



## THE INFLUENCE OF THE EUROPEAN UNION MEMBER STATES ON DEVELOPING THE HAULAGE OF HAZARDOUS CARGO IN LITHUANIA

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**Abstract.** Technological development inevitably increases the number of hazardous cargo in the European Union. The essential problem of the haulage of hazardous consignment deals with insufficient safety. The topic seems to be relevant due to importance to ensure the safety of carrying hazardous cargo, since while transporting such materials, a certain possibility of a negative impact on nature, people's health and safety occurs. This article assesses the current situation of the haulage of hazardous cargo in Lithuania and investigates activities of developing the possibilities of the haulage of hazardous cargo in the countries of the European Union (EU). The conducted research on transport organizations in the EU countries helped with evaluating safety remedies and with ensuring the safe haulage of hazardous cargo used by particular organizations as well as suggested the kinds of transport used for transporting hazardous cargo. The study also indicated the most frequently crossed countries and the kinds of information technologies an organization applies in practice so that to guarantee the safety of the haulage of hazardous cargo.

**Keywords:** haulage of hazardous cargo, transport, research, accidents, requirements for haulage

### 1. Introduction

Hazardous cargo contains hazardous materials that seriously endanger human lives and/or the environment (eSafety – Improving... 2005). The transportation of hazardous cargo is one of the most complicated fields of transport and the one that requires effective safety measures. The transportation of hazardous cargo by road creates risk for the people present on and along the routes (Cassini 1998). Risk occurs when improper transport is used to haulage hazardous materials. When operators and drivers are lacking qualifications, cargo is not transported in the optimal route and dangerous road sectors and densely-populated territories are not avoided. The related works that deal with the evaluation of the risk of transporting hazardous cargo is presented by Batarlienė (2007, 2008a, 2008b), Batarlienė and Baulblys (2007), Button *et al.* (2000), Kuncytė *et al.* (2003), Fabiano *et al.* (2005), Gheorghe *et al.* (2005), Ohtani and Kobayashi (2005), Ghazinoory and Kheirkhah (2008), Planas *et al.* (2008), Zografos and Androutsopoulos (2008), Samuel *et al.* (2009), Verma and Verter (2010), Yang *et al.* (2010), Milazzo *et al.* (2010), Androutsopoulos and Zografos (2010), etc.

In everyday life, from the viewpoint of road safety, a vehicle that carries hazardous cargo is treated in the same way as every other means of transport (European Road Safety... 2006; UN Recommendations on the Transport... 2001; OECD Studies in Risk... 2006). Jarašūnienė and Jakubauskas (2007) note that our aim must be noticeably develop and improve the safety, security and effectiveness of transportation systems. Kinderytė-Poškienė and Sokolovskij (2008) emphasize that achievement in safety on roads is one of the most important problems in road transportation.

Millions of money are spent for the modernization of the transport system each year and this helps in upgrading its technical level to the parameters of the leading European countries. Batarlienė (2007, 2008a) emphasizes that only modern transport may reliably perform cargo and particularly hazardous cargo transportation, thus ensuring efficiency and the total safety of the economic process. Wang (2007) analyses special demands for transportation systems in different periods and their intrinsic causations.

Ghazinoory and Kheirkhah (2008) agree that hazardous materials are continuously moved between all countries. These movements are naturally dangerous as

the release of hazardous substances as a result of an accident can lead to deaths and irreparable damages to the environment.

Batarlienė (2008b) suggests that everybody who deals with hazardous cargo has to solve two additional problems: to select an appropriate kind of transport and to reduce the risk of an emergency/accident and possible damage to people and the environment during haulage.

## 2. Evaluation of the Current Situation Considering the Haulage of Hazardous Cargo in Lithuania

Activity investigation into the transport organizations of the European Union countries was made in order to name the possibilities of development taking into account the answers provided by the organizations transporting hazardous consignments. The carried out research mainly focuses on the analysis of security questions in the context of the European Union.

The majority of all transported cargo in Lithuania is hazardous. They are transported not only for the purpose of inland trade but also include transit transfer.

