



# ANNUAL REPORT 2023

Norwegian Safety Investigation Authority

Rail Department

Lillestrøm, August 2024



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# 1. Norwegian Safety Investigation Authority

## 1.1 NSIA activities and key figures

The Norwegian Safety Investigation Authority (NSIA) is an administrative agency under the Ministry of Transport. The NSIA is an independent expert body.

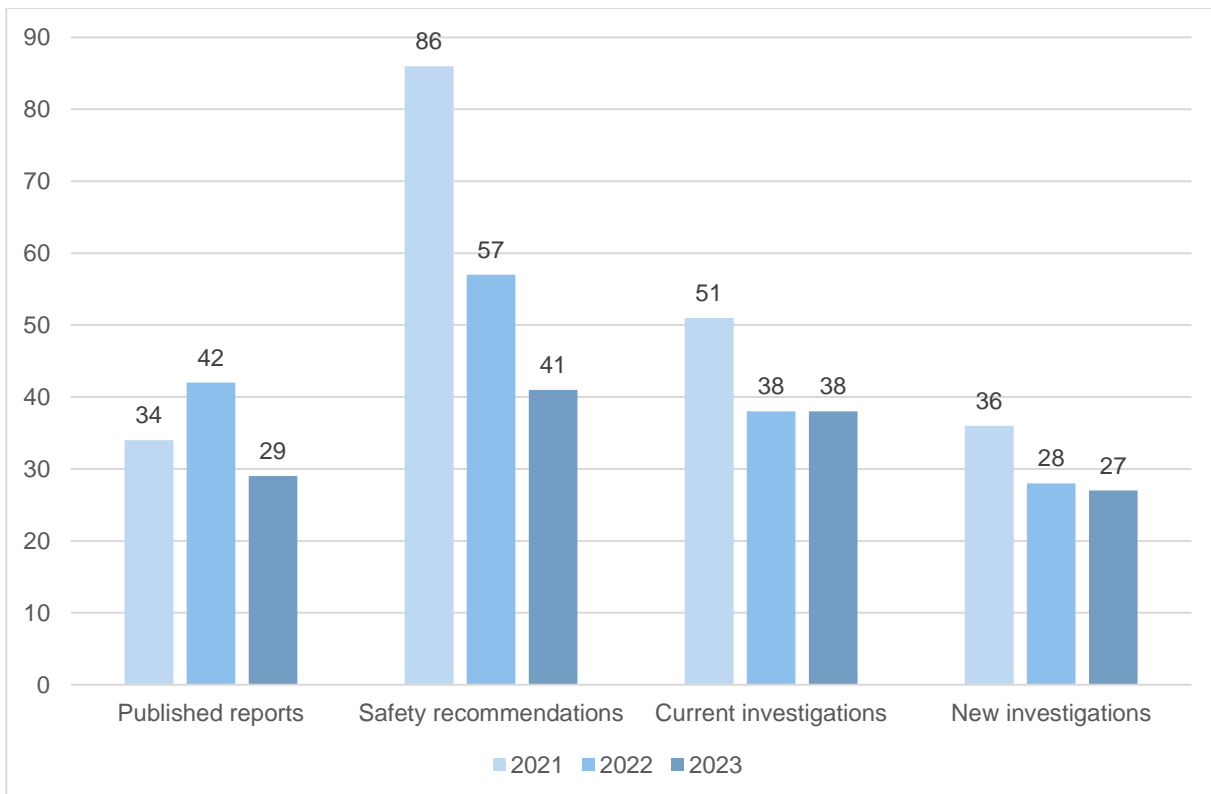
The NSIA investigates accidents and serious incidents in the aviation, rail, road, marine and defence sectors. The purpose of the investigations is to elucidate matters deemed to be important for the prevention of accidents in the transport and defence sectors, but it is not the NSIA's task to apportion blame or liability under criminal or civil law. The NSIA decides the scale of the investigations to be conducted and this includes making an assessment of the investigation's expected safety benefits in relation to necessary resources.



The NSIA is located in Lillestrøm. Photo: NSIA

The disciplines road, aviation and rail transport fall under the Ministry of Transport's area of responsibility. Marine transport falls under the Ministry of Trade, Industry and Fisheries, while the Ministry of Defence is responsible for the defence sector.

