



**STATE COMMISSION ON RAILWAY ACCIDENTS INVESTIGATION**  
**Ministry of the Interior and Administration**

**REPORT No. PKBWK 02/2022 from investigation of railway accident that occurred on 26 February 2021 0532 hrs at Grodzisko Dolne station, on second railway track, at km 163.654 of railway line No. 68 Lublin - Przeworsk, railway management infrastructure of PKP PLK S.A., Rzeszów Railway Department.**

**WARSAW, 9<sup>th</sup> of March 2022**

<https://www.gov.pl/web/mswia/panstwowa-komisja-badania-wypadkow-kolejowych>

*This Report is based on the provisions of Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be used for rail accident and incident investigation reports (OJ L 132, 27.4.2020).*

<b>I. SUMMARY.....</b>	<b>4</b>
<b>II. PROCEEDINGS AND CONTEXT .....</b>	<b>7</b>
<b>1. Decision to initiate procedure.....</b>	<b>7</b>
<b>2. Grounds for the decision to open procedure.....</b>	<b>7</b>
<b>3. The scope and limitations of the procedure, including the reasons for them, and an explanation of any delays that are considered to be a risk, or otherwise affecting the conduct of the procedure or its conclusions.....</b>	<b>7</b>
<b>4. Aggregate description of the technical capacity of the functions in the team of investigators .....</b>	<b>7</b>
<b>5. Description of the communication and consultation process conducted with persons or entities involved in the accident, during the investigation and in relation to the information provided .....</b>	<b>7</b>
<b>6. Description of the level of cooperation proposed by the actors involved.....</b>	<b>7</b>
<b>7. A description of the methods and techniques used during the investigation and the methods of analysis applied to establish the facts and make the findings referred to in the report .....</b>	<b>8</b>
<b>8. Description of the difficulties and specific challenges encountered during the procedure .....</b>	<b>9</b>
<b>9. Any interaction with the judicial authorities .....</b>	<b>9</b>
<b>10. Other information relevant to the procedure .....</b>	<b>9</b>
<b>III. DESCRIPTION OF THE ACCIDENT.....</b>	<b>11</b>
<b>1. Event and background information.....</b>	<b>11</b>
1.1. Description of the type of event.....	11
1.2. Date, exact time and place of event .....	11
1.3. Description of the site, including meteorological and geographical conditions at the time of the event and any works carried out on or near the site .....	11
1.4. Deaths, injuries and damage to property .....	14
1.5. Description of other effects, including the impact of the event on the regular activities of the entities involved.....	14
1.6. Identification of persons, their functions and entities involved, including possible links with contractors or other relevant parties.....	14
1.7. Description and identifiers of trains and their composition including associated rolling stock and registration numbers.....	14
1.8. Description of the relevant parts of the infrastructure and signalling - track type, crossover, interlocking, signal, train protection systems .....	15
1.9. Any other information relevant to the description of the event, and background information .....	16
<b>2. A factual account of events.....</b>	<b>16</b>
2.1. The chain of discrete events leading up to the accident, including actions taken by the persons involved; operation of rolling stock and technical installations; operation of the operating system.....	16
2.2. The sequence of events from the occurrence of the accident until the end of the emergency services' operations, including measures taken to protect and secure the scene of the accident; the efforts of the rescue and emergency services.....	16
<b>IV. ANALYSIS OF THE ACCIDENT .....</b>	<b>18</b>
<b>1. Roles and responsibilities.....</b>	<b>18</b>
1.1. Railway undertakings or infrastructure managers.....	18
1.2. Entities in charge of maintenance, maintenance workshops or any other providers of maintenance services.....	19
1.3. Rolling stock manufacturers or other suppliers of railway products.....	19
1.4. The national safety authorities or the European Union Agency for Railways (ERA).....	19
1.5. Notified bodies, designated bodies or risk assessment bodies .....	19
1.6. Certification bodies of entities in charge of maintenance listed in point 1.2 .....	19
1.7. Any other person or entity involved in the accident, as may be documented in one of the relevant safety management systems, or as referred to in the register or relevant legal framework .....	19
<b>2. Rolling stock and technical installations .....</b>	<b>19</b>
2.1. Consequences of the event due to manufacturers and the entity in charge of maintenance of rolling stock.....	19
2.2. Technical installations of rolling stock .....	21
2.3. Other factors arising from the design of the railway infrastructure .....	25

<b>3. Human factors</b> .....	<b>27</b>
3.1. Human and individual characteristics .....	27
3.2. Job-related factors .....	27
3.3. Organisational factors and tasks .....	27
3.4. Environmental factors .....	27
3.5. Any other factors relevant to the procedure .....	27
<b>4. Feedback and control mechanisms, including risk and safety management and monitoring processes</b> .....	<b>27</b>
<b>5. Previous events of a similar nature</b> .....	<b>27</b>
<b>V. CONCLUSIONS</b> .....	<b>30</b>
1. Summary of analysis and conclusions on the causes of the accident .....	30
2. Measures taken since the accident .....	32
3. Additional remarks .....	32
<b>VI. SAFETY RECOMMENDATIONS</b> .....	<b>33</b>

#### List of Figures

<b>Figure 1 - General view of the site (source: Geoportal)</b> .....	<b>12</b>
<b>Figure 2 - Sketch of the accident (by PKBWK)</b> .....	<b>13</b>
<b>Figure 3 - Diagram of locomotive 6Dg-140 s running parameters as a function of time (prepared by the PKBWK)</b> .....	<b>22</b>
<b>Figure 4 - Diagram of locomotive EU160-010 running parameters as a function of time (prepared by the PKBWK)</b> .....	<b>24</b>

#### List of photos

<b>Photo 1 - shows the situation 1 second before the collision (recorded by the PKP Intercity S.A. locomotive camera)</b> .....	<b>6</b>
<b>Photo 2 - view of the site and consequences of the accident (own material of the PKBWK)</b> .....	<b>6</b>
<b>Photo 3 – broken table in the passenger coach (photo by PKBWK)</b> .....	<b>20</b>
<b>Photo 4 – fixing system of the table (photo by PKBWK)</b> .....	<b>20</b>
<b>Photo 5 – view of pole hiding the night signal of semaphore D (photo by PKBWK)</b> .....	<b>25</b>
<b>Photo 6 – closed track 3 and discontinuity of track 3 beyond the crossroad of turnout no. 3</b> .....	<b>26</b>
<b>Photo 7- Method of securing the crossover of turnout no. 3 (photo by GDPWK)</b> .....	<b>26</b>
<b>Photo 8 – view from the driver's cab of train MPE38100 travelling on track 2 when train LSS335064 was travelling on track 4 and was 20 metres in front of exit semaphore D.</b> .....	<b>31</b>
<b>Photo 9 - view from the cab of a train travelling on track 2 at the time it implemented emergency braking as train LSS335064 entered its path, i.e. 99 metres ahead.</b> .....	<b>32</b>

## I. SUMMARY

**Type of event:** Accident

**Event description:** Collision of two trains -

During the running to station Leżajsk of train MPE38100 operated by PKP Intercity S.A., driven by locomotive EU160-010, on organized route K<sup>1</sup>-C, without stopping, from semaphore K<sup>1</sup> to semaphore C on main track two of Grodzisko Dolne station, from additional main track fourth, using not prepared way, without required permission, with D<sup>2</sup> semaphore showing "stop", the second train LSS335064 (loose locomotive 6Dg-140 of railway undertaking Lotos Kolej Sp. z o. o.) entered the said main track two. The entering locomotive 6Dg-140 ripped the crossover (switch) of turnout no. 6 and entered onto main track two directly in front of the passenger train MPE38100, without automatically changing signal on semaphore C from "free way" to "stop", due to the type of equipment. The driver of passenger train MPE38100, seeing the locomotive in front of his train, implemented sudden braking. Despite that, a collision occurred, that is a passenger train collided with a rear of freight train running on the same track and in the same direction.

**Date of event:** 26.02.2021 0532 hours

**Event location:** Railway line no. 68 Lublin - Przeworsk, Grodzisko Dolne station, second main track, km 163.654, geographical coordinates 50°10'24.7"N 22°30'21.1"E.

**Consequences of the event:** As a result of the accident, 4 people were injured, i.e. the driver of the loose locomotive and 3 passengers of the passenger train. There were also material losses, i.e. serious damages to locomotives EU160-010 and 6Dg-140, as well as passenger wagons.

**Casual factor:** Omission of semaphore D<sup>2</sup> showing signal Sr1 "Stop", ripping the crossover of turnout no. 6 and entry of locomotive 6Dg-140 onto main track two directly in front of train MPE38100.

- Contributing factors:**
- 1) Obstructed observation of semaphore D signals from track no. 4 caused by stopping LSS335064 in place making observation of signals showed by this semaphore difficult. *According to Ir-1 Instruction § 64 sec. 8 the front of the train should stop as close as possible to "stop" signal and in case of light semaphores not closer than it is needed to recognize the signal without any doubt.*
  - 2) Start running from track no. 4 after the driver of train LSS335064 misidentified indications of exit semaphore C from track no. 2 transmitting signal Sr2 (free way) for train MPE38100, as a "free way" signal for train LSS335064 operated by him.
  - 3) Obstructed visibility of the signals given by the shape semaphores in the area of illuminated turnout heads on the route during the dark period (early morning hours).

