



STATE COMMISSION ON RAILWAY ACCIDENT INVESTIGATION
Ministry of the Interior and Administration

REPORT No. PKBWK 04/2025

**on the investigation of a railway accident
that occurred on 1 May 2024 at 10:34 hrs
at Rudna Gwizdanów station, on track 1 on turnout no. 2,
at km 38.973 of railway line no. 289 Legnica - Rudna Gwizdanów**

area of infrastructure operator PKP PLK S.A. Railway Line Plant in Wrocław

WARSAW, 2 June 2025

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

**Pursuant to Article 28f (3) of the Act of 28 March 2003 on rail transport, the Commission's investigation determines
neither guilt nor liability.**

This Report has been prepared under the provisions of Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports (OJEU L 132 of 27 April 2020)

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I. ABSTRACT

Type of occurrence:	Accident.
Description of the occurrence:	When freight train TME 664015 operated by railway carrier POL-MIEDŹ TRANS Sp. z o.o. on the route between the line siding Lubin Kghm and Głogów Wróblin was passing from the single-track route at junction Koźlice - Rudna Gwizdanów onto track 1 of Rudna Gwizdanów station on railway line no. 289, on turnout no. 2, an axle of the second wheel set of the first bogie in the ninth wagon behind the locomotive fractured, causing to the derailment of six freight wagons with dangerous goods according to RID classification 90UN3077 (copper ore concentrate), i.e. the 9th, 10th, 14th, 15th, 16th and 17th wagons behind the locomotive.
Date of the occurrence:	1 May 2024, 10:34 hrs.
Location of the occurrence:	Railway line no. 289 Legnica - Rudna Gwizdanów, kilometre 38.973, turnout no. 2, track 1, geographical location: 51°31'35.3"N, 16°16'55.4"E.
Consequences of the occurrence:	<p>The following wagons were found to have been derailed as a result of the occurrence:</p> <ul style="list-style-type: none"> – EVN 84 51 0835 092-5; the ninth wagon behind the locomotive, – EVN 84 51 0835 082-6; the tenth wagon behind the locomotive, – EVN 84 51 0835 101-4; the fourteenth wagon behind the locomotive, – EVN 33 51 0665 185-4; the fifteenth wagon behind the locomotive, – EVN 84 51 0835 028-9; the sixteenth wagon behind the locomotive, – EVN 84 51 0835 059-4; the seventeenth wagon behind the locomotive, <p>Furthermore, the train was torn apart between the fourteenth and fifteenth wagon behind the locomotive. Turnouts no. 3 and 7, including turnout elements and track sections in the path of the train, were damaged.</p>
Causal factor: <i>(means any action, omission, event or condition, or a combination thereof that, if corrected, eliminated, or avoided, would have prevented the occurrence, in all likelihood)</i>	Fatigue fracture of axle no. 018808849 of the second wheel set of the first bogie of a Tals-type wagon no. EVN 84 51 0835 092-5.
Contributing factors: <i>(means any action, omission, event or condition that affects an occurrence by increasing its likelihood, accelerating the effect in time or increasing the severity of the consequences, but the elimination of which would not have prevented the occurrence)</i>	<ol style="list-style-type: none"> 1. The limit values (sulphur concentration, yield strength), which were in line with the standards applicable at the axle manufacture date and were not considered dangerous, but are unacceptable according to the currently applicable standards and represent a risk factor when exceeded. 2. Occurrence of corrosion in the axle fracture cross section. 3. Exceeding of the surface roughness limit for the central part of the axle.
Systemic factor:	None found.

Recommendations and their addressees:	<ol style="list-style-type: none">1. Entities in charge of maintenance of freight wagons (ECMs) shall update their maintenance system documentation (MSD) as regards the model document (report) for non-destructive testing (NDT) to identify the area covered by the axle test, in accordance with Appendix 1 to the Recommendation of the President of UTK of 29 December 2024 regarding NDT testing of axles of wheel sets in freight wagons.2. Entities in charge of maintenance of freight wagons (ECMs) shall make it obligatory from now on to carry out documented detailed¹⁾ non-destructive tests of axles of wheelsets before they are put back into service in accordance with Recommendation No. 6 in PKBWK Report no. 02/2024.3. Entities in charge of maintenance of freight wagons (ECMs) shall identify and then carry out documented detailed non-destructive testing of all reusable wheel set axles placed on the market and/or put into service in the last five years for which there is no documented operation and maintenance history.
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¹⁾ The scope of a detailed non-destructive test of freight wagon wheelset axles, as referred to in this Report, includes inter alia an inspection as per EVIC, removal of the wheelsets from under a freight wagon, removal of bearings and exposure of the centre section of the axle. The test must be carried out with the ultrasonic testing (UT) and magnetic particle testing (MT) methods following removal of the protection coating from the side surface of axle journals and from the centre section of the axles.



Photograph 1 - A view of the wagon with the fractured axle following the accident (source: materials provided by the railway commission)



Photograph 2 - A view of the wagon with the fractured axle following the accident (source: materials provided by the railway commission)



Photograph 3 - A view of the fractured axle (source: PKBWK's own material)



Photograph 4 - A view of the fractured axle (source: PKBWK's own material)

II. THE INVESTIGATION AND ITS CONTEXT

1. Decision to establish an investigation

On 16 May 2024, the Chairman of the State Commission for Railway Accident Investigation (hereinafter referred to as "PKBWK" or "the Commission") Tadeusz Ryś issued decision no. PKBWK.590.3.2024 to establish an investigation of the circumstances of the railway accident that occurred on 1 May 2024 at 10:34 hrs at Rudna Gwizdanów station on track 1, km 38.973 of railway line no. 289 Legnica - Rudna Gwizdanów. Pursuant to the provisions of Article 28e(4) of the Act on rail transport (Journal of Laws of 2024, item 697, as amended), hereinafter referred to as "the Rail Transport Act", the occurrence was reported on 22 May 2024 to the European Union Railway Agency and was registered in the EURA's database under number PL-10550.

2. Motivation for the decision to establish an investigation

Based on an analysis of the circumstances of the occurrence, considering that it was an accident which forms a series of accidents concerning the system as a whole, in accordance with Article 28e(3)(2) of the Rail Transport Act, the Chairman of PKBWK decided to establish an investigation to be conducted by the Commission's Investigation Team.

3. Scope and limits of the investigation including a justification thereof, as well as an explanation of any delay that is considered a risk or other impact to the conduct of the investigation or its conclusions

There were no limits during the investigation that would have a negative impact on its course.

The investigation into the circumstances of the occurrence was conducted under Article 28h(1) of the Rail Transport Act and, in accordance with the provisions of Article 28f(3), does not determine guilt or liability.

4. An aggregated description of the technical capabilities and the functions in the team of investigators

The Chairman of the Commission appointed a team from among the standing members of the Commission to carry out the investigation.

5. A description of the communication and consultation process established with persons or entities involved in the occurrence during the investigation and in relation to the information provided

Pursuant to Article 28h(2)(5) of the Rail Transport Act, the Chairman of PKBWK obliged the designated persons from among the members of the railway commission to cooperate with the Investigation Team on a permanent basis under written request no. PKBWK.590.3.1.2024 of 16 May 2024 addressed to their employers. Furthermore, by letter no. PKBWK.590.3.2.2024 of 20 May 2024, he obliged the chairman of the railway commission to hand over the accumulated documentation to the Investigation Team.

On 28 May 2024, the documentation accumulated by the railway commission was officially handed over at the headquarters of the Operations Section in Głogów, PKP PLK S.A. Railway Line Plant in Wrocław.

As part of the investigation, in accordance with Article 28h(2)(5) of the Rail Transport Act, by letter no. PKBWK.590.3.3.2024 of 22 May 2024, the Chairman of the Commission requested the railway carrier POL-MIEDŹ-TRANS Sp. z o.o. to commission a notified body to carry out an expert examination of the fractured axle.

