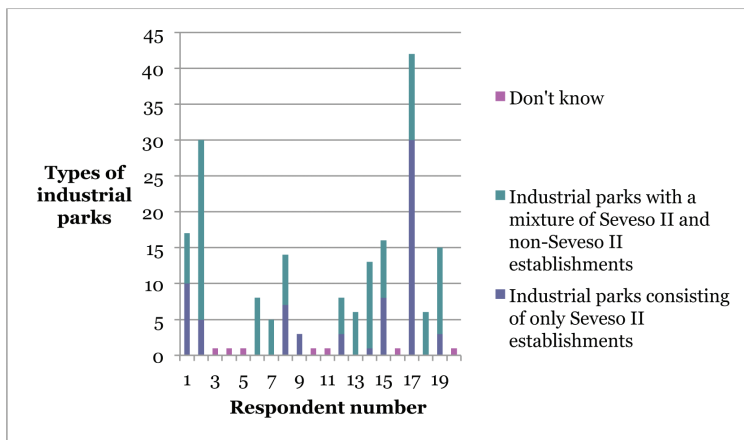


Figure 8: Types of industrial parks in responding countries.

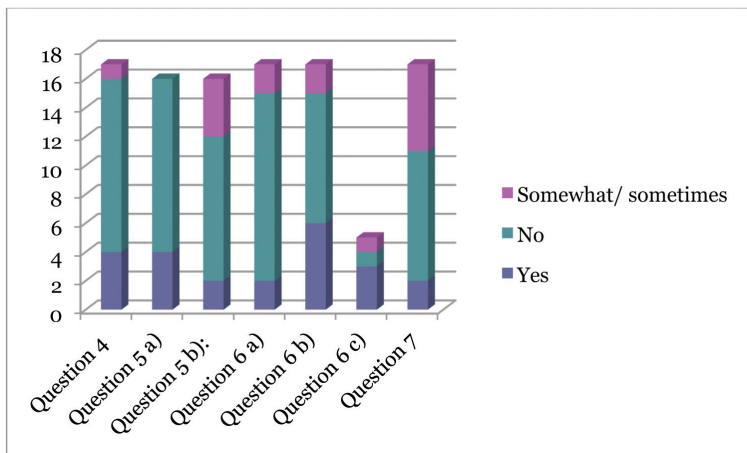
## Survey part 1A – Industrial parks – Seveso inspection practices

### Questions 4 – 7:

In this part of the survey, it was attempted to establish to what extent countries that have recognised industrial parks with Seveso establishments, demand some form of joint documentation: is there a demand for joint safety reports, joint emergency plans, joint risk assessments? Also, is there a joint emergency response organisation, and are the inspections targeting the total safety level in the industrial park?

#### Question 4: Do you accept one joint safety report from all establishments within the park?

4 countries answered “yes”. 12 countries answered “no”. 1 country can be grouped as “somewhat/sometimes” due to regional differences.



The answers to question 4-7 are presented in figure 9.

Even among the four countries that answered yes to this question, it was not common to receive a joint safety report. One of them simply said that they had not yet received any. Another country stated that the initiative lay with the operators, and getting a joint safety report was in practice very rare. For the most part, it has been implemented for sites which have recently split into two legal entities or for operators sharing a safety department. In only one of the four countries was a joint safety report required, as stated in their guidance documents.

Of the countries that answered “no”, one made an exception and accepted a joint safety report if all the establishments had one joint operator. In another, it was possible for the establishments to work out a common safety report together, which each one of them then used for their own purposes, provided that the report was detailed enough for each user. For others, there was no room for exceptions. One of the countries that said “no”, stated that the duty to produce a safety report rested with the operator of each establishment. A joint report would, in their opinion, cause enforcement difficulties.

#### **Question 5 a): Is it mandatory for the establishments within an industrial park to have a joint emergency plan?**

4 countries answered “yes”. 12 countries answered “no”. In one country, there



are seemingly regional differences.

In one of the countries that answered “yes” to this question, a joint emergency plan would be mandatory after the introduction of a new law, which would make it mandatory for the Seveso establishments within an industrial park to draw up a joint emergency plan extended to the whole area. In another country with a positive answer, this was already mandatory in practice, if not strictly by law. Out of all the countries that answered “no”, only one gave a more precise explanation, in which it was stated that a joint emergency plan was not mandatory, but the local authority responsible for preparing an off-site emergency plan was expected to take account of potential consequences of accidents at all establishments in close proximity and could choose to produce a generic plan for the entire industrial park. However, separate detailed annexes for each of the individual establishments would still be expected.

#### **Question 5 b): Is it mandatory for the establishments within an industrial park to have a joint emergency response organisation? (e.g. fire brigade)**

2 countries answered “yes”. 10 countries answered “no”. 4 countries answered or can be grouped as “somewhat/sometimes”.

Two of the countries that answered “sometimes” gave more detailed explanations. In one of them, it was mandatory to have a joint emergency response organisation in industrial parks where all establishments are under Seveso II. In the other, it depended on the hazard potential of the site. One of the respondents that answered “no” explained that a joint emergency response organisation is not mandatory, but co-operation and co-ordination was not unusual. In many cases, the fire brigade for the local area (located off-site) would respond to incidents at all establishments within the park. Work was on-going in this country to develop mutual aid arrangements, whereby emergency response organisations across the country would assist each other in mitigation and post-incident recovery in the event of large-scale incidents with the potential to overload locally available resources.

#### **Question 6 a): Are the different establishments within an industrial park obliged to prepare a joint risk assessment of the site in addition to each establishment’s individual risk assessment?**

2 countries answered “yes”. 13 countries answered “no”. 2 countries answered or can be grouped as “somewhat/sometimes”.

In one of the two countries that answered yes to this question, the duty to pre-

pare a joint risk assessment would apply after the implementation of a new law, which demanded an integrated safety study of the area. One of the countries who said that this obligation sometimes applies, explained that establishments in some cases were required to include/consider other establishments' risks in their own risk analysis. A similar explanation was given by one of the countries who answered "no": risk assessment was performed only by Seveso operators and they must take into consideration not only the risks of their own sites but also the risks from the other operators in their vicinity; they were also obliged to inform the other operators of the risks. Another "no" respondent said that this obligation did not exist within their Seveso legislation, but that it could be asked for in a framework of the licensing (permit) system.

### **Question 6 b): Are the different establishments within an industrial park obliged to prepare a joint analysis of domino effects?**

6 countries answered "yes". 9 countries answered "no". 2 countries answered "sometimes".

Again, for one of the countries that answered "yes", this duty would apply after the introduction of a new law (Integrated Safety Study of the Area). In the cases of the two countries that answered "sometimes", one said that this obligation only existed in cases when on the same establishment there are two or more Seveso II operators, while the other country said that this depended on the hazard potential of the site.

Three of the countries in which there are no such obligations, gave more detailed explanations. One of them said that there is normally no such obligation, unless in case of a joint safety report. Domino effects for upper tier establishments are evaluated in the safety reports. In case of a joint safety report, the establishments were considered as one entity regarding the domino effects. Another country explained that if the operators did not prefer to make analysis of domino effects together, they were all asked to make analysis of how their installations could impact neighbouring installations, and then to compare their assessments. A similar comment was made by the last of the three, who said that analysis would normally be separate, but members of a domino group were required to exchange information to enable them to take account of the nature and extent of the overall hazard.

### **Question 6 c): Other? (Please specify)**

3 countries indicated the existence of other types of practices associated with risk assessment. 1 country also responded "somewhat/sometimes" due to re-

gional differences within the country.

The countries and region that answered “yes” to this question, all explained their answers. In one of them, establishments should provide information about domino effects to the Ministry of Environment and the Ministry informed other Seveso II operators about possible domino effects on their plants. Another country answered that with the implementation of a new law, the establishments would be obliged to provide an Action Plan related to the critical aspects of the area. In the region that answered “yes”, it was the responsibility of the provincial authorities to analyse the possibility of domino effects.

### **Question 7. Do you perform inspections targeted on the total safety level in the industrial park and the co-operation between establishments regarding requirements in Seveso II?**

2 countries answered “yes”. 9 countries answered “no”. 6 countries answered “somewhat/sometimes”.

In two of the countries that answered “sometimes”, inspections targeting the total safety level in the industrial park were either related to special situations or particular accidents, or reserved for large industrial parks. Another country that answered “sometimes” gave an example: Inspectors would observe emergency plan test exercises and would check that adequate exchange of information had taken place between members of domino groups. A fourth “sometimes” respondent explained that they elaborated an individual inspection plan for each establishment. A site with 3 Seveso operators meant 3 inspection plans, and the Seveso inspection frequency regime was applied individually to each operator. Inspectors reported that shortcomings regarding the level of co-operation between operators were quickly detected during the “individual” inspections.

Finally, one country demonstrated regional differences in its approach. One region answered “yes” to this question, another “no”. The region with the positive answer explained that some first steps were taken to perform inspections on co-operation between Seveso II establishments. The region with the negative answer said that in case of a domino assignment, some attention was paid to the co-operation between both establishments during the inspections.

### **Question 8: Have you identified any industrial parks where one of the owners is responsible for the entire operation of all the different establishments on behalf of all their owners?**

3 countries answered “yes”. 10 countries answered “no”. 5 gave no answer. In

one country, there were seemingly regional differences, with 2 regions saying “yes” and 3 “no”. 1 country was uncertain how to respond.

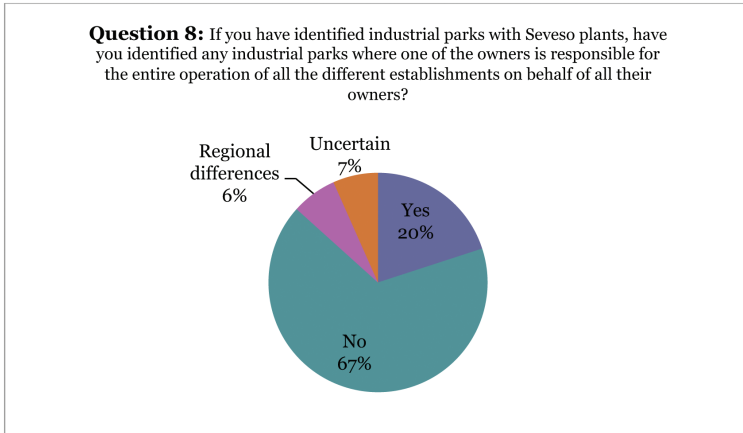


Figure 10: The identification of industrial parks where one of the owners is responsible for the entire operation of all the different establishments on behalf of all their owners.

2 out of 3 countries that answered “yes” gave an exact number of such industrial parks. In total it seemed that only a few (9+) such industrial parks were identified in survey responses.

For these types of industrial parks, 4 countries said that they accept joint safety reports from the operator on behalf of all establishments, and 4 answered that each establishment must produce separate safety reports. One country replied that it was mandatory to hand in a joint safety report.

**Question 9: If you have recognised industrial parks with Seveso establishments: Has your country developed guidelines or other national regulations specifically for industrial parks?**

3 countries answered “yes”. 3 countries answered “somewhat yes”, including one country where there are regional differences, with 3 regions saying “yes” and 3 “no”. 12 countries answered “no”.

The countries that answered “yes” or “somewhat yes”, were asked to explain what kind of specific guidelines or national regulations have been developed. The responses were as follows:

- One country explained that what they have is a kind of informative guide-

line, not a regulation.

- In another country, the guidelines/regulations are not for technological, technical and safety issues.
- In a third, the guidelines do not address industrial parks specifically.
- In a more detailed account, another explained how a new law would provide directions for identifying industrial parks related to the presence of domino groups, drawing up the Integrated Safety Study of the Area and evaluating it, and drawing up the Action Plan related with the critical aspect of the area.
- One country explained that they have a national directive for Seveso II establishments which describes several rules for the Seveso establishments. This directive describes general rules for the individual Seveso establishments, but not specifically for industrial parks. The Seveso inspectors are specifically trained on using several national and international guidelines.

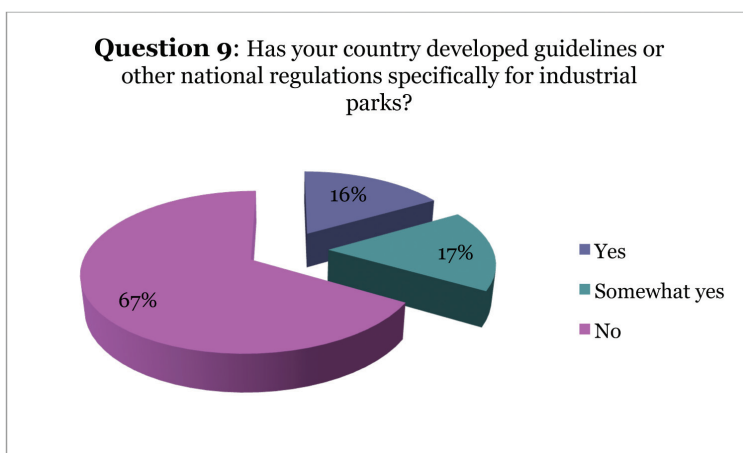


Figure 11: Participant countries with guidelines or other national regulation specifically for industrial parks.

### **Question 10: Have you established specific checklists on the theme of industrial parks to be used in inspections?**

1 country answered “yes”. 3 countries answered “somewhat yes”, including one country where there are seemingly regional differences, with 2 regions saying “yes” and 4 “no”. 13 countries answered “no”.

The countries that answered “yes” or “somewhat yes”, were asked to explain what kind of checklists have been developed. The responses were as follows:

- One country said that the checklist was in the very early planning stages.
- Italy explained that in the checklist used in inspections of all upper-tier Seveso establishments, there were some element related to the neighbouring establishments and service operators. These checklists were developed as a tool for the inspector to verify the completeness of the structure of the Safety Management System and its elements.

Three regions in the Netherlands referred to the Werkwijzer BRZO, which contains the checklists that can be used during inspections, available on the site [www.brzo99.nl](http://www.brzo99.nl). There are specific checklists for crude oil tanks, for the investigation of major accidents and for the judging of several safety management systems.

One country did not answer the question “yes” or “no”, but explained that there were not specific checklists, but the theme of industrial parks was included by checking intervention planned in case of emergencies, types of warning systems in place, and the process established for notification of incidents.

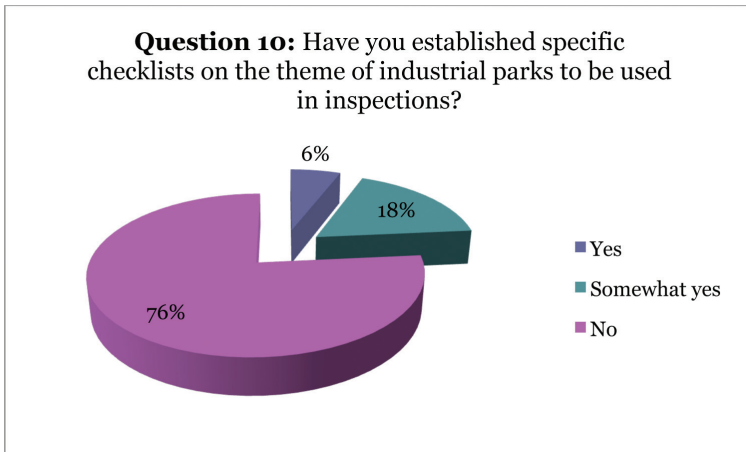


Figure 12: Whether the participants have specific checklists on the theme of industrial parks to be used in inspections.

## Survey part 2 – Domino Effects

Article 8.1 of the Directive on the domino effect gives Seveso authorities the responsibility of identifying groups of establishments where an accident in one establishment can lead to domino effects in the other establishments.

### Question 11: How many groups of establishments with a possibility of domino effects have been identified in your country?

Three countries answered “not applicable”/“don’t know” or gave no answer. 2 countries answered “none”. The remaining 14 countries identified a total of 353 groups of establishments with a possibility of domino effects.

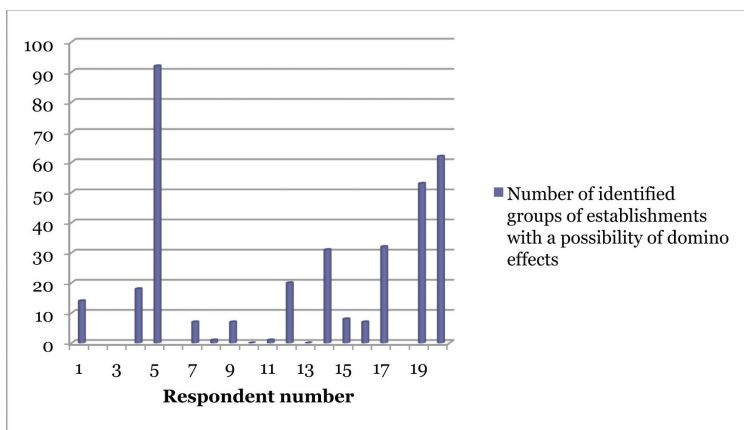


Figure 13: The number of identified groups of establishments with a possibility of domino effects.

### Question 12: In this question, the countries were asked to give a brief description of how they followed these groups of establishments for Seveso purposes (identification of establishments, communication with them on the subject, special inspection practices etc.).

Regarding the identification of possible domino establishments, numerous authorities identified such sites through the evaluation of the establishments' safety reports. If there was evidence of possible domino effects in the safety

report, the competent authority would take some kind of action, for example, giving a warning to the establishment or arranging a meeting with the operators of concern in order to agree on extra measures to be taken. Identification could also happen through site inspections, permit demands, digital maps and notifications from the establishments to the authorities. Domino effects due to new Seveso establishments were assessed through a risk assessment during the permitting process. In one country, all identified groups of establishments with a possibility of being domino-establishments were evaluated by the Seveso Co-ordinating Committee. The United Kingdom described their procedure used for designating domino groups, which can be found in Section 6 of the UK's Safety Report Assessment Manual (SRAM), available on HSE's web site at <http://www.hse.gov.uk/comah/sram/index.htm>.

On the question of communication with establishments regarding this subject, two countries stated explicitly that all identified groups of Seveso II establishments were officially informed in writing by the Competent Authority, stating their duties in accordance with the Seveso II Directive. One of the countries added that not all establishments had not accepted this duty, and that they were still working with the operators to help them understand and accept their legal obligations. Regarding communication on domino effects between authorities and establishments, one country said that domino effects should be recognised by operators and reported to the relevant authorities. The information should be transferred to the local authorities, for the development of external emergency plans. This was also mentioned by another country, stating that they asked the establishments to provide information to the rescue service and the relevant local government indicating the principal factors and circumstances that caused or facilitated the domino effect and information on protective measures. Several countries mentioned the establishments' duty to exchange information, and how the authorities took part in this process. For example, operators were provided with information of other operators possibly involved in domino effects. Furthermore, operators were asked to agree on procedures by which the reciprocal exchange of information should be performed.

