

Swiss Transportation Safety Investigation Board STSB Annual Report 2025



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Swiss Transportation Safety Investigation Board STSB

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1 Foreword by the President



After rising over many years to a record high of 2,295 in 2024, the number of notifications fell for the first time in the reporting year – and markedly so – to 1,775. Our analysis shows that this decline is not due to poorer notification discipline on the part of industry members, but is the result of the amendment to the legal framework at the start of 2025 and the implementation of this change. It is now clearly stipulated in the OSITI¹ (cf. Regulation (EU) No 996/2010) that the authorities must only be notified of 'serious' incidents, and this is now being implemented by industry members, following discussions.

With fewer incidents being reported, less time is spent by the STSB in assessing such notifications for their potential for prevention and in deciding which cases would benefit most from an investigation.

Managing a large number of pending investigations creates an additional workload, and this gets in the way of the actual task of conducting investigations. For this reason, in 2025 the STSB introduced a method to prioritise cases in the aviation sector even more strictly, which has resulted in fewer new investigations being launched (see Section 3.5). This prioritisation system also means that ongoing investigations are discontinued if they show less preventive potential than other cases. This change in STSB policy was also made possible by a legislative amendment. Finally, the scope of the reports is also strictly determined by their preventive effect, allowing the STSB to complete more safety investigations on time and thus affect accident prevention more rapidly.

¹ Ordinance on the Safety Investigation of Transportation Incidents (OSITI; SR 742.161)

The ever-increasing volume of data involved in safety investigations, as well as the growing international interdependence with operators, manufacturers and regulators in other countries, are just two of the reasons why conducting individual investigations is becoming increasingly time-consuming and why, despite our best efforts, it is often difficult to meet deadlines.

The STSB published fewer final reports in 2025 than in the previous year, partly because of vacancies resulting from staff turnover, but also because several cases required more attention than usual. Nonetheless, the number of safety recommendations issued to oversight authorities and safety advice notices issued to companies and industries remained stable in the aviation and rail/maritime sectors. These recommendations and notices, addressed directly to those concerned, are the STSB's main tool for achieving a preventive effect.

A good example of this is the 2025 STSB report on the derailment of a freight train in the Gotthard Base Tunnel in 2023: the conclusions and safety advice notices sparked a debate both nationally and internationally on an issue that has been on the international agenda for some time, but that has received too little attention until now.

The increased workload associated with the investigations, combined with an urgent need for a new IT system to manage investigations and publish reports, exhausted the STSB budget entirely.

Our main challenge – meeting our statutory prevention mandate with the available human and financial resources – will continue to be a challenge for us going forward.

*Gery Balmer,
President of the extra-parliamentary commission*

2 Management Summary



The STSB received 1,775 incident notifications in 2025 and launched 21 investigations.

In the reporting year, the STSB completed 24 investigations, and in each case published a final report or a summary report. Four investigations were discontinued or closed with a factual report.

Eighty preliminary investigations were concluded and the facts presented in a prevention

bulletin (see Section 3.4); in these cases, an extensive investigation was not launched.

The investigations revealed safety deficits, for which the STSB issued 28 safety recommendations and 17 safety advice notices.

These figures are distributed as follows across the different modes of transport:

	Aviation	Public transport	Maritime navigation	Total
Incident notifications	1470	304	1	1775
Opened investigations	12	9	0	21
Interim reports published	0	0	0	0
Investigations concluded with a summary report/final report	13	9	2	24
Investigations discontinued, or closed with only a factual report	3	1	0	4
Aviation safety investigations concluded with publication of a factual account in a prevention bulletin	80	n/a	0	80
Safety recommendations issued	7	7	14	28
Safety advice notices issued	6	5	6	17

3 The STSB

3.1 Remit

The Swiss Transportation Safety Investigation Board (STSB) investigates incidents in civil aviation, public transport and inland and maritime navigation in accordance with the relevant national and international laws.

STSB investigations consist of an independent examination of the technical, operational, human, organisational and systemic circumstances and causes that led to the given incident. The findings are intended to help prevent similar incidents occurring in the future. As stated explicitly in the Swiss Railways Act (RailA; SR 742.101) and the Swiss Aviation Act (AviA; SR 748.0), questions of culpability and liability are beyond the scope of the investigations.

The STSB collates and publishes the findings of investigations in the form of reports aimed at professionals in the sectors concerned and the interested public. They are explicitly not aimed at law enforcement authorities.

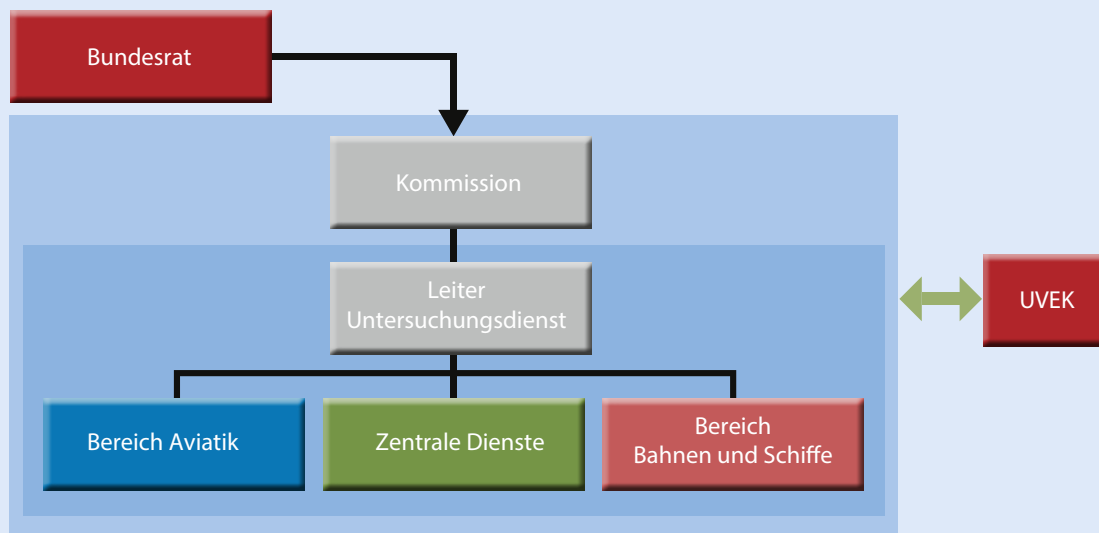
Where the STSB establishes safety deficits in the course of its investigations, it issues safety recommendations to the competent oversight authorities, or safety advice notices to the companies, bodies or organisations concerned. The task then is to determine what measures are appropriate to reduce or eliminate the risks attached to the deficit that has been identified. The authorities do this as part of their supervisory activities, the companies as part of their safety management systems.

Specific requirements regarding STSB organisation and its investigation procedures are set out in the Ordinance on the Safety Investigation of Transportation Incidents (OSITI; SR 742.161).

The revised version of the OSITI was approved by the Federal Council in 2024 and came into force on 1 January 2025.

In addition to various minor adjustments and corrections, the following issues amended in the Ordinance were implemented by the STSB:

- In aviation, the authorities now need only be notified of serious incidents that occur, in accordance with Regulation (EU) No 996/2010. The implementation of this amendment to the statutory requirements towards the end of the reporting year led to a decline in the number of notifications received in the aviation sector. The full impact will be evident in the figures for 2026.
- The investigation procedure has been streamlined to increase efficiency: a difference is no longer made between extensive and summary investigations. In 2025, a number of summary investigations which were at an advanced stage at the beginning of the year were concluded at this stage and a summary report was published (Art. 60a OSITI).
- A safety investigation consists of a preliminary investigation and a main investigation; this is particularly important in dealings with foreign authorities. This also means that investigations can be addressed in an order of priority based on their expected prevention effect. Information is now published in a 'prevention bulletin' (see Section 3.4).
- Article 21 para. 4 now explicitly provides for the possibility of discontinuing investigations where it becomes apparent during the course of the investigation that *'the investigation cannot prevent further incidents and that no reporting duty applies under international agreements'*. In such cases, the investigation is discontinued or, in the case of inves-



- tigations under EU law (Regulation (EU) No 996/2010), closed with only a factual report.
- As of March 2025, reports are no longer sent in paper form. The STSB ensures that all publications are available in electronic form.

3.2 Organisation

The STSB is structured as an extra-parliamentary commission under Articles 57a–57 g of the Swiss Government and Administration Organisation Act (GAOA; SR 172.010). The Board is appointed by the Federal Council. In 2025 it received an additional member, and so now comprises four independent experts from the relevant transport areas. The STSB's Investigation Bureau is responsible for conducting the investigation process. Administratively, the STSB is attached to the General Secretariat of the Federal Department of the Environment, Transport, Energy and Communications (DETEC), although it acts independently.

3.3 Performance targets

The Federal Administration's New Management Model (NMM) was introduced on 1 January 2017. It is designed to strengthen administrative management at all levels and to increase the transparency and manageability of performance. Within the framework set by the NMM, the STSB defined the following projects, initiatives and performance targets for the reporting year:

Projects and initiatives

[Replacement database for recording and analysing investigation data: Availability of a working beta version](#)

The STSB currently uses the EMAS incident management system to record and manage notifications of incidents and safety investigations. The current database no longer meets the Confederation's security requirements, nor all those of the STSB. Furthermore, it cannot be adapted to changes in business processes; for example, process changes cannot be mapped.

It was therefore necessary to procure a new system, and an internal project was launched to this end in late 2022.

Following a detailed needs analysis and a description of the data structure, workflow processes and user requirements, a public procurement process was launched in 2024, with a call for tenders published towards the end of the year. In spring 2025, the contract was awarded and agreements were signed.

The project involves an agile approach, with individual features developed and tested on an ongoing basis; there is no longer a traditional 'beta version' in this process. The rollout of a core version is still scheduled for 2026. Further developments and improvements (efficiency-enhancing measures) will then be implemented in 2027 and 2028.

