

## **SYSTEM OF REPORT OF AIRCRAFT OCCURRENCES INVOLVING DANGEROUS GOODS**

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*Summary: The article deals with the system of providing information about the dangerous goods in the event of an aircraft accident and incident. Summarizes the general requirements of national and international regulations for the individual participants of the transport of dangerous goods and analyzes relating omissions. It also deals with the system of dangerous goods occurrence report to the appropriate authorities and the possibility of using the outputs from these reports for the purposes of analyze, definition of causes, investigation and prevention of their occurrence.*

*Key words: Aircraft accident, Incident, Dangerous goods, Occurrence report*

### **INTRODUCTION**

Air transport of dangerous goods is subject to strict regulation by international organizations and building on it by the national competent authorities. Global trend is the pursuit of uniformity in procedures and activities related to air operations. Activities of international organizations aim to increase security and unification procedures. The efforts of international organizations and associations are subsequently reflected in the operating conditions of the various participants in the transport process within the countries and their national legislation. The emergence of new security programs, information collection, databases and data analysis can be beneficial only if these databases are accessible and especially if the collection of information involving all the parties concerned.

In the field of air transport of dangerous goods, and specifically in the provision of information in emergencies, and subsequently reporting and providing information on the occurrence of events for the needs of investigation and analysis of causes exists in current legislation unclear interpretation of the terms, duplication and lack of transparency. In addition, not very frequent controls by the appropriate national authorities gives room for neglect of its duties. Therefore, there are no reliable outcomes and the level of safety in the transport of dangerous goods is often limited to individual participants of the transport process and the internal organization of work and self-control.

### **1. DANGEROUS GOODS AIRCRAFT ACCIDENT AND INCIDENT REPORT**

Authority responsible for supervising compliance with all regulations in the field of aviation and hence regulations in the field of air transport of dangerous goods in Slovakia was previously Civil Aviation Authority of Slovak Republic. With effect from 1.1.2014 the legal

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successor of the Civil Aviation Authority of Slovak Republic became Transport Authority. This Authority was established by the Act No. 402/2013 Coll. on Regulatory Authority for Electronic Communications and Postal Services and on Transport Authority and on amendments of several acts as a state administrative body with nationwide operation in the area of railways and other guided transport, civil aviation and inland waterway transport. This office brings together three divisions:

- Civil Aviation Division,
- Railway and Other Guided Transport Division
- Inland Waterway Transport Division

Civil Aviation Division undertakes the tasks and activities in the area of civil aviation in accordance with the Act No. 143/1998 Coll on Civil Aviation (Civil Aviation Act) and on Amendments of some Act as amended by late regulation. (1)

Main regulations under national legislation remained alongside the aforementioned aviation act also regulations called Aviation Regulations „L“ series, based on the standards and recommended practices of the International Civil Aviation Organisation (hereinafter referred to as "ICAO"). The main provision of the transport of dangerous goods by air is: L18 Transport of Dangerous Goods by Air. Another important provisions in this field is for example: L14 Aerodrome Design and Operations, and L13 Aircraft Accident and Incident investigation.

For the purpose of the implementation of procedures and duties in the emergency events, especially duties and responsibilities to provide immediate information about the dangerous goods and later report the dangerous goods accidents or incidents to the appropriate authorities are defined some basic terms in these aforementioned acts. However, there are certain differences and not clear explanations. The terms "accident", "serious incident" and "incident" are for the purpose of investigation of aircraft accidents and incidents generally defined under Regulation L13. (3) In respect of the carriage of dangerous goods in the regulation L18 shows the specific definitions of "*Dangerous goods incident*" and "*Dangerous goods accident*."

***Dangerous goods accident*** is defined as an occurrence associated with and related to the transport of dangerous goods by air which results in fatal or serious injury to a person or major property damage. (4)

***Dangerous goods incident*** is defined as an occurrence, other than a dangerous goods accident, associated with and related to the transport of dangerous goods by air, *not necessarily occurring on board an aircraft*, which results in injury to a person, property damage, fire, breakage, spillage, leakage of fluid or radiation or other evidence that the integrity of the packaging has not been maintained. Any occurrence relating to the transport of dangerous goods which seriously jeopardizes the aircraft or its occupants is also deemed to constitute a dangerous goods incident. (4)

Incident and accident with dangerous cargo may in certain condition escalate to the level of aviation accident or serious incidents as defined above.

