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MINISTRY OF INFRASTRUCTURE

State Commission for Investigation of Railway Accidents

REPORT PKBWK/1/2011

on Investigation into Serious Accident

of 13 July 2010 at 09:12 hrs on Kępice – Korzybie route on track 1 of line 405 at km 151.835 , premises of Infrastructure Manager PKP Polskie Linie Kolejowe SA Zakład Linii Kolejowych in Szczecin

adopted by State Commission for Investigation

of Railway Accidents Resolution No 8/2011 of 5 July 2011

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WARSAW, 5 JULY 2011

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REPORT

drawn up on 5 July 2011 in Warsaw
on investigation into category A04 serious accident
which occurred at 9:12 hrs on 13 July 2010 on the Kępice – Korzybie route on track 1 at km 151.835 of line 405, premises of Infrastructure Manager Zakład Linii Kolejowych in Szczecin, a body controlled by Infrastructure Manager PKP PLK SA, conducted by the Railway Accident Investigation Team of the State Commission for Investigation of Railway Accidents, appointed by Decision of the Chairman of the State Commission for Investigation of Railway Accidents (PKBWK) (letter PKBWK-0780-54/TR/10 of 22 July 2010) composed of:

1. Andrzej Gniwek – Permanent Member of the Commission – Head of the Team
2. Jan Młynarczyk – Permanent Member of the Commission
3. Rafał Leśniowski – Permanent Member of the Commission

I. SUMMARY OF THE INVESTIGATION

1. Decision to institute a serious accident investigation, composition of the railway accident investigation team and description of the course of proceedings

The investigation was taken over by the railway accident investigation team from a company railway accident investigation team. The [company] railway accident investigation team had commenced the investigation into the occurrence, team headed by Mr Krzysztof Graboń, Traffic Controller with PKP PLK S.A. Zakład Linii Kolejowych in Szczecin (PKP PLK IZ Szczecin), which had been appointed by decision of the President of PKP PLK S.A. Zakład Linii Kolejowych in Szczecin of 14 July 2010, appointment IZES21-732 – 33/10, and composed of:
1. Krzysztof Graboń, Chairman – IZKR3 IZ Szczecin
2. Jan Gierszewski, Member – PRRK Gdynia
3. Eugeniusz Czapiewski, Member – PRMI1 Gdynia
The documentation compiled by the company railway accident investigation team was taken over on 29 July 2010.
Previous members of the internal railway accident investigation team in the composition established in Section VIII(5) of the 'Serious Accident On-site Inspection Protocol' dated 13 July 2010
listed below:
1. Krzysztof Graboń, Traffic Controller – IZ Szczecin
2. Jan Gierszewski, Traffic Controller – PR Gdynia
3. Eugeniusz Czapiewski, Train Driving Instructor – PR Gdynia
The Chairman of the the State Commission for Investigation of Railway Accidents (PKBWK) undertook to cooperate with the railway accident investigation team pursuant to written demand No PKBWK – 0780 – 54/TR/10 of 23 July 2010 submitted by the Chairman of the PKBWK pursuant to Article 28h(2)(3) of the Act of 28 March 2003 on railway transport.

In the course of work of the railway accident investigation team, as Mr Eugeniusz Czapiewski left Pomorski Zakład Przewozów Regionalnych in Gdynia, he was replaced by Mr Henryk Kastelik, Train Driving Instructor with PR Gdynia (letter of PR Gdynia of 30 August 2010).

2. Brief description of the occurrence, time and location and consequences of the serious accident

Train 89522 was started and departed from Korzybie passing the loop track 2 to Kępice – Korzybie entering the plain track 1 without required authorisation, causing a collision on that track at 9:12 at km 151.835 with train 89523 running from Kępice passing the loop in direction of Korzybie passing loop.
Train ROPSr 89522 (PR Gdynia) – consisting of locomotive SU42-523 and 2 Bhp series wagons 50 51 25-18181-6 and 50 51 25-18178-2, the train tail at km 151.885, the wagons standing on tracks, the locomotive reversed in the travel direction, axles 1 and 3 derailed and axle 4 raised above the rail head (as viewed in the travel direction). The train 89522 head at km 151.835 in a direct contact with the train ROPSr 89523 head. Train ROPSr 89523 (PR Gdynia) – consisting of locomotive SU42-524 and 2 Bhp series wagons 50 51 25-18304-4 and 50 51 25-18301-0, the train tail at km 151.785. Front bumpers of both locomotives broken, and rear bumpers stuck in the wagon sheathing.
Train ROPSr No 89523 (PR Gdynia) – from Szczecinek to Słupsk – consisting of locomotive SU42-524 and 2 Bhp series wagons 50 51 25-18304-4 and 50 51 25-18301-0. The locomotive of train 89523 reversed in the travel direction, the front bogie broken and derailed. In both locomotives, compartments with a high-tension cabinet and a heating unit crushed, partly shifted to the driver cab's zone. In locomotive SU4-523, lower front lamps broken and an upper front lamp smashed; in locomotive SU42-524, lower front lamps broken and an upper front lamp smashed – impossible to identify the train front signalling. The body of wagon 50 51 25-18304-4 broken and lifted.

3. Description of the immediate cause of the serious accident and of indirect causes identified in the course of proceedings

a) Immediate cause:

Train 89522 was started and departed from Korzybie passing the loop track 2 to Kępice – Korzybie entering the plain track without the required authorisation, which is against the Rules of Procedure for Railway Traffic Operation on the section of Szczecinek station – Korzybie station and Ir1 instructions, causing a collision on that route with train 89523 running from Kępice passing loop in the direction of Korzybie passing loop (basing on the instruction to arrive at Korzybie passing loop to cross with train 89522).

b) Primary cause:

- The driver of train 89522 failed to establish connection with the signal operator at Miastko station to obtain the instruction to enter Korzybie passing loop but despite that he continued to enter Korzybie passing loop without obtaining the instruction.
- The driver of train 89522 failed to stop at a designated point before entering Korzybie passing loop in order to establish wire communication (field phone).

c) Indirect causes:

- The driver failed to obtain the instruction to enter Korzybie passing loop from the train dispatcher at Miastko station.
- The Kapsch communication device in train 89522 locomotive was out of order.

- There was no Kapsch base station at 450MHz frequency at Korzybie station to provide wireless communication range, and the train communication at 150MHz frequency failed (out of range).
- Train 89523 should not have departed from Szczecinek station in the direction of Słupsk station because no (Kapsch) 450MHz radio telecommunication devices or mobile phone were available in the driving locomotive, which was against the Article 8(1) of Annex 1 'Emergency Procedure' of the Rules of Procedure for Railway Traffic Operation on Szczecinek – Korzybie Section.
- The train should not have departed from Słupsk station to the route including a section supervised from Miastko station because the locomotive driving train 89523 on Szczecinek – Słupsk section was not equipped with any (Kapsch) 450MHz radio telecommunication devices or mobile phone but it continued to run on that section, which was against the Article 8(1) of Annex 1 'Emergency Procedure' of the Rules of Procedure for Railway Traffic Operation on Szczecinek – Korzybie Section.
- No wireless (emergency) field phone available in the locomotive of train 89523.
- The series of locomotives used to operate trains 89522 and 89523 (SU42 instead of SU45), was incorrect and inconsistent with the official timetable, which compromised route sighting of both drivers.
- The drivers of trains 89522 and 8953 and the train dispatcher at Miastko station used mobile phones to operate railway traffic, which was against the Rules of Procedure for Railway Traffic Operation on that section.
- Passenger trains 89522 and 89523 were operated by single-member driving crews with SU42 series locomotives with driver stations non-adapted to driving the locomotives backwards on the left side in the travel direction, with the sighting limited by the train heating generator superstructure, causing a delayed response of the driver aimed to avoid or mitigate the collision.
- The railway undertakings allocated locomotive SU4-524 to operate train 89523 without equipment required under law, i.e. a Kapsch radio telephone and a wire portable phone, which made it impossible for the train to run safely on Szczecinek – Słupsk section (inconsistency with requirements of the Rule of Procedure for Railway Traffic Operation on that section).
- The radiogram forms used in train radio communication were inconsistent with regulations.
- Staff operating self-propelled railway vehicles on that line had carried out their tasks despite irregularities posing risks to railway traffic safety, which was against the Article 26(1)(3) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling.
- Supervision and control staff with the Infrastructure Manager and the Railway Undertaking carried out their tasks relating to supervision over compliance with regulations of staff that operated transport in an incorrect manner.
- Railway traffic was operated using mobile phone communication, which was tolerated by the supervision and control staff with the Infrastructure Manager and the Railway Undertaking.

d) Systematic causes:

- The train was operated by a single-member driving crew who failed to call the train manager to the locomotive even though there was no continuous train

radio communication coverage at 150MHz frequency, which was against the Article 21(8) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling.

- Internal regulations approved by the President of the Office for Railway Transport did not include the signalling system used on Słupsk – Szczecinek section.
- No regulations were provided to ensure passenger train safety in case if switches had to be cranked or (emergency) wire communication established, i.e. leaving a started locomotive by the driver. (No mention of using a crank, no authorisation to crank or on how to proceed).
- Kapsch railway traffic operation equipment was used on Szczecinek – Słupsk section without their appropriate expansion (no base station on Korzybie passing loop), while the remote traffic operation section had been extended and the traffic operation system including Korzybie – Słupsk route had been put into service following its modernisation (Korzybie station changed into Korzybie passing loop), which was inconsistent with Article 23(1) of the Act on railway transport. The available certificate and documentation did not cover traffic operation on Korzybie – Słupsk route with a remote traffic operation system (the equipment system is authorised for low traffic volume – no definition available).
- The supervision and control staff of the Infrastructure Manager and the Railway Undertaking carried out their tasks relating to the Kapsch system operation, trainings, exams and preparation for additional operations which required drivers to be qualified as switch man in an incorrect manner.

4. Identification of contributory factors of the serious accident

The train was operated on a distance of 105km with the driver station non-adapted in terms of ergonomics to such movement or such railway traffic control equipment system.

Weather conditions – high ambient temperature and high temperature on the train – the vehicle had no air conditioning.

The train radio telecommunication at 150MHz and the Kapsch traffic operation system were out of range.

