Economic Commission for Europe

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

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Accidents and risk management

Report on the 2nd workshop on risk management in the context of rail, road and inland waterways Transport of Dangerous Goods, 28-30 October 2014

General information

The second workshop of the roadmap on risk management in the context of inland transport of dangerous goods took place on the 28-30 October 2014, in Valenciennes. Mr Emmanuel Ruffin, project officer in charge of transport of dangerous goods at ERA, chaired the meeting.

Experts in the field of transport of dangerous goods, representatives of national administrations (from 11 countries) and the private sector, as well as of international organizations (6) and the European Commission (1st day) attended the workshop.

In total more than 40 participants, discussed the following items:

- existing databases on transport events and reporting of accidents,

- practical evaluation of TDG risks.

The same organization than for the first workshop was retained in order to allow participants to share their information/experience with short presentations. In total, sixteen (16) presentations served the introduction to the discussions; they are available at the following link: http://www.era.europa.eu/Document-Register/Pages/Presentations-of-the-Workshop.aspx.

Main results

Fruitful discussions took place and allowed the workshop participants to conclude on the necessary way forward. Main discussion findings are reported in the next section. It was concluded that for the next workshop (17-19 February 2015) the Agency should collect the following information from interested participants:

detailed lists of parameters that are collected today in existing databases or accident reporting systems, both in general transport databases and transport of dangerous goods ones,

description of the existing processes for data collection, including information on the database objective, the reporting entity, the timelines, the confidentiality requirements, the users…

The results will be reported by ERA in two documents for discussion.

Participants have volunteered to report to ERA the detailed information they have to facilitate this task.

On this basis, it is envisaged that the February workshop could discuss a baseline definition of information that are necessary for risk evaluations and the related data needs. The results are made available for information of the Joint Meeting of experts on ADR/RID/ADN.

Discussions results

Important note: The results reported hereinafter in the present document are to be considered in combination with the findings of the previous workshops reported in the workshops roadmap document. Some findings already discussed in the previous workshops have not been duplicated here.

Risk evaluation practice

Issues:	***Potential solutions:***
Both qualitative and quantitative methods should be allowed	Examples of both qualitative and quantitative practices have been presented by the participants showing that both methods are practicable and actually used today. It is also worth to mention that several participants use risk models that are applicable to all modes of inland transport, as well as to establishments producing or using dangerous substances. A question remains: how to ensure that on a given case the results of a qualitative approach lead to the same decision than the results obtained with a quantitative approach? In principle both approach should provide similar risk evaluations if they are sufficiently detailed and accurate. One potential solution would be to perform a benchmark/tests exercise after a harmonized method, scenarios and generic parameters have been defined.
Evaluation of risks	All examples indicate that it is a common approach to describe the Risks as a combination of a Probability of occurrence of a pre-defined Hazard and of the expected associated Impacts. As in practice it is impossible to cover every single possible case of accident scenarios, the probabilities and their associated impacts are evaluated on the basis of the definition of pre-defined accident scenarios. These scenarios are not harmonized today but are often quite similar. In general, the evaluation of the risks cover an envelope of the main relevant scenarios obtained from a risk analysis. The considered scenarios may also be linked to the objective of the risk evaluation, for example to solve a general or specific risk situation. However the choice of the scenarios should not lead to bias the results of evaluation toward a pre-defined decision on the considered situation. In general, one can define scenarios in various categories covering, for example: - the maximum physically possible impacts, - the credible impacts, - the most credible (statistically representative) impacts…

	On problem related to the lack of pertinent data is that it favors the use of conservative assumptions which in turn can lead to an overestimation of the impacts and of the risks levels.
Evaluation of probabilities	The probabilities of the impacts are estimated, in practice, by the use of frequencies of occurrences of pre-defined events. Different levels of details are possible following the level of detail of input data influencing the frequencies of occurrence. For example frequencies of occurrence may take into account the design of vehicles, design of containments or the quality of the road/tracks/waterways that are used for the transport, as well as the effect of traffic operating and signaling rules. One potential improvement to the definition of frequencies is to harmonize the collection of the data which are prominently influencing the evaluation of the frequencies. To develop this approach, the description of the most relevant events, using a bow-tie description, and an harmonized description of the most relevant causes and consequences would be helpful. Two categories of event should be distinguished: the events resulting from a traffic accident and the non-traffic accident scenarios, for example the spontaneous releases. Concerning the traffic accident events, the evaluation of the probabilities requires data on the traffic level and on the composition (e.g. % of representative substances carried) of the traffic .
Evaluation of impacts	One can distinguish several type of impacts that are commonly used: - victims, injuries, fatalities,… - asset damages, vehicles, transport infrastructure… - environmental damages, pollutions, damaged buildings… - financial damages, disruption of operation, - loss of good repute… When examining the details we can observe different approach to evaluated the impacts, for example concerning the victims, some participants evaluate the number of persons exposed to the hazard, others evaluate the effect of the dose related to the exposure, leading to an evaluation of the potential injuries or fatalities. In most of the case only potential fatalities are evaluated. The evaluation of impacts is also depending on the traffic composition and, of course the potential presence (or not) of hazardous substances.
Statistics on leaks	There is a need to define better statistically representative leakage because current databases show great disparities. A solution would be to establish generic frequencies of typical breach and/or leak sizes. In order to establish statistics, the data concerning leaks should be reported in a mandatory framework. To facilitate the use of harmonized risk evaluation, the collected data/statistics should be made publically available to risk assessors. Before generic leak frequencies are made available, a solution would be to agree on a consensus definition of leaks to be used in every risk evaluations. It would facilitate the mutual recognition of risk evaluations. The definition of generic leak frequencies/sizes could be refined in elaborating correlations with the tank design types; however no sufficient data is available today to clearly establish relevant correlation between the size of

