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Emergency Response Planning for Chemical Accident Hazards

KEY POINTS AND CONCLUSIONS
FOR SEVESO ENFORCEMENT
AND IMPLEMENTATION

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Assessment of Safety Management Systems of Major Hazard Sites



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Abstract:

Emergency response combines with prevention and mitigation to form the risk management triad of control measures for reducing chemical accident risks. In fact, standard good practice dictates that appropriate emergency response measures are identified for every major accident scenario of a hazardous operation. Consistent with this philosophy, emergency planning has been taken on board as an essential component of the Seveso Directive since its inception in 1982. Within the current Seveso Directive (2012/18/EU), under Article 12, emergency planning for upper-tier sites is assigned as a direct obligation to both the operator (for internal emergency planning) and the authorities (for external emergency planning). These obligations present considerable challenges for the authorities, in particular, in verifying that internal emergency planning of each upper tier site is conducted in accordance with Seveso requirements and existing performance standard; that a parallel process for external emergency planning is established; and an appropriate strategy is defined to inform populations potentially at risk from the accident scenarios of concern. To bring improvements and consistency to Member State practices in this regard, the European Commission and the Irish Health and Safety Authority organised a workshop in 2012 for Seveso inspectors from EU and aligned countries to exchange information on challenges and successes in implementing emergency planning obligations. This publication summarizes the main conclusions and observations from the workshop discussions.

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ABBREVIATIONS

AEGL	Acute Exposure Guideline Limit
BLEVE	Boiling Liquid Expanding Vapour Explosion
CCA	Central Competent Authority
CCPS	COMAH, Chemical Production and Storage
COMAH	Control of Major Accident Hazard Regulations
EEP	External Emergency Plan
ERPG	Emergency response planning Guideline
ERT	Emergency Response Team
HSA	Health and Safety Authority
IEP	Internal Emergency Plan
IP19	IP Model Code of Safe Practice in the Petroleum Industry Part 19: Fire Precautions at Petroleum Refineries and Bulk Storage
kW/m ²	Kilowatts per square metre, measure of thermal flux

LCA	Local Competent Authority
LUP	Land-Use Planning
MAHB	Major Accident Hazards Bureau
MJV	Mutual Joint Visit
PIZ	Public Information Zone
SMS	Safety Management System
TWG	Technical Working Group

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 cooperation. 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 European Union.

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 country 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 to represent Seveso inspection programmes throughout the European Union. The TWG is coordinated by the Major Accident Hazards Bureau (MAHB) of the European Commission's Joint Research Centre with the support of DG Environment.

This publication, "Emergency response planning" 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 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 Seveso countries (hence visits would be "mutual") and targeted for working inspectors of other Seveso countries (and thereby "joint" visits) charged with assessing compliance with the Seveso II Directive in industrial installations. The MJV Programme is managed by MAHB 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 TWG. 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 Seveso countries 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.

For more information on Seveso inspections, please visit <http://sevesoinspections.jrc.it>. This site and the MAHB website (<http://mahbsrv.jrc.ec.europa.eu>) contain useful references to Seveso legislation, its implementation and related risk management and assessment projects.

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The authors are thankful to the advice and contributions of colleagues in the Irish central and local competent authorities as well as that of the colleagues participating from other EU Member States, Candidate and EEA countries. Their willingness to share their extensive knowledge and experience helped to ensure a rich open discussion during the workshop on their efforts to fulfil the letter and spirit of authority responsibilities associated with emergency response planning on Seveso sites. It is hoped that the insights reflected in this publication will give inspectorates and local authorities throughout the Seveso implementing countries useful information and support for their commitment to minimizing the consequences of a chemical accident emergency on local communities.

EXECUTIVE SUMMARY

It is long accepted that effective management of chemical accident risks requires a wholistic approach such that all possible prevention, mitigation and emergency response measures are taken into account to achieve risk reduction objectives. The European Union's Seveso Directive, established in 1982 for the control of major chemical hazards, expresses a firm commitment to this philosophy, strengthening and refining it successively in both Seveso II and now the current Seveso III Directive (2012/18/EU). In particular, Seveso II and III reflected this vision broadly through the general obligation to take "all necessary measures" and in giving central importance to implementation of an effective safety management system that promotes integration of business operations with prevention, mitigation and emergency planning measures, in full recognition of the functional interdependencies that ultimately drive safety performance.

In chemical risk management, there is a hierarchical relationship between the three types of measures, such that prevention measures are considered the highest level of protection, followed by mitigation to reduce impacts, with emergency planning and response to reduce consequences in the event that prevention and mitigation fail to prevent a major incident. Since the probability of failure of both prevention and mitigation measures is considered

greater than one, it is standard good practice to assign appropriate emergency response measures (internal and external) to every major accident scenario on a site. The assignment of emergency response measures is the function of emergency planning. As such, emergency planning is a specific obligation of the Directive embedded in Article 12.

Despite its importance in Seveso implementation, emergency planning practices are only occasionally raised as a topic for EU level exchange among Seveso authorities. There remain numerous opportunities for information exchange on emergency planning for chemical hazard sites at EU level in the context of EU co-ordination on civil protection and public health response to hazardous materials and environmental accidents. However, these exchanges often do not support exchanges that specifically address Seveso obligations, in particular, how certain provisions are interpreted, successes and challenges in practices used in enforcement and implementation, and tools and scientific references for determining technical inputs to emergency planning decisions.

For this reason, it was considered that a workshop on Emergency Planning for Seveso authorities would offer an opportunity to start a dialogue on this topic at EU level. To this end, the Irish Central Competent Authority (CCA) proposed to host a workshop on emergency planning to the European Commission and the EU Technical Working Group on Seveso Inspections in the framework of the Mutual Joint Visit (MJV) programme of workshops specifically targeting

the Seveso inspector community. Since 1999, the MJV programme of workshops has served as a vehicle for the promoting of technical exchange among Member State Seveso inspectors on relevant topics for implementation and enforcement of the Seveso Directive.

Therefore, on 3-5 October 2012, the Health and Safety Authority (HSA), the CCA in Ireland for the Control of Major Accident Hazard Regulations (COMAH), hosted a Mutual Joint Visit (MJV) Phase 2 workshop on *Emergency Response Planning* in Dublin, Ireland¹. The purpose of the MJV was to share good practice for emergency planning within Seveso countries and identify possible areas of future exchange or collaboration at EU level in future. The dialogue fostered by the workshop could be

¹ The HSA is the sole CCA for the Seveso Directive 98/82/EC in Ireland. It is primarily an occupational health body. Internally it is split into three divisions one of which has responsibilities in the chemical area – the Chemical and Prevention Division. The unit within the Division dealing with Seveso is COMAH, Chemical Production and Storage. The unit has a manager and seven inspectors based between Dublin and Cork. The unit also deals with sub-COMAH sites and a number of specialised sectors. The inspectors of the unit assess safety reports and provide Land-Use Planning advice as well as carrying out the COMAH inspections. They also prepare files where enforcement actions are initiated. Local Competent Authorities are responsible for emergency planning in Ireland. These usually consist of the local fire authority, An Garda Síochána (National Police Service of Ireland) and the Health Service Executive (body with statutory responsibility for the management and delivery of health and personal social services in the Republic of Ireland). COMAH inspectors from the HSA also attend internal and external emergency plan tests.

particularly beneficial for the EU enforcement community given the number and variety of competent authorities involved in some way with emergency response planning throughout the EU and widely differing national approaches.

This publication presents the highlights of the exchanges during this workshop with the expectation that they will provide knowledge to improve emergency planning practices to competent authorities in all Seveso countries as well as the broader stakeholder community.

1.3 Proceedings and outcomes

Exchanges have a number of benefits including benchmarking of good practice, sharing of common concerns, and identification of emerging challenges that could be the topic of future dialogue collaboration. In this workshop, the following topics were proposed as the basis of discussions:

- Emergency planning in the safety management system: How should the emergency planning processes be described and what are good practices for assessing these processes?
- Testing of the External Emergency Plan (EEP): How should EEPs be tested? What is the role of the competent authority in regard to EEP testing?
- Establishing the public information zone: How should the public information zone be determined? What is best practice for providing

information to the public and communicating during a major accident?

- Determining the emergency planning threat zone: How is the emergency planning threat zone determined? How is the critical accident scenario selected?

In this document, outcomes are presented for each topic.

How is the safety management system assessed in practice with regard to emergency planning and response?

- **Checklists:** The SMS for emergency planning and response is generally assessed using checklists and by examining documentation including the emergency policy of the company.
- **Coordination:** Inspections may be co-ordinated between competent authorities or they may be carried out by individual competent authorities.
- **On-site exercises:** A number of countries consider that it is also necessary to assess the emergency response exercise in order to have a complete picture. In particular, on-site exercises are also used as a means of assessing the SMS. Emergency response exercises can be especially useful for observing deficiencies in the internal and external emergency plans.
- **SMS and emergency response testing:** There was some variation between Seveso countries

about assessing the SMS as part of emergency response testing. Some countries reported that on-site exercises are used while others reported that the SMS is not assessed as part of emergency response testing.

- **Role of Inspections.** To complement the safety report review, an onsite inspection can be used to verify the emergency response plan, e.g.,
 - that the operator has an emergency response department or section,
 - that there is an emergency response policy,
 - that emergency responders are present,
 - that a risk assessment has been documented,
 - that sprinklers and other control equipment function as intended.
- **Joint inspections:** The use of joint inspections by competent authorities to assess the SMS varies between Seveso countries. In some countries, the inspections are coordinated and in others, the individual competent authorities carry out their own inspections. An example was given by one Member State where the environmental agency inspects the documentation and the fire brigade and civil protection agencies do the on-site inspection and check the emergency plan.
- **Assessment of the SMS.** The SMS assessment should verify that the safety management system (SMS) is not an isolated exercise, but grounded in reality. A “reality check” could look for the following information:

- o Evidence of adequate staff and equipment resources
- o Documentation that critical control systems (instrumentation, equipment, structures, etc.) have been identified and are inspected and tested regularly
- o Consideration of risks to emergency response teams in scenario development, including:
 - timing of the emergency response effort for different scenarios
 - consideration of different decision pathways based on different scenario outcomes
 - pathways to escalation for each scenario identified.
- **Assessing scenarios.** Several countries agreed that selection of the most appropriate major accident hazard scenarios for the EEP is a significant challenge. At least one country focuses the emergency planning assessment on the scenarios, by reviewing the scenarios (for completeness, quality), the comments made by fire rescue, and whether the emergency response plans are practical and effective.
- **Reviewing the safety report.** Some countries consider that it is adequate to assess emergency planning on the basis of the safety report alone. However, several countries disagreed with this point. Many countries felt the information in the

safety report was not sufficient for judging the quality of emergency planning.

What is the best way to test the EEP?