6. A description of the level of cooperation offered by the entities involved

During the investigation, the level of cooperation with the representatives of the entities involved in the circumstances of the occurrence was standard and did not raise any reservations of the Investigation Team.

7. A description of the investigation methods and techniques as well as analysis methods applied to establish the facts and findings referred to in the report

Throughout the process aimed at investigating the circumstances of the occurrence, the Investigation Team relied on their own knowledge, experience and established findings.

The Team used their own documentation as well as documentation gathered by the railway commission.

As part of the investigation, the Investigation Team prepared/carried out inter alia the following activities:

- examination of the scene after the accident,
- site inspections of the occurrence site,
- interviews with the employees involved in the occurrence,
- analysis of the results of the expert opinion on the cause of the axle fracture carried out by TÜV Rheinland Polska Sp. z o.o.,
- an analysis of the contents of the train event data recorder,
- analyses of the Safety Management System (SMS) of the infrastructure manager,
- analysis of the rail vehicle's maintenance system documentation (MSD),
- analysis of the Safety/Maintenance Management System (SMS/MMS) of the carrier and the entity in charge of maintenance,
- inspections at the headquarters of the entity in charge of maintenance of the wagons, the headquarters of the wheelset supplier, and at the P5 maintenance provider of the coal wagons.

Listed below are selected legal acts, regulations and internal instructions of the entities involved in the occurrence that were used in the course of the investigation:

European Union Regulations and Directives:

- 1) Regulation (EU) No. 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation; OJ EU L 119, 04.05.2016, p. 1, as amended) and the related Act of 10 May 2018 on the protection of personal data (Journal of Laws, item 1000).
- 2) Commission Implementing Regulation (EU) 2020/572 of 24 April 2020 on the reporting structure to be followed for railway accident and incident investigation reports (OJEU L 132, 27.04.2020).
- 3) Directive (EU) 2016/798 of the European Parliament and of the Council of 11 May 2016 on railway safety (OJ EU L 138, 26.05.2016, p. 102, as amended).

National rules:

- 1) Rail Transport Act of 28 March 2003 (consolidated text: Journal of Laws of 2024, item 697, as amended).
- 2) Regulation of the Minister of Infrastructure of 11 January 2021 on personnel employed in positions related directly to the operation and safety of rail traffic and to the driving of specific types of rail vehicles (Journal of Laws of 2021, item 101, as amended).
- 3) Regulation of the Minister of Infrastructure of 18 July 2005 on general conditions for rail traffic operation and signalling (consolidated text: Journal of Laws of 2015, item 360, as amended).
- 4) Regulation of the Minister of Infrastructure and Construction of 27 January 2016 on general technical conditions for operation of rail vehicles (Journal of Laws 2016, item 226, as amended).

Internal instructions of railway infrastructure manager PKP PLK S.A.(selected)

- 1) Ie-1 (E-1) Instruction on signalling operations,
- 2) Ir-1 Instruction on operating railway traffic,
- 3) Ir-8 Instruction on the handling of serious accidents, accidents and incidents in railway transport.

Internal instructions of railway carrier and entity in charge of maintenance POL-MIEDŹ TRANS Sp. z o.o. (selected)

- 1) TKt-1 train driver instruction,
- 2) TKuw-2 Instruction on the rules of technical maintenance of standard -gauge freight wagons.

8. A description of the difficulties and specific challenges encountered during the investigation

Members of the Investigation Team did not encounter any difficulties or problems that could have impact on the course, timeliness or conclusions of the investigation.

9. Any interaction with the judicial authorities.

No interaction with the judicial authorities was required.

10. Other information relevant in the context of the investigation

By letter No. PKBWK.590.3.3.2024 of 22 May 2024, the Chairman of the Commission requested the President of the Management Board of POL-MIEDŹ TRANS Sp. z o.o. to commission an expert examination of the fractured axle to determine the cause of the fracture.

On 12 July 2024, the Management Board of POL-MIEDŹ TRANS Sp. z o.o. commissioned TÜV Rheniland Polska Sp. z o.o. in Zabrze to conduct the examination.

III. DESCRIPTION OF THE OCCURRENCE

1. The occurrence and background information

1.1. Description of the type of occurrence

The accident involved a derailment of a loaded Tals type wagon No. 84 51 0835 092-5, the ninth wagon in freight train TME 664015 operated by carrier POL-MIEDŹ TRANS Sp. z o.o., as a result of a fracture of the axle of the second wheel set in the first bogie. Furthermore, five freight wagons were derailed, i.e. the tenth, fourteenth, fifteenth, sixteenth and seventeenth wagons behind the locomotive.

1.2 The date, exact time and location of the occurrence

The accident occurred on 1 May 2024 at 10:34 hrs at Rudna Gwizdanów station at turnout no. 2 of railway line no. 289 Legnica - Rudna Gwizdanów at kilometre 38.973, track 1; geographical location: 51°31'35.3"N, 16°16'55.4"E.

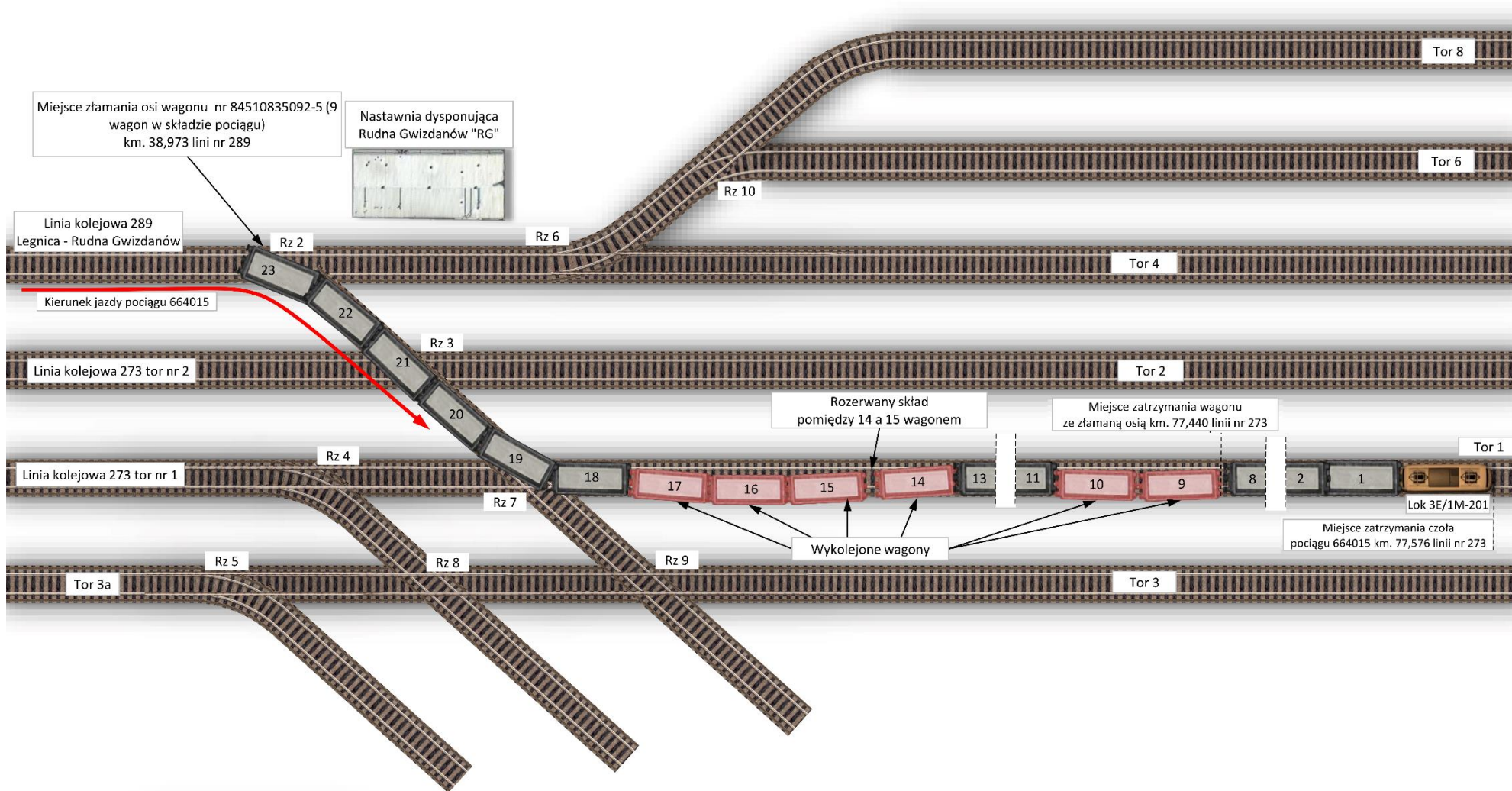
1.3. The description of the occurrence site, including weather and geographical conditions at the moment of the occurrence and if any works were carried out at or in the vicinity of the site