All these events depends on their seriousness are subjects of some requirements in the area of provision of information:

1. Firstly, it is the obligation participant "communicate", to provide an appropriate contingency components reliable and fast information on dangerous goods immediately after the incident or accident. Part of such notification, in particular, information on the nature and quantity of dangerous goods and risks arising from their properties.
2. Secondly, it is the preparation and sending reports about the reasons and circumstances of the incident or accident to the appropriate authority. For the sake of analysis, investigate the cause, prevention of the recurrence of removal and possible causes.

### **1.1 Information by operator in case of an aircraft Accident or Incident**

If this is the first above mentioned case, in the event of an *accident* or *serious incident*, which relates to an aircraft carrying dangerous goods, cargo aircraft operator shall without delay provide information to the competent emergency services about the dangerous goods on board, according to the written information to the commander for the aircraft. In the event of an incident, but which does not meet the characteristics of a serious incident is a same procedure, except that the operator is not required to transmit such information in any case, but only on request.

The pilot-in-command must be familiarized with the contents of dangerous goods. In accordance with the Technical instruction ICAO (TI ICAO), the operator of an aircraft in which dangerous goods are to be carried must as early as practicable, but at least prior to departure of the aircraft provide an accurate and legible written or printed information concerning dangerous goods that are to be carried as cargo to the pilot-in command. These information are called an Notification to captain (hereinafter referred to as „NOTOC“). It contains an description and definition of dangerous goods carried as cargo.

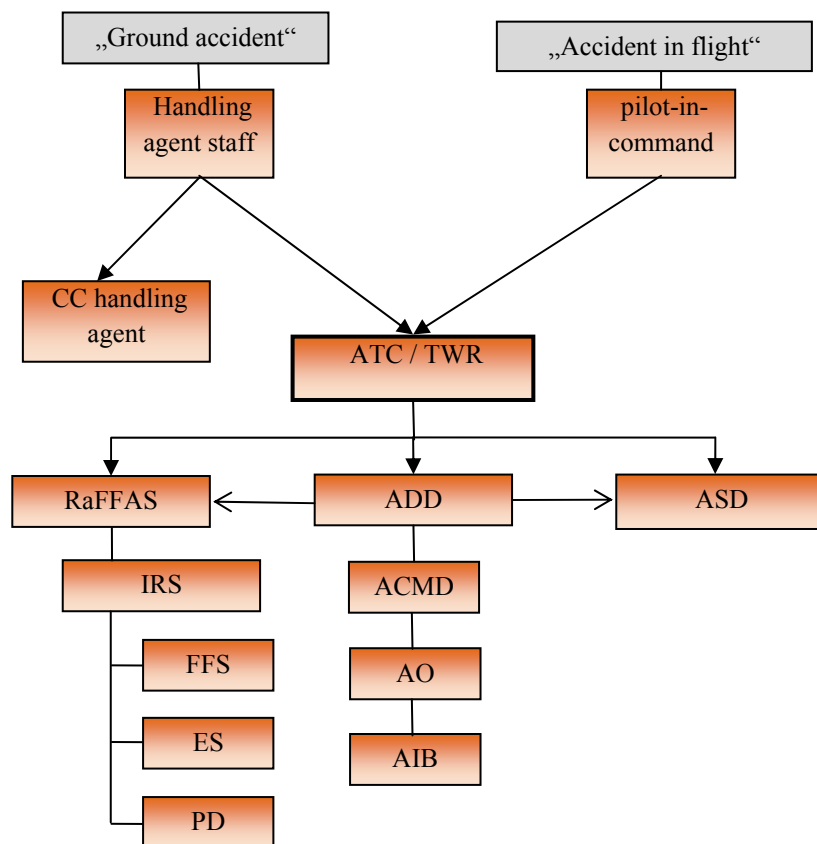
From 1 January 2014, the operator must also provide the same information to the personnel with responsibilities for operational control of the aircraft (e.g. the flight operations officer, flight dispatcher, or designated ground personnel responsible for flight operations) Each operator must specify the personnel (job title or function) to be provided this information in their operations manual and/or other appropriate manuals. (2)

These operators Operating Manuals should follow the appropriate Airport Emergency Plans (AEP), in terms of coordinate cooperation and exchange of information. According to the above mentioned regulations is the responsibility of the commander on the basis of the NOTOC in the event of an emergency with dangerous goods soon as possible inform the appropriate Air Traffic Service, which in turn inform the Airport Operator.