- **Live vs. desktop exercises.** Live exercises are carried out in more detail and are deemed to be important for finding weaknesses in EEPs. However, desktop exercises seem to be carried out more frequently in Seveso countries because they are easier to organise when there are a large number of sites and less costly. Desktop exercises are thought to be useful in understanding the roles of the competent authorities. For example, it can be beneficial to conduct a table top exercise initially so that logistical issues are resolved before running with a live exercise. In fact, live and desktop exercises have important complementary functions and should each be incorporated into the testing routine.

EEPs for domino establishments are tested at the same time in some countries.

- **Scenario selection for testing the EEP.** EEPs are generally tested using a standard or guidance, which tends to vary at national and local levels. They are generally based on major accident hazard scenarios identified in the safety report but not necessarily the worst case scenario. The workshop groups highlighted the importance of selecting good scenarios in order for EEP tests to be successful.

Mitigation measures proposed by the establishment are tested as part of the EEP in some countries and it is expected that the operator would brief the fire services on arrival. In others, it is an internal matter between the fire brigade and the operator when testing the IEP.

- **Reporting test results.** Written reports are prepared in all Seveso countries after EEP tests. In some, the local competent authorities are responsible for producing the reports. The operator may also be required to report on testing of the internal emergency plan.
- **Participation and observation by competent authorities.** The role of each competent authority is considered to be clear regarding the testing of EEPs. In some Seveso countries the national authority has a reporting role only while in others, a national authority may be required to liaise with the operator on the interface between the IEP and the EEP and assist the local competent authorities, particularly if the operator is reluctant to provide information. The local competent authorities are responsible for drawing up the EEP in most Seveso countries.

In some Seveso countries, all relevant authorities attend EEP tests. In others, the CCA may or may not attend EEP tests and may give advice. The importance of going on-site and making an assessment was emphasised by some participants.

- **Internal vs. external emergency plan testing.** IEPs are examined to determine the site hazards and associated risks, planned site responses and potential to interact with the external emergency responders. These are all vital contributors to the preparation of a good EEP.

There was some variation between Seveso countries regarding testing of the IEP in conjunction with the EEP. Some countries require or prefer testing of the IEP in conjunction with the EEP. In others, it is written into the procedures and is carried out during live exercises but not during desktop exercises. As a practical matter, resources and competence are not always available for both tests to be undertaken at the same time.

- **Pre- and post-brief testing.** Briefing before exercises and a thorough debriefing afterwards are essential components. If major deficiencies are identified during an EEP test, it is not usually re-tested. However, deficiencies are followed up and remedied. EEPs should be live documents that are updated following tests. Debriefing after the exercise ensures that the weaker elements of the EEP are disposed of and the good elements are retained, with a record kept of the changes made and the reasons for them.
- **Cost of testing.** Testing emergency plans can be quite costly. The recovery of costs for EEP tests varies between Seveso countries. Sometimes

costs are recovered indirectly through a special tax on Seveso sites. In a few countries, the competent authorities charge the operator for use of their resources in testing exercises (either a specific percentage or a fixed cost). However, in a number of countries the competent authorities absorb all the costs generated from their participation. In one country, the local competent authorities can make a reduction in the cost if they get a training benefit from the exercise. A few countries charge for the running of EEP tests.

How is the emergency planning threat zone determined?

- **Role of authorities vs. role of industry in selecting reference scenarios.** In general, the operator is responsible for defining major accident scenarios in the safety report. However, countries vary as to whether the operator also selects the reference scenario(s) for external emergency response planning. A few countries even prefer that operators in the same local area consult together to select an appropriate scenario for external planning purposes.

In some cases, scenarios for emergency planning may be identified as a distinct set of scenarios within the safety report or in a separate document.

- **Methodology for selecting reference scenarios.** Based on various criteria, the

authority or operator will select the appropriate scenario(s) to define the threat zone(s). There is variation among countries in the degree of liberty that the operator is allowed in selecting methodologies, endpoints (e.g., exposure levels) and other inputs. Generally, regardless of how the selection process is defined, authorities must examine the outcome and review the associated calculations to ensure that they are consistent and reasonable, that the operator has used recognised methods, and can justify the method that has been chosen.

The factors that determine the modelling methodology accepted by the authorities may also depend on whether risk or consequence-based approaches are preferred. Some Seveso countries require that specific methods are applied to support authority obligations for land-use and emergency planning. Indeed, some countries are very specific in requiring a certain approach (deterministic or risk-based) to select threat zone scenarios for emergency planning. There are also countries that prefer a consequence-based approach for selecting threat zone scenarios, while accepting or even encouraging a risk-based approach for safety report (i.e., SMS) scenarios.

- **The worst case scenario.** Some countries have adopted an approach that specifically uses the “worst case scenario” (or “credible worst case scenario”) to drive emergency planning. The definition of worst case scenarios may sometimes

differ from the definition of the scenarios selected by the site as a basis for the safety management strategy in the safety report. For example, the emergency planning process may not allow application of technical measures for controlling or mitigating accident consequences of the reference scenario, these same measures may be assumed for purposes of site risk management. Guidance for determining the worst case scenario appears to be available in some Seveso countries.

- **Acceptance of mitigation measures.** In some Seveso countries, implementation of technical measures for mitigation and control are considered as part of the IEP only, while they will by default be taken into account in countries when risk based calculations drive scenario selection. For consequence-based approaches, whether mitigation and control measures are accepted in the scenario depends on expert judgement concerning the reliability of the measure in an emergency situation. Some countries stated that it can be difficult to assess the reliability of on-site mitigation measures outside a risk context. Some authorities take the approach that technical mitigation measures (e.g., passive measures) are acceptable, but not active measures.
- **Domino effects.** Reference scenarios involving domino effects from multiple sites are also considered in some countries.

How should the Public Information Zone be determined?

- **Methods for identifying who should receive information (“the public information zone” or PIZ).** Countries vary considerably in the approach to identifying the geographical area defining the population, the “public information zone”, that should be informed about the presence of a chemical accident risk (“persons likely to be affected” in Article 14). Selecting the PIZ may be the responsibility of the national authority, local authority or operator depending on the Member State. Consequence-based approaches (rather than risk-based) are most commonly used for determining the PIZ

In some Seveso countries, determination of the PIZ is related to the EEP and is based on the maximum consequence scenario zone. Some countries, such as Ireland and the UK, have established a specific methodology to define the PIZ. In other countries, the public information area is based on information provided by the operator and it is determined in consultation with the local authority. Methodologies used for external emergency planning, such as Aloha and Effects, may equally be applied to determine PIZ’s but the results may be applied differently for PIZ’s than for threat zones.

Participants agreed that it would be useful to have common general principles or “benchmarks” for establishing PIZs, that could then be further

interpreted by Seveso authorities to meet local needs.

- **Determining “persons likely to be affected”.** There was a discussion about “persons likely to be affected” in terms of Article 14 vs. Article 16 (Information to be supplied by the operator and actions to be taken following a major accident”). For preparedness purposes, “persons likely to be affected” are defined broadly on the basis of an equally possible range of consequences for a given reference scenario. The geographic distribution and affected population may be much wider than if that accident actually were to occur, because a wide range of possible impacts must be taken into consideration to cover all possible sequences of events. For post-emergency communication the term “likely” is not relevant with respect to the scenario because the accident has already happened and to a large extent, the geographic scope and severity of consequences is known. Rather, “likely” applies to those who are in fact known to be affected already.
- **Defining the term “affected”.** Another related question was raised concerning the term “affected”. It was suggested that definition of this term is subject to broad interpretation. For example, in Ireland, Zone 3 of the public information zone is purposely defined so that it could possibly include those that may not be very much affected in human health terms, but could

experience other impacts, such as disruption of local services (e.g., electrical, telephone, roads, etc.) or populations that are simply close enough distance to the impact zone to be apprehensive about their own situation.

- **Costs.** In some Seveso countries, the costs associated with determining the PIZ are included in the costs associated with assessing the safety report. Some pass the costs onto operators while others do not.

What is best practice for provision of information to the public?

- **Pre-incident information to the public.** Most Seveso countries reported that information to the public should be disseminated both electronically and by leaflet. It was suggested that websites with risk information on maps and data contained as part of the permit process operated by some countries could be used. Citizens themselves can check what Seveso sites are present in their local area and sometimes also whether they are within a threat zone. Coupled with proactive outreach, online communication can be advantageous because it can be updated regularly at low cost and has potential to host a wide range of information.
- **Responsibility for public information.** Approval and communication of information to be communicated is managed differently in Seveso countries, also depending on whether it is pre-

incident information or after a major accident has occurred. The national authority takes a leading role in some countries defining the strategy and determining the content, particularly for pre-incident information, but in some countries this responsibility is allocated to local authorities (which could be the municipality, the fire brigade, a public health office, for example) with the national authority in a consultative and/or approval role. A number of countries reported that it is the responsibility of the emergency responders, not the CCA to communicate with the public during a major accident. It appeared that the size of the country and the historic role of the national government in emergency planning may play a significant role in this decision.

- **Crisis communication.** A number of suggestions were made about the means that could be used to inform the public during a major accident including public and company alarms, TV, radio, telephone, Short Message Service (text) and social media. Online sites for communicating to the public are also increasingly used to communicate risk and preparedness information.
- **Use of sirens.** There was much discussion during the plenary session about the means used to inform the public other than a siren. In response to a question about the best way to inform the public, it was suggested that meetings with local community groups and regular talks could be

used. In order to ensure that everyone received the information, the use of widespread advertising campaigns and information displayed in many locations was suggested.

- **Use of social media.** The use of social media (e.g., Twitter) for communicating during emergencies has become a global phenomenon. Thus far the use of social media as part of a communication strategy during a Seveso emergency does not appear to be widespread among Seveso countries. During such emergencies, the affected people are sometimes told to avoid using their phones and in some cases the authorities may have to prevent public access to the mobile network. Still, some authorities have tried it, with positive results in some cases, and less positive results in others. Therefore, at the time of the workshop, it appeared that use of social media for public communication in Seveso emergencies was an isolated, rather than standard, practice, especially since it did not appear that any national authorities represented at the workshop had adopted or tested its use for this purpose. It could be that this situation changes over time.

Conclusions

The results of the workshop made evident the significant benefits of exchanging good practice on emergency response planning between Seveso

authorities. This particular exchange included a discussion on a number of basic topics, how is emergency planning in the SMS and safety report assessed, how is testing conducted and what role do authorities play in it, and what means of communication are used to communicate to the public exposed to chemical risk as well as when an accident occurs. The workshop also touched on important and challenging technical topics associated with emergency planning, including the practical aspects of response that must be considered (e.g., timing, resources), how and what to test in test exercises, preparing responders for crisis communication and decision-making, defining reference accident scenarios for emergency response plans, and determining the geographic area for disseminating pre-incident information. These topics could be easily explored further and in greater depth at a future workshop or other similar venue. Emergency planning for Seveso sites may also be an interesting topic for further research, including as a special topic for analysis of lessons learned from past accidents. In addition, it could be also envisioned that these types of exchanges may benefit from including EU civil protection authorities and public health authorities with related responsibilities at EU level. As EU level co-ordination and technical support for Member States continues to evolve in the context of Seveso, and EU disaster risk management policy, there may be further opportunities for many of these ideas to be explored and elaborated.