**Systemic factor:** Not identified.

### **Recommendations and their addressees:**

- 1) Infrastructure managers shall ensure that train dispatchers, when providing information to railway vehicle drivers that other trains must be allowed to pass, will keep them constantly informed about changes to the traffic organisation of the station.
- 2) To ensure visibility of semaphore D at Grodzisko Dolne station of PKP PLK S.A., the Rzeszów Railway Department shall move the overhead traction line pole 163-44 located in the area of GD1 setting area.
- 3) Infrastructure managers shall perform exceptional checks on the visibility of semaphores, during day and night, in stations with overhead traction lines, both over the main and auxiliary tracks.
- 4) Railway undertakings will take measures to improve passenger safety on trains through the appropriate fitting of tables in the non-compartment passenger coaches, guaranteeing travellers' safety.
- 5) The infrastructure manager will implement the recommendation specified in the protocol from diagnostic tests of railway traffic control devices (hereinafter referred to as the rtc devices, see Protocol No. IZATA-I/3-22-068/2019 of 21.06.2021) with the following content: *"Provide for renovation of railway traffic control (rtc) devices, replacement of shaped semaphores with light semaphores and installation of EAP (Interlocking Early Action Project) on adjacent routes to Tryńcza-Leżajsk station"*.
- 6) To ensure safety of train traffic on routes a<sup>1</sup><sub>1</sub> b<sub>2</sub> and a<sup>2</sup><sub>3</sub> PKP PLK S.A., Rzeszów Railway Department, shall restore the technical condition of infrastructure in Grodzisko Dolne station to the currently existing technical documentation.
- 7) Railway undertakings and infrastructure managers shall introduce internal rules to restrict the use of non-traffic related multimedia devices by train crew and traffic posts staff, hindering the correct reception of the acoustic signals and announcements made as well as shall include this issue in the programme of periodic instructions.
- 8) Railway undertaking LOTOS Kolej Sp. z o. o. will implement order of the President of Office of Rail Transport (UTK) No. DBK-550/R03/KB/12 dated 30.05.2012, addressed to railway operators, about obligation to install pre-field recording devices - digital cameras or video recorders in newly built and operating railway vehicles, according to recommendation PKBWK-076-305/RL/R/11 dated 22.11.2011.



**Photo 1 - shows the situation 1 second before the collision (recorded by the PKP Intercity S.A. locomotive camera).**



**Photo 2 - view of the site and consequences of the accident (own material of the PKBWK)**

## **II. PROCEEDINGS AND CONTEXT**

### **1. Decision to initiate procedure**

The Chairman of the State Commission on Railway Accidents Investigation (hereinafter referred to as "PKBWK" or "the Commission") Tadeusz Ryś issued decision no. PKBWK.4631.3.2021 dated 11 March 2021 to undertake by the Commission's Investigation Team proceedings of the accident occurred at km 163.756 of railway line no. 68 Lublin Główny - Przeworsk, Grodzisko Dolne station, track no. 2.

Considering this fact and the provisions of art. 28e(4) of the Act of 28 March 2003 on Railway Transport (consolidated text, Journal of Laws of 2020, item 1043, as amended), hereinafter referred to as "the Railway Transport Act", on 12 March 2021 the accident has been reported, in due time, to the European Union Agency for Railways (ERA) and registered in the database under number PL-10030.

### **2. Grounds for the decision to open procedure**

The Chairman of the PKBWK decided to undertake by the Commission's Investigation Team proceedings pursuant to art. 28e(2a) of the Railway Transport Act taking into account the circumstances of the accident, which form a series of events related to the system as a whole.

### **3. The scope and limitations of the procedure, including the reasons for them, and an explanation of any delays that are considered to be a risk, or otherwise affecting the conduct of the procedure or its conclusions.**

Investigation determining the causes of the accident has been conducted under art. 28h(1) of the Railway Transport Act, which, pursuant to the provision of art. 28f(3), does not determine guilt or liability. There were no restrictions during the investigation that would adversely affect its conduct.

### **4. Aggregate description of the technical capacity of the functions in the team of investigators**

The Chairperson of the Commission appointed a three-member Investigation Team from among the permanent members of the Commission, competent for the proceedings.

### **5. Description of the communication and consultation process conducted with persons or entities involved in the accident, during the investigation and in relation to the information provided**

Pursuant to art. 28h(2)(5) of the Railway Transport Act, the Chairman of the PKBWK obliged indicated persons from among members of railway commission to co-operate with the Commission's Investigation Team to arrange access to all documentation and materials necessary for the investigation (decision no. PKBWK.4631.3.1.2021 of 11.03.2021). The Chairman of the PKBWK addressed also letters to railway undertakings PKP INTERCITY S.A. and LOTOS Kolej Sp. z o.o. and the infrastructure manager PKP PLK S.A. with a request to provide data concerning the conducted proceedings. The above-mentioned entities provided relevant materials for the needs of the Commission's Investigation Team.

### **6. Description of the level of cooperation proposed by the actors involved**

During the course of the investigation, the level of cooperation with representatives of entities related to the circumstances of the accident did not raise any concerns of the Commission's Investigation Team.

## **7. A description of the methods and techniques used during the investigation and the methods of analysis applied to establish the facts and make the findings referred to in the report**

Throughout the whole process aimed at clarifying the causes and circumstances of the accident, the Commission's Investigation Team has taken into account the provisions of national regulations, internal regulations of the infrastructure manager and railway undertakings and technical documentation. In addition, it made use of its own knowledge and experience.

The Commission's Investigation Team used documentation compiled by the railway commission and the Public Prosecutor's Office, as well as its own materials.

As part of the accident investigation, the Commission's Investigation Team undertook, inter alia, the following operations:

- visual inspection of the scene on the accident day,
- preparation of photographic and video documentation on the accident day and at later times,
- local examination at the accident site including an inspection ride in the train cab with recording the image of the area ahead of the train,
- analysis of the station's technical and traffic documentation,
- analysis of the records of the cameras and on-board rail vehicles recorders,
- analysis of railway vehicles documentation,
- analysis of employee records linked to the accident,
- analysis of the undertakings' and infrastructure manager's safety management systems (SMS).

The following is a selection of the legislation, regulations and internal instructions used in the course of the proceedings:

### **National legislation**

- 1) Act of 28 March 2003 on Railway Transport (Journal of Laws of 2020, item 1043, as amended).
- 2) Regulation of the Minister of Infrastructure of 11 January 2021 on workers employed in positions related to the operation and safety of railway traffic and to the operation of certain types of railway vehicles (Journal of Laws of 2021, item 101).
- 3) Regulation of the Minister of Infrastructure and Development of 18 July 2005 on general conditions for railway traffic and signalling (Journal of Laws of 2015, item 360, as amended).
- 4) Act of 7 July 1994 on Construction Law (Journal of Laws of 2020, item 1333 as amended).

### **Internal regulations of infrastructure manager PKP PLK S.A.**

- 1) Ir-1 Instruction on operating railway traffic.
- 2) Ir-2 Instruction for staff of signal posts.
- 3) Ie-4 (WTB-10) Technical Guidelines for the Construction of Railway Traffic Control Equipment, Railway Safety Equipment Design Regulations 1956, Railway Safety Equipment Design Regulations E10.
- 4) Ie-8 Instruction for the operation of mechanical and key signalling equipment of standardised type.
- 5) Ir-8 Instruction on dealing with serious accidents, accidents and incidents in rail transport.
- 6) Ik-2 Railway Safety Inspection Manual.

### **Internal instructions of railway undertaking PKP INTERCITY S.A.**

- 1) Instruction for the driver of a traction vehicle (Bt-1) I 304.
- 2) Instruction for train service staff on operating passenger trains owned by "PKP Intercity" S.A. (Br-21) BFO I 001.
- 3) Instruction on the use of shunting and traction radio equipment (Br-5) I 306.
- 4) Instruction for dealing with serious accidents, accidents and incidents (Br-3).



- 5) Instruction on occupational health and safety for the staff of electric and diesel motive power units Bbhp-1.
- 6) Instruction on professional preparation, examinations and periodical instructions for employees of "PKP Intercity" S.A. (IC-B) I 300.
- 7) Instruction on professional preparation of employees of "PKP Intercity" S.A. (BA-5) I 301.

#### **Internal instructions of railway undertaking LOTOS Kolej Sp. z o.o.**

- 1) Instruction for the driver of traction vehicles LOTOS T-1.
- 2) Instruction on dealing with serious accidents, accidents and incidents in rail transport LOTOS T-4.
- 3) Instruction on operating railway traffic LOTOS R-1.
- 4) Instruction on professional preparation, examinations and periodical trainings LOTOS S1.
- 5) Locomotive Maintenance Manual LOTOS T2.

## **8. Description of the difficulties and specific challenges encountered during the procedure**

The members of the Investigation Team did not encounter difficulties or problems that could affect the procedure, its timeliness or conclusions.

## **9. Any interaction with the judicial authorities**

The Chairman of the PKBWK applied by letter No. PKBWK.4631.3.7.2021 of 15 December 2021 to the Regional Prosecutor's Office in Leżajsk, to obtain access to the collected documents relevant to establishing the circumstances and causes of the accident. The documents have been made available to the extent specified in the said letter.

## **10. Other information relevant to the procedure**

In the course of the investigation, hearings of workers involved in the said accident have been conducted and the minutes of the interrogation of the employees made available by the Public Prosecutor's Office have been used.

Their content shows as follows:

The driver of passenger train MPE38100 while approaching from Tryńcza to Grodzisko Dolne station saw on K<sup>1/2</sup> entry semaphore signal S2 "travel with a maximum allowed speed" and received information that the next semaphore (exit semaphore C, towards Leżajsk station) showing also signal "travel with a maximum allowed speed". Continuing the journey on the main station track, on the second semaphore he saw the Sr2 signal "green light" and the raised-up arm (*PKBWK annotation; at an angle of 45°*). At the same time he saw two red lights of a locomotive (*GDPWK annotation; Pc-5*) coming from the right into the path of his train. He activated the emergency brakes, but despite this, passenger train MPE38100 collided with train LSS335064.