5. Main recommendations and addressees of the recommendations

5.1 Ad-hoc measures implemented immediately following the accident

Pursuant to Article 28l(8) of the Act of 28 March 2003 on railway transport (*Dz. U.* – Journal of Laws No 16, item 94, as amended), in connection with serious irregularities found, posing a direct risk to railway traffic safety, on 30 July 2010 the State Commission for Investigation of Railway Accidents issued a recommendation for the Management Board of PKP Polskie Linie Kolejowe S.A. in Warsaw to cause urgent measures to be taken with a view to improving railway traffic safety, as follows:

1. To immediately restore railway traffic control devices on Korzybie passing loop to full technical capacity.
2. To oblige all railway undertakings to provide two-member crews to operate single-cabin locomotives on Słupsk – Szczecinek section of line 405, including a

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relevant amendment to the Rules of Procedure for Train Route Allocation and to the official train timetable.

3. To ensure that train radio communication range is provided at 150MHz frequency by way of building a facility to retransmit the signal from Miastko station, as well as to restore Kapsch devices at 450MHz frequency to full technical capacity, including urgently putting the Kapsch base station into operation, which has been out of order to date.
4. To maintain the overhead telecommunications line acting as the Kapsch network and Traffic Control System transmission carrier, including cutting down trees in the line's belt.
5. To incorporate at Słupsk station facilities to record conversations held on channel 6 of train radio communication at 150MHz frequency on Słupsk – Miastko line section.
6. To cut down tree branches which are currently in the railway vehicle and structure gauge on Słupsk – Szczecinek section of line 405, which pose a threat to train crews and passengers during train journey.
7. To remind employees of the Infrastructure Manager and the railway undertakings that it is absolutely prohibited to transmit or receive authorisation to enter passing loops or routes on line 405 via mobile phones.

According to the information provided by the President of the Office for Railway Transport of 28 February 2011, as of 23 August 2010 Infrastructure Manager PKP PLK SA implemented on Miastko – Słupsk section train traffic based on announcement communications in accordance with the 'Interim Rules of Procedure of Railway Traffic Operation on Miastko Remote Traffic Operation Section' No IZES2-704-67/2010.

5.2 Safety improvement recommendations

1. The Office for Railway Transport shall initiate proceedings to verify whether it was legitimate to issue the commissioning certificate No T/99/0039 of 5 May 1999 with a supplementary annotation above the title Certificate which reads as follows: 'The certificate shall also concern the locomotive identified as SU42 owned by PKP' in order to introduce restrictions for these series' locomotives to be operated by two-member crews only and forward facing position of travel during train movement (including fixing the driver seat to a side wall of vehicle in forward facing position if the locomotive cannot be reversed at reversing stations).
2. PKP PLK IZ in Szczecin and PR Gdynia shall discuss the rules for ad-hoc traffic operation on Słupsk – Miastko section, placing a special emphasis on the ban on mobile phone use for communication between train dispatchers and drivers exchanging information in the framework of traffic operation.
3. PKP PLK IZ in Szczecin shall update its Rules of Procedure for Train Traffic Operation on Szczecinek – Słupsk Section.
4. PKP PLK, PR and other railway undertakings realizing transport services on that line shall discuss the accident during periodic briefings aimed at all their employees directly involved in railway traffic operation, having a particular regard to the obligation to follow regulations and rules of procedure in force.

5. PKP PLK shall systematically maintain technical efficiency of the train radio communication system at 150MHz frequency on Szczecinek – Słupsk section.
6. PKP PLK IZ in Szczecin shall keep cutting down tree branches in the railway vehicle and structure gauge, and in the area of the overhead network route on Słupsk – Szczecinek section of line 405.
7. PKP PLK shall carry out systematic inspections of equipment of self-propelled railway vehicles fitted with communication devices and owned by railway undertakings operating transport on Słupsk – Szczecinek section in terms of their compliance with regulations in force, including the Interim Rules of Procedure for Railway Traffic Operation on Miastko Remote Traffic Operation Section.
8. The obligation for two-member driving crews to operate single-cab locomotives on the section of Szczecinek – Słupsk line if the required train communication is unavailable, if the route or signalling sighting is limited, or in case of backward movements, shall be maintained. The railway undertaking shall set forth detailed conditions of staffing trains in its internal regulations, as defined in Article 21(3) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling.
9. PKP PLK SA and railway undertakings to operate transport on Słupsk – Szczecinek section shall draw up work schedules for supervision and control staff, having a particular regard to reporting on irregularities in infrastructure and communication on that section.
10. With reference to the current switch control system, having regard to the additional duties of railway vehicle operators, PKP PLK SA shall develop and agree with railway undertaking involved in transport on Słupsk – Szczecinek section on internal regulations on signalling, manual crank operation and handling procedure, and on how train driving and conductor crews are to proceed if they leave a traction unit in order to handle the devices, and it shall submit the regulations to the President of the Office for Railway Transport for approval.
11. The wording of Article 31(4)(2) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling shall be specified by adding at the end: ‘and on line sections provided with continuous train radio communication service’.
12. The Office for Railway Transport shall establish the definition of ‘small traffic volume’ and take measures aimed to introduce the definition to regulations.

If PKP PLK SA decides to reopen traffic on Miastko – Słupsk section with a remote train traffic control system, it is recommended that:

1. PKP PLK should request the Office for Railway Transport that the traffic operation system on Korzybie – Słupsk section is provided with a commissioning certificate. The remote traffic control system should only be put into operation once the commissioning certificate has been obtained.
2. PR should equip all locomotives operating trains on Słupsk – Miastko section with working Kapsch devices.
3. PKP PLK should cause the base station in Korzybie to be restored.
4. PKP PLK should systematically maintain technical efficiency of the Kapsch system at 450MHz frequency.

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5. Railway undertakings should equip self-propelled railway vehicles operating Słupsk – Szczecinek section with portable field phones for emergency communication.

II. FACTS DIRECTLY RELATING TO THE SERIOUS ACCIDENT

1. Description of the accident:

a) Time, date and location of the accident

Category A04 serious accident which occurred at 9:12 hours on 13 July 2010 on Kępice – Korzybie route on track 1 at km 151.835 of line 405 on premises of Infrastructure Manager Zakład Linii Kolejowych in Szczecin, a body controlled by Infrastructure Manager PKP PLK SA.

b) Description of the accident

Train 89522 was started and departed from Korzybie passing loop track 2 to Korzybie – Kępice plain track without the required authorisation, which is inconsistent with the Rules of Procedure for Railway Traffic Operation on the section of Szczecinek station – Korzybie station and Ir1 instructions, causing a collision on that route with train 89523 running from Kępice passing loop in the direction of Korzybie passing loop.

c) Identification of railway staff and subcontractors participating in the accident or incident, and of third parties and witnesses

Railway staff (including subcontractors) in connection with the occurrence:

Full name – Initials	**Title**	**Work establish-ment**	**Sobriety status**	**Time and date of work start**	**Hours of rest before work start**
RI	Train Driver	PR Gdynia	Sober	13/07/2010 at 08:20 hrs	72 hours
WO	Train Driver	PR Gdynia	Sober	12/08/2010 at 22:00 hrs	52 hours 38 minutes
BK	Train Manager	PR Szczecin	Sober	13/07/2010 at 04:00 hrs	16 hours
EG	Conductor	PR Gdynia	Not examined	13/07/2010 at 08:20 hrs	36 hours 10 minutes
IP	Train Manager	PR Gdynia	Sober	13/07/2010 at 04:35 hrs	35 hours 57 minutes
MS	Train Dispatcher at Słupsk station	IZ Szczecin	Not examined	13/07/2010 At 7:30 hrs	96 hours
WB	Signal Operator on Miastko remote traffic operation section	IZ Szczecin	Sober	13/07/2010 at 06:00 hrs	24 hours

d) Identification of accident-involved trains and their compositions, transported loads, railway vehicles, their series and numbers

Train ROPSr 89522 (PR Gdynia)
– consisting of locomotive SU42-523 and 2 Bhp series wagons 50 51 25-18181-6 and 50 51 25-18178-2, the train tail at km 151.885, the wagons standing on tracks, the locomotive reversed in the travel direction, axles 1 and 3 derailed and axle 4 raised above the rail head (as viewed in the travel direction). Compartments with a high-tension cabinet and a heating unit crushed, partly shifted to the driver cab's zone. In locomotive SU42-523, lower front lamps broken and upper front lamps smashed.
The front of train 89522 at km 151.835 in a direct contact with the front of train ROPSr 89523. Front bumpers of both locomotives broken, and rear bumpers stuck in the wagon sheathing.

Train **89522** specification – train type: ROPSr, railway undertaking: PR Gdynia
a) Route: Słupsk to Szczecinek, traction rolling stock series and number: SU42 523
b) Train timetable speed 90 km/h, actual speed 48 km/h
c) Train length in metres: 40m train set (number of wagons, wagon series, wagon composition):
d) 2 Bhp series wagons 50 51 25-18181-6 and 50 51 25-18178-2
e) Total train weight: 176 tonnes, actual train braking weight: 161 tonnes
f) Required train braking weight: 135 tonnes
g) Required train braking weight percentage: 76%, actual braking weight percentage: 90%
h) Wagons with cast-iron brake shoes
i) Fast brakes' setting (P, R, R+Mg)
j) Last extensive brake testing location: Słupsk
k) Rolling Stock Inspector or other person authorised to test brakes: Rolling Stock Inspector – MS.