Performance objectives

The STSB sets itself challenging performance targets regarding the application of the latest, recognised investigation methods, and the swift publication of investigation findings.

Targets and indicators	2025 TARGET	2025 ACTUAL	2026 PLAN
Conformity assessment: The internal guidelines and procedures in the Aviation Division are in line with the latest international requirements.			
Conformity assessment procedure conducted once a year in accordance with ICAO Annex 13, EU Regulation No 996/2010 (yes/no)	yes	yes	yes

Rapid conduct of safety investigations: By applying suitable measures, the STSB ensures that incident investigations are conducted promptly and in compliance with the law.

Prompt completion of safety investigations concerning serious incidents and accidents involving aircraft (% minimum)	60	31	60
Prompt completion of safety investigations concerning serious incidents and accidents involving railways, buses and boats (% minimum)	60	22	60

The targets for the prompt completion of safety investigations were not met.

In aviation, ongoing work on older cases continues to negatively affect our ability to complete investigations within the required timeframe. Although progress was made in 2025 in clearing the backlog of older investigations, there is still much to be done.

In order to better focus resources on processing relevant cases, the STSB has taken measures based on the new OSITI (in force since 1 January 2025):

- The number of notifications received will be reduced (only *serious* incidents now need to be reported).
- Under the new OSITI, investigations can now be rigorously prioritised in order to decide when an extensive investigation should be launched. The STSB will make use of this option.
- Furthermore, the OSITI states that an investigation may be discontinued if it becomes apparent during the course of the investigation that the preventive benefit no longer justifies the cost of a full investigation.

These measures are already helping to ensure that investigations are completed on time.

Unfortunately, besides the general workload, there are other factors preventing the STSB from completing investigations in a timely manner over which it has little or no control:

- As internationalisation spreads and the number of foreign stakeholders increases, there is a growing reliance on foreign partner organisations, as official documents from abroad can only be obtained through them. As these foreign investigation bodies are themselves increasingly under heavy pressure or overburdened, the STSB is having to wait longer for documents required in its investigations.
- The number of electronic data media requiring analysis is constantly increasing and often requires specialist knowledge and specialised software, which must be procured separately. This is a time-consuming process, which further delays investigations. Furthermore, data verification is taking up an increasing amount of time; in particular, the authenticity of photos and videos of events must be checked, as they may have been faked using AI.

In 2025, the target for completing reports on time was not met in the rail and navigation sector either. This was primarily because of understaffing: two (of four) investigator-in-charge posts were vacant for a time and replacements had to be sought. Once a post has been filled, new staff members must undergo a relatively long induction period before they can carry out investigations independently. Furthermore, priority was given to the investigation into the accident in the Gotthard Base Tunnel and its follow-up.

Investigations into public transport incidents are also becoming increasingly complex because of the large number of international bodies involved and the growing prevalence of elec-

tronic data-recording devices (both on board vehicles and in the surrounding environment).

3.4 Prevention bulletins (Aviation Division)

Many accidents and serious incidents of which the Aviation Division is notified must be closely assessed for their value in preventing similar incidents (prevention potential). The STSB therefore conducts a preliminary investigation, which itself often yields valuable findings, even if it is shown that it would not be sufficiently effective or efficient to open a full investigation.

The STSB publishes a summary in a quarterly prevention bulletin for those accidents and serious incidents in which the effort required to launch an investigation and produce a final report containing an analysis, conclusions and safety recommendations is not justified in order to achieve the desired preventive effect.

For each accident or serious incident, an anonymised account of the key facts is given. The prevention bulletins are organised chronologically and include those incidents for which preliminary investigations were completed by the end of the respective quarter. The non-exhaustive information is intended to raise safety awareness in the sector.

3.5 Cessations of investigations and factual reports (Aviation Division)

For several years now, it has not been possible to complete many safety investigations on time, which has lessened their preventive effect. For

this reason, the STSB will from now clearly prioritise individual safety investigations, whilst complying with the relevant national and international legal frameworks. The primary factor determining the scope of a safety investigation and the associated report is the potential to prevent further accidents. In accordance with legal requirements, all accidents and serious incidents are subject to a safety investigation. As a minimum, this comprises a preliminary investigation and a statement of facts published in the Prevention Bulletin within a reasonable time of the event occurring. When an investigation is launched because there is a sufficiently high potential for further accidents to be prevented, the STSB follows the standard procedure in accordance with Article 47 of the OSITI. Ongoing investigations are periodically reviewed to assess their potential for prevention and, where appropriate, are concluded with a presentation of the facts. This may take the form of a factual report (in the case of a mandatory investigation under EU regulations) or 'cessation of the investigation'.

By prioritising cases in this way, opening safety investigations only when clearly appropriate and grading investigations and reports according to how effective they are in preventing further accidents, it should be possible to complete many more safety investigations on time going forward.

3.6 Resources

In 2025, the STSB had a budget of approximately CHF 8 million, of which CHF 4.2 million was earmarked for staff expenses and CHF 3.6 million for material and operating expenses. CHF 1.6 million was spent on external services used to fund STSB investigations carried

out by external experts and specialist organisations. The budget was exhausted entirely.

As is also usual in other countries, the activities of the STSB are a basic service provided by the state to improve safety. It is therefore almost exclusively publicly funded. Consequently, all STSB products, and in particular the final reports on investigations, are provided free of charge on the internet.

The STSB Investigation Bureau had a staff of 19 (17.5 FTEs) at the end of 2025. In its investigative activities, the STSB can also call upon the support of around 130 external contract investigators, in particular when specific specialist skills are required.

4 Investigations and findings



4.1 Overview of investigations by the entire Investigation Bureau

The STSB received 1,775 incident notifications in 2025. The decline in the number of notifications received in the aviation sector is attributa-

ble to the implementation of the revised OSITI: from now on, the authorities must only be notified of *serious* incidents, rather than of all incidents. This new situation was discussed with the main stakeholders towards the end of 2025 and applied towards the end of the year. The effects are likely to be felt even more strongly in 2026.

	Aviation	Public transport	Maritime navigation	Total
Incident notifications	1470	304	1	1775
Opened investigations	12	9	0	21
Interim reports published	0	0	0	0
Investigations concluded with a summary report/final report	13	9	2	24
Investigations discontinued, or closed with only a factual report	3	1	0	4
Aviation safety investigations concluded with publication of a factual account in a prevention bulletin	80	n/a	0	80
Safety recommendations issued	7	7	14	28
Safety advice notices issued	6	5	6	17

The number of notifications dealt with by the Rail/Navigation Division has remained fairly constant for many years.

Following assessment of the notifications received, 21 new investigations were opened.

The STSB completed 24 investigations in 2025, all of which were concluded with a final report. Four investigations were discontinued, one of which was closed with a factual report.

In addition, eighty preliminary investigations were concluded and the facts presented in a prevention bulletin (see Section 3.4); in these cases, no extensive investigation was launched.

The investigations revealed safety deficits, for which the STSB issued 28 safety recommendations and 17 safety advice notices.

In 2025, the STSB received one notification of an incident involving maritime navigation. An investigation was not launched. The STSB completed two investigations with a final report, and one further investigation is currently in progress.

The Rail/Navigation Division is currently investigating 14 incidents (previous year: 16).

The Aviation Division was able to reduce the number of outstanding investigations further: at the end of 2025, 60 investigations were still pending, compared to 70 at the end of 2024. This reduction was achieved by restricting the criteria applied when assessing whether the potential preventive safety benefit justifies opening an investigation. Cases were identified in which simply publishing the facts of the case would have a significant preventive benefit. These cases are summarised in a quarterly pre-

vention bulletin and published on the STSB website. These bulletins are organised chronologically and include those incidents for which preliminary investigations were completed by the end of the respective quarter. The key facts of individual incidents are presented in anonymised form. The non-exhaustive information is intended to raise safety awareness in the sector.

4.2 Aviation

In 2025 the STSB received 1,470 notifications of incidents in aviation. Each of these was assessed for its potential preventive value. In many cases of potentially serious incidents, particularly close encounters between two aircraft (airprox), a preliminary investigation involving additional preliminary investigations and technical data analysis was carried out to assess the risk posed. These preliminary investigations resulted in a total of eight accident investigations and four serious incident investigations, two of which were an airprox involving a high or significant risk of collision.

One of the safety investigations opened by STSB in 2025 was into the accident involving a Swiss International Airlines A220, registered as HB-JCD, which occurred on 23 December 2024 near Graz, Austria. Immediately after the accident, an investigation was launched by the Federal Safety Investigation Authority (SUB) of the Republic of Austria. In April 2025, the SUB requested, pursuant to Article 6 paragraph 2 of Regulation (EU) No 996/2010, that the STSB take over the conduct of the investigation and continue the investigation. The STSB complied with this request and launched an investigation in April 2025. It published a progress report on

the investigation on the anniversary of the accident.

The STSB completed 16 investigations, of which 13 were concluded with a published final report, two were discontinued, and one was closed with a factual report.

In 80 cases a preliminary investigation did not lead to an extensive investigation, and so the cases were published in a prevention bulletin.

The final reports contained four safety recommendations and seven safety advice notices (Section 5.2).

During the reporting year, there were three fatalities in accidents involving aircraft registered in Switzerland.

In accordance with international guidelines, the STSB is obliged to cooperate in safety investigations relating to Switzerland or the Principality of Liechtenstein that are conducted by authorities abroad and to support the safety investigation authorities concerned. This applies in particular to accidents and serious incidents in which the aircraft is registered in Switzerland or Liechtenstein, or the air operator concerned or the company that developed or manufactured the aircraft or its systems is based in either of these countries. The STSB also provides support in investigations involving the death of Swiss or Liechtenstein nationals in accidents abroad. This might involve providing simple information and obtaining documents from companies based in Switzerland to undertaking time-consuming and costly technical support, such as analysing flight data recorders or conducting interviews in Switzerland with individuals involved in the incident.