1. EMERGENCY PLANNING IN THE CONTEXT OF THE SEVESO DIRECTIVE

It is long accepted that effective management of chemical accident risks requires a wholistic approach such that all possible prevention, mitigation and emergency response measures are taken into account to achieve risk reduction objectives. In particular, Seveso II and III reflected this vision broadly through the general obligation to take “all necessary measures” and in giving central importance to implementation of an effective safety management system that promotes integration of business operations with prevention, mitigation and emergency planning measures, in full recognition of the functional interdependencies that ultimately drive safety performance.

In chemical risk management, there is a hierarchical relationship between the three types of measures, such that prevention measures are considered the highest level of protection, followed by mitigation to reduce impacts, with emergency planning and response to reduce consequences in the event that prevention and mitigation fail to prevent a major incident. Since the probability of failure of both prevention and mitigation measures is considered greater than one, it is standard good practice to assign appropriate emergency response measures (internal and external) to every major accident scenario on a site. The assignment of emergency

response measures is the function of emergency planning. As such, emergency planning is a specific obligation of the Directive embedded in Article 12.

The Seveso Directive requires operators of upper-tier establishments where dangerous substances are present in significant quantities, to prepare an internal emergency plan (IEP) for the measures to be taken inside an establishment in the event of a major accident. They are also required to provide the necessary information to competent authorities to enable them to prepare an external emergency plan (EEP).

The Directive states that emergency plans must be established with the objectives of:

- containing and controlling incidents so as to minimize the effects, and to limit damage to man, the environment and property,
- implementing the measures necessary to protect man and the environment from the effects of major accidents,
- communicating the necessary information to the public and to the services or authorities concerned in the area,
- providing for the restoration and clean-up of the environment following a major accident.

The emergency plans are required to contain the information set out in Annex IV of the Directive, specifying the minimum data and information to be provided in both internal and external emergency plans.

In addition, emergency planning is identified as one of the 7 key elements of the site safety management system as described in Annex III of the Seveso Directive.

“Planning for emergencies — adoption and implementation of procedures to identify foreseeable emergencies by systematic analysis, to prepare, test and review emergency plans to respond to such emergencies and to provide specific training for the staff concerned. Such training shall be given to all personnel working in the establishment, including relevant subcontracted personnel”

1.1. Challenges in enforcing and implementing effective emergency planning within Seveso countries

The Seveso Directive requires that external emergency plans prepared by the authorities should take account of risks associated with upper tier establishment. Most countries do not require that external emergency plans account also for hazards present at lower-tier establishments. Rather, they are usually assumed into the general intervention plans prepared for a locality by the local fire brigade.

In practice a formal internal emergency plan is also required for every establishment in every country. Usually, there is specific legislation (mostly fire protection legislation) that imposes this standard and covers a wide range of establishments that is much broader than Seveso establishments.

The emergency plan is usually based on scenarios. These scenarios should consider all environmental, health and safety issues. Some scenarios require specific intervention material and equipment, e.g., foam, floating barrages.

In general, it is considered that the emergency plan should include (but not be limited to):

- a description of all reference scenarios
- the intervention strategy for each scenario
- links to relevant codes and good practices
- site plans identifying key locations and areas where hazardous materials are present
- an inventory of intervention equipment and manpower available
- other information of importance to emergency services

The emergency plan must take into account normal and abnormal conditions, different working conditions (night, weekend), and other routine variations in the plant schedule that might require additional or different emergency planning measures.

For additional assurance, inspectors should discuss emergency plans with fire brigades. The fire brigades often can confirm whether the site is appropriately prepared to implement the measures foreseen in the emergency plan. For example, they can provide information on the equipment, materials, knowledge, experience, and manpower available to the site for immediate use in case of an accident.

Each Member State has developed its own implementation approach to this obligation. The roles of competent authorities may vary considerably in Seveso countries, in particular, depending on the size of the Member State, the role of fire services assigned in national legislation associated with the Seveso Directive, and the degree to which Seveso enforcement is centralised or de-centralised. Different competent authorities may play different roles within the same Member State. Typical responsibilities assigned to one or more competent authorities under this obligation may include, but not be limited to, the following:

- Notifying other relevant competent authorities of the existence of an upper-tier site and providing the associated safety report
- Reviewing the safety report of upper-tier sites to check scenarios for onsite emergency planning measures

- Reviewing the safety report to assess how emergency planning is implemented within the safety management system
- Inspecting the site to verify the internal emergency plan and onsite emergency response measures
- Facilitating information exchange between the operator and other relevant competent authorities for external emergency planning purposes
- Leading the development of external emergency plans
- Advising on or reviewing external emergency plans
- Attending exercises to test the external emergency plan and making observations on those tests
- Ensuring that the public concerned is given early opportunity to give its opinion on external emergency plans when they are being established or substantially modified

The diversity of responsibilities combined with the diversity of Member State institutional historical, and social differences represents both a significant advantage and disadvantage for promoting an EU wide vision of emergency planning for major hazard sites. On the one hand, the diversity fosters creativity, and to some extent, each Member State is a testing ground for other Seveso countries for a

particular approach to implementation and enforcement. The most effective approaches eventually can be shared with other countries for the benefit of risk management EU-wide. On the other hand, diversity in approaches can also lead to inconsistency in the assessment and implementation of emergency planning across the EU, in turn leading to perceptions of unfairness and even varying levels of safety performance.

Given these considerations, emergency planning is a fruitful area for exchange of information between Seveso competent authorities across Europe. Exchanges have a number of benefits including benchmarking of good practice, sharing of common concerns, and identification of emerging challenges that could be the topic of future dialogue collaboration. In particular, there are specific elements of emergency planning that could benefit in this regard, notably:

- Emergency planning in the safety management system: How should emergency planning be described and what are good techniques for assessing them?
- Testing of the External Emergency Plan (EEP): How should EEPs be tested? What is the role of the competent authority in regard to EEP testing?
- Establishing the public information zone: How should the public information zone be

determined? What is best practice for providing information to the public and communicating during a major accident?

- Determining the emergency planning threat zone: How is the emergency planning threat zone determined? How is the critical accident scenario selected?

An effective approach to emergency planning depends on both the actors and the information available to support these critical aspects. Indeed, emergency planning is somewhat unique compared to prevention and mitigation in that it does not belong solely to the site operator. It represents the operational interface in which the operator and the local authorities share responsibility for controlling accident impacts. Therefore, the interaction between these actors, the sharing of relevant inputs with appropriate detail, competency on each side, and the degree to which there is a shared philosophy towards managing chemical accident emergencies, are all factors that can help or hinder a good planning process.

Moreover, emergency planning has the same complex technical requirements as prevention and mitigation and land-use planning. The site risk assessment process also drives the decision-making within this important function. As such, operators and competent authorities face the same challenges in emergency planning as with these related disciplines in terms of the establishment of criteria for decision-making, obtaining correct and complete data for the

decision process, and dealing with the inherent uncertainties of risk assessment in general.

For this reason, the Irish authorities proposed an EU level workshop for sharing and comparison of Member State experience and practices in emergency planning, with the view that exchange could be highly beneficial to all Seveso countries to identify and improvements to their emergency planning processes.

1.2. The Mutual Joint Visit Workshop on emergency planning

On 3-5 October 2012, the Health and Safety Authority (HSA), the Central Competent Authority (CCA) in Ireland for the Control of Major Accident Hazard Regulations (COMAH), hosted a Mutual Joint Visit (MJV) Phase 2 workshop on *Emergency Response Planning* in Dublin, Ireland². The MJV programme is

² The HSA is the sole CCA for the Seveso Directive 98/82/EC in Ireland. It is primarily an occupational health body. Internally it is split into three divisions one of which has responsibilities in the chemical area – the Chemical and Prevention Division. The unit within the Division dealing with Seveso is COMAH, Chemical Production and Storage. The unit has a manager and seven inspectors, based between Dublin and Cork. The unit also deals with sub-COMAH sites and a number of specialised sectors. The inspectors of the unit assess Safety Reports and provide Land-Use Planning advice as well as carrying out the COMAH inspections. They also prepare files where enforcement actions are initiated. Local Competent Authorities are responsible for emergency planning in Ireland. These usually consist of the local fire authority, An Garda Síochána (National Police Service of Ireland) and the Health Service Executive (body with statutory responsibility for the management and

shown in Annex 1. The purpose of the MJV was to share good practice for emergency planning within the Seveso countries and identify possible areas of future exchange or collaboration at EU level in future. The dialogue fostered by the workshop could be particularly beneficial for the EU enforcement community given the number and variety of competent authorities involved in some way with emergency response planning throughout the EU and widely differing national approaches.

Since 1999, the Mutual Joint programme of workshops for Seveso inspections has served as a vehicle for the promoting of technical exchange among Member State Seveso inspectors on relevant topics for implementation and enforcement of the Seveso Directive. The programme is sponsored by the European Commission on behalf of the Committee of the Competent Authorities for Implementation of the Seveso II Directive and DG-Environment, and is managed by the Major Accident Hazard Bureau (MAHB) of the European Commission's Joint Research Centre with oversight of TWG 2. The programme offers Seveso countries the opportunity to develop together a more sophisticated understanding of what constitutes Seveso compliance and acceptable safety in an inspection context. Moreover, it is rooted in the belief that countries can learn from each other and by doing so increase their technical proficiency and the

delivery of health and personal social services in the Republic of Ireland). COMAH inspectors from the HSA also attend internal and external emergency plan tests.

effectiveness of their respective inspection programmes.

The HSA took the lead in planning the programme of the MJV workshop with advice from the EC-JRC-MAHB. The programme structure took on board the established MJV protocols and incorporated (as appropriate) suggestions for achieving good outcomes from MJV workshops based on past workshop experiences shared by the EC-JRC-MAHB and the TWG 2, including past MJV host countries.

In addition to representatives from the Irish authorities and EC-JRC-MAHB, there were 27 participants from 21 countries (18 Member States, 2 countries in the European Economic Area (EEA), and 1 Candidate Country), and a representative from industry³. (For a list of participants, see Annex 2.)