Locomotive **SU42 523**, serial number: 8476, year of manufacture: 1975
Authorisation for putting into service of rail vehicle No T/99/0039
Technical efficiency certificate No PBU4/13-20/09 of 26 January 2010, Nowy Sącz, valid until 27 November 2013 for 220,000km calculated from 78km, meter reading: 42428, periodic inspection: 29 June 2010, inspection: 12 July 2010

Wagons:
No **50 51 25 18 181-6**, Home station: Chojnice
Year of construction: 1975
Construction type: DOUBLE-DECKER
Series: Bhp
Seating capacity: 90
Tare weight: 36,000kg
Last inspection: 29 May 2009 Carried out by Sekcja Utrzymania i Naprawy Taboru Słupsk
Overhaul: 30 April 1993 Carried out by Zakłady Naprawcze Taboru Kolejowego w Pruszkowie Spółka Akcyjna
Last periodic inspection: PO 2 Carried out on 31/05/2010 in Sekcja Utrzymania i Naprawy Taboru Słupsk
Last inter-train inspection (PM): 12 July 2010
Technical efficiency certificate PBU4/1-41/09 of 29 May 2009 valid until 29 August 2011 for 360,000km distance

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No **50 51 25 18 178-2**, home station: Chojnice
Year of construction: 1975
Construction type: DOUBLE-DECKER
Series: Bhp
Seating capacity: 90
Tare weight: 36t
Last inspection: 29 May 2009 Carried out by Sekcja Utrzymania i Naprawy Taboru Słupsk
Overhaul: 30 April 1993 Carried out by Zakłady Naprawcze Taboru Kolejowego w Pruszkowie Spółka Akcyjna
Last periodic inspection: PO 2 Carried out on 31 May 2010 in Sekcja Utrzymania i Naprawy Taboru Słupsk
Last inter-train inspection (PM): 12 July 2010
Technical efficiency certificate PBU4/1-40/09 of 29 May 2009 valid until 29 August 2011 for 360,000km distance

Train ROPSr 89523 (PR Gdynia) – from Szczecinek to Słupsk – consisting of locomotive SU42-524 and 2 Bhp series wagons 50 51 25-18304-4 and 50 51 25-18301-0. The locomotive of train 89523 reversed in the travel direction, the front bogie broken and derailed. Compartments with a high-tension cabinet and a heating unit crushed, partially shifted to the driver cab's zone. In locomotive SU42-524, lower front lamps broken and the upper front lamp smashed – impossible to identify the train front signalling. The body of wagon 50 51 25-18304-4 broken and lifted.

Train 89523 specification – train type: ROPSr, railway undertaking: PR Gdynia
a) Route: Szczecinek to Słupsk, traction rolling stock series and No SU42 524
b) Train timetable speed 90 km/h, actual speed 57 km/h
c) Train length in metres: 40m train set (No of wagons, wagon series, wagon composition): 2 Bhp series wagons 50 51 25-18304-4 and 50 51 25-18301-0
d) Total train weight: 176 tonnes, actual train braking weight: 161 tonnes
e) Required train braking weight 137 tonnes
f) Percentage of required train braking weight 78%, percentage of actual braking weight 90%
g) Wagons with cast-iron brake shoes
h) Last extensive brake testing location: Szczecinek
i) Fast brakes' setting (P, R, R+Mg)
j) Rolling Stock Inspector or other person authorised to test brakes: Rolling Stock Inspector – WK

Locomotive **SU42 524**, serial number: 8965, year of manufacture: 1975

Authorisation for putting into service of rail vehicle No T/99/0039
Technical efficiency certificate No PBU4-10/2010 of 1 February 2010, Poznań, valid until 18 March 2012 for 94,728km distance calculated from 125,272 km, meter reading: 152559, periodic inspection: 21 June 2010, inspection: 11 June 2010

Wagons:
No **50 51 25 18 304-4**, home station: Chojnice
Year of construction: 1975

Construction type: DOUBLE-DECKER
Series: Bhp
Seating capacity: 90
Tare weight: 36,000kg
Last inspection: 8 May 2009 Carried out by Sekcja Utrzymania i Naprawy Taboru Słupsk
Overhaul: 13 May 1991 Carried out by Zakłady Naprawcze Taboru Kolejowego w Pruszkowie Spółka Akcyjna
Last periodic inspection: PO 2 Carried out on 11 May 2010 in Sekcja Utrzymania i Naprawy Taboru Słupsk
Last inter-train inspection (PM) on 9 July 2010
Technical efficiency certificate PBU4/1-37/09 of 08/05/2009 valid until 08/08/2011 for 360,000km distance

No **50 51 25 18 301-0**, home station: Chojnice
Year of construction: 1975
Construction type: DOUBLE-DECKER
Series: Bhp
Seating capacity: 90
Tare weight: 36t
Last inspection: 8 May 2009 Carried out by Sekcja Utrzymania i Naprawy Taboru Słupsk
Overhaul: 13 May 1991 Carried out by Zakłady Naprawcze Taboru Kolejowego w Pruszkowie Spółka Akcyjna
Last periodic inspection: PO 2 Carried out on 11 May 2010 in Sekcja Utrzymania i Naprawy Taboru Słupsk
Last inter-train inspection (PM): 9 July 2010
Technical efficiency certificate PBU4/1-36/09 of 08/05/2009 valid until 08/08/2011 for 360,000km distance

e) Description of the railway infrastructure and signalling system at the accident site – types of tracks, turnouts, railway traffic control devices, signalling, train braking system, etc.

1. Railway traffic control devices, signalling devices and their indications (type, kind):
a) At a block post (control desk, block apparatus, and control bench, etc., conditions of seals and locks):
In 1996, Korzybie station was transformed into a passing loop which operates under 150MHz train radio communication and KAPSCH 150MHz remote train traffic operation systems on Szczecinek – Korzybie section extended to Słupsk with the operator (signal operator) based at Miastko station, a remote traffic operation section. Train traffic is operated based on radio communication between drivers and the signal operator. The station is fitted with an automatic switch control system with signalling which informs of switch positions not authorising arrivals or departures without authorisation from a supervising dispatcher (operator) based at Miastko station. The above devices were to be used in accordance with Article 59(5) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling (Journal of Laws No 172, item 1444)on designated railway lines of local importance and on sidings but not on that line (a secondary line);

b) Ground-based:

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Korzybie passing loop

The exit semaphore B in the direction of Kępice indicates signal S1, 'Stop', entrance semaphore A and repeating signal SpA (entrance to Korzybie from the direction of Kępice) indicates signal Wz1 – the switch positioned in straight direction,
The exit semaphore C in the direction of Słupsk indicates signal Wz1 – the switch positioned in straight direction,
The entrance semaphore D from Słupsk to Korzybie indicates signal S1, 'Stop', repeating signal SpD is off,
Turnout 1, manual switch positioned to plus (+) routing to switch 2, locked with a bolt lock,
Turnout 2, electric switch positioned to minus (-) routing to track 1, no visible rip traces,
Turnout 42, electric switch positioned to plus (+) routing to track 1,

Turnout 41, manual switch positioned to plus (+) routing to track 2, locked with a bolt lock;

c) In-house facilities (a relay room, power station, etc.):
The relay room at Korzybie passing loop is locked and sealed with seal U-81/235. The condition of seals on relays is correct. All relays have valid tests from the Relay Technical Support. Relay status: SA-energised (excited), SB – de-energised (de-excited), Kzw AB – de-energised (de-excited), Zwab – de-energised (de-excited), Kwz 1A – energised (excited), Kwz3B – de-energised (de-excited), Ua/b – de-energised (de-excited), Kn2+/- - minus energised (excited) whereas plus de-energised (de-excited), CzZwb – de-energised (de-excited), Or2 – de-energised (de-excited), N2 '-' energised (excited), N2 '+' de-energised (de-excited), Kzz – energised, Iz2(1) – energised (excited), Iz2(2) – energised (excited), Iz2(3) – energised (excited), StA – de-energised (de-excited), Kwz1C – energised (excited), S.C. – energised (excited, Zwcd – de-energised (de-excited);

d) Tracks, turnouts, engineering structures (year of construction, type, fixation type, track parameters, trackbed parameters, last measurements (by whom), diagnostic recommendations):
Continuous welded rail, year of construction: 1992, rails S49, sleepers PBS1, K type fixation, ballast: crushed stone 30cm, track on embankment, curvature with R=720 at km 151.720–151.880, direct D=1,373m at km 151.880–153.264, gradient – falling 2.5‰ on 660 running meters. Last EM-120 measurement on 21 May 2010 – recommendations: dibbles to be tamped, ballast to be refilled, widening in wooden sleepers to be removed, – the recommendations are planned to be implemented in 2011; diagnostic tests following the accident on 14 July 2010, recommendations – damaged footing bolts to be replaced 18 pcs., replaced on 14 July 2010;

e) Wire and radio communication devices used at the accident site (last inspection, (by whom), diagnostic recommendations):
Locomotive SU42-523 of train 89522 equipment – Kapsch radio telephone at 450MHz frequency – impossible to check whether it works (no power following the occurrence), train radio telephone at 150MHZ frequency turned on to channel 6 – impossible to check whether it works, MB mobile phone, jammed in a driver cab's cabinet – impossible to check whether it works.
Locomotive SU42-524 of train 89523 – train radio telephone at 150MHz frequency turned on to channel 6 – impossible to check in Zakład Linii Kolejowych whether it works.
No Kapsch radio telephone at 450MHz frequency, no MB mobile phone.
Because of the undue equipment of locomotive SU42-524 of train 89523, traffic operation related conversations were held using mobile communication without designated

channels, which was unacceptable and posed a fundamental safety risk. Such communication was not provided for in the Rules of Procedure for traffic operation on that section.