The STSB is increasingly required to assist in investigations conducted by other safety investigation authorities. This results from the success of Swiss companies (e.g. Pilatus Aircraft, Kopter Group (formerly Marenco Swisshelicopter)), the growth in air traffic abroad, and the establishment of investigation units in other countries.

In 2025, the STSB was asked to assist in 34 cases. At the end of the reporting year, it was involved in 75 investigations by foreign authorities.

4.3 Public transport

Railways and trams

The STSB received 265 notifications of safety-related incidents concerning trains (239) and trams (26) in 2025. An investigator-in-charge attended the scene in 20 cases. The notifications having been assessed for prevention potential, an investigation was opened in seven of the cases.

The investigations opened in 2025 related to: one runaway vehicle, one train derailment, one collision between a train and a shunting movement, two workplace accidents, one near-miss, one irregularity posing a hazard, one tram collision and one vehicle crash.

Seven investigations were completed during the reporting year.

In response to the safety deficits identified during the extensive investigations, the STSB addressed four safety recommendations to the regulator and four safety advice notices to carriers/infrastructure managers (Section 5.3).

In the railway sector, too, safety investigation bodies must provide mutual assistance: Direc-

tive (EU) 2016/798 (Railway Safety Directive) provides that investigation bodies from other countries may be consulted where a railway undertaking or a vehicle registered or maintained in another country was involved. There is an increasing number of such enquiries, the STSB does not yet systematically collect data on the number of such enquiries on public transport.

Cableways

The STSB was notified of twenty safety-relevant incidents on cableways in 2025. An investigator-in-charge attended the scene in two cases. After assessing each case for prevention potential, the STSB opened an investigation in two of the cases, a workplace accident and a vehicle crash.

The STSB concluded two investigations in the reporting year.

It issued three safety advice notices to cableway operators on the basis of the safety deficits identified in the investigations (Section 5.3).

Buses

Fifteen notifications were received in 2025. No prevention potential was identified in any of the cases, so no investigations were launched.

Inland navigation

Four notifications of incidents in inland waterway navigation were submitted to the STSB in 2025. No prevention potential was identified in any of the cases, so no investigations were launched.

4.4 Maritime navigation

In 2025, the STSB published its first final reports on maritime navigation. Besides these two re-

ports, it also published 14 safety recommendations and six safety advice notices.

It received one notification of an incident in maritime navigation; following a preliminary investigation, it decided not to proceed with a formal investigation.

4.5 Principality of Liechtenstein

In June 2024, Liechtenstein transferred its safety investigation authority duties to the STSB. The STSB was notified of one incident involving an aircraft in the Liechtenstein Aircraft Registry. In 2025, there was one ongoing investigation into an accident involving an aircraft registered in Liechtenstein.

5 Safety recommendations and safety advice notices



5.1 General

In the first half of the last century, accidents in the transport sector were usually investigated by the supervisory authority for the mode of transport concerned. However, since these may be involved in causing an accident or a hazardous situation as a result of their activity, a separation of tasks and powers has prevailed over the course of recent decades. In most countries, in addition to the supervisory authority, an independent, state-run safety investigation body exists, whose task is to establish the reasons for an accident or a serious incident impartially. In Switzerland, the Railways Act (RailA; SR 742.101) and the Aviation Act (AviA; SR 748.0) provide the legal framework for such an independent safety investigation body.

Because of the separation of powers, an investigation body does not itself issue safety measures to the authorities concerned. The latter retain their full responsibility. The safety

investigation body – the STSB in Switzerland – identifies any safety deficits and issues the corresponding safety recommendations in an interim or final report to the relevant supervisory authority or bodies. It is then up to the body to which the safety recommendation was directed to decide along with the stakeholders concerned whether and how the safety recommendations should be implemented. This principle applies to all modes of transport for which the STSB is responsible for investigating incidents

However, there are certain differences in both international and national legal frameworks regarding responsibilities in oversight of the individual transport modes. These affect the specific procedures followed, as described below.

The EU established the European Aviation Safety Agency (EASA) in 2002. EASA's mission is to provide uniform and binding rules on aviation safety in the European aviation sector on behalf of the member states. Here, the national

oversight authorities primarily play an executive and mediating role and their exclusive competence is increasingly limited solely to the nationally regulated aspects of civil aviation. For this reason the STSB addresses its safety recommendations concerning aviation to either EASA or the Federal Office of Civil Aviation (FOCA), depending on the area of competence. In individual cases the authority to act to rectify a safety deficit may lie with another authority in Switzerland or abroad. In these cases the STSB addresses its safety recommendation to the competent authority concerned.

Regulation by the EU is becoming increasingly important for the railways, in particular where technical and operational interoperability in international transport are concerned. Meanwhile, responsibility for overseeing railway safety essentially lies with the national safety supervisory authority, which in Switzerland is the Federal Office of Transport (FOT). However, since June 2019 the European Union Agency for Railways (ERA) has issued safety certificates and market authorisations for vehicles, and given its approval for train control command and signalling projects. As a further result of the changes to the legal foundations in the railway sector, other authorities and organisations also take on a supervisory role alongside the national authority. These include the Swiss Accreditation Service (SAS) and various certification bodies for companies that are responsible for maintenance. The STSB addresses its safety recommendations to that authority or body whose mandate gives it the power to implement or order action on the basis of the recommendation submitted to it.

Safety objectives and requirements for cableway installations and their operation are governed

by the EU Cableways Regulation (EU) 2016/424 dated 9 March 2016. However, supervision and enforcement lie fully within the remit of the national supervisory authority, which in the case of federally licensed cableways is the FOT. STSB recommendations are therefore addressed to this authority.

The regulations applying to licensed inland waterway navigation in Switzerland are primarily national ones. Consequently, recommendations from the STSB are addressed to the FOT as the national supervisory authority for safety.

With regard to maritime navigation, the European Union established the European Maritime Safety Agency (EMSA) in 2002. Its mission is to reduce the risk of accidents at sea, the pollution of the seas through maritime navigation and the loss of human life at sea. The EMSA advises the European Commission on technical and scientific matters concerning the safety of maritime traffic and in relation to preventing the pollution of the seas by ships. It plays a part in the ongoing drafting and updating of legislative acts, the monitoring of their implementation and in assessing the efficacy of existing measures. However it has no authority to issue directives to Switzerland, specifically. Any safety recommendations from the STSB are therefore addressed to the Swiss Maritime Navigation Office (SMNO) as the national supervisory authority, or to the International Maritime Organization (IMO).

Having received a safety recommendation, the addressee notifies the STSB of the action it intends to take to rectify the safety deficit, and submits an implementation timeline. The feedback from the addressees and the current implementation status can be found on the

STSB website (www.sust.admin.ch/en/safety-recommendations-and-advice).

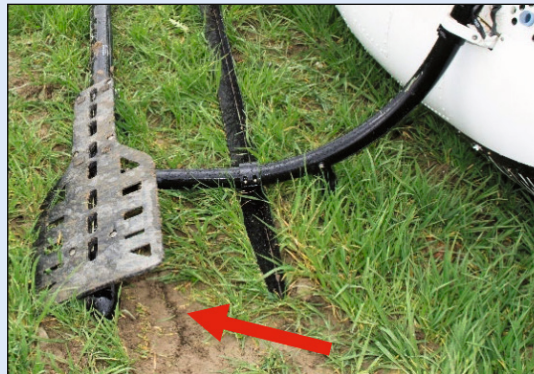
Occasionally, an investigation brings safety deficits to light that cannot be eliminated by amending rules or regulations or by direct supervisory activity, but rather by changing or improving awareness of risk. In these cases the STSB formulates a safety advice notice addressed at particular transport-related stakeholder or interest groups. This is intended to help the companies, people and organisations concerned to identify a risk and the associated action that is required. The legal foundations do not provide for feedback on the implementation of measures taken in response to safety advice notices. Unlike safety recommendations, safety advice notices are not published separately on the STSB website.

All of the safety recommendations and safety advice notices issued by the STSB in interim or final reports during 2025 are set out below. To aid understanding, these are accompanied by a brief description of both the incident concerned and the safety deficit which is to be eliminated.

5.2 Aviation

Loss of control of the helicopter during take-off, Egg, 3 km south of Weinfelden, commune of Bussnang (TG), 12 March 2024

A Bell 505 Jet Ranger X helicopter tipped onto its right side during take-off in a dynamic rollover.



Safety deficit

The Bell 505 Jet Ranger X helicopter had been fitted with skid sink protection (bear paws) under a supplemental type certificate (STC). The supplement to the STC holder's flight manual does not contain any information regarding the procedures for checking the secure fit of the bear paws during flight operations. The procedures are described only in general terms in the *Instructions for Continued Airworthiness* (ICA). They should be carried out in daily and periodic inspections by trained personnel.

The loose screw connections on the bear paws went unnoticed for quite some time. The loose screws contributed to the accident, as the bear paws could rotate very easily around the skid, thereby becoming the pivot point for the dynamic rollover.

Safety advice notice No 64, 11.03.2025

The persons to whom this safety advice notice is addressed should ensure that maintenance and flight crew have the necessary information to effectively check that the bear paws fit correctly and are secure both when initially mounted and during periodic and daily inspections.

Safety deficit

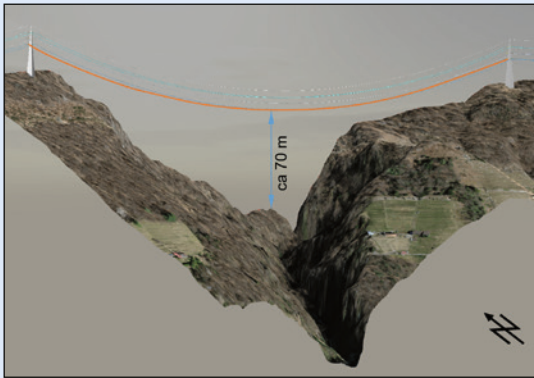
The helicopter was fitted with a high-mounted landing gear, had a calculated mass margin of more than 28 per cent, and was operated in wind conditions with light gusts of between 10 and 20 knots from the front left quadrant. This is the airspeed at which the transition to effective translational lift (ETL) occurs and inflow roll becomes more noticeable. Current theoretical principles and manuals on dynamic rollover do not take sufficient account of the fact that particular attention is required when a helicopter takes off in winds from the forward two quadrants and at speeds corresponding to the point of effective translational lift (ETL).