The train manager of MPE38100 at the time of collision was at the rear of the train. When passing through Grodzisko Dolne station, he felt sudden braking and when after a while the train hit an obstacle, he heard a bang. He immediately went along the line-up to the front of the train, noticed the broken windows and the injured train passengers. He went outside to check the consequences and assess whether assistance should be given to the train drivers.

The driver of freight train LSS335064 explained that the train dispatcher informed him to enter additional main track no. 4 to allow one passenger train to pass. After stopping in front of the D2 exit semaphore at a distance of about 100 metres (*GDPWK annotation; according to the recording device it was 222 m*) in front of this semaphore, he raised his head and noticed a green light on the semaphore after a fast train had passed. After starting off and passing the turnout, he noticed the lights of an oncoming train behind him, so he started to increase his speed to escape from this train but, despite this, there was an impact on the rear of his locomotive.

The signalman of the GD1 executive control room of the Grodzisko Dolne station received the information from the train dispatcher about the entry of train LSS335064 on track no. 4, in order to let passenger train

pass through. After the passenger train MPE31106 has passed he received information from the train dispatcher about the next train MPE38100, with order to prepare the route on track no. 2 for this train. He proceeded to prepare the running route for this train. After checking if the track is free, he blocked the block giving permission to enter on track no. 2. After unblocking the block receiving the order he proceeded to prepare the route in Leżajsk direction. By operating the signal lever of semaphore C, he gave the signal to allow the train MPE38100 to drive towards Leżajsk. Having made sure that the locomotive was still on track no. 4, he left the window, going to the WC room (located at the rear of the control room, behind the block apparatus and the dependence box). However, he did not enter this room but proceeded to observe the approaching train MPE38100 from the window of the control room, perpendicularly in the direction of the tracks. While walking to the window, he heard the cracking noise made by the lever of crossover no. 6 during its decoupling, after which he noticed that there is no longer a locomotive on track no. 4. At this moment he heard a bang and noticed a train hitting a locomotive which had left track no. 4.

### **III. DESCRIPTION OF THE ACCIDENT**

#### **1. Event and background information**

##### **1.1. Description of the type of event**

On 26.02.2021 during the running from Tyńcza station to Leżajsk station via Grodzisko Dolny station of passenger train MPE38100 operated by PKP Intercity S.A., driven by locomotive EU160-010, on organized way K<sup>1</sup>-C, without stopping, from semaphore K<sup>1</sup> to semaphore C, on main track no. 2 of Grodzisko Dolne station, from additional signal main track no. 4, using not prepared way, without required permission, with D<sup>2</sup> semaphore showing signal Sr1 "stop", the second train LSS335064 (locomotive 6Dg-140 of railway undertaking Lotos Kolej Sp. z o. o.) entered the said main track no. 2. During its movement, the locomotive of freight train ripped the crossover of turnout no. 6 and entered onto main track no. 2 directly in front of the passenger train MPE38100, without automatically changing signal on semaphore C from "free way" to "stop", due to the type of equipment. After passing turnout no. 6, the driver of locomotive 6Dg-140 noticed the lights of an approaching train from behind and accelerated to avoid a collision. The driver of passenger train MPE38100, seeing the locomotive in front of his train, implemented sudden braking. Despite that, a collision occurred, that is a passenger train collided with the rear of the freight train running on the same track and in the same direction. The railway vehicles were not derailed. The event has been classified as the accident.

##### **1.2. Date, exact time and place of event**

The accident occurred on 26.02.2021 at 0532 hours, at Grodzisko Dolne station, on track no. 2, at km 163.756 of railway line No 68 Lublin Główny - Przeworsk.

##### **1.3. Description of the site, including meteorological and geographical conditions at the time of the event and any works carried out on or near the site**

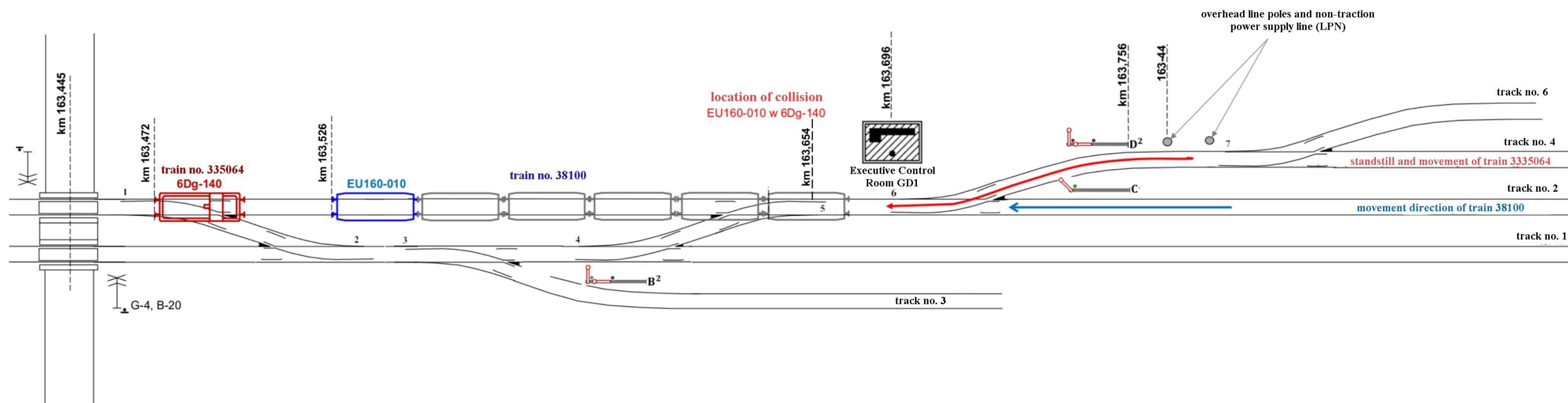
Grodzisko Dolne station is located on the electrified railway line no. 68 Lublin Główny - Przeworsk. The centre line of the station is located at km 164.198. The station is divided between two control areas - GD and GD1. The accident occurred in the area of the GD1 executive control room. The station is equipped with centralised mechanical equipment with light entry semaphores together with light warning boards, and shaped exit semaphores. Train traffic on the route to and from Leżajsk is operated, in the main directions, using a one-way electromechanical semi-self-acting interlocking system, without track occupancy control. In the direction to Leżajsk on the left track, opposite to the main one, traffic is operated on the basis of telephone train announcements. Train traffic to and from Tryńcza station is operated with the use of semi-self-acting double direction system of EAP type without control of track occupancy. Geographical coordinates of the station's centre line are 50°10'10.8"N and 22°30'33.7"E.

On the day of the accident, i.e. 26.02.2021, no works were carried out in the area of Grodzisko Dolne station and on the adjacent routes, train traffic was conducted on the basis of properly working traffic control devices at the station and the adjacent routes. The track no. 3 at the station and turnout no. 3 on the main track were closed and partially dismantled. The accident occurred during darkness before dawn, air clarity favourable, air temperature +3 °C, ground temperature about 0 °C, lingering snow, no precipitation.

Figure 1 - General view of the site (source: Geoportal)



Figure 2 - Sketch of the accident (by PKBWK)



#### **1.4. Deaths, injuries and damage to property**

##### **a) passengers, employees or contractors, level crossing users, trespassers, other persons on the platform, other persons not on the platform**

As a result of the accident, the driver of LOTOS Kolej Sp. z o.o. and three passengers of passenger train MPE38100 were injured. All the injured participants of the accident were released home after being given ambulatory assistance.

##### **b) cargo, luggage and other property**

There has been no damage to the belongings and luggage carried on the train.

##### **c) rolling stock, infrastructure and environment**

Damaged locomotives 6Dg-140 and EU160-010, damaged first 3 wagons behind the locomotive of passenger train MPE38100: nos. 50512978054-8, 50513978045-4 and 50512978062-1. Damaged drive system of crossover no. 6. No damage to the environment.

#### **1.5. Description of other effects, including the impact of the event on the regular activities of the entities involved**

As a result of the accident, station tracks 1, 2, 3, 4 and 6 were closed, tracks 1 and 2 towards Leżajsk were closed from 0535 hours. Station track 2 and track 1 were opened at 0900. Track 2 was opened at 1635.

55 passenger trains were delayed, totally - 592 minutes, and one freight train - 163 minutes.

A substitute bus service was introduced:

- on the section Grodzisko Dolne - Lublin instead of the train MPE38100 - involved in the accident,
- on the section Tryńcza - Leżajsk instead of two trains.

#### **1.6. Identification of persons, their functions and entities involved, including possible links with contractors or other relevant parties**

People involved in the accident - keeping them anonymous:

- driver of train MPE38100 - employee of railway undertaking PKP INTERCITY S.A,
- manager of train MPE38100 - employee of railway undertaking PKP INTERCITY S.A,
- driver of train LSS335064 - employee of railway undertaking LOTOS Kolej Sp. z o. o.,
- signalman of the GD1 executive control room of Grodzisko Dolne station - employee of infrastructure manager PKP PLK S.A,
- train dispatcher of the GD control room of Grodzisko Dolne station - employee of infrastructure manager PKP PLK S.A.

#### **1.7. Description and identifiers of trains and their composition including associated rolling stock and registration numbers**

Train MPE 38100 (of carrier PKP INTERCITY S.A.) from Rzeszów Główny to Szczecin Główny operated by locomotive EU160-010, rail vehicle identifier PL-PKPIC 91 51 5 170 097-7 set with five coaches (passenger wagons). Technical Railworthiness Certificate No. BIT1r-95/2020, type of railway vehicle E4DCU, valid until 23.03.2025 for a mileage of 1 200 000 km calculated from 4178.

The review of level P1 was performed on 17.02.2021, level P1 was performed on 23.09.2020, for which the railway vehicle's type approval certificate for service No. PL 51 2020 0053 has been issued.

