

SCIENTIFIC AND DIDACTIC EQUIPMENT

Hazards in the workplace of a dangerous goods transport vehicle driver

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Keywords: transport, hazardous goods, hazards, driver

ABSTRACT:

The article analyses drivers' working conditions and the hazards involved. Hazards were assigned significance based on their likelihood and potential consequences. The test results were expanded to include the proposed preventive measures.

Zagrożenia występujące na stanowisku pracy kierowcy pojazdu przewożącego materiały niebezpieczne

Słowa kluczowe: transport, materiały niebezpieczne, zagrożenia, kierowca

STRESZCZENIE:

W artykule przeanalizowano warunki pracy kierowcy oraz występujące zagrożenia. Zagrożeniom nadano wagi dotyczące prawdopodobieństwa ich wystąpienia oraz potencjalnych skutków.

1. INTRODUCTION

Even during a period of forced slowdown, the economy generates significant transport needs related to moving different types of substances referred to as dangerous goods. Dangerous goods can be transported using various modes of transport: rail, air, road or sea [1]. However, completion of transport requires compliance with relevant provisions regulating loading, packaging, transport or conduct in hazardous situations. Such provisions are, depending on the type of transport, as follows: ADR for road transport, RID for rail transport, ICAO for air transport or IMDG for sea transport.

According to publicly available statistics maritime transport has the greatest share in the transport of hazardous goods. However, road transport of hazardous goods is associated with the largest number of individual transport vehicles and, like other modes of transport, exhibits an ongoing growing trend [1].

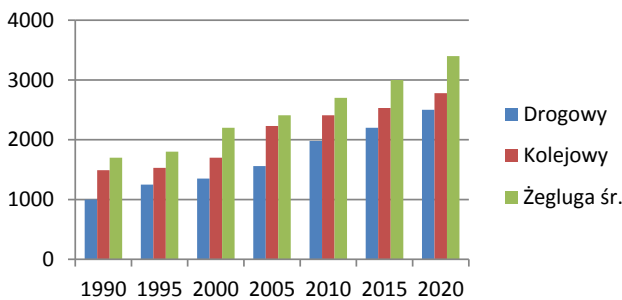
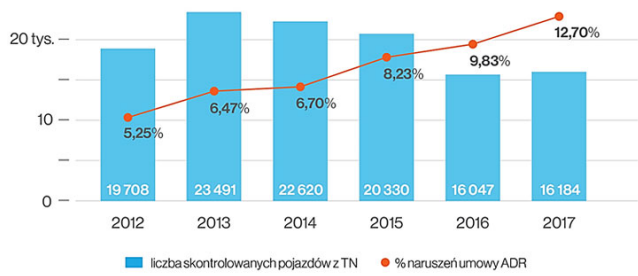


Figure 1 Transport of dangerous goods [billion tkm] using various modes of transport in the 1990–2020 period in the European Union

Along with the increasing number of hazardous goods transports on public roads, an increasing number of irregularities in the transport process is observed. According to data published by the Supreme Audit Office (pl. NIK), this trend persists despite the number of inspections decreasing [2].

Kontrole drogowe pojazdów przewożących TN z ujawnionymi naruszeniami umowy ADR



Źródło: Opracowanie własne NIK na podstawie informacji GITD

Figure 2 Roadside inspections of vehicles carrying hazardous goods with discovered ADR violations

The issue of the safety of hazardous goods transport is undoubtedly related to compliance with the requirements stipulated in the relevant sections of the ADR treaty. They cover methods of loading/unloading, transport, packing the load, equipment, vehicle marking and other aspects [3]. These issues are significant due to the potentially greater risks associated with the transport of hazardous goods when compared to the transport of goods other than hazardous.

As the means of transport used for shipping hazardous goods, the vehicle itself engenders a number of potential hazards; it should also be noted that the driver himself is exposed to hazards of various types. These can be generally divided into hazards typical for drivers working in road freight transport and hazards occurring exclusively in case of transport of hazardous goods.

The article analyses the hazards present in the workplace of a driver of a hazardous goods transport vehicle.

2. RESEARCH

The research was conducted in a transport company located in Poland. The company has a fleet of 320 vehicles (tractors and trailers) and over 500 employees. The entire vehicle fleet is monitored by an appropriate GPS-based positioning system.

The research started with several dozen interviews with drivers engaged in the transport of hazardous goods in Poland. They mostly drove FL vehicles (ones used to transport, for example, liquids with a flash point not exceeding 60°C [3]).

The interview aimed to supplement information regarding the workplace hazards of a lorry driver transporting hazardous goods [4]. It was conducted with the goal of indicating hazard groups present at the workplace of a lorry driver specified [5]:

- factors that could cause accidents (e.g. vehicle repair, malfunctioning vehicle, speeding, the driver slipping, stumbling or falling, sharp or falling objects in the surroundings);

- physical factors (e.g. vibrations during driving, unfavourable weather conditions, insufficient road illumination, noise);

- chemical agents [e.g. fuel, vehicle fluids, exhaust fumes and other poisonous substances, dust and dirt, transported chemicals (if dangerous goods are transported)];

- ergonomic, psychosocial and work organisation factors (e.g. improper diet and bad eating habits, manual lifting and carrying of excessively heavy objects, excess physical effort, long driving time, work at night, exceeding working time, breaks too short or complete lack thereof, improper and forced body position, stress related to, for example, time pressure, excess duties imposed on the driver, drowsiness);

- biological factors (e.g. pathogens that may be present in the carried cargo).