The MJV ran over three days and was divided into four separate sessions (called “workshops” in the programme. The themes of the sessions were as follows:

³ Under the Agreement on the European Economic Area (EEA), EEA countries must implement EU environmental legislation, including the Seveso Directive (except Liechtenstein, since it has not had Seveso sites in the past). Candidate Countries are also obliged to work towards Seveso Directive adoption and implementation. Since both EEA and Candidate Countries participate

Session 1: Safety Management System, Emergency Planning and Response

Session 2: Testing of Emergency Plans and the Role of the Competent Authorities

Session 3: The Public Information Area and Communicating with the Public

Session 4: The Worst Case Accident and Threat Zone for Emergency Planning

A similar format was employed for each session, with approximately one-third of each session devoted to introductory presentations, one-third to small group discussion, and one-third to a plenary discussion as follow-up to the small group discussions. The introductory presentations served to set the scene and highlight questions to be considered in the subsequent discussion. For the break-out discussions, participants were divided into three subgroups and asked to discuss and document their reactions to a structured set of questions on the topic. Then the follow-up plenary session focused on sharing and discussing the highlights from the small group exchanges amongst all participants.

The programme for each session is outlined in Annex 3 and shows the titles of the presentations and the main workshop questions including the additional bullet point questions.

This publication presents the highlights of the exchanges during this workshop with the expectation

that they will provide knowledge to improve emergency planning practices to competent authorities in all Seveso countries as well as the broader stakeholder community.

2. ASSESSING EMERGENCY PLANNING AND RESPONSE WITHIN THE SAFETY MANAGEMENT SYSTEM

This section of the report describes the main conclusions and observations from the workshop in regard to defining and assessing emergency planning in the context of the safety management system (SMS). This session focused in particular on identifying best practice for assessing the safety management system regarding emergency planning and response. It also highlighted the risks to site and civil emergency response teams (ERTs) and the need to assess this both in the safety report and in emergency response plans. There is substantial evidence in recent incident history documenting emergency planning failures, especially in consideration of numerous fire-fighter fatalities caused by chemical accidents all over the world. The investigation report of the U.S. Chemical Safety Board (CSB) from the Albert City, Iowa turkey farm BLEVE (Boiling Liquid Expanding Vapour Explosion) is one important case study in this regard⁴.

⁴<http://www.csb.gov/herrig-brothers-farm-propane-tank-explosion/>

Workshops 1 and 2 aimed to find answers to the following specific questions in regard to safety management systems:

1. *How is the safety management system assessed in practice with regard to emergency planning and response?*
2. *What information should be included on the safety management system in the Major Accident Prevention Policy document and safety report?*
3. *Are the roles of each competent authority clear with regard to testing External Emergency Plans (EEPs)?*
4. *What is the best way to test EEPs?*

In many cases, significant accident impacts can be traced directly to poor emergency response plans prepared by local authorities and operators. Often ERTs are put at unnecessary risk. There is also some evidence that small to medium sites may present the greatest risk to ERTs.

It was indicated by some participants that assessment needs to be made more challenging for operators. In general, most Seveso countries assess the SMS for emergency planning and response using checklists and by examining documentation including the emergency policy of the company. The approaches, including checklists, are not always well-coordinated between the various authorities, especially in countries where inspection is decentralized (performed by local inspectorates). In some countries,

one authority may be legally required to distribute the operator's documentation to other authorities.

The Seveso Directive states that internal and external emergency plans must be not only reviewed but also tested, and where necessary revised and updated by the operators and competent authorities at suitable intervals of no longer than three years. In regard to the testing of external emergency plans, the role of the competent authority is fairly clear. A local competent authority is usually responsible for drawing up the external emergency plan in most countries. In some countries, the national competent authority has a reporting role only, such that its oversight is limited to the assessment of emergency planning and control measures in the safety report. In others, the national authority may be required to liaise with the operator on the interface between the internal and external emergency plans and assist the local authorities, particularly if the operator is unwilling to provide much support.

Good communication and exercises involving both internal and external responders are important to maximize cooperation in the case of a real emergency. There can often be cultural differences that, if not overcome, may present a serious obstacle to effective response management. For example, it is

Chemical Business Services (CBS) Division - Guidance on "all necessary measures" at Petroleum Bulk Stores				Chemical Business Services (CBS) Division - Good Practice at Petroleum Bulk Stores - IP 19, Emergency Response			
Prepared by:	Approved by:	Issued by:	Revised By:	Prepared by:	Approved by:	Issued by:	Revised By:
Date: 20/10/2010	Date: 11/11/2010	Date: 20/10/2010	Approved By:	Date: 20/10/2010	Date: 11/11/2010	Date: 11/11/2010	Approved By:
Document Number: 01.06.29		Version: 1	Date:	Document Number: 01.06.31		Page: 1	Date:
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FIGURE 1: EXCERPT FROM TABLE OF CONTENTS FROM IRELAND'S NATIONAL IMPLEMENTATION GUIDANCE (2010 VERSION)

often the case the emergency response team (internal) is more aware of the hazards and risks of a scenario than the civil response team, with the general public and the press being least aware. This situation is somewhat inevitable considering that the on-site team has an inside track on what exists on site and the operational environment. The planning and testing process can help build awareness about specific risks across the teams and reduce other potential conflicts in approaches that could be detrimental to emergency response efforts.

2.1. Practices for assessing emergency planning within the SMS

From the discussions, approaches to the assessment of emergency planning within the SMS can be summarised as follows:

- **Checklists:** The SMS for emergency planning and response is generally assessed using checklists and by examining documentation including the emergency policy of the company.
- **Coordination:** Inspections may be co-ordinated between competent authorities or they may be carried out by individual competent authorities.
- **On-site exercises:** A number of countries consider that it is also necessary to assess the emergency response exercise also as a means of assessing the SMS. Emergency response exercises can be especially useful for observing deficiencies in the internal and external emergency plans. However, some Seveso countries reported that the SMS is not assessed as part of emergency response testing.
- **Role of inspections.** To complement the safety report review, an onsite inspection can be used to verify the emergency response plan, e.g.,

- that the operator has an emergency response department or section,
 - that there is an emergency response policy,
 - that emergency responders are present,
 - that a risk assessment has been documented,
 - that sprinklers and other control equipment function as intended.
- **Joint inspections:** The use of joint inspections by competent authorities to assess the SMS varies between Seveso countries. In some countries, the inspections are coordinated and in others, the individual competent authorities carry out their own inspections. An example was given by one Member State where the environmental agency inspects the documentation and the fire brigade and civil protection agencies do the on-site inspection and check the emergency plan.
- **Assessment of the SMS.** The SMS assessment should verify that the safety management system (SMS) is not an isolated exercise, but grounded in reality. A “reality check” could look for the following information:
 - Evidence of adequate staff and equipment resources
 - Documentation that critical control systems (instrumentation, equipment, structures, etc.) have been identified and are inspected and tested regularly
 - Consideration of risks to emergency response teams in scenario development, including:

- timing of the emergency response effort for different scenarios
 - consideration of different decision pathways based on different scenario outcomes
 - pathways to escalation for each scenario identified.
- **Assessing scenarios.** Several countries agreed that selection of the most appropriate major accident hazard scenarios for the EEP is a significant challenge. At least one country focuses the emergency planning assessment on the scenarios, by reviewing the scenarios (for completeness, quality), the comments made by fire rescue, and whether the emergency response plans are practical and effective.
- **Reviewing the safety report.** Some countries consider that it is adequate to assess emergency planning on the basis of the safety report alone. However, several countries disagreed with this point. Many countries felt the information in the safety report was not sufficient for judging the quality of emergency planning.
- **Examples of country specific practices:**
 - o Belgium. The SMS is assessed by the way in which the emergency exercise is performed.

Case Study on Planning for Emergencies:

Handling 90% of gross domestic product exports, the Dublin port area is of immense strategic importance to the national economy. It hosts twelve Seveso establishments in total, most of which are involved in petroleum bulk storage.

It had been the practice for many years that the petroleum storage operators relied on a common infrastructure provided by the Port Authority to mitigate major fire accidents since they did not individually have sufficient resources for this purpose. The Irish CCA (HSA) had encouraged the Port Authority to upgrade the common facility for emergency response and an independent report made detailed recommendations in this regard in 2006.

When the project stalled in 2008, the CCA engaged with the Port Authority (who was not an operator under Seveso) and obtained commitments to proceed. However the operators were holding up progress because of the costs involved.

In order to motivate the operators to take action, the CCA then developed a specific policy around each technical concern, specifying what “all necessary measures” were involved for these establishment types, the level of preparedness and response that would be required, and how the SMS was to address these issues. The CCA conducted considerable background research in order to establish a baseline standard against which operators could compare the adequacy of their management systems in this regard. In the end, the IP Model Code of Safe Practice in the Petroleum Industry, Part 19 (IP 19)

Dublin Port

was chosen as the main reference good practice document for the standard. All the operators were inspected and their safety documentation was examined (including safety reports). Operators were requested to provide evidence that they were in fact taking all necessary measures and had in place adequate emergency response arrangements.

Where this was not adequately demonstrated (which was in all cases!) enforcement notices were issued requiring the operators to:

1. Determine the consequence distance to thermal radiation levels of 6.3, 8 and 32 kW/m² for tank or bund fires of flammable liquid
2. The resources required to prevent/mitigate those fires (with reference to IP 19)
3. The resources actually available
4. Submit an implementation plan to remedy any shortfall.

A significant level of engagement then occurred between the CCA and the operators (and their technical consultants). By 2011, all the operators had agreed on-site measures to improve their-on-site facilities and to contribute to the cost of the off-site common infrastructure upgrade, so as to deliver adequate prevention and mitigation measures. The project was due to be completed by the end of 2013.

The Safety Report is not considered to be adequate on its own for assessing the SMS. It was reported that assessment needs to be made more challenging for operators.

The fire brigade is concerned with the permit and assessing the safety report. They go to the site on their own and there is no joint inspection with other authorities.

- o Cyprus. A single authority attends the EEP exercise and gives an opinion.
- o Czech Republic. Different authorities have their own questions which are not coordinated.
- o Denmark. The environment, fire and police authorities meet before inspections. Two inspections are carried out each year.
- o Finland. The SMS is assessed by looking at the scenarios, the comments made by fire rescue and how good the plans are in practice. Only the national competent authority carries out inspections.

The fire brigade is responsible for the EEP. The police and other authorities are under control of the fire brigade.

- o France. The safety report is used as the basis for assessing the SMS, including the EEP. In contrast to Belgium, the safety report is

considered to contain sufficient information. Exercises are carried out by the fire brigade and used to observe deficiencies in the IEP and EEP. High consequence and even catastrophic scenarios are routinely tested during inspections.

- o Germany. it takes three-four days to prepare for inspections. This includes the preparation of specific checklists for the establishment.
- o Ireland. The SMS for emergency planning and response is assessed by inspectors from the central competent authority using a proforma. Exercises are carried out in a similar manner to France.