Train LSS335064 (LOTOS Kolej Sp. z o. o.) from Przeworsk Gorliczyna to Łętownia, as 6Dg-140 series loose locomotive, rail vehicle identifier PL-LOTOS 92 51 3 620 308-8. Technical Railworthiness Certificate No 50/2017, type of railway vehicle 6Dg/B1, valid until 15.11.2021, for the mileage of 304 387 km calculated from 195 613 km, issued on the basis of the railway's vehicle's type approval certificate for service No. T/2013/0233. The review of level P1 was performed on 20.02.2021, level P2 was performed on 21.01.2021, level P3 was performed on 24-25.04.2019.

Train data of MPE 38100 – from brake test card:

- train length.....124.5 m
- total mass of the train.....320 t
- percentage of braking mass required.....108 %
- percentage of actual braking mass.....151 %
- braking mass required.....346 t
- actual braking mass.....485 t

Train data of LSS 33506400 – from brake test card:

- train length.....14.24 m
- service weight.....68,5 t
- percentage of braking mass required.....69 %
- percentage of actual braking mass.....100 %
- actual braking mass.....69 t

## 1.8. Description of the relevant parts of the infrastructure and signalling - track type, crossover, interlocking, signal, train protection systems

S49-type surface on wooden sleepers, classical K-type fixing. Turnout no. 6, ordinary left R190, wooden sleepers, in ripped condition after derailment. Track and turnout condition good with no influence on the accident.

Grodzisko Dolne station is located on the electrified railway line no. 68 Lublin Główny - Przeworsk. The centre line of the station is located at km 164.198. The station is divided between two control areas GD and GD1. The accident occurred in the area of the GD1 executive control room. The station is equipped with centralised mechanical equipment, entry light semaphores with luminous warning boards, exit shaped semaphores. Train traffic at the station is run based on station interlocking, train traffic on adjacent routes is run based on route interlocking system.

To and from Leżajsk - one-way electromechanical semi-self-acting interlocking system, without track occupancy control. To and from Tryńcza - semi-self-acting double direction system of EAP type without control of track occupancy.

Mechanical crossover drives centralized, switch drive No. 6 - broken valve breaking off the thruster, other drives in the train path undamaged. Running way reinforced using Pu block.

Condition of railway traffic control (rtc) devices after the accident:

- at the traffic station - executive control room/station GD-1: crossover levers of turnouts No 1, 2, 3, 4, 5 in the upper position. Lever of crossover no. 6 in the upper position - the "uncoupling" indicator deflected. Signal levers: semaphore B2 to Leżajsk from track 3 in the upper position - secured with a pawl wedge. Lever of semaphore C to Leżajsk from track 2 in lower position. Lever of semaphore D<sup>2</sup> to Leżajsk from track 4 in main position - upper. Blocks: D<sup>2</sup> giving way to Leżajsk from track 5 - red window, permission block E<sup>2</sup> K<sup>1/2</sup> - from Tryńcza K<sup>1/2</sup> to track 4, 2, 3 - to Tryńcza from track 4 - e<sup>2</sup> - red window, manual release sealed. Block Pu a<sup>1/2</sup> from Leżajsk to track 1 - red window. Block Pu b<sup>2</sup>cd<sup>2</sup> to Leżajsk from tracks 2, 3, 4 - white window. Block B2 giving way to Leżajsk from track 3 - red window. Block C giving way to Leżajsk from track 2 - white window. Block A<sup>2</sup><sub>4</sub> giving way from Leżajsk to track 4 - red window. Block A<sup>2</sup><sub>3</sub> giving way from Leżajsk to track 3 - red window. Block A<sup>1</sup> giving way from Leżajsk on track 1 - red window. End block A<sup>1</sup><sub>2</sub> from Leżajsk - white window. Start block B<sup>2</sup>CD<sup>2</sup> to Leżajsk - white window. Valves over the starting and ending blocks padlocked and sealed - white windows. Light plan over the block system - sealed. Rafter lever Rg1 and Rg3 in lower position, rafter lever Rg2 in upper position. Rg1(3+), Rg2(4-,5-), Rg3(4+,5+). Double locking dependence Wk1+(7+) - lever in lower position. Upper lock closed, no key. Status of alternate signal counters LSzA-00479, LSz2n-03640. Block system sealed with seal no. U32/19. Lever of crossover no. 6 - seal broken due to ripped turnout.

- outside (at the track) - GD-1 signalling area: on track no. 4, D2 shaped semaphore showing signal Sr1 - semaphore arm in horizontal position. Exit C shaped semaphore - arm raised at 45<sup>0</sup> degrees - transmitting signal Sr2 (free way). Semaphore D2 transmitting night signal red "stop". Turnout no. 6 shifted to the "plus" basic position. In the mechanical drive of turnout no. 6 a slightly bent valve breaking off the thruster as a result of the turnout ripping.

### **1.9. Any other information relevant to the description of the event, and background information**

Not applicable.

## **2. A factual account of events**

### **2.1. The chain of discrete events leading up to the accident, including actions taken by the persons involved; operation of rolling stock and technical installations; operation of the operating system**

On 26.02.2021, before entering Grodzisko Dolne station, driver of train LSS335064 received order to enter additional track no. 4 to let a fast train through. During the standstill on track no. 4 the traffic arrangement of passing trains was changed from one to two trains, about which the train dispatcher did not inform the driver of train LSS335064. After passing of the first fast train (MPE38106) the route for train MPE38100 of PKP INTERCITY S.A. was prepared. The signal Sr2 "free way" (semaphore arm raised at an angle of 45° and green light) was given on semaphore C. The driver of train LSS335064 seeing night signal Sr2 (green light) "free way" thought that after passing of the first fast train the given signal concerns his train, due to not having information about passing of the next fast train. Fast train MPE38100 coming as the second one, driven by locomotive EU160-010, entered the station on the organized way K<sup>1</sup>-C, without stopping and using track 2, from semaphore K<sup>1</sup> to semaphore C and then towards the Leżajsk station.

The signalman of the Gd1 executive control room, operating the signal lever of semaphore C, set the signal to allow the MPE38100 train to depart in the direction of Leżajsk. Having made sure that the locomotive was on track 4, he left the window, going to the WC room (located at the rear of the control room, behind the block apparatus and the dependence box). However, he did not enter this room but proceeded to observe the approaching train MPE38100 from the window of the control room, perpendicularly in the direction of the tracks. While walking to the window, and before starting observation, he heard the cracking noise made by the lever of crossover no. 6 during its decoupling, after which he noticed that there is no longer a train LSS335064 on track no. 4.

From additional main track no. 4, using not prepared way, without required permission, with D<sup>2</sup> semaphore showing "stop", the train LSS335064 (loose locomotive 6Dg-140) entered the main track no. 2. The entering locomotive 6Dg-140 ripped the turnout no. 6 and entered onto main track no. 2 directly in front of the passenger train MPE38100, without automatically changing signal on semaphore C from "free way" to "stop", due to the type of equipment. The driver of this locomotive (series 6Dg-140) after realising that train MPE38100 is approaching from behind on the same track, started increasing the speed of the locomotive. On the other hand, the driver of passenger train MPE38100, seeing the locomotive in front of his/her train, implemented sudden braking. Despite the actions taken by both drivers, a collision occurred, that is the train of the carrier PKP INTERCITY S.A. MPE38100 collided with the rear of locomotive 6Dg-140 of the carrier LOTOS Kolej Sp. z o. o. The collision occurred on turnout no. 5, at km 163.654. After the collision, the front end of the locomotive EU160-010 stopped at km 163.526, that is after travelling 128 metres. The front end of locomotive 6Dg-140 stopped at km 163.472, that is, after travelling 182 metres after the collision.

### **2.2. The sequence of events from the occurrence of the accident until the end of the emergency services' operations, including measures taken to protect and secure the scene of the accident; the efforts of the rescue and emergency services**

After stopping, the driver of the MPE38100 train called via radiotelephone the train dispatcher of the Grodzisko Dolne station and informed him about the accident and the necessity to notify the railway commission. At the same time, the manager of that train went by wagons to the beginning of the train to check what had happened



and whether there are any injured passengers on the train. As he went through the wagons he found that three passengers are slightly injured. He then went to the drivers in charge of train MPE38100 and train LSS335064. The drivers of both trains stated to him that they do not need medical assistance. Approximately 3 minutes after the stop, the train dispatcher called the driver of train MPE38100 to clarify the situation.

The driver of train MPE38100 reported the accident by phone to the dispatcher of the carrier PKP INTERCITY S.A. in Kraków. After 7 minutes, the train dispatcher called the train dispatcher by radio, and during the conversation they agreed that the train manager will call the emergency services. The police arrived at the scene at 0615, the ambulance service and the fire brigade at 0620, the prosecutor at 0800. Medical aid was provided to the driver of the LOTOS Kolej Sp. z o. o. railway undertaking and to three passengers of the train of the PKP INTERCITY S.A. railway undertaking. The rescue action lasted from 0535 to 1635.

After the accident station tracks 1, 2, 3, 4, 6 as well as tracks no. 1 and no. 2 of the Grodzisko Dolne - Leżajsk route were closed. Station track no. 1 and track no. 1 opened at 0900 h. Track no. 2 and station tracks no. 2 and 4 were opened at 1635. Turnout no. 6 was opened for traffic at 1300, after the diagnostic examination.

