

## IMPLEMENTING EU INDUSTRIAL SAFETY LEGISLATION IN CENTRAL AND EASTERN EUROPE

Pat Swords BE CEng FIChemE CEnv MIEMA

PM Group, Killakee House, Belgard Sq, Tallaght, Dublin 24, Ireland. Tel: ++353-1-4040786;

e-mail: pat.swords@pmg.ie

Despite many challenges EU environmental legislation has been to a large extent successfully implemented in Central and Eastern Europe and is leading to real improvements in industrial safety within the new Member States. Some, such as Romania, are now actively participating in training colleagues from the Candidate Member States in South Eastern Europe on the practical implementation of the Seveso II Directive.

### INTRODUCTION

This paper provides an insight on the implementation of EU industrial safety legislation regulating major accident hazards in Central and Eastern Europe. PM Group has since the mid-nineties participated on European Union (EU) Technical Assistance projects in the Candidate Member States, many of which have now become New Member States. The *Acquis Communautaire* is used in European Union law to refer to the total body of EU law accumulated thus far that has to be implemented before a Candidate Member State can be accepted for membership. PM Group's focus has been the implementation of the Environment *Acquis*, which is one of the 31 chapters of the *Acquis Communautaire* and comprises over 300 Directives relating to the EU legislation on environmental issues. Two of the primary Directives in the Environment *Acquis* are the Industrial Pollution Prevention and Control (IPPC) Directive and the Control of Major Accident Hazards (Seveso II) Directive. A further more recent development is the 2004 Directive on Environmental Liability with regard to the Prevention and Remedying of Environmental Damage, which ensures that the full weight of the 'Polluter Pays' principle is applied to any environmental damage that could result from an accident scenario.

### THE LEGISLATION

The original Seveso Directive was introduced in 1982 as the Control of Major Accident Hazards of Certain Industrial Facilities, the legislation has been updated a number of times since and is now called Seveso II. A number of Member States developed their own system of integrated permitting in the late eighties and early nineties and in 1996 the Directive on Integrated Pollution Prevention and Control (IPPC) was introduced. This Directive is still in force today with just some minor tweaks to the original text. While the focus of the IPPC Directive is on pollution control by application of Best Available Techniques (BAT), the requirements of BAT include the need to prevent accidents and to minimise the consequences for the environment. While the Seveso Directives were clearly focused on a quite limited number of facilities that were identified as high risk due to the quantities of dangerous substances present, the IPPC Directive is also relevant in that a

system of permitting that required a higher standard of management control was now being applied to all major industrial sectors. Furthermore in the permitting and inspection process the facilities now have to clearly demonstrate appropriate measures are being implemented to prevent accidents and that cleaner production techniques are being used, such as the reduction in volume of hazardous materials and the use of less hazardous materials. Facilities in the then Member States had eleven years from 1996 entry into force of the IPPC Directive to achieve compliance.

The 2004 Directive on Environmental Liability is new and powerful legislation that is still in its implementation stage throughout Europe. Indeed while some of the Candidate Member States, such as Croatia, have implemented it as part of the *Acquis*, some of the older Member States have missed the 30 April 2007 deadline for bringing into force the necessary laws and administrative provisions. While Article 130r of the Maastricht Treaty of 1992, enshrined the 'Polluter Pays Principle' into EU law, due to the complexity and far reaching implications of environmental liability, it took a further 15 years to develop this legislation. Essentially under the Directive on Environmental Liability an operator whose activity has caused the environmental damage or imminent threat of such damage can be held financially liable. This has the purpose to induce operators to adopt measures and develop practices to minimise the risks of environmental damage so that their exposure to financial liabilities is reduced.

### UNDERSTANDING THE DIFFERENCES!

The IPPC and Seveso II Directives originated in the older Member States, which are often called the EU15. It is important to realise that they essentially 'evolved' to meet a perceived public need for better regulation of industry and this 'evolution' occurred over an extended period of time in conjunction with the main stakeholders of Legislators, Regulators, Industry and Public.