The diagram below shows the NSIA's total production of reports and safety recommendations, the number of ongoing investigations at the turn of the year and investigations initiated per year for the past three years. In the departmental descriptions in Part III, the figures are broken down by department.



## 1.2 Organisation as of 31 December 2023



The NSIA consists of four technical departments, one administrative department and an advisory staff unit. The head of the Aviation Department coordinates the follow-up of the Defence Accident Investigation Act and the pertaining Regulations.

As of 31 December 2023, the NSIA had 53 permanent employees as well as one apprentice and one temporary employee in the Administration Department.

## 1.3 Selected key figures from the annual accounts

Key figures from the annual accounts	2023	2022	2021
Number of employees*	55	53	55
Number of contracted FTEs*	53	51	54
Number of FTEs worked**	50.3	48.4	50.5
Total appropriations (NOK)	97,158,000	94,919,000	93,673,000
Utilisation of appropriations	102.9%	95.7%	91.2%
Operating expenses	98,448,567	90,817,869	82,534,144
Payroll expenses as a percentage of operating expenses	69%	68.3%	73.8%
Payroll expenses per full-time equivalent	1,350,876	1,282,025	1,206,671
Consultancy fees as a percentage of total payroll expenses	5.8%	10.0%	3.7%

\* Source: Statistics Norway table '12623 Government employees, by unit'. Data collected through the A-ordningen service.

\*\* One full-time equivalent is defined as one person working full time for one year. Other periodic work measurements (monthly, quarterly, four-monthly) are defined as full-time work throughout the period in question. The Ministry of Local Government and Modernisation has defined the concept of 'full-time equivalents worked', cf. personnel notification of change to the Personnel Handbook for State Employees: PM-2019-13: *Definisjon av utførte årsverk* (Definition of FTEs worked).

## 1.4 Goal

The overarching transport policy objective is 'An efficient, environmentally friendly and safe transport system by 2025'.

The NSIA's main objective for 2023 was as follows:

'The Norwegian Safety Investigation Authority shall contribute to improving safety through independent investigations of accidents and serious incidents in the aviation, rail, road and defence sectors, and of marine accidents and work accidents on board ships.'

A subsidiary objective was that:

'Investigation reports, including any safety recommendations, shall be submitted within 12 months of the accident or serious incident occurring. If the time limit cannot be met, an interim report shall be made at least every 12 months.'

## 1.5 About this report

By 30 September every year the investigating body shall publish an annual report accounting for the investigations carried out by the rail department in the preceding year, the safety recommendations that were issued and actions taken in accordance with recommendations issued previously. This report is sent to European Railway Agency and is an extraction from the official annual report for NSIA, which can be found on <https://www.nsia.no/About-us/Annual-report>. In addition, an annex providing status for the safety recommendations has been added.

## 2. Rail department's activities and goal achievement

### 2.1 Notification of accidents and incidents

The Rail Department was notified of 420 railway accidents and serious railway incidents in 2023, compared with 329 in 2022. This is the highest number reported in the past ten years. About 46% of the notifications were received outside normal working hours, and just over 20% were received at weekends or on movable public holidays. The Rail Department is often notified of the same incident by both the railway undertaking and the infrastructure manager, and in some cases also the police, which means that the number of calls received by the duty officer is higher than the number of incidents recorded.

The number of notifications received per month varied from 27 in February to 53 in December, with an average of 36 per month. Most accidents and incidents were reported Monday–Friday, which reflects the weekly pattern of train traffic.

In 2023, the Rail Department was notified of 42 railway accidents and 378 serious railway incidents. Fourteen notifications have been registered as not falling under the duty of notification and reporting to the NSIA (railway incidents).

Notifications are received via the 24/7 duty phone. Dealing with such notifications requires considerable effort by the department, as notifications received at an early stage are often based on limited knowledge about the severity of the accident or incident. A decision on whether to initiate an investigation must be made quickly, so that rolling stock/vehicles and infrastructure can be released and traffic resumed.

The most common accident and incident types in 2023, as before, were signal passed at danger, persons on the track and level-crossings incidents. There were 20 fatal accidents assumed to be self-inflicted. The NSIA does not investigate these incidents any further, but relies on the police's work.