Risk evaluation objectives	leakages and the design of tanks. It means that an improvement of the current TDG databases could be the collection of detailed data concerning the design of vehicles involved in accidents (design data) and the resulting size of the breach/leak. In principle the evaluation of risk could also combine information on statistical accident outcomes and a theoretical analysis of the influence of the containments' designs on the potential outcomes. In principle risk evaluations have different objectives and related necessary data inputs may differ in consequence. For example we can identify the following recurrent objective categories: - Optimization/compliance of the level of risks on a network, - Optimization/compliance of the level of risks on a route, - Risk mapping, including the identification of hotspots - Local optimization of the level of risk in relation with urban planning, - Risk evaluations associated with an analysis of cost and benefits of potential risk reduction options… Concerning the difference between objectives it was agreed by the participants that the Seveso directive approach is not relevant for regulating the transport of dangerous goods and that risk evaluation approaches and objectives should be different, even if they should be consistent in principle.

Databases and Reporting of transport events

Issues:	***Potential solutions:***
Database objectives	It is clear that every database is designed for specific objectives. The most common two objectives are: - collecting indicators for monitoring and analysis of impacts (e.g. number of victims in road accidents) and evaluating the effectiveness of policies/laws, - collecting accident reports to share knowledge acquired through accident investigation, notably the accident causes and consequences, in order to avoid recurrence of similar accidents or impacts, as much as practicable. Today there is no international database which has been developed with the objective to provide data for risk evaluation practice. Participants agree that it is a weakness and a barrier to the proper implementation of well-informed risk-based decision-making regulations.

Under-reporting	Some existing databases have the ambition to collect a large number of information (including causes/precursors of accidents) which could be used as inputs to risk evaluations if statistics could be extracted from the collected data. This approach still needs to be further developed and harmonized to be applicable in practice. It was noted that many databases suffer of under-reporting even when it is mandatory to report data by law. To counter this problem, some reporting frameworks have established a system of fines to help for a proper enforcement. However another approach consists to improve the safety culture, in particular the no-blame culture, where it is considered as a positive behavior to report accidents data on voluntary basis, directly by any staff member of a concerned organization. In any case it was also considered that in order to establish relevant statistics or to draw sound conclusions from analyzed collected data, quantity of data shall be important and thus the reporting thresholds should be lowered in order not to collect information on severe accident but also on minor incidents, and even on near misses. It will probably be a challenge to find the right balance between the quantity of data to be reported for risk evaluation practice and statistics purpose, and in the same time to limit the cost and the complexity of the data collection process.
Combination of databases objectives	In principle a virtuous development circle of existing databases could be established if the three following objectives: - monitoring indicators - identification of causes and impacts - input data to risk evaluations would be properly combined and structured. Monitoring should be used to evaluate the performance of a global policy and also provide general statistical data (by the way anonymous) necessary for risk assessments, for example traffic statistics. Identification of causes and impacts should be used to continuously improve the definition of data collection devoted to evaluate the risks and to prevent, as much as possible, the recurrence of known causes/impacts. Therefore, a process consisting to: 1) establish an harmonized data collection process of the main causes and impacts, 2) use the collected data for the purpose of risk evaluations, 3) update regularly the harmonized data collection definition taking into account newly identified causes/impacts, may be effective for both the monitoring, risk identification and risk evaluation activities. It was noted that ERA is studying the possibility to develop a detailed data collection of rail occurrences and that interested organizations may participate to these developments. Most of the participants considered that it was preferable to coordinate, as much as possible, the use of existing databases, and to complement them with

Coordination of databases administration	missing data for the purpose of risk evaluations than to develop new databases. Following this principle, one cost-effective option could be to coordinate the content of accident databases in different transport modes with the content of specialized database on dangerous goods events, covering the needs of dangerous goods experts. In this case the accident database would provide details on the causes of the transport accidents while the dangerous goods event data-bases would provide detailed information on the impacts of accidents involving dangerous substances, for example the size of the breach, the quantity of substance spilled, the damages/malfunction of safety valves or other tank equipment's, as well as the activation of specific equipment's, for example the energy absorbing systems… An advantage for this approach is that it would support the description of transport event based on bow-ties approach (which could be enriched, for example, when a new accident cause or type of impact is discovered), the fault-tree part being much more relevant for the transport databases (description of causes) and the event-tree part being much relevant for the description of dangerous goods substance impacts. Such a collaborative approach would be possible only if there is a clear commitment to maintain the development of collaborative databases on the long term (stability of the data collection process), which may necessitate specific formal administrative arrangements/commitment between the concerned databases' administrative entities.
Contribution to the review of chapter 1.8.5 of ADR/RID/ADN	The participants considered that sufficient time should be reserved at the next workshop to discuss the implications of the findings reported above for the future amendments of the Chapter 1.8.5 of ADR/RID/ADN. In particular it was discussed that the following points may be clarified: - the (reviewed) objective of the chapter 1.8.5 - the definition of the needs that specific to the Transport of Dangerous Goods events - what need is already/should be covered by general transport databases - what should be covered by transport of dangerous goods databases - the process of collaboration between general transport and specialized TDG databases, including a development work plan, - the roles and responsibilities for the use, administration, maintenance of the collaborative process, - the practical implementation which may be different for different modes of transport - the costs and benefits of a collaborative approach