The situation could not be more different in the Candidate Member States. There a political decision had been taken to join the EU and it was then necessary for all stakeholders to implement the Environment *Acquis* as quick as possible to achieve the political aim. Typically a period of

seven years would have been considered necessary to complete the *Acquis Communautaire*, although the complexity of this process is ever growing.

The clear outcome of this is that legislation had to be fast tracked to meet the targets set for EU membership and the option of letting it be developed and implemented over the longer period of time that occurred in EU15 was simply not available. Furthermore:

- The economies of these countries are usually in transition and often there is a legacy of derelict or unviable industrial facilities.
- There is an enormous technical challenge in implementing this legislation, in many cases the public administration had been short of financial and technical resources and the additional workload presented by the new legislation can stretch it to its capabilities.
- The perceived corruption and inefficiencies inherent in the previous planned economies has often left a legacy of deep public distrust in the administrative process.

It is abundantly clear in the recent economic climate that un-governed practices are not by any means limited to developing economies. However, most of these countries had five decades of repressive regimes based on a planned economy. In many respects individual survival was based upon being able to tap into the resources of the 'black economy'. Some typical issues left as a legacy from those five decades were:

- Not only was technical knowledge in these countries high. In many cases emissions standards for single media discharges, such as air and water, were equivalent or even more stringent to those that applied in the EU15 prior to IPPC.
- Industry in terms of financial, technical and managerial resources was usually unable to meet these standards; a system of lax controls had to prevail if the product was to be got out the door to meet the Plan's requirements.
- The pay of public officials was often far below what would sustain a reasonable lifestyle. The principles of good governance did not apply.
- The 'command and control' system was rigorously implemented into the legal system. Instead of the 'soft law' approach of codes of practice, guidelines, technical standards, etc, used in many cases in the EU15, the legal system of the planned economy was based on a 'hard law' approach of binding technical regulations.
- This 'hard law' approach also extended into administration and enforcement. In the EU15 flexibility could often be applied in terms of setting emission limits and timescales for compliance, indeed inspectors usually had the option of using verbal warnings or issuing simple notifications of non-compliance as the first step in enforcement. In the 'hard law' approach any non-compliance, no matter how trivial, in theory lead to a legal enforcement action.
- In some jurisdictions fines collected by the enforcement authorities were placed into a 'pool' and at the end of

the year the staff received a percentage of this 'pool'. Naturally this had the potential to lead to an adversarial instead of a co-operative relationship between industry and regulator.

- In the EU15 well developed industry associations regularly and effectively lobbied the administration to protect the perceived interests of their members. In the Candidate Member States industry associations also existed but often had a legacy of being part of the previous command and control economy. Hard and effective lobbying of the political system was a skill that was only being developed.

### THE IMPLEMENTATION PROCESS

Due to its complexity environmental protection has been recognised as one of the most demanding areas in the process of approximation to the EU *Acquis Communautaire*. Preparation for membership in the area of the environment presents three particular challenges:

- Legal: The Environment *Acquis* consists of a large body of legislation most of which is in the form of directives requiring transposition into the national legal order.
- Administrative: Planning, permitting and monitoring require sufficiently staffed and well equipped environmental administration at various levels.
- Financial: Substantial investment in infrastructure and technology in order to make up for lacking or insufficient investments.

The EU therefore provides technical support to assist the Candidate Member States in legal harmonisation and in strengthening their administrative structures for the implementation of the new legislation. In general the Candidate Member States must increase the investments in environmental protection using the experience and good practice of developed European countries (*lessons learnt*) in balance with economic and social interests. This technical support from the EU takes a number of forms, such as:

- Technical assistance projects with a defined Terms of Reference based on identified gaps in a Candidate Member State's legislative and administrative structures. An example is the current project in Croatia in which PM Group is participating in on 'Enhanced Environmental Inspection for Enforcement of the New Environmental Legislation'. This project assists with the inspection and enforcement of the Seveso II and IPPC Directives and includes the provision of training and a new system for electronic reporting. The Croatian project is funded under the PHARE 2005 programme (EuropeAid/123226/DSER/HR).
- While the above technical assistance projects are often carried out by private companies engaged by the EU, the Twinning Projects are specifically completed by linking the staff and resources of the competent authorities in the older Member States with those in the Candidate Member States.