## IV. ANALYSIS OF THE ACCIDENT

### 1. Roles and responsibilities

#### 1.1. Railway undertakings or infrastructure managers

##### Infrastructure manager PKP PLK S.A. Railway Branch in Rzeszów

Railway infrastructure manager is responsible, inter alia, for proper maintenance of railway lines. Duties of railway infrastructure manager are specified, among others, in art. 62 of the Act of 7 July 1994 on Construction Law. This provision obliges managers to carry out annual and five-yearly inspections of buildings. The infrastructure manager's internal instruction Ie-7 imposes an obligation to carry out a diagnostic survey of a building facility at least once a year. Inspections of building facility maintenance in the scope of checking the technical condition of the object "traffic control station devices" at Grodzisko Dolne station were carried out in accordance with the regulations. Protocols from the inspections were drawn up, which included, among others, the irregularities found: in 2019 - "corroded base of semaphore F"; in 2020 - *according to the diagnostic auditor* - "corroded arms and background plates of exit semaphores, corroded exit shaped semaphores". After the inspections for 2019-2020, a recommendation was made: "provide for the repair of signalling equipment, the replacement of shaped semaphores with light semaphores and the installation of EAP on the adjacent routes to Tryńcza station". After the inspection of the facility in 2021, the following recommendation concerning the operating and maintenance conditions was issued: "the equipment urgently qualifies for a major overhaul due to exploitation over a long period of operation".

In 2019-2021, the station was inspected for the visibility of signals and the operation of train management control equipment during daytime and nighttime. No defects were found during the inspection.

The infrastructure manager's employees, who arrived first at the scene of the accident, acted pursuant to the provisions of § 5 of instruction *Ir-8 on dealing with serious accidents, accidents and incidents in rail transport*, notified the police about the accident and, after giving first aid to the injured person, secured the scene of the accident until the arrival of the emergency services.

##### Railway undertaking LOTOS Kolej Sp. z o.o.

For carrying out a transport task, the carrier is obliged to appoint railway vehicles with a type certificate of approval for service and the technical railworthiness certificate. The investigation team stated that the railway vehicle involved in the accident met the conditions necessary to be placed in service and had the required documents.

The railway undertaking's responsibilities for safe driving are defined in the infrastructure manager's and railway undertaking's internal regulations.

The appointed crew operating the train had all authorisations and qualifications required by law. The train was operated based on individual timetable dated 24.01.2020.

The driver's obligation was to stop the train in a place of good visibility of signals from semaphore D (Instruction Ir-1 § 64 rec. 8).

##### Railway undertaking PKP INTERCITY S.A.

For carrying out a transport task, the carrier is obliged to appoint railway vehicles with a type certificate of approval for service and the technical railworthiness certificate. The investigation team stated that the railway vehicle involved in the accident met the conditions necessary to be placed in service and had the required documents.

The railway undertaking's responsibilities for safe driving are defined in the infrastructure manager's and railway undertaking's internal regulations.

The appointed crew operating the train had all authorisations and qualifications required by law. The train was operated based on an annual timetable.

## **1.2. Entities in charge of maintenance, maintenance workshops or any other providers of maintenance services**

Railway undertakings LOTOS Kolej Sp. z o. o. and PKP INTERCITY S.A. are responsible, inter alia, for the maintenance of railway vehicles. With regard to the maintenance of level P1, in accordance with the Maintenance System Documentation (DSU), the companies carry out tasks on their own, while the remaining levels of inspections P2, P3 and P4 included in the DSU for powered vehicles involved in the accident are carried out by external entities. The maintenance levels were carried out according to the cycles defined in the DSU documentation.

## **1.3. Rolling stock manufacturers or other suppliers of railway products**

Based on the research material collected, the investigation team did not find a link between rolling stock manufacturers and service providers and the accident.

## **1.4. The national safety authorities or the European Union Agency for Railways (ERA)**

The President of Office of Rail Transport (UTK) supervises railway traffic safety.

The investigation team, on the basis of the collected research material, did not establish a link between the national security authority and the investigated event.

## **1.5. Notified bodies, designated bodies or risk assessment bodies**

The investigation team, on the basis of the collected research material, did not establish a link between the national security authority and the investigated event.

## **1.6. Certification bodies of entities in charge of maintenance listed in point 1.2**

The certification body of railway undertakings LOTOS Kolej Sp. z o. o. and PKP INTERCITY S.A. as entities responsible for maintenance under Safety Management System (SMS) is the President of Office of Rail Transport (UTK). The investigation team, on the basis of the collected research material, did not establish a link between the certification body of the railway undertaking and the investigated event.

## **1.7. Any other person or entity involved in the accident, as may be documented in one of the relevant safety management systems, or as referred to in the register or relevant legal framework**

Not applicable.

## **2. Rolling stock and technical installations**

### **2.1. Consequences of the event due to manufacturers and the entity in charge of maintenance of rolling stock**

During the inspection of passenger coaches after the accident the investigating team has found the following damages: broken door windows, broken tables, damages of the carriage bodies. The photos below show broken tables in the non-compartment passenger coaches and the way of their fixing.



**Photo 3 – broken table in the passenger coach (photo by PKBWK)**



**Photo 4 – fixing system of the table (photo by PKBWK)**

The fixing of the tables did not fulfil the task of preventing them from breaking off without the involvement of third persons and injuring passengers on the train, which poses a safety risk to travellers. The above photos show the tearing off of tables in the first and second coach behind the locomotive due to dynamic forces caused by the collision of trains, without the presence of passengers.

## 2.2. Technical installations of rolling stock

The powered railway vehicle - diesel shunting locomotive 6Dg-140 is equipped by the manufacturer with the HASLER TELOC 1500 electronic system for recording driving parameters.

The investigation team analysed selected driving parameters recorded in the TELOC 1500 system immediately before the accident. The driving parameters of the locomotive from the moment of starting the journey at the Grodzisko Dolne station to the moment of its stopping after the event are presented in the below figure together with a description.

The below figure shows the following running parameters of train LSS335064 (6Dg-140):

1. Pressure in the main line.
2. Speed.
3. Operation of the air brake.
4. Activation of the Deadman CA.
5. Generator excitation.
6. Special event (departure, stop).

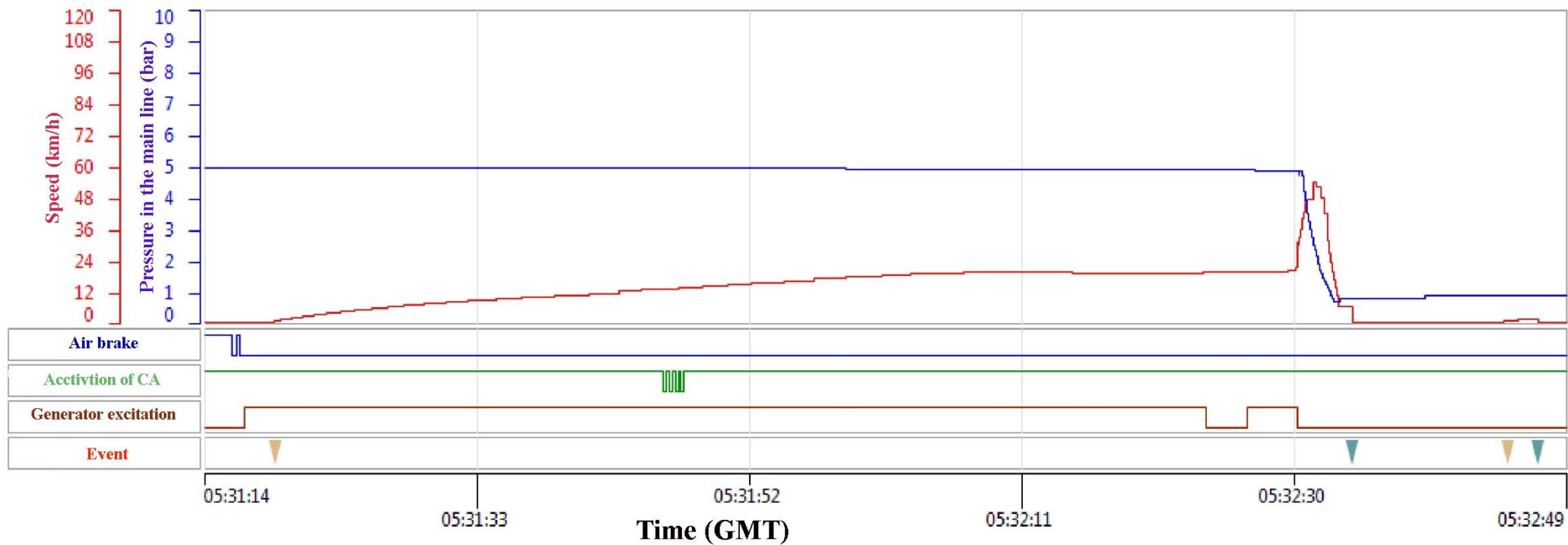
From the analysis of the driving parameters it follows:

- from 04:59:40 to 05:31:14 hrs the locomotive was stopped, and the generator excitation switched off,  
- from 05:31:14 onwards, there was a filling of the locomotive's main line to the pressure of 4.99 Bar, the so-called slackening. Then, at 05:31:18 the excitation of the main alternator and the start of the locomotive's forward travel in the speed range from 0.00 km/h to 19.890 km/h over a length of 286.00 m were recorded. At 05:32:30, when locomotive EU160-010 hits the rear of locomotive 6Dg-140, there was a sudden increase in locomotive speed from 21.32 km/h to 52.80 km/h and then the sudden drop in pressure in the main line.

The stopping of the locomotive was recorded at 05:32:47. The total distance travelled by the locomotive from starting to stopping was 320 m (in reality the locomotive travelled 506 m and stopped at km 163.472).

The investigation team was not able to analyse the course of the accident on the basis of the monitoring system installed in the railway vehicle. The locomotive was not equipped with such a device.

Figure 3 - Diagram of locomotive 6Dg-140 s running parameters as a function of time (prepared by the PKBWK)



The powered railway vehicle EU160-010 is equipped by the manufacturer with the HASLER TELOC 3000 electronic system for recording driving parameters.