Safety advice notice No 65, 11.03.2025

Flight crews should be made aware of the influence of in-flow roll in causing dynamic rollover at wind speeds near the ETL point.

Collision with an extra-high-voltage power line, Riale Carcale, commune of Gordola (TI), 16 March 2022

During a transport flight beneath a live extra-high-voltage power line, a helicopter collided with the conductors whilst climbing vertically.

**Safety deficit**

The relevant federal regulations do not address the impact of extra-high-voltage current on aviation operations, which was therefore not considered by the operator when compiling the risk analysis.

Safety recommendation No 599, 29.04.2025

The Federal Office for Heavy Current Installations (ESTI) should, in collaboration with the FOCA and the operators of high-voltage power lines, develop safety regulations applicable to aviation operations in the vicinity of high-voltage power lines.

Safety recommendation No 600, 29.04.2025

The FOCA should, in collaboration with the relevant authorities, verify whether risk analysis procedures also take electrical hazards into account when work flights are carried out in the immediate vicinity of live high-voltage power lines.

Safety deficit

The safety regulations issued by the operator of the high-voltage power line were not communicated to the helicopter transport company. The risks resulting from the electricity were not taken into account.

Safety advice notice No 62, 29.04.2025

Contractors, construction industry associations, engineering and architectural firms, planners, engineering consultancies, site management teams, and construction and air transport companies should introduce appropriate procedures to ensure that safety instructions always reach helicopter transport companies.

Safety advice notice No 63, 29.04.2025

Contractors, construction industry associations, engineering and architectural firms, planners, engineering consultancies, site management teams, and construction and air transport companies should introduce appropriate procedures to ensure that risk management analyses also take into account the specific factors relating to helicopter operations in the vicinity of high-voltage power lines.

Unusual odour detected over the English Channel, United Kingdom, 11 July 2023

During the flight, an unusual odour became noticeable in the cabin of an Airbus A330-343, prompting the cockpit crew to don their oxygen masks and several cabin crew members to use protective breathing equipment (PBE).

**Safety deficit**

Several cabin crew members reported significant difficulties in handling the PBE, both when unpacking, unfolding, fitting and activating the equipment, and during its subsequent use. Furthermore, some PBE was faulty and therefore either non-functional or only partially functional. The PBE was manufactured by Collins Aerospace with part number 119003-21.

The PBE devices of the same design which were tested as part of the safety investigation also displayed technical defects that compromised their safe use. Furthermore, trained crew members were unable to get the PBE functioning within a reasonable time.

Safety recommendation No 601, 27.05.2025

The European Union Aviation Safety Agency (EASA) should, in cooperation with the United States' Federal Aviation Administration (FAA), take appropriate measures to ensure that PBE manufactured by Collins Aerospace with part number 119003-21, both when new and throughout its intended service life, does not exhibit any technical shortcomings or defects that could compromise the use of this PBE. Furthermore, the PBE must be designed in such a way that trained crew members can get the equipment functioning within a reasonable time.

Safety deficit

Several cabin crew members reported significant difficulties in handling the PBE, both when unpacking, unfolding, fitting and activating the equipment, and during its subsequent use. Furthermore, some PBE was faulty and therefore either non-functional or only partially functional.

The PBE devices of the same design which were tested as part of the safety investigation also displayed technical defects that compromised their safe use. Similar problems arose during tests with a different model of PBE, particularly with regard to the appropriate time required to get the PBE functioning. This was considerably longer than the fifteen-second limit defined in the technical standard order (TSO).

Furthermore, there is currently no reliable systematic inspection of PBE that would provide information on its failure rate over its service life. As PBE is only used in emergency situations – which experience has shown occur very rarely – technical faults may remain undetected for a long time or even indefinitely. To resolve this issue, PBE units could be inspected by the manufacturer or airline operators to ensure they are in good working order once they have reached the end of their service life, rather than being disposed of without being checked.

PBE is typically deployed in the event of fire or smoke in the aircraft cabin, or in the event of an unusual odour that may indicate the presence of toxic gases – in other words, in a potentially dangerous, time-critical and complex emergency situation. It is therefore essential that protective equipment is not faulty and can be used quickly, easily and without difficulty by crew members.

Safety recommendation No 602, 27.05.2025

The European Union Aviation Safety Agency (EASA) should, in cooperation with the Federal Aviation Administration (FAA), assess whether current PBE certification and maintenance criteria are adequate from both a technical and an operational perspective, and amend them as necessary.

Safety deficit

Several cabin crew members reported significant difficulties in handling the PBE, both when unpacking, unfolding, fitting and activating the equipment, and during its subsequent use. Training of crew members is usually carried out using dummy PBE that is not equipped with the components that process air for breathing. Furthermore, the dummy PBE is already unpacked and opened, so the trainee simply needs to put it over their head and fasten it before starting firefighting training.

The dummy PBE used during training does not allow trainees to gain vital experience in handling PBE, particularly removing it from its vacuum packaging and unfolding it before placing it over the head. Furthermore, the dummy PBE does not simulate the intense heat generated after activation or the difficulty in breathing when wearing PBE.

Safety recommendation No 603, 27.05.2025

The European Union Aviation Safety Agency (EASA) should, in cooperation with national aviation authorities (NAAs), ensure that crew training on PBE handling covers all elements necessary to operate the equipment properly. In particular, it should be explained how the PBE functions and how long it is effective in providing protection: crew should understand the indicators showing when the oxygen supply is exhausted and the PBE must be removed.

Safety deficit

Several cabin crew members reported significant difficulties in handling the PBE, both when unpacking, unfolding, fitting and activating the equipment, and during its subsequent use. Furthermore, some PBE was faulty and therefore either non-functional or only partially functional. The PBE was manufactured by Collins Aerospace with part number 119003-21.

The PBE devices of the same design which were tested as part of the safety investigation also displayed technical defects that compromised their safe use.

Safety advice notice No 66, 27.05.2025

Airline operators using the Collins Aerospace PBE with part number 119003-21 should be aware that it may have technical faults that could remain undetected under current maintenance procedures.

Safety deficit

Several cabin crew members reported significant difficulties in handling the PBE, both when unpacking, unfolding, fitting and activating the equipment, and during its subsequent use.

Training of crew members is usually carried out using dummy PBE that is not equipped with the components that process air for breathing. Furthermore, the dummy PBE is already unpacked and opened, so the trainee simply needs to put it over their head and fasten it before starting fire-fighting training.

The dummy PBE used during training does not allow trainees to gain vital experience in handling PBE, particularly removing it from its vacuum packaging and unfolding it before placing it over the head. Furthermore, the dummy PBE does not simulate the intense heat generated after activation or the difficulty in breathing when wearing PBE.

Safety advice notice No 67, 27.05.2025

Organisers of initial and continuing training on the use of PBE should be aware that the dummy PBE used in training has different properties to actual PBE. Dummy PBE with realistic characteristics should be used; trainees should be required to first remove it from its packaging and unfold it before placing it on the head, as with real PBE, and the difficulties involved in doing this should be addressed. Moreover, trainees should be made aware that, once the PBE is activated, they will be exposed to intense heat, and that breathing and communication are more difficult whilst wearing PBE. The training processes should be adapted or extended accordingly.

Loss of control whilst flying at low altitude over the terrain, approximately 1 km south-east of the Chistehorn, commune of Niedergesteln (VS), 23 August 2024

Two pilots took off in an Arcus-M self-launching glider on a two-day cross-country flight from Birrfeld aerodrome (LSZF), flying over the main Alpine ridge to Grenoble in France and back. After flying for over two and a half hours, the pilots lost control performing figure eight manoeuvres while slope soaring, having exceeded the critical angle of attack, at which point a collision with the ground could no longer be avoided; both pilots were fatally injured.

Safety deficit

Over the past 17 years, there have been a total of 20 accidents involving (motorised) gliders caused by a loss of control in flight (LOC-I), resulting in 15 fatalities.

In addition to the technical measure in the form of a stall warning device, the STSB considers it advisable to raise awareness of the issue as soon as possible.

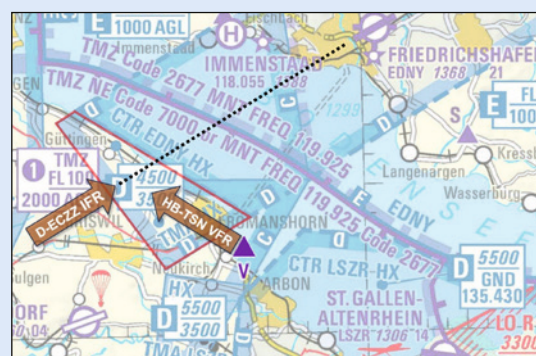
Safety recommendation No 557, 19.08.2025

The Federal Office of Civil Aviation (FOCA) should, in collaboration with the Gliding Club, take prompt action to raise

awareness appropriately within the gliding community of the risk of losing control, particularly when slope soaring.

Airprox over the Friedrichshafen terminal manoeuvring area, Germany, 18 September 2024

An airprox occurred involving a Cessna C152 flying over the Friedrichshafen terminal manoeuvring area (TMA) under visual flight rules and a Cirrus SR22 approaching runway 06 at Friedrichshafen Airport under instrument flight rules.