Hazardous cargo carried out in Lithuania consists approximately of 60% of water, 25% of road, 55% of rail-road and 100% of the pipeline of the totally transported consignments for that particular transport mode. Fig. 1 shows the dynamics of transporting hazardous consignment in various transport modes, however, the carriage of hazardous consignment by air transport is not taken into the account because these types of loads make only 1% of the total carried freight.

Fig. 1 shows that the major parts of hazardous consignments were carried by rail transport due to the fact that tank-wagons can contain a large amount of oil and its products. Fig. 1 also displays that according to the data provided by the Statistical Department (Statistics Lithuania 2010), the most hazardous consignments in Lithuania are carried by rail transport.

Fig. 2 points to the numbers of carrying hazardous consignments by road and rail transport (thousand/tons). It can be noticed that when comparing these two transport modes, the major part of consignment is carried by rail transport. Comparing years 2004 and 2009, the amount of hazardous consignments carried by rail transport decreased by 22.5%. The amount of hazardous shipments carried by road transport in 2007 increased if comparing to the situation in 2005, while in 2009 it decreased by 30% comparing with 2004.

Fig. 3 represents a change in the transit of hazardous consignments by rail and road transport. These numbers are confirmed by the Statistical Department (Statistics Lithuania 2010). Comparing the data obtained in 2005 and 2009, a decrease in transited hazardous consignments by rail transport was about 67% while by road transport it made 15.5%.

Table 1 represents statistical numbers of hazardous consignment types carried by rail transport (Statistics Lithuania 2010). Dry (powdery) consignments, hazardous liquid materials, gas and consignments requiring additional care and control are carried by rail transport. The main consignments are fuel, manure and oils.

Table 1 suggests that flammable liquids were the mainly transported hazardous material in 2005–2009. In 2005, flammable liquids made 80%, in 2007 – 74.55% and in 2009 – 75.48% of all hazardous consignment carried by rail transport.

While analyzing the carriage of hazardous consignment using road transport (Table 2), it can be seen that, similarly to rail transport, flammable liquids occupy the major part. In 2005, this type of hazardous consignment consisted of 64.08% while in 2007 it made 75.14% and in 2009 – 72.26% of all transported hazardous consignment using road transport (Statistics Lithuania 2010).

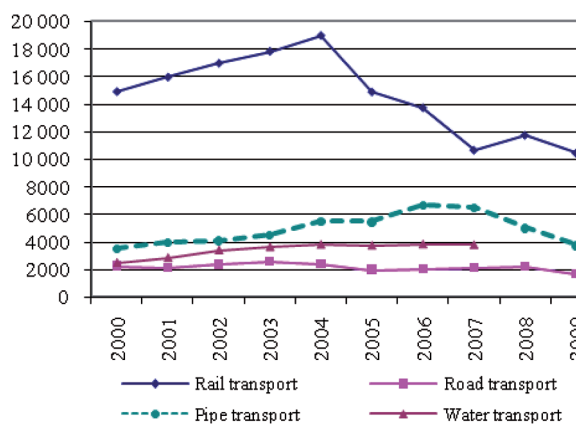


Fig. 1. The dynamics of transporting hazardous consignment using various transport modes

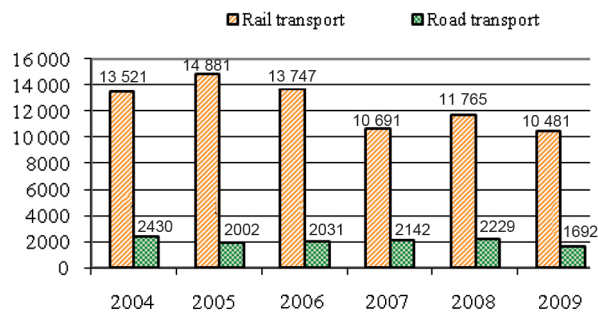


Fig. 2. The transportation of hazardous cargo by road and rail transport (thousand/tons)