Regarding special inspection practices, one country said that the Seveso II establishments were inspected by the Competent Authority at least once a year. Two others mentioned that during such an inspection, the competent authorities would check the information exchange between operators and how the public was informed. Practices differ when it comes to domino effects and inspections. While one country reported that domino was a specific item during inspections, another said that the inspection authorities were not involved in the domino aspect of the Seveso Directive at all.



**Question 13: If you have Industrial parks with a mixture of Seveso II establishments and establishments not covered by the Seveso II Directive:****a) Do you also evaluate the possibility of “quasi domino effects” between the Seveso II and the non-Seveso establishments?**

7 countries answered “yes”. 6 countries answered “no”. 2 countries answered “sometimes” and 2 had regional differences.

One of the countries that answered “yes”, explained that there was a description of the various consequences of every possible accident scenario, both for Seveso and non-Seveso establishments. Another stated that Seveso operators evaluated the possibility of “quasi domino effects” as part of the risk assessments. The countries that said they sometimes evaluate the possibility of “quasi domino effects”, had various more detailed explanations of their answers. In one country, the non-Seveso establishments were considered as external risk sources and are examined in the safety reports. In another, they only evaluated possible “quasi domino effects” when both the Seveso and the non-Seveso establishment were dealing with explosive and/or flammable substances. One of the respondents that answered “no” to this question, added that they would, however, expect operators of upper-tier sites to consider off-site events in their safety reports, and this could include risks from neighbouring non-Seveso sites.

**b) Are such non-Seveso establishments in any way included in the inspections of neighbouring Seveso II establishments?**

2 countries answered “yes”. 13 countries answered “no”. 1 country answered “sometimes”.

The country that said that they sometimes included the non-Seveso establishments in the inspections, adding that they inspected them separately if they were under their national legislation. One of the countries that answered “no” to the question said that the non-Seveso establishments were inspected from an environmental view. Another said that though the neighbours were not inspected, the Seveso establishment itself was required to consider the risks of neighbours.

In question 13 c), the countries were asked to describe any other measures taken in order to ensure that authorities have the full picture of the overall risk in an industrial park where you have both Seveso and non-Seveso establishments.

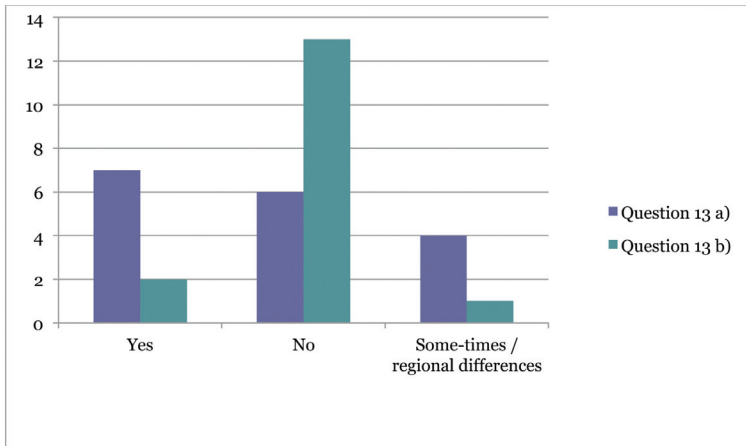


Figure 14: If the possibility of “quasi domino effects” between Seveso II and non-Seveso establishments is being evaluated (13a), and whether such non-Seveso II establishments in any way are included in the inspections of neighbouring Seveso II establishments (13b).

Two of the countries that gave feedback to this question mentioned the need for dialogue between the competent authorities and the need for joint inspections in large industrial parks. Two others answered that the authorities could get information about the risks of non-Seveso establishments by using environmental, work environmental and civil protection laws. The non-Seveso establishments could, for example, be inspected by the environmental authorities. However, they had no mandatory measures in their legislation through which the full picture of the risk in an industrial park could be required.

#### Question: 14: Have you established specific checklists on the theme of domino effects to be used in inspections?

2 countries answered “yes”. 1 country answered “somewhat yes” and 1 country had regional differences. 14 countries answered “no”.

The countries that answered “yes” or “somewhat yes”, were asked to explain what kind of checklist(s) that has (have) been developed. In Italy, the checklist used in inspections of all upper-tier Seveso establishments contains some elements related to the neighbouring establishments and service operators. These checklists were developed as a tool for the inspector to verify the completeness of the structure of the Safety Management System and of their elements.

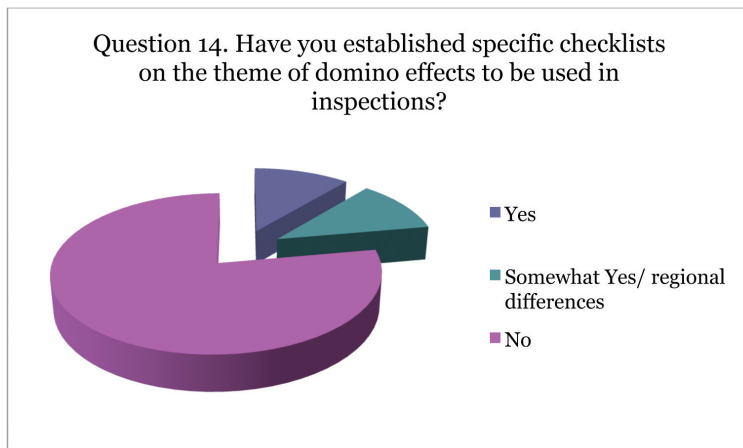


Figure 15: Whether participants have specific checklists on the theme of domino effects to be used in inspections.

Norway has developed joint check lists for Seveso II inspectors, as part of an overall checklist for Seveso inspections. This is a short list stating the obligations according to the Directive. In Sweden, one regional authority has developed a check-list for domino-effects to use at inspections, and also in The Netherlands, one region has a check list.

### Survey part 3 – other comments

#### Question 15: What do you consider to be the greatest challenges in your country when it comes to following up Industrial Parks and/ or Domino Effects?

The following challenges were highlighted:

- Maintaining adequate resources, knowledge and expertise.
- Lack of joint risk analysis and joint incident control plans for whole industrial parks, and support from the legislation to be able to demand this. How to integrate domino effects in risk analysis.
- Communication and interaction: between the authorities and the establishments, between domino establishments, between Seveso and non-Seveso establishments, and the need for ways to make the establishments ex-

change information more openly and continuously.

- Lack of criteria for identification of establishments which are obliged to exchange data due to their proximity and possibility of domino effects.
- Different challenges regarding inspections:
  - the need for guidelines or other inspection tools specific for industrial parks, and specifically for domino effects
  - achieving a more comprehensive and robust enforcement
  - how to combine Seveso and non-Seveso inspections
- The change of site ownership from one owner to multiple owners and keeping track of changes in owner relationships. This can cause changes in safety policy over time, risk of loss of knowledge and experience, and an inspector will not know whether previous findings still apply.
- Responsibility issues – both among the competent authorities and the members of the industrial parks.
- Employing more appropriate and effective measures to avoid accidents.
- Ensuring that risk is reduced to a level as low as reasonably practicable and that the establishments are more active on a common basis to really increase the safety situation at the site.
- Co-ordination of emergency organisation related to such establishments. Specifically, a need for joint fire brigades was indicated.

### **Question 16: Are there other aspects concerning your practice in dealing with industrial parks that you would like to share with us?**

The survey received the following answers:

- Identification of the property and the management of some utilities, such as pipelines, that go through the areas of different operators, is very critical. Therefore during the monitoring of industrial parks it is important to pay particular attention to the modality of the management of the interconnecting and the mutual utilities.
- Checklists for inspections are helpful. It is difficult to get a good picture of the safety situation in an industrial park since the establishments can be at different levels in regard to Seveso and in regard to overall safety culture development, have different inspection authorities etc. The checklists can aid in producing a more consistent evaluation.
- The inspection of domino establishments needs to be developed, for in-

stance by developing domino checklists further.

- A current research project. One country described a research project that is being carried out in one region on domino effects in Seveso establishments. Development of an inventory of establishments with possible domino effects is part of this study. One of the objectives of the research project is to evaluate the most effective strategy for ensuring that the establishments exchange sufficient information on possible domino effects. The results of this study are most probably relevant for future work.

### 3.3 Results of the MJV participants survey

The number respondents consisted of 24 inspectors from 20 countries (Norway included). (The survey was aimed at obtaining greater understanding of government practices and norms and therefore, the industry representatives were not asked to respond.) The number of responses did not equal the number of competent authority participants (28) because some participants from the same country responded jointly. Respondents and their country or industry affiliations are listed in Annex 2.

#### Question 1:

After giving their names and contact information, the participants in the second part of question 1 were asked about their organisation's role in Seveso inspections:

Please check the box for any of the following statements which are true.

1. Our organisation leads Seveso inspection activities in my country.
2. Our organisation shares but does not lead Seveso inspection activities
3. I have inspection responsibilities not related to Seveso If so, Please name them (environment, occupational safety, etc.)

Additional explanation/comment ...

16 of the participants answered that their organisation led Seveso inspection activities in their country. 6 of the participants said that their organisation shared but did not lead Seveso inspection activities. 1 participant had only inspection responsibilities not related to Seveso (occupational safety). For 2 participants, the three alternatives were not applicable.

In addition, 8 of the participants whose organisation led Seveso inspections, also had inspection responsibilities not related to Seveso. Similarly, 1 participant indicated that his organisation shared but did not lead Seveso inspections. Most of these non-Seveso inspection responsibilities were related to safety and

occupational health, some were environmental inspection responsibilities, and one organisation's enforcement portfolio also included biological safety.

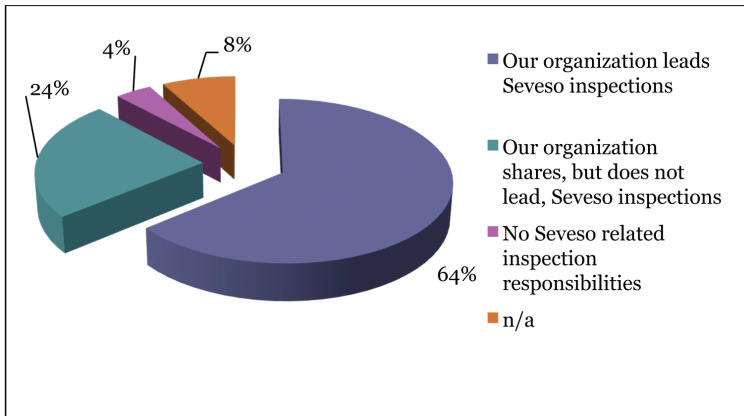


Figure 16: The Seveso inspection responsibilities of the participants' organisations.

## Question 2: Please describe any legal instruments that provide support to inspection and oversight of Seveso implementation in industrial parks.

For example:

1. Is there a legal definition of industrial parks in your country?
2. Does your legislation require that there be a legal entity (person/company) responsible for operating the industrial park?
3. Are operators of Seveso sites legally required to make a contract with the operator of the industrial park regarding emergency related tasks?

If there is a legal definition, could you please provide or attach the definition if possible.

The following answers were given:

- Sub question 1: 17 participants answered "no", 2 participants answered "yes", and 1 participant gave no answer.
- Sub question 2: 16 participants answered "no", 2 participants answered "yes", and 2 participants gave no answer.
- Sub question 3: 13 participants answered "no", 2 participants answered "yes",

and 5 participants were uncertain or gave no answer.

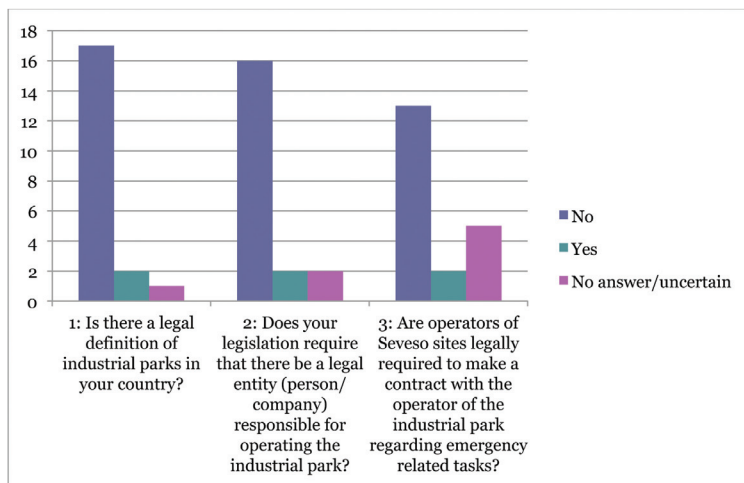


Figure 17: Legal instruments that provide support to inspection and oversight of Seveso implementation in industrial parks.

The vast majority of the participants gave additional comments to this question.

In one country, under the land use planning legislation, all development of land around Seveso sites is controlled by the local authorities who obtain their risk-based advice from the national authority.

The other participants answered the three sub questions, and their answers have been summarized below accordingly.

### Sub question 1: Is there a legal definition of industrial parks in your country?

Again, it was confirmed that most countries did not have legal definitions of industrial parks. However, two countries provided legal definitions. In Italy, a draft decree contains the following definition of an industrial park: An area under the control of multiple operators in which dangerous substances are present. Portugal legally defines an industrial park as an area business location - the

territorially delimited area, affecting the installation of industrial, commercial and services administered by a management company. Switzerland said that they have a legal definition of industrial parks related to land-use planning practices, but this definition was not provided.

One country did not have a legal definition but provided an informal definition: As soon as a neighbour industrial site is located within the domino effect zones of a Seveso site, both sites are considered to make up an industrial park. Another country reported that it did not have a legal definition either, but said that it has guidelines including guidelines and examples produced by the industry.

### **Sub question 2: Does your legislation require that there be a legal entity (person/company) responsible for operating the industrial park?**

Again, the vast majority of participants answered “no” to this question. One of the two countries whose legislation does require that there be a legal entity responsible for operating the industrial park explained that there was a “management society” which is responsible for operating the industrial park.

A number of countries described different ways in which this issue was addressed as follows, for example:

- The operator of a Seveso site (the entity, normally a company, that holds the environmental license to operate) was the one responsible for the operation of the industrial park.
- There is a so-called “storage area permit” procedure concerning operators in the same storage area in the case where the operators share common equipment and areas.
- The identification of domino effects involving more than three sites implies the identification of a critical area (RIR Area). It has become mandatory, for operators included in the RIR area, to set up an Integrated Safety Study as well as to identify a legal entity (typically a consortium) responsible for its implementation.
- Zones within industrial parks are administered by a regulatory body with representatives from authorities and establishments within the zone.

### **Sub question 3: Are operators of Seveso sites legally required to make a contract with the operator of the industrial park regarding emergency related tasks?**

Most countries answered “no” to this question as well but with much uncer-



tainty. The following examples of non-mandatory equivalents to a legal requirement were provided by different countries:

- Often the operator of a Seveso site is required to establish contracts or agreements about emergency response provisions as a part of a good Safety Management System. However, the respondent was not sure if there was a legal requirement for that.
- There is no legal requirement to make a contract with other operators. It has been sometimes required in the environmental permit that a contract between neighbouring sites is established. This has usually been inserted to assure that the mutual risk of major accidents would be reduced. These contracts normally address issues such as safety information plans that have to be made by the neighbouring sites to promote consultation on technical safety matters.
- The competent authority can place a duty on the operators of mutual exchange of data necessary for risk management in these establishments.
- Contracts called "Industrial park instructions" are the main guidance for individual sites in regard to infrastructure and emergency. These contracts are voluntary, not legally required, but without them, the relationship within the sites is not able to work.

**Question 3: Please indicate what type of additional questions you would ask sites in industrial parks in addition to the "normal" Seveso inspection questions.**

**If you have a specific checklist for industrial parks, please enclose a copy (does not have to be in English).**

The participants provided a long list of additional questions that they would ask. Below, these have been summarized and organised into categories:

- Communication and exchange of information between operators
  - What information is exchanged between operators, how is this done, what is the frequency of this contact, and is it formalized? What routines are in place?
  - Is the necessary information about risks being exchanged?
  - Is there a periodic meeting where information about changes in risks, emergency devices, etc. can be shared?
  - Are emergency plans being shared between operators?
  - Questions about information exchange regarding domino effects.

- Questions about communication and information exchange procedures in case of an emergency.
- Co-operation between operators
  - How do the operators co-operate in the areas of risk analysis? emergency response? alarms and control systems? fire brigades and equipment? organisation of rescue services?
  - Are responsibilities between the establishments clearly defined and if so, how are they defined??
  - Have the operators themselves identified any unclear areas regarding shared responsibilities, and how have these been dealt with?
  - How are common routines developed?
  - How do the operators deal with the hiring of common personnel and subcontractors and their safety training?
  - Are there any common procedures (e.g., personal safety practices, emergency response, etc.) for the companies?
  - Are there common exercises and emergency drills?
  - Has a joint committee been established to oversee co-operation on shared responsibilities? What are its conclusions?
  - Questions concerning co-operation about common pipelines and common utilities. Who is responsible?
- Personnel safety
  - Are there evacuation directions for personnel and vehicles?
  - Do the employees have the correct emergency clothing and devices for dealing with dangerous substances? Are these equipment easily accessible in case of any foreseeable emergency?
- Domino effects
  - Have the risks of major accidents related to domino effects been identified?
  - What measures have been taken to decrease the risks connected with domino effects?
  - Are the industrial sites near the establishment impacted by domino effects?
  - What kind of activities are taking place in nearby sites? Are dangerous goods involved? If so, what accident scenarios have been foreseen? What information has been provided and when did the last information exchange take place?

- Emergency planning
  - Are there established procedures in case of a major accident?
  - Is there periodic testing with the fire brigades?
  - Who communicates an emergency situation to the neighbouring sites, what information will be given, and how will this be done?
  - Is there a shared alarm or fire control system? Who is responsible and how is it used?
  - How do the operators contact one another and share information in case of an emergency?
  - How will the overall emergency response be co-ordinated?
  - Are emergency plans being shared between operators?
  - Ask for documentation on the testing of emergency services.
  - How does the individual operator's on-site plan and the interface with the off-site emergency plan?
  - How do operators co-operate in preparing and executing emergency drills and common training exercises?
- Infrastructure
  - Have the operators defined hazard control and maintenance responsibilities in regard to common infrastructure? Who is the right legal person to address when it comes to common devices like pipelines?
  - What risks are associated with "interconnecting" features like pipelines?
  - Who is legally responsible for hazard control and maintenance of common pipelines and utilities? Who manages inspections and necessary repairs?