However in practice is this procedure often opposite, or not always accurately determined. The Airport Operator within their own Airport Dispatching Department find out information about the flew, crew members, passengers and the nature of the cargo and provides these information to the other service department at the airport. Operators Operating Manuals, Airport Emergency plans and Air Traffic Services activities must be harmonized and those responsible for requesting and transmitting the information shall be clearly delegated. If this is not fulfilled, there is often duplication of the information submitted. If the operator fails to comply with the obligation to inform the appropriate air traffic services unit,

or Air Traffic Services not ensure the provision of information, a dangerous situation may occur. To inform the intervention emergency services about the presence of dangerous goods on board an aircraft after arriving at the site of the incident, may endanger the conduct of intervention and increase the risk of injury and damage.

To coordinate all local communities operating on the airport area an airport operator must develop and implement an Airport Emergency Plan. AEP addresses essential emergency related and deliberate actions planned to ensure the safety of and emergency services for the airport community in which the airport is located. Accident or incident involving dangerous goods are one of the emergency events which should be apart of the emergency procedures. The level of processing security procedures in the airport emergency plans in the event of accident or incident involving dangerous goods is various. This depends on the activities that are carried out at airports. There are not the uniform model for all airports and all AEP. Based on the analysis of selected AEP in Slovakia is possible to make the following general scheme of the emergency procedures and information in the event of an accident or incident involving dangerous goods. There are several variations that may occur. For example there can be discovered a leakage of dangerous goods or other dangerous goods accident or incident direct during the flight or during loading or unloading cargo or other handling procedures. The following scheme on the image no. 1 includes information procedures in the both above mentioned events (accident in flight and ground accident).



Source: own version

Fig. 1 – Scheme of providing information in the event of an accident or incident involving dangerous goods

Explanatory:

CC handling agent - Coordination center of handling agent  
ATC/TWR - air traffic service/ tower  
RaFFAS - rescue and firefighting airport service  
ADD - airport dispatching department  
ASD - airport security department  
IRS - integrated rescue system  
FFS - fire fighting service  
ES - emergency service  
PD - police department  
ACMD - airport crisis management department  
AO - aircraft operator  
AIB - National Accidents Investigation Authority

## 1.2 Reporting of Dangerous Goods Occurrences

The causes of accidents or incidents with dangerous goods must be adequately investigated by the appropriate authorities. Air and Maritime Accidents Investigation Branch is in Slovakia responsible for these measures. This branch coordinates procedures for investigation, collection and reporting of information relating to accidents and incidents with dangerous goods, and also cases of undeclared or misdeclared dangerous goods. Accident or incident reports must be made in accordance with the technical instructions. (4)

„Dangerous goods Occurrence Report“, may be used as a standard form where the reporting format has not been specified by the appropriate authority. Operators shall in accordance with the Technical Instructions, report without delay to the competent authority and to the appropriate authority of the State of occurrence in the event of:

- dangerous goods accidents and incidents, or
- occasions of undeclared or misdeclared dangerous goods, and
- other occurrences (e.g. dangerous goods are discovered to have been loaded, segregated, separated and secured not in accordance with relating regulations, or are discovered to have been carried without information having been provided to the pilot-in-command.