Only the national competent authority carries out inspections.

- o The Netherlands. The SMS is assessed using checklists. However, detailed assessment of the paperwork on its own is not considered to be sufficient. The inspection verifies that the operator has an emergency response department, and that there is a policy, risk responders and a risk assessment.
- o Norway. Only one or two parts of the SMS are checked at any one time. Common checklists may be used by all the authorities. The central authority does the inspection and does not always include the fire brigade.

Local authorities are responsible for emergency testing.

- o Poland. The law does not allow joint inspections however pilot inspections may be carried out if operators volunteer for this. The responsible authorities are those for the environment and for fire protection. The operator's documentation is checked by fire protection and its implementation in practice is verified at annual inspections. An administrative decision is given at the end of the inspection and other relevant authorities may also give opinions.
- o Portugal. The SMS is assessed by reviewing documentation.
- o Romania. A question list is used by a team for the first three days of the inspection. There are no joint inspections. The fire and civil brigades get involved after the inspection. The fire brigades perform the tests of the emergency response plans. Documentation is inspected by the environmental authority.
- o Switzerland. Each canton has a different system. Usually, the inspector performs an assessment on his/her own but is part of a bigger team that provides input to the final opinion.

The Right Hand Side of the Bow-Tie in Europe - A Dutch Benchmarking Study

At the time of the workshop, a European benchmark study was currently underway in the Netherlands conducted by the national centre of expertise on Seveso for the fire brigades in the Rotterdam region of the Netherlands. This particular region has 40% of Dutch heavy industry with more than 100 Seveso II companies and nine industrial fire stations. Activities in the port include the storage and transport of explosives.

The benchmark study examined the best practice for Seveso inspections concerning the right-hand side of the Bow-Tie, i. e., the response and mitigation events following a loss of containment of a dangerous substance. In particular, the study explored how the Seveso Directive addresses fire prevention and fire suppression and where the fire brigade fits within the inspection process. Through the process, project sponsors also aimed to promote knowledge sharing among the Member States, particularly concerning best practice, use of questionnaires or other tools.

Of 9 Member States that had responded, 4 (45%) involved the fire brigade in Seveso inspection. In 5 Member States (55%) the fire brigade were involved in some way in developing or reviewing the external emergency plan (EEP). For 6 (66%) of the Member States surveyed, the legislation addresses the role of company fire brigades.

The full results can be found at www.veilighedsregio-rr.nl.

2.2. Practices for testing EEPs and clarification of the roles of the competent authorities

- **Live vs. desktop exercises.** Live exercises are carried out in more detail and are deemed to be important for finding weaknesses in EEPs. However, desktop exercises seem to be carried out more frequently in Seveso countries because they are easier to organise when there are a large number of sites and less costly. Desktop exercises are thought to be useful in understanding the roles of the competent authorities. For example, it can be beneficial to conduct a table top exercise initially so that logistical issues are resolved before running with a live exercise. In fact, live and desktop exercises have important complementary functions and should each be incorporated into the testing routine.

EEPs for domino establishments are tested at the same time in some countries.

- **Scenarios selection for testing the EEP.** EEPs are generally tested using a standard or guidance, which tends to vary at national and local levels. They are generally based on major accident hazard scenarios identified in the Safety Report but not necessarily the worst case scenario. The workshop groups highlighted the importance of



FIGURE 2: THE EXERCISE CYCLE

selecting good scenarios in order for EEP tests to be successful.

Mitigation measures proposed by the establishment are tested as part of the EEP in some countries and it is expected that the operator would brief the fire services on arrival. In others, it is an internal matter between the fire brigade and the operator when testing the IEP.

- **Reporting test results.** Written reports are prepared in all Seveso countries after EEP tests. In some, the local competent authorities are responsible for producing the reports. The operator may also be required to report on testing of the internal emergency plan.
- **Participation and observation by competent authorities.** The role of each competent authority is considered to be clear regarding the

testing of EEPs. In some Seveso countries the national authority has a reporting role only while in others, a national authority may be required to liaise with the operator on the interface between the IEP and the EEP and assist the local competent authorities, particularly if the operator is reluctant to provide information. The local competent authorities are responsible for drawing up the EEP in most Seveso countries.

In some Seveso countries, all relevant authorities attend EEP tests. In others, the CCA may or may not attend EEP tests and may give advice. The importance of going on-site and making an assessment was emphasised by some participants.

- **Internal vs. external emergency plan testing.** IEPs are examined to determine the site hazards and associated risks, planned site responses and potential to interact with the external emergency responders. These are all vital contributors to the preparation of a good EEP.

There was some variation between Seveso countries regarding testing of the IEP in conjunction with the EEP. Some countries require or prefer testing of the IEP in conjunction with the EEP. In others, it is written into the procedures and is carried out during live exercises but not during desktop exercises. As a practical matter, resources and competence are not always

available for both tests to be undertaken at the same time.

- **Pre- and post-brief testing.** Briefing before exercises and a thorough debriefing afterwards are essential components. If major deficiencies are identified during an EEP test, it is not usually re-tested. However, deficiencies are followed up and remedied. EEPs should be live documents that are updated following tests. Debriefing after the exercise ensures that the weaker elements of the EEP are disposed of and the good elements are retained, with a record kept of the changes made and the reasons for them.
- **Cost of testing.** Testing emergency plans can be quite costly. The recovery of costs for EEP tests varies between Seveso countries. Sometimes costs are recovered indirectly through a special tax on Seveso sites. In a few countries, the competent authorities charge the operator for use of their resources in testing exercises (either a specific percentage or a fixed cost). However, in a number of countries the competent authorities absorb all the costs generated from their participation. In one country, the local competent authorities can make a reduction in the cost if they get a training benefit from the exercise. A few countries charge for the running of EEP tests.


2.3. Questions to assess emergency planning in the safety management system

Inspectors should seek assurance that the measures foreseen in the emergency plans are appropriate. It is generally not possible for the inspector to evaluate the adequacy of individual measures. Rather, the inspector should seek evidence that emergency plans have been approached thoughtfully, using appropriate expertise and experience, and tested on a regular basis. Discussions and presentations at the workshop included the following suggestions in regard to questions that could help inspectors and operators assess the robustness of the emergency planning process:

2.3.1. Emergency response planning

- The types of sites have the greatest risks to emergency response personnel?
- Who would be exposed?
- What is their role?
- Do site emergency response plans describe the hazards to which they could be exposed?

FIGURE 3: REPLICIA OF EEP TEST REPORT (IRELAND)

 **EEP Attendance Form**

Establishment Name: EPOW:

Attended by: Date:

Exercise Type:

Scenario Tested (expand space as required)

Exercise based on Plan

The following neighbours were checked:

Name	Address	Info	Alert
There are no residents currently within the specified area.			

Observations on the Exercise
(expand space as required)

Completed report to be filed with EPOW and copy kept in 'EEP Reports' Folder

- Does it appear that a good quality hazard consequence and escalation analysis was used as the basis for emergency response planning?
- Is there a clear linkage between safety report scenarios and emergency response plans?
- Have the scenarios been documented?

- For each scenario, has a specific timing been estimated from initiation to major escalation?
- Do the plans take into account consequences and potential escalation within each section of the plant?
- Have the critical control and protection systems been identified?
- Are there reliable barriers to major escalation in place, i.e., passive or effective fixed active barriers?
- Does each scenario have a realistic expectation that the incident can be controlled?
- Is the emergency plan adequately resourced with the appropriate personnel and equipment?
- Do safety reports highlight and assess the risks arising from emergency response?
- Is the information adequate to assess the risks in an emergency?
- Are the civil authorities involved in the planning?

2.3.2. Emergency response implementation

- Are the control room and ERTs aware of the hazard potential of the plant and activities?
- Is there regular and meaningful communication and planning between site and civil response personnel?
- Are critical control systems inspected and tested regularly and is this documented? Critical control systems include detectors, ESD (emergency shutdown device), bunds, drains and

depressurisation, fixed passive and active protection systems, and any other instrumentation and barriers in place that play a role in mitigation and response.

- Does planning ensure that the necessary site and civil emergency response personnel are readily available should an emergency occur?

2.3.3. Emergency response exercises

- Are the exercises based on unusual and challenging but also realistic scenarios?
- Do they focus on controllable events and include evacuation events?
- Do they take into account the potential for escalation, safety system failure and emergency response risks?
- Do the exercises include an assessment of the risks to emergency response personnel and the impact of different decisions on risk?
- Do the exercises test the relationships between control rooms, incident control, front line emergency response personnel and civil/mutual response?

2.3.4. Testing of the emergency response plan

- How are the objectives of the exercise selected?
- Do the objectives take into account practical considerations, and different possible sequences of

events, including potential mitigation or response failures?

- What are the criteria for selecting test scenarios? Do they adequately test communication between team members, potential risks to emergency responders, pathways that could lead to escalation of the incident, communication with the public, etc?
- Are tests conducted for response to domino effect incidents?
- When applicable to the site, are different types of scenarios tested over time (e.g., fire, explosion, release to the environment)?
- Do all personnel that would be involved in the emergency response take part in the exercise?
- Do the test exercises take into account lessons learned from previous exercises?
- Do the test exercises require a briefing before the exercise and a debriefing after it takes place?
- Does the exercise briefing explain the purpose of testing the emergency plan and objectives of the exercise?
- Are lessons learned from the debriefing documented in a revised emergency plan?
- Are lessons learned from incidents also applied to similar scenarios at other installations on the site (internal emergency plan)? In the local area (external emergency plan)?

3. DETERMINING EMERGENCY RESPONSE ZONES, PUBLIC INFORMATION ZONES AND COMMUNICATION STRATEGY

Emergency response planning for chemical accident risks requires establishing a reference scenario (or scenarios) for each hazardous site. The potential consequences of the reference accident scenario, taking into consideration foreseeable variability in the sequence of events (e.g., night vs. day, direction of the impact, etc.), determine the nature of the response and define the area of impact (sometimes also called the “threat zone” or “impact zone”). The reference scenario also will define the level and scope of the response, the logistical requirements, organisations involved, and the contingency strategies that may have to be activated.

Workshops 3 and 4 aimed to find answers to the following specific questions in regard to defining emergency response zones and strategy for communication emergency information to the public:

1. *How is the reference accident scenario determined?*
2. *How is the emergency planning threat zone determined?*
3. *How is the public information zone be determined?*
4. *What is good practice for provision of information to the public?*

In addition, some Seveso countries also use reference accident scenarios to establish public information zones to fulfil the obligation under Article 14 of the Seveso Directive that competent authorities should ensure for every upper tier site that

“all persons likely to be affected by a major accident receive regularly and in the most appropriate form, without having to request it, clear and intelligible information on safety measures and requisite behaviour in the event of a major accident.”