- Participation in EU networks also provides valuable training and assistance to the staff in the competent authorities in the Candidate Member States, in particular in the IMPEL (European Network for the Implementation and Enforcement of Environmental law) and ECENA (Environmental Compliance and Enforcement Network for Accession) networks.

Seveso II is the directive with the greatest technical challenge. Traditionally in many of the Candidate Member States inspectors were required to enforce legislation at anything ranging from a pig farm to an oil refinery. Clearly not all inspectors are able to develop the necessary technical skills to implement Seveso II on a large complex site in which experience and judgement play a large role. Unfortunately those that have the experience and can exercise the necessary judgement are also in demand by industry.

While the primary focus of the technical assistance above is the administration in the Candidate Member States, the EU is very conscious that Industry and the Public are also stakeholders in effective regulation. With regard to industry the principles of the internal market prohibit the EU from giving direct financial assistance to companies, as once the Candidate Member State enters the EU these companies will be in direct competition with firms in the older Member States that have already implemented these measures from their own internal financial resources.

However, in addition to training programmes provided to the Regulatory Agencies, seminars are also provided to industry and Pilot Companies from industry are selected for participation in the initial implementation process.

The EU also strongly considers that the public and Non-Governmental Organisations (NGO) have a significant role to play in the regulatory process, particularly in terms of public participation, and the some of the training programmes provided are open to, and in some cases specifically directed to, the needs of the public and NGOs.

#### SEVESO II IMPLEMENTATION IN ROMANIA

In 2001 when PM Group commenced work on the implementation of the Seveso II legislation in Romania, under the PHARE project 'Planning for Emergencies Involving Dangerous Substances for Romania' (*REAP 2002*), the date set for Accession was 1st January 2007. To get there major hurdles, particularly in the field of environment and industrial safety, had to be overcome as the legacy of Ceauşescu was visible not only in the buildings in the centre of Bucharest but in the heavy 'showcase' industrial projects that had been left behind with their associated major environmental and safety impacts. Indeed in January 2000 a tailings pond at a gold mine in Baia Mare in North Western Romania was overwhelmed by heavy rainfall and melting snow, the dam was overtopped and then breached. About 100,000 m<sup>3</sup> of tailings water containing free cyanide and cyanide complexes were released. The spill contaminated several small rivers in Romania and Tisza in Hungary, entering the Danube upstream of Belgrade and eventually, the Black Sea. The spill had a very

severe immediate effect on plants and wildlife and fish were killed in the plume or immediately after; 1,240 tonnes in Hungary alone. The sediment released from the dam was rich in heavy metals and these will have a more lasting impact than cyanide, due to their persistence and bioaccumulation. It is feared that some native, protected and endangered species of fish may have been finally eliminated from the receiving river system by the spill.

Unfortunately on the 10 March 2000 in Baia Borsa, in Maramures County where Baia Mare is located, another dam overflowed and burst, leading to 100,000 m<sup>3</sup> of water and 20,000 tons of tailings sludge containing heavy metals flowing out of the dam and washed downstream into the Viseu and Tisza rivers. It is estimated that the indirect economic costs of the Baia Mare incident have totalled hundreds of millions of Euro. The pollution also had serious social and economic impacts on the population in the area affected by the disaster. Indeed the Seveso II Directive was amended in 2003 as a result of this accident.

The main activities of the PHARE project that ran from April 2001 until February 2002 were:

- Legal Drafting of Regulation – Assisting in the legal drafting of the Seveso II Regulation for incorporation into Romanian Law by providing legal guidance and advice.
- Emergency Planning and Response – Methodological study covering Hazard Identification, Risk Assessment and Emergency Planning and Response.
- Pilot Study – Pilot Study of a selected Romanian establishment and local authority. The integrated Ammonia and Fertiliser complex SOFERT SA in Bacau was chosen. Note only sulphate and phosphate based fertilisers were produced at SOFERT SA, i.e. no ammonium nitrate.
- Training – Training of representatives from the Ministries involved and also representatives from a number of Seveso II establishments and related local authorities.