Rudna Gwizdanów station, railway line no. 289 Legnica - Rudna Gwizdanów, turnout no. 2, track 1.

Good weather conditions, no precipitation, temperature +20°C, good visibility.

At the time of the accident there were no works on rail infrastructure in progress near or at the place of the accident.

Figure1 - A drawing of the accident (prepared by PKBWK)



1.4. Deaths, injuries and material damage

a) passengers, employees or contractors, level crossing users, trespassers, other persons at a platform, other persons not at a platform

No person was injured in the occurrence.

b) cargo, luggage and other property

The cargo carried on the train was not damaged.

c) rolling stock, infrastructure and the environment

Wagon no. 84 51 0835 092-5 (ninth behind the locomotive) derailed with the second wheelset of the first bogie to the left side looking in the direction of travel;

- bogie no. 97565 - deformed bogey frame,
 - first wheelset no. 018125611 - damage due to the derailment,
 - second wheelset no. 018808849 - fractured axle,
- bogie no. 17860 - deformed bogey frame,
 - third wheelset no. 018185747 - damage due to the derailment,
 - fourth wheelset no. 018249999 - damage due to the derailment.

Wagon no. 84 51 0835 082-6 (tenth behind the locomotive) derailed with two wheelsets of the first bogie to the right side looking in the direction of travel.

Wagon no. 84 51 0835 101-4 (fourteenth behind the locomotive) derailed with four wheels and tilted to the right side looking in the direction of travel.

Wagon no. 33 51 0665 185-4 (fifteenth behind the locomotive) derailed with two wheelsets of the first bogie to the right side looking in the direction of travel.

Wagon no. 84 51 0835 028-9 (sixteenth behind the locomotive) derailed with two wheelsets of the first bogie to the right side looking in the direction of travel.

Wagon no. 84 51 0835 059-4 (seventeenth behind the locomotive) derailed with two wheelsets of the first bogie to the right side looking in the direction of travel.

As a result of the derailment, the train was separated between the fourteenth and fifteenth wagons, counting from the head of the train, and the draw gear of the wagons was damaged.

Visual examination of the damaged wheelsets of wagon no. 84 51 0835 092-5 confirmed damage to the wheels and axles qualifying them for scrapping.

The following elements of the railway infrastructure located in the path of the train were damaged:

- control and setting rods for the Siemens S700K drive of turnout no. 7;
- left turnout guard rail no. Rkpd 3ab;
- left turnout guard rail no. Rkpd 3ab;
- left inner turnout half-switch no. Rkpd 7cd with accessories;
- right inner turnout half-switch no. Rkpd 7cd with accessories;
- oak turnout bearers - 37 pieces with fixings;
- oak sleepers reinforced with S60 track plates - 25 pieces;
- concrete sleepers of type PS-83Sb - 146 pieces;
- SB attachments - 584 pieces;
- 60E1- 60 mb;
- turnout heating elements.

1.5. The description of other consequences, including the impact of the occurrence in the regular operations of the actors involved

As a result of the occurrence, traffic was suspended on the routes adjacent to Rudna Gwizdanów station from 10:35 hrs to 12:40 hrs on 1 May 2024. Tracks no. 1, 3, 5, 7 of Rudna Gwizdanów station were closed until 7 May 2024. The aforementioned train traffic restrictions caused delays of 655 passenger trains for a total of 11,036 minutes, and 112 freight trains for a total of 25,713 minutes.

1.6. The identification of the persons, their functions, and entities involved, including possible interfaces to contractors and/or other relevant parties

The Investigation Team identified individuals and entities connected with the occurrence:

- the driver of train TME 664015,
- the signaller at Rudna Gwizdanów station,
- the point operator at Rudna Gwizdanów station,
- POL-MIEDŹ TRANS Sp. z o.o. - the carrier and ECM for the freight wagons of train TME 664015,
- TABOR Dębica Sp.z.o.o - the P5 maintenance provider,
- Sylwester Komisarek P.W. Inter-KomTrans - the supplier of the axles.

1.7. The description and identifiers of train(s) and their composition including the rolling stock involved and their registration numbers

Railway carrier POL-MIEDŹ TRANS Sp. z o.o.

Freight train TME 664015 was composed of locomotive 3E/1M-201 operated by railway carrier POL-MIEDŹ TRANS Sp. z o.o. and 23 Tals, Talns, Tads and Fals freight wagons loaded with dangerous goods number 90UN3077 (copper ore concentrate).

Locomotive 3E/1M-201 has EVN 91 51 3 140 049-0 and notice of return to operation no. L_P-24/04/0052 issued on 23 April 2024 in Polkowice - vehicle mileage 229,945 km. Year of manufacture 1961, serial number 201.

The railway wagon where the axle fracture occurred:

- Type 24VeCu/M,
- Tals series,
- EVN 84 51 0835 092-5,
- *"Notice of return of a freight wagon to operation"* no. PMT/DW/369/2022 of 31 October 2022, valid until 8 October 2024 or for 81,638 km of mileage. The wagon's mileage as recorded by the owner was 59,771 km.

Train TME 664015 was admitted to operations following a required detailed brake test conducted on 1 May 2024 at the KGHM Lubin siding. A simplified brake test following a replacement of the locomotive was conducted on 1 May 2024 at 10:30 hrs at Lubin station.

TME 664015 data:

- | | |
|--------------------------------------|------------------|
| – length | – 215,62 m |
| – total mass | – 1890.90 tonnes |
| – percentage of braked mass required | – 48 % |
| – required braked mass | – 853.87 tonnes |
| – actual braked mass | – 1277.00 tonnes |
| – percentage of actual braked mass | – 67.53 % |

1.8. A description of the relevant parts of the infrastructure and signalling system – track type, switch, interlocking, signal, train protection systems

Track superstructure:

- | | |
|-------------------|--------------------|
| – rail type | – 60E1 |
| – turnout bearers | – hardwood |
| – sleepers | – concrete PS-83Sb |

- attachment type – SB
- ballast type – crushed stone
- turnout no. 7 – on hardwood turnout bearers, crushed stone ballast
- turnout no. 3 – on hardwood turnout bearers, crushed stone ballast

Signalling equipment:

Mechanical equipment, centralised with the light signalling system

Indications by the equipment in the traffic post:

- B1/2 home signal showing the red aspect,
- turnout no. 2 free, white light in the minus " - " position,
- ItB section free, white light,
- turnout no. 3 - switch rung-through indicated,
- turnout no. 7 - switch run-through indicated,
- turnout no. 9 - switch rung-through indicated,
- PuB block - red window,
- A²b^{2/2} permission block - white window,
- G¹H²I²K² order block - white window,
- G signal - green light,
- route lever ^{B1/2} switched to "+",
- relay room sealed,
- block apparatus sealed,
- padlocks and buttons sealed,
- the status of the meters as per the documentation kept.