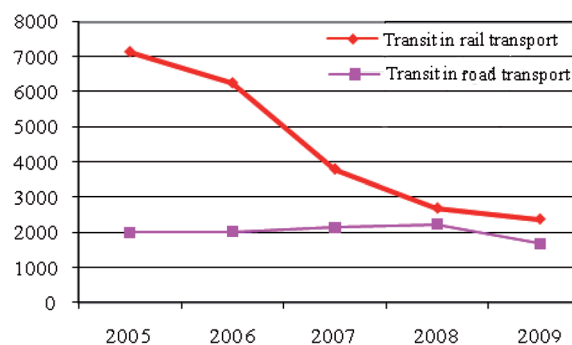


Fig. 3. The dynamics of transporting hazardous consignment by railway and road transport

**Table 1.** The distribution of hazardous consignment in rail transport 2005–2009 (thousand/tons)

	2005	2006	2007	2008	2009
Total of hazardous cargo by railway transport thousand/tons	14 880.8	13 746.5	10 690.7	11 764.9	10 480.7
Explosive materials and products	32.8	34.6	46.4	47.1	18.5
Gas	709.4	625.3	515.4	534.2	670.0
Flammable liquids	11 921.8	11 066.4	7 970.2	9 064.8	7 910.7
Flammable solid materials, self-acting materials and solid desensitize materials	433.7	399.6	392.1	398.2	397.8
Self-lighting materials	318.7	288.3	238.0	244.4	155.1
Materials in contact with water releasing flammable gas	89.9	145.1	106.8	62.6	0.5
Oxidizing materials	1246.5	1094.4	1326.3	1310.5	1221.0
Organic peroxides	0.0	–	0.0	–	–
Toxic materials	6.6	1.9	2.3	3.9	5.0
Contagious substances	0.0	–	0.0	–	–
Radioactive materials	0.0	–	0.0	–	–
Corrosive materials	121.4	90.1	93.0	98.3	100.8
Various hazardous materials	0.1	0.9	0.3	0.4	1.6

– category not applicable, data not available or data is not presented

**Table 2.** The distribution of hazardous consignment in road transport 2005–2009 (thousand/tons)

	2005	2006	2007	2008	2009
Total of hazardous cargo by road transport, thousand/tons	2002.4	2030.7	2141.5	2229.3	1692.1
Explosive materials and products	7.0	0.2	1.6	1.3	0.8
Gas	337.6	448.3	337.1	308.9	353.4
Flammable liquids	1283.2	1372.5	1609.2	1793.6	1222.7
Flammable solid materials, self-acting materials and solid desensitize materials	46.0	43.6	–	–	–
Self-lighting materials	2.9	0.0	–	–	–
Materials in contact with water releasing flammable gas	0.0	–	–	–	–
Oxidizing materials	3.0	19.6	–	–	–
Organic peroxides	0.4	0.4	–	–	–
Toxic materials	3.1	–	–	–	–
Contagious substances	0.0	–	–	–	–
Radioactive materials	0.0	–	–	–	–
Corrosive materials	29.7	14.4	16.2	30.3	43.3
Various hazardous materials	289.5	131.7	177.4	95.1	72.0

– category not applicable, data not available or data is not presented

### 3. Research on Developing the Possibilities of the Haulage of Hazardous Cargo in the EU Countries

Research on developing the possibilities of the haulage of hazardous cargo was undertaken in the EU countries.

The purpose of the conducted research was to find out what kind of safety measures were taken by an appropriate company of transport in order to provide a safe haulage of hazardous cargo?; what types of transporting means are mostly used for hauling hazardous cargo?; what are the territories of the countries mostly used for

transporting hazardous cargo using a particular transporter; what means of an information system are used by a company in order to haul expeditiously and safe that kind of cargo to a receiver? etc.

Research was made using the method of surveying. Anonymous questionnaires were sent out to transport companies that carry hazardous cargo by emails and are established in the countries of the European Union.

The purpose of the questionnaire is an evaluation of the grade of attention paid to the haulage of hazard-

ous cargo by a transporting company: the questionnaire analyzes the means used for achieving that aim and the reasons for the accidents that happened at the time of hauling hazardous cargo.

