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## PROPOSAL FOR THE CREATION OF SECURITY PLANS FOR THE ROAD TRANSPORTATION OF HIGH CONSEQUENCE DANGEROUS GOODS

**Summary.** In the list of dangerous goods, there are materials and articles, which, due to particular criteria stated in the European Agreement Concerning the International Carriage of Goods by Road (ADR), are treated as high consequence goods. High consequence dangerous goods are those whose misuse may lead to a terrorist event and therefore pose a serious threat of mass casualties, destruction or socio-economic disruption. All personnel responsible for the carriage of high consequence dangerous goods should comply with ADR requirements, as appropriate. Basic ADR requirements, which should lead to the elimination of potential safety violations hazards, is to acknowledge, implement and respect security plans. The ADR reflects overall security plan regulations, describing the elements of which such plans should be created. The ADR itself does not prescribe methods for preparing documentation, nor implementation details. This article is to elaborate on these aspects.

**Keywords:** ADR; high consequence dangerous goods; security provisions

### 1. INTRODUCTION

Physical, chemical and biophysiological properties are the basis for the classification of

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substances, mixtures and objects as dangerous goods. During this procedure, certain properties of substance or mixture are compared to the classification criteria stated in the legislations concerning the transport of dangerous goods. The determining factor that classifies materials or objects to certain classes is the dominant danger. It may occur with diversified intensity, as a result of which it is discriminated according to packaging group. If an item is considered dangerous and likely to cause more risks, with less intensity, they are defined in the proper order by classification codes. The final stage of the procedure is the assignment of the relevant UN number, as well as proper shipping name for the relevant dangerous good. The UN code is a unique four-digit identification number relating to a specific material or article.

The literature presents various elaborations concerning the storage or transport of dangerous goods [2, 3, 4]. It should be noted that all activities related to dangerous goods are regulated by relevant laws: the ADR for road transportation [5]; the RID Regulations for rail transportation [6]; and the Act for Dangerous Goods Transportation, dated 19 August 2011, for road, rail and inland transports [7].

Dangerous goods, in terms of road transportation, involve materials or objects, which have been approved for transport under the ADR or have been accepted for carriage only after meeting criteria listed in the mentioned document [5, 7]. These dangerous goods are considered to be high consequence goods. A company involved in the transport of high consequence dangerous goods and related activities is required to meet a number of additional requirements in accordance with the provisions of the ADR [5].

## **2. HIGH CONSEQUENCE DANGEROUS GOODS**

High consequence goods are goods that could be misused in a terrorist acts, thereby having consequences such as mass casualties, mass destruction, or could be radioactive materials, which have the potential to cause economic and social disruption [5]. Worldwide, the growing wave of terrorism and terrorist groups has resulted in the introduction of the ADR 2005 guidelines for cargo security. Such activities are aimed at reducing the risk resulting from the use of dangerous goods in deliberate criminal activities against the public order. These actions mainly concern the theft of means of transport used for the carriage of dangerous goods, the theft of dangerous goods and their illegal use, and attacks on vehicles that have been parked. Since the 2005 guidelines for the carriage of dangerous goods, group of goods called high consequence goods have been distinguished. These goods may be used for typical terrorist purposes or inappropriately for their intended purpose. Among these high-risk goods are explosive substances and articles (Class 1), toxic substances (Class 6.1), materials with flammable properties (Class 3 and 4.1) or infectious substances (Class 6.2). Once the transport of these goods is planned, specifically established procedures must be implemented [1]. The carrier, as one of the participants, is obliged to develop and implement a high consequence dangerous goods security plan, including elements consistent with the ADR [5] or the RID Regulations for the transportation of high consequence dangerous goods by rail [6]. The term “protection” is understood in terms of the precautions that should be taken to reduce the risk of the theft of dangerous goods or attacks on means of transport, leading to the reduction of hazards posed to humans, property or the environment [1, 5].

Cargo security, an element of which involves high consequence dangerous goods, should be carried out by participants involved in the process, with special emphasis on the sender and the carrier. Activities in this field should include, inter alia, actions such as the identification

of the driver and the carrier by the sender, the protection of places of loading, storing and unloading, regular checks on persons and enterprises, and the confirmation of the training of people who are involved in the transport of dangerous goods [1]. High-risk goods, which are non-classified as Class 7 (radioactive materials) goods, are indicated in Table 1. They are transported in quantities greater than those indicated in the table [5].

Table 1.

