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RISK OTHER THAN ATTACK – SUBSTANCES TRANSPORTATION

Dănuţ MOŞTEANU*, Lucian TREFAŞ,**

Alexandra-Simona TREFAŞ*, Ruxandra MOŞTEANU

***"Nicolae Bălcescu", Land Forces Academy,Sibiu, România**
****Inspectorate for Emergency Situations of Sibiu County, Sibiu, Romania**

Abstract: *The modern era, alongside with the very fast development of technology rise challenging threats to human establishments. A large number of industrial processes include the usage of substances that present themselves as dangerous for life. Therefore, one is obliged to look into ways of reducing the risk of accidents that could affect the population surrounding the industrial sites. Given the fact that Romania has signed the "Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction", risk other than attack remains the main threat in the field. The article is aimed at studying what is considered to be the most vulnerable process – transportation of hazardous substances.*

Keywords: hazardous substances, industrial site, transportation

1. Introduction

Transportation of hazardous substances is one of the most important vectors that may produce damaging effects, under the action of miss care, negligence or criminal act. These consequences are spread on both short and long term and can affect the personnel as well as the environment.

There are a number of effects that substances create in order to be considered dangerous, among them we have explosions, gas emissions, fires and toxic vapors. These effects have an impact on all living beings and the environment especially during transportation, when the probability of a hazard is multiplied. Whenever the transportation mean is affected by incorrect wrapping, unexpected chemical reactions or other factors, accident happen.

Traffic can present dangerous chemical substances in one of the states below: compressed gas, gas, liquefied gas, solid (compact, rocks, dust) and liquid.

This article is aimed at presenting a set of legal and operational measures in order to reduce the impact on the population and environment of the effects hazardous substances produce when one of the accident situations occurs, especially during the transportation operations. The first rule is that when a hazardous substance is established to be in a danger class, all operations involving that substance should carry a label on the package, according to its' "Packaging Group". The pack must comply with a simple rule: when exposed to the normal stresses and strains of transportation, the dangerous substance cannot leak, escape or create any risk to safety and health. There are two main factors that influence the type of packaging: one is the hazard the substance presents itself with (fire, emission, corrosive, explosion, danger in contact with water) and the other is the type of container the substance is (plastic, metal, glass container).

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The packaging rules are established in the publication entitled "Approved Requirements and Test Methods for the Classification and Packaging of Dangerous Goods for Carriage" and should be complied with at all times. not only that having a safe container helps prevent any unwanted accident, but all intervention personnel is trained to take safety measures according to the legal containers. Therefore, any package that does not fit the rules will present double hazard by creating the conditions of an accident and interfere with the intervention procedures.

Another very important rule to be complied with, in order to help prevent any escalation of an accident involving hazardous substances, states that any package must be appropriately labeled. The importance of labeling is given by what stands behind it. Every label presented on a container should be in accordance with the Materials Safety Data Sheet supplied. Therefore, one of the first operations undertaken by intervention personnel is to try and find this safety chart.

The transportation labels are different from the chemical substance labels. The main differences come from the shape and the color of the label. Transportation labels have different background colors according to the hazard and are diamond in shape.

Furthermore, the carrier that transports any hazardous substance should have a Transport Emergency Card which must be placed inside the vehicle. The card details all substances being carried, the hazards they present and the action procedures in case of emergency. It also must contain dates of contact (address and telephone number) in case an accident occurs, so that the emergency services can get a hold of the owner of the containers. It is also important that the card be removed from view once the load is removed from the vehicle, so that no unnecessary measures are taken.

2. Labels

One can find below the information a label must provide:

Name of substance;

Origin of substance (name and address of the manufacturer, distributor or importer);

Danger symbols and indication of danger involved in the use of the substance;

Reference to special risks.

There are very precise specifications in what concerns the size of the labels presented on a vehicle. Therefore, the dimensions of the labels should not be smaller than an A4 sheet of paper and any symbol on it should cover at least one tenth of the surface.

There are European states that require their national language symbols to be used at the labeling of any dangerous substance that is being carried on their territory. There are also member states that may allow hazardous substances not to be labeled according to the general rules, excepting the substances that present the risk of explosion and the toxic substances. These countries may accept that such substances are not labeled or that the labels differ from the ones established in the European Directive.

To conclude, no member state of the European Union can forbid the transportation of dangerous substances in order to prevent free movement. The labeling must comply with the national rules first and only then, if possible, be similar to the international rules. One country can ban the transportation of a dangerous substance only if they establish that a hazard to health or environment is posed. If that is the case, there must be official information to the European Commission, which launches a consultation procedure to assess the hazards and take any further measure.

3. Physical measures

Provided that one is able to reduce the effects of such an accident, he must first address the cause of the event. Therefore, there will be no action taken by the structures involved in dealing with such an accident before stopping the emission of dangerous substances. The measure is aimed at locating and eliminating the effects of a chemical accident in order to reduce the toxic cloud's action in both surface and time.