This obligation raises questions as to who should be informed about a major accident and what kind of information should be communicated. For this reason, some Seveso countries have used reference accident scenarios to establish “public information zones”. Other countries rely on established protocols for communicating emergency information to the public, often delegating leadership to authorities with local knowledge and experience.

3.1. Determining the Threat Zone for Emergency Planning

The internal and external emergency plans are defined on the basis of the area affected by the reference accident scenarios⁵ selected for the planning exercise, sometimes called the “threat zone”. The precise definition of such events is challenging in practice. The approach to defining the area of impact for an external emergency plan varies considerably among the Seveso countries.

In any case, the precise selection of appropriate reference scenarios is challenging in practice. In most Seveso countries, the emergency planning area is determined by using the scenarios and calculations in the safety report, but there is no uniform approach across the EU for this purpose. Some countries have an explicit policy to apply a worst-case scenario formula for purposes of emergency planning; other countries use a number of other indicators in addition to worst-case criteria to select reference scenarios.

⁵ The workshop programme specifically uses the term “credible worst case accident scenario” in the session title since Seveso implementation of emergency response planning obligations in Ireland is based on this approach. However, it was decided not to use this term in this publication since this approach is not universally applied across the Member States.

Several Seveso countries have produced guidance for selecting emergency planning scenarios, that often includes recommended methods for identifying and ranking candidate scenarios, as well as variables that should be taken into consideration when determining emergency response measures. An example of one possible classification approach described at the workshop is depicted in Table 1.

TABLE 1: A METHOD FOR CLASSIFYING SCENARIOS FOR EMERGENCY PLANNING⁶

Minor	most common, no real potential for harm
Immediate	common, operator fatality no risk of escalation
Controllable	occasional, major risk to ERTs
Evacuation	occasional, risk to ERTs and the public
Catastrophic	rare, little further risk of fatalities

Both consequence and risk-based approaches are used in Seveso countries to define emergency planning areas, although most countries use either

⁶ Dalzell, G. 2012. Relationship between the operator and emergency services. Mutual Joint Visit Workshop for Seveso Inspectors on Emergency Planning. Dublin, Ireland.

one or the other. In addition, some countries allow explicit inclusion of technical measures in scenario development. In particular, risk-based approaches can automatically account for technical measures in calculations to produce the risk estimates for the emergency planning zone. For consequence-based approaches, it may be more difficult to assess which on-site mitigation measures should be included and as such, scenarios often exclude them.

The workshop generated a number of observations concerning practices for establishing worst case accident and threat zone for emergency planning. There was a concern expressed that too much emphasis on worst-case accidents in the safety report sometimes results in too little emphasis on more frequent events, thereby increasing their risk and potential to escalate into a major incident.

- **Role of authorities vs. role of industry in selecting the reference scenarios.** In general, the operator is responsible for defining major accident scenarios in the safety report. However, countries vary as to whether the operator also selects the reference scenario(s) for external emergency response planning. A few countries even prefer that operators in the same local area

Case Study (Ireland): Controlled Burn Vs. Extinguishment

There are various scenarios where a fire-fighting response might be required, for example a fire at petroleum bulk stores sites, chemical warehouses or in a production plant. Typically, rapid fire development occurs in pool fires but development is much slower in warehouse fires. The more intense the fire, the greater the buoyancy of the plume, and (normally) the lower the risk to human health.

Noting that fire protection systems are part of risk mitigation measures, a number of fire-fighting policies exist to guide emergency planning. For example, IP_19 identifies responses at extremes – from total protection to burn-down – with typical responses falling somewhere in-between. Controlled Burn*: PPG28 also provides criteria for deciding when a burn-down may be appropriate.

Some key considerations include:

- Risk to people from thermal radiation and toxic plumes
- Impact of smoke plume
- Potential to extinguish the fire successfully
- Risk of fire spreading
- Presence of important buildings in the vicinity
- Potential impacts should fire water run off escape
- Domino effects of any “let it burn” approach
- Resource needs if extinguishment is required (see IP 19 and National Fire Protection Association codes for estimated rates for foam and for water cooling)

For more details, the reference standards should be consulted.

*A publication of the UK government available for free download at <https://www.gov.uk/government/publications>.

consult together to select an appropriate scenario for external planning purposes.

In some cases, scenarios for emergency planning may be identified as a distinct set of scenarios within the safety report or in a separate document.

- **Methodology for selecting reference scenarios.** Based on various criteria, the authority or operator will select the appropriate scenario(s) to define the threat zone(s). There is variation among countries in the degree of liberty that the operator is allowed in selecting methodologies, endpoints (e.g., exposure levels) and other inputs. Generally, regardless of how the selection process is defined, authorities must examine the outcome and review the associated calculations to ensure that they are consistent and reasonable, that the operator has used recognised methods, and can justify the method that has been chosen.

The factors that determine the modelling methodology accepted by the authorities may also depend on whether risk or consequence-based approaches are preferred. Some Seveso countries require that specific methods are applied to support authority obligations for land-use and emergency planning. Indeed, some countries are very specific in requiring a certain approach (deterministic or risk-based) to select threat zone scenarios for emergency planning. There are also

countries that prefer a consequence-based approach for selecting threat zone scenarios, while accepting or even encouraging a risk-based approach for safety report (i.e., SMS) scenarios.

- **The worst case scenario.** Some countries have adopted an approach that specifically uses the “worst case scenario” (or “credible worst case scenario”) to drive emergency planning. The definition of worst case scenarios may sometimes differ from the definition of the scenarios selected by the site as a basis for the safety management strategy in the safety report. For example, the emergency planning process may not allow application of technical measures for controlling or mitigating accident consequences of the reference scenario, these same measures may be assumed for purposes of site risk management. Guidance for determining the worst case scenario appears to be available in some Seveso countries.
- **Acceptance of mitigation measures.** In some Seveso countries, implementation of technical measures for mitigation and control are considered as part of the IEP only, while they will by default be taken into account in countries when risk based calculations drive scenario selection. For consequence-based approaches, whether mitigation and control measures are accepted in the scenario depends on expert judgement concerning the reliability of the measure in an emergency situation. Some countries stated that it can be difficult to assess the reliability of on-site

mitigation measures outside a risk context. Some authorities take the approach that technical mitigation measures (e.g., passive measures) are acceptable, but not active measures.

- **Domino effects.** Reference scenarios involving domino effects from multiple sites are also considered in some countries.
- **Examples of good practice:**
 - In Denmark, the Netherlands and Sweden, the local competent authorities determine the reference accident scenarios.
 - Denmark. The endpoints that define threat zones are established in the safety report.
 - Ireland. The endpoints defining the threat zones are determined as part of emergency planning. The CCA expects that zones are established following the most conservative approach but does not specify what endpoints should be used.
 - Germany and Finland have guidance for selecting the reference scenario for emergency planning with examples of consequence based scenarios.
 - Netherlands. The method for determining reference accident scenarios for emergency planning is written into regulations in the Netherlands. The emergency planning scenarios are in a separate section of the

safety report from the accident scenarios analysed for site risk management.

The public have access to some information about the reference accident scenarios for emergency planning.

- o Norway and Romania. The reference accident scenarios for emergency planning are taken from the safety report. However, the worst case scenario is not necessarily used.
- o Portugal. The reference accident scenarios for emergency planning are determined between operators. This is not as common in other Member States.
- o Romania. The operator decides which methodology to use to identify major accident scenarios. It is considered advantageous to have more than one operator in an area to compare results. Inspections are carried out against detailed scenario descriptions. The inspection gives particular attention to checking that barriers meet the description in the scenario and can function as expected.

3.2. Practices for establishing the public information zone and communicating with the public

The public information zone is not necessarily defined in the same way as the emergency planning zone. For example, the emergency planning zone may be concerned about acute human health and environmental impacts, whereas the public information zone may also include populations on the perimeter of emergency planning zones. Lack of information or flawed release of information, could actually cause panic or confusion among a wide geographic area. In some cases, curiosity or concern may drive some citizens to expose themselves needlessly to greater risk.

According to the workshop, Seveso countries vary in their approach to establishing public information zones. In some countries, the operator is asked to propose the public information zone and other cases the authority, using information supplied by the operator, designates the zone applying a systematic approach define the public information zone (PIZ), based on consequence or risk calculations. It determines the PIZ by taking account of both the likelihood and effects of possible major accidents at the establishment. It is set on the basis that people

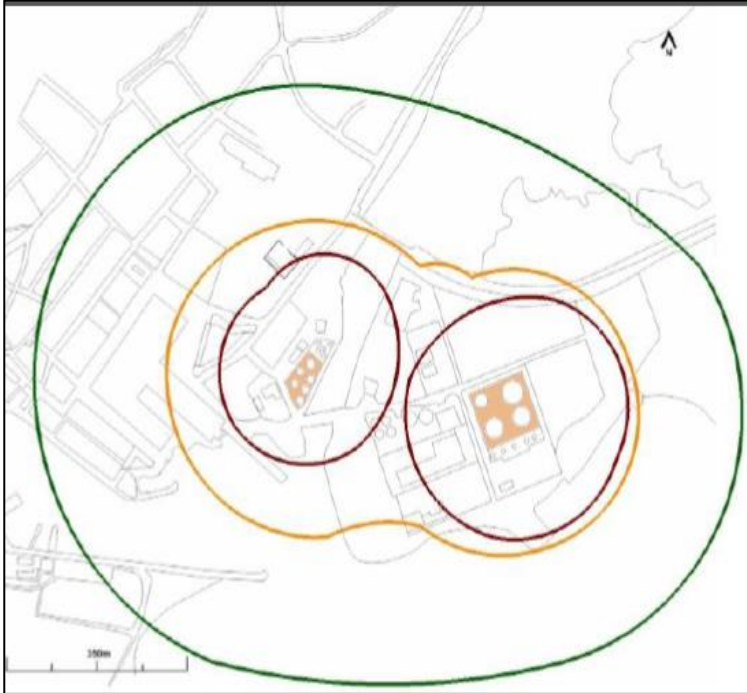


FIGURE 4: EXAMPLE OF A PUBLIC INFORMATION ZONE APPLYING THE IRISH HSA APPROACH. (THE OUTSIDE BORDERS OF ZONES 1, 2 AND 3 ARE MARKED BY THE BROWN, GOLD AND GREEN LINES RESPECTIVELY.)

outside it are not at significant immediate risk from major accidents, although they could be if the accident escalates. The responsibility of informing the population in the PIZ may be allocated to any number of competent authorities depending on the country. The national authority may sometimes take the role of developing standardized materials with local communication strategy as the responsibility for local authorities.

Communication responsibilities are also two-fold, in the sense that PIZ populations normally should be provided with information on what to do in case an accident occurs. In addition, there should be a strategy in place that addresses all perceived contingencies for communicating with the PIZ population should such an emergency occur.

