

# EMERGENCY PLANNING DEVELOPMENTS IN ITALY

*Edoardo Galatola\**, *Graziella Palla\*\**

\*SINDAR s.r.l. Corso Archinti, 35 - 26900 LODI - ITALY

E-mail [sindar@sindar.it](mailto:sindar@sindar.it) [www.sindar.it](http://www.sindar.it)

\*\*STA S.R.L. E-mail [sta.net@tin.it](mailto:sta.net@tin.it)

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## **Abstract:**

According to the Pres. Decree 175/88, in Italy (Seveso I), the prefectures have been drawing up external emergency plans for those plants that are prone to major accidents, but have not achieved the aim of completing the job for all the plants in the nation's territory. When fulfilling the task, the prefectures gave priority to the plants' external emergency plans rather than to those of the industrial areas. In general, where the investigation of the major-accident plant was not completed (more than 50% of the cases), the Plan is still in draft form.

So far, the existing emergency plans have been drawn up with reference standards: every prefecture has been using its own emergency-plan standard, which generated as many documents as there are plants in the territory of competence. In the emergency plans, the populations' behavioural pattern is neglected and informing the population is left to the mayors. It should also be kept in mind that the mayor is held to draw up the Township's Emergency Plan, which, as concerns major-accident hazards, hardly interfaces with the External Emergency Plans and Provincial Emergency Plans.

The recent Legislative Decree 334/99 (Seveso II) stipulates that for emergency management a larger area than that of the major-accident plant should be considered and that emergency planning should involve the entire area where there is a high concentration of dangerous plants. Based on the above, the entire question of Emergency Planning for major-accident hazards is being revised and standardised in Italy.

## **1. INTRODUCTION**

Emergency planning concerns emergencies arising from natural events (acute seismic episodes, floods, landslides and rock falls, volcano eruptions, extreme weather conditions) and those arising from human-related activities. Of the latter the emergency scenarios originating in industrial plants, in particular chemical plants, in stores of hazardous substances and during their road, rail and sea transport, are of particular importance.

The preparation of external emergency plans for chemical risks involves collecting information concerning the features of the accident and environmental scenarios and the availability of human and material resources for tackling the emergency.

The accident scenario is defined by:

- type and quantity of the substance involved;
- intrinsic hazard properties of the substance (flammability, explosion potential, toxicity);
- type of accident (fire, explosion, toxic release).

The environmental scenario is defined by:

- distribution of vulnerable elements around the accident epicenter;
- geomorphologic features of the site;
- weather conditions;
- road infrastructures.

The human and material resources are defined by the availability of the men and equipment of the institutions involved (fire brigade, armed forces, police, health authority, Red Cross, traffic police etc.).

## **2. LEGISLATION**

The relevant laws on the layout of external emergency plans currently drawn up are Presidential Decree no. 175 of 17 May 1988, the so-called Seveso Directive and implementation of EEC directive no. 82/501, relating to major accident risks linked to specific industrial activities (Art. 17 Duties of the Prefect) and subsequent Environment Ministry Decree of 20 May 1991 and Law no. 137 of 19 May 1997, which requires the mayor of the municipality to perform tasks of informing the population.

More recently, in Decree Law no. 334 of 17 August 1999, the so-called Seveso Directive 2 and implementation of EC directive no. 96/82, the obligations of drafting of the external emergency plan by the prefect and of information of the population by the mayor are endorsed.

Italian legislation on the risks of major accidents lays down the obligation of drafting specific plans for all the areas concerned by the activity at risk and of notifying the public of them, but is only compulsorily applied to firms in the upper potential risk bracket (Article 4 of Presidential Decree no. 175/88, Art. 8 of Decree Law no. 334/99) and does not give detailed indications as to the minimum content of the plans, nor specifications which ensure standardized criteria, for their drafting, throughout the territory and for all types of activity.

The prefectures obliged to draw up the external emergency plans have only been able to complete these plans in a provisional form, in that they have worked without data which has been adequately checked and standardized for the whole country, given that the initial surveys of plants subject to notification or declaration are proceeding slowly.

The reference guidelines for drafting of the external emergency plans were drawn up by the civil defence department.

In the document “External emergency planning for industrial plants with a major accident risk” dated 18 January 1994 means are provided for identifying the areas to be covered by the emergency planning.

The report, whose planning instructions were included in the checklist for the minimum content of the external emergency plans, involves the definition of:

- the relevant accident scenario for planning, considering the weather conditions;
- the planning zones and levels of protection (threshold values).