There was an attempt to find out the activities of a transport company addressing the former questions of the questionnaire determining if the main activity of a company was the haulage of hazardous cargo and if the haulage of such kind of cargos was the only one service of all services provided by the company. When using the above introduced questions, the kind of hazardous cargo mostly hauled by an appropriate company and the kind of transport means used to execute such type of haulage have been determined.

All in all, 533 questionnaires were sent out to transport companies carrying a similar type of cargos. 157 respondents sent the answers for the given questions (Fig. 4). Fig. 4 displays the number of transport companies involved in research. The figure discloses that the questionnaires were received mostly from the transport companies located in the United Kingdom.

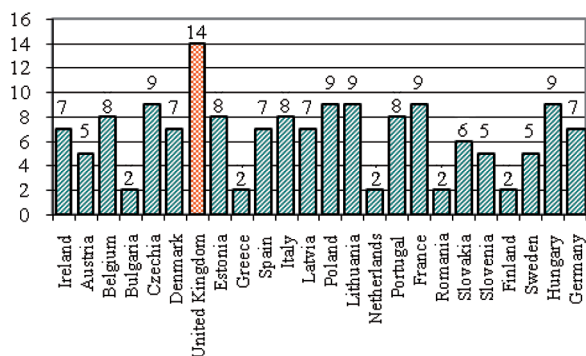


Fig. 4. The number of transport companies that agreed to participate in research

The total number of transport companies participating in the survey and carrying hazardous cargos is distributed with reference to the number of people who work in a transport company under the determined categories. Fig. 5 shows that the major part of the investigated transport companies are medium size companies (regarding the dimension of the conducted research). The number of workers (31÷50) in a company was chosen by 42% of the respondents. The number of employees in the biggest transport companies exceeded-

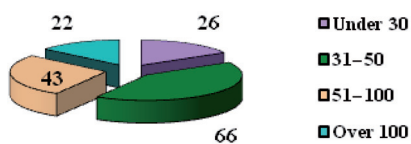


Fig. 5. The distribution of the number of transport companies in accordance to the number of people working in that company

ing 100 employees participated in research and composed 14%. In consequence, the major part of the investigated companies was medium size companies.

All analyzed companies announced in their internet websites as ones dealing with the haulage of hazardous cargo; therefore, the survey was aimed at establishing the part of the haulage of hazardous cargo they had composed.

Therefore, an important point was to evaluate what portion of cargo carried by transport companies exactly composed hazardous freight. Detailed information is represented in Fig. 6 showing the quantity of the investigated transport companies that carry a certain amount of hazardous cargos in comparison with the total amount of cargo. The haulage of transporting cargo composes 6÷10% of the whole amount of cargo haulage which is a bigger part of the respondents (56%). The minimum of the respondents (12%) signed a portion of 11÷30 while 32% of those answered that hazardous cargo carried by them composed less than 5% of the total amount of hauling cargo. The majority of transporters carry different types of cargos, thus, it was complicated for researchers to find the respondents dealing only with the haulage of hazardous cargo. Therefore, when summing up the obtained results, an assumption that the haulage of hazardous cargo is not the main activity of the investigated companies might be accepted.

In order to evaluate the transport class of hazardous cargo by investigating transport companies, the collected information was put into the tables evaluating the class of hazardous cargo carried by a particular company in one or another country. Then, the total number of the transport companies of that country hauling a particular class of hazardous cargo at most was evaluated introducing percentage rate (Fig. 7).