**Question 4: Please list any specific tools (guidelines, checklists, models, software, etc.) that you use for inspecting industrial parks and/or assessing domino effects?**

The participants were also asked to enclose a copy or a link to specific tools if possible. Several of them answered that there are no specific tools, and this seems to be the case for many of the countries. Several countries have general checklists or question lists. The other answers are listed below. Some of them have been shortened.

- Austria: Joint guidelines for inspecting industrial parks and lone standing Seveso Plants.

For safety management system: [http://www.land-oberoesterreich.gv.at/cps/rde/xbcr/00e/U\\_Seveso\\_Inspektionskatalog.pdf](http://www.land-oberoesterreich.gv.at/cps/rde/xbcr/00e/U_Seveso_Inspektionskatalog.pdf)

- France: Technical guidelines for PPRT (technological risk prevention plan) on thermal and overpressure effects. [http://www.installationsclassees.developpement-durable.gouv.fr/IMG/pdf/Rapport\\_CSTB\\_surpression\\_Vdef.pdf](http://www.installationsclassees.developpement-durable.gouv.fr/IMG/pdf/Rapport_CSTB_surpression_Vdef.pdf) and [http://www.installationsclassees.developpement-durable.gouv.fr/IMG/pdf/complement\\_toxique\\_CERTU-CETE\\_de\\_Lyon-ENERIS\\_15-07-2008.pdf](http://www.installationsclassees.developpement-durable.gouv.fr/IMG/pdf/complement_toxique_CERTU-CETE_de_Lyon-ENERIS_15-07-2008.pdf)
- Germany: A guideline and specific works for calculating the hazards in case of a leakage. A special software, to recalculate the hazards of releases e.g. of the sites.
  - SFK-GS-44: Arbeitshilfe für die Anwendung der Störfall-Verordnung bei Industrieparks des Arbeitskreises Industriepark [http://www.kas-bmu.de/publikationen/sfk\\_pub.htm](http://www.kas-bmu.de/publikationen/sfk_pub.htm)
  - Guideline - explanation of the SEVESO Ordinance for the authorities of 3/2004, page 31-33 <http://www.bmu.de/anlagensicherheit/doc/6133.php>

In addition, a checklist is used to assess the risk of a domino effect and the prevention instruments of the site management.
- Iceland: Items list for MAPP and SMS.
- Ireland: Risk-based software is used to determine the cumulative risk due to the operation of the domino effect sites.
- Italy: The software VARIAR and the SIMAGE information system aimed respectively to risk area evaluation and to emergency management are sometimes, but not systematically used for inspection activities.
- Norway: Question list for inspectors where industrial parks and domino effects are two of many themes.
- Slovakia: Model risk assessment of the situation in several industrial plants in the industrial park developed by technically competent persons, companies that are trained and tested to the Ministry of Environment. Choosing the right software depends on the type of industry and the environment in which they are located.
- Switzerland: A federal and cantonal database, and a cantonal cartographic GIS server and also a GIS risk mapping calculation and visualization tool.
- United Kingdom: HSE has developed a 3-zone mapping process around COMAH sites which guides to the risk-based approach to land use planning around such sites are and will also take into account possible domino effects.

**Question 5: Please describe any specific requirements or recommendations in your country applied to industrial parks in relation to Seveso implementation.**

**For example:**

- **What (if any) risk management information are Seveso sites in the same industrial park required or recommended to share or co-ordinate (e.g., safety report, safety management systems, internal emergency plan, risk assessment, emergency communication system, etc.)?**
- **What additional information (if any) is required or recommended to be included in the safety report of Seveso sites in industrial parks (e.g., for domino effects)?**

Since almost all the participating countries responded to the two sub questions, their answers have been grouped accordingly.

### **Sub question 1**

When asked what risk management information Seveso sites in the same industrial park were required or recommended to share or co-ordinate, the following answers were received:

- One country answered that establishments were required to share/co-ordinate all listed items – that is, safety report, safety management systems, internal emergency plan, risk assessment and emergency communication system.
- In another country, this same list of items, adding industrial park emergency plans, was recommended for co-ordination, and co-ordination is required if the sites in question are domino plants.
- In a third country industrial plants in industrial parks are also obliged to have joint emergency services.
- Another country indicated that industrial park operators could identify a unique subject (generally the main company) to whom they officially entrust utilities management or operating services such as emergency and/or waste management.
- One country has a Fire Protection Act that recommends that operators that share a building or working area, or work in the industrial parks, should make a contract describing their common duties relative to fire protection obliga-

tions. All operators that use the same evacuation directions in one location are obliged to communicate their evacuation plans (Law on safety at work).

Several countries mentioned domino effects in their answers to this sub question.

- In one country the labor legislation makes it mandatory for companies with more than 50 people to have a council with representatives from company leaders and trade unions in order to discuss health and safety issues. In an industrial park with domino effects, it is mandatory to have at least one common meeting of these councils for all companies in the industrial park.
- Another country said that sites that are part of a domino group, designated by the competent authority, should confirm as to whether there has been information exchange between the operator and other operators in the domino group.
- A country answered that the Seveso establishments are required to share the analysis of potential domino effects and to include other establishments' relevant risks in their own risk analysis. Operators of Seveso establishments are required to consider possible domino effects in their work with safety aspects. They shall investigate the impact of the site on its surroundings as well as the possible impact of the surroundings on their site. They do this by communicating with other establishments. The establishments are obliged to report the possible domino effects to the authorities in their notification or safety report.
- One country indicated that there is a focus on the establishments' obligation to inform the authorities. Operators of COMAH sites are required to provide sufficient information to the EPA to enable them to draw up an appropriate off-site emergency plan. The Competent Authority is required to notify the operator of each establishment within the Domino group of the names and addresses of other such establishments within the same group. The responsibility is then on operators to determine and then take account of the increase in overall hazard and review whether they have taken all measures necessary to limit the consequences of major accidents for their site.
- One country simply referred to the Seveso II Directive and its requirements for information exchange between establishments and co-operation in informing the public and supplying information to the competent authority.

## Sub question 2

In terms of what additional information is required or recommended to be

included in the safety report of Seveso sites in industrial parks, most of the participating countries focused on domino effects. In the safety report, they mentioned the obligation of Seveso sites in industrial parks to report domino effects in their safety reports, and to give statements on how to handle them. The operators must take into account what kind of consequences an accident at a neighbouring site could have to them, and the consequences an accident at their own plant could have to their neighbours. Another country emphasised that only Seveso sites that were close to each other were asked to add a description of the risks of mutual domino effects in the safety reports.

In another country the Seveso operators should provide data for the register of companies and their installations which may cause domino effects. This register is intended to contain the information from the safety reports of the operators concerning the company and installations. The Ministry of Environment must notify the operators of installations in the impact area with a potential or heightened risk of domino effect.

One country answered that a risk evaluation associated with interconnecting activities should be included in the safety report.

### **Question 6: What do you need in order to work better with questions related to industrial parks and domino effects?**

The participants' answers have been summarised below.

Several participants mentioned the need for:

- Checklists: official checklists, specific for carrying out inspections in industrial parks.
- Guidelines: (better) guidelines about the practice in industrial parks.
- A clear definition of an industrial park.
- More precise legislation and clear legal requirements that can be enforced.
- Ways to deal with the problems related to non-Seveso sites.
- To evaluate and control industrial parks as a whole. Joint safety reports and common security documentation from the companies.

Single participants also expressed a need for:

- Training in the inspection of industrial parks.
- A clear understanding of the nature of the Major Accident Hazard scenarios that might have domino implications.

- More specific tools for the Seveso inspector.
- Overcoming the barrier that operators are often unwilling to share important information on the grounds of commercial confidentiality and security, so that there can be a free and open exchange of important information.

### **Question 7: What do you consider to be the greatest challenges in your country when it comes to following up industrial parks and/or domino effects?**

When the participants were asked about the greatest challenges in following up industrial parks and domino effects, only one of them reported that "at present there would appear to be no major challenges". The rest gave a list of challenges that have been summarised as grouped below.

The greatest challenges to following up on industrial parks and/or domino effects were noted as follows:

- Legal issues
  - To define the responsible legal person.
  - The interpretation of the legislation: "how far can we go..."
  - The legislation does not open the industrial park for monitoring and evaluating as a whole, or for demanding a joint risk assessment for the whole park.
  - That there is no difference between an industrial park and a lone-standing Seveso plant.
  - Legal issues related to the fact that some establishments in the industrial park are Seveso and others non-Seveso.
- Co-ordination of and co-operation between authorities
  - To co-ordinate and achieve close co-operation between all competent authorities.
  - Co-operation between the local and the national level.
  - To have a good link with land-use planners and with the authority in charge of giving permits in industrial parks.
- Communication and co-operation between operators
  - To achieve a mutual, open, continuous exchange of information between the operators of all necessary or wanted information about risks, emergency planning etc.
  - To have the operators co-operate on accident prevention and conse-



- quence limitation.
  - The question of shared liability and responsibility and how the costs should be shared between the companies.
  - Overcoming the issues of commercial confidentiality and security.
- The splitting up of companies
  - The evaluation of the hazard of sites which previously belonged to one company, that have now been split up and are being operated with different safety philosophies.
  - Big industrial complexes, previously considered to be a single Seveso site, are being split up and sold or operated by other operators, and the distinction between the Seveso operator and the other operators/employers becomes an issue.
- Domino effects
  - To be sure that all domino effects have been identified and the information shared between operators.
  - Assessing the worst case scenario of a domino event.
  - Lack of risk management experience in the national directorate when it comes to Seveso II and domino effects.
- Emergency plans
- Keeping emergency plans up to that, especially those parts involving different sites.
- Assessing the external emergency plan.
- Other
  - To get good data quality.
  - Lack of time and resources.

**Question 8: Can you give examples of relevant accidents and incidents in industrial parks and domino establishments that had an impact on neighbouring establishments?**

If you know, please indicate if the accident met the Seveso Annex VI criteria.

The following accidents/incidents were reported by the participants:

- A near miss in Aarhus in 2008, when there was a fire in palm oil just beside an upper-tier establishment . (It contained a storage of formalin and methanol).

- The explosion of an oxygen tank belonging to one Seveso company caused a lot of damage to the other surrounding the first. The explosion was caused by a change in material of the tank which did not resist the pressure swings as well as before.
- In 2001, there was an explosion in a fertilizer plant in Toulouse when a large amount of ammonium nitrate residue detonated, causing devastating effects at the site and beyond. 30 people were killed, thousands were hospitalised, and there was enormous material damage. No notable domino effect occurred.
- In 2006 a pool fire located in a pipe rack in the Priolo industrial area involved pipelines in charge to different operators and caused, in addition to injuries and high media impact, the fire fighting water line to be out of use.
- The major explosion at the Buncefield fuel storage terminal in Hertfordshire in 2005.
- In 2008, a power failure in a Belgian refinery led to the downfall of the flare. Because of this downfall, little drops of hydrocarbons came out of the flare, and a hydrocarbon film was spread out in the surrounding area. One employee in a neighbouring site was sent to the hospital with respiratory problems. Two days later, an employee of a third site was seriously burnt on his arm by a (small) jet fire, while he was replacing a gas bottle of oxygen. The jet fire was caused by a hydrocarbon deposit on the gas bottle (probably coming from the refinery two days earlier), in combination with a little amount of the oxidizing oxygen that was still in the bottle.

### 3.4 Conclusions from the surveys

The survey results indicated that several countries had invested time and effort on refining practices and yet still had many questions about what strategies and techniques would be most effective in enforcing the Directive in industrial parks and for promoting prevention and emergency preparation in regard to domino effects. In particular, the results of the first survey of inspection authorities confirmed that there could be substantial benefits in organising an MJV workshop with the objective of eventually publishing an expert report on this topic. The second survey clarified additional questions, particular on specific tools and legal instruments for inspectors, many of which were a follow-up to the first survey.

### 3.4.1 Industrial parks

#### Identification of industrial parks establishments

From the surveys it appears that the countries' knowledge of their industrial parks can be improved. Most of the countries have identified their domino establishments, but 25% of the respondents did not have any or did not reply to the question. In addition, it appears that many countries have a large number of industrial parks with a mixture of Seveso and non-Seveso sites. These numbers demonstrate how important it is to have a focus on industrial parks that is broader than just Seveso.

#### Legal instruments

The answers to questions about legal instruments that provide support to inspection and oversight of Seveso implementation in industrial parks, indicate that most participants have few such legal instruments. In the vast majority of the participating countries, there is not a legal definition of industrial parks; the legislation does not require that there be a legal entity responsible for operating the industrial park; and operators of Seveso sites are not legally required to make a contract with the operator of the industrial park regarding emergency related tasks. Only two countries could provide legal definitions of industrial parks.

#### Joint documentation

The participants were asked several questions about joint documentation. In most countries, the individual operator is obligated to prepare the safety report. However, in some countries, different practical approaches have been tried where it has been reasonable to accept a joint report. In only a few countries is it mandatory to have a joint emergency plan. It is therefore important that the external emergency plans deal with the whole of the industrial park in a good way. Likewise, only a few countries demand that the establishments co-operate about a joint internal emergency response organisation. Only two countries require the operators in industrial parks to do a joint risk assessment. This means that in most countries, the total risk of an industrial park is not usually identified. The practice differs as to whether a joint analysis of domino effects is required. In 8 countries, the operators always or sometimes have to make a joint analysis of domino effects, while 9 countries do not have such a requirement. It is also clear that few authorities perform inspections targeted at the total safety level in the industrial park.

### **Inspection of total site safety**

Not many countries inspect industrial parks as a whole. The inspections are performed at Seveso establishments located within the park. Few countries have national regulations specifically for industrial parks, there are not many guidelines as to how to assess that safety level in such areas is adequate. Italy and Germany have developed guidelines that may contribute to establishing best practice in these matters. Only a few countries have specific checklists targeting industrial park inspections.

## **3.4.2 Domino effects establishments**

### **Monitoring domino effect establishments**

Respondents were asked to describe how they follow groups of possible domino establishments. Most authorities identify domino effect establishments through the evaluation of safety reports, through site inspections, use of digital maps and notifications from the establishments. On the question of communication with establishments regarding this subject, respondents emphasised that the Seveso establishments are informed in writing by the competent authority about their duties, and expect that the establishment will report back to them and to local authorities about possible domino effects – and to one another. Special inspection practices differ between countries. In some, domino effects is a specific item during inspections, while in others, the inspection authorities are not involved in the domino aspect of the Seveso Directive at all.

### **Inspection of non-Seveso domino effect establishments**

The countries that have industrial parks with a mixture of Seveso II establishments and establishments not covered by the Seveso II Directive, were split quite evenly into those who evaluate the possibility of “quasi domino effects” between the Seveso II and the non-Seveso establishments, and those who do not. At least one country included the inspection of neighbouring Seveso II establishments in cases where mitigation or emergency preparedness for domino effects might be necessary. Participants in the workshop recognised this option could give inspectors a distinct advantage in effectively addressing domino effect concerns.

However, in the vast majority of the countries the legal framework or current practice do not support this kind of intervention on non-Seveso sites. In these countries non-Seveso establishments are not in any way included in the inspections of neighbouring Seveso II establishments. When asked to describe any

other measures taken in order to ensure that authorities have the full picture of the overall risk in an industrial park where there are both Seveso and non-Seveso establishments, respondents mentioned the importance of dialogue between the competent authorities, joint inspections and getting information about the risks of non-Seveso establishments by using environmental, work environmental and civil protection laws.

### **3.4.3 Tools for inspecting industrial parks/assessing domino effects- Checklists for industrial parks/domino effects inspections**

The vast majority of the countries have not established specific checklists on the theme of domino effects to be used in inspections. Norway, Italy, a Swedish region and a Dutch region answered yes to this question. The checklists of each of these countries can be provided, but need translation. Italy qualified its response indicating that, while there is no specific checklist for industrial parks, the SMS checklist offers the opportunity to highlight safety management critical factors associated with industrial parks such as common services, inter-connections, joint internal emergency planning, joint training exercises, joint maintenance services, domino effects, etc.

The greatest challenges pointed out by the countries when it comes to the follow-up of industrial parks and/or domino effects, are the need for more resources, knowledge and expertise; a lack of joint risk analysis and joint incident control plans for whole industrial parks; communication and interaction challenges; the need for criteria for the identification of possible domino establishments; several challenges regarding inspections; the splitting up of sites from one to multiple owners and keeping track of changes in owner relationships; responsibility issues and challenges related to emergency organisations and the need for joint fire brigades. Several countries mentioned the same needs and challenges. Another important aspect mentioned was that the inspection of domino establishments needs to be developed, for example by developing domino checklists further.

Many of the participating countries do not have any specific tools (guidelines, checklists, models, software) that they use for inspecting industrial parks and/or assessing domino effects. Several of them have general checklists or question lists.

### **Suggestions to improve industrial park/domino effect inspections**

The participants were asked about what they need in order to work better with questions related to industrial parks and domino effects, and their answers centered on the same issues. They need official checklists (specific for

inspections in industrial parks); a clear definition of an industrial park; (better) guidelines; more precise legislation and clear legal requirements that can be enforced; ways to deal with the problems related to non-Seveso sites; and tools to evaluate and control industrial parks as a whole.

### **Greatest challenges**

Likewise, when the participants were asked what they consider to be the greatest challenges in their countries when it comes to following up industrial parks and/or domino effects, they mentioned many of the same challenges. These were related to legal issues, co-ordination and co-operation between authorities, communication and co-operation between operators, the splitting up of companies, domino effects and emergency plans.



## 4. The MJV Workshop

### 4.1 Summary of workshop presentations

The workshop consisted of several blocks of presentations followed by break-out sessions in which groups of participants discussed specific topics in a small group as described in Chapter 2.0. The presentations consisted of different experiences from both an industry and different country experiences with control of major hazards involving industrial parks and domino effects. They are described below.

#### 4.1.1 Introduction to the topic – conclusions from the EPSC-report on Industrial Parks

A representative of the European Process Safety Centre (EPSC) gave a presentation describing EPSC's work perception concerning challenges associated with control of major hazards in industrial parks.