Safety deficit

The Altenrhein-Friedrichshafen area (ARFA) is a hotspot for dangerous approaches in class E airspace. For this reason, a Transponder Mandatory Zone (TMZ) exists for this area in conjunction with a listening watch (squawk) at the Alps Radar air traffic control. In Germany, it is compulsory to establish a listening watch, whereas in Switzerland it is voluntary. This involves considerable risks.

It turned out that, since a listening watch is not compulsory in the TMZ, the C152 was not in contact with the air traffic control centre, which could have warned it of the dangerous approach.

According to ATC, pilots do not often apply the voluntary listening watch system appropriately. A compulsory listening watch, accompanied by effective measures such as training for those involved, should therefore be introduced.

Safety recommendation No 604, 02.09.2025

The Federal Office of Civil Aviation (FOCA) should declare the hitherto voluntary listening watch in the TMZ above Switzerland to be compulsory, as it is under German regulations, so that VFR aircraft can be contacted immediately if necessary. Furthermore, appropriate accompanying measures should be taken in consultation with ATC to train pilots and air traffic controllers on this issue.

5.3 Railways

HGV fire on car shuttle train in the Furka Tunnel (UR), 7 November 2023

On 7 November 2023 at 3.46 pm, whilst Matterhorn-Gotthard Bahn (MGB) car shuttle train No 2450 was travelling through the Furka Tunnel, a fire broke out in the HGV on the final ramp wagon. After exiting the tunnel at Realp station, the HGV driver was able to jump out of his cab through the left-hand door just before the loading ramp. He suffered severe burns.



The fire in the HGV in the Furka Tunnel was caused by an electric arc between the lorry's aerial and the overhead line in the area of the Rotondo track change. The resulting short-circuit current, which flowed through the HGV to the ground, caused the lorry cab to catch fire.

The following factors contributed to the cause:

- The lorry's aerial had not been removed.
- During the visual inspection, it was not observed that the prescribed maximum loading height had been exceeded.

The following risks were identified during the investigation:

- The overhead line in the area of the Rotondo track change was mounted too low. Its height did not comply with the minimum height specified in the Oberwald-Realp loading profile.
- The loading regulations, MGB's internal specifications regarding the height of railway vehicles, the road signs at the loading ramps and the information on the MGB website differ from one another.
- Self-rescue by the HGV driver was almost impossible.
- Inadequate alarm systems and inconsistent instructions on how to respond in the event of an incident are confusing to users of the car shuttle train and pose a serious risk to life in an emergency.

Safety deficit

Furka Tunnel automatic inspection portal system:

The HGV in question exceeded the maximum height displayed on road signage and the general loading instructions on the MGB website. The ramp employee had no means of effectively checking the vehicle's maximum external dimensions and weight.

Safety recommendation No 202, 08.04.2025

The STSB recommends that the Federal Office of Transport (FOT) request the operator of the Furka Tunnel car transport service to equip the loading ramps in Oberwald and Realp with an automatic control portal system.

Safety deficit

Time spent by driver of heavy vehicles in cab:

Instructions for users of car transport trains are confusing and, in the event of an incident, put lives at risk. Drivers of heavy vehicles (HGVs and coaches) remain in the cab during the journey. Because of the width of the vehicle, the doors cannot be opened or can only be partially opened in the event of an incident. This means that the driver has no lateral escape route. Laminated safety glass also prevents exit via the windscreen. This risk (see also Section 2.13.1) is mentioned in the MGB loading regulations. The loading instructions state that users must listen to the radio on the specified stations in the event of an incident. However, if a heavy vehicle's aerial is removed, there is no guarantee of radio reception. This means that important information may not be transmitted to the driver in the event of an incident.

Safety recommendation No 203, 08.04.2025

The STSB recommends that the Federal Office of Transport (FOT) request the operator of the Furka Tunnel car shuttle service to no longer transport the drivers of heavy vehicles (HGVs and coaches) in the driver's cab, but in the accompanying escort wagon.

Safety deficit

Emergencies on car transport trains:

Persons using car transport trains on the Swiss rail network must follow a different protocol in each tunnel (Furka, Vereina, Lötschberg, etc.). The protocol covers the information provided during loading, the number to dial in an emergency, the radio channel used for communication during the journey and what to do in an emergency. The different instructions may confuse road users and lead to human error in an emergency.

Safety recommendation No 204, 08.04.2025

The STSB recommends that the Federal Office of Transport (FOT) request operators of car transport trains to consider standardising emergency procedures. The aim should be to create a common set of guidelines for all car transport trains, covering aspects such as signage, emergency numbers and rules of conduct, so that road users can respond correctly and safely in the event of an incident.

Safety deficit

Discrepancies between operating rules, technical specifications and standard catenary specifications:

The operating rules for the Furka Tunnel car transport wagons, the supplementary loading regulations, and the technical specifications for ramps and loading wagons all specify different values for loading height, vehicle height and minimum contact wire height. It would not be effective to communicate any changes simply by means of a written internal directive (see Section 5.3).

Safety advice notice No 50, 08.04.2025

Target group: Matterhorn Gotthard Bahn

The Matterhorn Gotthard Bahn (MGB) should revise and update the operating rules for Furka car transport wagons, the loading regulations and the technical specifications for rolling stock and minimum contact wire height, and make these updated specifications available in a new version.

Derailment of a goods train in the Gotthard Base Tunnel in Faido (TI), 10 August 2023

On 10 August 2023, approximately 10 km after entering the south portal of the Gotthard Base Tunnel, at tunnel kilometre 47, travelling at a speed of approximately 90 km/h, a fragment of the right-hand wheel disc of the first axle on the eleventh wagon in the direction of travel broke away. The freight train travelled approximately 7 km in this condition, as far as the Faido multi-function station. The locomotives and the first 13 carriages continued to travel on the tracks. The front section of carriage 14 crashed into the tunnel bulkhead. The rear section continued along the connecting line, broke through the safety gate leading to the east tunnel, and came to a halt there at an angle.

The wheel disc fracture was the result of thermal overloading of the wheel tread; excessive residual tensile stresses caused vertical fatigue cracks to form, which then extended to the wheel web and caused the wheel disc to fracture.



Safety deficit

Wheelsets with LL brake blocks, minimum diameter in operation:

The final report of the JNS Broken Wheels Task Force, published on 28 July 2017, mentions that in the case of cracks on the rim of wheelset BA 004, the probability of thermally initiated defects is higher in some applications. The Task Force defined short- and long-term measures to limit risks during operation and maintenance of the wheelsets, and proposed amendments to standards and regulations. As a measure to limit risks during operation, the minimum diameter for wheelset types BA 314 and BA 004 was set at 880 mm.

In its final report dated 11 July 2024, the JNS Accident Gotthard Base Tunnel – Broken Wheels Task Force concludes that:

- Wheelset type BA 390 is comparable to wheelset type BA 004. Four additional wheelset types (Db004-sa, Ri 025, R32, BA 304) were found to be comparable. The risk control measures (minimum wheel diameter 880 mm), which were published in the first JNS Broken Wheels report on 28 July 2017, also apply to these wheelset types.
- An analysis of 74 cases of different wheelset types (either broken wheels identified through visual inspection or cracks detected via non-destructive testing) showed ten instances of broken wheel discs or wheels with cracks detected during visual inspection. In all ten cases, the wheelsets had a wheel diameter equal to or smaller than 880 mm.

The broken wheel that is the subject of this report had a wheel diameter of 862 mm after the last reprofiling.

Safety recommendation No 205, 27.05.2025

The STSB recommends that the European Union Agency for Railways (ERA) require ECMs to extend the risk control measures proposed by the JNS Task Force to all types of wheelsets braked with composite brake blocks.

Safety deficit

Ultrasonic wheel disc testing, VPI specific requirements:

VPI specific requirements for the maintenance of wheelsets currently include the following criteria:

Once the maximum mileage of the given wheelset group has been met (in this case 660,000 km), and no later than when the maximum installation period of the wheelset group has been reached (8 years), the wheelsets must be removed and undergo wheelset maintenance.

Since the last IS2, the wheelset with the fractured wheel disc had travelled approx. 173,000 km. The cracked wheel disc showed no signs of overheating or flaking paint. Nevertheless, as the results of the metallurgical testing show, the residual tensile stresses present on the tread are likely to have significantly contributed to the expansion of existing cracks or caused cracks in the first place. Cracks always expand when tensile stresses caused by cyclic loading are present in the area of the crack. The considerable residual tensile stresses present on the tread are believed to have contributed significantly to the formation of cracks. A comparable investigation of the residual stresses using ultrasonic testing (this method only provides a local mean value of the residual stress in the wheel rim) and X-ray diffraction testing showed that the ultrasonic measurements carried out during maintenance only provide a limited indication of the residual stresses directly on the tread. The area on the tread responsible for crack initiation can therefore not be adequately identified.

VPI-04 stipulates that ultrasonic testing of the wheel rims or ultrasonic measurements of residual stresses must always be carried out during wheelset maintenance (IS1 and IS2). IS1 and IS2 maintenance can only be carried out on a wheelset off the train. This practice, developed and established over many years, was introduced when freight wagons still had grey cast iron brake blocks. Nowadays there are different operating requirements for freight wagons.

Freight trains travel at higher speeds. Grey cast iron brake blocks have been replaced by composite brake blocks. However, the use of LL brake blocks leads to an increased thermal load on the wheel. This development did not lead to the maintenance specifications being adapted. Wheelset inspections carried out in accordance with current maintenance specifications are unable to detect the above-mentioned risk of critical cracking – caused by excessive residual stresses on the wheel disc surface – at an earlier stage.

Safety recommendation No 206, 27.05.2025

The STSB recommends that the European Union Agency for Railways (ERA) require ECMS to adapt the interval and methodology criteria for maintenance specifications for wheelsets braked with composite brake blocks.