The number of reported railway accidents and serious railway incidents received (72-hour reports) was 1,196 in 2023, compared with 1,056 in 2022, 929 in 2021 and 930 in 2020. The figures have not been adjusted for double reporting, nor for any subsequent reclassification. Every report is reviewed and assessed in terms of what lessons one can expect to draw from an investigation with a view to improving safety.

The figures presented herein do not represent Norway's official accident and incident statistics, as the preparation of such statistics does not fall under the NSIA's remit.

### 2.2 Investigations

The department published five investigation reports in 2023. No preliminary reports or notifications of safety-critical factors were issued.

A number of preliminary investigations are also carried out to obtain further information in order to decide whether or not to investigate a reported incident. Relevant information from all preliminary reports is filed to allow for subsequent use of data in similar cases. The amount of time spent on investigations of this type varies from a few hours to several days. One of the preliminary investigations led to a safety note in which relevant safety learning points from previous

investigations were highlighted, without initiating a full safety investigation of a type of accident we have investigated a number of times before.

The Rail Department visited accident sites on seven occasions in the course of 2023, compared with six in 2022.

### 2.2.1 Current investigations

At the beginning of 2024, the department had five ongoing investigations.

An overview of the Rail Department's ongoing investigations can be found on the NSIA's website. The information is updated regularly.

The Rail Department's investigation portfolio as of 31 December 2023:

Date	Title	Type of transportation	Category of occurrence
16 Oct. 2023	Investigation of a derailment at Åneby station, Gjøvikbanen	Passenger train	Derailment
11 Sept. 2023	Investigation of a serious rail incident between Dunderland and Bolna		Track work
28 March 2023	Investigation of a collision between a tram and the buffer stop at Fyllingsdalen terminus on the Bergen Light Rail	Tram	Collision
12 March 2023	Investigation of derailment at Narvik station	Freight train	Derailment
4 Nov. 2022	Investigation of a landslide incident with subsequent derailment of a freight train at Heskestad, Sørlandsbanen	Freight train	Derailment/collision

Two of the investigations are given special mention below.

#### Investigation of a serious railway incident between Dunderland and Bolna

Various types of maintenance are carried out on the Norwegian railway network every year. In order to ensure the safety of maintenance personnel, various means are used to prevent trains from being directed to the work site. The Nordland Line is equipped with an older signalling system and is the type of line that is most vulnerable to human error, as there are no technical barriers to prevent incorrect track occupation at a place where work is being carried out.

On 11 September 2023, work was being performed on rock face stabilisation, drainage and ballast distribution for Bane NOR SF between Dunderland and Bolna on the Nordland Line. Work teams from various companies were cooperating on working on their own areas over the geographically long distance. In connection with completion of the work, the section was reported ready for traffic before the track had been cleared of all the work teams. When train traffic resumed, several workers and a track-guided railway vehicle were therefore still on the track. Only coincidence led to the workers getting off the track just before a freight train arrived. This could have resulted in a serious accident under slightly different circumstances. The investigation focuses on the rules and procedures for work, as well as the barriers that should be in place to prevent accidents.



## **Investigation of a collision between a tram and the buffer stop at Fyllingsdalen terminus on Bergen Light Rail**

Bergen Light Rail carries a significant number of passengers each year and is an efficient and integrated public transport system in Bergen and the surrounding area. On Tuesday 28 March 2023, a light rail vehicle ran into the buffer stop at Fyllingsdalen terminus. Fyllingsdalen terminus is the end stop on the line, and the tram was therefore about to stop, meaning that many passengers had got up to get off. The collision with the concrete buffer stop, located at the end of the track, led to a sharp, sudden stop and many of the passengers fell inside the vehicle. Several people were taken to A&E or hospital after the collision, with mild to moderate injuries. The investigation focuses on the physical design of buffer end solutions and operation of light rail vehicles.

### **2.3 Published reports**

Five investigations were completed in 2023. They resulted in the following reports:

- 2023/05 Report on a runaway locomotive on the Alnabru freight terminal 23 October 2023
- 2023/04 Report on collision between a passenger train and tractor at Hagamælen level crossing, Dovre Line on 31 May 2022
- 2023/03 Report on fire in the signalling system at Sandefjord station on 27 July 2021
- 2023/02 Report on near-collision between a freight train and passenger train at Bolna station on the Nordland Line on 11 May 2022
- 2023/01 Report on fire in a snow shed near Vegårshei at Sørlandsbanen Line on 26 September 2021

The reports have summaries and safety recommendations in English.