According to a recently published EPSC report, industrial parks were formed around 1990 out of previous large single site chemical processing operations as a way of optimizing the flows of energy, utilities and chemical substances. Following structural changes in the entire chemical industry, pieces of these sites were eventually sold to create multi-operator sites, but tied to the chemical-processing sector. As a result, business operations on these sites were subsequently owned and operated separately from their infrastructure elements.

The presentation highlighted particular challenges, especially:

- The problem of finding a workable legal definition of the term “industrial park”. According to the EPSC report, a legally unambiguous definition has not been found and could be counterproductive by impeding the economic processes.
- The role of infrastructure companies on site which fill the space between park manager and one of the service providers. For example, an infrastructure facility may
  - be operated by a “major user” (one of the companies on the site) or independently
  - have different ranges of services, involvement, and governance structure
  - substitute the former “works management” of the single operator



- be the owner of the site
- legally be considered a “third party” in relation to Seveso establishments on site and with legal responsibility only for its own operations with the same legal status as any contractor especially regarding liability for accidents.

It was noted that strong infrastructure companies may follow best practices for risk management, but on a voluntary basis, since compliance with the Seveso II Directive of non-Seveso operators cannot be enforced by authorities.

Therefore, this new separation of site responsibilities between different operators as well as infrastructure companies leads to the following questions:

- Who takes care of the aggregated risk of the site?
- Who will be addressed by the authorities (who is the operator)?
- How can “best practices” from single user sites be adapted to a completely different economic and legal environment?

As significant as the legal changes are, there are in comparison far fewer changes in day-to-day operations from the time of single-operator sites. The main difference is legal, since in most European countries operational control defines legal responsibility. The concept of group responsibility is not legally enforceable in most cases without specific provisions and even close co-operation does not create joint responsibility. It should also be noted that stakeholders (inside and outside the Park) may not be aware of changes in legal responsibilities for risk management on the site and how these could affect them.

Moreover, it was noted in the presentation that neighbours are generally the protection target of many regulations. However, the regulations usually assume that neighbours are outside the fenceline (“external neighbours”) and that workers of neighbouring installations on the same site are protected by occupational safety and health regulations.

Yet, given the existence of multi-operator industrial parks, different companies may also now be regarded as neighbours as well (“internal neighbours”). This new definition of “off-site” consequences creates some potentially new challenges. For example, the risks associated with hazardous substances, noise levels, etc. that were previously acceptable (when the site hosted only one company) now may be exceeding legally acceptable levels for off-site impacts. Moreover, agreements between companies in the industrial park may not waive the right for an impaired health of individual employees and authorities may be forced to act following complaints. On the other hand, enforcement of safety and health buffer zones may jeopardize the viability of the park as a host site for chemical processing companies.

One common sense solution could be to promote co-operation within industrial parks on common services in particular with respect to safety and emergency management. Authorities would view the industrial park as one site in terms of safety and emergency management including in terms of off-site consequences. However, it is likely that the regulatory framework would have to change in many countries in order to support this solution.

The EPSC presentation then discussed challenges for control of major hazards in industrial parks associated with individual components of risk management, as follows:

Safety Management System (SMS). There is an intrinsic conflict between the interests of global companies and the industrial parks that house parts of their operations. Global companies strive for uniform SMS, but with multiple companies on site, each with their own version of the SMS, handed down from the multinational owner, it is difficult to obtain similar or compatible SMS throughout operations within the park.

Moreover, the elements of the SMS require different level solutions, that is, global vs. local, in particular:

- Organisation and personnel - company specific
- Planning for emergencies - site specific
- Hazardous works regulations, personal protective equipment - site specific
- Management of change – compatible across the site

The different stakeholders in industrial parks (operators, infrastructure companies, contractors, authorities) at least have to know and understand the differences between each of the systems implemented by the different operators. Important in this aspect is:

- Process safety. Process safety management is strongly based on company culture and therefore, different approaches in industrial parks have to be accepted. More problematic are operators with low performance in this area. The reputation of the industrial park is influenced by the lowest performers. This challenge suggests that exchange of information and approaches between operators (beyond the minimum obligation in regard to domino effect) is a chance to improve overall process safety performance and for a cross-fertilization of the companies beyond their individual site limits.
- Emergency management. A basic obligation of the individual operators should be to co-operate intensely with other operators, not only for “domino establishments”. According to EPSC, operation of a joint emergency service between operators, mostly provided by the infrastructure company,

should be considered best practice in this regard.

- Inspections (art. 16). Although the individual operator is the subject of an inspection, the inspector should take account of the specific issues associated with Industrial Parks, including
  - Contractual agreements for joint services
  - Interfaces between operators and providers of joint services (mostly the infrastructure company)
  - The control of the industrial park's overall risk by the emergency management service

In conclusion, the presentation noted that Seveso II did not foresee the multi-operator structure of Industrial Parks, although it takes into account the aggregated risk of sites. As such, the legal focus of Seveso enforcement remains on the responsibilities of the individual operators. Nonetheless, the accumulated risk of these sites should and can be controlled by co-operation of the individual operators.

Moreover, a common infrastructure company for the site would be EPSC's first choice as a best practice. This arrangement enables industrial parks to be managed based on contractual agreements (civil law) rather than regulations (public law). The main tool of authorities to control Industrial Parks beyond the duties of individual operators is inspections.

#### **4.1.2 Introduction to industries' experience – Challenges in running an industrial park**

Mr. Sverre O. Lie from Hydro, Herøya Industrial Park (HIP) in Norway, described challenges encountered by HIP in running an industrial park. Herøya industrial park used to be a single owner site, owned by Norsk Hydro. During the last 15 years, all plants within the industrial park have been sold out and Norsk Hydro has ended up as a pure infrastructure company, delivering utilities, emergency response etc.

Mr. Lie cited the following lessons and recommendations learned from this experience:

- The proprietor should establish a high HES standard.
- Land lease agreements should include safety, health and environmental requirements and a sustainable profile agreement.
- Parks with more than one operator should be organised jointly.
- In parks with more than one Seveso II operator co-operation should be enforced.

- One operator should be appointed to co-ordinate joint HSE related activities within the park.
- Risk analysis should be regularly prepared or revised for the park by an independent 3rd party company.

#### 4.1.3 Accidents related to industrial parks and domino effects

##### **Germany – 2008 blaze at an ethylene pipeline and a nearby acrylonitrile tank**

A representative from German authorities gave a presentation on an accident that happened in Cologne, at a petrochemical plant in an industrial area with many chemical companies. At the blocking station of an international ethylene pipeline, where the pipeline goes from sub-surface to the surface, a leakage at an insulating flange occurred. The ethylene ignited a few minutes later. The fire brigade struggled to get the fire and leakage under control, and the fire spread from the pipeline to the top of an acrylonitrile tank located 10 m from the pipeline. The tank burned down to the acrylonitrile liquid level. The fire brigade managed to extinguish the tank fire about 8.5 hours after the first flames formed on top of the roof. The ethylene flame had extinguished 5 hours after the ignition. The damages from this accident were the destroyed pipeline bypass and the destroyed tank. There were no other serious injuries. The inhabitants of the nearby districts of Cologne had been warned to stay inside to avoid acrylonitrile exposure from the smoke.

With reference to the theme of the MJV, the following is important to take note of.

Consequences for Seveso sites located in the vicinity of pipelines:

- Pipelines in the vicinity of Seveso sites have to be considered as a possible hazard, and the risk assessments have to be adapted accordingly.
- Exchange of safety relevant information between operators of pipelines and Seveso sites is necessary.
- Vulnerable installations must have an adequate distance. In the case of short distances between pipelines and tanks, additional requirements on removable connections and fittings of pipelines are necessary. For example, a reduction of the amount of flange connections and fittings, fire proof construction of such components, replacement of flange connections by maintenance-free welded insulating connectors.

Measures taken by the Cologne District Government:

- Registration of pipelines in the vicinity of Seveso sites.
- Registration of the technical construction of the pipelines.
- Registration of the distances between pipelines and safety relevant installations of Seveso sites.
- Evaluation as to whether the pipeline is considered as a source of environmental danger in the risk assessment.
- Documentation of the risk assessment in the safety report.
- Specification and enforcement of the necessary measures.

### **Denmark – 2008 accident in the industrial park located in the harbour of Århus**

Representatives from Danish authorities presented an accident that happened in an industrial park in the harbour of Århus, Denmark. The fire started in a vegetable oil spill at a non-Seveso establishment which spread to nearby tanks with methanol at an upper-tier Seveso establishment.

The fire started in a bund with four tanks containing a total of 37.000 m<sup>3</sup> of vegetable oil. One of the tanks leaked some of its content into the bund, and the insulation around the defective tank was soaked in oil. Solar exposure and heating pipes in the insulation layer caused auto-ignition of the oil. The result was fire in the oil spill in the bund and oil fume explosions.

It took the fire brigade 4 hours to get the situation under control. Cooling of nearby tanks was difficult. The integrity of the methanol tanks was not affected.

The accident resulted in:

- Complaints on political level (legislation was not sufficient to deal with domino effects between non-Seveso and Seveso establishments).
- The identification of the need for new guidelines for industrial parks on planning, emergency preparedness and environment. This work is ongoing.

### **The Buncefield accident**

This theme was presented by a representative from the Health and Safety Executive (HSE) of the United Kingdom (UK).

The Buncefield oil storage terminal was strategically placed close to London. It was connected to a pipeline net work, and was supplying road fuels and aviation fuel to Heathrow and Gatwick airports. There were three operators at the

site: Hertfordshire Oil Storage Ltd (HOSL), British Pipeline Agency Ltd (BPA) and BP Oil UK Ltd. They had the consent to store approximately 195,000 tonnes of fuel. The depot received the product by pipeline from three refineries. The site was subject to the EU Major Accident Hazards Legislation (Seveso II), in addition to other health, safety and environmental legislation.

In December 2005, there were several explosions followed by fires in the terminal. It was the biggest accident of its kind since World War II. It took three days to put the fires out. Fire crews from across the UK were helping. 22 tanks were engulfed in fire, most of the installations owned by HOSL and BPA were destroyed. There was extensive damage on and off the site, up to 2 km away. The accident caused no fatalities, but 40+ minor injuries were registered, none of them serious.

The greatest environmental effects came from the use of fire water (water, foam), of which 40,000 tonnes were used on the fire. Though 12,000 tonnes of fire water were removed from the site to be treated at a local sewage treatment facility, 1000 tonnes flowed into the ground, resulting in contamination of the ground water as far as 3 kilometers from the site of the accident. In March 2006, Buncefield was reported to the European Commission as a major accident to the environment because of serious damage to more than 1 hectare of groundwater. The contamination of drinking water was, however, thought to be unlikely to cause health problems.

The economic damages were severe. On the plant itself, there were damages estimated at up to 1 billion euros. 76 % of the surrounding households had experienced some damage, and 92 firms at a business park close by were directly affected by the explosion. The incident cost firms more than 70 million pounds.

#### 4.1.4 The Chemelot case

**Information on Chemelot was given by a representative from Dutch authorities.**

Chemelot was originally an area owned by the Dutch state mines, who did mining activities there from 1902-1975. Among the by-products of these activities were ammonia, and later, fertilizer production was established. During the war, several industrial chemicals were produced at the site: caprolactam, acids, urea. Over time, Chemelot developed into becoming more of a chemical park. In the 1970s, the production of petrochemicals and plastics (HD/LD, polyprop) started.

In 1985, there were 5 dominating clusters at Chemelot:

- Polymer Intermediates, (caprolactam/nylon, ACN)
- Base Chemicals and Materials, (agro, melamine, energy)
- Performance Materials, (engineering plastics, Dyneema ®)
- Nutrition (vitamins, supplements),
- Pharmaceutical (antibiotics etc.)

During the 1990s, there was outsourcing of “no core” business like energy and logistics. A new range of special plants were also established (life science products, engineering plastics, high performance materials, fine chemicals etc.).

The presentation focused on inspection practices in general regarding composition of inspection teams and input to long-term inspection planning. Furthermore, it was described how an inspection tool is used in order to determine inspection days on site. Important input in this connection is

- Plant sections (logical divided)
- Potential dangerous activities (batch, under pressure, chemical/physical, human activities), ranking
- Used substances (toxic, flammable, environmental)
- Surroundings (domino, public buildings/area in 10E-8)
- Quality/performance regarding specific elements in the safety management system

Authorities' practices regarding joint safety reports, joint emergency planning and joint risk assessments at Chemelot is as follows.

- Joint safety report
  - One license for the complete site, one public safety report
  - Confidential safety report per plant or clustered plants
  - Different safety management system (SMS) per site-user possible
- Joint emergency planning and preparedness
  - Compulsory emergency organisation, enforced by law
  - Training, material, responding time and approaches predetermined, site-wide emergency plan
  - One emergency organisation, all users participate
  - Competence requirement for team members
- Joint risk assessment for domino plants, two defined on Chemelot as result of one permit and one neighbour

#### **4.1.5 Germany - Practical handling of domino effects in Schleswig-Holstein**

A presentation on the Schleswig-Holstein practice of handling domino effects was given by a representative from German authorities.

The presentation focused on the handling of domino effects in Germany:

- donator-acceptor relation;
- identification of the major hazards scenarios;(e.g.from safety report)
- results of investigations and practical consequences in reference to hazard prevention;
- communication of the results and experience at the identified sites.

The presentation focused on the handling of domino effects in Germany; donator-acceptor relation; identification of the major hazards scenarios; results of investigations and practical consequences in reference to hazard prevention; communication of the results and practical experience of particular sites.

The competent authority has to review the operator's risk analysis to check for the possibility of a domino effect and to make sure that the company will take measures according to Article 8 in the Seveso II Directive should domino effects be foreseen.

A German expert body also has provided recommendations regarding minimum distances (200/500m) and the estimation and handling of domino effects for sites with multiple upper/lower tier establishments.

The presentation described the Schleswig-Holstein procedure of determining domino effects:

- Generate a list of all sites and neighbourhood areas which may be affected by an accident.
- Generate a list of identified major hazards.
- Point out the relations of the donator/acceptor sites.
- Evaluation of the results and necessary measures for the sites.

Furthermore, the presentation went into detail concerning how the domino effect determination process is performed, and the content of the resulting domino effect legal statement given to the establishments from the authorities.

Lastly, the presentation gave recommendations for inspections concerning domino effects:

- It is important to check the documentation and periodic testing systems in



the control room.

- During interviews with management, check whether they have enough information about the hazard of the neighbour sites.
- Ask questions about the testing of the alarm plans and the co-operation with the neighbour sites.
- Look at the documentation from the communication meetings in the park.

## 4.2 Results from MJV working group discussions

A main focus of the MJV was to activate the participants in working group discussions. The information from the three workshops is summarized below. The answers represent the feedback from the group discussions. For the sake of order, it needs to be pointed out that not all questions were discussed by all groups. For this reason, the conclusions will not reflect the practices in all the countries that participated in the MJV.

### 4.2.1 Workshop Part 1: Legal issues and organisation of industrial parks

The purpose of this session was to solicit perspectives from participants on legal and organisation aspects of industrial parks. Participants were expected to identify challenges and opportunities in regard to enforcement of Seveso implementation on industrial parks. Moreover, participants were also to provide insights on the influence of various requirements and practices associated with the legal and organisational status of industrial parks.

This topic was considered to be somewhat broad with several interesting dimensions. Therefore, it was broken into four parts as follows:

- Legal issues
- Involving non-Seveso establishments in the enforcement of Seveso II
- Different ways of organising (or managing) common services in an industrial park
- Co-operation between establishments

The questions for each of these subtopics that were prepared by the Technical Advisory Team are contained in Annex E.

The section below summarises the most notable conclusions and observations from these discussions and refers to survey responses and other references as necessary to support particular points.

#### **4.2.2 Workshop Part 2: Inspection practices and tools for inspections**

In this session, the participants were to provide insights on Seveso inspection practices in industrial parks, and tools needed for these. Practices and needs associated with inspections of domino establishments were given special focus.

The topic was divided into two parts:

- Inspection practices in an industrial park
- Inspection practices regarding domino establishments.

The questions for each of these subtopics that were prepared by the Technical Advisory Team are contained in Annex E.

The section below summarises the outcomes of the group discussions.

#### **4.2.3 Workshop Part 3: Practices regarding joint documentation from industrial parks and authorities' co-operation**

In the third and final workshop session, the participants answered questions about practices regarding joint documentation from industrial parks and co-operation between authorities. They were to give an overview of the practices, needs and tool associated with joint emergency plans, joint risk assessments and joint safety reports for Seveso establishments in industrial parks. Also, they were to identify co-operation practices between inspection authorities regarding the enforcement of Seveso obligations.

The topic was broken into four parts:

- Joint emergency planning/preparedness.
- Joint risk assessment/risk assessment, domino effects and land-use planning.
- Joint safety reports.
- Co-operation between authorities regarding industrial parks and domino establishments.

The questions for each of these subtopics that were prepared by the Technical Advisory Team are contained in Annex E.

In the section below, the outcomes of the group discussions on these topics are summarized.

## 4.3 Overall summary of outcomes of workshop discussions

### 4.3.1 Legal issues and co-ordination between establishments

#### Legal definition of industrial parks

As confirmed by the participants' survey, most countries do not have a legal definition of industrial parks. Participants questioned for the most part whether such a definition was not only necessary but possible. The diversity in composition and characteristics of industrial parks does not lend itself easily to one common definition. In particular, it was noted that it was difficult to provide a common legal definition that would both include industrial parks with a distinct identity as industrial parks versus zones containing a heavy concentration of industrial and commercial establishments but not labelled as "industrial parks" as such.

For this reason most countries took a pragmatic approach in defining which groups of establishments shared risks or responsibilities associated with major accident hazards and Seveso implementation and as much as legally and practically possible addresses these issues in enforcement. When a concentrated industrial zone was not clearly self-identified as an "industrial park", informal criteria such as number and proximity of establishments, potential for domino effects, etc. were applied to determine whether the issue of joint safety responsibilities should be addressed.

A few countries did apply a legal definition. One country has a legal definition in a Governmental Ordinance on the establishment and operation of industrial parks. The legislation does not impose requirements for a joint risk management (e.g., joint risk analysis, joint risk assessment/risk assessment domino effects, joint emergency planning). The ordinance requires industrial parks to have a contract appointing an administrator and a legally responsible party for common services. However, these provisions cannot be enforced in heavily industrialized zones that are not designated as industrial parks.