Given the fact that a solid substance is practically easy to contain, unless it reacts to the atmosphere or water, the emission

stoppage is much more relevant when referring to a dangerous substance that present itself as a liquid or a gas. The first objective of any intervention is to prevent the growth of the contaminated area. That can be done by summing up two main actions: stop any leak and prevent the movement of the substance that is already displaced from the container.

3.1. Spread stoppage

This is a list of challenges that taking that first measure may pose: difficulty of leakage point identification and difficulty in getting to that point through a contaminated environment.

Beside the information from the Transport Emergency Card, a very useful detail provider may consist of the person operating the vehicle. Provided the leakage cannot be stopped using one of the facilities of the vehicle, the emergency services must be equipped with special devices for such tasks.

An unwritten rule of emergency management states that the life of one saver is worth more than any other. Therefore, the personnel must be informed about the type of substance transported and the protection measures required, in order to reduce the impact on population and environment and not generate more victims from the intervention staff. Furthermore, specially designed and chosen breathing and skin protection is to be carried.

Coming down to tactical measures, any intervention must comply with a set of rules. First of all, one trying to stop a leakage must keep in mind the fact that there are two efficient ways to stay out of harms' way: distance and time of exposure must be precisely calculated so that the emergency management forces stay as far as they can from the dangerous container to be efficient and spend as less time as possible to complete the mission.

3.2. Spread prevention

A more complicated measure to be taken when involved in managing a hazardous substance accident is limiting the spread of the contamination in the environment. The spilled substance can enlarge the contaminated area by travelling through three ways: air, water and soil.

The most efficient way to address the problem is chemical neutralization. As in every other case, the ideal measure is the most unlikely to be possibly taken. The modern days have created a very large range of dangerous substances to be transported in order to keep the industry going. Therefore, the emergency management forces should have a very wide range of substances in order to neutralize the spills.

Given the challenges that chemical intervention poses, the most common intervention procedure is taking a physical measure to stop the spread.

When confronted with a gas contamination, the most common action is to create a water spray that contains the substance to the ground. Once that is done, the intervention personnel must be aware of the fact that all liquid resulted from the action has become residual waste and must be collected in order to be analyzed and treated in special facilities.

Both liquid and solid spills generate a soil contamination that is much easier to deal with. The first measure is to try and generate a contaminated area limited to the smallest size possible. Then all contaminated soil is also to be considered dangerous residue and treated in special facilities.

3. Case study

This chapter is aimed at presenting the intervention measures taken to manage the effects of a road accident involving a tanker carrying more than 20 tones of toluene which happened in a member state.

The fire brigade was first on scene, within five minutes from being called up, which is practically an ideal case. The liquid had spilled through the drains and there were fires along the drains for approximately 400 m from the vehicle. The County Emergency Plan was put into action, with social services and public transport put on alert in case evacuation was needed.

The first actions of the fire brigade were aimed at finding and saving the occupants and extinguishing the fires while creating a

safety zone where only intervention personnel may enter. Doing that, they tried to identify adequate water supply. The intervention coordination cell now contained members from the chemical company, ambulance staff, environment agency, police and local administration.

The consultations lead to the conclusion that it was better to let the spill burn than try to extinguish it, generating contamination cloud. Police issued radio warnings advising the population to stay indoors and close all doors and windows for a four-hour period of time. The road was closed for more than eight hours, before the toluene level fell below the limits and the fires were finally extinguished. The incident was considered to be concluded thirteen hour after is started.

There was potential harm to humans from thermal radiation; to the environment, from air, soil and water pollution. One must not ignore the economic impact of an eight hour traffic disruption. In less than 15 minutes from the accident, the company activated an emergency plan that put five persons in attendance of the intervention. The county activated an offsite plan that consisted in activating a command centre and sending field teams from the fire brigade, police and ambulance services. The fire brigade and the environment agency made concentration measures, but there was no dispersion prediction. The fire brigade response involved over 50 persons and ten appliances, whose major actions were fire-fighting, washing down and spillage retention. Over 40 police officers were committed in traffic direction, warning the public, security and press control. The health service response encompassed two ambulances and two onsite medical staff. Local government reaction involved environmental health, transport and social services. The public were informed of the incident by loudspeakers, radio and word of mouth. The information focused on what to do, especially on sheltering indoors.

The accident produced two victims that needed hospital admission; both victims were produced by the impact of the accident. There was noticeable air pollution but only slight soil and water contamination. The greater loss came in the economic direction and it consisted of serious damage to the road and traffic delays that extended to hours.

The lessons learned from the incident included the value of rapid information exchange and the presence of company chemical staff in order to coordinate the correct immediate measures to be taken. Another aspect that is to be considered in such situations is communication. The emergency management services must keep the population informed and must coordinate their statements in order not to generate different perspectives. The action that gave the bigger effect was no action; provided that the fire had been extinguished at the early stages of the incident, a considerable amount of contamination liquid (both toluene and contaminated firewater) could have entered the drains, soil and water supplies.

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