In addition an inventory of Seveso II establishments in Romania was conducted which found a total of 132 Top Tier sites and 70 Lower Tier sites in 38 of the 44 Inspectorates. As is common on these technical assistance projects local experts are recruited to work on the project in addition to the assistance of the staff of the beneficiary, which in this case was the Ministry of Waters and Environmental Protection. For this project two engineers from ICIM, the Research-Development National Institute for Environmental Protection in Romania provided technical support. This helps provide a pool of suitably qualified technical people at the end of the project, when the international experts are no longer available.

With regard to the Inventory a letter was sent to the Inspectorates requesting the details of the types and quantities of dangerous substances stored on sites in their area. The Romanian Local Experts from ICIM reviewed the raw data and compiled tables under the direction of the international experts in order to assess sites to see if the Seveso II Regulations would apply.

For the Pilot Study a Hazard and Identification (HAZID) Study was completed of SOFERT SA. Not unsurprisingly this identified the catastrophic failure of the 13,000 tonne single skinned liquid ammonia tank as the main hazard. (See Figure 1)

Consequence modelling using the PHAST software indicated that the reference toxic concentration of 110 ppm, a 60 minute Acute Exposure Guideline Level (AEGGL), could potentially extend to 50 km downwind of the site. A Hazard and Operability (HAZOP) study of the ammonia storage was then completed. In the ideal situation the ammonia storage tank would be to a double skinned design. However, the engineering standards at the plant were good and the only significant recommendation was to consider changing the water sprays surrounding the ammonia tank bund to a foam blanket system over the bund. The use of water sprays, while effective in absorbing ammonia vapour, would in fact provide a significant heat input to liquid ammonia spillage in the bund, which was at a temperature of  $-33^{\circ}\text{C}$ , and help vapourise it. A suitable foam blanket could instead potentially slow down the heat input and the ammonia release giving more time to the emergency responders.

Romania, like many of the surrounding countries, is an earthquake zone and partly as a result of this has well developed Civil Defence structures that play a major role in emergency planning and response. Indeed for Bacau, where SOFERT SA is located, the local Civil Defence already had a well developed emergency plan based on a toxic release spreading 40 km downwind. For the general population evacuation was not considered practical for those in the immediate vicinity of the plant. Instead people should stay indoors and seal doors and windows. However, evacuation may be considered for communities located further away. The population had been issued with the relevant emergency instructions. Every two years a full emergency drill was practised, which requires participation by the public. The response of the public to the drill was monitored and adjustments made to the plan if necessary. On the local television and radio a civil defence message for the general population was broadcasted every day.

Romania now has 159 Lower Tier and 128 Upper Tier sites, all holding the necessary documentation, although some of the initial documentation received from operators



**Figure 1.** 13,000 t Ammonia storage tank at SOFERT SA

was poor. It was found that the inspections of these sites needed to be improved and new legislation on inspection was introduced in 2005. Romania is now participating in the training of the Candidate Member States such as through training programmes organised by the ECENA network.

The IPPC Directive was implemented in Romania in the period 2003 to 2007, PM Group participating in two PHARE projects; Technical Assistance for Implementation of the IPPC Directive and Technical Assistance to Support the Integrated Permitting Process. In September 2007 when nine industry open days were held around Romania, in which Question and Answer Sessions were provided to the public and members of the Media on the implementation of the EU permitting process, no concerns were expressed relating to the safety of industrial sites.

### SEVESO II IMPLEMENTATION IN SLOVENIA

The same PHARE Project (*REAP 2002*), "Planning for Emergencies Involving Dangerous Substances" was implemented by PM Group in Slovenia in the period 2001 to 2002.

The technical scope was quite similar and two local experts from the Institut Stefan Josef provided local support. The beneficiary was the Minister of Environment and Spatial Planning and the Ministry of Defence, the Seveso II legislation being implemented by a joint competent authority. Like Romania, Slovenia is in an earthquake zone and has a well developed civil defence structure that reports to the Ministry of Defence.