Wire communication devices, last inspection and maintenance of carrier telegraphy on 10, 13, 18 and 26 May 2010 (Article 97 of Ie-13 (E-25) guidance), announcement communication on 19 May 2010 (Articles 29, 90 and 91 of Ie-13(E-25) instructions); last inspection and maintenance of Kapsch base stations on 07, 08 and 21 June 2010. (Articles 65 to 66 of Ie-13 (E-25) instructions), TH-79A mobile radio telephones and road and railway network radio telephones on 04, 20, 22 and 28 June 2010 (Articles 57 to 58 of Ie-13 (E-25) instructions), performed by Rejon Robót Telekomunikacyjnych in Szczecin.

f) Work performed at the accident or incident site or its neighbourhood
Not performed

g) Triggering of accident procedures and their subsequent stages

Full name and title of person notifying	**Time of notice**	**Notified unit**	**Full name of person receiving notice**
WB Train Dispatcher Miastko	09.30	Company Dispatcher	ZG
WB Train Dispatcher Miastko	10.00	Technical emergency services	Deputy Manger WS
----------	---------	Network emergency service	----------
----------	At the occurren ce site	Railway Protection Guard (SOK)	BJ
EG Conductor PR Gdynia	09.15	Railway Undertaking	Dispatcher MP
EG Conductor PR Gdynia	09.15	Railway vehicle owner	Dispatcher MP
----------	---------	Forwarder	----------

h) Description of rescue operations carried out by specialised units of railway and public rescue services, the Police and medical services, sequence of rescue operation stages

Full name and title of person notifying	Time of notice	Notified unit	Full name of person receiving notice	Time and date of reaching occurrence site	Completion of work
Unidentified person from mobile phone	09.20	Police	PZ Police staff ensign KP, Kępice	13/07/2010 at 9:30 hrs	13/07/2010 at 23:00 hrs
WB Train Dispatcher Miastko	09.33	Emergency ambulance service	Dispatcher	13/07/2010	
Unidentified person	09.13	Fire brigade	Dispatcher	13/07/2010 at 09:21 hrs	13/07/2010 at 15:41 hrs, return at 17:19 hrs
Police Headquarters, Kępice	09.20	Prosecution	MK Regional Public Prosecutor,	13/07/2010 at 10:10 hrs	13/07/2010 at 17:30 hrs

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			Miastko		

Rescue operation commenced on	13/07/2010	at	09.15
completed on	14/07/2010	at	01.25

2. Fatalities, injuries and losses

a) passengers, third parties, railway staff including subcontractors injured in the accident

Casualties	Fatalities	Serious injuries	Injuries
a) passengers	----------	9	24
b) employees, including subcontractor employees	----------	3	1
c) railway crossing users	----------	----------	----------
d) persons unauthorised to stay on railway premises	----------	----------	----------
e) other	----------	----------	----------

b) Restriction on train movements

Restriction on train movements				
Disruption of train movements	from day, time	13/07/2010 at 09:12 hrs	until day, time	14/07/2010 at 01:25 hrs
Delayed passenger trains	Number of trains	4	minutes Delays	56
Delayed freight trains	Number of trains	1	minutes Delays	127
Replacement transport service	from day, time	13/07/2010 at 09:20 hrs	until day, time	14/07/2010 at 01:25 hrs
Closing of Kępice – Korzybie route track	from day, time	13/07/2010 at 09:12 hrs	until day, time	14/07/2010 at 01:25 hrs
Turning off of voltage above the track	from day, time	----------	until day, time	----------

c) Damage to cargo or passenger luggage or other property and breakage of or damage to railway vehicles, infrastructure, the environment, etc.

3. Damage and destruction		
	Scale and nature of damage and destruction	Estimated reconstruction cost
Track	Damaged footing bolts, 18 pcs	66.48
Turnout	----------	----------
Railway traffic control devices	----------	----------
Traction network components	----------	----------
Traction units	SU42-523: 1. Frame at the rear of the locomotive ripped, 2. Both rear locomotive bumpers broken,	

	3. Track sweepers at the rear of the locomotive broken, 4. Suspension of the 4th axle of wheel set broken, 5. Walkways with steps and lanterns to the right and left of the locomotive torn off, 6. Rear compartment housing roof broken, 7. Rear equipment room smashed, 8. High-voltage cabinet moved into the driver cab with the cabin rear wall crumpled, 9. Most appliances in the high-voltage cabinet destroyed, 10. Caterpillar heating aggregate unit pulled from the plinth, aggregate fittings torn and broken, 11. Electric heating connecting box at the front of the locomotive torn off, 12. Rear walkway rails torn, SU42-524 1. Frame at the rear of the locomotive ripped, 2. Rear walkway partly torn and bent, 3. Both rear locomotive bumpers broken, 4. Second bogie suspension torn, 5. Track sweepers at the rear of the locomotive broken, 6. Rear compartment housing roof broken, 7. Rear equipment room smashed, 8. High-voltage cabinet moved into the driver cab with the cabin rear wall crumpled, 9. Most appliances in the high-voltage cabinet destroyed, 10. Caterpillar heating aggregate unit pulled from the plinth, aggregate fittings torn and broken, 11. Both fuel tanks torn and shifted, 12. High-voltage train set heating cabinet torn, 13. Fixing of the main air container slightly torn,	662,870.65 67,527.34
Passenger wagons	No 50 51 25 18 304-4 (as view in the train travel direction) On the right side: Running gear: Front wall of the wagon dented in the upper part about 1.5m, in the lower part 1m, sheets torn off, Frame bent such that the right bumper mounted on the buffer beam is leaning against the rail head, Breakage of the wagon – the body and frame – runs from the first bogie, approx. 6m, from the first vertical edge of the front wall, Side wall panel dented at approx. 0.6m in depth, Bogie shifted, the centre pin bent relative to the twist bearing seat, at a distance of approx. 0.7m Floor torn, folded up and leaned against the right wheel of the first bogie's wheel set, Second part of the broken running gear at the height of stairs leaned against the second set, Wagon bogie components torn and twisted, Right-side panel of the side wall torn at full height, approx. 1.85m longitudinally, Side wall sheets from the front to the first window of passenger compartment crumpled, Pushed out approx. 1.9m counting from the right rail head, Roof	

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	panel folded, On the left side: At the second step of the wagon door, collapsed (dented) wall in the direction of track axis from the wagon centre at the place where identification (number and series) is placed, side wall sheet perforated and broken, Sheets at the second and third window of the lower and upper deck broken up (torn off), Sheathing sheets totally torn from the roof to the frame, Fixing components of the (front) wagon bogie torn, the frame twisted, Buffer beam bent, the bumper mounted to it located approx. 0.05m above the rail head, Inside: Toilet and service compartments totally damaged, the front wall dented, the floor and the stairs leading to the upper deck lifted approx. 1m, sheets crumpled, walls torn, External structure components, metal frames of stairs, walls, ceilings and seats and window frames twisted. The damages make it impossible to move between (upper and lower) compartments and the vestibule at the door by the service compartment, Windows partly broken, No 50 51 25 18 301-0 (as in forward facing direction) On the right side: Roof panels from the side of the first wagon folded at approx. 1.6m, On the left side: Side wall and roof panels folded at approx. 1.2m and 0.8m, respectively, No 50 51 25 18 181-6 (as in forward facing direction) On the left side: Side wall panels folded, sheets overlap approx. 0.1m–0.3m at the first windows of upper and lower compartments, Bogie frame bent and twisted, Brake fittings damaged, partly broken, frame breakdown of approx. 0.25m On the right side: First and second bogie springs damaged, Wall sheets folded at approx. 6m, At the front windows of upper and lower decks, sheets overlap approx. 0.1m-0.3m,	0.00 0.00
	Buffer beam shifted back from the wagon front (as viewed from the locomotive), stuck at approx. 0.3m, Front wall torn, pushed inside toilet and service compartments, Support plate under the left bumper cracked, both bumpers damaged, the buffer beam stuck inside, Inside the wagon: Compartment window frames partly deformed, seat structures twisted, Side walls slightly damaged up to the third bench (broken wooden lining), metal sheet	

	structures twisted, Wall with incorporated control cabinet slightly damaged, batteries scattered, partly broken, Heating and lighting system components torn and crushed, No 50 51 25 18 178-2 (as in forward facing direction) On the right side: Side wall sheets folded at approx. 4m, Wagon (front) bogie structure slightly damaged, On the left side: Roof sheet panels folded at approx. 2m from the wagon front wall edge. Side wall sheets perforated at approx. 5m,	0.00 0.00
Freight wagons		Not applicable
Transported cargo		Not applicable
Environment		No loss reported
Passenger luggage		No loss reported
Other		No loss reported

Operational loss - 1 464.00
Removing accident consequences IZ Szczecin - 12,501.32
Replacement transport services - 300,633.63
Loss PR Gdynia - 765,528.65

TOTAL..... 1,080,127.50

3. External circumstances

a) Weather conditions

Time of the day	By noon	Overcast	None
Rain	None	Temperature	+26°C
Visibility	Very good	Audibility	Very good
Other phenomena	None		

b) Other external circumstances which might have contributed to the accident or incident (damage caused by mining establishment operations, flood, etc.).
None

III. DESCRIPTION OF RECORDS, EXAMINATIONS AND INTERVIEWS

1. Description of the railway traffic safety management system with reference to the serious accident

1) Manner and organisation of giving and following authorisations

Records from (technical and operational, vehicle related, etc.) documentation relevant to the accident:

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- Log book – The traffic diagram for Miastko station was kept correctly, records of the accident occurrence and closing of Kępice – Korzybie plain track,
- In phone log book R138 for Miastko station, records of the accident occurrence and notifying of the accident,
- In communication failure log book R366 for Miastko station, records of breaking the seal and using the 'Alert' button,
- In movement reports and vehicle documentation, no records of the accident,
- Book entry – movement log book R146 – Train 89522 from station track 8 at Słupsk station was given clear signal to leave to Korzybie at 8:40 hrs; it departed at 08:45 hrs and arrived at Korzybie at 9:10 hrs; whereas train 89523, while on the route between Kępice and Korzybie, was given by Słupsk clear signal at 9:11 hrs because in Korzybie a crossing with train 89522 was planned, of which the driver of train 89522 was unaware; there is also an entry to state that train 89523 did not leave Korzybie to Słupsk because of the accidents.