Report 2023/01 is in the Nynorsk form of Norwegian.

The safety note that was written after a preliminary investigation was shorter and focused on increasing learning from previous investigations on similar issues relating to level crossings. The note was written and published just 35 days after the accident:

2023/SN1 Safety note on collision between passenger car and work train at Sandermoen level crossing on 19 May 2023.

A more detailed discussion of two of these reports is given below.

#### **2023/04 Report on collision between a passenger train and tractor at Hagamælen level crossing, Dovre Line on 31 May 2022**

On 31 May 2022 at about 06:45, SJ Norge AS's passenger train 411 from Røros to Trondheim collided with a tractor at Hagamælen level crossing just north of Støren station. The driver of the tractor died in the crash. Through the safety investigation, the NSIA has identified several possible contributing factors, but has not been able to determine why the tractor was on the level crossing when the train arrived. The investigation has shown that the signalling system probably worked as intended.

The report discusses various general reasons why road users do not always pass level crossings safely. The NSIA has in particular referred to how road users are largely responsible for ensuring

that level crossings are passed safely, and that this responsibility is probably greater than perceived by most road users.

Research, reports and observations show that there are many reasons why road users inadvertently make mistakes in these situations and end up in very dangerous situations. The investigation refers to various surveys and observations showing that road users fail to stop for the red stop signal. It is uncertain why this is the case, and the NSIA believes that the road authorities should reach a conclusion in their work on alternatives to stop signals in the event of closed tunnels. The result of this work may also be relevant for level crossings.



Overview photograph of the accident site. The yellow arrow indicates the tractor's direction of travel. The yellow circles indicate the tractor's position in the river and the trailer's position to the left at the signal box. The blue circle shows where the driver was found. The red circle shows the location of the train after the accident. Photo: The police. Graphics: NPRA

### **2023/03 Report on fire in the signalling system at Sandefjord station on 27 July 2021**

On Tuesday 27 July 2021, a short circuit occurred and a fire broke out in the overhead contact line system at Sandefjord station.

The fault was probably caused by a bird creating a connection between the bridging feeder and earth in the system. The protective devices intended to detect such faults and ensure that breakers disconnected the power supply did not work as intended. This caused the bridging feeder to burn through and fall to the ground.

It was not until 9 minutes and 40 seconds later that the power supply was manually disconnected by Bane NOR SF's electrical power operator monitoring the system. During the intervening period, the current found its way into several low-voltage systems and parts of the signalling system. A fire occurred in a technical room at Sandefjord station, and extensive damage was done to the system over a large geographical area. In addition to the extensive disruption of train traffic on the Vestfoldbanen Line, the incident caused direct damage estimated to approx. NOK 90 million.

It is not uncommon for external factors to affect the overhead contact system, for example birds or vegetation that come into contact with live parts of the system. Protective devices are therefore installed in the system to ensure that the power supply is disconnected until the problem has been remedied. They did not work in connection with this accident.

The NSIA's investigation has identified a number of contributing factors to the accident and its consequences. Shortage of resources and Bane NOR SF's complex organisation contributed to faults in the system not being detected. This also meant that decisions about measures in the system were made without sufficient basis or risk assessments. As a result, further weaknesses were unintentionally introduced into the system. The investigation has also shown that several other measures proposed internally in Bane NOR SF following similar incidents in the past had not been decided or implemented. The NSIA therefore submits a safety recommendation addressed to Bane NOR SF in which Bane NOR SF is requested to consider the organisation of the discipline area tasked with planning, developing and operating the power supply system to reduce the risk of undesirable incidents.