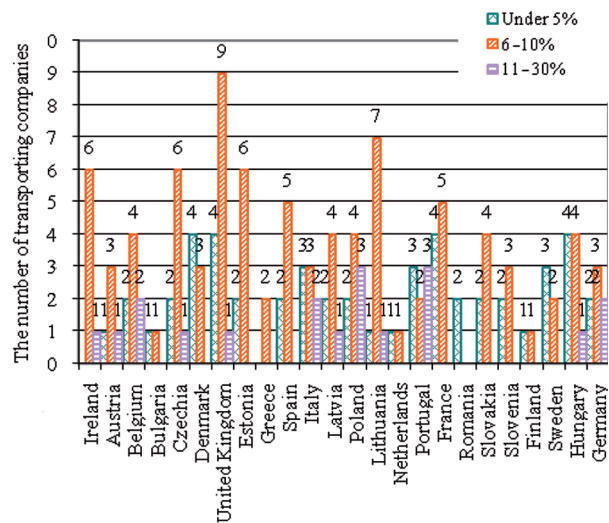


Fig. 6. The distribution of the amount of transport companies in accordance with the portion of hauled hazardous cargo in regard of their total activity

In this case, an assumption that the third class hazardous cargo (flaming liquids) composes the biggest part of hauled hazardous cargo can be made. The investigated associations of appropriate countries (Ireland, Bulgaria, Czech, Denmark, United Kingdom, Italy, and Slovakia) belong to this group.

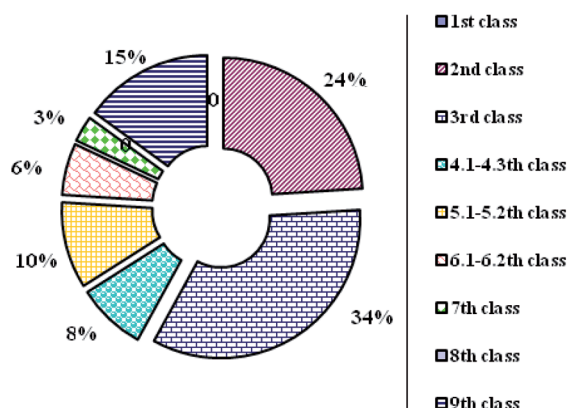


Fig. 7. The distribution of transport companies in accordance with the classification of hauled hazardous cargo considering percentage rate

The questionnaire was aimed at determining the kind of transport the investigated respondents mostly used for hauling hazardous cargos. The major part of the respondents carries hazardous cargos by multimodal transport – they use several types of transport for carrying cargo.

The performed research was aimed at determining what investigated companies in which EU countries mostly hauled hazardous cargo (Table 3). The total results are presented in the following table: the investigated transport companies filled in the questionnaire pointing to the countries they hauled hazardous cargos into/from. The table shows that some transport companies indicated countries – not the member states of the EU because of not going into the question or not understanding the given question due to a language barrier. Therefore, an assumption that the majority of the investigated companies hauled hazardous cargos at a small distance and that the majority of respondents named the neighbourhood states might be made.

The purpose of this research was to find out the main subjects requiring the closest attention (Fig. 8) in the current transport organizations and to ensure a safe haulage of hazardous cargo. Fig. 8 demonstrates that ac-