It also supplies a “rapid” method of identifying the planning zones, prepared in order to simplify forecasting of the extent of the consequences.

In January 1995 the guidelines “Prior notification of the public of the industrial risk. Presidential Decree no. 175/88” of January 1995 were published on the basis of the European document “General guidelines on the content of information to the public” Eur 15946 EN report of the Joint Research Centre of the European Commission, Ispra (Varese).

With reference to the planning zones identified, the document identifies the minimum information to be supplied to the public during the preliminary planning phase.

More particularly the need is underlined of locating in the plans the sites with high vulnerability (schools, hospitals, kindergartens, welfare facilities) and those of high concentration (hotels, shopping malls, sports fields, beaches) where specific intervention actions are foreseen.

### **3. CURRENT SITUATION**

As implementation of Presidential Decree no. 175/88, the prefectures have taken steps to draw up the external emergency plans for plants with major accident risks, not achieving the aim of completing drafting for all the plants in the country. In carrying out their task the prefectures opted to draw up external plant emergency plans rather than area ones.

The plans were drawn up for plants subject to notification (pursuant to Art. 4 of Presidential Decree no. 175/88); in some cases (for example the Lombardy regional authorities) the prefectures were asked to draw up external emergency plans also for firms subject to a declaration (pursuant to Art. 6 of Presidential Decree no. 175/88).

Generally, where the survey of the plant with risk of a major accident has not ended (over 50% of cases), the plan has remained as a preliminary draft.

The external emergency plans, in terms of structure, content and level of depth, are non-standardized and often incomplete. Each prefecture has used its own emergency plan standard, which has generated the same number of documents as the number of plants in the relevant area. The behavioural aspect of the public is underestimated in the emergency plans and the mayor is given the responsibility of informing the population.

It also has to be remembered that the mayor is obliged to draw up the municipal civil defence plan which, as regards major accident risks, is difficult to interface with the external plant emergency plan and with the provincial plans.

#### **4. VERIFICATION OF CURRENT STAGE OF APPLICATION**

In a specific research project commissioned by the CNR (Italian National Research Council) on behalf of the civil defence department, an updated and analytical picture was given of the planning of emergencies caused by industrial risks in Italy, defining the critical points both in terms of area distribution and completeness of the analysis, to prepare finally the means for the simplification and standardisation of the procedures.

The plans analysed were divided into area emergency plans, if referred to an industrial site formed by several production plants and into external emergency plans, where they only refer to a plant with a high accident risk.

On the basis of the national guidelines and the experience gained in and outside Europe (particularly in the USA), a chart was drawn up for checking on the minimum content of an external emergency plan.

Among the other points checked, attention was turned to checking on:

- definition of the validity and updates of the plan;
- definition of individual responsibilities in management of emergencies;
- the intelligibility of the plan (inclusion of the list of the institutions in charge, structuring of the plan and so on);
- the resources available (with specific definition of the effective availability of the resources);
- information to the public (preventive above all, but also communication during the emergency);
- consideration of the plan per se as a means of information which has to be circulated to the public;
- the inclusion of a glossary with definitions of the terms used in the plan;
- features of the site (presence of other natural risk sources and protected areas).

#### **5. MAPPING OF EXISTING PLANS**

The survey has shown a situation of gradual improvement in terms of number of emergency plans drawn up, even if the same have not been completed.

In the majority of cases the plans refer to individual plants and not to the industrial areas involved; this is basically due to the fact that the “areas with a high concentration of industrial activities which may entail greater risks of major accidents and where notification may be required” have not yet been identified.

The situation revealed is the following:

*Table 1 Situation of external emergency plans in Italy*

Year	No. of plants subject to notification	No. of external emergency plans drawn up	No. of plans deposited at the civil defence department	Percentage of plants without an external emergency plan
1997	473	133	70	68 %
1998	392	211	211	46 %
1999	363	255	255	30 %

## 6. CONSIDERED VALUATION OF THE PLANS SUBMITTED

In order to process the data collected statistically to identify the greatest shortcomings found in the plans and their structural and organisational weaknesses, a specific valuation was carried out to allow a numerical definition of the level of completeness of the plans. From the checklists compiled on a quality basis, the quantity data were processed, checking from time to time the state of completeness of each check item. The checklist was divided into ten sections, listed in Table 2; 1 to 10 items to be checked were defined per section.

