Economic Commission for Europe

Inland Transport Committee

Working Party on the Transport of Dangerous Goods

Joint Meeting of the RID Committee of Experts and the Working Party on the Transport of Dangerous Goods

Bern, 21–25 March 2011
Item 6 of the provisional agenda
Reports of informal working groups

Report of the informal working group on reduction of the risk of a BLEVE

Transmitted by the Government of the Netherlands on behalf of the working group

1. The working group held a seventh session on 20 to 22 December 2010 in Paris, France under the chairmanship of Mr. Claude Pfauvadel (France). The meeting was attended by representatives of France, Germany, the Netherlands, Norway, Belgium, Poland, and the following non-governmental organisations: European Liquefied Petroleum Gas Association (AEGPL), the European Railway Association (ERA) and the International Union of Railways (UIC).

2. The documents on the agenda were as follows:

- Report Joint Meeting March 2006, ECE/TRANS/WP.15/AC.1/102 (OCTI/RID/GT-III/2006-A), para. 5-12, 20 and 21

- Report Joint Meeting working group on tanks, ECE/TRANS/WP.15/AC.1/102/Add.1 (OCTI/RID/GT-III/2006-A/Add.1), item 4

- ECE/TRANS/WP.15/AC.1/2006/8 (OCTI/RID/GT-III/2006/8) (NL)

- Informal document March 06/ INF.3 (NL)

- Informal document March 06/ INF.26 (AEGPL)

- ECE/TRANS/WP.15/AC.1/2007/11 - Report of the first informal working group on reduction of the risk of a BLEVE (meeting in The Hague, 8-10 November 2006)

- Informal document March 07/INF.22 (AEGPL)

- Report Joint Meeting March 2007, ECE/TRANS/WP.15/AC.1/106 (OTIF/RID/CE/2007-A), para. 62

- Informal document September 07/INF. 9 – Report of the second informal working group on reduction of the risk of a BLEVE (meeting in Tønsberg, 20-22 June 2007)

- Report Joint Meeting September 2007, ECE/TRANS/WP.15/AC.1/108 (OTIF/RID/CE/2007-B), para. 105

- Informal document March 08/INF.5 – Report of the third informal working group on reduction of the risk of a BLEVE (meeting in Rome, 27-28 November 2007)

- Informal document September 08/INF.6 – Report of the fourth informal working group on reduction of the risk of a BLEVE (meeting in The Hague, 16-18 June 2008)

- Report Joint Meeting September 2008, ECE/TRANS/WP.15/AC.1/112 (OTIF/RID/RC/2008-B), para. 41

- Informal docuemnt March 09/INF.25 – Report of the fifth informal working group on reduction of the risk of a BLEVE (meeting in Paris, 4-6 February 2009)

- Report Joint Meeting March 2009, ECE/TRANS/WP.15/AC.1/114 (OTIF/RID/RC/2009-A), para. 62

- ECE/TRANS/WP.15/AC.1/2010/9 (OTIF/RID/RC/2010/9) - Report of the sixth informal working group on reduction of the risk of a BLEVE (meeting in Paris, 21-23 October 2009)

- ECE/TRANS/WP.15/AC.1/2010/47 (OTIF/RID/RC/2010/47) - Report on the seventh informal working group on reduction of the risk of a BLEVE (meeting in Berlin, 19-21 April 2010)

- Report Joint Meeting September 2010, ECE/TRANS/WP.15/AC.1/120 (OTIF/RID/RC/2010-B), para. 60-61.

Furthermore several working documents and presentations submitted by participants were scheduled.

3. The meeting was welcomed by the Chairman. He referred to the key elements of the mandate given by the RID/ADR/ADN Joint Meeting:

(a) Prevention of a BLEVE;

(b) Reduction of the effect of a BLEVE;

(c) Hot BLEVE and cold BLEVE should be considered;

(d) Technical and other measures should be taken into account;

(e) Other matters of principle.

4. The meeting discussed on the conclusions of data of accidents and on testing results of the Bundesanstalt fur Materialforschung and –prüfung (BAM) in Germany.

5. Members are invited to draw conclusions from the available accident data and to discuss these conclusions in the next meeting. A draft program for further testing of tanks with/without PRV’s and/or thermal protection will be discussed at the next meeting.