The investigation team analysed selected driving parameters recorded in the TELOC 3000 system immediately before the accident. The driving parameters of the locomotive when passing through Grodzisko Dolne station until it stopped after the event are presented in the below figure together with a description.

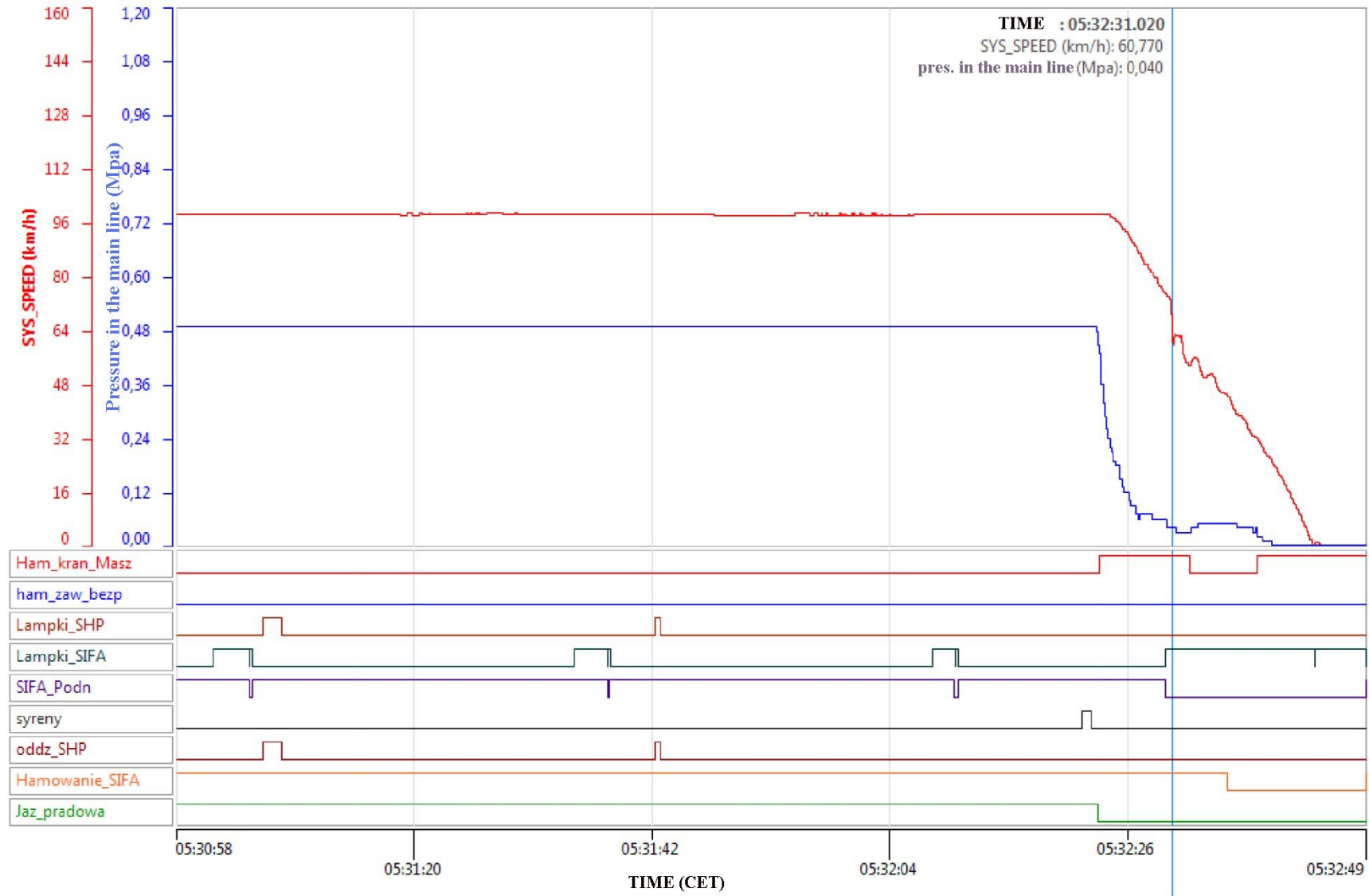
The below figure shows the following running parameters of locomotive EU160-010:

1. Pressure in the main line.
2. Speed.
3. Manipulator braking of the combined brake.
4. Braking using safety valve.
5. Braking using SIFA.
6. Signalling of the automatic train braking (ATB) activation
7. Impact of ATB.
8. Siren operation.
9. Driving using electrical power.
10. Signalling of SIFA.
11. SIFA footswitch.

From the analysis of the driving parameters it follows:

- at 05:31:42, signalisation of ATB activation and its cancellation was recorded while the train was travelling at  $V=98.92$  km/h,
- at 05:32:08 the SIFA switching on signal was recorded and at 05:32:10 its cancellation,
- from 05:32:22 to 05:32:23 a siren operation was recorded,
- at 05:32:24 recorded the disengagement of the driving using electrical power and the start of braking with using the combined brake manipulator at a speed of  $V=99.08$  km/h, a rapid pressure drops in the main brake line from 0.43 MPa to 0 MPa,
- from 05:32:24 a rapid decrease in speed was recorded from  $V=99.08$  km/h until hitting the rear of locomotive 6Dg-140 at speed  $V=60.77$  km/h, clearly visible beginning of a sudden collapse of the graph of the analogue speed signal versus time at 03:32:31,020,
- at 05:32:30,300 the SIFA footswitch release and SIFA signalling at speed  $V=74.99$  km/h was recorded,
- from 05:32:32 to 05:32:38, a braking disengagement using the combination brake manipulator was recorded with no change in air pressure in the brake main line (0.05 MPa),
- at 05:32:36 the braking applied by SIFA was recorded,
- stopping the train at 05:32:44 after travelling 295 metres from the start of braking,
- the distance covered from the moment the attention signal was given to the start of braking was 45 metres, from the moment the brakes were applied to the impact was 163 metres.

Figure 4 - Diagram of locomotive EU160-010 running parameters as a function of time (prepared by the PKBWK)





### 2.3. Other factors arising from the design of the railway infrastructure

- Lack of uninterrupted visibility (at a distance of 100 metres) of the night signal Sr1 (Stop) given on semaphore D2 (exit from track 4) due to build up overhead line poles and non-traction power supply line (LPN).

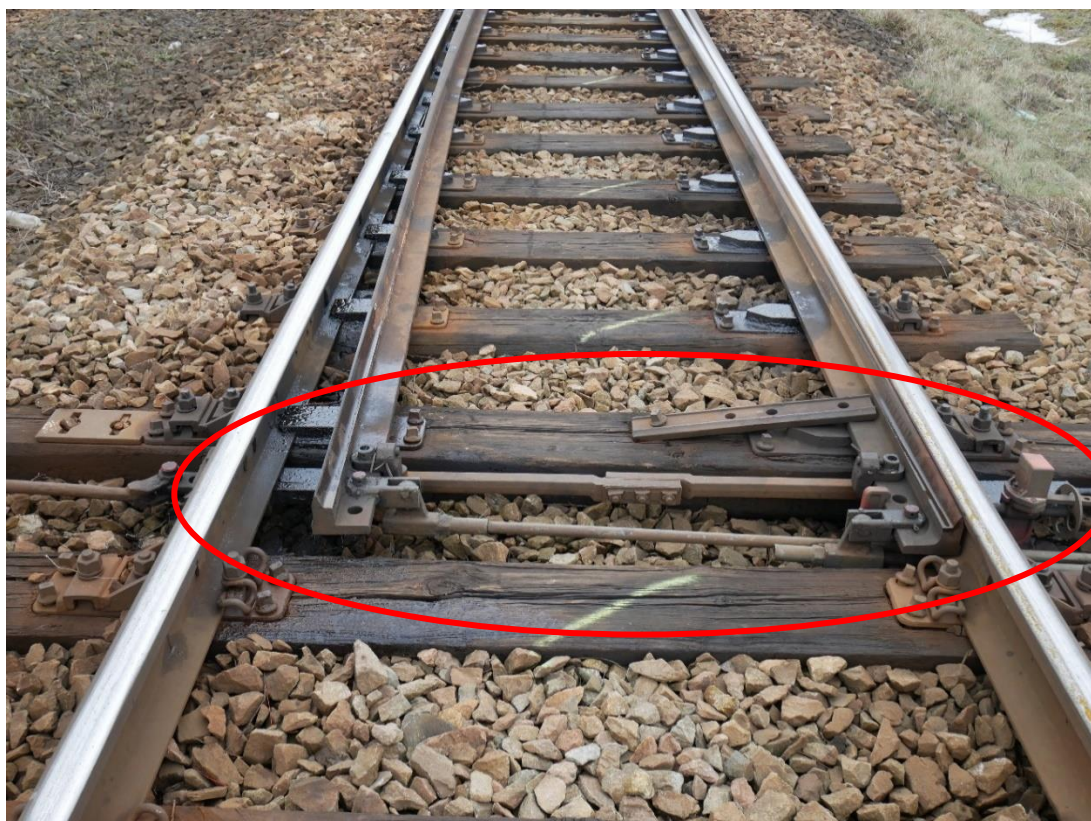


Photo 5 – view of pole hiding the night signal of semaphore D (photo by PKBWK)

- Unfinished decommissioning of track three, partial decommissioning of turnout no. 3, devastated semaphore B, not removed lever of inoperative semaphore B.
- D1 disc set contrary to regulations.



**Photo 6 – closed track 3 and discontinuity of track 3 beyond the crossroad of turnout no. 3**



**Photo 7- Method of securing the crossover of turnout no. 3 (photo by GDPWK)**

### **3. Human factors**

#### **3.1. Human and individual characteristics**

The investigation did not reveal the influence of the individual characteristics of the drivers on the accident. The investigation team did not identify the influence of health condition, fatigue, stress of the participants of the event on its causes.