2) Requirements for railway staff and enforcement thereof (working times, vocational qualifications, health requirements)

Train Driver RI – Authorisation to drive railway vehicle 006731 issued by PKP Cargo S.A. Zakład Taboru in Gdynia on 28 November 2005, qualifying exam of 10 September 1989, periodic exam of 5 May 2008, knowledge of line 405 of 31 March 2010, knowledge of the RTS and Miastko Remote Traffic Operation Section of 19 May 2009, last periodic briefing of 29 June 2010, last periodic medical examination of 14 January 2010, last psychological examination of 14 January 2009, the accident occurred in the first hour of work;

Train Driver WO – Authorisation to drive railway vehicle 039350 issued by PKP Przewozy Regionalne Pomorski Zakład Przewozów Regionalnych in Gdynia on 24 March 2009, qualifying exam of 2 March 1982, periodic exam of 12 May 2008, knowledge of line 405 of 29 June 2010, knowledge of the RTS and Miastko Remote Traffic Operation Section of 9 December 2010, last periodic briefing of 14 May 2010, last periodic medical examination of 17 July 2009, last psychological examination of 7 July 2009, the accident occurred in the 11th hour of work;

Train Manager IP – Qualifying exam of 30 October 1997, periodic exam of 7 May 2010, periodic medical examination of 19 March 2009, periodic briefing of 16 March 2010, knowledge of the RTS and Miastko Remote Traffic Operation Section of 16 September 2000, the accident occurred in the 5th hour of work;

Conductor EG – Qualifying exam of 14 November 2006, periodic exam of 7 May 2010, periodic medical examination of 17 September 2008, psycho-technical examination of 16 September 2008, periodic briefing of 12 March 2010, knowledge of the RTS and Miastko Remote Traffic Operation Section of 5 July 2007, the accident occurred in the 1st hour of work;

Conductor BK – Qualifying exam of 14 February 2000, periodic exam of 28 April 2010, periodic medical examination of 31 March 2010, last psychological examination of20 March 2008, periodic briefing of 18 January 2010, knowledge of RTS and check of knowledge of Miastko Remote Traffic Operation Section of 26 June 201, the accident occurred in the 6th hour of work;

Conductor WB – Qualifying exam of 26 April 1980, periodic exam of 11 September 2006, periodic medical examination of 8 October 2009, last psycho-technical examination of 5 October 2007, periodic briefing of 28 April 2009, knowledge of the RTS and Miastko Remote Traffic Operation Section of 8 June 2007, the accident occurred in the 4th hour of work;

Train Dispatcher MS – Qualifying exam of 214 December 1982, periodic exam of 13 September 2006, periodic medical examination of 27 April 2010, last psycho-technical examination of 5 May 2008, periodic briefing of 19 March 2009, knowledge of RTS transcripts and of Miastko Remote Traffic Operation Section of 28 June 2007, the accident occurred in the 2nd hour of work.

3) Ad-hoc and periodic internal control procedures and their outcomes (internal safety audit)

Internal controls by the Infrastructure Manager and the Railway Undertaking had been conducted in a rather non-exhaustive manner as a result of which irregularities failed to be revealed:

- In the course of monthly controls of records of conversations between the signal operator at Miastko station and train driving crews, no stance was taken on missing records of such conversations of even one week, which shows that the remote traffic operation was based on mobile phone conversations only, which is inconsistent with internal regulations.
- No stance was taken on undue maintenance of the overhead telecommunications line acting as the main signal carrier of wireless transmissions from the bases on the passing loops to the operator at Miastko station, leading to frequent failures of Kapsch devices.
- Failure to respond to the malfunctioning of the train radio communication at 150MHz frequency on channel 6 on Miastko – Słupsk section.
- The technical condition of the overhead telecommunications line was maintained in a manner not ensuring that signals required to operate train traffic would be transmitted.

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- No stance was taken on undue maintenance of structure gauges (trees entered traction unit gauge) affecting the route and infrastructure sighting.
- No stance was taken on undue fitting of traction units (no Kapsch devices or field phones) and putting them into transport operation on that section of the line.
- Failure to respond to the undue ergonomics of driver workstation in SU42 series locomotives, in particular during backward movements in the travel direction by a single-member driving crew.
- SU42 instead of SU45 series locomotive was operated, which was inconsistent with the official train timetable.

4) Obligation to collaborate between various organisations involved in the accident

The collaboration was correct – no reservations.

2. Description of the rules and regulations concerning the accident

1) Laws and regulations applicable in the EU and in Poland

Directive 2005/49/EC on safety on the Community's railways and amending Directive 2001/14/EC on the allocation of railway infrastructure capacity and the levying of charges for the use of railway infrastructure and safety certification,
Act of 28 March 2003 on railway transport and administrative acts thereof,

2) Internal regulations of railway companies

Infrastructure Manager – PKP PLK SA
Ir8 – Instruction on managing serious accidents, other accidents and incidents as well as operational difficulties on railway lines,
Ir1 – Train traffic operation instruction,
Rules of Procedure for railway traffic operation on the Szczecinek station to Korzybie section of the single-track line Piła Główna – Szczecinek – Korzybie – Słupsk – Ustka of 7 December 1994 obtained from PKP PLK SA Zakład Linii Kolejowych in Szczecin, Sekcja Eksploatacji in Słupsk,

Przewozy Regionalne (PR)
The official train time table approved for use by the Railway Undertaking,
Pt-2 – Instruction for to traction unit drivers,

3. Summary of interviews (personal information protected pursuant to the Act of 29 August 1997 on personal information protection (Journal of Laws of 2002 No 101, item 926, as amended)

1) railway staff and subcontractor's staff.

Train Driver RI
On 13 July 2010, he was driving train 89522 with locomotive SU42 on Słupsk – Szczecinek route. He departed from Słupsk station late because he was waiting for

the connecting SKM train from Gdynia. Prior to departing, he was informed during his conversation with the train dispatcher at Słupsk that the train he was driving would be crossing with train 8953 on Kępice passing loop – the conversation was heard by the train manager. During the conversation, a 'dispatch' signal was given. He tried to connect via a Kapsch radio telephone with the train dispatcher at Miastko station several times – unsuccessfully. He drove onto track 2 on Korzybie passing loop, adapted for movements in the direction of Kępice passing loop, with the route placed 'straight' and a white light showing. He failed to establish connection with the train dispatcher – he was planning to do so only on Kępice passing loop. Approximately 200m behind the exit semaphore from Korzybie, he noticed a train approaching from the track curvature from Kępice – it was at a distance of 100m–150m. Following the collision, he fell on the locomotive floor. At the time of the collision, he was sitting on the left side of the cab, in front facing direction.

Train Driver WO
On 13 July 2010, he was driving train 89523 with locomotive SU42 on Szczecinek – Słupsk route. He departed from Szczecinek station to Słupsk station on schedule at 7:47 hrs. After leaving Miastko station, he was informed via a 150MHz radio telephone by the train dispatcher at Miastko station that the planned crossing would not take place in Kępice but in Korzybie because the other train had been delayed. The train dispatcher requested that he contact him from Kępice. In Kępice, he was given information (via mobile phone) by the train dispatcher in Miastko that the crossing would be taking place in Korzybie and obtained authorisation to depart from Kępice to Korzybie. He passed the content of the authorisation to a female train manager who was standing on the platform by the locomotive. When he was approaching the repeat signal he saw that it was off (dark) but it changed (‘a white vertical strip went on’). When he was leaving the curvature he noticed a train approaching in his direction from Korzybie passing loop. He activated 'emergency braking'. The collision came about. Shortly after the collision he received a call – the train dispatcher at Miastko station informed him that he authorised him to enter Korzybie. The locomotive he was driving was not equipped with any Kapsch radio telephone or any portable phone.

Train Manager IP
On 13 July 2010 she was acting as Manager of train 89523 (Szczecinek – Słupsk route). The train was standing on Kępice passing loop when she was informed via radio by the driver that the train had clear signal to Korzybie. She was unable to say how far the train drove until the collision came about, she did not recall the very collision.

Train Manager BK
On 13 July 2010 he was acting as Manager of train 89522 (Słupsk – Szczecinek route).
He did not hear any conversations between the driver and the train dispatcher when he was preparing for departure from Słupsk and giving the dispatch because of a very loud locomotive engine's operation. Neither, when travelling to Korzybie later, did he hear any conversations on his radio telephone. When passengers changed in Korzybie, having made sure that ‘the signal [was] showing white light’, he gave the signal to leave via radio telephone and by hand. He had no information that the train dispatcher from Miastko had made a decision to change the crossing location from

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Kępice to Korzybie. At the time of the accident he was in the service compartment. He did not recall anything from the moment of collision.

Train Dispatcher WB

As from 6:00 hrs he was on duty at Miastko station. In the course of his duty, train 89523 left Szczecinek station on schedule at 7:47 hrs. When the train dispatcher at Słupsk station notified him of a 20-minute delay of train 89522, he concluded that the trains might cross on Korzybie passing loop instead of the planned Kępice passing loop. When train 89523 was leaving Miastko station, via radio telephone at 150MHz, he gave (train 89523) authorisation to run to Kępice passing loop and to enter the passing loop while informing that it might be crossing with train 89522 on Korzybie passing loop. He notified the train dispatcher at Słupsk of the change of the crossing location and heard him pass the information to the driver of train 89522 via radio telephone.

Via mobile phone, he ordered train 89523 to depart from Kępice passing loop to Korzybie because he did not manage to establish communication via radio telephone at 150MHz and the driver did not have a Kapsch radio telephone. At about 9:10 hrs he saw on the monitor of the Traffic Supervision System that train 89522 had entered track 2 of Korzybie passing loop without obtaining his authorisation. He did not manage to establish connection with the driver and in that moment he heard a danger warning signalled by the Traffic Supervision System and he saw the 'EMERGENCY TRAIN ENTERED CLOSED TRACK' message on the monitor. He immediately pressed the emergency RADIOSTOP button on the telephone at 150MHz, several minutes later he received information about the collision from Mr D employed with PKP who was travelling on train 89522 as a passenger.

Train Dispatcher MS

On 13 July 2010 he was on duty at Słupsk station from 7:30 hrs to 19:30 hrs. At 8:45 hrs train 89522 from Słupsk to Szczecinek left Słupsk station with an 18-minute delay caused by waiting for the delayed train from Gdańsk. In accordance with the standard procedure, prior to dispatching the train he contacted the train dispatcher at Miastko station who was responsible for train movements on Słupsk – Szczecinek route. The train dispatcher at Miastko station said that trains 89522 and 89523 would be crossing on Korzybie passing loop and asked to notify of the fact the driver of train 89522, which he did. He learned about the accident from the train dispatcher at Miastko station who asked him to call train 89522 via phone, and several minutes later he asked to call an ambulance because two trains had collided.

4. Functioning of the railway traffic and railway vehicle operation structures and facilities

1) Signalling, traffic control and security systems, including recordings from automatic data recorders

In 1996, Korzybie station was transformed into a passing loop which operates under the KAPSCH-450MHz train radio telecommunication system on Szczecinek – Korzybie section extended to Słupsk with the (signal) operator based at Miastko station, a remote traffic operation section. Train movements are operated based on radio telecommunication between train drivers and the signal operator. The station is fitted with

an automatic switch control system.
Szczecinek – Korzybie station is fitted with an incorporated Traffic Supervision System (SNR) used as an auxiliary means of traffic operation during supervised operation. Under this system, a printer and monitor terminal for processing signals from passing loops is installed at the operator at Miastko station; the monitor is out of order and information on irregularities is transmitted using printouts including data which do not reflect the state of facts, e.g. on 22 July 2011 a train speed of 225 km/h was indicated, while on other occasions it was -1 km/h and -2 km/h.