#### Specific regulations for Seveso enforcement of industrial parks

This area of discussion was intended to solicit information on whether Seveso enforcement in industrial parks required or could benefit from additional legal provisions or permissions specific to industrial parks. For example, do some countries have regulations that allow them to review contracts between neighbouring establishments (e.g., on common safety or emergency response services)? Is it necessary for the regulations to distinguish between neighbouring establishments that are internal to the park or industrial zone as opposed to

those neighbours that are external to the park or industrial zone?

Most countries indicated that such regulations were not considered necessary and could result in overburdening the enforcement process or even conversely, limiting the flexibility of the enforcement process. Most countries did not need new regulations to look into contracts and generally explore the effectiveness of common services.

A number of countries indicated that there are special requirements that must be respected in establishing co-operation between companies. Moreover, environmental, health and safety regulations give wide formal powers to the authorities to review co-operation arrangements that affect compliance with these regulations.

One country was noted as a special case in which there is no differentiation between internal and external neighbours and therefore, this concept is not relevant to the authorities' right to inspect and verify compliance. Moreover, if there is a risk extending beyond the enterprise boundaries, any neighbours affected by potential consequences must be notified.

### **When one Seveso site becomes many sites**

When most large Seveso sites are divided into several smaller sites, most of the new establishments are also Seveso sites or regulated under environmental law. Therefore, in these cases, the authorities will generally have an opportunity from the beginning to introduce some risk controls on the new sites from their beginning. Some examples noted by the groups include:

- The legislation establishes strict requirements for co-operation between companies operating on the same site.
- To obtain new operating permits for the new entities, some countries require submission of safety reports and impact assessments. In one country requirements may also be stipulated for those entities which are not Seveso if they are unacceptably exposed or represent a risk in themselves.
- A new operator taking over an existing operation must demonstrate having the necessary technical and economic knowledge to comply with all pertinent regulations.
- The site continues to have only one license holder for the site (an umbrella company) this is no problem and the license holder is considered the legally responsible entity for the site.

### **Promoting a risk management strategy that goes beyond the fenceline**

Most participants indicated that they had limited ability to recognise the need for or to enforce a strategy that emphasised reduction of potential risks also to neighbours. In particular, most countries lacked adequate regulation and/or resources. Moreover, it was noted that risk based prioritisation of inspections results in a focus on Seveso plants more than on the (lower risk) neighbouring facilities. In many countries where the necessity could be foreseen, some requirements involving reducing risks to neighbours could be established in new permits or licenses considered in connection with the commission of a new Seveso plants in an industrialised neighbourhood. Effects on neighbours might also be mentioned as elements in risk assessments or safety reports presented to inspecting authorities.

Of all the participating countries in the MJV, one country alone appeared to allow authorities to take action to compensate neighbours for risks associated with neighbouring Seveso plants. On occasion, neighbouring facilities that are incompatible with the risk may even be moved.

In general, however, it was acknowledged that in all countries identification of risks affecting non-Seveso neighbours is difficult. Even information exchange on potential risks is a challenge due to differences in technical knowledge and differences in business contexts and company culture.

### **Highest priority risk management for co-operation between companies**

Participants suggested the following topics as the highest priority for co-operation between Seveso and non-Seveso establishments in the area of risk management:

- Hazard identification
- Risk assessment
- Assessment of domino effects
- Management of changes that affect shared risks
- Emergency response planning
- Process shut-downs

The following approaches were specifically identified as potentially successful for encouraging co-operation in particular industrial areas with Seveso sites, sometimes individually but more often in combination:

- Joint meetings between operators, for example, open meetings between site operators (Seveso and non-Seveso), either initiated by authorities or

companies themselves. For example, the meeting can foster exchange of emergency or risk management plans between Seveso sites and common services. If Seveso operators are not prepared to initiate such meetings, the authorities can also arrange such meetings and through them encourage exchange of information between the operators. The meetings should not only result in information exchange but definition of clear responsibilities for different aspects of risk management.

- Moreover, participants placed particular emphasis on having regular meetings to foster ongoing communication and promote a common safety culture in the industrial zone and so that exchange of information becomes a routine activity.
- Checklists: Providing checklists for use by both Seveso and non-Seveso establishments on areas of co-operation that are developed together with authorities.
- Safety management systems: Comparison of the safety management systems in the two different categories of plants can help different operators understand and explore their differences. A few participants contended that all operators should generally have a safety management system, even if they are not Seveso sites. The complexity and burden of the SMS should be proportionate to site risks.
- Safety reports: Development and review of Seveso safety reports can also offer opportunities to encourage co-operation on risk management. For example, inspectors can insist on co-operation in development of safety reports between Seveso sites to make them more homogenous. The safety report must be considered a practical document for the company and therefore, it should be expected to address mitigation and response in regard to potential consequences that affect operators sharing their location.

The safety reports should be generally considered public documents and shared among operators on the site with the view to not only informing other operators but also soliciting improvements.

A few participants considered a common safety report for industrial parts to be a standard good practice. However, other participants were concerned that this would distance operators from ownership of the safety report. In addition, one country had a difficult situation with a common safety report. A large company split up and both “new” companies still kept the old safety report as a common safety report. Then the common safety report no longer reflected the realities. A good way of dealing with this could be to divide the safety report in two or three levels where the highest level is the common parts, and next level describes risk for each individual company.

- **Contracts:** Encouragement of the establishment of joint contracts or procedures that describe roles and obligations for the different parties in regard to different safety elements. To be effective, responsibilities and accountability of different parties for such responsibilities should be clearly defined. A lesson learned is that if it is not obvious who is responsible, contracts tend to be vague and responsibilities unclear.
- **Legal requirements for co-operation between companies:** Only one country mentioned that it has a model for legislation concerning co-operation between companies which is yet to be passed, but it is known and accepted. It comes under the Process Safety Act and covers environmental risks, and requires co-operation between the companies regarding certain elements connected to safety, for example, emergency planning and the issue of people entering the area. No documentation from the companies is required, but compliance is to be checked during inspections/ supervision.

### **Promoting co-operation between establishments (including both Seveso and non Seveso establishments)**

Promoting co-operation between establishments in industrial parks and zones was recognised as a particular challenge for Seveso inspectors. In general, most inspectors have a number of different techniques that can be used in this situation. Depending on the situation in particular Seveso sites or in the industrial area, some techniques may work better than others. If one approach fails, another technique may have better success. As a first step, an extensive inspection of the Seveso site(s) should be conducted in order to establish and confirm the need for co-operation between establishments to the operators in the industrial area. It was also observed that non-Seveso companies might be partly included in environmental inspections via the IPPC Directive<sup>1</sup>.

The participants listed the following measures that can be used to promote co-operation between establishments (including both Seveso and non Seveso establishments):

- Extensive inspections from authorities combined with information and inducement.
- Ask the establishments to co-operate regarding their safety reports, to make them more homogenous.

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<sup>1</sup> Directive 2008/1/EC of the European Parliament and of the Council of 15 January 2008 concerning integrated pollution prevention and control (Codified version)

- Checklists for use by both Seveso and non-Seveso establishments may be worked out in co-operation with authorities.
- Conferences or meetings where authorities and establishments meet and exchange information.
- Initiate and motivate to more co-operation and communication amongst establishments

#### **4.3.2 Joint risk assessment / risk assessment, domino effects and land-use planning**

##### **Identifying domino establishments**

In all countries, the authorities, not the operators, decide whether domino effects are possible, as required of them in the Seveso Directive. One country at first accepted the establishments' own conclusion regarding domino effects, but have since 2005 gone into discussions with operators in more detail. Safety reports from the establishments do in some countries decide whether or not there are possible domino effects, though it is not clear how this conclusion is communicated to the other non-Seveso establishments. In another country, this information is given to the other establishments by the fire brigade.

Possible domino effects are evaluated by some authorities as part of the safety reports, in other countries, it is a separate process. Both operators and authorities use experts to do calculations regarding domino effects; major operators often have expertise themselves. In some countries the register of Seveso sites may indicate which ones have potential domino effects.

##### **Assessment of the overall risk in industrial parks**

Most participants indicated that they do not demand an overall risk assessment for industrial parks by the Seveso operators nor is there a legal requirement. According to participants there is no specific approach or methodology applied for risk assessment of industrial parks or domino establishments. In many countries, the authorities assess risk in industrial parks by looking at all relevant safety reports. One participant also noted that this assessment can also be enhanced by using Geographic Information Systems (GIS).

##### **Domino effects in land-use planning**

Some participants simply said domino effects are not addressed in land-use



planning. In general many authorities have little control over the local permission processes leading to the location of new high risk plants, and this can result in new domino plants.

On the other hand, some practices in the direction of land-use planning were noted as follows:

- One country has started using cumulative risk as a criteria in land-use planning.
- In another, domino effects are being addressed in land-use planning in one municipality.
- For one country it was also indicated that if there is an increase of consequences due to domino effect, this may be taken into consideration in land-use planning.

### **Problems in addressing domino effects**

The participants identified various problems authorities encounter in trying to address domino effect as follows:

- Although the consequences for the establishment may be negligible, some establishments oppose being categorised as a “domino establishment” due to adverse publicity. One country specifically avoids the use of the term “domino effects”.
- There are no specific criteria for identifying domino effects. Although such criteria might be useful, many participants thought it was not feasible.
- Uncertainties about the risk assessment may also lead to a discussion on whether a site has possible domino effects or not.

### **Reducing the risk of domino effects**

The groups put together a short list of proposals for approaches on how to reduce the risk of domino effects:

- Good land-use planning.
- Stimulate relocation of the establishments.
- Increasing the relevant safety equipment.
- Authorities can ask operators to revise their risk assessment in order to identify risk reducing measures.

### **Tools to support inspections**

In terms of tools developed to support inspection of risk assessments, review of safety reports and evaluation of domino effects in industrial parks, participants mentioned checklists and expert advice, and said that guidelines for assessing Safety Reports are also used for industrial parks. Formal agreements between the competent authorities have been established in several countries regarding the co-ordination of inspections of Seveso activities. The results of experiences regarding co-ordinated inspections were reported as mixed.

### **4.3.3 Inspection practices for an industrial park**

#### **Seveso inspection strategies for inspection authorities**

Most countries inspect each operator separately. For example, one country inspects the umbrella company when there is one license holder; where there are several license holders, they are inspected individually. Another country mainly inspects the operators individually, but is in the process of inspecting a couple of industrial parks as a whole, to see how their co-operation functions. Others limit themselves to encouraging co-operation between establishments.

Another frequently mentioned issue is whether the inspections are joint or not. One country said that joint inspections may lead to diluted responsibility. Most of the countries seemed to favor well-prepared joint inspections. Three of the participating countries said that they are obliged by law to co-ordinate inspections.

Other inspection strategies mentioned were checklists regarding domino effects, and to arrange meetings after the inspections – charting the weak and strong points of the operator.

Practices diverged over whether or not non-Seveso establishments are inspected during an inspection in the industrial park. While one country indicated that the Seveso inspectors will not inspect non-Seveso establishments, another does not limit its inspections to Seveso II plants.

#### **Tools for inspections in industrial parks**

Several countries said that inspectors had guiding documents or checklists to assist them. One country mentioned a specific domino effect checklist. Another country works on the basis of its data base and a GIS prioritisation system. Others also mentioned a system of prioritisation of inspections.

Participants were also asked what sort of additional tools they would like to have, and the following items were identified:

- Dedicated checklists and guidelines for inspection of industrial parks.
- Joint international inspections with a discussion/learning process afterwards.
- Access to independent, competent management expertise.
- Power to serve an order to produce an improvement plan.

### **Inspection of common services necessary for Seveso II**

The countries were asked how authorities inspect services, necessary for implementation of Seveso II, that are common to all or some establishments in the industrial park. The service operator may not be covered by Seveso II. For example, do the authorities perform one overall inspection of services or an inspection of service for every establishment?

The participants answered that the service operator and the performance of the service delivered to the site is normally checked out during the inspection of the Seveso plant. Inspection of one operator indicates the standard of common service provided.

### **Inspection practices regarding contractors, infrastructure, co-operation contracts and technical equipment**

The participants had difficulty giving concrete examples of how authorities inspect the handling of contractors, when contractors are often hired by the non-Seveso service company. One country indicated that the responsibility rests with the operator. The country has a check list regarding procedures that the operator uses regarding service providers. Others mentioned that this is a challenge during inspections. Sometimes there are case by case solutions for individual sites.

On the question of how authorities inspect the common use of infrastructure (including fire brigade, factory security service, raw materials, process media and energy), some countries inspect the fire brigades to see if they have the resources required for response. In most countries these inspections of fire brigades will not be performed by the Seveso inspectors. Another participant stated that truck drivers must pass a test before entering an industrial park. One participant indicated that this can be addressed on a case by case basis with the site.

There was little discussion concerning how authorities check contracts/agreements for the co-operation between establishments (including both Seveso and non-Seveso establishments, and to what extent do authorities inspect contracts among the (non-) establishments and between the (non-) establishments and the service units of the sites. One participant said that in the inspections, the inspector may ask for confirming evidence, but complete contracts were not requested. Another said that they ask for the routines regarding co-operation.

On inspection of technical equipment, the participants noted the following practices:

- Doing site “walk-throughs”.
- Asking for inspection certificates from third parties.
- Asking for the implementation of the risk analysis.
- Requesting demonstrations of functionality.
- Looking at labelling.
- Sampling.
- Spot checks.
- Overall check of the site’s standard and orderliness.
- Looking at the general visual state of equipment and following spot check of inspection and maintenance status.
- For joint equipment – check out whether responsibilities are clearly defined and understood.

### **Tools for improving inspections and enforcement of emergency planning requirements**

It was mentioned that questionnaires could be helpful, and that the aim should be to develop an EU “best practice document”. It was also called for authorities to take part in the establishments’ internal inspections as a way of checking if it is functioning properly. When asked to describe any tools that currently exist within the authorities and how they are effective, a participant from Germany stated that their document SFK GS 45 represents good practice. The participants also mentioned that they all look at the internal reports from the companies’ exercises and do spot checks on the follow-up of improvement areas. Many of the countries say that legal instruments are in place and sufficient.

#### 4.3.4 Inspection practices for domino establishments

##### Inspection of the domino effect between domino establishments

The participants discussed how the domino effect between domino establishments is inspected, and to give examples of good practice. Their observations are summarized below:

- Important tools for planning and preparation
  - Use of safety reports.
  - A register of domino establishments is necessary.
  - Guidelines/checklists/question lists: One country has guidelines for inspections, including a checklist with specific questions regarding domino effects. Question lists or checklists were also mentioned by others as useful.
  - Setting good criteria for domino is important, and the criteria should be easy to communicate. One criterion can be distance between establishments. (Example given: 500 m upper tier/200 m lower tier.) Others criteria are also in use.
  - Use of electronic maps (like Google Earth).
- Co-ordinated inspections
  - Most countries co-ordinate inspections between authorities and also have joint inspections. Both joint and separate reports are used.
  - One country has co-ordinated planning and inspections of domino sites.
  - One participant says that all authorities meet to co-ordinate their checklists before inspections, and that this is useful.
- During inspections
  - Inspections based on specific scenarios. It is important to remember that open questions could lead to difficulties evaluating the answers.
  - Inspection of joint documents that are prepared.
  - Checking compliance with the demands of the directive (communication between the domino establishments, co-operation regarding emergency preparedness, joint communication with local authorities regarding external emergency plan).

### **Specific measures for domino effect sites**

The participants discussed which specific measures are applied to inspection and enforcement of sites associated with domino effects and whether authorities inspect with shorter intervals if possible domino effects are identified. Some countries said that domino sites should be inspected more often than non-domino sites. If the result of the inspection is negative, the inspection interval should be further reduced. In one country, a scoring system will decide if intervals should be changed (there are inspections at a minimum every 3 years). Other countries answered that the inspection frequency is not different when domino effects are identified.

### **Evaluating the internal siting of establishments**

From the discussion, it appears that in some countries, safety distances are defined in the legislation, and that during inspections they control the distances that have been defined in the permit. In other countries, the safety distances are inspected by the local fire brigade and not by the Seveso inspectors. In one country, safety distances are linked to the land use planning procedure (risk assessment process). And lastly it was pointed out that siting inside an industrial park should be evaluated in the same manner as siting of ordinary establishments.

### **Problems in trying to address domino effects**

The participants identified a number of problems that authorities encounter in trying to address domino effects, including how these can be resolved, as follows:

- Detailed evaluations of domino effects can be expensive. It needs to be clear who is paying for these evaluations.
- Sometimes establishments do not agree that they are domino, and this requires good documentation.
- Authorities cannot calculate the effects in detail, and not all authorities have enough information to conclude.
- There are great challenges regarding the inspection of Seveso and non-Seveso establishments, as you cannot decide that there is a risk of domino effects between these different types of establishments.

### **The effectiveness of current inspection approaches regarding domino establishments**

According to many participants, the current tools used by inspection authorities are considered adequate. The inspectors make plans for the Seveso inspections, and potential domino effects is one point among others. The performance of the operators can cause an increase or decrease in the frequency of inspections. For example, if there is an accident in an establishment, this can cause a change of inspection frequency.

In all countries, the inspectors study the safety reports, and seek information on surrounding establishments and environment. Another practice that has appeared to be effective, is the use of scenarios for the identification of domino effects. But, as for what improvements can be made, awareness is encouraged when it comes to the establishments' choice of scenarios.

### **Tools for evaluating domino effects**

In the final question of this section, the countries were asked what kind of tools might be useful to assist authorities in evaluating domino effects, and to describe any tools that have already been created by inspection authorities. It is clear that different countries have very different levels of approaches. While some feel there is no need for additional tools, others do. The following list of useful tools was compiled by the groups:

- Safety reports and risk assessment reports created by the operators.
- An expert institute for analysing risk and consequence.
- Technical guidelines on consequence analysis.
- Access to data on accidents involving domino effects such as eMARS (<https://emars.jrc.ec.europa.eu>) or the ARIA database ([www.aria.developpement-durable.gouv.fr](http://www.aria.developpement-durable.gouv.fr))
- Good and not too complicated criteria are necessary for evaluating domino effects.
- Different tools may be used depending on the life cycle of the establishment:
  - Checklists
  - Guidelines
  - Risk contours
  - When evaluating risk analysis, it is crucial to check the assumptions and restraints. If done properly, one can then evaluate the conclusions directly.

### 4.3.5 Safety critical services

#### Service elements critical for risk management

The participants discussed whether inspectors consider certain common service elements of higher priority (or criticality) for risk management than others, and if so, which ones have the highest priority. From these discussions the following service elements were identified:

- Emergency preparedness and response. Identify the whole range of emergency services.
- Utilities and their back-up:
  - Water and foam in case of fire
  - Power supply
  - Fuel supply
  - Instrument air
- Security and admission control.
- Safety critical maintenance.
- Infrastructure (roads, traffic routes).
- Hazardous waste.
- Health, safety and environmental protection.
- Information to contractors working at the site.