The laws and regulations that regulate railway, light rail, subway and streetcar power supplies are the responsibility of the Ministry of Justice and Public Security and the Ministry of Transport through the Directorate for Civil Protection and Emergency Planning and the Norwegian Railway Authority, respectively. In order to keep power supply systems safe and secure, they are subject to requirements and provisions both at a very detailed technical level and at a more general level as regards, e.g., safety management. The NSIA's investigation has shown that the differences between the two supervisory bodies in terms of regulatory framework, supervisory practices, resources available for supervisory activities and risk assessments may have contributed to inadequate supervision of the objects they were charged with supervising. The NSIA therefore submits a safety recommendation to clarify how the supervision of railway, light rail, subway and streetcar power supplies is to be attended to when responsibility for the area is shared between two official bodies.

The investigation has not identified any single cause or action that allowed the short-circuit to have such extensive consequences. What the safety investigation did show, however, was that, over time, circumstances have arisen in the system that made it vulnerable in the event of such faults. As neither the established quality and safety work nor the supervisory authorities identified these circumstances, the system remained vulnerable.





*Visible outdoor fire during the short circuit. Photo: Hans Morten Tamnes*

## 2.4 Safety recommendations

The Rail Department issued five safety recommendations in 2023.

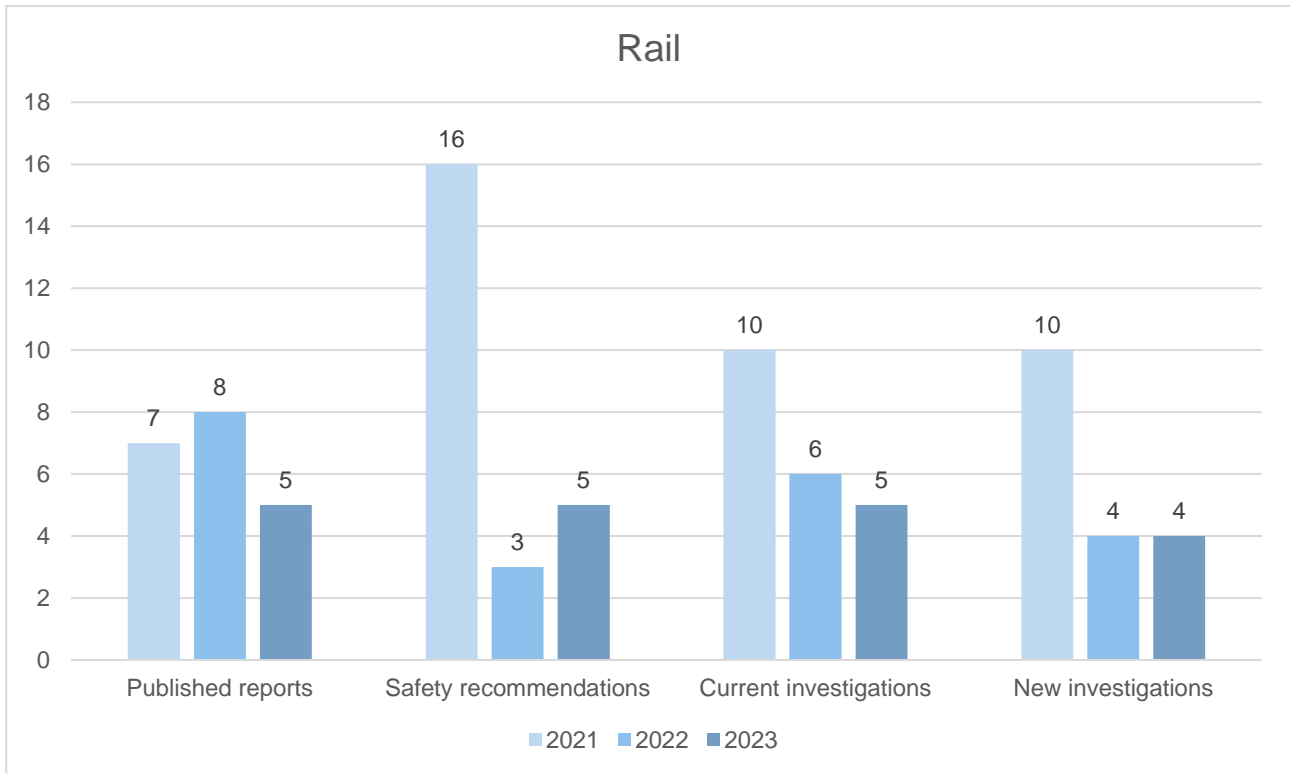
Reference is made to Annex B, which contains an overview of all safety recommendations in the rail area.