Table 3. The haulage of hazardous cargo into and from the EU countries

	To EU countries into and from which hazardous cargos are being hauled
Ireland	Austria, Belgium, Denmark, United Kingdom, Estonia, Latvia, Lithuania, Italy, Poland, France, Finland
Austria	Germany, Czech, Slovakia, Switzerland, Croatia, Hungary, Slovenia, France, Poland, Romania, Bulgaria
Belgium	Netherlands, Germany, Luxemburg, France, Germany, Italy, Poland, Bulgaria
Bulgaria	Romania, Greece, Hungary, Slovakia, Germany, France, Denmark, Netherlands
Czech Republic	Germany, Poland, Austria, Slovakia, Hungary, Belgium, France
Denmark	Sweden, Germany, Netherlands, Switzerland*, Norway*, Poland, Hungary
United Kingdom	France, Ireland, Belgium, Netherlands, Norway*, Denmark, Germany
Estonia	Lithuania, Latvia, Finland, Russia*, Poland, Germany, Slovakia
Greece	Albania*, Bulgaria, Hungary, Austria, Italy, Germany
Spain	France, Italy, Belgium, Luxemburg, Germany, Poland
Italy	France, Switzerland*, Austria, Slovenia, Hungary, Slovakia, Czech, Germany
Latvia	Lithuania, Estonia, Russia*, Belarus*, Poland, Germany, France
Poland	Germany, Czech, Slovakia, Austria, Belarus*, Russia*, Ukraine*, Hungary, Romania
Lithuania	Latvia, Estonia, Poland, Sweden, Norway*, Belarus*, Russia*, Germany, Slovakia, Spain
Netherlands	Belgium, Denmark, Germany, Luxemburg, France
Portugal	Spain, France, Belgium, Netherlands, Germany
France	Spain, Belgium, Germany, Luxemburg, Netherlands, Austria, Switzerland*, Italy
Romania	Hungary, Bulgaria, Ukraine*, Slovakia, Poland
Slovakia	Czech, Poland, Ukraine*, Hungary, Austria, Germany
Slovenia	Italy, Austria, Hungary, Croatia*, Slovakia, Czech
Finland	Sweden, Norway, Russia*, Estonia, Latvia, Lithuania, Poland
Sweden	Norway*, Finland, Estonia, Latvia, Lithuania, Poland
Hungary	Austria, Slovakia, Ukraine*, Romania, Hungary, Poland, Italy
Germany	Netherlands, Belgium, France, Poland, Czech, Austria, Hungary, France, Spain

\* – not member state of the EU

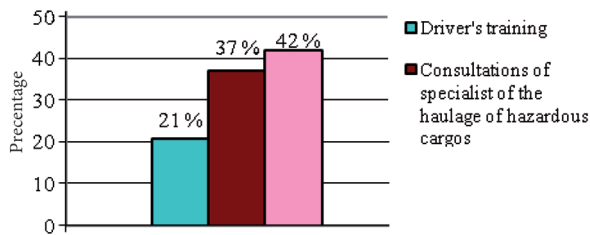


Fig. 8. The distribution of transport companies paying attention to one of the current subjects

cording to almost 1/5 of the researched companies, driver training requires scrupulous attention. Nevertheless, special attention is paid to marking and packing hazardous cargo. More attention should be devoted to raising the qualification of drivers directly participating in the haulage of hazardous cargo. A number of accidents appear in case of a lack of drivers' qualification.

The purpose of this research was to find out if there were any accidents during the haulage of hazardous cargo throughout the whole history of a company (Fig. 9). 18% (28 respondents) of all researched companies told that they had such accidents. Only two reasons were chosen: bad traffic conditions or a failure of a vehicle. No other reasons were mentioned. The figure discloses that the majority of respondents indicated bad traffic conditions.

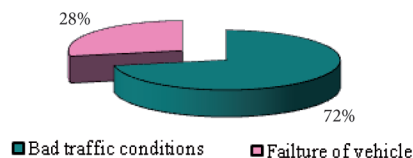


Fig. 9. Reasons for accidents

During the carried out research, the frequency of companies to organize trainings in order to raise the qualifications of drivers directly participating in the haulage of hazardous goods was established. The major part of the respondents (83%) maintained that such training took place once a year, the other part (12%) pointed to every half a year. A small part of the respondents (5%) agreed that such training was organized every two years. In conclusion, the current companies understand the importance of trainings to raise the qualification of drivers who directly participate in the haulage of hazardous cargo.

All respondents maintain that they use special programs designed for the haulage of cargo (tracing cargo, checking the condition of cargo, controlling haulage) to optimize routes.

#### 4. The Effect of the European Union Countries on Improving the Haulage of Hazardous Cargo in Lithuania

Considering that almost 1/5 of the respondents (18%) maintained that their companies had accidents during

the haulage of hazardous cargo, it is necessary to look at risk that can appear during an accident while improving the safety of hauling such kind of goods.

First, it is necessary to evaluate the main risk factors: a possible accident and possible damage. Losses and damage depend on a number of factors such as quantity, type and the contamination rate of a hazardous material.