2) Efficiency of railway traffic control devices

The devices work efficiently. The devices are manufactured in compliance with documentation.
On 20 October 2010, the dependence between StA transmitter control and occupancy indication of Iz2 insulated circuit, including $Iz2_3$ transmitter de-excitation, was inspected on Korzybie passing loop. The tests showed that a traction unit located in the sensors' zone before SpA signal, with Iz2 section marked as occupied by rolling stock, did not excite StA transmitter, as a consequence switch 2 failed to be thrown for driving in the direction of track 1 of the passing loop (straight route), Wz1 signal was displayed on SpA and Wz1 signal was displayed on semaphore A with S1 signal off.

3) Railway infrastructure condition

The technical condition of the superstructure and engineering structures was sufficient – it did not contributed to the occurrence.
On 28 July 2011, during an inspecting movement it was found that tree branches were located in the railway vehicle and structure gauge as well as in the overhead communication route zone on a part of the line, as a consequence drivers had compromised route sighting.

4) Description of communication devices
The train radio communication devices at 150MHz frequency and Kapsch devices at 450MHz are out of order; the lack of range prevents trains from logging in and establishing wireless train communication.

On 17 March 2011, audio tapes recorded with an IRYS conversation recorder from the signal operator post at Miastko station, secured on 13 July 2010, were heard. The tape recordings were played and entered in the computer system in the Central Forensic Laboratory of the Polish Police (CLKP). The recording was obtained from the Municipal Police Headquarters in Słupsk on a CD with a duplicate of Central Forensic Laboratory of the Polish Police letter H-L-I-214/1451/10/11 of 31 January 2011.

Following the hearing of the recording, it is established as follows:

1. Copying was carried out with reference to the channels involving radio correspondence. No decoding of timestamp signals recorded on audio tapes is available. It is therefore impossible to identify which conversations were made on the day of the accident, i.e. on 13 July 2010.

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2. The recordings include conversations on shunting movements at Miastko station, conversations between train managers and drivers on giving dispatches and conversations between train dispatchers and drivers on train traffic operation (phone announcements). It is impossible to establish on which days and at what times the conversations were held.

3. Starting from the 38th minute 26th second of tape recording 2 of channel 2, a low-volume recording of a 'Radio-Stop' signal can be heard. Conversations held in that time frame of the recording are clearer and louder than the 'Radio-Stop' signal and are irrelevant to the train collision occurrence. Despite the fact that neither the technical and operational documentation of the train dispatcher at Miastko station nor the board books of the self-propelled vehicle of railway undertaking PR Gdynia include any previous records of using or hearing a 'Radio-Stop' signal, it cannot be acknowledged with absolute certainty that the heard sound concerns the occurrence of 13 July 2010.

4. Following the hearing of the recordings, it needs to be stated that radio communication at 150MHz or mobile communication instead of Kapsch communication at 450MHz was used. It is impossible to determine dates and times of use of such communication forms.

5. In accordance with entries in communication failure logbook R366 of the signal operator post at Miastko station, the audio tapes in the IRYS conversation recorder were replaced for the last time on 10 July 2009.

6. As the tapes are recorded in a closed circuit, i.e. by overwriting old recordings, and no reference to the time or date of recording is available, it is impossible to establish what the earliest date when the conversations and signals were recorded is and at which moment the latest signal recorded ends.

7. The identification of timestamps seems impossible to recreate as no time or date identification of the conversations was found during the attempt of 13 July 2010 to recreate the content of conversations by Police officers from the Municipal Police Headquarters in Słupsk (the survey report enclosed to the investigation files).

5) Description of the railway vehicles, including automatic data recorder entries

Having analysed speedometer recordings, it is established as follows:
– Train 89523 from Szczecinek to Słupsk – At 09:14 hrs, when the train speed was 83 km/h, an abrupt drop in speed and a maximum increase in pressure of brake cylinders of the locomotive can be seen. This shows that the emergency brake was called by the driver. The speed diagram shows that the train speed at the time of the collision was 57 km/h. The braking distance from calling the emergency brake to the collision was 150m.
– Train 89522 from Słupsk to Szczecinek – At 09:11.5 hrs, following a standstill on Korzybie passing loop, the driver started the train and by about 09:12.5 hrs he drove a distance of 350m to a point where the train passed exit semaphore B. At 09:13 hrs, when the train speed was 48 km/h, an abrupt drop in speed and a maximum increase in pressure of brake cylinders of the locomotive can be seen. This shows that the emergency brake was called by the driver. The speed diagram shows that the train

speed at the time of the collision was 38 km/h. The braking distance from calling the emergency brake to the collision was 50 m.

6) Visibility of signals from the train driver's workstation

It is limited because the driver's station is on the left and because of the specific operation of such signalling (a repeating signal goes on upon logging in of an approaching train to repeating signal SpA).

7) Ergonomics of train driver workstations

Passenger trains' operation by single-member driving crews with SU42 series locomotives with driver's station on the left side in the travel direction unfit for backward running of the locomotive limits the ability of measuring equipment relevant to train movement safety, including speedometers, to provide indications.

Moreover, the train heating generator superstructure limits the sighting of routes, markers and light signals displayed by signalling devices located on the right side of travel direction.

The route configuration is unfortunate, with non-alternate curvatures, rising and falling gradients and tree-covered area, tree limbs reach railway vehicle outlines, which made it impossible to lean one's head to extend the sighting.

8) Railway traffic operation documentation

a) Measures taken by railway staff with a view to controlling traffic and signalling

Train dispatchers at Słupsk and Miastko stations keep record of traffic operation in R146 books and keep a logbook, a 24-hour train movement diagram for Szczecinek – Słupsk section.

As of 23 August 2010 infrastructure manager PKP PLK SA implemented on Miastko – Słupsk section train movements based on announcement communications pursuant to the 'Interim Rules of Procedure of Railway Traffic Operation on Miastko Remote Traffic Operation Section' No IZES2-704-67/2010.

b) Exchange of oral messages relevant to the accident or incident, including documentation from records

Based on the interviews, the railway accident investigation team assessed the messages communicated between persons involved in the occurrence from which it results that the signal operator at Miastko station was informed of the train collision by train 89522 passenger via mobile communication. Then, the train dispatcher at Miastko station notified the train dispatcher at Słupsk station who notified rescue services. Triggering of accident procedures notification times are described in detail in tables in Section II e 1 h–i.

c) Measures taken to protect and secure the serious accident site
The serious accident site was secured by Public Prosecutor from the Regional

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Prosecutor's Office in Miastko, Police from the Police Headquarters in Kępice and by Railway Protection Guard (SOK) in Słupsk.

9) Work organisation on the site and at the time of the accident or incident

a) Working hours of the staff involved in the serious accident

Railway staff (including subcontractors) in connection with the occurrence:

Full name	Title	Work establishment	Sobriety status	Time and date of work start	Hours of rest before work start
RI	Train Driver	PR Gdynia	Sober	13/07/2010 at 08:20 hrs	72 hours
WO	Train Driver	PR Gdynia	Sober	12/08/2010 at 22.00	52 hours 38 minutes
BK	Train Manager	PR Szczecin	Sober	13/07/2010 at 04.00	16 hours
EG	Conductor	PR Gdynia	Not examined	13/07/2010 at 08:20 hrs	36 hours 10 minutes
IP	Train Manager	PR Gdynia	Sober	13/07/2010 at 04.35	35 hours 57 minutes
MS	Train Dispatcher at Słupsk station	IZ Szczecin	Not examined	13/07/2010 at 7:30 hrs	96 hours
WB	Signal Operator on Miastko remote traffic operation section	IZ Szczecin	Sober	13/07/2010 at 06.00	24 hours

Other persons involved in the occurrence:
A list of victims to the occurrence is attached to the serious accident investigation records.

b) Results of the examinations:

Blood was drawn to test ethyl alcohol content in the blood of the drivers:
– RI
– WO
and Train Managers:
– IK
– BK
No ethyl alcohol content was found in the blood of the above men.

A control measurement device was used to determine alcohol in exhaled air in order to examine sobriety status of the train dispatcher at Miastko station:
– WB
No ethyl alcohol content was found in the exhaled air.

c) Environmental and ergonomic conditions of workstations of the railway staff in a casual connection with the accident or incident.

IV. ANALYSIS AND CONCLUSIONS

1. Reference to previous accidents or incidents under similar circumstances

In 2008-2010 (by the date of the serious accident), a total of 62 occurrences caused by starting a train or shunting a train set without the required authorisation or a failure of a railway vehicle to stop at a designated point took place, of which 24 included category B04 accidents and 28 category C44 incidents.

In most of the cases, the immediate causes were:

- Passing a semaphore or a shunting signal indicating a 'Stop' signal,
- Starting shunting movements without authorisation,
- Hitting a buffer stop or a gate due to starting to brake too late,
- Failing of a train to stop at a passenger stopping point.

In most cases caused by category B04 accidents, a railway vehicle would run into a standing railway vehicle or a side collision, or a head-on collision, as in one case, of railway vehicles would occur. In several cases of category C44 incidents, railway vehicles stopped at a small distance from one another, which might have resulted in a serious accident or an accident, taken slightly changed conditions and circumstances.

Worth of special note and mention is category B04 accident which occurred on 16 August 2008 on Szczecin Załom – Szczecin Dąbie route of line 401 at km 4.620, in the course of which a service handcar had entered the route without the required authorisation and disregarding a 'Stop' signal, which resulted in a head-on collision with a passenger train running in the opposite direction. As a result of the accident, two handcar workers were seriously injured. Once the accident investigation was completed, in addition to recommendations by a railway accident investigation team, the State Commission for Investigation of Railway Accidents addressed safety improvement recommendations to the Railway Undertaking concerning fitting all self-propelled railway vehicles of the owner of the service handcar with train radio telecommunication devices.