Equipment on the ground as indicated by the equipment in the traffic post. Turnout positions in the path of travel in accordance with the route followed.

2. The factual description of the events

2.1. The proximate chain of events leading up to the occurrence, including actions taken by persons involved, the functioning of rolling stock and technical installations, the functioning of the operating system

On 01.05.2024 at 10:34 hrs a route was set from the line track of junction Koźlice - Rudna Gwizdanów onto track 1 of Rudna Gwizdanów station for train TME 664015 (POL-MIEDŹ TRANS Sp. z o.o.) travelling from Lubin Kghm Bsz to Głogów Wróblin, consisting of locomotive 3E/1M-201 and 23 covered freight wagons of types Tals, Talns, Tads and Fals loaded with dangerous goods No. 90UN3077. The train travelled on the permissive aspect on the B^{1/2} home signal, onto track 1 via turnouts 2, 3ab/cd, 7ab/cd and 9ab/cd. While the train was travelling through turnout no. 2, the axle of the second wheel set of the first bogie in the ninth wagon behind locomotive (no. 84 51 0835 092-5) fractured. The axle fracture resulted in the derailment of the wagon at km 38.973 of railway line no. 289. The point operator at Rudna Gwizdanów station, who was watching the on-coming train, noticed the derailment of the wagon and immediately informed the signaller at Rudna Gwizdanów station, who used the "Radio-stop" button and stopped the train. From the moment when the derailment was noticed to the moment the train stopped, train TME 664015 travelled approximately 353 metres. The derailment occurred at a speed of approximately 20 km/h. The locomotive and the first eight wagons entered track 1 in a non-railed condition. The derailed ninth wagon travelled approximately 220 metres causing damage to the track infrastructure, which led to the derailment of the following wagons:

- tenth wagon in the train, EVN 84 51 0835 082-6,
- fourteenth wagon in the train, EVN 84 51 0835 101-4,
- fifteenth wagon in train, EVN 33 51 0665 185-4,
- sixteenth wagon in the train, EVN 84 51 0835 028-9,
- seventeenth wagon in the train, EVN 84 51 0835 059-4.

The accident also resulted in separation of the train between the 14th and 15th wagons behind the locomotive and damage to the rail superstructure, including turnouts in the path of the train. Furthermore, there was damage to track 1 over a length of 60 m, and to the turnout segments. The stopped train prevented traffic on tracks No. 1, 3, 5 and 7 of Rudna Gwizdanów station. The accident did not lead to a release of the transported dangerous goods (copper ore concentrate) from the wagons.

2.2. The chain of events from the occurrence until the end of the actions of the rescue services, including measures taken to protect and safeguard the site of the occurrence, the efforts of the rescue and emergency services.

The signaller at Rudna Gwizdanów station notified the line and plant dispatchers and his immediate superiors about the accident. Due to the derailment and the inability to operate traffic, train traffic on adjacent routes was suspended. Outcomes of the occurrence required conducting an operation involving railway emergency services. The emergency operation commenced at 10:34 hrs on 1 May 2024. The WM15A/PRT-00 Technical Rescue Car from Wrocław Nadodrze arrived on site at 16:46 hrs. A rescue train from Wrocław Nadodrze arrived on site at 23:00 hrs. A maintenance train was on site at 00:12 hrs on 2 May 2024. At 01:55 hrs, the overhead line of Rudna Gwizdanów station was de-energised over tracks no. 1, 3, 5, 7, 9 and line track no. 1 for the purpose of accident recovery. The rescue operation and repair of the track infrastructure ended on 7 May 2024.

The derailed wagons were re-railed and shunted onto a side track of Rudna Gwizdanów station. The damaged wheel sets of wagon no. 84 51 0835 092-5 were secured by the carrier until transfer for testing by a competent notified research body.

IV. ANALYSIS OF THE OCCURRENCE

1. Roles and duties

1.1. Railway undertaking(s) or infrastructure manager(s)

Infrastructure operator PKP PLK S.A. Railway Line Plant in Wrocław

The primary task of the railway infrastructure manager is maintenance and operation of railway infrastructure as regards:

- a) provision of railway infrastructure and related services, and collection of charges thereon,
- b) safe operation of railway traffic.

The train was running on the basis of a timetable, and the entry was set on the basis of an organised route. The condition of the railway infrastructure and the manner of the train driving did not contribute to the occurrence.

Railway carrier POL-MIEDŹ TRANS Sp. z o.o.

The locomotive and freight wagons designated to carry out the transport task by the railway carrier had a rail vehicle type operation approval certificate and a valid technical railworthiness certificate. The designated train crew that operated the train held all ratings and qualifications requirement by law. The train was run based on a timetable.

The responsibilities of railway carriers concerning safe operation of rail vehicles are laid down in the infrastructure manager's instructions *Ir-1 – Instruction on operating railway traffic*, *Ie-1(E-1) – Instruction on signalling operations*, and the internal instruction of the railway carrier *11 – Instruction for a traction vehicle driver*. Based on an analysis of the material gathered in the case, the Investigation Team did not find any irregularities in the conduct of the train crew during operation of the train or after the occurrence.

1.2. The entities in charge of maintenance, the maintenance workshops, or any other maintenance suppliers

Based on the documentation gathered, the Investigation Team identified the following entities connected with the occurrence:

- POL-MIEDŹ TRANS Sp. z o.o.,
- Sylwester Komisarek P. W. Inter-KomTrans,
- TABOR Dębica Sp. z o.o.

The company POL-MIEDŹ TRANS Sp. z o.o. is the owner of Tals freight wagon no. 84 51 0835 092-5 and the entity responsible for maintenance (ECM) of this wagon. As regards P1, P2 and P3 maintenance (in accordance with the Maintenance System Documentation, MSD), the company carries out its tasks by own means, while other maintenance activities (P4, P5) are outsourced to external entities. The maintenance levels were carried out in accordance with the cycles defined in the MSD. The maintenance level cycles of the freight wagons implemented by POL-MIEDŹ TRANS Sp. z o.o. were observed.

The Investigation Team analysed the documentation held by the carrier as regards the acquisition and operation of wheelset no. 018808849.

The Investigation Team was not provided with any documentation relating to the purchase of the wheel set. The carrier provided a copy of the documentation from the wheel set measurements carried out by Sylwester Komisarek P.W. Inter-KomTrans in May 2014. The documentation included measurement sheets for wheelset no. 018808849 and an ultrasonic test report for the axle of that wheelset. Although there is no purchase document, it can be assumed that the measurements and tests performed on the wheelset were related to its acquisition by the carrier POL-MIEDŹ TRANS Sp. z o.o. in order to put it into service.

The set was installed in 2015 in freight wagon no. 84 51 0835 092-5 owned by POL-MIEDŹ TRANS Sp. z o.o.

As wagon no. 84 51 0835 092-5 had reached its P5 maintenance date in 2020, it was transferred to the plant TABOR DĘBICA Sp. z o.o. in Dębica. During a P5 maintenance inspection, the rims in all wheelsets in

wagon no. 84 51 0835 092-5 were replaced. On 8 September 2020, non-destructive ultrasonic testing (UT) of the axles of the wheelsets was carried out and showed no abnormalities.