#### Common problems related to safety-critical services in industrial parks

The most common gaps or identified problems in providing safety-critical services in industrial parks were said by participants to be unclear responsibilities for maintenance and the running of common equipment and property. All of the services they identified are listed below:

- Lack of communication and transfer of information between operators, partly also between operators and service providers.
- Lack of clearly defined responsibility for maintenance of commonly owned/used equipment.
- Problems related to the ownership of pipelines and third party equipment such as gas bottles.
- Too little emergency training and exercises. One participant says that combined emergency plans with multiple operators may cause too many sce-



narios to be involved, which may affect training frequency.

- Unclear responsibility for ensuring the emergency power supply through the provision of diesel.
- Lack of good co-operation and a co-ordinating role to ensure a co-ordinated response in the case of an accident.

### **Promoting good risk management in non-Seveso service and maintenance companies**

Most countries make the operator responsible for contractors and sub-contractors, but many participants questioned whether there are generally adequate inspection resources to enforce this responsibility. There was some concern also raised about enforcing risk management associated with common infrastructure, e.g., pipelines, a large part of which might lie outside the boundaries of the Seveso site(s) who use and benefit from them.

Some countries were able to address these challenges through specific practices, notably:

- Spot-checks of contract services associated with risk management, e.g., emergency response, conducted while inspecting the Seveso establishments.
- Enforcement of other regulations (health and safety, environment, emergency response) than Seveso II that cover these service providers.

## **4.3.6 Joint emergency planning/preparedness**

### **Joint emergency planning among sites (Seveso and non-Seveso) in industrial parks**

According to participants, most countries can enforce high risk establishments in industrial parks to have a joint emergency planning, preparedness and response. In a few cases, participants indicated that their authority does not enforce, but strongly encourages joint emergency planning for concentrated industrial areas. Participants identified a number of opportunities for enforcing joint emergency planning in industrial parks and zones, in particular:

- Reliance on local authorities to co-ordinate joint emergency plans as part of external emergency planning obligations under the Seveso II Directive.
- Other participants considered co-ordination of a joint emergency plans for the area as a responsibility associated with internal emergency planning ob-

ligations of the Seveso establishment(s). If needed, non-Seveso establishments should be included. In such cases the neighbours may be considered as a non-third party, which means that they co-operate in the preparation of the emergency plans and are thus aware of the risks.

- Establishing a requirement in legislation, for example, an obligation to produce an integrated safety study when an area is defined as a critical industrial zone.
- Promoting the practice of joint emergency response drills between Seveso and non-Seveso establishments.

### **Examples of how sites develop emergency plans**

The countries cited and discussed examples of how sites develop emergency plans in industrial parks. In most of the countries, there is a mix of individual and integrated plans – with a clear majority of individual plans.

Some sites develop them themselves, others use a third party to help them. One participant indicated that integrated emergency plans are regarded as the best practice there, and another mentioned that, in some cases, the authorities ask for joint emergency plans. In many countries, each establishment has their own emergency plan, and the external emergency plan will in most cases be the only joint emergency plan for the whole industrial park.

### **The creation of joint emergency plans**

Concerning the creation of a joint emergency plan, participants noted that the major company normally develops the plan. Some authorities favour plans developed by the establishments themselves rather than by external experts, reasoning that this will create a feeling of greater ownership of the plan among the establishments. One participant listed as a “lesson learnt” that the total costs are reduced and the quality of the plan increased when there is one joint evaluation process with an external expert rather than separate evaluations for each operator.

### **The highest priorities in an emergency plan**

The participants were asked which are the highest priorities for consideration in an emergency plan of an industrial park. The discussions concluded as follows:

- Clarity of roles and responsibilities.
- Consideration of the relevant scenarios and plans about how to attack dif-

ferent situations. The actions to be taken first depend on the hazards and chemicals involved, and knowledge of the hazardous materials and the resources available is therefore crucial.

- First response: education and training of internal first response personnel. A short first response time (5 minutes is being mentioned) is important in order to limit the consequences until the external help arrives.
- Internal communication: The other establishments must have accurate information to make sure they know how to respond. A good communication and alarm system is fundamental.
- External communication: communication with the police, the health authorities, the fire brigade – and the public. Public relations: it is important to have a controlled relation to the media, with designated persons to communicate with them.

### **Legal requirements for emergency plans**

Most of the participants said that there are no specific legal requirements in their countries for emergency plans in industrial parks or for domino effects. However, a few examples of partial legal requirements were noted, as follows:

- One country has a regulation that demands that the establishments must describe how they would handle each scenario.
- Another country has provided specific guidance.
- There may be specific requirements imposed for some sites in one of the countries, depending on the authorities' evaluation of the level of the risk in each individual case.

### **Voluntary development of joint emergency plans**

The discussion produced no particular commonality in regard to voluntary development of joint emergency plans. In many countries, industrial parks voluntarily develop joint emergency plans. Authorities can promote communication and the development of joint emergency plans, but it is not possible to enforce it. On the other hand, some participants stated that no one does this voluntarily; it is only done on demand.

### 4.3.7 Joint safety reports

#### Perceptions on the value of joint safety reports

The participants were asked what their position is in regard to joint safety reports, including a number of sub-questions:

- a) Are they permitted, encouraged or tolerated?
- b) What is the reasoning for this position?
- c) How does it influence enforcement?
- d) How does it affect overall safety?
- e) What are the advantages and disadvantages of joint safety reports in comparison to individual ones in an industrial park?
- f) Do joint safety reports include more information because of considering all hazards related to dangerous substances (for example information regarding both Seveso- and non-Seveso establishments)?

Some of the countries do not encourage joint safety reports. In particular, some participants felt strongly that there is no particular advantage associated with joint safety reports. However, some authorities may accept joint safety reports when the site has some functions under joint management. Nonetheless, authorities cannot normally demand that a joint safety report be developed. In some circumstances the authorities may collect necessary information themselves and distribute it to other operators.

#### How to stimulate industrial parks to make joint safety reports

The participants discussed good practices for stimulating industrial parks to conduct joint safety reports. Most of their suggestions centered around inviting the companies' representatives to come together, and encouraging them to co-operate. The suggestions can be summarized as follows:

- There are no laws that can force industrial parks to make joint safety reports, but the authorities who are in favor of joint reports can encourage the establishments.
- In some cases most companies are very responsible safe companies, but there are always one or a few who are not interested in making a joint safety report. Inspection authorities can invite all these companies to a dialogue meeting, and explain to them how to co-operate and the benefits involved.

- Authorities can invite elected safety representatives of companies on neighbouring sites to a one day training session, with a real life incident as case for the day. This can result in important network building between establishments.
- Promoting ideas through a third party, for example, trade unions, is another option.

### **Important joint elements in safety reports**

The countries compiled the following list of important joint elements in safety reports :

- Emergency services
- Maintenance
- Security
- Emergency exercise
- Insurance

Participants were invited to give examples of good alternatives to joint safety reports that can be used to address the above elements, if joint safety reports are not accepted or are not possible legally, but there was only one example provided. It was suggested to address these elements through an appendix to individual safety reports, alternatively a common part incorporated into individual reports.

### **Companies' problems in preparing joint reports**

The participants were asked to describe what kind of problems companies have in preparing joint reports, or specific elements. The following problems were identified:

- Legislation
- Share of cost
- No duty to landlord
- Lack of guidance
- Commercial confidentiality

#### 4.3.8 Co-operation between authorities regarding industrial parks and domino establishments

Co-operation between authorities on enforcement of Seveso obligations

The countries were asked to describe how authorities co-operate on the enforcement of Seveso obligations in industrial parks. For example, who takes the lead, which activities are joint, how is communication in relation to

- a) inspections of industrial parks and in the management of domino effects obligations?
- b) the evaluation of site performance of Seveso obligations in industrial parks and domino establishments?
- c) the identification and management of domino effects?
- d) the review and follow-up of joint safety reports?

Several countries gave extended answers to these questions, presented below:

Country 1: Seveso inspectors perform all these tasks because they are in charge of all Seveso requirements. Each region has special Seveso inspectors and the Seveso inspector can inspect all elements at the Seveso site (electricity, safety management system, security system, process, loading operations and more). Sometimes they perform joint inspections with the labor authorities, or share information with them.

Country 2: This country has five central authorities that share information and co-ordinate all the work related to inspections in all the Seveso establishments. All authorities comment on the safety report, but the company gets one document back from a Seveso secretariate. In this country there is one common regulation for Seveso. Some inspections are joint (2 or 3 authorities come together).

Country 3: The local fire brigade, local environmental inspectors and two authorities visit the Seveso plant together. They have different laws, and they rotate the leadership over the course of the inspection.

Country 4: The central authorities help the local district office to comment on the safety report, but the participant felt that co-operation could be improved and in particular a co-ordination group would be beneficial.

Country 5 performs joint inspections every time, with 4 local authorities (among them the police and the fire brigade) and two umbrella central authorities (labour and environmental). The environmental authorities always

are in charge of the co-ordination. All co-ordination is at local level (planning, organising, issuing the permit). The central level gives advice to the local level.

Country 6 has one common program for Seveso inspection. Three authorities at local level (the environmental inspectorate, the environmental protection agency, and the civil protection inspectorate) discuss the program of inspection and perform the inspections in teams. The authorities make one report from each inspection. The participant felt that this system worked well. Regional and central authorities also must approve of the program of inspection discussed at the local level.

Country 6: All experts are in the same department. They make the inspection together, but write two separate reports (one on safety/fire/risk and one on occupational health).

#### **Co-operation problems between inspection authorities**

A couple of the participants mentioned challenges: a lot of discussion between local and central authorities, that the many actors in the inspections could be a problem if the leadership is not good. On the other hand, one participant said that there are 1-2 inspectors and just one authority in the inspection, so co-operation problems are not an issue. As for resolving co-operation problems, another participant observed that they bring in the ministry hierarchy if there is a problem with co-operation. Some countries have harmonised instructions for inspections and follow up.

## **4.4 Specific recommendations provided by participating countries**

### **Finland**

- 922/1999 ([www.finlex.fi](http://www.finlex.fi))
- OSH Act 2003, 738/2002 ([www.finlex.fi](http://www.finlex.fi)) especially chapter 6
- 44/2006 (adjustment 701/2006) chapter 5a

### **Germany**

- SFK-GS-44: Guideline on the application of the Seveso II directive on industrial parks: SFK-GS-44 by the Commission on Process Safety and a report on the damage limitation in case of a nevertheless accident. In SFK-GS-44

(chapter 4.3) there are recommendations about co-ordination and matching of safety reports and safety management systems. The objectives are a site related and an establishment related part of the safety report and a common safety management system. Chapter 5 of the guideline gives guidance for structuring the internal emergency plan. Objectives in this case are adjusted establishment specific and site specific internal emergency plans. All other co-ordination in relation to risk assessment and an emergency communication system is normally done by agreement between the manager of the site, the operators of the Seveso establishment and the competent authority.

- SFK-GS-26: Research report on industrial parks and law of hazardous incidents by the "Umweltbundesamt" (Federal Environment Protection Agency): 31/02, ISSN 0722-186X (2002).
- Arbeitshilfe für die Anwendung der Störfall-Verordnung bei Industrieparks des Arbeitskreises Industriepark ([http://www.kas-bmu.de/publikationen/sfk\\_pub.htm](http://www.kas-bmu.de/publikationen/sfk_pub.htm))
- Guideline - explanation of the SEVESO Ordinance for the authorities of 3/2004- page 31-33 (<http://www.bmu.de/anlagensicherheit/doc/6133.php>)

### Italy

- Industrial parks operators act as single entities that, on the base of common specific operating requirements, could identify a unique subject (generally the main company or an outer subject) to which officially entrust utilities management or operating services as emergency and/or waste management. Subjects involved are called by authorities for providing evidence of matching safety management system requirements (in charge of each operator) as far as (i.e.) training and maintenance common procedures is concerned.
- Risk evaluation associated with interconnections..

### Norway

- In principle the competent authority should convey information about possible initiating events at neighbouring enterprises which may cause a domino effect at the Seveso establishment in question, but in practice such a system is highly dependent on the willingness of the neighbouring enterprises to share such information.



### United Kingdom

- Operators of COMAH (Seveso) sites are required to provide sufficient information to the Environmental Protection Agency to enable them to draw up an appropriate off-site emergency plan - the requirements are set out in HSE publication HSG 191 "Emergency Planning for Major Accidents - COMAH".
- The competent authority is required to notify the operator of each establishment within the domino group of the names and addresses of other such establishments within the same group.
- The responsibility is then on operators to determine and then take account of the increase in overall hazard and review whether they have taken all measures necessary to limit the consequences of major accidents for their site and in particular whether there is likely to be an escalation as a result of consequent incidents on their own site.
- Operators will also need to take account of this information in their on-site emergency plans, provide the information to the local authorities and pass on information about the increased consequences to other members of the domino group where it affects them.
- The information to be exchanged with other operators is not specified and will depend on the nature of the business but will include, for example, information about the kinds of activities being carried out at other establishments in the group and the ways in which these could trigger a major accident at their own sites. Information about the substances and their hazardous properties will also need to be shared.

## 5. Summary of Findings and Conclusions

The following paragraphs summarise key findings and conclusions from the surveys and workshop on the topic of inspection and enforcement of Seveso Directive obligations in industrial parks and domino effect establishments.

- The answers given to the pre-MJV surveys indicated that there are a large number of industrial parks in the EU and other Seveso implementing countries. Some parks consist only of Seveso sites, while others have a mixture of Seveso and non-Seveso sites. These numbers demonstrate how important it is to have an enforcement focus on industrial parks that allows a broad perspective inclusive of non-Seveso sites when necessary. Note that the survey responses indicate that not all countries have identified their domino establishments. This means that some Seveso authorities have work to do when it comes to identifying groups of establishments with a possibility of domino effects.
- 14 out of 20 Seveso countries identified a total of 353 groups of establishments with a possibility of domino effects. Of these 282 industrial parks with Seveso establishments were identified. Three other countries surveyed indicated that they had industrial parks and domino effects sites but they had not counted them. Taking into account that this represents just about half of Seveso implementing countries, the number of Seveso domino effects sites within the EU and beyond could well exceed 400 (of whom around 80% may be industrial parks).
- The survey results indicated that several countries had invested time and effort on refining practices and yet still had many questions about what strategies and techniques would be most effective in enforcing the Directive in industrial parks and for promoting prevention and emergency preparation in regard to domino effects.
- Few countries have legal instruments that provide support to inspection and oversight of Seveso implementation in industrial parks. In the vast majority of the participating countries, there is not a legal definition of industrial parks; the legislation does not require that there be a legal entity responsible for operating the industrial park; and operators of Seveso sites are not legally required to make a contract with the operator of the industrial park regarding emergency related tasks. Only two countries could provide legal definitions of industrial parks.
- Most countries do not have a legal definition of industrial parks. Several

difficulties in creating a common definition were noted. Though enforcement of the Directive can be particularly challenging in industrial parks, participants generally felt that specific legal definitions or other provisions in order to aid Seveso enforcement, are unnecessary. Most countries seem to be satisfied with existing regulations provided that the regulations can be adapted a more flexible way.

- Most participants indicated that they had limited ability to recognise potential risks or enforce more appropriate protection measures associated with non-Seveso neighbours. It was noted that risk based prioritisation of inspections focuses on Seveso-plants rather than on the neighbouring non-Seveso facilities. Even information exchange with non-Seveso neighbours on potential risks is a challenge due to differences in technical knowledge and differences in business contexts and company culture.
- Many of the participating countries did not cite specific tools (guidelines, checklists, models, software) used for inspecting industrial parks and/or assessing domino effects. Several of them use general checklists or question lists. However, the surveys provided a long list of questions inspectors could ask during inspections in industrial parks in addition to the “normal” Seveso inspection questions. These can be sorted into the following categories:
  - communication and exchange of information between operators
  - co-operation between operators
  - personnel safety
  - domino effects
  - emergency planning
  - infrastructure
- As for the tools inspectors of industrial parks would like to have, the participants listed:
  - (better) checklists and guidelines
  - joint international inspections with a learning process afterwards
  - access to independent, competent management expertise
  - the power to serve an order to produce an improvement plan
  - an expert institute on analysing risk and consequence
- Challenges noted in terms of follow-up of industrial parks and/or domino effects included:
  - the need for more resources, knowledge and expertise
  - a lack of joint risk analysis and joint incident control plans for the industrial park as a whole

- communication and interaction challenges
  - co-ordination and co-operation between authorities
  - communication and co-operation between operators
- the need for criteria for the identification of possible domino establishments
- several challenges regarding inspections
- the splitting up of sites from one to multiple owners and keeping track of changes in owner relationships
- responsibility issues and challenges related to emergency organisations, emergency plans and the need for joint fire brigades
- the need to improve the inspections further, for example by improving checklists
- The authorities usually decide whether the potential for domino effects exists. Most authorities identify and monitor potential domino effects establishments through the evaluation of safety reports, through site inspections, use of digital maps and notifications from the establishments. Evaluation of possible domino effects is either performed as part of the safety report assessment, or as a separate process. However, some countries have encountered establishments that do not always agree that they are domino establishments.
- Most Seveso authorities have little control of the local permission processes leading to the location of new high risk plants. This can result in new domino plants, since consideration of possible domino effects is seldom addressed in land-use planning. The participants listed some proposals for approaches on how to reduce the possibility of domino effects:
  - good land-use planning
  - stimulate relocation of the establishments
  - increasing the relevant safety equipment
  - authorities ask operators to revise their risk assessment in order to identify risk reducing measures
- It is clear that few authorities perform inspections targeted at the total safety level in the industrial park. The inspections are mainly performed at Seveso establishments located within the park and most countries inspect each Seveso operator in the same industrial park separately.
- Several countries require or recommend Seveso sites within an industrial park to share or co-ordinate certain risk management information:
  - safety report

- safety management systems
- internal emergency plan
- risk assessment
- emergency communication system
- industrial park emergency plans
- information about domino effects
- However, participants suggested the following topics as the highest priority for co-operation between Seveso and non-Seveso establishments for risk management:
  - hazard identification
  - risk assessment
  - assessment of domino effects
  - management of changes that affect shared risks
  - emergency response planning
  - process shut-downs
- Approaches suggested for encouraging establishment co-operation included:
  - joint meetings between operators
  - checklists
  - safety management systems
  - safety reports
  - contracts
- The common service elements considered by participants to be more critical for risk management than others, were:
  - emergency preparedness and response
  - utilities and their back-up
  - security and admission control
  - safety critical maintenance
  - infrastructure
  - hazardous waste
  - co-operation in HSE matters
  - information to contractors working at the site

The most common gaps or identified problems in providing safety-critical services in industrial parks were identified as unclear responsibilities for maintenance and the running of common installations, equipment and property.