List of high consequence dangerous goods [5]

Class	Division	Substance or article	Quantity		
			Tank (l)	Bulk (kg)	Packages (kg)
1	1.1	Explosives	-	-	0
	1.2	Explosives	-	-	0
	1.3	Compatibility group C explosives	-	-	0
	1.4	Explosives for UN nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456 and 0500	-	-	0
	1.5	Explosives	0	-	0
2		Flammable gases (classification codes including only letter F)	3,000	-	-
		Toxic gases (classification codes including letters T, TF, TC, TO, TFC or TOC) excluding aerosols	0	-	0
3		Flammable liquids of packing groups I and II	3,000	-	-
		Desensitized explosives	0	-	0
4.1		Desensitized explosives	-	-	0
4.2		Packing group I substances	3,000	-	-
4.3		Packing group I substances	3,000	-	-
5.1		Oxidizing liquids of packing group I	3,000	-	-
		Perchlorates, ammonium nitrate, ammonium nitrate fertilizers and ammonium nitrate emulsions or suspensions or gel	3,000	3000	-
6.1		Toxic substances of packing group I	0	-	0
6.2		Infectious substances of Category A (UN Nos. 2814 and 2900, except for animal material)	-	0	0
8		Corrosive substances of packing group I	3,000	-	-

## 2.1. Elements of the security plan

The participants in the road transport of dangerous goods are all entities listed in the ADR [5, 7]. The concept of the road transport of dangerous goods not only includes any movement of the vehicle on the public highways or other public roads, but also any stops required during the carriage and activities related to it [7]. Participants in the road transport of high consequence dangerous goods should adopt, implement and apply a protection plan, created in accordance with specific guidelines. The security plan should, at least, contain the following elements [5]:

- (a) exact division of responsibilities with respect to competent and qualified people
- (b) list of dangerous goods or types of dangerous goods that are the subject to protection
- (c) the characteristics of performed activities in line with their hazard assessment (the description should include stops required for the transport operations, dangerous goods storage, as well as temporary storage of dangerous goods related to change of type/mean of transport)
- (d) list of measures to reduce the risk of exposure in accordance with the roles and responsibilities of the participants, which should contain:
  - training methods
  - workflow (e.g., in cases of increased danger, control of respective workstation)
  - practical attitude (e.g., identification and use of well-known routes)
  - necessary equipment and tools for hazard reduction
- (e) scheme of notifying and reacting procedures in cases of hazard occurrence or security breaches and related activities
- (f) assessment and testing methods for security plans, with regard to procedures for periodic inspections and possible upgrades
- (g) description of safeguards concerning the physical protection of information about the transportation, as stated in the security plan
- (h) arrangements to ensure the restriction of access to the information included in the security plan for authorized persons, with the solutions compatible with the guidelines for reporting the information identified in provisions of the ADR [5]

## 3. EXAMPLE OF A SECURITY PLAN: UN 1680 POTASSIUM CYANIDE, SOLID

This section gives an example of a protection plan for dangerous goods, which was prepared for a company involved in packing, loading and managing the transport of high consequence dangerous goods, in this case, UN 1680 potassium cyanide, solid. The packing, loading and shipping of dangerous goods are activities associated with the movement of dangerous goods. The company performing such operations acts as the participant of the transport of dangerous goods by road along with the packer, shipper, the sender [5]. UN 1680 potassium cyanide, solid, is a Class 6.1 poisonous material, and classified according to packing group I, meaning it is considered as a high-risk dangerous good when carried in a tank or packages regardless of the amount.

### 3.1. Legal basis concerning the preparation of a security plan for the transport of dangerous goods by road

The legal basis for security plan preparations are:

- ADR Section 1.10. Provisions for dangerous good transportation (Dz. U. 2015 poz. 882),
- Act for Dangerous Goods Transportation, dated 19 August 2011 (Dz. U. Nr 227, poz. 1367 with act changes).

### 3.2. List of high consequence dangerous goods

The concept of ensuring security is understood in terms of actions or precautions taken to minimize the risk of theft or misuse of dangerous goods, which could endanger people, properties or the environment.

High consequence dangerous goods are those goods that can be used in accordance with their intended use in a terrorist event and cause serious consequences, such as mass casualties, mass destruction or, particularly for Class 7 (radioactive materials), socio-economic disorganization. Figure 1 shows the list of dangerous goods, which are high consequence goods.