Following maintenance level P5 work, the wagon returned to service with POL-MIEDŹ TRANS Sp. z o.o. on 8 October 2020. After two years of operation, in accordance with the maintenance cycle specified in the MSD, the wagon was transferred on 5 October 2022 for P3 maintenance, which was carried out at the Wagon Repairs Section of POL-MIEDŹ TRANS Sp. z o.o. in Polkowice. As part of the P3 level maintenance, non-destructive tests were carried out on 27 October 2022 on the axles of the wheelsets in the sections where the axle boxes and wheels are installed. Also that examination showed no abnormalities. From 31 October 2022 until the day of the accident, the wagon had been operated without any disruptions. By letter no. DMB-WMIC.464.1.2020.1.AM of 25 February 2020, the President of UTK communicated to entities in charge of maintenance, inter alia, the following order arising from Recommendation No. 11 issued in Report PKBWK/7/2019:

"Entities in Charge of the Maintenance of Freight Wagons (ECM), in view of the fact that non-destructive testing of the axles of a wheelset, carried out as part of the maintenance process required under the Maintenance System Documentation, did not detect any internal defects of the axle in its central part, shall introduce additional testing of wheelset axles in their central parts (between the wheel discs) as mandatory under the Maintenance System Documentation, to be carried out during P3, P4 and P5 maintenance activities."

The Maintenance System Documentation provided by POL-MIEDŹ TRANS Sp. z o.o. for the Tals wagon did not include any provisions requiring non-destructive testing of axle centres during P3 maintenance activities.

As another irregularity, the Investigation Team found the failure to implement Recommendation No. 11 included in Report No. PKBWK/07/2019 concerning the obligation to introduce provisions in the Maintenance System Documentation on detailed defectoscopic tests of wheelset axles of freight wagons during P3, P4 and P5 maintenance.

Recommendation No. 11 from Report No. PKBWK/7/2019 was forwarded by the President of UTK for implementation, as a result of which the President of the Management Board of POL-MIEDŹ TRANS Sp. z o.o. in Lubin issued Order No. DN/13/2022 of 29 March 2022 on the appointment of a Team to carry out wheelset axle tests within the scope specified in the UT2 non-destructive testing certification competence, in accordance with the requirements of PN-EN ISO 9712. In addition, as a result of the issuance of the aforementioned Order, the Head of the Wagon Maintenance Department an order on 24 August 2022 for the workshop to formally start the implementation of the axle tests as part of P3 maintenance.

The Management Board of POL-MIEDŹ TRANS Sp. z o.o. commissioned an expert examination of the fractured axle to TÜV Rheinland Polska Sp. z o.o. in Zabrze.

The results of the expert examination as regards the causes of the axle fracture are included in REPORT no. TUV/84977141/2024 - *"Analysis of the causes of the axle fracture in a Tals wagon of Pol-Miedź Trans Sp. z o.o."*

Although the marks for steel grade ST 397 and heat treatment method ST 984 are stamped on the axle, the expert examination did not clearly establish the steel grade. Based on the tested parameters and the year of manufacture of the axle (1979), the research unit assumed that it was grade St5P steel as per PN-64/H-84027, i.e. the norm applicable in the year of manufacture of the axle. In 1991, a new standard defining steel grades for the railway industry (PN-91/H-84027/03) was introduced. Furthermore, the norm EN 13261:2011 *"Railway applications - Wheelsets and bogies - Axles - Product requirements"* was issued in 2011. The new norms significantly reduced the maximum permitted values for sulphur content from 0.050% by mass (as per PN-64/H-84027) to 0.035% by mass as per PN-91/H-84027/03, and to 0.020% by mass as per PN-EN 13261:2011. The sulphur content of 0.041% by mass was found in the tested sample from the fractured axle. The sulphur content of the steel significantly influences the formation of surface and internal corrosion and the weakening of the material structure. The issue of the negative effect of sulphur on the weakening of steel for railway products was recognised also by the standards body, and so the applicable 2021 standard, EN 13261:2021 *"Railway applications - Wheelsets and bogies - Axles - Product requirements"* sets the maximum sulphur content in such products at 0.015%.

The change in standards, lowering the maximum permitted sulphur content, was intended to increase the parameters for both the strength and yield point of the steel.

During tensile strength testing of three samples from the fractured axle, the samples failed at 245, 259 and 268 MPa. While the PN-64/H-84027 norm did not specify a yield strength value, the subsequent norms and the ones currently applicable specify the minimum yield point at 320 MPa.

When examining the material structure of the fractured axle, roughness on the surface of the axle was found to be between 4.2 and 6.1 micrometres, with the permitted value set in the MSD at 3.2 micrometres. The expert examination showed that the axle fracture had had a fatigue character and propagated for a long time. The expert examination did not determine how long the crack had propagated over time. The fracture location (centre of the axle) is where the highest stresses occur due to rotational bending of the axle.

The Investigation Team concluded that a contributing factor in the axle fracture was material fatigue resulting from:

- exceeded sulphur concentration limit for the steel from which the fractured axle was made,
 - excessively low yield strength of the steel from which the axle was made,
 - presence of corrosion on the axle surface in the area of the fracture,
 - exceeded permitted surface roughness of the central part of the axle,
- relative to the applicable norms.

The limit values which were in line with the standards applicable at the axle manufacture date and were not considered dangerous are now unacceptable according to the currently applicable standards and represent a risk factor when exceeded.

This has been the fourth case where an axle of a freight wagon wheelset fractured since 2019. In two cases, the broken axles were older than 40 years, while the year of manufacture of the third axle could not be identified (the occurrence described in Point 5). In all those, the fractured axles had been introduced from the second-hand market without any possibility of determining their previous service history.

From 2010 onwards, POL-MIEDŹ TRANS Sp. z o.o. purchased 360 reusable wheelset axles whose service history is unknown. Following their entry into service and P4 and P5 maintenance activities as per the MSD, 128 wheelset axles were decommissioned due to defects detected. According to this statistic, 35.5 % of the reusable axles of unknown origin put into service posed a potential accident risk at a single carrier alone.

1.3. Manufacturers of rolling stock or other suppliers of rail products

On the basis of the material collected, the Investigation Team concluded that the manufacturer of the steel from which the axle was made in 1979 was Huta Gliwice. The axle service history is unknown for the period before the inspection in 2014 carried out by Sylwester Komisarek P.W. Inter-KomTrans.

1.4. National safety authorities or the European Union Agency for Railways

The European Railway Agency (ERA) Task Force, following a meeting with representatives of the European National Railway Safety Authorities and the railway freight sector (CER, ERFA, UIP, UIRR, UNIFE) held after the Viareggio accident in 2009, developed the *"Implementation guide for the European Wheelset Traceability (EWT) for freight wagon axles"* in 2010. Following the announcement of the guide, it was agreed that the data entered in the EWT system for freight wagons would be available electronically as of 1 January 2012.

In Report PKBWK 07/2019, the Commission issued a recommendation which read as follows: *"The President of the Rail Transport Office shall take actions to introduce the obligation regarding traceability of wheelsets for freight wagon axles in accordance with the Implementation guide for the European Wheelset Traceability (EWT) for freight wagon axles made in Brussels on 26 July 2010 by the Joint Sector Group for ERA Task Force on wagon/axle maintenance and agreed with the National Safety Authority"*. In Report No. PKBWK 02/2024, the Commission recommended completing the actions commenced in 2020 with the aim of introducing the EWT for freight wagon axles. According to information provided by the President of the Rail Transport Office, the implementation work is still in progress. By the Recommendation of 20 May 2024, the President of UTK obliged entities in charge of maintenance and rail vehicle administrators to keep inner wheelset traceability records until the central traceability system is put in place.

1.5. Notified bodies, designated bodies or risk assessment bodies

Based on the evidence gathered, the Investigation Team did not identify any relation between the accident and notified bodies or risk assessment bodies.

1.6. Certification bodies of entities in charge of maintenance mentioned under Point 1.2.

Based on the investigation material gathered, the Investigation Team did not establish any relation between the certification body of the railway carrier or entity in charge of maintenance and the occurrence under investigation.

1.7. Any other person or entity relevant to the occurrence, documented or not in one of the relevant safety management systems or referred to in a register or relevant legal framework

Not applicable.