Safety deficit

Influence of composite brake blocks on the thermal stresses of wheels

Thermal overloads on the wheel surface occur during travel if the brake blocks are in contact with the wheel as a result of a fixed brake or if the brakes have not been fully released. The final report of the JNS Broken Wheels Task Force, published on 28 July 2017, mentions that in the case of cracks on the rim of wheelset BA 004, the probability of thermally initiated defects is higher in some applications.

As a Swedish study published in 2021 shows, composite brake blocks lead to increased thermal stress on the wheel. Temperature is distributed unevenly on the tread, with noticeable hot spots around the wheel rim.

The independent safety, standards and research body for the UK rail sector (RSSB) demonstrated in its project T963 'Improving wheelset life by better understanding the causes of wheel damage' that prolonged exposure to heat caused by heavy braking can lead to a reversal of residual compressive stress into residual tensile stress, which can result in sudden catastrophic wheel failure of the wheel due to crack formation.

The results of the metallurgical investigation show that the cracks formed because of thermal overloading on the tread. Vertical cracks that develop from fatigue cracks on the tread are serious defects that may eventually cause a wheel disc to break if not detected and treated at an earlier stage. On the cracked wheel disc, no signs of overheating were found on the paint in the area of the wheel web or under the wheel rim. Nevertheless, the thermal overloads contributed to the development of residual tensile stresses.

As the results of the metallurgical testing show, the residual tensile stresses present on the tread are likely to have significantly contributed to the expansion of existing cracks or caused them in the first place.

The characteristics of wheelsets, wheels and brake blocks are part of the Rolling Stock – Freight Wagons technical specification for interoperability (TSI) subsystem.

Safety recommendation No 207, 27.05.2025

The STSB recommends that the European Union Agency for Railways (ERA) commission a study on the impact of composite brake blocks on the thermal stresses affecting wheels.

Safety deficit

Hydrostar points:

At kilometre 46.7, the axle came off the guideway, derailed and from then on hung at an oblique angle under the carriage. The freight train travelled approximately 7 km in this condition, as far as the Faido multi-function station. The first set of points (W387) at the cross-over was approached from the root side. Axle 1, which was hanging at an an-

gle beneath wagon 11, destroyed the monoblock concrete sleepers and all Hydrostar point machines. The rails and the crossing were also badly damaged. The front part of the train passed the points still in a straight position. The rear section was diverted onto the connecting track in the direction of the east tunnel tube. This led to the derailment and collision with the tunnel bulkhead.

The Hydrostar turnouts are equipped with a hydraulic drive that transmits the changeover forces to all point and centre locks hydraulically. In the design concept of this type of switch, the locks and the tongue connecting rod, which serve as a fall-back level for the point locks, are located above the top edge of the sleeper.



If part of a wagon or a derailed axle hangs below the top edge of the rail, there is a risk of these parts coming into contact with the point locking device or the tongue connecting rod, potentially damaging or even ripping off these components.

As a result, the switch blades, which are no longer locked in place, can move if they are shaken by passing trains. Unlocked points can lead to derailments.

Safety recommendation No 208, 27.05.2025

The STSB recommends to the Federal Office of Transport (FOT) that infrastructure managers operating or planning to operate points with locking devices above the top of the sleeper on their network should assess the risk of mechanical damage to the devices above the top of the sleeper and reduce it if necessary.

Safety deficit

Safety Management System SBB Cargo AG, Train preparation

The manual for the technical wagon service regulates the tasks of the engineering technical inspector (ETI), the technical inspection of wagons and the measures that must be taken in the event of irregularities on the wagon, and also describes the uniform quality standard. This manual mentions that in the event of irregularities on the wagon, the ETI must document the damage on an electronic tablet. The results of the inspection during train preparation in Chiasso

were recorded on various documents and then transferred to the upper part of train list 45016. Manually recording a summary of information on a verification document intended to show procedural compliance is suboptimal, as errors can be introduced when information is transferred.

Safety advice notice No 54, 27.05.2025

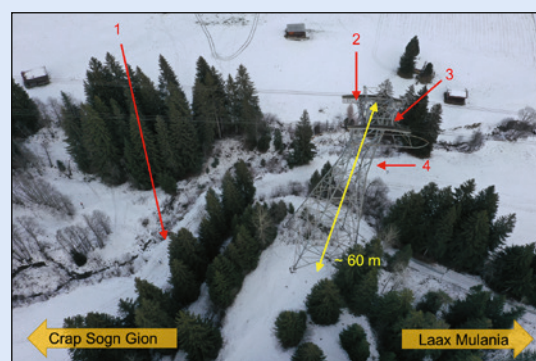
Target group: SBB Cargo AG

To ensure a uniform quality standard, SBB Cargo AG should record the results of technical inspections and train preparation on the same medium.

5.4 Cableways

Fall of a trainee cable car mechatronics technician from a cable car tower in Laax (GR), 19 December 2022

At 14:24 on 19 December 2022, in Laax (GR), a trainee cable car mechatronics technician was struck and dragged along by the drive unit of cable car cabin 2 as it passed by whilst he was working on tower 2, which is approximately 60 metres high. He first crashed into the front edge of the cable car cabin and then fell to his death.



- 1) Site of fall
- 2) Work platform, cabin 2 side
- 3) Work platform, cabin 1 side
- 4) Cable car tower 2

Safety deficit

Supervision of trainees during dangerous work:

Trainee 2 carried out work on the cable car tower while it was in operation and without effective supervision by a qualified person. From an organisational point of view, it would have been possible for a qualified person from the technical team to supervise the trainee.

Safety advice notice No 51, 06.05.2025

Target group: BFL (Weisse Arena Bergbahnen AG)

The BFL should plan and implement the deployment of young people in vocational training so that effective supervision by a qualified person is ensured for dangerous work.

Safety deficit

VET documentation:

Training reports and detailed training logbooks for funicular technicians in training could not be provided; nor could proof of training on prevention topics relating to dangerous work. A host company's failure to document vocational training can result in training and learning deficits not being identified in good time.

Safety advice notice No 52, 06.05.2025

Target group: BFL (Weisse Arena Bergbahnen AG)

BFL should adapt its internal processes and responsibilities to ensure that funicular technicians in training receive up-to-date apprenticeship documentation in accordance with the requirements.

Safety deficit

Working hours legislation for young employees:

The investigation revealed several deviations from the regulations on working hours set out in the special protection provisions for young employees in the Employment Act. Deviations from these regulations can lead to young people, especially apprentices, being given too much responsibility or being overexerted, and this has a negative impact on their safety at work.

Safety advice notice No 53, 06.05.2025

Target group: BFL (Weisse Arena Bergbahnen AG)

The BFL should take the necessary measures to ensure that the special protection provisions for young employees under the Employment Act are complied with.

5.5 Buses

No safety recommendations or advice notices were issued for buses as a mode of transport in 2025.

5.6 Inland navigation

The STSB did not issue any safety recommendations or safety advice notices for inland waterway navigation in 2025.

5.7 Maritime navigation

Workplace accident on board the multi-purpose cargo ship SABINA at a shipyard in Constanța, Romania, 26 June 2015

Whilst the vessel was in dock, a crew member fell through a maintenance hatch from the main deck about three metres down into the engine room below and suffered serious injuries. The hatch had not been properly closed by local shipyard workers; however, this was not noticed by the ship's crew members, as the shipyard workers had not been adequately supervised, contrary to the shipping company's procedures. Furthermore, despite thunderstorms being forecast, insufficient precautionary measures had been taken on board the ship.

The internal investigation subsequently carried out by the captain and the incident review were incomplete, one-sided and lacked self-criticism, and so were of little use in contributing to accident prevention.

Safety deficit

Following the accident, a flag state inspection of the vessel carried out by the Swiss Maritime Navigation Office (SMNO) attested to the fact that procedures for the notification, internal investigation and follow-up of incidents were in place. However, there were several shortcomings in the SMNO's oversight of how procedures had actually been followed: in its investigation the office did not consider the fact that no notification of the incident had been received, did not assess whether the incident review was fit for purpose, and did not raise any objections over the captain's rather superficial incident analysis. The SMNO's oversight, by focusing solely on whether procedures exist and are carried out on paper, are of little use in terms of the ongoing process of improving safety.

The flag state inspection carried out by the SMNO was limited to checking the situation and the crew present at the time of the inspection. However, given that the flag state inspection carried out was the first such inspection since the vessel was commissioned and registered fifteen years earlier, it seems of little practical use from a safety assessment perspective to assess only the current situation and the crew present.

The SMNO's flag state inspection processes were therefore insufficient to ensure a high standard of safety on board in several respects.

Safety recommendation No 188, 21.01.2025

In order to ensure high safety standards on board Swiss sea-going vessels, the Swiss Maritime Navigation Office (SMNO) should amend its flag state inspection processes such that

- during flag state inspections, it is checked both whether safety-related procedures have been carried out and whether these procedures are effective. Where necessary, the shipping company or crew is required to implement corrective measures promptly;
- during flag state inspections, both the current condition and a longer prior period are assessed – depending on the actual interval between flag state inspections;
- the interval between flag state inspections on a ship also meets this objective.

Safety deficit

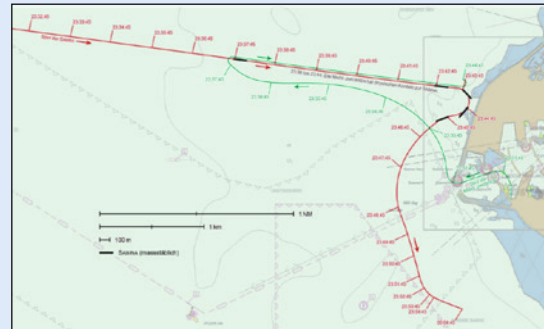
Whilst the vessel was in dock, a crew member fell through a maintenance hatch from the main deck about three metres down into the engine room below and suffered serious injuries. The hatch had not been properly closed by local shipyard workers; however, this was not noticed by the ship's crew members, as the shipyard workers had not been adequately supervised, contrary to the shipping company's procedures. Furthermore, despite thunderstorms being forecast, insufficient precautionary measures had been taken on board the ship.