The workshop highlighted the number of different issues surrounding establishing public information zones to fulfil the obligations of Article 14.

- **Methods for identifying who should receive information (“the public information zone” or PIZ).** Countries vary considerably in the approach to identifying the geographical area defining the population, the “public information zone”, that should be informed about the presence of a chemical accident risk (“persons likely to be affected” in Article 14). Selecting the PIZ may be the responsibility of the national authority, local authority or operator depending on the Member State. Consequence-based approaches (rather than risk-based) are most commonly used for determining the PIZ.

Case Study (Ireland): Defining the Public

In 2009 Ireland adopted a new approach to define the Public Information Zone (PIZ) in keeping with the European Guidelines on Land-Use Planning (LUP). This was previously set on the basis of the consequences of specified events but, following the introduction of a risk-based LUP system, it is now based on risk. Article 13.1 of the Directive 96/82/EC sets out the requirement for the PIZ but, importantly, the Directive does not elaborate further on how it is to be implemented.

In Ireland, the Central Competent Authority (HSA) decides on the extent of the PIZ, although the operator of the establishment concerned may make a proposal in the draft Safety Report. In determining the extent of the zone, consideration has been given to establishing who “the persons likely to be affected by a major accident” are. Previously they had been identified as those within a specified consequence zone for a specified event, for example those within the “half dangerous dose” footprint following a 10 minute release of chlorine gas from a cylinder, in D5 weather conditions*.

In some Seveso countries, determination of the PIZ is related to the EEP and is based on the maximum consequence scenario zone. Some countries, such as Ireland and the UK, have established a specific methodology to define the PIZ. In other countries, the public information area is based on information

Information Zone

The new method for establishing the PIZ utilizes a three-zone risk of fatality system, based on specified scenarios for ten different industry types (representative of the COMAH establishment population). The outer planning risk zone, representing a risk of fatality of 1 in 10 million per year, is used to define the area containing “the persons likely to be affected by a major accident” i. e., the PIZ. The PIZ is based on risk and not on the worst case scenario.

*A dangerous dose is defined as one where there is:

- Severe distress to almost everyone.
- A substantial fraction requires medical attention, some suffer irreversible effects.
- Highly susceptible people might be killed (taken as ~1%).

Weather conditions in hazard studies are generally described in terms of an atmospheric stability condition and a wind speed. D5 indicates Pasquill stability class D with a wind speed of 5 ms⁻¹.

provided by the operator and the public information area is determined in consultation with the local authority. Methodologies used for external emergency planning, such as Aloha and Effects, may equally be applied to determine PIZ's but the results may be applied differently for PIZ's than for threat zones.

Participants agreed that it would be useful to have common general principles or “benchmarks” for establishing PIZs, that could then be further interpreted by Seveso authorities to meet local needs.

- **Determining “persons likely to be affected”.** There was a discussion about “persons likely to be affected” in terms of Article 14 vs. Article 16 (Information to be supplied by the operator and actions to be taken following a major accident”). For preparedness purposes, “persons likely to be affected” are defined broadly on the basis of an equally possible range of consequences for a given reference scenario. The geographic distribution and affected population may be much wider than if that accident actually were to occur, because a wide range of possible impacts must be taken into consideration to cover all possible sequences of events. For post-emergency communication the term “likely” is not relevant with respect to the scenario because the accident has already happened and to a large extent, the geographic scope and severity of consequences is known. Rather, “likely” applies to those who are in fact known to be affected already.

- **Defining the term “affected”.** Another related question was raised concerning the term “affected”. It was suggested that definition of this term is subject to broad interpretation. For example, in Ireland, Zone 3 of the public information zone is purposely defined so that it could possibly include those that may not be very much affected in human health terms, but could experience other impacts, such as disruption of local services (e.g., electrical, telephone, roads, etc.) or populations that are simply close enough distance to the impact zone to be apprehensive about their own situation.
- **Costs.** In some Seveso countries, the costs associated with determining the PIZ are included in the costs associated with assessing the safety report. Some pass the costs onto operators while others do not.
- **Information to the public and the EEP:** There seems to be a correlation between the EEP and the information provided to the public. Approval

Case Study (France): Providing Information to the Public in France: Shared Competencies between the Operator and the Authorities

There are two mechanisms to deliver preventative information to the public in France - one regarding general information on major accident hazards and the other dealing with specific information on technological hazards. Furthermore there are two major tools available for general information, a departmental document (DDRM: Dossier Départemental sur les Risques Majeurs) and a local information document (Document d'information communal sur les risques majeurs) written by town council services.

In relation to the specific information regarding technical hazards, the legal requirements cover:

- Recommendations on the behaviour to adopt
- Information on emergency measures
- Posters in establishments where the public gathers (schools, museums, etc.)
- Flyers
- Information campaigns
- Pen-door days at Seveso establishments
- The state co-ordinates and controls these requirements and they are implemented by the mayors and the prefects (representing the state).

The operator pays for its implementation.

of information to the public varies between Seveso countries and responsibility varies between the national authorities, local authorities and the operator.

- **Pre-incident information to the public.** Most Seveso countries reported that information to the public should be disseminated both electronically and by leaflet. It was suggested that websites with risk information on maps and data contained as part of the permit process operated by some countries could be used. Citizens themselves can check what Seveso sites are present in their local area and sometimes also whether they are within a threat zone. Coupled with proactive outreach, online communication can be advantageous because it can be updated regularly at low cost and has potential to host a wide range of information.
- **Responsibility for public information.** Approval and communication of information to be communicated is managed differently in Seveso countries, also depending on whether it is pre-incident information or after a major accident has occurred. The national authority takes a leading role in some countries defining the strategy and determining the content, particularly for pre-incident information, but in some countries this responsibility is allocated to local authorities (which could be the municipality, the fire brigade, a public health office, for example) with the

national authority in a consultative and/or approval role. A number of countries reported that it is the responsibility of the emergency responders, not the CCA to communicate with the public during a major accident. It appeared that the size of the country and the historic role of the national government in emergency planning may play a significant role in this decision.

- **Crisis communication.** A number of suggestions were made about the means that could be used to inform the public during a major accident including public and company alarms, TV, radio, telephone, Short Message Service (text) and social media. Online sites for communicating to the public are also increasingly used to communicate risk and preparedness information.
- **Use of sirens.** There was much discussion during the plenary session about the means used to inform the public other than a siren. In response to a question about the best way to inform the public, it was suggested that meetings with local community groups and regular talks could be used. In order to ensure that everyone received the information, the use of widespread advertising campaigns and information displayed in many locations was suggested.
- **Use of social media.** The use of social media (e.g., Twitter) for communicating during emergencies has become a global phenomenon. Thus far the use of social media as part of a communication strategy during a Seveso

emergency does not appear to be widespread among Seveso countries. During such emergencies, the affected people are sometimes told to avoid using their phones and in some cases the authorities may have to prevent public access to the mobile network. Still, some authorities have tried it, with positive results in some cases, and less positive results in others. Therefore, at the time of the workshop, it appeared that use of social media for public communication in Seveso emergencies was an isolated, rather than standard practice, especially since it did not appear that any national authorities represented at the workshop had adopted or tested its use for this purpose. It could be that this situation changes over time.

- **Examples of country practices.**
 - Ireland. The CCA decides on the extent of the zone, although the operator of the establishment concerned may make a proposal in the draft Safety Report. In determining the extent of the zone, consideration has been given to establishing who “the persons likely to be affected by a major accident” are.
 - Cyprus. The national competent authority determines the zones based on information provided by the operator.
 - France. There are two mechanisms to deliver preventative information to the public in France - one regarding general information on

major accident hazards and the other dealing with specific information on technological hazards.

Furthermore there are two major tools available for general information, a departmental document (DDRM: Dossier Départemental sur les Risques Majeurs) and a local information document (Document d'information communal sur les risques majeurs) written by town council services.

- o Netherlands. The government uses an online tool (www.risicokaart.nl/en) to provide information about possible risks including accidents involving hazardous substances. The tool allows the public to see the risks in their area by entering a post code or place of residence. They can then see if there is an increased risk in the area e.g. an aviation accident, natural fires or floods and they can receive advice about what dangers they represent and how to protect themselves in an emergency.
- o Norway. The operator is responsible for providing the information for the PIZ.
- o Slovenia. The operator and the local authority are responsible for the PIZ.
- o Sweden. A decision about the PIZ is made in conjunction with the operator.

ANNEX 1 – MJV PROGRAMME

Wednesday 3 October 2012

12:30 – 13:45	Light lunch/Registration	
14:00	<i>Welcome</i> Dr. Sharon McGuinness, Health and Safety Authority	
14:05	<i>Context of the MJV</i> Maureen Wood, European Commission	
	Session 1: <i>Safety Management System, Emergency Planning and Response</i> Chair: Pat Conneely, Health and Safety Authority	
14:15	Presentation 1	<i>Right Hand Side of the Bow-Tie in Europe</i> Michael de Gunst, Safety Region Rotterdam Area
14:35	Presentation 2	<i>Relationships Between the Operators and Emergency Services</i> Graham Dalzell, European

		Process Safety Centre
14:55	Presentation 3	<i>Planning for Emergencies – Dublin Port, a Practical Example</i> Dr. Alice Doherty, Health and Safety Authority
15:15	Coffee Break	
15:45	Workshop 1	<i>Best Practice for Assessing the Safety Management System regarding Emergency Planning and Response</i>
16:50 - 17:30	<i>Reports from workshop 1 sessions, questions and general discussion</i>	
18.30	<i>Social Event - Irish Night</i>	

Thursday 4 October 2012

	<p>Session 2: Testing of Emergency Plans and the Role of the Competent Authorities</p> <p>Chair: Dr. P J Claffey, Health and Safety Authority</p>
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09:15	Presentation 4	<p><i>Role of the Central Competent Authority in Testing the Internal and External Emergency Plans</i></p> <p>Dr. Tom O'Sullivan, Health and Safety Authority</p>
09:40	Presentation 5	<p><i>The External Emergency Plan - the Obligation to Regularly Test in Practice?</i></p> <p>Peter Daly, Health Service Executive</p>
10:05	Presentation 6	<p><i>Practical Testing Of External Emergency Plans</i></p> <p>Richard Hedderman, Dublin Fire Brigade</p>
10:30	Coffee Break	
11:00	Workshop 2	<p><i>Best Practice for Testing External Emergency Plans and Clarification of the Roles of the Competent Authorities</i></p>

