**ASSESSMENT OF OCCURRING RISK OF MAJOR INDUSTRIAL ACCIDENTS WITH TAKING
IN VIEW OF MALEVOLENCE ACTIONS**

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Abstract: *The main objective of this paper is to develop the infrastructure of the risk assessment methodology of major accidents in terms of considering the acts of malevolence.*

Key words: risk assessment, malevolence act, major industrial accident, safety

1. General aspects regarding the issue at national and international level

At this time it is not possible to consult a data base developed at national level in which can be found information regarding accidents generated by malevolence actions in industrial areas.

The possible causes of this fact could be the following: the lack of information generated by the issue; the actual methodology of communication, investigation, recording and report of unwanted events that occur in industrial area, does not allow taking into account of malevolence actions as a potential cause of an accident; usually the legal authorities involved in investigation of an accident indicate as potential cause of this a technical malfunction or an act of indiscipline; confidentially of some information wrong understanding; professional incompetence of the abilities involved in this accident investigation.

In Romania the legislative frame the monitoring of major hazards to accidents in which are involved dangerous substances is founded on provisions of Directive 96/82/CE known as Directive II the monitoring of activities which involved the danger of major accidents, and after that by HG 804/2007 regarding the control of the risks of major accidents in which are involved dangerous substances. This regulation takes in view the modifications and completing the Directive SEVESO II by the Directive 2003/105/CE and the Council Decision 98/433/CE.

The imposing of the implementation of the prevention of major accidents was considered a new aspect included in Directive SEVESO II.

Today, it is becoming more accepted and recognized the fact that the vast majority of industrial accidents have the fundamental cause the faulty way in which management is conducted at company level

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To prevent industrial accidents at source is particularly important that this type of measure to be part of company policy. In this sense, this prevention policy must be more than a mere declaration of intent of management at the highest level (top management). The company should ensure that the policy is implemented and that a high level of protection is ensured by implementing all necessary measures (not only technical, but including those concerning organizational structure and management of the company) to achieve this objective.

In France, the central public authority for environmental protection decided in 1992 to create, within the Directorate for the Prevention of Pollution and Risk, a specific structure responsible for the centralization and transfer of experience in the field of industrial accidents or Hazard Analysis Bureau of industrial pollution (Bureau d'Analyse des Risques et Pollutions Industrielles – B.A.R.P.I.). Part of the environmental service industry which implement their ministry policy in the prevention of industrial risks, B.A.R.P.I. has 3 main missions, namely: collate and analyze data on accidents, serious pollution and significant incidents produced in facilities classified for environmental protection or related to their activity; setting up a power pole able to help define general policy on technological risk prevention; ensure the dissemination of the findings of an analysis of accidents in France and abroad.

To carry out the specific tasks, B.A.R.P.I. has developed a computerized data base A.R.I.A. (Analyse, Recherche et Information sur les Accidents)

The beneficiaries of the database A.R.I.A. are public or private entities interested / affected by risk prevention (operators or consulting firms, experts, with the inspection authorities, emergency services, prefecture, local government, workers' associations, local residents, training bodies, commissions information, press etc.). Each event that is logged into the database A.R.I.A. is the subject of a summary that takes into account all available information. The typology of the events recorded in the database A.R.I.A., according to the main characteristics of the accident, indicates that fires and emissions / discharges of hazardous substances are the most common forms of accidents. Thus, from 1,073 accidents reviewed in 2008, fires represents 60% and emissions / discharges of hazardous substances 44%. This distribution is similar to that one concerning the 18,469 accidents occurred between 1992- 2008 (64% for fire and 38% for emissions / discharges of hazardous substances). Usually, at the origin the same event can be many causes but they are only known to the extent of 30-40% of cases. Acts of malevolence proven or suspected constituted they only 7.5% of the known causes of accidents in France between 1992- 2008 (approx. 6.9% in 2008). Also, during 2003 - 2008 were registered annually in France, between 47- 66 of industrial accidents caused by acts of malevolence.