The pilot facility selected was Butan Plin's Liquefied Petroleum Gas (LPG) transfer and storage facility on the outskirts of Ljubljana. LPG was delivered by rail and transferred to the storage and filling facilities. The LPG was then dispatched either in bulk road tankers or portable cylinders. The pilot facility implementation was aided by the fact that the German Federal Environment Agency (*Umweltbundesamt 1985*) had prepared in 1985 a sample Seveso I compliance documentation for liquefied gas storage facilities. This was referenced in the EU Major Accident Hazard Bureau's Community Document Centre on Industrial Risk (CDCIR).

### SEVESO II IMPLEMENTATION IN MALTA

The Austrian Environment Agency has a twinning project with the Malta Environment and Planning Authority (MEPA), which includes the implementation of the Seveso II legislation. The 12 Seveso sites II on the island are related to the provision of bulk petroleum storage. How does one provide the necessary fuel storage with appropriate Land Use Planning separation distances when the island is so densely populated and essentially a completely urban environment? Only with compromises between the needs to operate the facility and needs to minimise disruption to the surrounding communities that have always lived there!

As part of the twinning project, PM Group provided assistance to MEPA on inspecting the two underground



fuel storage locations on the island and in providing training on Seveso II with a particular emphasis on petroleum storage. The geology of Malta is particularly suited for construction in stone. Has Saptan is an impressive underground facility built by NATO to a very high standard over forty years ago to serve for refuelling the Mediterranean fleet and its aviation support. 150,000 tonnes of refined fuel is stored underground with two 5 km tunnels that connect to marine unloading and loading facilities. The facility was transferred to Enemalta in 2003, the value being estimated at that time at €150 million. Some recommendations were made based on the fact that Has Saptan is little changed since when it was first built and technology, such as related to fire fighting, HAZOP reviews and Explosives Atmospheres (ATEX) has moved on since then.

Raz Hanzir is even more remarkable, built nearly seventy years ago by the Royal Navy as an underground facility for storage of 80,000 tonnes of petroleum fuels, the tanks are still in use today providing refuelling at Valletta Harbour. While the original design details for the construction of the hewed stone tanks at Ras Hanzir have long been lost it would appear that they have some form of inner coating. Remarkably there is no evidence in the surrounding area that their integrity has been breached. However, they are a considerable age and it is impossible to predict for how much longer their integrity can be guaranteed. One recommendation made was to consider upgrading the tank level monitoring system to modern instrumentation with a measurement accuracy of 0.1 mm. This would provide sufficient detection in the event that the tank integrity started to fail.

### SEVESO II IMPLEMENTATION IN CROATIA

As mentioned previously there is a current project in Croatia in which PM Group is participating in on 'Enhanced Environmental Inspection for Enforcement of the New Environmental Legislation'. This project assists with the inspection and enforcement of the Seveso II and IPPC Directives. Enforcement is the means to provide sufficiently strong controls and penalties to ensure that the laws and regulations are complied with. Since the 1990s, enforcement has become a very important issue, because weak enforcement by some Member States will prevent achievement of the EU's environment and health policies and the proper functioning of the single market. The project website is available at: [www.ifenel.hr](http://www.ifenel.hr).

Currently in Spring 2009 the main focus is on training with in-depth seminars proceeding for both regulators and industry.

Seminars have also been specifically arranged at four regional locations for the NGOs and members of the public but the turnout of the NGOs and public has so far been poor. In many respects this mirrors experience found in many other countries, unless there is a specific industrial problem that concerns the public, and in most cases the one issue that really does get them irritated is a plant with a persistent odour problem, then the public tend to take a

relaxed attitude to the public participation process that is now more in-depth under the new EU Environmental Legislation.

That is not to say this element should be put to one side, particularly given that the news media sense and publicise issues that will attract the public's concern and attention (creating customer readership and therefore advertising), and this concern appears to feed upon itself and attract more publicity. In turn, these arouse public concerns and capture the attention of politicians and industry managers, who are more inclined to act once their stakeholders start asking questions such as, "Could this happen to us also?" Because of this PM Group technical experts take great pains in seminars to make themselves available for Question and Answer sessions, all relevant questions are answered, if not immediately then with a follow up.