2. Description of the sequence of events in connection with the serious accident investigated

At 7:47 hrs train 89523 driven by locomotive SU42-522 departed from Szczecinek station on schedule. The locomotive driving the train was not equipped with any Kapsch radio telephone or any portable phone. Having regard to the fact that the railway undertaking had allocated a locomotive which was not equipped with devices required to drive on Szczecinek – Słupsk section with remote traffic control to operate train 89523, the train dispatcher at Szczecinek station should not have dispatched the train onto a route in the direction of Miastko station, in accordance with the Rules of Procedure. The train was driving smoothly to Miastko station. As the train was approaching Miastko station, the train

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dispatcher at Słupsk station informed the signal operator at Miastko that train 89522 would be departing from Słupsk with an approximately 20-minute delay (the waiting for connection with SKM Trójmiasto train). Following that, the signal operator at Miastko decided that the planned crossing of trains 89522 and 89523 would be taking place on Korzybie passing loop instead of Kępice passing loop. Following that, via radio telephone at 150MHz frequency on channel 6 he ordered train 89523 to run to Kępice passing loop and informed that in Kępice he would provide further information concerning a possible crossing of the trains in Korzybie.

The driver of train 89522 checked whether the Kapsch radio telephone connection was working and checked the train radio telecommunication portable phone. However, he made further conversations concerning the entrance and crossing location of the trains via train radio telecommunication on channel 6.

At 8:40 train 89522 was given clear signal to depart from station track 8 at Słupsk station in the direction of Korzybie; it departed at 08:45 .

When train 89522 was leaving Słupsk station, the train dispatcher at Miastko notified the train dispatcher at Słupsk that the crossing would be taking place on Korzybie passing loop. In the course of that journey, the train dispatcher at Słupsk informed the driver of that train via radio telephone at 150MHz on channel 6 that he was driving to an unplanned crossing with train 89523 in Korzybie. This information failed to reach the driver of train 89522. The railway accident investigation team did not have the opportunity to confirm that fact owing to the lack of train radio telecommunication conversation recorders at 150MHz frequency at Słupsk station.

At 9:05 train 89523 entered Kępice passing loop and the signal operator was trying to establish a radio connection at 150MHz without the Kapsch system – he obtained no connection. He passed the information about the crossing in Korzybie via mobile phone while giving authorisation to depart from the passing loop in the direction of Korzybie. According to a record from railway traffic control devices, the train left at 9:08 hrs.

At about 9:07 train 89522 driver, being at the W29 signal, was trying to establish connection with the signal operator at Miastko under the Kapsch system – the attempt was unsuccessful. The train failed to be logged in the system. Despite that, he continued to drive in the direction of Korzybie passing loop, with signallers indicating permission to enter (the right-hand movements through passing loops rule) and at about 09:10 he entered track 2 of the passing loop.

The information about the fact that train 89522 had entered the signal, the operator at Miastko had from Traffic Supervision System devices at about 09:10 . In the first place, the train dispatcher was trying to establish connection with train 89522 driver using Kapsch radio communication; having failed to do so, he tried to connect using train radio telecommunication at 150MHz. Both the attempts were to no effect. While keeping trying to establish connection, the signal operator at Miastko received a danger warning signalled by the Traffic Supervision System and the message ‘Emergency, train entered closed track’ appeared on the screen. He immediately pressed the Alarm-Stop button on the radio telephone at 150MHz.

At that time train 89523 had already been on the route for approx. 4 minutes and were driving in the direction of Korzybie.

After a standstill of approx. 1 minute (passenger handling), having failed to establish connection with the signal operator at Miastko, with signals on semaphore B authorising entrance, the train 89522 driver started the train in the direction of plain track 1.

After passing the semaphore it drove onto the non-occupancy control section of switch 2 (de-excitation of Iz2 transmitter). After passing the semaphore, at 09:11 hrs it departed from track 2 of Korzybie passing loop to Korzybie – Kępice plain track without

the required authorisation.

At that time train 89523 drove onto sensors recording vehicle presence for the purpose of positioning the driving route to track 1 of the passing loop (throwing of switch 2 to straight direction). Despite receiving the signal, the device system failed to carry out the switch throwing operation and Wz1 signal was displayed on SpA signalling device. Once train 89522 exited Iz2 circuit, Iz2 transmitter was excited, which allowed the signal to be received, making the driving route preparation system involving track 1 of the passing loop work. Once the position of switch 2 was changed, Wz1 signal was displayed on SpA and Wz1 signal was displayed on semaphore A referring to train 89523. At that time the train was just before SpA signalling device. As the driver of train 89523 was taking the station on the left side (backward running) in the direction of travel, with a limited sighting of signals located on the right side, he failed to notice or respond to the late display of Wz1 signal on SpA repeat signalling device.

It should be presumed that the train driver considered the signals to have worked in due time. Without limiting the speed (the driving speed was 83 km/h), he continued to drive in the direction of Korzybie passing loop without being able to observe the route as his post was on the outer side of the curve, and in addition the vision was impeded by trees on the inner side of the curve.

The vision of the route of train 89522 driver was affected and he was not able to notice an approaching train while operating his locomotive from his post on the inner side of the curve where the vision was limited by trees. If the train driver posts had been positioned in a different manner and if the trees had been kept 20m away from the track outline, it would have been possible to avoid or mitigate the accident. The train drivers noticed one another when they were approximately 150m from one another. Train 89523 driver had time to respond so that he was able to implement emergency braking and reduce the speed from 83 km/h to 57 km/h, whereas train 89522 driver, by implementing emergency braking, reduced the speed from 48 km/h to 38 km/h.

3. Findings of the Commission on the course of the serious accident based on the facts

Train 89522 was started and departed from Korzybie passing loop track 2 to Kępice – Korzybie plain track without the required authorisation, which was inconsistent with the Rules of Procedure for Railway Traffic Operation on the section of Szczecinek station – Korzybie station and Ir1 instructions, causing a collision on that route with train 89523 running from Kępice passing loop in the direction of Korzybie passing loop (under authorisation to arrive at Korzybie passing loop to cross with train 89523).

Train ROPSr 89522 (PR Gdynia) – consisting of locomotive SU42-523 and 2 Bhp series wagons 50 51 25-18181-6 and 50 51 25-18178-2, the train tail at km 151.885, the wagons standing on tracks, the locomotive reversed in the travel direction, axles 1 and 3 derailed and axle 4 raised above the rail head (as viewed in the travel direction). The front of train 89522 at km 151.835 was in direct contact with the front of train ROPSr 89523. Train ROPSr 89523 (PR Gdynia) – consisting of locomotive SU42-524 and 2 Bhp series wagons 50 51 25-18304-4 and 50 51 25-18301-0, the train tail at km 151.785. Front bumpers of both locomotives broken, and rear bumpers stuck in the wagon sheathing.

Train ROPSr No 89523 (PR Gdynia) – from Szczecinek to Słupsk – consisting of locomotive SU42-524 and 2 Bhp series wagons 50 51 25-18304-4 and 50 51 25-18301-0.

The locomotive of train 89523 reversed in the travel direction, the front bogie broken and derailed. In both locomotives, compartments with a high-tension cabinet and a heating unit

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crushed, partly shifted to the driver cab's zone. In locomotive SU4-523, lower front lamps broken and an upper front lamp smashed; in locomotive SU42-524, lower front lamps broken and an upper front lamp smashed – impossible to identify the train front signalling. The body of wagon 50 51 25-18304-4 was broken and lifted.

4. Analysis of the facts to establish conclusions concerning the causes of the serious accident and operation of the rescue services

It should be presumed that the train driver considered the signals to have worked in due time. Without limiting the speed (the driving speed was 83 km/h), he continued to drive in the direction of Korzybie passing loop without being able to observe the route as his post was on the outer side of the curve, and in addition the vision was impeded by trees on the inner side of the curve.

The vision of the route of train 89522 driver was affected and he was not able to notice an approaching train while operating his locomotive from his post on the inner side of the curve where the vision was limited by trees. If the train driver posts had been positioned in a different manner and if the trees had been kept 20m away from the track outline, it would have been possible to avoid or mitigate the accident. The train drivers noticed one another when they were approximately 150m from one another. Train 89523 driver had time to respond so that he was able to implement emergency braking and reduce the speed from 83 km/h to 57 km/h, whereas train 89522 driver, by implementing emergency braking, reduced the speed from 48 km/h to 38 km/h.

5. Identification of the immediate causes of the serious accident including factors in connection with actions taken by persons involved in railway traffic operation and railway vehicle or equipment condition, as well as of indirect causes in connection with competences, procedures and maintenance, and of systematic causes in connection with legal and other regulatory constraints and with application of the safety management system

a) Immediate cause:

Train 89522 was started and departed from Korzybie passing loop track 2 to Kępice – Korzybie plain track without the required authorisation, which is inconsistent with the Rules of Procedure for Railway Traffic Operation on the section of Szczecinek station – Korzybie station and Ir1 instructions, causing a collision on that route with train 89523 running from Kępice passing loop in the direction of Korzybie passing loop (under authorisation to arrive at Korzybie passing loop to cross with train 89522).

b) Primary cause:

- The driver of train 89522 failed to establish connection with the signal operator at Miastko station to obtain the instruction to enter Korzybie passing loop but despite that he continued to enter Korzybie passing loop without obtaining authorisation.
- The driver of train 89522 failed to stop at a designated point before entering Korzybie passing loop in order to establish wire communication (field phone).

c) Indirect causes:

- The driver failed to obtain authorisation to enter Korzybie passing loop from the train dispatcher at Miastko station.
- The Kapsch communication device in train 89522 locomotive was out of order.