Except operator and his staff, there are other entities who should followed the reporting requirements. They are entities which are in possession of dangerous goods at the time a dangerous goods accident or incident occurs or entities who discovered undeclared or misdeclared dangerous goods. For example persons undertaking the responsibilities of shippers', including operator's staff acting as shippers, operator's staff preparing dangerous goods, packers, staff of freight forwarders involved in processing dangerous goods, carto or mail, staff of freight forwarders and operators and ground handling agent's staff involved in the handling, storage and loading of cargo or mail, operator's and ground handling agent's staff accepting dangerous goods, cargo or mail, or passenger handling staff, flight crew members, loadmasters and load planners, crew members (other than flight crew members) or security staff who deal with the screening of passengers and their baggage and cargo or mail, e.g. security screeners, their supervisors and staff involved in implementing security procedures. (2)

An incident such as occurrence of undeclared or misdeclared dangerous goods is a serious problem whose solution is focused more advanced countries. Subject of interest and

investigations is the development of new packagings, materials of packaging, handling and storage equipment and other technical support, including, in particular extinguishing systems, protecting the aircraft, crew and other passengers before the adverse effect. Technical solutions are together with the provision of adequate operational procedures and training of staff ensuring the security underlying factor. Technical solutions can not be the only protective element, particularly since the financial demands of their introduction. All staff and personnel must be adequately and regularly familiarizing by employer how to take action in the event of emergency situation.

Specification of the events, which concerns the reporting requirements is complicated. The regulations state requirements to provide accidents or incidents reports as defined in particular as prescribed in Aviation regulation "L13". Furthermore, with reference to the requirements of international organizations in relation to the carriage of dangerous goods it is also the above mentioned events according to the ICAO Technical Instructions. Also Government Regulation No. 661/2005 on the reporting occurrences in civil aviation deals with the issue of mandatory reporting of events other than accidents or incidents as defined in the Aviation regulation "L13" and also Civil Aviation Act. Annex. 1 of this government regulation lists all mandatory reports. Among others, it is also: "Carriage or attempted to carriage of dangerous goods in contravention of applicable regulations, including incorrect labeling, marking and packaging of dangerous goods." (6)

In practice, the fact is that many participants in the transport process neglect this obligation. The shipper through ignorance or intentionally violates fails to comply with the responsibilities of the identification of dangerous goods. Other participants often such events do not declare. Whether this is due to the complex detecting this hidden form of dangerous goods, insufficient organizational and technical support, lack of trained staff, or just for the sake of good business relations because reporting may be mutual business partners. They mostly solve these situations without any reporting to the appropriate authorities. Incidents or accidents statistics on such a global scale thus lacking or they are only a small sample of the actual state.

## **2. PREVENTIVE ACTIONS OF SOME PARTICIPANTS IN THE TRANSPORT PROCESS**

All participants of the transport process have in relation to the preparation of shipments of dangerous goods, transportation and handling as well as of the potential for and dealing with emergencies related to leakage of hazardous substances range of duties imposed by law as well as the attempt to minimize the damage and losses in carrying out its activities. However the implementation of the transport chain cooperate more participants. According to the scope and the nature of the tasks can be divided into the three groups. First there are direct participants which handle the actual physical movement of freight, further there are the competent appropriate authorities, and the third group covers the emergency services.

We can define the main participants of the transport chain of air transport of dangerous goods as follows:

- shippers and persons undertaking the responsibilities of shippers' (regulated agent, freight forwarder,... )
- round handling entities,
- operators,
- airport operators,
- consignees.

Every shipper who offers a dangerous goods for air transport must comply fully with the specific responsibilities in accordance with the requirements of the International Air Transport Association (ďalej len „IATA“). These requirements are applied to every shippers when offering a consignment of dangerous goods to IATA Member and associate Member airlines, and to airlines participating in IATA interline agreements for Cargo. These Regulations are fully compliant with the ICAO Technical Instructions. In addition, shippers must comply with any applicable regulations set forth by the States of origin, transit and destination. (2)

Interface between shippers and operator may be in the transport process called „regulated agent“. It is responsible individual or legal person representing operator, which in his name provides the necessary formalities (including the required security controls) which are acceptable and required by the competent authority in the case of freight and mail. (7) The "regulated agent" in the transportation process fulfills all safety requirements when sending dangerous goods as well as the above shipper.