An examination of both trains staff and employees of the traffic control stations did not reveal the presence of alcohol in their blood as well as other psychoactive compounds.

#### **3.2. Job-related factors**

The investigation team raises no concerns in relation to the workplace of drivers and maintenance staff at Grodzisko Dolne station.

#### **3.3. Organisational factors and tasks**

From the material collected by the Commission's Investigation Team, it appears that the employers provided the statutorily required rest time to the train crews and staff of the traffic control stations involved in the accident.

Carriers and infrastructure manager in accordance with adopted Safety Management System within the framework of management of competences on positions directly connected with maintenance and safety of railway traffic, provided cyclic trainings for workers. Employees involved in the accident had all required by regulations and instructions authorisations and qualifications related to activities performed on a given work position. These employees were provided with the necessary instructions and regulations to ensure safe work performance. They were also inspected and instructed at their workstations in accordance with the applicable internal regulations of the infrastructure manager and railway undertakings.

#### **3.4. Environmental factors**

Environmental factors influencing the causal as well as contributing factors of the accident have not been identified.

#### **3.5. Any other factors relevant to the procedure**

Not applicable.

### **4. Feedback and control mechanisms, including risk and safety management and monitoring processes**

The investigation team did not identify systemic factors influencing the accident. Feedback mechanisms, control mechanisms across the railway system actively influencing the occurrence of similar events were not identified.

### **5. Previous events of a similar nature**

As part of the investigation, the team analysed a selection of train collisions occurred between 2017 and 2020.

The following is a brief description of selected events and their impact:

- A serious train accident occurred on 30 August 2017 at 21:53 at Smętowo station, on track two, at km 457.485 of railway line no. 131 Chorzów Batory - Tczew, area of infrastructure manager PKP PLK S.A. Gdynia Railway Department.

On 30.08.2017 at 21:40, from Morzeszczyn station towards Smętowo station departed freight train TMS564024 - carrier STK S.A. Wrocław. The train consisted of a diesel locomotive series S200-303 and 6 wagons. At 21:48

from Morzeszczyn station also in the direction of Smętowo station, on the same track, as the second train, departed passenger train MPE 54170 of the carrier PKP Intercity S.A., which was supposed to pass through Smętowo station without stopping on station track 2. The train consisted of locomotive EP07-395 and 11 wagons. Both trains were on the track Morzeszczyn - Smętowo and they were moving on the basis of signals emitted by semaphores of the EAC type multi-output automatic blockade. A train dispatcher and signalmen of Smętowo station prepared the route by displaying permissive signals on semaphores: - A 1/2 - signal S2 (one continuous green light), X - signal S2 (one continuous green light) for train TDE 752009 to pass without stopping on track 1; - Z 1/2 signal S13 (two continuous orange lights) for train TMS 564024 to enter the main additional track 32. Train TMS 564024 at Smętowo station entered track 32 at 21:51 and travelled on this track at a steady speed of approximately 17 km/h, for the entire runway. At that time MPE 54170 passenger train was approaching Smętowo station for which, after preparing the route (non-stop passage) the S2 signal (one continuous green light) were displayed on the entry semaphore Z1/2 and the exit semaphore C. When these signals were given, passenger train MPE 54170 was on the penultimate interval of the automatic line block system (SBL). Train TMS 564024 did not stop in front of the S1 (Stop) signal (one red light) given by the L2 signal semaphore, on track 32. The driver of train number TMS 564024 realised, when passing L2 semaphore, that the signal S1 'Stop' is on and changed the train adjuster to reverse speed in order to move the train back asap, and then applied the emergency brakes, which caused the train to continue towards turnout no. 24, and the head of the train stopped 38 m behind the L2 semaphore. At the same time train MPE 54170 was on station track 2. The driver of train MPE 54170 when realised that train no. TMS 564024 is in the gauge of track no. 2, applied sudden braking, but despite this, with the speed of 110 km/h, collided by the right side of its locomotive EP07 with the left side of locomotive S200 - 303 of train TMS 564024, which was too close (indicator W17) to the turnout no. 24. As a result of the collision, the locomotive and seven coaches of train MPE 54170 derailed to the left side in the intertrack of tracks 1 and 2. The front end of train MPE 54170 stopped at kilometre 457.270 at a distance of 184 metres from the collision site. The derailment of train MPE 54170 caused damage to track 1 and its control equipment, which consequently led to an automatic change of the image on entry semaphore A1/2 from signal S2 (continuous green) to signal S1 (continuous red) for freight train TDE 752009, which stopped in front of the semaphore. As a result of the accident, 28 passengers of train MPE 54170 were injured, 10 of them seriously. REPORT No. PKBWK/03/2018.

- Accident on 19.05.2019 15:25 hours which has occurred as a result of side collision of a pushed composition of empty wagons (coal coaches) from track 309, which was too close to turnout No 452 of Rybnik Towarowy station, with a freight train TMS 444255 relation Rybnik Towarowy - Chałupki having permission signal (S10) on exit semaphore T3082, of track no. 308.

On 19.05.2019 15:25 hours at Rybnik Towarowy station, during the departure of a freight train TMS 444255, having a permission signal (S10) on the departure semaphore T3082 of track 308, a side collision occurred, at the turnout no. 452, with a simultaneously mistakenly pushed, on track no. 309, composition of empty wagons, which were in too close proximity to the mentioned turnout. This resulted in the derailment of three empty wagons of the pushed composition. Also, 8 loaded wagons of the outgoing freight train TMS 444255 relation Rybnik Towarowy - Chałupki were damaged. Moreover, elements of the infrastructure were destroyed (mechanical switch drives of crossovers No 452 and 455 together with the tracks, turnouts No 452 and 455 as well as eight wooden sleepers between turnout No 452 and 455). The speed of the pushed empty wagons (coaches) composition at the time of the accident was about 10 km/h, while the speed of the TMS 444255 freight train at the time of the event was 16 km/h. REPORT No. PKBWK/01/2020.

- Serious train accident on 09.03.2020 at 04:15 hours in station track no. 2 of Szymankowo station at km 287.360; main rail line No. 9 Warszawa Wschodnia Osobowa - Gdańsk Główny, area of infrastructure manager PKP PLK S.A. Gdynia Railway Department.

On 09.03.2020 at approx. 04:15 hrs the motor trolley WMB10-182 (work train Rob.1), while driving from closed track no. 2 to Szymankowo station, did not stop before the entry semaphore "P" transmitting signal S1 "Stop". Simultaneously on track no. 1 Tczew - Szymankowo in the same direction was moving train LTE 555122 (locomotive E186-261, carrier HSL Polska Sp. z o. o.) from Gdynia Port GPA to Malbork station, which had an established route from this track, to track no. 2 of Szymankowo station. The route of this train included among others turnout no. 26. After LTE 555122 train had passed entry "O" semaphore showing "S6 - free way, proceed at speed not exceeding 100 km/h" signal, the train continuing further on the track connecting track 1 with track

Report from the investigation of railway accident occurred on 26.02.2021 at 0532 hours at Grodzisko Dolne station, track no. 2, at km 163.654 of railway line No. 68 Lublin Główny - Przeworsk.

2, and collided at a speed of 76.7 km/h with a motor trolley WMB10-182, which stopped at turnout no 26 being in the path of the train LTE 555122 (motor trolley WMB10-182 of PKP PLK S.A. Gdynia Railway Department). As a result of the collision two people died: the driver of the motor trolley and the track fitter riding with him, the WMB10-182 motor trolley was destroyed, and also the electric locomotive E186-261 and elements of the railway infrastructure were damaged. REPORT No. PKBWK 01/2021.

## V. CONCLUSIONS

### 1. Summary of analysis and conclusions on the causes of the accident

The investigation team found that

1. The driver of locomotive 6Dg-140 of LOTOS Kolej Sp. z o.o. stopped the train on track 4, in a place making it difficult to observe the indications of outbound semaphore D2, giving a night signal Sr1 (one red light), that is 222 m before this semaphore.
2. The driver of locomotive 6Dg-140 misidentified the indications of exit semaphore C set at track no. 2, giving the night signal Sr2 (upper green light) for train MPE38100 (of carrier PKP INTERCITY S.A.), as the signal for his train given on semaphore D.
3. The signalman of the GD1 executive control room, operating the lever of the signal semaphore C, set the signal permitting the train MPE38100 to leave in the direction of Leżajsk. Having made sure that the locomotive was on track 4, he left the window, going to the WC room (located at the rear of the control room, behind the block apparatus and the dependence box). However, he did not enter this room but proceeded to observe the approaching train MPE38100 from the window of the control room, perpendicularly in the direction of the tracks. While walking to the window, and before starting observation, he heard the cracking noise made by the lever of crossover no 6 during its decoupling, after which he noticed that there is no longer a train LSS335064 on track four. The locomotive 6Dg-140, after passing the exit semaphore D, entered the crossover of turnout no. 6. The distance from semaphore D to the crossover of turnout No. 6 is 34 metres, which the locomotive passed in 6 seconds. The length of the distance travelled by the locomotive while driving without permission as well as passing semaphore D towards turnout no. 6, in such a short time, made it impossible for the signalman to take appropriate actions to stop the trains.
4. The driver of train LSS335064 operated by locomotive 6Dg-140 started the train (at the moment when train MPE38100 was approaching K semaphore) and after starting he did not observe the indications of passed semaphore D<sup>2</sup> and did not observe the route within executive control room borders, indications of crossover no. 6 light showing position of spires not for his direction of travel (§ 64 sec. 1(3), (2) of the Ir-1 Instruction), he drove onto the crossover of turnout no. 6 causing its ripping, and entered the route of the MPE38100 train without automatically changing the transmitted signal on semaphore C "free way" to "stop", due to the type of equipment.
5. At the time when locomotive 6Dg-150 entered turnout no. 6, train MPE38100 was 65 metres before semaphore C and 99 metres before the crossover of turnout no. 6, moving at a speed of 99 km/h. Stopping the locomotive before the crossover of turnout no. 6 as shown in section 2 was impossible. On the other hand, if the driver had attempted to stop the locomotive, the stopping of the locomotive would have occurred only at the crossover of turnout no. 6, which would have increased the consequences of the accident.  
Entering turnout no. 6, the driver of locomotive 6Dg-140 noticed the lights of an approaching train from behind and made the right decision by increasing the speed of his locomotive, thus reducing the impact of the accident.
6. The driver of train MPE38100, proceeding without stopping through the station on track 2, at km 164.064, at a distance of about 300 metres ahead, noticed the Pc5 signal of train LSS335064 proceeding on track 4, which was at that time 20 metres ahead of semaphore D. Then, being 65 metres ahead of semaphore C, he noticed that the train was in his path. He applied the emergency brakes at a speed of 99 km/h, despite this he collided with the rear of locomotive 6Dg-140 moving at a speed of 60.770 km/h. The speed of locomotive 6Dg-140 at the time of collision was 21.32 km/h.