- In most countries, the individual operators make their own safety reports. However, in some countries, different practical approaches have been tried where it has been reasonable to accept a joint report, but the workshop confirmed that some countries do not encourage these. There are no laws that can force industrial parks to make joint safety reports, but the authorities who are in favor of joint reports can encourage the establishments to co-operate.
- Most countries do not have specific legal requirements for joint emergency plans in industrial parks or for domino effects. However, many countries can enforce high risk establishments having a joint emergency planning, preparedness and response in industrial parks on a case by case basis. In many countries, each establishment in an industrial park has its own emergency plan. Still many countries reported having a mix of individual and integrated emergency plans, with a clear majority of individual plans. In many countries, industrial parks voluntarily develop joint emergency plans.
- Co-operation between authorities varies greatly between countries for industrial parks and domino effect establishments. Some countries have no need for co-operation since they have one authority; others have many authorities and have established more or less formal ways to co-operate. A few countries have established joint Seveso inspection teams, and all Seveso inspections are performed as joint inspections.



## Annexes

### Annex 1: Norway MJV 2009 Programme

#### Wednesday 18th November

09:00	Welcome, practical information, short individual presentations (host/ MAHB)
09:30	Introduction to the topic – conclusions from the EPSC-report on Industrial Parks (Christian Jochum, EPSC)
10:00	Industries' experience – Challenges in running an Industrial Park (Sverre O. Lie, Herøya Industrial Park)
10:45	Coffee break
11:00	Accidents related to Industrial Parks / Domino Effects (Nanna Rörbeck, Denmark and Horst Büether, Germany)
11:30	Buncefield - after the accident . Consequences for the other establishments in the industrial park (Jeff Chambers, UK)
11:50	Conclusions from the TWG2- survey on Industrial Parks and domino effects (Ragnhild G. Larsen, Norway)
12:10	Main issues from participants survey (Zsuzsanna Gyenes, MAHB)
12:30	Lunch
14:00	Introduction to Workshops (host/ MAHB)
14:15 - 17:30	Workshop (part 1)
19:00	Dinner hosted by DSB



**Thursday 19th November**

9:00-10:00	Plenary meeting - results from the Workshop (part 1), discussion
10:00 - 13:00	Workshop (part 2)
13:00	Lunch
14:00	The Chemelot Case (Bart Krzeminski, The Netherlands)
14:20	Practical handling of domino effects (Jürgen Dahlkemper, Germany)
14:40 – 17:30	Workshop (part 3)
19:30	Dinner

**Friday 20th November**

09:00 – 10:30	Plenary meeting - results from Workshops part 2 and 3, discussion
10:30	Coffee break
10:45	Continued Plenary meeting and summing up of results from workshops part 2 and 3
12:00	Closing of MJV (host/ MAHB)
12:15	Lunch

## Annex 2: List of participants

	Name	Organisation	Country
1	Edith Moshammer	Magistrat Linz	Austria
2	<b>Leentje Timmerman</b>	Ministry of Environment, Flanders Region	Belgium
3	Patricia Vanspeybroeck	Belgian Ministry of Labour	Belgium
4	Miljenka Klicek	Ministry of Environmental Protection, Physical Planning and Construction	Croatia
5	Themistoclis Kyriacou	Department of Labour	Cyprus
6	Zuzana Machatova	Ministry of Environment	Czech Republic
7	Nanna Roerbech	Danish Ministry of the Environment	Denmark
8	Allan Thomsen	Danish Emergency Management Agency	Denmark
9	Morten Østergaard	Danish Ministry of the Environment	Denmark
10	Paul De Bruyn	TOTAL	EPSC
11	Chr. Jochum	EPSC	EPSC
12	Leena Ahonen	TUKES, Safety Technology Authority	Finland
13	Satu Anno	Occupational Safety and Health Inspectorate of Uusimaa	Finland
14	Loic Malgorn	Ministère de l'Ecologie, de l'Energie, du Développement Durable et de la Mer	France
15	Horst Büther	Bezirksregierung Köln	Germany
16	Jürgen Dahlkemper	Landesamt für Landwirtschaft, Umwelt und ländliche Räume	Germany

17	Steinar Hardarson	(Vinnueftirlit rikisins)	Iceland
18	Dermot O'Callaghan	Health and Safety Authority	Ireland
19	Francesco Astorri	ISPRA	Italy
20	Bart Krzeminski	Ministry of Social Affairs and Employment	Netherlands
21	Graça Bravo	Inspeccao Geral do Ambiente	Portugal
22	Carmen Miclea	National Environmental Guard - Romania	Romania
23	Claes Petersén	Swedish Work Environment Authority Falun	Sweden
24	Enver Berisha	Swedish Work Environment Authority	Sweden
25	Britta Munksten	County Administrative Board of Ostergötland	Sweden
26	Carina Fredstrom	Swedish Civil Contingencies Agency, The	Sweden
27	Alberto Susini	Geneva Territorial Department, Environment Directorate, Intervention Service	Switzerland
28	Cem Ural	Turkish Ministry of Environment and Forestry	Turkey
29	Jeff Chambers	Health & Safety Executive	United Kingdom
30	Maureen Wood	European Commission, Joint Research Centre	Italy
31	Zsuzsanna Gyenes	European Commission, Joint Research Centre	Italy
32	Marit Bjerknes	Norwegian Industrial Safety and Security Organisation	Norway
33	Arne Johan Thorsen	The Petroleum Safety Authority Norway	Norway
34	Lars Drolshammer	Norwegian Pollution Control Authority	Norway

35	Kaare Lövdal	The Directorate for Civil Protection and Emergency Planning (DSB)	Norway
36	Gunnar Hem	DSB	Norway
37	Janet Gullvåg	DSB	Norway
38	Conny T. Bruun	DSB	Norway
39	Ragnhild G. Larsen	DSB	Norway
40	Torill Tandberg (day 1)	DSB	Norway
41	Siri Hagehaugen (day 1)	DSB	Norway
42	Ingvild Irgens Jensen (day 1)	Ministry of Justice and the Police	Norway

### Annex 3: Working groups

Group Number	1	2	3	4	5
Chairman	Christian Jochum, ESPC	Gunnar Hem, Norway	Claes Petersén, Sweden	Arne Johan Thorsen, Norway	Marit Bjerknes, Norway
Deputy Leader		Nanna Rörbeck, Denmark		Horst Bühler, Germany	
Rapporteur	Kaare Lövdal, Norway	Conny Bruun, Norway	Janet Gullvåg, Norway	Lars Drolshammer, Norway	Ragnhild G. Larsen, Norway
Participants	Alberto Susini, Switzerland	Edith Moshammer, Austria	Jeff Chambers, UK	Miljenka Klicek, Croatia	Themistoclis Kyriacou, Cyprus
	Leentje Timmermann, Belgium	Loic Malgorn, France	Patricia Vanspeybrouck, Belgium	Morten Østergaard, Denmark	Zuzana Machatova, Czech Republic
	Satu Anno, Finland	Steinar Hardarson, Iceland	Allan Thomsen, Denmark	Paul De Bruyn, EPSC	Francesco Astoria, Italy
	Dermot O'Callaghan, Ireland	Carmen Miclea, Rumania	Leena Aho-nen, Finland	Jürgen Dahlkemper, Germany	Bart Krze-minski, The Netherlands
	Graza Bravo, Portugal	Carina Fredström, Sweden	Cem Ural, Turkey		Enver Berisha, Sweden
	Britta Munksten, Sweden				
	Christian Jochum, ESPC				

## Annex 4: Surveys

### Survey I : Pre MJV- survey of inspection authorities

#### Part 1 – Industrial Parks

Please note that, for the purposes of this survey, the term “Industrial Park” includes Chemical Parks, Multi-Operator Sites and Industrial parks that accommodate several chemical facilities in close proximity to one another. The facilities on these sites have different owners but share infrastructure services, which may be provided by one of these facilities or one or several third parties, and they usually (but not always) share a fence.

#### A. COUNTRY PROFILE IN RELATION TO INDUSTRIAL PARKS

Question 1. Does your country have industrial parks with Seveso establishments?

Yes  No

If you answered “No”, please go on to Part 2 of this questionnaire (“domino effects”)!

Question 2a. Has your country counted or estimated the number of industrial parks with Seveso industrial parks?

- Yes, for the whole country (Go to question 2b).  
 Yes, but not for all regions (Go to question 2c).  
 No (Go to question 3).

Question 2b. If you answered “yes, for the whole country” how many industrial parks with Seveso II establishments (upper and/or lower tier) are have been counted or estimated to be in your country?

You may provide further explanation if you wish to qualify your answer (for example, if the number sometimes fluctuates in time). Then go to question 3.

Question 2c. If you answered “Yes, but not for all regions”, could you indicate what region(s) and how many have been estimated for each?

If you have any other information to explain the situation in the rest of the country, please provide it here. Then go to question 3.

Question 3. Please complete the following table to describe the types of industrial parks that have been identified in your country and (if you know or have an idea) how many of each? Note that the third column asks you to indicate whether the number of each type is an estimate or an exact number (write “estimate” or “exact”).

Type	Yes/No*	How many?*	Estimate or exact number?
Industrial parks consisting of only Seveso (upper and/or lower tier) establishments			
Industrial parks with a mixture of Seveso II establishments and establishments not covered by the Seveso II directive			
Other (please specify):			
Additional Comments:			

\* If you have no clear idea, please write “DK” or “don’t know”, and explain the situation in the “additional comments” section of the table.

## B. SEVESO INSPECTION PRACTICES IN INDUSTRIAL PARKS

If you have recognised industrial parks with Seveso establishments:

Please place an “X” in the correct box and, if necessary, please provide an explanation in the last column and especially if you answered “sometimes”. If you need more room please continue on the other side of this paper.

Questions	Yes	No	Some-times	Explanation
4. Do you accept one joint safety report from all establishments within the park?				
5. Is it mandatory for the establishments within an industrial park to have a joint a) Emergency plan? b) Emergency response organisation? (e.g. fire brigade)	a)			
	b)			
6. Are the different establishments within an industrial park obliged to prepare a: a) Joint risk assessment of the site in addition to each establishment's individual risk assessment? b) Joint analysis of domino effects? c) Other? (please specify)	a)			
	b)			
	c)			
7. Do you perform inspections targeted on the total safety level in the industrial park and the co-operation between establishments regarding requirements in Seveso II?  (Please explain if necessary):				

Question 8	Yes /No	How many?
Have you identified any industrial parks where one of the owners is responsible for the entire operation of all the different establishments on behalf of all their owners?		
If Yes, please indicate how you handle the safety report obligation (please check only one response):		
<input type="checkbox"/> You accept one joint safety report from this operator for all the Seveso establishments on the site		
<input type="checkbox"/> Each Seveso establishment must produce separate safety reports.		
<input type="checkbox"/> Other. Please explain.		



Question 9	Yes	Some- what yes	No
Has your country developed guidelines or other national regulations specifically for industrial parks?			
If you answered "yes", or "somewhat yes", please explain what kind of specific guidelines or national regulations have been developed			
Can they be provided to TWG 2 for its study of Seveso inspection practices in industrial parks?			

Question 10	Yes	Some- what yes	No
Have you established specific checklists on the theme of industrial parks to be used in inspections?			
If you answered "yes", or "somewhat yes", please explain what kind of checklist(s) has (have) been developed.			
Can they be provided to TWG 2 for its study of Seveso inspection practices in industrial parks?			

## Part 2 – Domino Effects

Article 8.1 of the Directive on the domino effect gives us the responsibility of identifying groups of establishments where an accident in one establishment can lead to domino effects in the other establishments.

Question 11	Number
How many groups of establishments with a possibility of domino effects have been identified in your country?	

If you answered "0", please go on to Part 3 of this questionnaire.

Question 12. Please give a brief description of how your country follows these groups of establishments for Seveso purposes (identification of establishments, communication with them on the subject, special inspection practices etc.).

Question 13. If you have Industrial parks with a mixture of Seveso II - establishments and establishments not covered by the Seveso II – directive:

Question	Yes	No	Some-times	Explan-ation
a. Do you also evaluate the possibility of “quasi domino effects” between the Seveso II- and the non-Seveso establishments? (Please note that we call it “quasi domino effect” since the term “domino effect” in the directive is defined to occur only between Seveso establishments.)				
b. Are such non-Seveso II – establishments in any way included in the inspections of neighbouring Seveso II establishments?				
c. Please describe any other measures taken in order to ensure that authorities have the full picture of the overall risk in an industrial park where you have both Seveso and non-Seveso establishments.				

Question 14	Yes	Some-what yes	No
Have you established specific checklists on the theme of domino effects to be used in inspections?			
If you answered “yes”, or “somewhat yes”, please explain what kind of checklist(s) has (have) been developed.			
Can they be provided to TWG 2 for its study of Seveso inspection practices in industrial parks?			

### Part 3 – other comments

Question 15. What do you consider to be the greatest challenges in your country when it comes to following up Industrial Parks and/ or Domino Effects?

Question 16. Are there other aspects concerning your practice in dealing with Industrial Parks that you would like to share with us?

#### Part 4 – Background information

In order to analyse the data it is important that we have some background information so that we can group opinions together.

Remember all responses are completely confidential.

Your organisation belongs to the government body responsible for (check only one):

- Employment/Labour                       Environment  
 Civil Protection                               Industry/Economy

Other (specify) [  ]

Your organisation is at what level (check only one):

- National                       Regional                       Local

Your inspectors' group performs inspections on implementation of:

- The Seveso II directive  
 Other types of regulation (PLEASE SPECIFY, e.g., occupational safety, environmental protection, fire protection)

What process did you use to complete the answers to this survey (check all that reply)?

- To answer some questions I used my own knowledge from  years working on inspections of the Seveso II directive.  
 I discussed several/all questions with different inspectors individually.  
 The answers to the questions were discussed in a meeting.  
 All inspectors were distributed the questionnaire and some answers are based on their feedback.  
 Other.

Work location - City: [  ]

## Survey II: MJV participants survey

This questionnaire is intended to solicit information on participants in the MJV Norway on Industrial Parks on Domino Effects to obtain a general overview of the practices within Seveso countries to implement and enforce associated Seveso obligations. The answers will serve as a foundation for discussions on the topic during the MJV workshop and also provide interesting findings for the resulting workshop publication.

### I. PARTICIPANT INFORMATION

#### 1. Name and contact information

Name:
Email:
Position/job title:
Country
Name of organisation:

Please check the box for any of the following statements which are true

Our organisation leads Seveso inspection activities in my country

Our organisation shares but does not lead Seveso inspection activities

I have inspection responsibilities not related to Seveso.  
If so please name them (environment, occupational safety, etc.)

Additional explanation/comment:

[  ]

#### 2. Please describe any legal instruments that provide support to inspection and oversight of Seveso implementation in industrial parks.

For example:

- Is there a legal definition of industrial parks in your country?
- Does your legislation require that there be a legal entity (person/company) responsible for operating the industrial park?
- Are operators of Seveso sites legally required to make a contract with the operator of the industrial park regarding emergency related tasks?

If there is a legal definition, could you please provide or attach the definition if possible (If you do not have an English language version, please provide the version in your language).

3. Please indicate what type of additional questions you would ask sites in industrial parks in addition to the “normal” Seveso inspection questions *If you have a specific checklist for industrial parks, please enclose a copy (does not have to be in English).*
4. Please list any specific tools (guidelines, checklists, models, software, etc.) that you use for inspecting industrial parks and/or assessing domino effects?  
*If possible, could you enclose a copy or link?*
5. Please describe any specific requirements or recommendations in your country applied to industrial parks in relation to Seveso implementation. For example:
  - What (if any) risk management information are Seveso sites in the same industrial park required or recommended to share or co-ordinate (e.g., safety report, safety management systems, internal emergency plan, risk assessment, emergency communication system, etc.)?
  - What additional information (if any) is required or recommended to be included in the safety report of Seveso sites in industrial parks (e.g., for domino effects)?
6. What do you need in order to work better with questions related to industrial parks and domino effects?
7. What do you consider to be the greatest challenges in your country when it comes to following up industrial parks and/ or domino effects?
8. Can you give examples of relevant accidents and incidents in industrial parks and domino establishments that had an impact on neighbouring establishments? If you know, please indicate if the accident met the Seveso Annex VI criteria.

In the space below, please feel free to add any additional comments you may wish to share about inspections and enforcement of Seveso obligations in industrial parks in your country.

## Annex 5: Topics for working group sessions Part 1-3

Each group sessions consists of 2- 4 separate topics. The groups will be asked to discuss at least two topics per session.

### PART 1 - LEGAL ISSUES AND ORGANISATION OF INDUSTRIAL PARKS

#### Legal issues

This topic concerns legal and regulatory instruments that have been established (or could be established) to aid in enforcement and oversight of Seveso implementation in industrial parks.

1. Is there a legal definition of Industrial Parks in your country?
2. Describe specific regulations for (some aspects of) Industrial Parks exist in countries/regions of participants? For example,
  - Do you need any regulations to be allowed to look into contracts?
  - Do your regulations make a difference between “regular neighbours” (establishments outside the Industrial Park) and internal neighbours?
  - Others?
3. Are there countries/regions in this group that do not have any specific regulations as such?
4. On a scale of 1 to 10, how valuable are these regulations and definitions? Are they adequate? Too restrictive?
5. Do participants whose countries/regions do not have any regulation or definition think that they should? In what areas?

#### Involving non-Seveso establishments in the enforcement of Seveso II

This topic addresses how countries/regions’ authorities manage the relationship between Seveso and Non-Seveso establishments in an industrial park as a whole, please describe the practices.

1. How do inspection authorities work in order to see the complete risk picture from an industrial park with both Seveso- and non-Seveso establishments?
2. How do inspection authorities handle the situation, when/where Seveso

establishments may be split up in many smaller establishments resulting (partially) in non-Seveso establishment?

3. How can the authorities put demands upon non-Seveso service and maintenance companies?
4. Can you enforce joint emergency planning/preparedness/response for an Industrial Park (including both Seveso and non Seveso establishments)?
5. What measures can you use to promote co-operation between establishments (including both Seveso and non Seveso establishments)?