Theft of dangerous goods (dynamite, ammonium perchlorate etc), submission of suspicious packages on an industrial site and sabotage treatment plants and water distribution, constitute a particular form of acts of malevolence uncommon but refers to the possibility of terrorist attacks. The statistical data for 2008 illustrates well this tendency, namely the 50 accidents, 31 were caused by arson, 12 evacuations / emissions of toxic substances intentional and 5 thefts of dangerous goods. However, the information contained in other databases in France or in other countries highlights the emphasis on the types and frequency of industrial accidents caused by acts of malevolence.

Therefore, we can say that acts of malevolence as a cause of accidents in industrial sites should not be neglected.

2. Considerations regarding on assessment of occurring risk of major industrial accidents with taking in view of malevolence actions

The specific typology of malevolence acts establishing for each type, the direct cause or an indirect one of producing a major accident, respectively: internal origin malevolence action (voluntarily destroying regarding some material benefits, dissimulation of criminal acts, deviant individual behaviour with the intention to produce damage, dissimulation of a risky action, social conflicts); external origin malevolence action (industrial spy, deviation of the communication devices, conflicts with neighbours, vandalism, stealing, gang actions, terrorism).

From the many specific factors of malevolence action it looks interest just which are reasonably to be in effective way, directly or indirectly, at the origin of a major accident.

In a logical and coherent manner, the security measures, designated to reduce the risks of occurring major accidents generated by malevolence actions, can be structured in this way: general security measures, in force for the majority of malevolence actions type, both for internal or external origin, the education and carrying, developing a vulnerability analysis and for safety to, the surway of the industrial objectives (video survey, phone - surveillance, access control, human survey location system), protection of industrial objectives (mechanical protection, detection of intrusions); specific security measures for internal origin malevolence actions (the quality of social media, the selection of personnel,

involving and forming, carrying out of health and the workers, work conditions); specific security measures for external origin malevolence actions (security of the communication devices, the reliability of the supply with services, preventive actions of preventions, protection and intervention, maintaining the public order, the survey of the territory).

The analysis of national and international legal regulations regarding the prevention and avoiding of malevolence actions in industrial plants in the area of civil use explosives, underlining the following aspects: malevolence acts could (and in some situation should) be take in consideration in the assessment process of the risks in occur major industrial accidents; the content of the security report and the emergency plans should be structured such the malevolence acts to be separated from other causes witch can conduct to produce of one major industrial accident. The issues mentioned above require clear, finding that the evidence regarding acts of malevolence, the documents relating to the security of industrial installations could contain, must remain confidential, even if some of these documents (especially emergency plans) can and should be made public. In terms of emergency plans the elements regarding security measures and security for industrial plants, and intervention in emergency situations, must be disjoint and cannot be made public.

Analysis of accidents caused by acts of malevolence within industrial sites, revealed the fact that they were in the period 1992-2008, approx. 7.5% of the known causes of industrial accidents produced in France. However, it is possible that the figure quoted is underestimated because of the accidents whose causes remain unexplained (approx. 30-40%), it is more likely to have originally acts of malevolence.

The typology specifies of acts of malevolence, sets for each type, direct or indirect cause of producing a major accident, namely: acts of malevolence of internal origin (intentional destruction in order to obtain material benefits, concealing the fraudulent facts or in tort, individual deviant behaviour with intent to cause damage, concealing of a risky act, social conflicts); acts of malevolence of external origin (industrial espionage, hijacking means of communication, conflicts with the residents, vandalism, theft, banditry, terrorism).

Among the many factors specific of acts of malevolence are of interest only those who are likely to be effective, directly or indirectly, to the origin of a major accident. From a logical and coherent manner, security measures, designed to reduce the risk of major accidents arising from acts of malevolence can be structured as follows: general security measures, available for most types of acts of malevolence, regardless of their internal or external origin: education and awareness, vulnerability analysis for safety and supervision industrial site (video surveillance, phone - surveillance, access control, human supervision, positioning systems), protection of industrial sites (mechanical protection, intrusion detection); specific security measures of acts of malevolence of domestic origin (quality social climate, security policy, organization of work, the financial viability of the company, personnel selection, employment and training, health surveillance and working conditions of workers);

- specific security measures of acts of malevolence of external origin (means of communication security, cyber security, quality of relationships with the residents, deliveries control, reliability of supply of utilities, prevention, protection and intervention, maintaining public order, supervision planning.