The possibilities of an accident can be reduced considering the following opportunities:

- increasing the amount of cargo per trip as an increase in transport volume, decreasing the number of trips in determining a lower accident and accident rate;
- reducing the number of trips and the likelihood of an accident;
- to ensure a high quality of loading, reloading and handling hazardous cargo are efficient means reducing the amount of damage caused by an impact on the society and environment;
- it is necessary to choose the exact route (bypassing populated areas) with good driving conditions, thus reducing the likelihood of contingency;
- it is also necessary to take into account climatic conditions and a season, for example, during a particularly hot time of the day, refusing to haul gas and flammable liquids is advisable as immediate danger depends on the ability to ignite these materials at high temperatures;
- very important factors are the qualification, experience and training of drivers and those directly involved in the process of the haulage of hazardous cargo.

The EU countries use plenty of various security measures to reduce the risk of the haulage of hazardous cargo. One of the methods is the determination of routes in order to haul the most hazardous cargo on land. This method allows increasing the safety of transportation. Route control might temper a hazardous impact of cargo on the environment at the time of an accident, thus bypassing densely populated areas.

#### 5. Safety Measures for the Haulage of Hazardous Cargo and Improving Access

Conditions and precautions for the haulage of hazardous cargo are estimated separately for each class of hazardous cargo:

- the type of packaging and containers that must be submitted to the carriage of goods are particularly important;
- informative captions and labels on containers;
- instructions on shipping documents about the degree and type of hazard are very important;
- cargo packaging, layout, mounting on the vehicle mode;
- fire-fighting measures and else.

Precautions to be followed during the haulage of hazardous cargo by road are divided into:

- common to all dangerous goods (such as the presentation and acceptance of shipment; the

finalization of documentation, entry into the station store and exit after landing conditions, requirements for containers and packaging, the procedure of determining the load);

- for each dangerous cargo separately, depending on its properties and characteristics.

Only the shipper can provide the best characteristics of hazardous cargo and transport conditions. Therefore, the consignment note must precisely indicate the exact name while the upper part of the invoice must indicate the hazardousness of the material (for example, *Flammable Gas*).

The examination of rail cargo considering special features and conditions and the haulage of hazardous cargo are accepted under the list of regulations for hazardous cargo:

- the category (class) of hazardous cargo;
- label form in which the category of the danger of cargo is pointed out;
- inscriptions on hazard that must be specified in shipping documents;
- automobile connection to the train and shunting conditions.

By the way, requirements for the haulage (depending on the category) of explosive and toxic cargo are in the rules for transporting freight. Consignee measures and materials are used for the preparation and installation of wagons to carry hazardous cargo.

The general conditions for all cargo transported by railways are as follows:

- the presentation and adoption of shipment;
- the finalization of documentation;
- entry to the station store and exit after landing conditions;
- requirements for containers, packing and rolling stock;
- the procedure of determining the load and loading and unloading work;
- conditions and precautions set for each category of hazardous cargo and cargo separately for each of the following;
- the type of wrapping and packaging that must be submitted to the transport of the given load;
- records, a label on the container and instructions related to the degree of hazardousness;
- a type of rolling and a wagon for transport installation;
- load packaging, layout and mounting a carriage way;
- fire-fighting measures to ignite the wagon or store the given load;
- the possibility of carrying the load in one car with other types of dangerous or hazardous cargo;
- attachment to the wagon with a full train load of such goods and shunting station conditions.

Only the shipper may provide the most accurate information about the characteristics of hazardous cargo. Therefore, it must specify the objectives of the consignment note, the name and the upper part of the bill of lading to affix stamps on the seriousness of the colour, for

example, *Caution*. Such stamps are affixed on the road and railway transport documents. Each package of hazardous cargo has to be labelled on the top and contain information about the hazard.

The toughness and neatness of containers used to haul hazardous cargo by railways are the most important conditions to ensure the safety of such transportation. Therefore, packaging should be dense, tough, absolutely undamaged and should not have any wet parts. Depending on the type, form, volume and quality, a container has to complete all standard requirements or technical conditions created by the owner of the good. All types of packaged hazardous cargo are transported in covered wagons.