Each check item of the checklist was assigned a value of 1 when the information was present and adequately processed, and 0 when the information was missing or in any case not dealt with in sufficient depth. Since a value of 0 (missing/incomplete) or 1 (present/complete) was assigned for each item, the maximum value assigned to a complete plan would consequently be 52.

*Table 2 External emergency plans valuation chart*

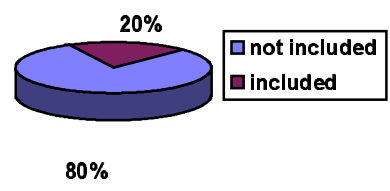
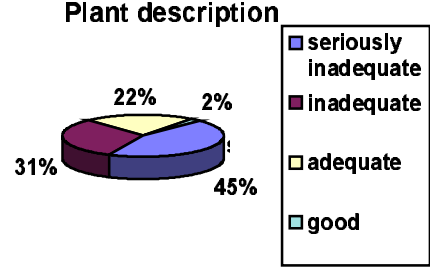
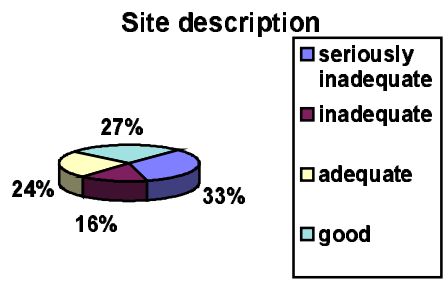
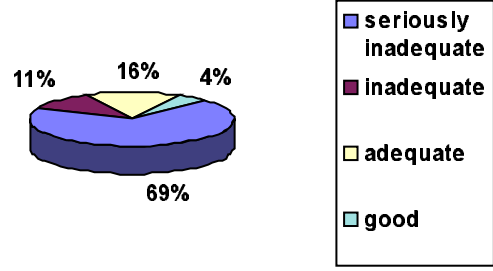
Section number	Checklist section*	Number of items	Max. score
1	Periodical updating	1	1
2	Plant description	4	4
3	Site description	5	5
4	List and reference to organisations and bodies	4	4
5	Definition of roles	10	10
6	Resources available	4	4
7	Description of the scenarios and of the accident	4	4
8	Description of the elements of vulnerability	5	5
9	Emergency management	8	8
10	Can be used as a means of information	7	7
	Total maximum score		52

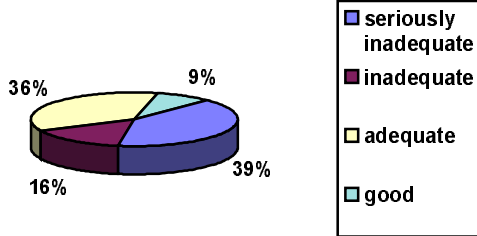
The percentage values of completeness found were grouped into four categories:

0-25	seriously inadequate	51-75	adequate
26-50	inadequate	76-100	complete

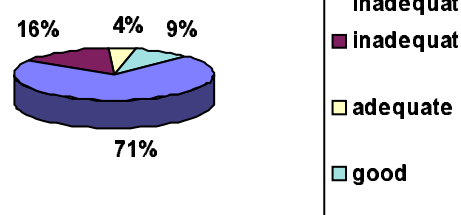
## 7. ANNOTATED STATISTICAL PROCESSING OF THE SHORTCOMINGS MOST FREQUENTLY FOUND IN THE EMERGENCY PLANS

By analysing each check item drawn up during reading of the plans the following was found:

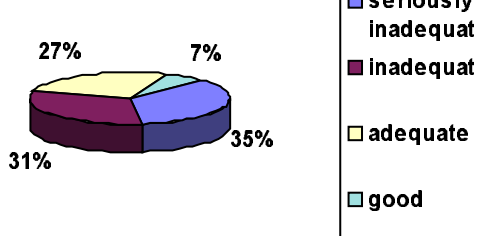
<b>1. Periodical updating</b>											
<p><b>Updating of the plans</b></p>  <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>not included</td> <td>80%</td> </tr> <tr> <td>included</td> <td>20%</td> </tr> </tbody> </table>	Category	Percentage	not included	80%	included	20%	<p><i>Periodical updating (at least three-yearly) and clear definition of the duration and validity of the plan are specifically included in only 20% of the emergency plans.</i></p>				
Category	Percentage										
not included	80%										
included	20%										
<b>2. Plant description</b>											
<p><b>Plant description</b></p>  <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>seriously inadequate</td> <td>45%</td> </tr> <tr> <td>inadequate</td> <td>31%</td> </tr> <tr> <td>adequate</td> <td>22%</td> </tr> <tr> <td>good</td> <td>2%</td> </tr> </tbody> </table>	Category	Percentage	seriously inadequate	45%	inadequate	31%	adequate	22%	good	2%	<p><i>The plant description is generally inadequate (76%). It can be said that:</i></p> <ul style="list-style-type: none"> <li>☺ <i>the hazardous substances are nearly always listed pursuant to Presidential Decree no. 175/88 with the relevant quantities;</i></li> <li>☹ <i>the substances numbered as per Ann. 175/88 are not included, except in very rare cases;</i></li> <li>☹ <i>the attached safety sheets are not drawn up according to the 16 points required by legislation.</i></li> </ul>
Category	Percentage										
seriously inadequate	45%										
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Category	Percentage										
seriously inadequate	49%										
inadequate	24%										
adequate	27%										
good	16%										
<b>4. List and reference to organisations and bodies</b>											
<p><b>Definition of the organisations involved</b></p>  <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>seriously inadequate</td> <td>80%</td> </tr> <tr> <td>inadequate</td> <td>11%</td> </tr> <tr> <td>adequate</td> <td>16%</td> </tr> <tr> <td>good</td> <td>4%</td> </tr> </tbody> </table>	Category	Percentage	seriously inadequate	80%	inadequate	11%	adequate	16%	good	4%	<p><i>The information relating to the institutional organisations and others involved in management of a possible accident, are largely inadequate (80%). This is mainly due to the following factors:</i></p> <ul style="list-style-type: none"> <li>☹ <i>the list, where it exists, is incomplete;</i></li> <li>☹ <i>the list generally includes the emergency numbers but not the addresses;</i></li> <li>☹ <i>the location of the organisations in the area is always missing;</i></li> <li>☹ <i>the involvement of voluntary associations would not appear to be very prominent in the emergency management organisation.</i></li> </ul>
Category	Percentage										
seriously inadequate	80%										
inadequate	11%										
adequate	16%										
good	4%										
<b>5. Definition of roles</b>											

<p style="text-align: center;"><b>Definition of roles and responsibilities</b></p>  <p>A 3D pie chart with four segments: 'seriously inadequate' (39%), 'adequate' (36%), 'inadequate' (16%), and 'good' (9%). A legend to the right lists the categories with corresponding color swatches.</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>seriously inadequate</td> <td>39%</td> </tr> <tr> <td>inadequate</td> <td>16%</td> </tr> <tr> <td>adequate</td> <td>36%</td> </tr> <tr> <td>good</td> <td>9%</td> </tr> </tbody> </table>	Category	Percentage	seriously inadequate	39%	inadequate	16%	adequate	36%	good	9%	<p>The level of definition of the roles and responsibilities of individuals in the various phases of prevention and management of the emergency in most cases does not achieve satisfactory levels (54% is still inadequate). The following is generally the case:</p> <ul style="list-style-type: none"> <li>☹️ the definition of the roles almost never states the name of the person in charge, merely the position occupied;</li> <li>☹️ the responsibilities relating to emergency aid in the areas hit are not always explicitly defined;</li> <li>☹️ the name of the person in charge of preventive information to the public is almost always missing;</li> <li>☹️ consideration is almost never made of the need to define roles and responsibilities relating to management of available resources, work on unsafe buildings, and post-emergency restoring to a state of normality.</li> </ul>
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seriously inadequate	39%										
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### 6. Available resources

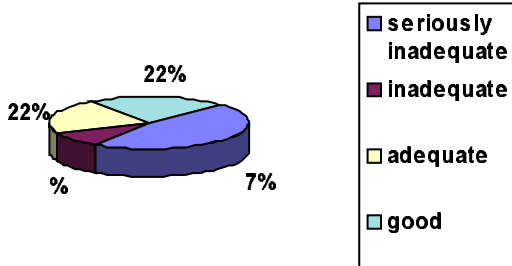
<p style="text-align: center;"><b>Definition of available resources</b></p>  <p>A 3D pie chart with four segments: 'seriously inadequate' (71%), 'adequate' (16%), 'inadequate' (9%), and 'good' (4%). A legend to the right lists the categories with corresponding color swatches.</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>seriously inadequate</td> <td>71%</td> </tr> <tr> <td>inadequate</td> <td>9%</td> </tr> <tr> <td>adequate</td> <td>16%</td> </tr> <tr> <td>good</td> <td>4%</td> </tr> </tbody> </table>	Category	Percentage	seriously inadequate	71%	inadequate	9%	adequate	16%	good	4%	<p>Although the effective utility of immediate knowledge of the resources actually available in the case of an emergency is clear, the list of the same is, together with preventive information to the public, the topic least dealt with by the emergency plans analysed (86% inadequate). In general it can be said that:</p> <ul style="list-style-type: none"> <li>☹️ the data almost always indicate information relating to the fire-fighting equipment available in the firm;</li> <li>☹️ the emergency aid and transport means which could be used on a municipal or provincial level are rarely defined;</li> <li>☹️ information concerning schemes for the homeless and post-emergency resources is totally lacking.</li> </ul>
Category	Percentage										
seriously inadequate	71%										
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### 7. Description of the scenarios and of the accident