6. ERA is invited to inform the next meeting on the preliminary results from the study on measures against freight train derailments.

7. Norway invites the working group for the next meeting in Oslo. The meeting will be held from 8 to 10 June 2011.

Annex to the report of the working group meeting in Paris, 20-22 December 2010

Four sets of documents were presented to the working group for discussion and validation in this meeting.

- Documents by UIC, an analysis on the statistics RID-1.8.5 accidents (Class 2) and the French rail accidents;
- Documents by AEGPL, an analysis on the statistics of the French road accidents 1998-2009;
- List of data by France on road accidents;
- A presentation by Germany/BAM on testing results of tanks.

Presentation on analysis French data road accidents by AEGPL and discussion

The representative of AEGPL presents an analysis on reported road tank vehicles (and other tanks) accidents in France. France submitted a complete database of the accidents involving at least road tankers (period: 1998-2009). The United Kingdom submitted data according to 1.8.5 (2005-2009) and the Netherlands submitted a report with data, but these were not sufficient detailed according to 1.8.5 for a consistent analysis.

AEGPL analysed the database of France and presents an overview. The analysis shows that of 249 accidents with Class 2 there were 165 accidents concerning the transport of LPG. The AEGPL links the most frequent causes of accidents to human error and other vehicles. The cause 'unspecified' is too high for a good analysis. The cause technical default is not an issue to solve. The types of accident that occur the most are lane departure and overturn. The representative of AEGPL says that most accidents are caused by human error to be solved with more training and control. The majority of casualties are caused by the accident itself and not by gas leaks. The 14 gas leaks that occurred need to be further analysed, but it concerns leakages from the pipes not from the content of the tank itself.

The AEGPL also concludes that the existing regulation on transport of dangerous goods seems to be rather good from the technical point of view. The AEGPL suggests that improvement of the data and more data from other representative countries would add value for a right and complete analysis.

There is also a need for a common and representative unit of comparison. The AEGPL recommends concentrating for the short time on preventive measures such as a safety management system and the responsibilities of the safety adviser. For the medium term other measures like safety relieve valves and a lane departure alarm can improve safety. For the long term other measures still to be proven, such as thermal insulation and heat detection systems can be of use.

The representative of the Netherlands asks how many transported kilometres and tons of weight these data represent. The details of the analysis should be verified to agree on conclusions.

The representative of AEGPL answers that the total estimated figure for the transport of LPG in France is 9 million kilometre per year.

The representative of France adds to the analysis that half of the accidents had serious consequences. It is easy to estimate a frequency of accidents on an amount of 6.5 million trips per year in France. Some conclusions of AEGPL should be further analysed, as a part of the accidents (e.g. caused by other vehicles) cannot be avoided by a safety management system only. And a low probability of an event does not necessarily mean that there is no problem with that event. The next step is to discuss how to choose from the list of measures in document INF. 6 of September 2008. Do we want detailed discussions on causes or do we want to discuss causes in general.

The representative of the Netherlands suggests to get a general idea of causes of accidents and to look at measures on that basis that are easy to take or more difficult and costly.

The representative of Belgium says that minimizing accidents is different for rail and road and that a choice can be to minimize the risk of a BLEVE once an accident has happened. It is not realistic to choose different measures for rail and road.

The representative of the Netherlands says that there are already differences between ADR and RID.

The representative of France says that this working group cannot limit the choice to mitigating measures as suggested by the representative of Belgium because that decision is for the Joint Meeting. Our work is to advice the Joint Meeting on measures.

Discussion on general safety and safety of dangerous goods

The representative of ERA says that preventive measures concerning the general safety of EU railways must be decided at EU level by relevant committees. The adoption of railway measures is regulated in the Railway Safety Directive.