It does not matter if you haul hazardous cargo inside the country (locally) or internationally (to foreign countries), as it is necessary to choose the safest routes. To cut off the number of accidents related to transporting dangerous goods and to lower the possible damage to people and environment, in some routes, the haulage of hazardous cargo is limited.

It is necessary to determine and adjust a route in the haulage of hazardous cargo responsibility for which is taken by the shipper and the agents of a receiver.

While planning the safest routes, first of all, it is necessary to determine the roads that are the shortest and the most comfortable ones to haul that kind of cargo, in case that the road has any special obstructions that may cause an accident.

In order to avoid traffic jams and other disturbances, hazardous cargo should not be transported in peak hours. Also, it is very important that a route should have alternative paths, not only cross the centre of the city. However, it is important that those roads had the surface of a good condition and communication equipment.

It is important to organize traffic on the route: to set speed limits and rules for stopping, to check fastenings of the good and the impermeableness and toughness of a container.

## 6. The Influence of the EU Member States on Developing the Haulage of Hazardous Cargo in Lithuania

The EU countries are using a number of different safety measures to lower the risk of the haulage of hazardous cargo. The evaluation of risk factor depends on statistical information about accidents, expenses and profit analysis used in the EU countries. There are two types of risk: objective and subjective, i.e. the reasons to appear for an event depending on human or vice versa.

One of the methods is route control. It might reduce outcomes or an accident when hazardous cargo undergo to the environment because it can make big amounts of hazardous cargo evading highly populated areas.

When examining risk, it is necessary to take into account a number of measures, including:

- experience of a driver, work environment and relationship – the longer experience the driver has, the easier becomes to avoid extreme situations

during haulage; in case such situation appears, it is easier to control it;

- the age of a driver because his/her reaction directly depends on it;
  - safety directly depends on the reliability and condition of a vehicle;
  - shipment specifications (packaging, tightening);
  - marking (cargo and vehicle);
  - the type of cargo (flammable, poisonous);
  - traffic conditions;
  - determined route and else.
- We might name such main factors that ensure the safety of haulage. First of all, special attention should be devoted to these requirements:
- the identification and classification of materials, mixtures and waste;
  - containers and packaging;
  - vehicles;
  - treatment with cargo (loading and unloading);
  - limiting special hazardous cargo;
  - supervising vehicles;
  - the problem of determining routes.

Another factor is competency and teaching personnel: specialists on safety, drivers and other people related to the haulage of hazardous cargo.

## 7. Conclusions

1. After the examination of the current situation on the haulage of hazardous cargo in Lithuania, we may conclude that:
  - it is impossible to control work of all organizations participating in the haulage of hazardous cargo;
  - there is no solid control of the haulage of hazardous cargo;
  - there are no existing conditions that would allow providing necessary information on the haulage of hazardous cargo.
2. Examining the experience of the EU countries might name the following main reasons that caused accidents during the haulage of hazardous cargo:
  - outrages on requirements for the haulage of hazardous cargo;
  - weak preventive and educative work;
  - there is no suitable mechanism of control.
3. The examination of transport organizations in the EU countries helped with evaluating safety remedies, ensuring a safe haulage of hazardous cargo used in particular organizations, establishing the kinds of transport used for transporting hazardous cargo, identifying most frequently crossed countries and using information technologies to guarantee safety in the haulage of hazardous cargo.
4. The main requirements for ensuring safe transportation of hazardous cargo are as follows:
  - the type of package and container;
  - route determination;
  - informative inscriptions, labels on containers;
  - prescriptions in documents about the rate and type of hazardous cargo;

- the way of packaging, tightening and locating on the vehicle;
- fire-fighting and other equipment to be used in case of an accident.

5. It is important to evaluate risk that can be caused in case an accident appears so that to improve the safety of the haulage of hazardous cargo.
6. To reduce the number of accidents, it is necessary to create a logical high level system for examining accidents using the results of examination. The system would give us more information about the reasons and causes of the accidents. Special institution would work using all data about the accidents from all EU countries. This data base would become the most important source of information about the accidents throughout Europe.

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