<p style="text-align: center;"><b>Definition of the accident scenarios</b></p>  <p>A 3D pie chart with four segments: 'seriously inadequate' (35%), 'adequate' (31%), 'inadequate' (27%), and 'good' (7%). A legend to the right lists the categories with corresponding color swatches.</p> <table border="1"> <thead> <tr> <th>Category</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>seriously inadequate</td> <td>35%</td> </tr> <tr> <td>inadequate</td> <td>27%</td> </tr> <tr> <td>adequate</td> <td>31%</td> </tr> <tr> <td>good</td> <td>7%</td> </tr> </tbody> </table>	Category	Percentage	seriously inadequate	35%	inadequate	27%	adequate	31%	good	7%	<p>Analysis of the risk and definition of the accident scenarios is inadequate (66 %) for the following reasons:</p> <ul style="list-style-type: none"> <li>☹️ the criteria of choice of the scenarios are poorly descriptive;</li> <li>☹️ the scenarios are not clearly explained both as regards impact and possible consequences;</li> <li>☹️ where the levels of protection and planning are defined, the three distances laid down by the civil defence guidelines (zone of definite impact, damage zone, attention zone) are not included, and only two planning levels are defined;</li> <li>☹️ in almost all cases reference to the presence of natural risks is missing.</li> </ul>
Category	Percentage										
seriously inadequate	35%										
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## 8. Description of the elements of vulnerability

### Definition of the elements of vulnerability

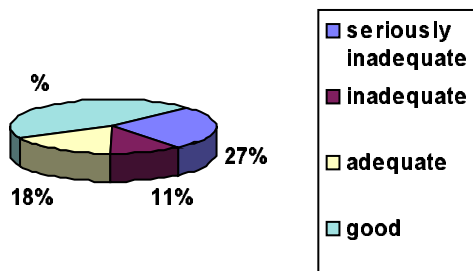


Identification of the elements of vulnerability is in most cases inadequate (58%):

- ☺ the centres of vulnerability, the means of protection and the areas or crops protected are often identified;
- ☹ information relating to population distribution, road system and means of protection is rarely included.

## 9. Emergency management

### Definition of emergency management

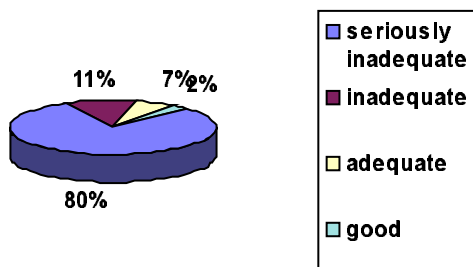


Emergency management is absolutely the topic which is most complete or adequately dealt with (62%). In general it can be said that:

- ☺ the methods of activating the emergency, organisation of intervention, of the evacuation plan, organisation of technical and medical aid and notification of the end of the emergency are adequately indicated;
- ☹ the methods of notification of the state of alarm to the public and of activation of self-protection procedures are not very clear (since reference is often made to activities which presuppose preventive information which is not however implemented in reality, or reference is made to mass communication media with dedicated channels of which preventive notification is not given to the public);
- ☹ references to the accident report are very rare.

## 10. Use as a means of information

### Can be used as a means of information



Preventive information to the public is totally lacking. The plans are largely inadequate (80%) and also, where the sheets for information of the public are present (drawn up according to the civil defence guidelines), the activity of information is only encouraged and not implemented.

- ☹ Charts on the communication method are rarely present (there is no evidence however that they were effectively sent later), at times involving alternative solutions which are not sufficiently clear, nor are the behavioural chart models and definitions
- ☹ information concerning organisation of relations with the mass media and the self-protection behaviour to be adopted is totally lacking;
- ☹ in general the total lack of information, accident simulations, plan implementation exercises and coordination between administration, industry and the population is totally missing.