The Chairman reminds the mandate of the working group and the progress in the discussion till now. An advice from the working group to the Joint Meeting can also need a decision by other organisations. This working group will look at all measures listed in the report INF. 6 of the working group of June 2008. The list includes measures for all modes and measures specific for rail or road. The issue of the working group is now to make a sound proposal to the Joint Meeting with a ranking which measures would work the best to prevent a BLEVE. The possible choice may be a group of measures that work in combination with other measures. The Joint Meeting and other relevant committees will decide on measures to be taken. The working group gives a technical advice on ranking the measures. But it is very complicated to make a complete bow tie with all possible causes of accidents. And even if a measure is good for preventing a BLEVE, it may not be good for other causes. The available data of accidents should be improved in order to draw conclusions. Everything this working group proposes must be clear, but the choice of the Joint Meeting is a political matter. France will prepare an INF Paper for the next Joint Meeting explaining the need for having a reliable and standardized database system in order to be able to take as much as possible lessons from the accidents that happen during the transport of dangerous goods.

The representative of ERA only wants to point out that some work is already done in parallel. The ERA is coordinating a detailed study on derailments and has already identified about 30 preventive and 20 mitigative existing and potentially new measures. These measures are scientifically assessed in detail by the ERA and it is not efficient to duplicate this work in this working group.

The representative of Germany says that ERA looks at safety in general and not specific at safety of dangerous goods. If ERA deals with the derailment cause, the results are interesting for this working group.

The representative of France says this working group can use the results of ERA to advice on measures to prevent derailments and will not further investigate that cause itself.

The representative of the Netherlands says that the risk analysis is a technical matter but the choice for a measure is a political one. Serious accidents with dangerous goods as happened in Italy and recently in Poland urge for a solution, because the public does not accept this kind of accidents in a populated area.

The representative of ERA says that the level of risk acceptance is decided by the member states and not by ERA. The ERA gives technical assistance to meet the targets defined in EU legislation for the member states, including advice on cost effectiveness of possible measures. Zero risk does not exist.

The representative of France says there is not a European level of risk acceptance. Member states can take a routing decision based on criteria for risk acceptance. France had another serious accident last week when a tank vehicle with propane collided and took fire. Fortunately no BLEVE occurred and there was no public near the accident. But when a BLEVE does happen it will not be enough to say that measures to prevent a BLEVE are too expensive.

The representative of Germany says that ERA has a different look at safety than the working group. The working group has never accepted a level of safety and reacts on accidents to improve safety. The majority of the working group has the idea that a BLEVE may be a serious problem and looks for measures. Let's talk about a higher level of safety for the transport of LPG. We have no harmonized database to get a better view on accidents, we should improve that.

The representative of France says that the acceptance of risk is not a matter for this working group. But contracting parties are bound to accept the level of safety according to ADR/RID. The EU accepted this level of safety as well. This working group initiated to look at statistics to prevent accidents and not merely at measures in reaction to a serious accident.

The representative of the Netherlands wants to rank measures in a practical way on criteria of costs and benefits to make a recommendation. A difficult discussion on a safety level does not help.

The representative of ERA says there is no objection to improve safety in a practical manor if that is efficient. He reminded that the EU adopted safety levels to be achieved – at least – by each EU member state (Commission Decision 2010/409/EU of 19 July 2010) and adopted also the principles and requirements for safety improvement and development above these levels in the Railway Safety Directive (2004/49/EC as amended).

The representative of Germany says that EU regulations on this are still under work. And some countries already have a fixed safety level by law.

The representative of Belgium adds that the same level of safety in the EU should be the aim.

The representative of France says that the dangerous goods regulations are far ahead and that RID is one of the interoperable conditions for rail. If RID adds requirements, there must be no interference with the normal requirements of general safety.

The representative of ERA says that the future objective should be to reach a common (minimum) safety level, improving the safety levels currently achieved by the less advanced member states. The representative of Germany asks how this common safety is defined and if it is possible to define a different safety level for dangerous goods in order to prevent severe consequences.

The representative of ERA says that all transport contributes to the safety level and that common safety targets are not defined for specific goods. In addition to the fulfilment of defined safety levels and the RSD requirements, interoperability and cost effectiveness are the additional criteria to be fulfilled for any new or amended potential measures.

The representative of France says that RID is part of interoperability; that leaves cost effectiveness as criteria. The ERA choice for general safety may not be enough for dangerous goods.