The aircraft operator shall not accept dangerous goods for carriage, if this is not accompanied by the prescribed documents complete and has been inspected in accordance with the procedures adopted for the transport specified in the TI ICAO. An operator shall establish procedures to ensure that they take all appropriate measures to prevent unintentional devolution of dangerous goods on board and provide personnels with the necessary information to enable them to exercise their responsibilities in accordance with the requirements of the technical instructions. (5)

Air safety operations therefore includes not only the phase of an aircraft, but also all other activities related to the conduct of the flight. These include, for example, boarding and alighting of passengers, operational and replenishment of fuel, repairs and maintenance, loading and unloading of cargo and more. We can consider for the "safe flight" an each flight that has been held under specified conditions without endangering life and health crew, passengers and without damage to aircraft or property. Difficult situation during the flight, when vested and present danger of crew, passengers and aircraft is known as *a dangerous flight situation*. (8)

Some organizations adopt in order to improve and enhance safety and prevent dangerous situations within their own society preventive measures and operational procedures. These are such as internal statistical reports of incidents or incidents that occurred in connection with the manipulation, transporting and handling of dangerous goods in their premises. In this context, statistics are often very detailed and the incident is considered to be any finding of infringement and non-compliance with prescribed procedures in the

preparation, submission to transport, actual transport and handling of dangerous goods. Any misconduct are recorded, if further action effects could cause a dangerous situation either in flight or in connection with the handling and loading. In terms of legislation, not all of them are subject to reporting to the competent authorities.

Statistical representation of such incidents of company Dalsey, Hillblom and Lynn Slovakia (hereinafter "DHL Slovakia") for the period 2012 and 2013 are shown in Tables 1-4 below. These statistics are therefore focused on internal process and indicate the occurrence of incidents in the transport of hazardous substances at the premises of the company in Europe for the period between 2012 and 2013.

Tab. 1 – Dangerous goods incidents in first quarter (Q1) 2012 and 2013

Dangerous goods Shipments	Frequency of incidents in Q1		Percentage incidents in Q1	
	2012	2013	2012	2013
Classic shipments	357	349	2,35 % of all classic shipments	2,36 % of all classic shipments
Express shipments	3777	5709	0,95 % of all express shipments	1,21 % of all express shipments
Total dangerous goods shipments	4134	6058	1,00 % of all dangerous goods shipments	1,48 % of all dangerous goods shipments

Source: processed according to records of DHL Slovakia

In the 2012, there were classified an employees responsibility for incidents in 295 events, which represents 7,14 % from the total of registered incidents and in 2013 it was in 396 events, which represents 6,54 % from the total of registered incidents.

Tab. 2 - Dangerous goods incidents in second quarter (Q2) 2012 and 2013

Dangerous goods Shipments	Frequency of incidents in Q2		Percentage incidents in Q2	
	2012	2013	2012	2013
Classic shipments	296	283	1,93 % of all classic shipments	1,59 % of all classic shipments
Express shipments	3898	5308	1,04 % of all express shipments	1,08 % of all express shipments
Total dangerous goods shipments	4194	5591	1,07 % of all dangerous goods shipments	1,09 % of all dangerous goods shipments

Source: processed according to records of DHL Slovakia

In the 2012, there were classified an employees responsibility for incidents in 242 events, which represents 5,77 % from the total of registered incidents and in 2013 it was in 224 events, which represents 4,01 % from the total of registered incidents.



Tab. 3 - Dangerous goods incidents in third quarter (Q3) 2012 and 2013

Dangerous goods Shipments	Frequency of incidents in Q3		Percentage incidents in Q3	
	2012	2013	2012	2013
Classic shipments	278	319	1,87 % of all classic shipments	1,42 % of all classic shipments
Express shipments	3995	5999	1,01 % of all express shipments	1,27 % of all express shipments
Total dangerous goods shipments	4273	6318	1,04 % of all dangerous goods shipments	1,27 % of all dangerous goods shipments

Source: processed according to records of DHL Slovakia

In the 2012, there were classified an employees responsibility for incidents in 288 events, which represents 6,74 % from the total of registered incidents and in 2013 it was in 357 events, which represents 5,65 % from the total of registered incidents.