In the Terms of Reference for the project it was highlighted that in the 2006 EU Progress Report on Croatia, how good progress on the Environment *Acquis* was referred to but:

- "Specific gaps remain to be addresses particularly in relation to administrative capacity as well as the definition of financial strategies. The division of responsibilities for operational aspects of environmental protection and the lack of coordination between Ministries continues to hamper progress."

The Ministry of Environmental Protection, Physical Planning and Construction (MEPPC) has overall responsibility for environmental protection in Croatia and coordinating the approximation process in the environment sector. MEPPC is responsible for license permitting, carrying out environmental impact assessments procedures and environmental inspection activities. However, this last duty is carried under a Joint Agreement with a number of other different Ministries, such as the Ministry of Agriculture, Fisheries and Rural Development, the Ministry of Regional Development, Forestry and Water Management, the Ministry of Health and Social Welfare, the Ministry of Culture, etc.

The Croatian Environmental Protection Act of 2007 is a very comprehensive piece of legislation that transposes the Seveso II Directive, IPPC Directive and Directive on Environmental Liability. Subordinate legislation continues to be introduced, such as that enacted in late 2008 and early 2009 for the implementation of these three Directives. However, the roles of the different Ministries and administrative departments, who will have to act in joint fashion to fulfil the role of the Competent Authority, are still somewhat unclear and will present a challenge in terms of co-ordination.

With regard to Seveso II, a database of notified installations has been developed by MEPPC (approx. 150 sites). Training of the regulators and industry on hazard identification and risk management techniques is on-going. As has been found in all Member States, Seveso II is a huge technical challenge; risk management is not and is

unlikely ever to be as well defined as IPPC with its BAT guidance.

Another aspect of the project is the establishment of a Pilot Team, whose key role will be to establish an investigative group that will respond to incidences of environmental damage. Where negligence can be established then it is likely that this will lead to initiation of a prosecution to recover the costs associated with remedying the environmental damage in accordance with the terms of the Directive on Environmental Liability. While the legislative measures are now in place in Croatia, such as Article 171 of the Environmental Protection Act which establishes an “*Obligation to Secure Available Funds for Compensation of Damage*”; the issues relating to financial coverage and cost assessment of damage are highly complex and only evolving. Indeed the numbers of cases that have arisen to date throughout Europe under the terms of the Directive on Environmental Liability are extremely limited. However, as the project is very much focused on enforcement of environmental legislation, there has been an emphasis in the training seminars on techniques related to minimising the impacts of spillages and fire water run-off, which are recognised as the technological accident scenarios that have in practice resulted in most environmental damage.

#### BULGARIA

There are currently about 140 Seveso II sites in Bulgaria. Initial problems related to poor documentation, particularly with regard to risk assessments and as in Romania with regard to inspections. Sourcing sufficiently experienced technical resources was a challenge for both industry and regulators. The Directive requires the Competent Authority to ‘communicate the conclusions’, of the Safety Report to the operator. It is not necessary to issue a ‘Seveso Permit’, although Bulgaria does and these can include improvement requirements.

#### OVERVIEW OF CANDIDATE COUNTRIES

Table 1 (JRC June 2003) presents the estimates of Top Tier and Lower Tier Seveso II installations for the Central and Eastern European Candidate Member States in 2002. The EU’s Joint Research Centre (JRC) used the designation PECO based on the French for Central and Eastern Europe.

We can off course never rule out the occurrence of another major technological accident in Central and Eastern Europe, such as which occurred in Baia Mara in Romania in 2000. But major strides to reduce the probability of occurrence have taken place in the last decade. Indeed the JRC (JRC June 2003) also prepared a risk relevance matrix of priority natural and technological hazards for these countries in 2002 (See Figure 2).