2. Rolling stock and technical installations

Rail vehicles:

The 3E/1M 201 powered rail vehicle was equipped by the manufacturer with a HASLER Bern Rt-9 train data recorder no. MF9/01/09 and a CONSEL GPS system.

The Investigation Team analysed selected driving parameters of train TME 664015 recorded on the tape and in the CONSEL GPS system in order to investigate the driving characteristics of the train up to the moment of the occurrence. The driving parameters of the powered rail vehicle on the railway line section concerned from 10:09 hrs on 1 May 2024 until the stop at Rudna Gwizdanów station due to the occurrence and removal of the tape - are shown in the description and diagram below.

10:09:50 hrs - the locomotive is stationary, Lubin station, speed 0 km/h, active cab no. 2

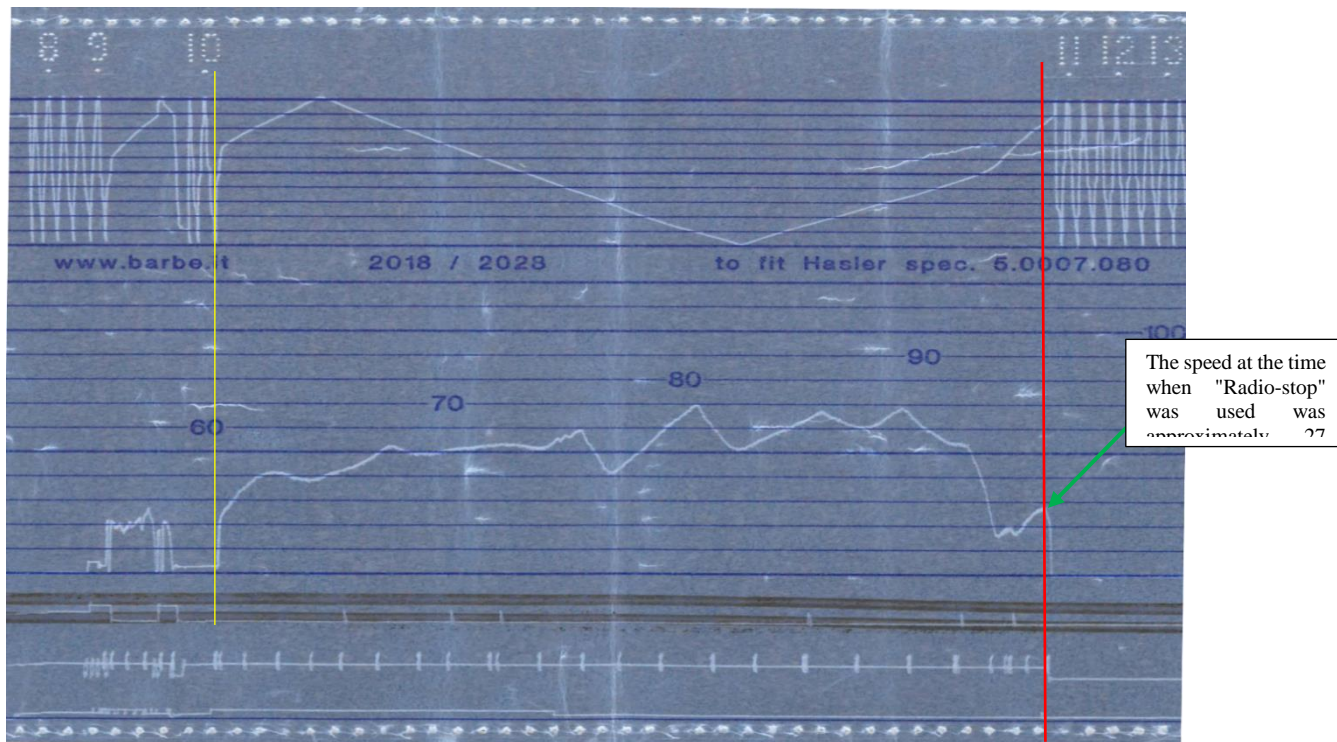
10:09:59 hrs - the train is started at Lubin station

10:10:09 - 10:30:15 hrs - travel in accordance with the railway line parameters and timetable, over a distance of 16 kilometres, the maximum speed reached by the train is 70 km/h (the train speed limit is 75 km/h)

10:31:45 - 10:33:42 hrs - the train enters Rudna Gwizdanów station, maximum speed 27 km/h

10 34:08 hrs - "Radio-stop" is used, rapid drop in speed (emergency braking), drop in speed from 27 km/h to 0 km/h over a distance of 10 metres

Figure 2 - A diagram showing driving parameters of locomotive 3E/1M 201, recorded on the HASLER BERN Rt9 speedometer tape (compiled by PKBWK)



3. Human factors

No direct influence of human factors on the occurrence was identified.

4. Feedback and control mechanisms, including risk and safety management as well as monitoring processes

The relevant regulatory framework conditions:

4.1. The processes, the methods, the content and the results of risk assessment and monitoring activities, performed by any of the involved actors: railway undertakings, infrastructure managers, entities in charge of maintenance, maintenance workshops, other maintenance providers, manufacturers and any other actors, and the independent assessment reports referred in Article 6 of Implementing Regulation (EU) No. 402/2013

The entity responsible for maintenance POL-MIEDŹ TRANS Sp. z o.o. carried out a detailed analysis of risks associated with axle fracture of a freight wagon wheel set in 2023. Following the risk analysis, the Company took actions in the form of maintenance checks as per control plans in accordance with the improvement action plan. The wheelset revision requirements laid down in the Maintenance System Documentation (MSD) for freight wagons were expanded, inspections were carried out at wheelset revision service providers; and wheelsets operated in other freight wagons owned by the Company were subjected to detailed checks.

4.2. The safety management system of the involved railway undertaking(s) and infrastructure manager(s) including the basic elements stated in Article 9(3) of Directive (EU) 2016/798 and any EU legal implementing acts

Railway infrastructure manager PKP Polskie Linie Kolejowe S.A.

The Safety Management System (SMS) at PKP Polskie Linie Kolejowe S.A. was put in place under Resolution no. 30/2011 of 24 January 2011 regarding the adoption of the order introducing the Safety Management System at PKP Polskie Linie Kolejowe S.A. A summary of selected SMS elements in place at PKP PLK S.A. is shown in the table below.

Table 1 - A summary of selected SMS elements in place at PKP PLK S.A. related to the occurrence

Item	Symbol/ Procedure No.	Name of document / procedure
Main process		
1.	SMS-PG-01	Provision of railway infrastructure and operation of railway traffic.
Procedures for supporting processes		
2.	SMS-PW-01	Maintenance of a railway line in technical and organisational serviceability
	SMS/MMS-PR-02	Technical and operational risk assessment
3.	SMS/MMS-PW-03	Procedure for railway occurrences
4.	SMS-PW-04	Conduct of railway accident recovery operations
5.		Hazard record

Railway carrier POL-MIEDŹ TRANS Sp. z o.o.

POL-MIEDŹ TRANS Sp. z o.o. has a Safety Management System (SMS) in place. A summary of selected SMS elements used at POL-MIEDŹ TRANS Sp. z o.o.

Table 2 - A summary of selected SMS elements in place at POL-MIEDŹ TRANS Sp. z o.o. related to the occurrence

Document no.	Name of document / procedure
SUBSYSTEMS OF THE SAFETY MANAGEMENT SYSTEM	
P/06	Operation of the freight transport process, including the carriage of dangerous goods and special consignments
P/08	Hazard identification and technical risk analysis
P/16	Preparation of emergency plans
P/12	Management review: 1. linked directly to the operation and safety of rail traffic and the driver of rail vehicles
P/17	Procedure in case of a railway occurrence
	Safety Improvement Program 2024

Based on an analysis of the SMS documentation of the railway carrier POL-MIEDŹ-TRANS Sp. z o.o., having considered the circumstances, course and consequences of the occurrence, the Investigation Team does not raise any reservations concerning the functioning of the SMS as regards the conduct of the process of carriage, management of worker competences, knowledge of the SMS by the workers, procedures in case of a railway traffic hazard, availability of up-to-date versions of respective procedures.