The representative of ERA says that ERA does not define tank measures; this is a matter for RID. Following a question concerning derailment detection ERA reminded that the derailment detector was conflicting with the TSI and was not assessed as an efficient measure. The aim for ERA is to find the most efficient measure to prevent or mitigate derailments.

The representative of France says RID is a part of TSI, a tank not conforming to RID is not interoperable. The issue is only technical.

The representative of Germany says that this working group can advise the Joint Meeting on the most cost effective measures to prevent a BLEVE. Measures only concerning the tank regulated in RID are not sufficient.

The representative of the Netherlands says that we can cooperate with ERA on measures. The safety of the tanks and the general rail safety are both important. We have to take our responsibility both in RID and in railway regulations.

Presentation on analysis rail accidents by UIC

The representative of UIC presents a pragmatic analysis on reported rail accidents according to 1.8.5 of RID in France, Germany, Spain and Norway. The data represent 43 accidents with Class 2, among which 17 concern LPG. There has been no BLEVE. Most accidents concern a derailment or a collision. The main cause is a technical defect. The causes ‘unspecified’ and ‘other failure’ are also relatively high, therefore the reporting should be improved for better analysis. The time frames of the countries are different and data are not complete. The transport concerns 100 million of wagons x kilometres or 5.10^9 tons x kilometres.

The representative of Poland says they have a table with 46 accidents with Class 2 during the period 2005-2010, but these are not only 1.8.5 and not included in the analysis of UIC. Poland will send the data on 1.8.5 to UIC to add to the analysis.

The representative of Belgium says we have to work with the data we have, but that the data are not equivalent. We need guiding lines for harmonized data. What data do we need to draw conclusions?

The representative of Germany agrees that we have no harmonized data of accidents and no statistics for amounts of transported goods. We can conclude that reporting only on 1.8.5 is not enough.

The representative of Norway says that 1.8.5 accidents should be reported to OTIF. In Norway there is a database with all accidents since 1990. He picked out what he thought is relevant of these data.

The representative of France reminds that in the bow tie approach we lacked accident data to make a choice of measures. We have seen that the available database does not have enough information, but yet this is the best available data.

The representative of the Netherlands refers to the data available at ERA, where serious accidents on rail are notified.

The representative of ERA reminds that ERA sent a presentation with statistics on freight train accidents and accidents concerning dangerous goods at a previous meeting.

The representative of France concludes that this working group tried to look at the existing data and is not able to advice on measures on this basis. We should recommend to the Joint Meeting to improve the reporting of accident data. It will probably take time to improve that.

The representative of Germany says the first step is to use existing data. OTIF and UNECE are not interested in work on data. It is very difficult to conclude on causes using the existing data.

The representative of Norway asks what we can do the next year to make an advice on measures.

The representative of the Netherlands suggests filling in the bow tie model with percentages of causes in order to rank the measures. The percentages can possibly be drawn from the existing data. Too much detailed information does not always help the discussion.

The representatives of Germany and France suggest to proceed on the basis of existing data and to do more analysing.

The representative of ERA thinks that the data shared in this meeting is relevant but not sufficient to establish measures.

The representative of UIC says that it is not always easy to get information, not everyone shares data. UIC counted the derailments, but did not study them in detail.

The representative of France asks what we intend to do furthermore. The French database is available for everyone to make own analysis and present it to the working group.

Experts can explain to the working group how they come to conclusions on the basis of the available data.

The representative of Norway doesn't see a need for more complete accident reports.

The representative of UIC presents another analysis on 1082 reported accidents in France (Class 2) in the period 1998-2009, of which 18 were events according to 1.8.5. It shows that 10% of the reported accidents are false alarms. The event is sometimes just the opening of a PRV for control and not an accident. These events stop the traffic for a check and are reported. Technical failure, excessive overpressure, overfills and derailments are the main causes of accidents. The analysis shows 20 spills and 2 fires as consequences of these accidents.

This table with French data shows additional information. Traffic is different in countries.

The representative of ERA promises a complete impact assessment of all freight train derailments.

The representative of France is not sure that the working group can advice on the basis of accidents with dangerous goods that are relatively few.