## 8. LINES OF DEVELOPMENT

The analysis performed has led to some considerations. The prefectures are obliged to draw up an external emergency plan only for firms obliged to draft a safety report (Art. 8 of Decree Law no. 334/99).

The obligation refers to individual plants and not to areas with a high industrial concentration. In the case of surveys by the control authorities which have not yet concluded, the prefectures have drawn up a provisional emergency plan.

Joint reading of Arts. 20 (drafting of external emergency plans), 14 (urbanisation control), 12 (domino effect) and 13 (areas of high concentration) implies the need for closely interconnected industrial areas to be analysed on a standardised basis: safety reports, safety management system, internal emergency plans and external emergency plans must be integrated.

External emergency planning cannot be carried out on an isolated basis but must be homogeneous in these areas.

Incidental to the above is the fact that external emergency planning has to analyse the situations of greatest risk of a particular industrial complex and therefore must above all involve the transport of dangerous goods.

Information to the public also takes on considerable importance in this respect, but must be tackled with more complete means than hitherto.

There is a strong need to examine in greater depths the topics linked to vulnerability, and in particular that which is:

- environmental (in particular relating to surface and underground waters)
- epidemiological (population groups response difference)
- structural (defence capacity of individuals within the structures).

The recommendations for improvement listed above are applied in Decree Law no. 334/99 which lays down the development of specific guidelines in order to remedy the strong lack of uniformity.

These guidelines are currently being drafted.

Starting from a comparative analysis of the regulation in European countries, the main arguments that will be organized are the following:

- Scope, author's responsibility, updating, divulgation
- Site and plant description
- Description of scenarios and accidents (methodology, protection areas)
- Description of the elements of vulnerability (man, environment)
- Emergency management (roles, procedures)
- Use as a means of information (preventive, in emergency)

More in detail the guidelines will go in deep in various aspects, e.g.: the damage areas related to new substances like N (dangerous for the environment), O (oxidants), explosive powders; the interaction between off-site emergency plans and municipal emergency plans; the vulnerability criteria to define evacuation policies, etc.

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- Ref. 3 Report on the application in the Member States of Council Directive 82/501/EEC of 24 June 1982 on the major-accident hazards of certain industrial activities for the period 1994-96
- Ref. 4 Circolare n. 20 M.I. Protezione Civile (1989) 1 del 23 febbraio 1989 - attività di pianificazione di cui all'art. 17 del D.P.R. 175/88.
- Ref. 5 Dipartimento della Protezione Civile - "Pianificazione di emergenza esterna per impianti industriali a rischio di incidenti rilevanti" - gennaio 1994
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- Ref. 8 B. De Marchi, S. Funtowicz: General Guidelines for Content of Information to the Public (Directive 82/501/EEC - Annex VII), EUR 15946 EN (1994)
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## 10. ESSENTIAL PERSONAL PROFILE

dr.ing. Edoardo Galatola, Nuclear Engineering Degree – University of Pisa, 1982, born in Naples I, December 29, 1957

Mr. Galatola joined E.N.I. group in 1985, then he established Eidos and Icaro that he left, while establishing Sindar (a safety and environment engineering company) in 1998 where he is managing director.

Main activities of Mr. Galatola and its companies deal with studies on Major Industrial Hazards (Chemical and Petrol-chemical Establishments), Risk Analysis of the Transport of Dangerous Goods, Risk Area Analysis, Environmental Assessments, Safety at Work, Safety and Environmental Management Systems, Emergency Management and Civil Protection Planning, Environmental Engineering, Software Tools for Risk Analysis, Safety, Environment Protection and training.

He published papers (more than 30) and lectured on above arguments in national and International Congresses (>60), and taught the subjects in public and private courses (>50).

Mr. Galatola is advisor of JRC (Revision of Seveso I Directive), Ministry of Interior - Department of Civil Protection (Off-site Emergency plans), ANPA - National Agency for the Environmental Protection (developing standards for risk analyses), Federchimica and Assogasliquidi - National chemical and LPG Associations (developing standards for the associates), Trenitalia and Italferr - Italian Railways companies (risk analyses and safety design), Ministry of the Environment (safety and risks standards), Regione Lombardia (risk assessment), CEPAS - the Italian personnel certification organism (certified Safety Lead Auditor).