Safety advice notice No 44, 21.01.2025

Swiss shipping companies should ensure that their procedures and guidelines adequately address responsibilities and the management of risks while a vessel is in dock. Furthermore, crew members should receive effective training and guidance, so that any risk to safety can be proactively avoided when working with shore-based companies.

Maritime accident involving the multi-purpose cargo ship SABINA off the coast of Rønne, Bornholm, Denmark, 15 October 2015

The multi-purpose freighter SABINA ran aground off the coast of Bornholm at night after sailing with the bridge unmanned for an extended period, the crew having been unable to take control of the vessel in time.



Safety deficit

The impact of the guarantees provided by the Swiss Confederation and the Federal Office for National Economic Supply (FONES) on the SMNO's oversight activities was problematic from a safety point of view. The fact that the Swiss Confederation acted both as supervisory body (SMNO) and as guarantor (FONES) led to a persistent conflict of objectives and interests. The order by the supervisory body to suspend operations for safety reasons had the potential to harm the government's financial interests, with sums running into millions per ship. The enforcement of safety regulations, backed up where necessary by effective financial penalties, was enough to cause shipping companies financial difficulties under certain circumstances. The SMNO stated that it felt as though its hands were tied and it was constrained in its actions. It had reportedly come under pressure from senior officials within the Federal Administration and from persons connected with the FONES not to take any measures against shipping companies that would have a serious financial impact on them. The SMNO bowed to pressure and refrained from imposing appropriate sanctions on shipping companies for a breach of the rules. This contributed to the body's failure to exercise effective regulatory oversight. The system of state guarantees coupled with state oversight inherently involves this conflict of objectives and interests. However, in legal terms, the roles of the FONES and the SMNO were appropriately separated and clearly defined. The situation became problematic from a safety perspective because the SMNO felt it was being subjected to undue pressure from other bodies within the Federal Administration, which prevented it from carrying out its oversight duties properly. The authority to which the SMNO reports – the Directorate of International Law at the Federal Department of Foreign Affairs (FDFA) – may not have been aware of this problem, and if it was, did nothing to resolve it.

Safety recommendation No 189, 21.01.2025

The Federal Department of Foreign Affairs (FDFA), which, under the Maritime Navigation Act, is responsible for direct oversight of maritime shipping under the Swiss flag, should, in conjunction with the Federal Department of Economic Affairs, Education and Research (EAER) and the FDFA's Directorate of International Law, the Swiss Maritime Navigation Office (SMNO), the Federal Office for National Economic Supply (FONES) and, where appropriate, other federal bodies dealing with maritime shipping, ensure long term that the authorities involved and their staff demonstrably manage the conflict of interests between economic efficiency and safety-related oversight in such a way that the SMNO can, without hindrance, carry out effective oversight of maritime shipping under the Swiss flag in accordance with its statutory mandate.

Safety deficit

The SMNO's oversight of the Swiss maritime cargo fleet was not very effective, partly because of understaffing.

Safety recommendation No 190, 21.01.2025

The Federal Department of Foreign Affairs (FDFA), which, under the Maritime Navigation Act, is responsible for direct oversight of maritime shipping under the Swiss flag, should systematically and continuously assess whether the SMNO's safety-related oversight activities are sufficiently effective in promoting high safety standards, systematically and continuously monitor whether the SMNO complies with its mandate under the Maritime Navigation Act, and, where necessary, take corrective measures – particularly regarding the human resources made available to the SMNO – or seek to amend the applicable legal framework.

Safety deficit

The shipping company involved in the maritime accident under investigation did not make its crew members aware of its safety culture, nor did it offer any formal safety culture and compliance training, e.g. a course involving comprehension and learning assessments. Furthermore, the methods used by the shipping company to publicise its approach to safety suggest that the company was not sufficiently aware of practices on board ship. The measures taken proved largely ineffective. The requirements of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code, ISM Code for short) regarding in-house training leave considerable room for interpretation. Above all, they allow for the interpretation that detailed induction by the shipping company into its safety culture and its compliance requirements – including training and performance assessments – is not mandatory. The shipping company therefore decided not to provide such training and assessment for its crew members.

Safety recommendation No 191, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the regulatory authority for maritime shipping under the Swiss flag, should, within the scope of its existing powers and discretion, effectively enforce the existing rules regarding shipowners' internal training of ship crews in safety culture and compliance in order to ensure high safety standards; furthermore, it should monitor the impact of these measures in order to gain a realistic picture of the situation. If the SMNO's existing powers or the applicable rules are insufficient, the Office should agree appropriate amendments to the regulatory framework with other players in the sector.

Safety deficit

The second officer received no training between the time he joined the SABINA and the incident concerning the technical configuration of the bridge navigational watch alarm system (BNWAS) on the SABINA. The captain, the first officer and the second officer had a poor understanding of the alarm system installed. A lack of understanding of on-board systems is problematic for a number of reasons: users may be lulled into a false sense of security, or conversely, they may be sceptical of the system and so not use it properly, or at all. The requirements of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code, ISM Code for short) regarding in-house training leave considerable room for interpretation. Above all, they do not state clearly that a detailed, vessel-specific introduction to the technical systems available, including learning and performance checks, is compulsory. Consequently, the shipping company involved in the maritime accident investigated did not require its crew members to undergo comprehensive training and assessment programmes.

Safety recommendation No 192, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the regulatory authority for maritime shipping under the Swiss flag, should, within the scope of its existing powers and discretion, effectively enforce the existing rules regarding shipowners' internal training of ship crews in vessel-specific technical systems in order to ensure high safety standards; furthermore, it should monitor the impact of such measures in such a way as to gain a realistic picture of the situation. If the SMNO's existing powers or the applicable rules are insufficient, the Office should agree appropriate amendments to the regulatory framework with other players in the sector.

Safety deficit

The internationally applicable rules of the STCW Convention state that the officer of the watch may not hand over the watch to the relieving officer if there is reason to believe that the latter is unable to perform the duties of the watch

effectively. In such cases, the captain must be informed of the situation. If, as in the present case, the captain is the watch officer who is due to be relieved and the relieving watch officer is unlikely to be able to perform the duties of keeping watch effectively, the captain must, or should, be aware of this ('short-circuiting the chain of command'). In this situation there is clearly no possibility of escalating: the issue cannot be assessed impartially by a third party of higher rank. For reasons of safety, an officer of the watch should always be able to consult a third party of higher rank in the event of any issues relating to watch duties. However, the Maritime Navigation Ordinance explicitly permits the captain to be included in watch duties for 'long-distance coastal voyages', and so exacerbates the problem that there is no possibility of referring to a higher ranked officer. As a result, the SMNO cannot ensure that there are enough deck officers available so that the captain does not normally have to be part of the watch. Such a regulation could be included in a Minimum Safe Manning Document.

Safety recommendation No 193, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the regulatory authority for maritime shipping under the Swiss flag, should, within the scope of its existing powers and discretion, effectively enforce the existing rules regarding minimum safe manning in the interests of high safety standards, and monitor the effectiveness in order to gain a realistic picture of the situation. When determining the minimum number of crew members on Swiss-flagged ocean-going cargo ships, the SMNO should pay particular attention to ensuring that the captain is never scheduled to conduct the watch (i.e. he should assume the watch only in a rare emergency) and that the watch schedule should not be such that crew members conducting the watch are fatigued and unable to carry out their duties properly. If the SMNO's existing powers or the applicable rules are insufficient, it should seek to amend the regulatory framework appropriately in agreement with other players in the sector.

Safety deficit

The issue of fatigue was dealt with inadequately in the Safety Management Manual of the shipping company involved in the maritime accident under investigation. Strategies for preventing fatigue were not set out in the Safety Management Manual itself, only in supplementary documents. Furthermore, they were unsuitable for life and work on board a seagoing vessel. Issues relevant to the operation of a seagoing vessel, such as irregular working hours, unforeseen tasks, managing a skeleton crew, night watch duties and the like, were not addressed in the Safety Management Manual.

The requirements of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code, or ISM Code for short) regarding a shipping company safety management manual leave considerable room for interpretation. Above all, they allow for the interpretation that it is not a requirement to have documentation on issues relating to fatigue on a seagoing vessel, such as irregular working hours, unforeseen tasks, dealing with understaffing, night watch duties, etc. The shipping company did not therefore mention the issues in its Safety Management Manual, and this was accepted by the SMNO.

Safety recommendation No 194, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the regulatory authority for maritime shipping under the Swiss flag, should, within the scope of its existing powers and discretion, effectively enforce the existing rules regarding the preparation and maintenance by shipping companies of a safety management manual containing all the information necessary to achieve a high standard of safety, and monitor the effectiveness of such enforcement in order to gain a realistic picture of the situation. If the SMNO's existing powers or the applicable rules are insufficient, it should seek to amend the regulatory framework appropriately in agreement with other players in the sector.

Safety deficit

The SABINA crew members were asleep in their cabins and were not alerted by the BNWAS to the fact that the bridge was unmanned at an earlier stage, i.e. before the rescue boat crew intervened.

The BNWAS was unable to perform its warning function because it had not been switched on during the voyage leading up to the accident. Had the BNWAS been switched on, the captain and the first officer would have been woken in their cabins by an audible alarm no later than 12 minutes and 30 seconds after the second officer – the officer of the watch on duty – had left the bridge. In this case they would have been able to correct course at around 22:58 UTC and so avert the impending collision with the island of Bornholm. At this time, the SABINA was still at a safe distance of around 10 nautical miles from Bornholm.

On 9 September 2015, the day on which the former first officer of the SABINA was appointed captain of the vessel – and thus around five weeks before the accident – the captain had been reminded in writing by the shipping company that the bridge watch alarm system must be in operation whenever the vessel was at sea.