Tab. 4 - Dangerous goods incidents in fourth quarter (Q4) 2012 and 2013

Dangerous goods Shipments	Frequency of incidents in Q4		Percentage incidents in Q4	
	2012	2013	2012	2013
Classic shipments	264	338	1,77 % of all classic shipments	2,29 % of all classic shipments
Express shipments	4686	6324	1,19 % of all express shipments	1,34 % of all express shipments
Total dangerous goods shipments	4950	6662	1,21 % of all dangerous goods shipments	1,55 % of all dangerous goods shipments

Source: processed according to records of DHL Slovakia

In the 2012, there were classified an employees responsibility for incidents in 250 events, which represents 5,05 % from the total of registered incidents and in 2013 it was in 462 events, which represents 6,93 % from the total of registered incidents.

In 2012, there were identified the following reasons of above mentioned incidents, including their percentage in all incidents involving dangerous goods:

- Hidden dangerous goods – danger of undeclared or misdeclared dangerous goods – 27 %.
- „Suspected dangerous good“ - goods which are not originally declared as dangerous. Suspicions must be confirmed or refuted by shipper of suspected good. These suspicion are considered to be an incident – 22 %.
- Wrong completion of required documentation – 14 %.
- „Not authorized shipper“ - not known shipper which is not contained in the internal organization database of shippers. It is an internal precaution to minimize danger of undeclared dangerous goods – 12 %.
- Wrong or missing labels and marks on the package of dangerous goods – 5%,

- Wrong packagings or packagings material – 5 %.
- Operational staff mistakes – mistakes of operational acceptance staff in a process of accepting dangerous goods – 4 %.
- „Suspected dangerous goods/Non hazardous“ – the situation when the suspicion describe in the second point above was not confirmed – 4 %.
- „Non approved destination“ - if the final destination of shipment is not for some reason approved by the internal procedures of the forwarder. It is internal precaution – 4 %.
- Missing or wrong completion of dangerous goods checklist as the most important point for accept or refuse shipments – 3%.

The above mentioned company collects and analyzes in the process of transport of dangerous goods especially incidents with employees responsibility. Following are present the reasons of those incidents, including percentage of all incidents with employees responsibility:

- Operational staff mistakes – mistakes of operational acceptance staff in a process of accepting dangerous goods – 56 %,
- Damaged package (leaking,...) – 13 %,
- Unit load device ( „ULD“ ) failures – 10 %,
- Misrouted package/ paperwork - 10 %,
- Missing or wrong completion of dangerous goods checklist – 7%,
- hidden dangerous goods – 4%.

Generally the basic group of human error generating assumptions air accidents and serious incidents can be sorted into the following five groups:

- Lack - linked to faulty operation of appropriate authorities, crew members, and providing technical staff during the preparation, implementation and execution of the flight.
- Error - such malfunction related to cause of flight or during dangerous situations.
- The unconscious negligence - as a fault causes or circumstances of the dangerous flight situations where the offender committed the infringement or faulty procedure of ignorance, although he has been given the necessary knowledge.
- Knowingly negligence - as a fault causes or circumstances of the dangerous flight situations where the offender unreasonably and knowingly violates the regulations and procedures.
- Disturbances or failures - phenomena involving defective activities of persons or malfunction of the aircraft or equipment. (8)

## CONCLUSION

Duties and requirements of providing information in case of dangerous goods incident or accident are given by international legislation, prescriptive regulations deriving from national membership in international organizations as well as their own national legislation.

Diversity of interpretation of requirements and use concepts opens up the possibility for non-compliance with prescribed procedures in both these areas, the provision of information and reporting system. A unified approach by all participants and their cooperation is missing.

In the commercial sphere, the level of safety means spending adequate funding. International associations and organizations encourage to cooperation between various participants of transport chain in the field of safety. Membership in programs and organizations with the possibility of transmitting and receiving information to and from shared databases brings benefits to participants in the safety analysis but with increased funding costs.

By contrast, legal regulations, for example in the form of reporting of dangerous goods incidents, are not analyzed and the results are not normally accessible. Report of various occurrences, even those with less severe consequences, for example as through annual summary reports can be co-factor in the safety analysis and identification of elements threats. A clear statement of the requirements by the competent authorities, collection and processing of information from mandatory reports, other operators access to the results of analyzes of the collected information is the missing link that could contribute to the discovery of vulnerabilities and the adoption of specific preventive actions among the participants in the transport chain.

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