Twice a year, the NSIA receives a letter from the Department for Rail, Planning and Environment at the Ministry of Transport about the status of the safety recommendations that are being followed up by the Norwegian Railway Authority. The NSIA has also received letters from the Department of Public Roads, Urban Mobility and Traffic Safety about the status of safety recommendations being followed up by the Road Safety Authority. The status of safety recommendations issued directly to the Ministry of Transport, or via other ministries or government agencies, is followed up by the Ministry itself.

Of the five safety recommendations issued in 2023, four remained open at the end of the year.

## 2.5 Developments over the past three years

The diagram shows the trends in submitted reports, safety recommendations, ongoing investigations at the turn of the year and initiated investigations per year for the past three years.



As the figure shows, the number of safety recommendations issued varies from one year to the next. The reasons for this are complex, and the number varies with the number of completed reports and the complexity of and number of parties involved in a case, among other things. If the NSIA has recently submitted a safety recommendation on the same topic, it will be natural to wait until the measures have had time to take effect before considering repeating the message in another safety recommendation. The NSIA also expects the content of its reports to be used in the work to improve safety, not just the individual safety recommendations.

## 2.6 Other activities

In 2023, the Rail Department attended three network meetings for European rail accident investigation bodies held by the European Union Agency for Railways (ERA). One was held in Brussels, one as a virtual/hybrid meeting, while the last meeting took place near ERA's headquarters in Valenciennes.

Pursuant to Regulations No 378 of 31 March 2006 on Public Investigations of Railway Accidents and Serious Railway Incidents etc. (Railway Investigation Regulations), the NSIA shall, by 30 September each year, prepare and publish a report describing the investigations carried out in the preceding year, the safety recommendations issued and their status. The report for 2022 was prepared and published within the deadline. It is available on the NSIA's website under Rail.

Norway hosted this year's Nordic meeting, which was held in Oslo in May 2023. Representatives of the accident investigation bodies of Denmark, Finland, Sweden, Norway, UK, Ireland, Estonia and a representative from ERA attended the event.

Two contact meetings with the Norwegian Railway Authority are held each year. Contact meetings were also held in 2023 with Bane NOR SF and Sporveien T-banen AS. In connection with investigations, meetings are also held with relevant parties at different levels of the organisation.

Prior to the expansion of the NSIA's investigative mandate to cover cable cars and amusement devices from 2024, a number of preparatory activities were carried out in 2023, including

establishing contact with a range of industry players and competence-raising courses for NSIA employees.

Since 2013, the department has given lectures as part of the Norwegian Railway Academy's training of new train drivers. This helps to raise knowledge about the NSIA among all new train drivers. Seven lectures were held in 2023.

## **2.7 Goal achievement**

The Rail Department completed five investigations in 2023 and issued a safety note from a preliminary investigation where it was appropriate to highlight safety learning without initiating a full safety investigation. This is a new and shorter report format that is intended to be used to convey lessons learned from selected preliminary investigations.

Five safety recommendations were issued in 2023. The main reason why reports are published without safety recommendations is that the enterprise concerned has already addressed the issue and implemented measures. The NSIA assumes that the entire report will be used for safety learning purposes, not just the safety recommendations.

One of the investigations was conducted within 12 months of the accident/incident, while the other four were completed within 13 to 22 months. The delay can largely be ascribed to staff changes in the department, resulting in associated recruitment and training.

At the turn of the year, one of the five ongoing investigations had exceeded 12 months, and a 12-month status report was submitted.

Through its investigations, the NSIA makes important contributions to safety in the sector. The undertakings concerned make direct use of the safety recommendations and reports in their safety work. In addition, the Norwegian Railway Authority uses the reports as a basis for its audit programme.

Feedback received by the NSIA indicates that the reports and safety recommendations maintain good quality and are included in the curriculum used for training new train drivers and for in-house training by the railway undertakings. The NSIA translates the summaries, conclusions and safety recommendations from all its published reports into English, which helps to make the results of our investigations available to an international audience.

# Annexes

# Annex A

## Safety recommendations 2023 – Rail

The safety recommendations are translated from Norwegian language. The Norwegian text remains the official version of the safety recommendations. Should ambiguity arise between the two, the Norwegian text takes precedence. Status is given per 31 December 2023.