4.3. The management system of the entity/entities in charge of maintenance and maintenance workshops including the functions stated in the Article 14(3) and Annex III of Directive (EU) 2016/798 and any subsequent implementing acts

The owner of the wagons and the entity responsible for their maintenance is POL-MIEDŹ TRANS Sp. z o.o., which is also a carrier. The company has implemented a Safety and Maintenance Management System SMS/MMS. The company maintains a Hazards and Risks Record (MMS) in which the risk of axle fracture is included. The Investigation Team has raised no objections as regards the manner in which the freight wagon maintenance system works.

Table 3 - A summary of selected MMS elements in place at POL-MIEDŹ TRANS Sp. z o.o. related to the occurrence

Item	Document No.	Name of document / procedure
SUBSYSTEMS OF THE MAINTENANCE MANAGEMENT SYSTEM		
1.	P/04a	Maintenance of serviceability of rolling stock and technical assets
2.	P/08	Hazard identification, technical risk analysis
3.	MMS/ECM-07	Risk and hazard record (HRR/ECM)
4.	MMS/ECM-02	Rail vehicles maintenance management
5.	MMS/ECM-03	Conduct of maintenance

4.4. The results of supervision performed by the national safety authorities in accordance with Article 17 of Directive (EU) 2016/798

The President of UTK audited POL-MIEDŹ TRANS Sp. z o.o. in 2022 with regard to the functioning of the Safety and Maintenance Management System.

The audit was documented with report no. OT6.501.28.2022.13.IF of 11 November 2022.

26 irregularities were identified during the audit. POL-MIEDŹ TRANS Sp. z o.o. had rectified the irregularities and informed the President of UTK about the rectification in letter no. PMT/OK/315/23 of 23 January 2023.

4.5. The authorisations, certificates and assessment reports granted by the Agency, the National Safety Authorities or other conformity assessment bodies

Railway infrastructure manager: PKP Polskie Linie Kolejowe S.A. holds:

Safety Authorization:

- no. EU PL2120210000
- Date of issue 26 February 2021,
- Valid until 30 December 2020,
- Type of infrastructure: standard gauge (99.2%), broad gauge (0.8%)

Size of the infrastructure under management:

- total length of railway lines 18,566 km,
- total length of tracks 36,042 km,
- 39,389 turnouts,
- 13,695 level crossings, including 11,938 on railway lines in service.

POL-MIEDŹ TRANS Sp. z o.o.

Certificate of conformity for an entity in charge of maintenance:

- certificate number PL/31/0022/0013,
- Issue date 9 February 2022,
- Valid until 30 December 2020,
- vehicle category - freight wagons, locomotives.

4.6. Other irregularities

POL-MIEDŹ TRANS Sp. z o.o. has implemented Recommendation no. 11 contained in Report No. PKBWK/07/2019 consisting in the introduction of additional testing of central sections of wheelset axles

as part of P3 maintenance activities. Despite the implementation of the aforementioned recommendation, the Maintenance System Documentation has not been supplemented with a provision requiring such testing during P3, P4 and P5 maintenance activities.

5. Previous occurrences of a similar character

As part of the investigation, the Investigation Team analysed accidents that took place in similar circumstances in 2019 - 2023.

A brief description of the occurrences and their consequences.

1. On 17 March 2019, during travel of freight train no. TMS 654035 operated by carrier Przedsiębiorstwo Obrotu Surowcami Wtórnymi DEPOL w Bydgoszczy on the Jerzmanice Zdrój - Bydgoszcz Główna route, led by locomotive BR232-154-5 on track no. 1 of the Taczanów - Pleszew route, a loaded wagon (no. 84 51 5945 940-1) was derailed. The derailed wagon was the 20th wagon behind the locomotive - two twin-axle bogies derailed (with the axle in the first one broken). The place of the derailment was located at km 107.985 of railway line no. 272. The wagon and the track superstructure over a length of approximately 6,000 m were damaged. The train stopped at Pleszew station at turnout no. 1 at km 113.740 of railway line no. 272 Kluczbork – Poznań Główny.

The derailment was caused by breaking of the first wheelset axle (manufactured in 1975) of the first bogie of freight wagon no. 84 51 5945 940-1 due to the irregular structure of the axle material in the place of braking. Furthermore, the Commission's Investigation Team found a systemic cause involving inappropriate supervision of maintenance of the freight wagon by "Inter- KomTrans" Sylwester Komisarek, the entity in charge of maintenance (ECM).

2. On 8 August 2019, during travel of freight train TME 464045 operated by carrier PKP CARGO S.A. on the Ornontowice Budryk - Opole Elektrownia route, composed of an ET22-1064-series leading locomotive and 40 coal wagons loaded with coal dust, the signaller at Tarnów Opolski noticed sparking near the fourth or fifth wagon and ordered the train to stop. After the train stopped, the driver conducted a check and found no fault. He continued driving at a speed of around 60 km/h. At 23:18 hrs, after covering a distance of around 3.8 km, he felt a jolt of the locomotive and initiated emergency braking. After getting out of the locomotive, the driver noticed wagons lying on tracks no. 1 and 2. The accident was caused by derailment of loaded wagon no. 31 51 5496 893-9 (the fifth wagon in the train set) as a result of a fracture breaking of the axle journal.

The causes of the fatigue fracture of the axle journal:

1. Exceeded roughness value of the wheelset axle journal surfaces following machining, i.e. the roughness of the average value of 2.8 μm (the area ground within the crater) to 8.7 μm (in the undercut area), which exceeds the permitted limit.
 2. The inappropriately conducted repair of the wheelset axle, involving giving an inappropriate shape (inconsistent with the WT-2 documentation) to the transition of the axle journal to the wheel seat, which resulted in adverse stress concentrations and consequently the initiation of a fatigue crack.
 3. A negligent acceptance procedure following the repair of wheelset no. 5249978 and release to operation with a technical flaw.
3. On 7 February 2023 at 02:00 hrs, during entry of freight train no. 654027 operated by railway carrier T&C Sp. z o.o. on the Kłodzko Główny – Olsztyn Główny route onto track no. 1N at Wrocław Brochów WBA station, railway line no. 349, the last freight wagon (the 45th wagon in the train composition), type Eamnos no. 33 51 5839 055-9, derailed at turnout no. 501. The occurrence resulted in the following damage: a derailed wagon, damaged turnouts no. 501, 502, 503 and 506 of tracks no. 1N and 3N, damaged turnout segments. Furthermore, the train was broken apart between the 34th and 35th wagons, and the 42nd and 43rd wagons in the train composition.

The causal factor of the accident was the fracture of the first axle of the first bogie of Eamnos wagon no. 33 51 5839 055-9, whereas the contributing factors included:

- 1) Inappropriate machining of the radius of transition of the wheel seat into the centre section of the axle, leading to the occurrence of a large gradient of tensional and compressive stress.
- 2) Formation of microcracks in the place subjected to machining.
- 3) Decreased strength along the axle cross section up to the critical moment at the place of the fatigue crack.
- 4) Introduction to service of a wheelset as a reusable set from the second-hand market without documented history of prior use. Year of manufacture of the wheelset axle: 1980.

V. CONCLUSIONS

1. A summary of the analysis and conclusions with regard to the causes of the occurrence

The Investigation Team concluded that the causal factor of the accident was the fracture of the second axle of wheelset no. 018808849 in the first bogie of wagon no. 84 51 0835 092-5, during the entry of train TME 664015 to Rudna Gwizdanów station, which resulted in a derailment of the said wagon to the left side in the direction of travel.