12:05	<i>Reports from workshop 2 sessions, questions and general discussion</i>	
13:00	Light Lunch	
	Session 3: The Public Information Area and Communicating with the Public Chair: Dr. Sharon McGuinness, Health and Safety Authority	
14:15	Presentation 7	<i>Defining the Public Information Zone – a Central Competent Authority View</i> Pat Conneely, Health and Safety Authority
14:35	Presentation 8	<i>Providing Information to the Public – the Operators Experience</i> Eamon Judge, Eli Lilly S.A
14:55	Presentation 9	<i>Providing Information to the Public in France: Shared Competencies Between the</i>

		<i>Operator and the Authorities</i> Maud Casier, Ministry of Ecology
15:15	Coffee Break	
15:45	Workshop 3	<i>Best Practice for Determining the Public Information Zone and Communicating with the Public</i>
16:50 - 17:30	<i>Report from workshop 3 sessions, questions and general discussion</i>	
19.00	<i>Social Event - Dinner in Hotel</i>	

Friday 5 October 2012

	Session 4: The Worst Case Accident and Threat Zone for Emergency Planning Chair: Dr. P J Claffey, Health and Safety Authority	
09:15	Presentation 10	<i>Maximum Credible</i>

		<p><i>Accident</i></p> <p>Michael de Gunst, Safety Region Rotterdam Area</p>
09:40	Presentation 11	<p><i>When a Controlled Burn Response Might be Appropriate</i></p> <p>Thomas Leonard/Shane Malone, Byrne Ó Cléirigh Ltd</p>
10:05	Presentation 12	<p><i>Appropriate Endpoints for Modelling Worst Case Accidents/Threat Zones in the Emergency Planning Context</i></p> <p>Dr. Mary T. O'Mahony , Health Service Executive</p>
10:30	Coffee Break	
11:00	Workshop 4	<p><i>Defining the Credible Worst Case Accident Scenario and Threat Zone for Emergency</i></p>

		<i>Planning</i>
12:05	<i>Reports from workshop 4 sessions, questions and general discussion</i>	
12:45	<i>Overview of MJV and concluding remarks</i> Maureen Wood, European Commission	
13:00	Light Lunch	
Close of MJV		

ANNEX 2 --PROGRAMME FOR EACH WORKSHOP SESSION

Session 1 - Best practice for assessing the safety management system (SMS) regarding emergency planning and response

Presentation 1 - Right Hand Side of the Bow-Tie in Europe

Michael de Gunst, Safety Region Rotterdam Area

Presentation 2 - Relationships Between the Operators and Emergency Services

Graham Dalzell, European Process Safety Centre

Presentation 3 - Planning for Emergencies – Dublin Port, a Practical Example

Dr. Alice Doherty, Health and Safety Authority

Workshop 1

Group 1 – Chair: Michiel Goethals, Rapporteur: Charlotte Lindkvist

Group 2 – Chair: Arvid Samuelsson, Rapporteur: Dagmar Dräger

Group 3 – Chair: Norman Powell, Rapporteur: Ole Karsten Stubben

1. How is the SMS assessed in practice with regard to emergency planning and response?

- What questionnaires or checklists are used?
- Is the SMS assessed by the competent authorities individually or as part of joint inspections?
- Is the SMS assessed as part of emergency response testing?
- What improvements can be made for more effective assessment of the SMS with regard to emergency planning and response?

2. What information should be included on the SMS in the Major Accident Prevention Policy document and Safety Report with regard to emergency planning and response?

- How can gaps between SMS documentation and emergency planning in practice be identified?
- Do Safety Reports contain enough information for the emergency services to prepare an EEP? If not, how is this addressed?
- How do operators ensure that emergency services are informed of significant changes at the establishment which may have implications for them and the emergency response?
- Are exercises based on actual scenarios?

- How are safe locations identified for emergency responders?

Session 2 - Best practice for testing external emergency plans (EEPs) and clarification of the roles of the competent authorities

Presentation 4 - Role of the Central Competent Authority in Testing the Internal and External Emergency Plans, **Dr. Tom O'Sullivan, Health and Safety Authority**

Presentation 5 - The External Emergency Plan – the Obligation to Regularly Test in Practice?, **Peter Daly, Health Service Executive**

Presentation 6 - Practical Testing Of External Emergency Plans, **Richard Hedderman, Dublin Fire Brigade**

Workshop 2

Group 1 – Chair: Michiel Goethals, Rapporteur: Charlotte Lindkvist

Group 2 – Chair: Arvid Samuelsson, Rapporteur: Dagmar Dräger

Group 3 – Chair: Norman Powell, Rapporteur: Ole Karsten Stubben

1. Are the roles of each competent authority clear with regard to testing EEPs?

- Does the Central Competent Authority (CCA) have a function other than a reporting role?
- Does the CCA liaise with the operator on the interface between the internal emergency plan (IEP) and the EEP?
- Are written reports prepared after EEP tests? If so, who is responsible for doing this?
- Do all the competent authorities attend EEP tests?

2. What is the best way to test EEPs?

- Is a standard or guidance used?
- Is the EEP tested in conjunction with the IEP?
- Are the EEP tests live?
- Are desktop exercises appropriate?
- Is it appropriate to test more than one establishment at the same time as part of an EEP test i.e. domino establishments?
- Are EEP tests based on major accident hazard scenarios identified in the Safety Report?
- How are the mitigatory measures proposed by the establishment tested as part of the EEP?
- If major deficiencies are identified during an EEP test, is it re-tested?
- Do competent authorities re-cover the costs of EEP tests?

Session 3 - Best practice for determining the public information zone (PIZ) and communicating with the public

Presentation 7 - Defining the Public Information Zone – a Central Competent Authority View, **Pat Conneely, Health and Safety Authority**

Presentation 8 - Providing Information to the Public – the Operators Experience, **Eamon Judge, Eli Lilly S.A**

Presentation 9 - Providing Information to the Public in France: Shared Competencies Between the Operator and the Authorities, **Maud Casier, Ministry of Ecology**

Workshop 3

Group 1 – Chair: Michiel Goethals, Rapporteur: Charlotte Lindkvist

Group 2 – Chair: Arvid Samuelsson, Rapporteur: Dagmar Dräger

Group 3 – Chair: Norman Powell, Rapporteur: Ole Karsten Stubben

1. How should the PIZ be determined?

- Is there a preference for consequence over risk-based approaches?
- Is any particular software preferred?
- Does the Central Competent Authority (CCA) decide the PIZ (who is consulted)?
- What is the role of the Operator/CCA/Local Competent Authority (LCA)?
- Are the costs involved passed on to the operator?

2. *What is best practice for provision of information to the public?*

- Who should approve the content/adequacy of the information provided to the public to ensure it is comprehensible (and correct)?
- Has a standard format/template been used?
- Should the information be disseminated electronically or by leaflet (or both)?
- How should cross border considerations be taken into account?
- Does the external emergency plan correlate with the information provided to the public?

3. *Communicating with the public during a major accident*

- Is this the role of the CCA?
- Are the means used to inform the public other than a siren considered to be acceptable?

Session 4 - Defining the credible worst case accident scenario (CWCAS) and threat zone for emergency planning

Presentation 10 - Maximum Credible Accident, ***Michael de Gunst, Safety Region Rotterdam Area***

Presentation 11 - When a Controlled Burn Response Might be Appropriate, ***Thomas Leonard/Shane Malone, Byrne Ó Cléirigh Ltd***

Presentation 12 - Appropriate Endpoints for Modelling Worst Case Accidents/Threat Zones in the Emergency Planning Context, ***Dr. Mary T. O'Mahony, Health Service Executive***

Workshop 4

Group 1 – Chair: Angela Moriarty, Rapporteur: Charlotte Lindkvist

Group 2 – Chair: Arvid Samuelsson, Rapporteur: Dagmar Dräger

Group 3 – Chair: Norman Powell, Rapporteur: Ole Karsten Stubben

1. How is the CWCAS determined?

- Is the Safety Report used to determine the CWCAS or does the Central Competent Authority (CCA) have pre-determined scenarios for each sector?

- What is the role of the CCA and Local Competent Authority (LCA) in
 - Assessment of methodologies?
 - Agreement of CWCASs?
- Should domino effects be considered in CWCASs?

2. *How is the emergency planning threat zone determined?*

- Are the endpoints (thermal, toxic, overpressure) to be used specified by the CCA/LCA?
- Is there a preference for Acute Exposure Guideline Levels over Emergency response planning Guidelines or other?
- What factors determine the modelling methodology used e.g. ALOHA, Phast?
- How is on site mitigation/implementation of technical measures considered?
- Are domino sites considered?
- What communication takes place between the LCA/Operator/CCA?

ANNEX 3 – LIST OF PARTICIPANTS

Name	Representation	Title
Michiel Goethals	Belgium	Head of Chemical Risks Inspectorate
Ingrid Roels	Belgium	Environmental Inspector
Miljenka Kliček	Croatia	Senior Environmental Inspector
Themistoclis Kyriacou	Cyprus	Labour Inspection Officer
Zuzana Machatova	Czech Republic	Officer
Anders Flindt Rasmussen	Denmark	Officer
Graham Dalzell	European Process Safety Centre	European Process Safety Centre
Timo Talvatie	Finland	Senior Safety Engineer
Tanja Heinimaa	Finland	Safety Engineer

Maud Casier	France	Policy Officer
Dagmar Dräger	Germany	Head of Department
Rainer Grosse- Daldrup	Germany	Dipl. Ing
Katalin Gorog	Hungary	Legal Advisor
Pat Conneely	Ireland (HSA)	Senior Inspector
Tom O'Sullivan	Ireland (HSA)	Inspector
Alice Doherty	Ireland (HSA)	Inspector
Angela Moriarty	Ireland (HSA)	Inspector
Dermot O'Callaghan	Ireland (HSA)	Inspector
Ita Daly	Ireland (HSA)	Inspector
Ben Browne	Ireland (HSA)	Inspector
Olivia Walsh	Ireland	Inspector

	(HSA)	
Tara Horigan	Ireland (HSA)	Inspector
John Sheehan	Ireland (HSE)	Interagency officer for Major Emergency Management
Paola De Nictolis	Italy	Engineer – Fire Officer
Pieter Boerma	Netherlands	Occupational Health and Safety Advisor
Michael de Gunst	Netherlands	
Walter Reurink	Netherlands	Manager Centre of Industrial Safety
Ragnhild Larsen	Norway	Senior Principal Engineer
Ole Karsten Stubben	Norway	Senior Advisor
Slawek Zajac	Poland	Head of Hazard Analysis Section
Joao Alberto Coelho Sousa	Portugal	Environmental Compliance Inspector

Francisc Senzaconi	Romania	Head of Disaster Prevention Department
Juliana Knazovicka	Slovakia	Inspector
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Charlotte Lindkvist	Sweden	Environment and Seveso Administrator
Helena Nässlander	Sweden	Desk Officer
Roland Burren	Switzerland	Head of Plant Security
Norman Powell	United Kingdom	Lead Emergency Planning Officer
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