#### CONCLUSIONS

The Major Accident Hazard Bureau (MAHB) of the JRC concludes with respect to the Major Accident Reporting System’s (MARS) database

**Table 1.** Top Tier and Lower Tier Seveso II sites in PECO states in 2002

	Distribution of Seveso installations in PECO countries in December 2002		
	Total	Upper Tier	Lower Tier
Bulgaria	67	35	32
Czech Rep	154	68	86
Estonia	28	3	15
Hungary	216	134	82
Latvia	44	16	28
Lithuania	120	35	85
Poland	253	106	147
Romania	202	132	70
Slovak Rep	160	40	120
Slovenia	34	19	15

- The vast majority of accidents notified (over 95% of the accidents in which the causes are known) could have been foreseen early and consequently prevented by the proper application of existing experience and disseminated knowledge.
- It is also true that frequently accidents are actually re-occurrences of previous events, which means that we are possibly not learning sufficiently from the investigative work of others.

The Candidate Countries, many of whom are now new Member States, are rapidly progressing up the learning curve in terms of proper management of industrial risk and prevention of environmental damage at both the regulator and operator levels. This is evident from the reduced level of accidents and the greater confidence that the public has with the role of their regulators and the operators in controlling the technological hazards within their communities.

#### ACKNOWLEDGEMENTS

I am indebted for the section on Bulgaria to Emmet McMahon, an independent Environment, Health and Safety expert, who has worked on PM Group technical assistance projects in the Candidate Member States and extensively in Bulgaria, originally as part of the twinning project with the Irish Environmental Protection Agency (EPA). This twinning project in the late nineties helped implement the Seveso II directive and has been replaced by two successive twinning projects with the Austrian Environment Agency.

PM Group has been proud to play a very small role in the implementation of EU legislation controlling industrial hazards over the last decade. Others have also played a role, such as the Joint Research Centre’s (JRC) Enlargement project “Management of Natural and Technological Hazards,” which provides for the extension of the JRC’s activities in these areas to include the Candidate Countries. This was achieved through the means of workshops, analyses of existing situations, prioritising of interven-

**Estimates of Risk Relevance per Country of Priority Natural and Technological Hazards\*  
Year-End 2002**

Country	1	2	3	4	5	6	7	8	9	10	11
BG	High	Low	Low	High	High	High	High	Low	High	High	High
CZ	High	High	Low	High	High	High	High	High	Low	High	Low
EST	Low	Low	Low	Low	Low	Low	Low	High	Low	High	Low
H	High	High	Low	High	High	High	High	Low	Low	High	Low
LV	High	Low	No applicable	High	High	High	High	Low	No applicable	High	No applicable
LT	High	Low	Low	Low	High	Low	High	High	Low	High	No applicable
PL	High	High	Low	High	High	High	High	High	Low	High	Low
RO	High	High	No applicable	High	High	High	High	High	High	High	High
SK	High	High	Low	Low	Low	High	Low	Low	Low	Low	Low

  

High	High
Medium	Medium
Low	Low
-	No applicable

  

1. Chemical process/storage installations
2. Contaminated Lands
3. Oil shale mining
4. Pipelines
5. Transport of dangerous goods
6. Transboundary pollution
7. Floods
8. Storms
9. Landslides
10. Forest Fires
11. Earthquake

*\*These hazards were selected as priorities by a consensus of PECO countries. Estimates of risk relevance were provided by competent authorities participating in the project and may be subject to revision.*

### Relevance of the Hazard

“High”	The hazard is present within a vast majority of the country (~>2/3) due to the infrastructure or geographic character of the country, OR the hazard is confined only to particular areas but in the event of an incident, the effect could be significant for: at least one major population centre (such as a medium to large city or metropolitan area) or an important economic resource.
“Medium”	The hazard is present within a good portion of the country (~>1/3, <2/3) due to the infrastructure or geographic character of the country, OR hazard is confined only to particular areas but in the event of an incident, the effect could be significant for: a minor population centre (a large town or small to medium-size city) or minor economic resource.
“Low”	The hazard is present within a small portion of the country (~<1/3) due to the infrastructure or geographic character of the country, but in the event of an incident, there is no significant effect for: minor or major population centres, minor or major economic resources.

**Figure 2.** Estimates of risk relevance per country

tions, data collection, transfer of EU software tools, training, joint projects, mutual joint visits and benchmark exercises.

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