It should be emphasized that the responsibility of preventing and combating of acts of malevolence returns both industrial operator and a relatively large number of stakeholders / affected outside the site on which it operates.

The absence of a conceptual and methodological framework enabling of acts of malevolence integration in the process of assessing the risk of major accidents, the obligation imposed process of developing a safety report by the operator for locations in which hazardous substances are present in quantities equal to or greater than those specified in Annex 1, part I and part II, column 3 of HG 804/2007, laying oriented scientific approach to shaping a need for innovative methodologies through which acts of malevolence are considered in the evaluation process of the risks of major accidents.

The scope of the proposed methodology for integrating of acts of malevolence in the evaluation process has a broader spectrum because it aimed not only industrial sites covered by the SEVESO II Directive, extending also in for economic operators which it operates in a particular generator relative vulnerability (e.g. the vulnerability induced by psychological impact and the importance of symbols).

The topic of this paper ensure analyse issues of the three main risk assessment of the specific activity of producing major accidents considering acts of malevolence, namely: first direction presents national and international legal framework on preventing acts of malevolence in industrial sites; second direction highlights the main methods used for vulnerability analysis for safety industrial sites; the third direction aimed at integrating acts of malevolence in the evaluation process of the risks of major accidents.

Research in the field led to develop a methodology for assessing the risks arising from acts of malevolence, according to which the evaluation results can be presented in the following documents: document dedicated to acts of malevolence; summary document on risk assessment for major accidents; safety report.

Presenting the results of the risk assessment resulting from acts of malevolence can be performed similarly to present the results of the risk assessment of major accidents which consists in presenting the particular aspects of each stage, respectively:

Step	The issues addressed
Description of security management	Listing of principles to combat acts of malevolence implemented on industrial sites.

Risk analysis of external origin. Inventory acts of malevolence of foreign origin, indicating the various forms that may materialize external aggression.

Accident analysis produced in similar installations	Present of an analysis of accidents caused by acts of malevolence.
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Analysis of accidents within the industrial site studied	Presentation of accidents caused by acts of malevolence (if it is available)
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Systematic analysis of failures 1.Consider of acts of malevolence of internal and external origin, as being a potential cause of major accidents;

2.The hierarchy of the scenarios identified, of major accidents, depending on the frequency and initial severity;

3.The inventory of security barriers, technical and organizational, implemented or planned, aimed at combating of acts of malevolence;

4. Proposal for ways to reduce the frequency and / or severity of accidents, depending on the characteristics identified security barriers;

5. Checking the acceptability of the final level of control of each scenario of an accident; if the control is not acceptable to be provided ways to improve the performance of existing security barriers or will be proposed additional security barriers.

Examination of major accidents scenarios	For each scenario of producing a major accident could be caused by an act of malevolence must be mentioned the following: causes, security barriers, consequences and possibly important elements for security.
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Presenting the results of the risk assessment resulting from acts of malevolence, is considering steps to include every relevant aspect generic risk assessment of major accidents (the act of malevolence is considered a cause, among other things, producing a major accident is treated similarly).

The summary document on risk assessment of major accidents are subject to special measures ensuring confidentiality.

Conclusions

The topic addressed in this paper falls within the scope of European and national interest in order to increase the security and protection of human health and ensuring environmental sustainability for the industrial sites susceptible to major accidents.

The research undertaken helps to deepen knowledge in the approached field, by obtaining information and technical data on investigations in evaluation methodology.

The evaluation results can bring significant benefits to businesses and real who hold critical infrastructure through systematic evaluation of policies, of the procedures and of the operations made in such industrial sites and to make recommendations on how to improve and to achieve predetermined performance levels in total security.

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