The wheelset with axle no. 018808849 was manufactured in 1979. The axle's service history since the date of manufacture is unknown. Before the axle was put into service by POL-MIEDŹ TRANS Sp. z o.o., the selling entity P.W. "Inter-KomTrans" Sylwester Komisarek carried out an inspection of the wheelset on 26 May 2014. The wheelset with axle no. 018808849 was installed in wagon no. 84 51 0835 092-5 in 2015 together with other wheelsets supplied by the same entity. In April 2020, wagon no. 84 51 0835 092-5 was transferred for P5 maintenance to "Tabor" Dębica Sp. z o.o. During the execution of P5 maintenance activities in October 2020, all wheelset rims were replaced, including the ones with axle no. 018808849, and a defectoscopic test was carried out. After two years of operation, in October 2022, the wagon was transferred for P3 maintenance to Polkowice Wagon Repairs Section of POL-MIEDŹ TRANS Sp. z o.o. After completion of P3 maintenance, which included non-destructive testing of the wheelset axles, the wagon was put into service. Up to the day of the accident, the wheelset with axle no. 018808849 had been in use in wagon no. 84 51 0835 092-5.

Taking into account the analysis carried out by the Investigation Team and the conclusions of the expert examination carried out by TÜV Rheinland Polska Sp. z o.o. in Zabrze, the Investigation Team determined that the factors contributing to the occurrence were:

- exceeding the sulphur concentration limit for the steel from which the fractured axle was made, relative to the applicable norms,
- excessively low yield strength of the steel from which the axle was made, relative to the applicable norms,
- presence of corrosion on the axle surface in the area of the fracture,
- exceeded permitted surface roughness of the central part of the axle, relative to the applicable norms.

The information contained in the documentation of non-destructive testing (NDT) for the wheelset axles at the respective maintenance levels does not permit to establish which parts of the axle had been tested (bearing journal, wheel seat, axle centre section), and therefore it is reasonable to supplement the NDT report template in the MSD by adding this data so that it could be clearly identified when which part of the axle was tested.

From 2010 onwards, POL-MIEDŹ TRANS Sp. z o.o. purchased 360 reusable wheelset axles whose service history is unknown. After they were put into service and underwent P4 and P5 maintenance in accordance with the MSD, 128 wheelset axles were taken out of service due to the defects detected, which represents 35.5 % of the defects diagnosed in the purchased batch. The introduction of reusable wheelset axles of unknown origin into service with such a percentage of defects detected after only a few years of operation poses a potential risk of further cases of axle fatigue fractures. In the opinion of the Investigation Team, the implementation of the European Wheelset Traceability (EWT) would make it possible to obtain information on their service history, including about any possible involvement of wheelset axles in railway occurrences or their decommissioning due to detected defects.

2. Measures taken since the occurrence

The entity in charge of maintenance of the wagons, POL-MIEDŹ TRANS Sp. z o.o., in order to prevent similar occurrences in their wagons, pursuant to the request of the Commission sent in letter no. PKBWK.590.3.4.2024 of 3 June 2024, took measures by conducting a detailed analysis of the wheelsets purchased from P.W. "Inter-KomTrans" Sylwester Komisarek and subsequently put into service as regards maintenance activities performed, in particular non-destructive tests, damage (defects) found and decommissioning.

3. Additional comments

Pursuant to Recommendation No. 7 contained in Report PKBWK 02/2024 from the investigation of the railway accident that occurred on 7 February 2023 at 02:00 hrs at Wrocław Brochów station, at km 1.701 of track no. 1N of railway line no. 349 Św. Katarzyna - Wrocław Kuźniki, the President of UTK issued Order No. P.021.18.2024 by which he appointed a Team of Experts to determine the scope of additional tests of wheelset axles that remain in service in freight wagons for longer than 40 years. The Team completed their work on 31 December 2024 by issuing "*Opinion of the Expert Team regarding NDT of wheelset axles in freight wagons*", which included recommendations addressed to:

1. ECMs and maintenance providers as regards documentation related to NDT (non-destructive testing), personnel competence and recognition of NDT providers' competence.
2. President of UTK - to include in the supervision priorities continuous verification of the organisation and manner of carrying out NDT by ECMs and maintenance providers, and to plan and verify compliance with recommendations issued by the President of UTK in the area of NDT during ongoing inspections and audits of ECMs and certified maintenance entities.
3. Entities providing training and certification to NDT personnel by organising training courses combined with practical workshops for ECMs with the possibility of obtaining Level III certificates in ultrasound and magnetic particle methods.
4. Railway commissions as regards investigation of railway accidents - after every accident involving fatigue fracture of a wheelset axle, the railway commission concerned shall request an expert examination of the fractured axle to be commissioned to an authorised body to determine the cause of the fatigue fracture.

According to the recommendation of the President of UTK of 29 December 2024 contained in Appendix 1 to the "*Opinion of the Expert Team regarding NDT of wheelset axles in freight wagons*", every UT or MT examination report should contain at least the following information:

- 1) Title of the report - indication of the types of tests conducted.
- 2) Number of the report.
- 3) Date and place of the examination.
- 4) Identification details of the entity that commissioned the examination.
- 5) Identification details of the entity that conducted the examination.
- 6) Identification details of the part being examined (e.g. type, name, serial number, date of manufacture).
- 7) Identification details of the test equipment involved, including accessories.
- 8) Data on test apparatus settings used (applicable to UT and MT).
- 9) Identification details of the NDT personnel involved (full name, type and level of qualifications, certificate number).
- 10) Reference to an NDT procedure or manual.
- 11) Reference standards and samples used.
- 12) Parameters obtained during the examination, appropriate to the NDT method used.
- 13) Identification of the examination area.
- 14) Results of the examination - a decision arising from the testing.
- 15) Where any defects are detected, the following information should be recorded: location of the defect (drawing, photograph), characteristics of the defects.

VI. SAFETY RECOMMENDATIONS

1. Entities in charge of maintenance of freight wagons (ECMs) shall update their maintenance system documentation (MSD) as regards the model document (report) for non-destructive testing (NDT) to identify the area covered by the axle test, in accordance with Appendix 1 to the Recommendation of the President of UTK of 29 December 2024 regarding NDT testing of axles of wheel sets in freight wagons.
2. Entities in charge of maintenance of freight wagons (ECMs) shall make it obligatory from now on to carry out documented detailed¹⁾ non-destructive testing of axles of wheelsets before they are put back into service in accordance with Recommendation No. 6 in PKBWK Report no. 02/2024.
3. Entities in charge of maintenance of freight wagons (ECMs) shall identify and then carry out documented detailed non-destructive testing of all reusable wheel set axles placed on the market and/or put into service in the last five years for which there is no documented operation and maintenance history.

¹⁾ The scope of a detailed non-destructive test of freight wagon wheelset axles, as referred to in this Report, includes inter alia an inspection as per EVIC, removal of the wheelsets from under a freight wagon, removal of bearings and exposure of the centre section of the axle. The test must be carried out with the ultrasonic testing (UT) and magnetic particle testing (MT) methods following removal of the protection coating from the side surface of axle journals and from the centre section of the axles.

PRESIDENT
OF STATE COMMISSION ON RAILWAY ACCIDENT INVESTIGATION

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Tadeusz Ryś

No	Symbol (acronym)	Explanation
<i>1</i>	<i>2</i>	<i>3</i>
1.	EUAR	European Union Agency for Railways
2.	MSWiA	Ministry of the Interior and Administration (Polish: Ministerstwo Spraw Wewnętrznych i Administracji)
3.	UTK	Office of Rail Transport (Polish: Urząd Transportu Kolejowego)
4.	PKBWK	State Commission on Railway Accident Investigation (Polish: Państwowa Komisja Badania Wypadków Kolejowych)
5.	IZ	PKP PLK S.A. – Railway Line Plant