Class	Division	Substance or article	Quantity		
			Tank (l) <sup>c</sup>	Bulk (kg) <sup>d</sup>	Packages (kg)
1	1.1	Explosives	a	a	0
	1.2	Explosives	a	a	0
	1.3	Compatibility group C explosives	a	a	0
	1.4	Explosives of UN Nos. 0104, 0237, 0255, 0267, 0289, 0361, 0365, 0366, 0440, 0441, 0455, 0456 and 0500	a	a	0
	1.5	Explosives	0	a	0
2		Flammable gases (classification codes including only the letter F)	3000	a	b
		Toxic gases (classification codes including letters T, TF, TC, TO, TFC or TOC) excluding aerosols	0	a	0
3		Flammable liquids of packing groups I and II	3000	a	b
		Desensitized explosives	0	a	0
4.1		Desensitized explosives	a	a	0
4.2		Packing group I substances	3000	a	b
4.3		Packing group I substances	3000	a	b
5.1		Oxidizing liquids of packing group I	3000	a	b
		Perchlorates, ammonium nitrate, ammonium nitrate fertilisers and ammonium nitrate emulsions or suspensions or gels	3000	3000	b
6.1		Toxic substances of packing group I	0	a	0
6.2		Infectious substances of Category A (UN Nos. 2814 and 2900, except for animal material)	a	0	0
8		Corrosive substances of packing group I	3000	a	b

<sup>a</sup> Not relevant.

<sup>b</sup> The provisions of 1.10.3 do not apply, whatever the quantity is.

<sup>c</sup> A value indicated in this column is applicable only if carriage in tanks is authorized, in accordance with Chapter 3.2, Table A, column (10) or (12). For substances that are not authorized for carriage in tanks, the instruction in this column is not relevant.

<sup>d</sup> A value indicated in this column is applicable only if carriage in bulk is authorized, in accordance with Chapter 3.2, Table A, column (10) or (17). For substances that are not authorized for carriage in bulk, the instruction in this column is not relevant.

Fig. 1. List of high consequence dangerous goods (ADR Table 1.10.3.2.1) [2]

### 3.3. Description of responsibilities with related risk assessment

#### A. Division of duties with reference to security

Employees should acknowledge, apply and respect any security plan, with regards to assigned roles, responsibilities and duties.

**Name and Last Name:** person no. 1, **Position:** CEO, **Contact:** telephone number.

**Responsibilities:**

Supervision of the legalization and approval of high consequence dangerous goods security plans for road transport.

**Name and Last Name:** person no. 2, **Position:** COO, **Contact:** telephone number.

**Responsibilities:**

Supervision of the legalization and approval of high consequence dangerous goods security plans for road transport.

**Name and Last Name:** person #3, **Position:** Logistics Manager, **Contact:** telephone number.

**Responsibilities:**

Receiving and approving orders. Signatures and authorization controls for orders, notifications and other documents related to the transport of high consequence dangerous goods. Managing employees and the security agency with regard to physical security of property and facility.

**Name and Last Name:** person no. 4, **Position:** Warehouse Manager, **Contact:** telephone number.

**Responsibilities:**

People management and work division with reference to the shipment of dangerous goods. Supervision of shipments.

**Name and Last Name:** person no. 5, **Position:** Dangerous Goods Safety Adviser, **Contact:** telephone number.

**Responsibilities:**

Preparing, updating and ensuring proper training for respective employees on high consequence dangerous goods security plans for road transport. Supervising the tasks of staff involved in transport-related operations with regard to the road transport of high consequence dangerous goods.

**Security Agency:** agency no. 1, security agency employees as per respective shifts, **Contact:** telephone number.

**Responsibilities:**

Physical security of facilities and properties.

#### B. List of dangerous goods to be protected

UN no.: UN 1680

Name and description: potassium cyanide, solid

Classification code: T5

Packing group: I

Hazard identification no.: 66

### **C. Operations review and assessment of associated risks**

*Location/operations:* warehouse at the company/packaging site of high consequence dangerous goods with UN no.: UN 1680.

*Risk characteristics:* unauthorized access to high consequence dangerous goods with UN no.: UN 1680.

*Preventive actions:* manufacturing facility and warehouse monitoring, control of people and transport units entering and leaving the site property, led by the respective security agency.

*Risk degree:* low.

*Location/operations:* company site, zone A/loading of high consequence dangerous goods with UN no.: UN 1680.

*Risk characteristics:* unauthorized access to high consequence dangerous goods with UN no.: UN 1680, unauthorized access to loaded transportation unit.

*Preventive actions:* manufacturing facility and warehouse monitoring, supervision of transportation unit by warehouse staff delegation as well as by the respective security agency; control of people and transport units entering and leaving site property, led by the security agency.

*Risk degree:* low.

*Location/operations:* company site, internal road within the property/the passage of the transport unit with high consequence dangerous goods with UN no.: UN 1680.

*Risk characteristics:* unauthorized access to loaded transport unit, the opportunity for vehicle-vehicle collision or the vehicle-construction collision.

*Preventive actions:* manufacturing facility and warehouse monitoring, identity control of transport crew by the security agency.

*Risk degree:* low.