### **Different ways of organising (or managing) common services in an industrial park**

This topic aims to identify and present advantages and disadvantages of the different ways that sites in industrial parks are operated to address common service issues related to risk management.

- Describe different ways in which industrial parks are organised to address common service issues related to risk management.
- For example, are there IP's that share the operation of the control rooms between the operators?
- Are the service units of the sites normally involved in the implementation of Seveso II? Why or why not? Should they be? What is the interplay of responsibilities concerning binding agreements within the industrial park and with the competent authority (service provider - operators of Seveso- and non-Seveso establishments – CA)? What advantages and limitations are associated with this interplay?
- Discuss the role of the different types of “infrastructure companies”. Do they sometimes act as “site manager” and how does that influence a) our inspections and b) overall effectiveness of risk management on the site?
- Give examples of the “fragmentation of responsibilities” that often occur in an industrial park! How can these situations be improved?

### **Co-operation between establishments**

This topic is intended to identify various practices of inspection authorities (mandatory or preferential) aimed to achieve co-operation on risk management between sites in the same industrial park. Examples of voluntary practices of operators are also of interest.

- Provide examples of good practice within industrial parks for promoting the necessary co-operation between companies for effective risk management.
- In your opinion, what common topics of risk management are highest priority for co-operation between companies?
- Do some countries have legal requirements that make co-operation between companies on certain elements mandatory (e.g., emergency plan? If so, what are they?
- Are such legal requirements useful? Where they do not exist, could they be useful or are voluntary means better?
- What does the co-operation between establishments improve according to your experiences (e. g. a joint safety report, regular common meetings, a powerful service unit of the site, a common working unit for tests, services and repairing)?
- Where co-operation is voluntary, what approaches can an inspection authority apply to implement improvements? How effective are they?

## **PART 2 - INSPECTION PRACTICES AND TOOLS FOR INSPECTIONS**

### **Inspection practices in an industrial park**

This topic aims to identify and describe Seveso inspection practices in industrial parks within different countries/regions.

- Describe strategies of different inspection authorities for performing Seveso inspections in industrial parks.
  - For example, do you inspect several operators together or do you consider each operator as a separate issue?
- How do authorities inspect services necessary for implementation of Seveso II that are common to all or some establishments in the Industrial Park? (Please note that the service operator may not be covered by Seveso II)
  - For example, do the authorities perform one overall inspection of services or an inspection of service for every establishment?
- What are the most common gaps or problems in providing safety-critical services in industrial parks?
- Do inspectors consider certain common service elements of higher priority (or criticality) for risk management than others? If so, which ones have highest priority?



- How do authorities inspect handling of contractors, when contractors are often hired by the non-Seveso service company?
- How do authorities inspect the common use of infrastructure (including fire brigade, factory security service, raw material, process media and energy)?
- How do authorities check contracts/agreements for the co-operation between establishments (including both Seveso and non Seveso establishments)? To what extent do authorities inspect contracts among the (non-) establishments and between the (non-) establishments and the service units of the sites?
- Do authorities inspect the technical equipment of plants besides inspecting the management system and supervise them visually?
- Which tools are available for use when planning and performing inspections in industrial parks? For example, do you have guidance's or checklists to assist you in the planning process?
- What sort of additional tools would you like to have?

### **Inspection practices regarding domino establishments**

This topic aims to identify and describe practices and needs associated with inspections of domino establishments

- How is the domino effect between domino establishments inspected? Give examples of good practice.
- What specific measures are applied to inspection and enforcement of sites associated with domino effects?
  - e.g., do you inspect with shorter intervals if possible domino effects are identified?
- Do authorities evaluate the internal siting of establishments within the industrial park in your inspections? If so, how? Give examples.
- What kinds of problems do authorities encounter in trying to address domino effects? How are these resolved?
- How effective are current approaches in inspection authorities regarding domino establishments?
  - What practices have appeared to be effective?
  - What improvements can be made?
- What kind of tools might be useful to assist authorities in evaluating domino effects? Please describe any tools that have already been created by inspection authorities.

### **PART 3 - PRACTICES REGARDING JOINT DOCUMENTATION FROM INDUSTRIAL PARKS AND AUTHORITIES CO-OPERATION**

#### **Joint emergency planning/ preparedness**

This topic aims to provide an overview of requirements, practices and needs associated with development and inspection of site emergency plans for Seveso establishments in industrial parks and the industrial parks themselves.

- Give and discuss examples of how sites develop emergency plans in industrial parks.
- If an industrial park has a joint emergency plan, how is this plan created? Who takes the lead and how are the sites involved (both Seveso and non-Seveso)?
- What are the highest priorities for consideration in an emergency plan of an industrial park?
- Are there specific legal requirements in some countries for emergency plans in industrial parks or for domino effects? If so, what are they and how effective are they?'
- If there are no legal requirements for joint emergency plans, do some industrial parks voluntarily develop joint emergency plans? What other ways can authorities encourage joint communication and planning on emergency plans?
- What tools could be helpful in improving inspections and enforcement of emergency planning requirements in industrial parks? Please describe any tools that currently exist within the authorities and describe how they are effective.

#### **Joint risk assessment/ risk assessment domino effects and land-use planning**

This topic seeks to identify and describe approaches and tools to assess and manage risk and domino effects in industrial parks and otherwise areas with domino establishments.

- Describe the authorities, process for identifying domino establishments. Who decides whether domino effects are possible, authorities or operator? Give examples of how either approach functions in process. What are the advantages and limitations of each approach?
- How is the overall risk of an industrial park assessed by the establishments,

including possible domino effects? e.g.:

- How is the overall risk of an industrial park assessed by the authorities, including possible domino effects?
- Do the authorities demand an overall risk assessment for an industrial park, or a group of domino-establishments? If so, on what basis, legal or voluntary?
- Do any authorities have specific legal requirements for risk assessments of sites in industrial parks or domino establishments? Please describe if any and whether they are effective. assessments
- Have any authorities developed a specific approach/methodology for risk assessment of sites in industrial parks or domino establishments? If so, please describe it and indicate whether the approach is effective.
- Do authorities address domino effects in land-use planning? Do some authorities apply or require industry to apply a specific risk assessment methodology for land-use planning in areas at risk for domino effects? Please describe any current practices that exist.
- What kind of problems do authorities encounter in trying to address domino effects? How are these resolved?
- What approaches can authorities apply to reduce the risk of domino effects? Please describe any examples of good practice. What are the advantages and disadvantages of these approaches?
- What tools have authorities developed to support inspection of risk assessments and review of safety reports in industrial parks? For domino effects? How effective are these tools? What other kinds of tools might be needed?

### **Joint safety reports**

This topic is aimed to identify practices associated with joint safety reports and their advantages and limitations.

1. What is the position of the represented countries/region in regard to joint safety reports?
  - Are they permitted, encouraged or tolerated?
  - What is the reasoning for this position?
  - How does it influence enforcement?
  - How does it affect overall safety?
  - What are the advantages and disadvantages of joint safety reports in comparison to individual ones in an industrial park?

- Do joint safety reports include more information because of considering all hazards related to dangerous substances (for example information regarding both Seveso- and non-Seveso establishments)?
2. Under what conditions would inspection authorities accept a joint safety report (e. g. a common management system, subsidiary company in 100% ownership of the mother company, other conditions)?
  3. Please provide any suggestions or good practices to stimulate industrial parks making joint safety reports.
  4. What elements are emphasised as “joint elements” in safety reports For example, do they facilitate (please be specific):
    - The co-ordination of the common use of infrastructure? If so, what specific infrastructure elements?
    - The authorities’ inspections and the fire brigades’ deployment
    - Joint risk assessment and/or assessment of domino effects?
    - Other?
 Please explain why each element listed is considered important for joint reports.
  5. If joint safety reports are not accepted, or are not possible legally, what alternatives to joint safety reports can be used to address the above elements? Please give examples of good practice.
  6. What kind of problems do companies have in preparing joint reports, or specific elements? Please describe.

### **Co-operation between authorities regarding industrial parks and domino establishments**

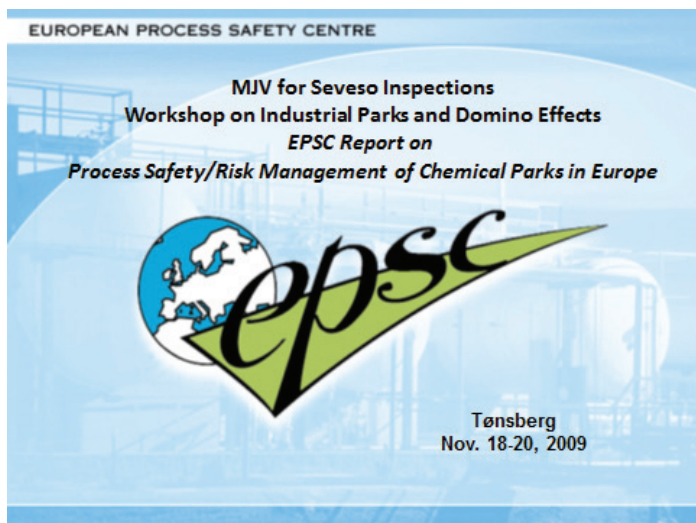
This topic seeks to identify and describe current co-operation efforts in the enforcement of Seveso obligations in industrial parks among inspection authorities in different countries and regions. It also seeks to identify areas where improved co-operation can be helpful and good practices that are already in place.

1. Describe how authorities co-operate on enforcement of Seveso obligations in industrial parks (who takes the lead, which activities are joint, communication) in
  - Inspections of industrial parks and in management of domino effects obligations

- Evaluation of site performance of Seveso obligations in industrial park and domino establishments
  - identification and management of domino effects
  - Review and follow-up of joint safety reports
2. What problems of co-operation often come up between inspection authorities in relation to enforcement of Seveso obligations in industrial parks and domino establishments? How are these resolved?

## Annex 6: General presentations

EPSC Report on Process Safety/Risk Management of Chemical Parks in Europe



### Industrial Parks: Formation

- **Formation of the big traditional chemical sites („works“) up to appr. 1940s.**
  - Optimising the flows of energies/utilities and chemical substances („Verbund“)
  - Single user/operator
  - Sometimes extremely diversified („little cities“)
- **Formation of Industrial (mostly still Chemical) Parks**
  - since appr. 1990
  - Consequence of economic trends/restraints
    - focusing on core business
    - outsourcing
    - breakdown of industrial complexes in middle and eastern Europe
    - ...
- **Multiple user/operator**
  - Separation between operations and infrastructure



### Industrial Parks – a „moving target“

Coming from different roots, Industrial Parks fill the space between „works“ (single user sites) and industrial estates

„works“ → „major user site“ → „closed park“ → „open park“ → industrial estate

- **The scene is still changing driven by the market**
  - Industrial Park, Chemical Park, ValuePark®, Bio Park, ...
- **The Parks can be fairly well described under a technical/economical view**
- **A legally unambiguous definition has not been found**
  - and may be counterproductive by impeding the economic processes



### The Status of Infrastructure Companies

Another differentiator is the role of the infrastructure company which fill the space between park manager and one of the service providers

- Infrastructure facilities ...
  - ... may be operated by „major user“ or separately
  - ... different range of services/involvement/governance
  - ... may substitute the former „works management“
  - ... may be owner of the site
  
- ... but are legally „third party“
  - responsibility only for own operations
  - same legal status as any contractor (e.g. liability!)
  - needs customer focus and competitive prices
  - clear contractual agreements necessary

*Strong infrastructure company may be „best practice“, but cannot be enforced by authorities*



### Industrial Parks: the basic legal issues for the control of major hazards

- The comprehensive responsibility of one operator for all activities at the site has been split up between several companies, leading to questions:
  - Who takes care for the aggregated risk of the site?
  - Who will be addressed by the authorities (who is the operator)?
  - How can „best practices“ from single user sites be adapted to a completely different economic and legal environment?
  
- As significant the legal changes are, as little are the changes in day-to-day operations
  - Operational control defines legal responsibility (at least under German law)
    - no group/corporate responsibility
    - even close co-operation does not create joint responsibility
    - public law has to accept entrepreneurial decisions if settled under civil law
  - Stakeholders (inside and outside the Park) may not be aware of legal changes!





### Industrial Parks: who is the neighbour to be protected?

- Neighbours are protection target of many regulations. Common understanding was that
  - neighbours are outside the fence (“external neighbours”)
  - workers from neighbouring installations on the same site are protected by occupational safety and health regulations
- In Industrial Parks, different companies have to be regarded as neighbours as well (“internal neighbours”)
  - Thresholds for hazardous substances, noise etc. may be exceeded
  - Agreements between companies in the Industrial Park may not waive the right for an impaired health of individual employees
  - Authorities may be forced to act at least after complaints
  - Enforcement of safety & health buffer zones may jeopardize the Park
- “Common sense” solution may be
  - Industrial Parks with good cooperation esp. for Safety and Emergency Management Systems may be treated in regard to neighbourhood like a single user site
  - Regulations may have to be changed to allow that!



### Principles for safe operation of Industrial Parks -1-

#### Safety Management System (SMS)

- Intrinsic conflict between interests of global companies and Industrial Parks
  - Global companies strive for uniform SMS
  - SMS esp. “closed parks” need to be similar or at least compatible
- The elements of SMS require different solutions, e.g.
  - Organisation and Personnel → company specific
  - Planning for Emergencies → site specific
  - Hazardous works regulations, PPE → site specific
  - Management of Change → site compatible
- The different stakeholders in Industrial Parks (operators, infrastructure company, contractors, authorities) at least have to know and understand the differences



### Principles for safe operation of Industrial Parks -2-

#### Process Safety

- Strongly based on company culture
- Different approaches in Industrial Parks have to be accepted
- Different performance is a problem
  - “Low performers” are a “domino risk”
  - Reputation of the Industrial park is influenced by the lowest performers
- Exchange of information and approaches beyond “domino requirements” is a chance to improve overall process safety performance and for a cross-fertilisation of the companies beyond site limits



### Principles for safe operation of Industrial Parks -3-

#### Emergency Management

- Although a basic obligation of the individual operators intense cooperation is necessary not only for “domino establishments”
- “Best practice” is a joint emergency service
  - Mostly provided by infrastructure company
  - Best option to control the overall risk of an Industrial Park
  - Only one interface to public emergency services
  - Fulfilment of “domino requirements”
  - Contractual condition in the majority of “closed parks”
  - Costs should be allocated on a risk basis
- Clear contractual agreements are necessary



#### Principles for safe operation of Industrial Parks -4-

##### Security

- As for emergency response “best practice” is a joint security service and a perimeter fence for the whole Industrial Park
  - Access controls may be adapted to the “average threat level”
  - Additional measures for high risk/vulnerability areas
  - Contractual condition in the majority of “closed parks”
  - Costs should be allocated on a risk basis
- Clear contractual agreements are necessary



#### Principles for safe operation of Industrial Parks -5-

##### Inspections (art. 16)

- Although the individual operator is subject of the inspection, the inspector should take account of the specific issues of Industrial Parks
  - “Joint services” should be inspected separately and “only once”
  - Contractual agreements for joint services have to be reviewed, too
  - Interfaces between operators and providers of joint services (mostly the infrastructure company) need special attention
  - The control of the Industrial Park’s overall risk by the emergency management needs special attention



## Conclusion

- Industrial Parks save the ecological benefits esp. of big chemical sites („Verbund“) in a changing economy
- Seveso II has not foreseen Industrial Parks, but takes into account the aggregated risk of sites
  - Legal focus still on responsibilities of the individual operators
  - Domino requirements, “external events triggering major acc. Hazards”
  - Need for interpretation
- The accumulated risk of these sites has to (and can!) be controlled by co-operation of the individual operators.
  - Contracts & Committees
  - The infrastructure company is „first choice“ to enable that.
- Industrial Parks have to be managed based on contractual agreements (civil law) rather than regulations (public law).
- The main tool of authorities to control Industrial Parks beyond the duties of individual operators are inspections.



## Back-up: Other legal issues (focus on German regulations) -1-

- Hazardous Chemicals (EU-regulation!)
  - Handling of internal intermediates may become „placing on the market“ due to legal splitting
    - Illegal if substance is not registered as existing or new substance!
    - Labelling etc.
  - Transportation inside Parks is regarded as internal if access to the Park is controlled
- Wastewater
  - All rights and responsibilities are with the operator of treatment plant
    - Detailed contractual agreements with the users!!!



**Back up: Other legal issues (focus on German regulations) -2-**

- **Hazardous Waste**
  - Treatment facilities (e.g. incinerator of the infrastructure company) may not be used by other operators
- **Ground Contamination**
  - Detailed Environmental Due Diligence, contractual agreements!
- **Permits**
  - Refer in Germany basically to the installation, not to the operating company - no problem after legal splitting
- **Insurance**
  - Third party liability is significantly higher in Industrial Parks
  - Contractual agreements/waiver (prior to a damage!) are possible



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Seveso Inspection Series Volume 5

Chemical Hazards Risk Management in Industrial Parks and Domino Effect Establishments: Key points and conclusions for Seveso Directive enforcement and implementation

Ragnhild Gjøstein Larsen, Astrid Lie Olsen, Maureen Wood, Zsuzsanna Gyenes

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## **Abstract**

Most EU and EEA countries have a number of Seveso establishments located in large industrial complexes (industrial parks, chemical parks) as well as areas where there is a high density of industrial operators creating a potential risk for domino effects (for example, port areas). Industrial sites that were once unified under one operator's management are now often divided into several companies according to different production and service activities. In this situation several separate organisations may be now working on the same site and share responsibility for certain prevention or mitigation measures. A parallel circumstance exists in domino effect Seveso sites that are not necessarily in an industrial park with shared services. A domino effect is the cumulative effect produced when one event sets off a chain of similar events elsewhere. When performing inspections in these Seveso establishments, inspectors are faced with challenges uniquely due to the proximity of neighbouring companies (both Seveso- and non-Seveso establishments). In particular it becomes a significant challenge for inspectors to obtain assurance that "all necessary measures" have been taken on each site to prevent accidents and limit their consequences, as required by the Directive. This publication was developed from information provided by Seveso inspectors through surveys and a Mutual Joint Visit workshop on good enforcement practice for inspectors to promote effective industrial risk management in industrial parks and on domino effect sites. The publication is part of the Seveso Inspections Series, a set of publications reflecting conclusions and key points from technical exchanges, research and analyses on topics relevant to the effective implementation of the inspection requirements of the Seveso Directive.

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