A list of the hazards most frequently mentioned by drivers and hazards selected by the study's authors is presented in Table 1.

The results were further processed in accordance with the recommendations of the RISC SCORE occupational risk assessment method [6]. Selected hazards were assigned rates and weights upon the assumption that the conditions for implementing the transport stages resulting from the relevant regulations are met [3].

- for effects "S" from 0 to 100,
- for exposure "E" from 0.5 to 10,
- for probability "P" from 0.1 to 10.

Finally, as per the RISC SCORE method of occupational risk assessment [6], the product of the adopted rates, which served as the basis for the classification of a given hazard (risk value), was calculated. The results were presented in Table 2. Based on data presented in Table 2, high-risk hazards can be noted, e.g. a traffic accident, explosion hazard or falling asleep when driving.

Table 1 Hazards at the workplace of a driver of a hazardous goods transport vehicle selected on the basis of literature and information collected during research

Lp.	Zagrożenie
1	Wypadek komunikacyjny
2	Potrącenie przez inny pojazd (np. w trakcie wymiany koła)
3	Zaśnięcie kierowcy podczas jazdy
4	Przewrócenie, stoczenie się pojazdu
5	Napaść rabunkowa
6	Konflikty z innymi uczestnikami ruchu lub klientami
7	Pożar, wybuch
8	Porażenie prądem elektrycznym
9	Przygniecenie
10	Uderzenie
11	Poślizgnięcie, potknięcie, upadek
12	Przeciążenie układu kostno-mięśniowego
13	Pochwycenie przez ruchome części maszyny
14	Upadek z wysokości
15	Kontakt z ostrymi krawędziami
16	Gorące powierzchnie
17	Hałas
18	Drgania
19	Promieniowanie ultrafioletowe
20	Temperatura otoczenia
21	Spaliny
22	Substancje chemiczne
23	Obciążenie psychiczne
24	Obciążenie układu kostno-mięśniowego
25	Oslabienie, zmęczenie wzroku
26	Reakcje uczuleniowe

Aside from the risk of explosion or fire, the hazards were typical for the work of a driver transporting goods, not necessarily dangerous goods. A similar situation was observed in the group of medium-risk hazards – these were also typical for the workplace of a driver transporting goods (not necessarily dangerous goods).

Table 2 Level of occupational risk in the workplace of a driver of a dangerous goods transport vehicle

Lp.	Zagrożenie	Ryzyko przed zastosowaniem środków profilaktycznych				Poziom ryzyka
		S Skutki	E Ekspozycja	P Prawdopodobieństwo	R= S*E*P Wartość ryzyka	
1	Wypadek komunikacyjny	40	6	1	240	duży
2	Potrącenie przez inny pojazd (np. w trakcie wymiany koła)	15	2	3	90	średni
3	Zaśnięcie kierowcy podczas jazdy	40	6	1	240	duży
4	Przewrócenie, stoczenie się pojazdu	40	6	0,5	120	średni
5	Napaść rabunkowa	15	3	0,5	22,5	mały
6	Konflikty z innymi uczestnikami ruchu lub klientami	3	3	3	27	mały
7	Pożar, wybuch	40	6	1	240	duży
8	Porażenie prądem elektrycznym	15	3	3	135	średni
9	Przygniecenie	15	3	3	135	średni
10	Uderzenie	1	3	6	18	znikomy
11	Poślizgnięcie, potknięcie, upadek	3	3	6	54	mały
12	Przeciążenie układu kostno-mięśniowego	7	3	3	63	mały
13	Pochwycenie przez ruchome części maszyny	7	2	3	42	mały
14	Upadek z wysokości	15	3	3	135	średni
15	Kontakt z ostrymi krawędziami	1	3	6	18	znikomy
16	Gorące powierzchnie	3	3	6	54	mały
17	Hałas	7	6	1	42	mały
18	Drgania	7	6	1	42	mały
19	Promieniowanie ultrafioletowe	15	6	1	90	średni
20	Temperatura otoczenia	15	3	1	45	mały
21	Spaliny	15	6	0,5	45	mały
22	Substancje chemiczne	15	2	1	30	mały
23	Obciążenie psychiczne	3	10	3	90	średni
24	Obciążenie układu kostno-mięśniowego	3	6	6	108	średni
25	Oslabienie, zmęczenie wzroku	3	6	3	54	mały
26	Reakcje uczuleniowe	40	10	0,2	80	średni

3. CONCLUSIONS

1. Low-risk hazards dominate in the workplace of a lorry driver transporting dangerous goods.
2. High-risk hazards included those typical for drivers who transport safe goods, with the exception of the risk of explosion or fire, which was

a hazard typical for the transport of dangerous goods.

3. A prerequisite for maintaining the presented hazard rates is compliance with the procedures stipulated in transport stage (loading, packing, etc.) instructions.

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