### **D. List of measures to minimize the risk of threats**

#### **Staff training**

Training schedule (developed in accordance with the provisions of ADR1.10.2 on protection training):

1. Identification and characteristics of threats
2. Methods for detection and removal of threats
3. Actions taken in the event of security breaches
4. Ways to secure staging points of dangerous goods, including high consequence dangerous goods
5. Provisions for high consequences dangerous goods
6. Security plans (ADR 1.10.3.2)
7. Liability of employees resulting from the duties performed.

#### **Security policy**

The company with the registered site packs, loads and ships dangerous goods, i.e., UN 1680 potassium cyanide, solid, Cl. 6.1, PG I.

#### **Procedure:**

Control of recruitment and shifts within positions, criminal record verification.

***In the event of danger:***

In case of any threat involving the release of the dangerous goods concerned, employees are obliged to notify the emergency services, notify the supervisor of such possibility, take actions to minimize the risk of the potential release of dangerous goods, notify the heads of other entities (carrier, consignee) operating in relation to the high-risk goods. If a threat occurs on site, the Logistics/Warehouse Manager or a respective deputy should announce the evacuation of people from the site area within a radius of 300 m from a presumptive event, take over the evacuation of people, and coordinate the activities of workers of the company in close alignment with the emergency services.

***Practical attitude:***

The selection of routes for the transport of transport units and in-house roads should involve the shortest distance to or from the loading, located as far away from the object as possible. Equipment and other measures used to minimize safety risks: the area of the site is fenced and lit at night. The area should be monitored and the camera monitor located at the building entrance, such that it is available for constant supervision by security agency workers from Agency no. 1. Monitoring is carried out 24/7 including Sundays and holidays by security agency workers from Agency no. 1 on the registered site. The entrance is barrier-protected and fenced by an electric gate, which is controlled from the guardhouse. The guardhouse is located at the entrance to the company.

**E. Notification, prevention and reaction procedures in case of threat**

Workers are obliged to notify their supervisor about every single threat related to transport or other activities related to goods. If high consequence goods have been impacted, workers are obliged to follow the fire protection and general safety instructions.

**F. Security plan evaluation and testing and periodical revisions/updates to procedures**

Once a year, the CEO, the COO, the Logistics Manager, the Warehouse Manager, the Dangerous Goods Safety Adviser and representatives of the emergency services should evaluate the security plans. The revision is confirmed by the Adviser's signature on the relevant document (annex to the security plan). If there are significant modifications or comments, a special memorandum should be completed, confirming related remarks and conclusions. Any evaluation of a security plan should be performed in a practical manner by simulating the events posing a potential threat to security in the context of activities related to the transport of dangerous goods. The evaluation should also assess how to respond, handle and notify the emergency services. Event simulations should take place at least once every two years. Updating a security plan should also take place promptly after the occurrence of changes concerning the business itself, personnel or legal regulations. The update is made by the Road Carriage of Dangerous Goods Safety Adviser who is preparing the security plan. The update should be confirmed by the relevant entry in the appropriate supporting document (annex to the security plan). Changes to the plan may be the result of evaluations, testing and reviews.

**G. Measures to ensure the physical security of the information flow that is part of the security plan**

The security plan should be drawn up by two identical counterparts. The copies are stored by:  
Copy no. 1: person no. 5 (Dangerous Goods Safety Adviser)  
Copy no. 2: person #2 (CEO)



## **H. Measures to ensure the access restriction to information about the transport operations contained in the security plan**

The individuals authorized to access the security plan are:

CEO, COO, Logistics Manager, Warehouse Manager, Dangerous Goods Safety Adviser, representatives of the emergency services and the inspection authorities once noted in access control document.

Annex 1 - Employees covered in the high consequence dangerous goods security plan

Annex 2 - List of reviews and updates

Annex 3 - Access control document

Annex 4 - Company address with in-house route maps included

## **4. CONCLUSION**

The protection of high consequence dangerous goods reduces the risk of the improper use of dangerous goods, contrary to their purpose or in terrorist events. High consequence dangerous goods security plans should refer to the ADR guidelines. A security plan should be drawn up precisely, with adherence to the role that the company is responsible for within the dangerous goods supply chain, carrier safety responsibilities, and the class of the dangerous good transported and the means of its transportation. Measures and procedures designed to protect high consequence dangerous goods should be described in details, considering their actionability. The adopted procedure should be tested at regular intervals. If the simulation of the event involving high consequence dangerous goods proves that the procedures do not fully protect these goods, it should be modified, updated and reapplied. The optimal coordination of activities and establishing duties commensurate with the responsibilities of involved personnel involved in the work with high consequence dangerous goods provides the environmental, health and safety protection in case of accidents involving the usage of these goods contrary to their intended purpose.

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