The investigation team considered that the other circumstances contributing to the accident were the early morning hours (around 05:20), and limited visibility at night.

As a result of its analysis, the Commission's Investigation Team identified the following inadequate safety measures related to the accident for which remedial measures are recommended:

- The traffic officer of Grodzisko Dolne station, having given information to the driver of train LSS335064 about entering the station and stopping on track 4 to let a fast train pass, did not complement this information with the message about the need to let one more fast train pass.
- Lack of uninterrupted visibility of the Sr1 night-time signal from semaphore D2 (exit track 4) due to obstruction by overhead line poles, when continuing on track 4.
- Fixing of tables in non-compartment passenger coaches which does not guarantee passenger safety, allowing them to be detached (without passenger involvement) due to inertial forces after a train collision.
- Railway undertaking LOTOS Kolej Sp. z o. o. did not implement order of the President of Office of Rail Transport (UTK) No. DBK-550/R03/KB/12 of 30.05.2012, addressed to railway undertakings, about obligation to install pre-field devices - digital cameras or video recorders in newly built and operating railway vehicles according to recommendation of PKBWK - No. PKBWK-076-305/RL/R/11 of 22.11.2011.

As a result of its analysis, the Commission's Investigation Team identified other deficiencies with potential safety implications, resulting from additional observations in a context other than the causal one or contributing to the accident, for which the following remedial measures are recommended:

- Failure to carry out the diagnostic recommendation following the building facility inspection regarding the renovation of traffic control equipment at Grodzisko Dolne station, inter alia, replacement of shape semaphores by light semaphores.
- At Grodzisko Dolne station the condition of the track system and the signalling equipment does not comply with the documentation, e.g. for routes B2 and A<sup>2/3</sup>.



Photo 8 – view from the driver's cab of train MPE38100 travelling on track 2 when train LSS335064 was travelling on track 4 and was 20 metres in front of exit semaphore D.

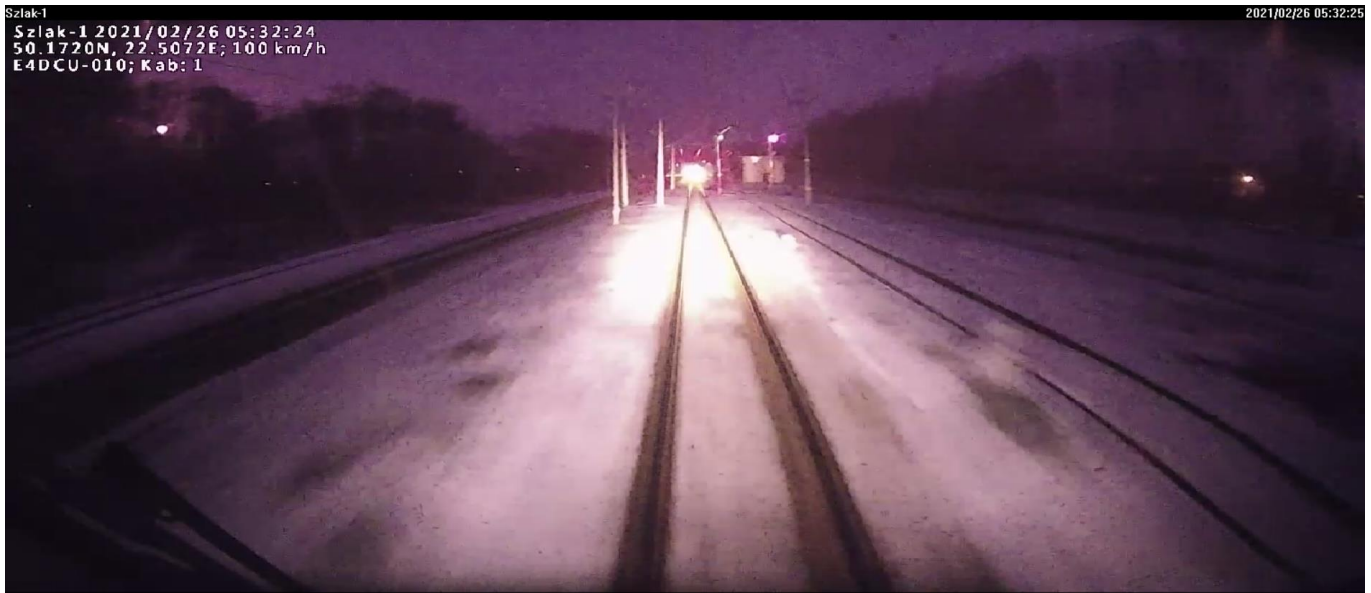


Photo 9 - view from the cab of a train travelling on track 2 at the time it implemented emergency braking as train LSS335064 entered its path, i.e. 99 metres ahead.

## 2. Measures taken since the accident

There was no need for this.

## 3. Additional remarks

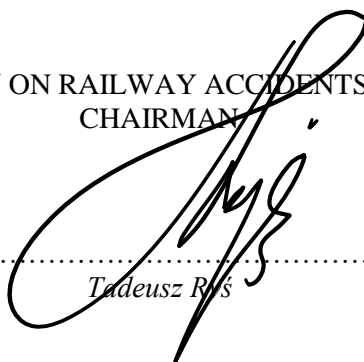
1. Railway Infrastructure Managers carrying out maintenance and reconstruction of signalling equipment in a station should work towards unification of systems (equipment) affecting the safety of train movements in the area of the station, e.g. traffic lights, occupation control equipment, crossing devices, etc.
2. The driver of train MPE38100 of the carrier PKP INTERCITY S.A., while driving on the Tryńcza - Grodzisko Dolne route and during the passage through the Grodzisko Dolne station, was listening to too loud music in a way making it impossible to hear any transmitted sound signals, e.g. ALARM.



## VI. SAFETY RECOMMENDATIONS

- 1) Infrastructure managers shall ensure that train dispatchers, when providing information to railway vehicle drivers that trains must be allowed to pass, will keep them constantly informed about changes to the traffic organisation of the station.
- 2) To ensure visibility of semaphore D at Grodzisko Dolne station of PKP PLK S.A., the Rzeszów Railway Department will move the overhead traction line poles 163-44 located in the area of GD1 setting circle.
- 3) Infrastructure managers shall perform exceptional checks on the visibility of semaphores, during day and night, in stations with overhead traction lines, both over the main and auxiliary tracks.
- 4) Railway undertakings will take measures to improve passenger safety on trains through the appropriate fitting of tables in passenger coaches without compartments, guaranteeing travellers' safety.
- 5) The infrastructure manager will implement the recommendation specified in the protocol from diagnostic tests of railway traffic control devices (hereinafter referred to as the rtc devices, see Protocol No. IZATA-I/3-22-068/2019 of 21.06.2021) with the following content: *"Provide for renovation of railway traffic control (rtc) devices, replacement of shaped semaphores with light semaphores and installation of EAP (Interlocking Early Action Project) on adjacent routes to Tryńcza-Leżajsk station"*.
- 6) To ensure safety of train traffic on routes a<sup>1</sup> b<sub>2</sub> and a<sup>2</sup><sub>3</sub> PKP PLK S.A., Rzeszów Railway Department, will restore the technical condition of infrastructure in Grodzisko Dolne station to the currently existing technical documentation.
- 7) Railway undertakings and infrastructure managers shall introduce internal rules to restrict the use of non-traffic related multimedia devices by train crew and traffic posts staff, hindering the correct reception of the acoustic signals and announcements made as well as shall include this issue in the programme of periodic instructions.
- 8) Railway undertaking LOTOS Kolej Sp. z o. o. will implement order of the President of Office of Rail Transport (UTK) No. DBK-550/R03/KB/12 dated 30.05.2012, addressed to railway operators, about obligation to install pre-field recording devices - digital cameras or video recorders in newly built and operating railway vehicles, according to recommendation PKBWK-076-305/RL/R/11 dated 22.11.2011.

STATE COMMISSION ON RAILWAY ACCIDENTS INVESTIGATION  
CHAIRMAN



.....  
Tadeusz Ryś

List of entities appearing in the content of the Report No. GDPWK 02/2022

No.	Abbreviation	Explanation
<i>1</i>	<i>2</i>	<i>3</i>
1.	ERA	European Union Agency for Railways
2.	PKBWK	State Commission on Railway Accidents Investigation
3.	UTK	Office of Rail Transport
4.	IZ	PKP PLK S.A. Department of Railways
5.	PKP INTERCITY S.A.	Railway undertaking
6.	LOTOS Kolej Sp. z o. o.	Railway undertaking