- There was no Kapsch base station at 450MHz frequency at Korzybie station to provide wireless communication range, and the train communication at 150MHz frequency failed (out of range).
- Train 89523 should not have departed from Szczecinek station in the direction of Słupsk station because no (Kapsch) 450MHz radio telecommunication devices or a mobile phone were available in the driving locomotive, which was inconsistent with Article 8(1) of Annex 1 'Emergency Procedure' of the Rules of Procedure for Railway Traffic Operation on Szczecinek – Korzybie Section.
- The train should not have departed from Słupsk station to the route including a section supervised from Miastko station because the locomotive driving train 89523 on Szczecinek – Słupsk section was not equipped with any (Kapsch) 450MHz radio telecommunication devices or a mobile phone but it continued to run on that section, which was inconsistent with Article 8(1) of Annex 1 'Emergency Procedure' of the Rules of Procedure for Railway Traffic Operation on Szczecinek – Korzybie Section.
- No wireless (emergency) field phone available in the locomotive of train 89523.
- The series of locomotives used to operate trains 89522 and 89523 (SU42 instead of SU45), was incorrect and inconsistent with the official timetable, which compromised route sighting of both drivers.
- The drivers of trains 89522 and 8953 and the train dispatcher at Miastko station used mobile phones to operate railway traffic, which was inconsistent with the Rules of Procedure for Railway Traffic Operation on that section.
- Passenger trains 89522 and 89523 were operated by single-member driving crews with SU42 series locomotives with driver stations non-adapted to driving the locomotives backwards on the left side in the travel direction, with the sighting limited by the train heating generator superstructure, causing a delayed response of the driver aimed to avoid or mitigate the collision.
- The railway undertakings allocated locomotive SU4-524 to operate train 89523 without equipment required under law, i.e. a Kapsch radio telephone and a wire portable phone, which made it impossible for the train to run safely on Szczecinek – Słupsk section (inconsistency with requirements of the Rule of Procedure for Railway Traffic Operation on that section).
- The radiogram forms used in train radio communication were inconsistent with regulations.
- Staff operating self-propelled railway vehicles on that line had carried out their tasks despite irregularities posing risks to railway traffic safety, which was inconsistent with Article 26(1)(3) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling.
- Supervision and control staff with the Infrastructure Manager and the Railway Undertaking carried out their tasks relating to supervision over compliance with regulations of staff that operated transport in an incorrect manner.
- Railway traffic was operated using mobile phone communication, which was tolerated by the supervision and control staff with the Infrastructure Manager and the Railway Undertaking.

d) Systematic causes:

- The train was operated by a single-member driving crew who failed to call the train manager to the locomotive even though there was no continuous train

radio communication coverage at 150MHz frequency, which was inconsistent with Article 21(8) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling.

- Internal regulations approved by the President of the Office for Railway Transport did not provide for the signalling system used on Słupsk – Szczecinek section.
- No regulations were provided to ensure passenger train safety should switches be cranked or (emergency) wire communication be established, i.e. should a driver leave a started locomotive. (No mention of using a crank, no authorisation to crank or on how to proceed).
- Kapsch railway traffic operation equipment was used on Szczecinek – Słupsk section without their appropriate expansion (no base station on Korzybie passing loop), while the remote traffic operation section had been extended and the traffic operation system including Korzybie – Słupsk route had been put into service following its modernisation (Korzybie station changed into Korzybie passing loop), which was against Article 23(1) of the Act on railway transport. The available certificate and documentation did not cover traffic operation on Korzybie – Słupsk route with a remote traffic operation system (the equipment system is authorised for low traffic volume – no definition available).
- The supervision and control staff with the Infrastructure Manager and the Railway Undertaking carried out their tasks relating to the Kapsch system operation, trainings, exams and preparation for additional operations which required drivers to be qualified as switch man in an incorrect manner.

6. Identification of other irregularities revealed in the course of the proceedings, but irrelevant to the conclusions concerning the serious accident

- Technical efficiency certificates under numbers: PBU4/1-36/09, PBU4/1-43709, PBU4/1-40/09, PBU4/1-41/09 concerning the wagons of which trains 89522 and 89523 consist have been issued inconsistently with the model set out in the Annex to the Ordinance of the Minister of Infrastructure of 15 February 2005 on technical efficiency certificates of railway vehicles.
- The train drivers have not been qualified as switch men in order to carry out supplementary activities, which was inconsistent with the provisions of Article 4(1)(6) and of Article 3 of Annex 4 of the Ordinance of the Minister of Infrastructure of 16 August 2004 on the list of positions directly involved in railway traffic safety and operation and on conditions to be met by persons employed on such positions and persons operating railway vehicles (Journal of Laws No 212, item 2152).
- It was not entered in the board book of the self-propelled vehicle whether the driver had checked if the train radio telecommunication was functional, which is inconsistent with Article 8(9)(4c) of the PR's Pt-2 Instruction for traction unit drivers.

V. DESCRIPTION OF AD-HOC PREVENTIVE MEASURES

Pursuant to Article 28l(8) of the Act of 28 March 2003 on railway transport (*Dz. U.* –

Journal of Laws No 16, item 94, as amended), in connection with the serious irregularities found, posing a direct risk to railway traffic safety, on 30 July 2010 the State Commission for Investigation of Railway Accidents issued a recommendation for the Management Board of PKP Polskie Linie Kolejowe S.A. in Warsaw to cause urgent measures to be taken with a view to improving railway traffic safety, as follows:

1. **To immediately restore railway traffic control devices on Korzybie passing loop to full technical capacity,**
2. **To oblige all railway undertakings to provide two-member crews to operate single-cabin locomotives on Słupsk – Szczecinek section of line 405, including a relevant amendment to the Rules of Procedure for Train Route Allocation and to the official train timetable,**
3. **To ensure that train radio communication range is provided at 150MHz frequency by way of building a facility to retransmit the signal from Miastko station, as well as to restore Kapsch devices at 450MHz frequency to full technical capacity, including urgently putting the Kapsch base station into operation, which has been out of order to date,**
4. **To maintain the overhead telecommunications line acting as the Kapsch network and Traffic Control System transmission carrier, including cutting down trees in the line's belt,**
5. **To incorporate at Słupsk station facilities to record conversations held on channel 6 of train radio communication at 150MHz frequency on Słupsk – Miastko line section,**
6. **To cut down tree branches which are currently in the railway vehicle and structure gauge on Słupsk – Szczecinek section of line 405, which pose a threat to train crews and passengers during train journey,**
7. **To remind employees with the Infrastructure Manager and with railway undertakings that it is absolutely prohibited to transmit or receive authorisation to enter passing loops or routes on line 405 via mobile phones.**

According to the information provided by the President of the Office for Railway Transport of 28 February 2011, as of 23 August 2010 Infrastructure Manager PKP PLK SA implemented on Miastko – Słupsk section train traffic based on announcement communications in accordance with the 'Interim Rules of Procedure of Railway Traffic Operation on Miastko Remote Traffic Operation Section' No IZES2-704-67/2010.

VI. RECOMMENDED PREVENTIVE MEASURES TO AVOID OR MITIGATE SUCH ACCIDENTS OR INCIDENTS IN THE FUTURE

1. **The Office for Railway Transport shall initiate proceedings to verify whether it was legitimate to issue authorisation for putting into service No T/99/0039 of 5 May 1999 with an annotation above the title 'Authorisation' which reads as follows: 'The authorisation shall also concern the locomotive identified as SU42 owned by PKP' in order to introduce restrictions for these series' locomotives to be operated by two-member crews only and facing in the direction of travel during train movement (including fixing the driver seat to a side wall of a vehicle**

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facing in the direction of travel if the locomotive cannot be reversed at reversing stations).

2. **PKP PLK IZ in Szczecin and PR Gdynia shall discuss the rules for ad-hoc traffic operation on Słupsk – Miastko section, placing a special emphasis on the ban on mobile phone use for communication between train dispatchers and drivers exchanging information in the framework of traffic operation.**
3. **PKP PLK IZ in Szczecin shall update its Rules of Procedure for Train Traffic Operation on Szczecinek – Słupsk Section.**
4. **PKP PLK, PR and other railway undertakings to operate transport on that line shall discuss the accident during periodic briefings aimed at all their employees directly involved in railway traffic operation, having a particular regard to the obligation to follow regulations and rules of procedure in force.**
5. **PKP PLK shall systematically maintain technical efficiency of the train radio communication system at 150MHz frequency on Szczecinek – Słupsk section.**
6. **PKP PLK IZ in Szczecin shall keep cutting down tree branches in the railway vehicle and structure gauge, and in the area of the overhead network route on Słupsk – Szczecinek section of line 405.**
7. **PKP PLK shall carry out systematic inspections of equipment of self-propelled railway vehicles fitted with communication devices and owned by railway undertakings operating transport on Słupsk – Szczecinek section in terms of their compliance with regulations in force, including the Interim Rules of Procedure for Railway Traffic Operation on Miastko Remote Traffic Operation Section.**
8. **The obligation for two-member driving crews to operate single-cab locomotives on the section of Szczecinek – Słupsk line if the required train communication is unavailable, if the route or signalling sighting is limited, or in case of backward movements, shall be maintained. The railway undertaking shall set forth detailed conditions of staffing trains in its internal regulations, as defined in Article 21(3) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling.**
9. **PKP PLK SA and railway undertakings to operate transport on Słupsk – Szczecinek section shall draw up work schedules for supervision and control staff, having a particular regard to reporting on irregularities in infrastructure and communication on that section.**
10. **With reference to the current switch control system, having regard to the additional duties of railway vehicle operators, PKP PLK SA shall develop and agree with railway undertaking involved in transport on Słupsk – Szczecinek section on internal regulations on signalling, manual crank operation and handling procedure, and on how train driving and conductor crews are to proceed if they leave a traction unit in order to handle the devices, and it shall submit the regulations to the President of the Office for Railway Transport for approval.**
11. **The wording of Article 31(4)(2) of the Ordinance of the Minister of Infrastructure of 18 July 2005 on general conditions of railway traffic operation and signalling shall be specified by adding at the end: 'and on**

line sections provided with continuous train radio communication service.'

12. **The Office for Railway Transport shall establish the definition of 'small traffic volume' and take measures aimed to introduce the definition to regulations.**

If PKP PLK SA decides to reopen traffic on Miastko – Słupsk section with a remote train traffic control system, it is recommended that:

1. **PKP PLK should request the Office for Railway Transport that the traffic operation system on Korzybie – Słupsk section is provided with a authorisation for putting into service. The remote traffic control system should only be put into operation once the authorisation for putting into service has been obtained.**
2. **PR should equip all locomotives operating trains on Słupsk – Miastko section with working Kapsch devices.**
3. **PKP PLK should cause the base station in Korzybie to be restored.**
4. **PKP PLK should systematically maintain technical efficiency of the Kapsch system at 450MHz frequency.**
5. **Railway undertakings should equip self-propelled railway vehicles operating Słupsk – Szczecinek section with portable field phones for emergency communication.**

SIGNATURES OF MEMBERS OF THE ACCIDENT INVESTIGATION TEAM

HEAD OF THE TEAM

1……

Andrzej Gniwek

MEMBERS:

2…… 3……

Jan Andrzej Młynarczyk **Rafał Leśniowski**