Accidents in Poland and France

The representative of Poland shows a video of an accident on rail with wagons filled with gas oil (UN 1202) and other petroleum products (UN 1268). It happened on 8 November 2010 in the morning. There were wagons with LPG near the accident but not involved in it. A Class 3 wagon took fire and exploded. Leaking oil initiated the fire. It was an aluminium tank that exploded. It was an area without buildings. No casualties.

The representative of France says this represents a typical accident for this working group, it starts with a traffic problem, resulting in a collision and a fire and a BLEVE of the tank. The question is whether a measure from our list would have prevented the BLEVE. Or would a steel tank have prevented it.

The representative of Germany says he asked Italy for more information on the accident at Viareggio, but did not get it.

The representative of ERA says these accidents have been notified and the ERA expects a report.

The representative of France says these accidents are not only railway accidents but also dangerous goods accidents. Local authorities can take measures to avoid dangerous goods. The French Parliament proposed to prohibit all transport of dangerous goods in Paris and its region. The political worry on dangerous goods is related to some BLEVE's in France and some near BLEVE's. Even last Friday there was an accident near Nice with a tank filled with propane on a mountain highway. Another truck drove full speed in the propane tank; the internal stop-valve broke down, escaping gas led to an external fire. The propane tank behaved well, there was no BLEVE. But the public is concerned. The question is which measure is enough for a worried politician to allow dangerous goods on road and rail.

Presentation of Germany/BAM on the results of tests

The representative of Germany/BAM presents the work on tests since the previous meeting in Berlin. Some research is done on information about coatings and PRV's. Criteria for fire tests for coatings are established. According to existing design and construction experience coatings could have a lifetime of more than 10 years and normally no maintenance. The costs, time of application and additional weight are negative effects of a coating, but fire protection and corrosion resistance are positive effects. Several technical questions about coatings are identified. The tank to be tested is defined and the fire scenario. The BAM did seven tests on tanks with PRV's and one tank without a PRV since 1982 and shows the conditions of the test in a scheme. The tests show that with consideration of the chosen parameters (filling degree, type valve, etc.) a PRV alone is not sufficient to prevent a BLEVE of a tank in a fire for more than 15 minutes.

The representative of AEGPL says that the main issue is the extra weight of a coating, because more weight will result in more transport of dangerous goods.

The representative of the Netherlands says there is a development towards coating materials with less weight.

The representative of France says that more transport is not necessary more dangerous when a coated tank is safer. The testing is to verify the working of PRV's and coatings to prevent a BLEVE. The discussion should be on what further tests are necessary and whether we can share the costs of testing.

The representative of Germany says that Germany has a budget of about €100,000 for testing, but there is still a need for another €150,000 to €250,000 to do tests on coatings. Different kind of coatings can be tested for the time to delay a BLEVE. The testing will take 12 of 18 months.

The representative of the Netherlands reminds that TNO already did testing on coatings. All theoretical knowledge and experience with tests should be combined to draw conclusions.

The representative of AEGPL offers to see if their members have old tanks available for testing and if a contribution of fuel for the testing fire is possible.

Conclusions

- France will prepare an INF. paper for the next Joint Meeting in order to explain and justify the need for having a standardised database allowing a reliable analysis of the accidents that happen during the transport of dangerous goods.
- Test programmes and financial resources: terms of references for additional testing of tanks with PRV's and thermal coating have to be established by the working group before starting with the tests programme.
- The existing French database (road & rail) should be used as reference in order to improve the accident reporting and analysis.

Next steps

- ERA will present the intermediate results of the assessment on derailments in the next meeting.
- Poland will send rail accident data to UIC in January 2011.
- UIC will send the complete accident database on rail to members of the working group by the end of January 2011 for further analysing. The French database on road accidents is already available.
- Members may present analysis of the accidents data to the working group for discussion on how to proceed. The analysis has to be verifiable.
- Members are invited to participate in the testing program by Germany/BAM and to contribute in knowledge and in financing the testing of tanks and coatings. A draft testing program will be send to the members with the question which members are willing to participate.
- BAM will send the report of the test in Berlin on 20 April to the other participants of the working group.

Next meeting

Norway invites the working group for the next meeting from 8 to 10 June 2011 in Oslo. France is willing to chair the meeting. The Netherlands offers to make the report.