Report title	Safety rec. No	Safety recommendation	Ministry of Transport Status report	Status
Report on collision between passenger train and tractor at Hagamælen level crossing, Dovre line on 31 May 2022 (2023/04)	2023/05T	<p>Safety recommendation Rail no 2023/05T</p> <p>On 31 May 2022, a passenger train collided with a tractor with a trailer at the Hagamælen level crossing on the Dovre line. The level crossing was equipped with flashing red stop lights and audible warning, but no physical barrier. 30 level crossings on the Bane NOR SF's network are equipped with similar systems.</p> <p>The Norwegian Safety Investigation Authority recommends the Norwegian Railway Authority to request Bane NOR SF to assess whether it is possible to take measures that increase the attention of road users at level crossings equipped with flashing red stop light and audible warning.</p>	Under processing.	Open
Report on fire in the signalling system at Sandefjord Station on 27 July 2021 (2023/03)	2023/04T	<p>On Tuesday 27 July 2021, a short circuit occurred in the overhead contact line system at Sandefjord station. This created a connection with the low-voltage system that caused extensive fire damage and disrupted train traffic for a long time. The cause was related to the fact that, for various reasons, protective devices in the system did not work as intended. Bane NOR's organisation of the planning, development and operation of the power supply system is complex, with multiple interfaces related to responsibilities and personnel.</p> <p>The Norwegian Safety Investigation Authority recommends that Bane NOR SF consider whether the organisation can be changed to reduce the risk of undesirable incidents.</p>	Under processing.	Open



<p>Report on fire in the signalling system at Sandefjord Station on 27 July 2021 (2023/03)</p>	<p><b>2023/03T</b></p>	<p>On Tuesday 27 July 2021, a short circuit occurred in the overhead contact line system at Sandefjord station. This created a connection between the high-voltage and low-voltage systems that caused extensive fire damage to the systems and disrupted train traffic for a long time. The design, operation and maintenance of power supply systems are regulated by a number of laws and regulations that fall within two different supervisory bodies' areas of responsibility. The interface between the Directorate for Civil Protection and Emergency Planning and the Norwegian Railway Authority needs clarification.</p> <p>The Norwegian Safety Investigation Authority recommends that the Ministry of Justice and Public Security clarify how supervision of power supply systems in railway infrastructure is to be attended to when responsibility for the regulatory framework is shared between two official bodies.</p>	<p>Under processing.</p>	<p>Open</p>
<p>Report on fire in the signalling system at Sandefjord Station on 27 July 2021 (2023/02)</p>	<p><b>2023/02T</b></p>	<p>"On Tuesday 27 July 2021, a short circuit occurred in the overhead contact line system at Sandefjord station. This created a connection between the high-voltage and low-voltage systems that caused extensive fire damage to the systems and disrupted train traffic for a long time. The design, operation and maintenance of power supply systems are regulated by a number of laws and regulations that fall within two different supervisory bodies' areas of responsibility. The interface between the Directorate for Civil Protection and Emergency Planning and the Norwegian Railway Authority needs clarification.</p> <p>The Norwegian Safety Investigation Authority recommends that the Ministry of Transport clarify how supervision of power supply systems in railway infrastructure is to be attended to when responsibility for the regulatory framework is shared between two official bodies. "</p>	<p>Under processing</p>	<p>Open</p>
<p>Report on fire in a snow shed near Vegårshei at Sørlandsbanen line on 26 September 2021 (2023/01)</p>	<p><b>2023/01T</b></p>	<p>In the early hours of 26 September 2021, a wooden snow shed burnt down near Vegårshei on the Sørlandsbanen line. Bane NOR SF was carrying out track maintenance using a rail grinding train, and the fire was probably caused by hot particles from the grinding. No fire prevention measures had been implemented in the snow shed. The risk associated with hot work near wooden structures is known from previous fires, but the organisational learning process has been ineffective.</p> <p>The Norwegian Safety Investigation Authority recommends that the Norwegian Railway Authority request Bane NOR SF to ensure that the process for disseminating lessons learnt from incidents and accidents functions so that it can help to prevent recurrence.</p>	<p>Half-yearly status report</p>	<p>Closed</p>