The captain stated that he had forgotten to switch on the BNWAS when the ship set sail from Aalborg. It is difficult

to understand why this was the case, as switching on the BNWAS was an explicit item on the departure checklist. According to an entry in the bridge logbook, all the items on the list had been checked before the ship set sail.

On the morning before the accident, i.e. on 15 October 2015, the shipping company sent a further written reminder regarding operation of the BNWAS.

The captain and nautical officers were therefore undoubtedly aware on the day of the accident and in the hours leading up to it that the BNWAS should be switched on – this was not merely ‘in the back of their minds’, as they had been freshly reminded of it by the shipping company.

Moreover, there were several changes of watch between the ship's departure from the port of Aalborg at 03:10 UTC and the watch handover at 21:00 UTC, and so the deactivated BNWAS must have been noticed by the officers involved. The watch handover checklist requires the officer taking over the watch to check that all navigation and safety equipment that may be used during the watch is in good working order. The captain had ordered in writing that this checklist be used. The entries in the bridge logbook showed that the checklist had been completed several times prior to the accident.

The facts presented lead to the inevitable conclusion that the SABINA watch officers deliberately failed to use the BNWAS, which would certainly have prevented the accident. This constitutes a reckless violation of a recognised safety regulation in maritime shipping.

All of this, combined with the fact that, even eight months after the accident off Bornholm, the SABINA was still being operated – albeit by a different crew – with the BNWAS switched off for large parts of a voyage suggests that the BNWAS was often deliberately left switched off while the vessel was at sea. The fact that the shipping company felt compelled to issue a reminder to its crews regarding the operation of the BNWAS even before the SABINA's accident off Bornholm is an indication that there are failings in compliance with BNWAS regulations, not only on the SABINA but also on the company's other vessels.

Safety recommendation No 195, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the regulatory authority for maritime shipping under the Swiss flag, should, within the scope of its existing powers and discretion, effectively enforce the existing rules regarding the use of the bridge watch alarm system in the interests of high safety standards on Swiss ocean-going cargo ships, and monitor the effectiveness in order to gain a realistic picture of the situation. For example, shipping companies could be required to carry out a broad, systematic analysis of data from the voyage data recorder (VDR) (voyage operations quality assurance, VOQA) and the SMNO would monitor

this data; alternatively, the SMNO or a contracted service provider could conduct random checks of VDR data during flag state inspections. In either case, there should be consistent enforcement of the regulations with effective sanctions. If the SMNO's existing powers are insufficient for this purpose, it should seek to amend the regulatory framework in agreement with other players in the sector.

Safety deficit

The SABINA crew members were asleep in their cabins and were not alerted by the BNWAS to the fact that the bridge was unmanned at an earlier stage, i.e. before the rescue boat crew intervened.

The BNWAS was unable to perform its warning function because it was not switched on during the voyage leading up to the accident. Had the BNWAS been switched on, the captain and the first officer would have been woken in their cabins by an audible alarm no later than 12 minutes and 30 seconds after the second officer – the officer of the watch on duty – had left the bridge. In this case they would have been able to correct course at around 22:58 UTC and so avert the impending collision with the island of Bornholm. At this time, the SABINA was still at a safe distance of around 10 nautical miles from Bornholm.

The findings of the investigation lead to the inevitable conclusion that the SABINA's watch officers deliberately failed to use the BNWAS; doing so would certainly have prevented the accident. They also suggest that the BNWAS was often deliberately left switched off during voyages on the SABINA. The SABINA is by no means an isolated case in this regard: in the past there have been a number of incidents in Europe involving cargo ships at sea on which the BNWAS, although present, was switched off – in some cases deliberately.

Safety recommendation No 196, 21.01.2025

The International Maritime Organization (IMO) should commission or itself conduct a study into why it is not uncommon for ship crews to set sail with the BNWAS switched off. In particular, it should be asked how the ergonomic design of the system may influence seafarers' acceptance or rejection of it. Based on the findings of this study, appropriate adjustments should be made to the international standards governing the design requirements for bridge navigational watch alarm systems.

Safety deficit

The SABINA's minimum safe Manning Document (MSMD), issued by the Swiss Maritime Navigation Office (SMNO), included a note under the heading *Exceptional Circumstances* on the action to be taken if the rules on minimum crew numbers (as set out in the MSMD) cannot be met owing to unforeseen and unavoidable circumstances. However, this

note contains contradictory information: on the one hand, it makes it clear that the crew must be complete at the earliest opportunity; on the other hand, it contains a passage stating that a formal statement from the captain must be submitted to the SMNO before the vessel leaves port (or immediately after it enters a port). This suggests that a voyage may be commenced even if the crew is not yet complete. This regulation places a strong emphasis on cost-effectiveness, which is not conducive to safety. The regulation was also found in the MSMD of another ocean-going cargo ship flying the Swiss flag.

The SABINA's MSMD authorised the operation of this vessel worldwide and stated that the SABINA could be regarded as 'safely manned' worldwide provided that it had at least the crew complement specified in the document. The minimum crew complement specified in this document included two deck officers – first and second officer – in addition to the captain. However, the Maritime Navigation Ordinance stipulates that three teams must take turns on watch at sea and that, except during major coastal voyages, the captain should not conduct watch duty. To comply with this regulation for worldwide voyages, including those beyond the major coastal routes, it would have been necessary to have three officers on deck plus the captain: a first, second and third officer. In other words, the authorisation contained in SABINA's MSMD was at odds with a safety-related provision in the Swiss Maritime Ordinance.

Safety advice notice No 197, 21.01.2025

The Swiss Maritime Safety Office (SMNO), as the supervisory authority for maritime shipping under the Swiss flag, should, with a view to upholding high safety standards, review the MSMDs it issues, any relevant guidelines and procedures it has in place, and its established practices in this regard, ensuring that these documents, templates, procedures and established practices comply with the legal requirements. Any modifications made should be publicised to shipping companies and ship crews affected, and effectively enforced.

Safety deficit

The SMNO's understanding of its rights and responsibilities as a supervisory authority was inappropriate in several respects. The SMNO thus saw itself more as a service provider for the shipping companies rather than as a supervisory authority. However, this is not the role assigned to the SMNO under the Maritime Navigation Act. The SMNO also relied heavily on ship classification societies for ensuring compliance with technical and operational standards. Even if it is understandable that a public authority might outsource or delegate certain tasks or work because of a lack of resources, it should nevertheless ensure that the organisation

taking on these tasks or work actually carries them out in accordance with the outsourcing authority's requirements. This was not the case here: the outsourcing authority – the SMNO – did not have a clear idea of how the classification society carried out the tasks delegated to it.

The objectives that the SMNO sought to achieve with the few flag state inspections carried out did not constitute effective oversight; in the authority's understanding, its primary role was not so much to monitor and enforce the applicable rules on board ships, but to act as a support and partner to shipping companies and to help them pass port authority inspections. In other words, it placed greater emphasis on trust than on oversight. Even though legal remedies existed, identified shortcomings were not addressed. The SMNO examined written documents – which, as experience shows, are occasionally embellished – with little critical scrutiny; safety-related aspects, which would have warranted review and for which reliable information and data were available, were not taken into account; technical equipment for collecting data was not used during flag state inspections. All of this suggests that the supervisory authority had an inappropriate understanding of its role and responsibilities.

Although various '*acts against the safety of the ship and navigation*' or '*against the order of Swiss maritime navigation*' are punishable under the penal provisions of the Maritime Navigation Act, and the SMNO, as the 'reporting authority', is legally required to report any infringements it identifies, the SMNO did not file any reports with the competent prosecuting authority regarding '*acts against the safety of the ship and navigation*' or '*against the order of Swiss maritime shipping*' – not even following the flag state inspection of the SABINA on 5 and 6 October 2015, during which an excess of working hours was identified, nor following the SABINA's accident on 15 October 2015, even though this accident had endangered the SABINA itself and other vessels, as the second officer had left his post and various safety-related navigation rules had been breached. Sanctioning mistakes that occur despite every precaution being taken is not generally conducive to improving safety. However, from a safety perspective, actions that pose a safety risk and are no longer within the bounds of tolerance should be consistently sanctioned.

Safety recommendation No 198, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the supervisory authority for maritime shipping under the Swiss flag, should consistently fulfil its role as enforcement body as assigned to it under the Maritime Navigation Act in order to ensure high safety standards, particularly in relation to flag state inspections and the imposition of sanctions.

Safety deficit

Key recruitment, training and operational processes in the SMNO's safety-related oversight activities were either not defined, inadequately or inappropriately defined, or were not implemented.

Safety recommendation No 199, 21.01.2025

The Swiss Maritime Navigation Office (SMNO), as the supervisory authority for shipping under the Swiss flag, should, in the interests of maintaining high safety standards for shipping under the Swiss flag, define and structure its safety-related recruitment, training and operational processes in such a way that they systematically and effectively support the Office and its staff in the oversight tasks assigned to them under the Maritime Navigation Act. For example:

- The SMNO should improve the quality of its flag state inspections so as to achieve its own and – in conjunction with its other oversight activities – internationally recognised objectives regarding these inspections. During these inspections, technical equipment should be used more frequently and systematically to obtain reliable information retrospectively. Quality assurance or verification processes should be introduced to identify inconsistencies in the content of inspection reports or inadequately carried out flag state inspections.
- In the process for issuing minimum safe manning documents (MSMDs), the SMNO should collect, in the relevant application form, the information to be considered as specified in the relevant IMO resolution.
- The SMNO should systematise and strengthen its checks of classification societies operating under its oversight or authority (*'under the authority of the Government of the Swiss Confederation'*) so as to obtain a realistic picture of the services provided by those classification societies. Furthermore, the SMNO should amend and clarify the mandates granted to classification societies in order to ensure high safety standards for maritime shipping under the Swiss flag. Procedures for the oversight of classification societies as required by the IMO and the SOLAS Convention should be introduced.
- The SMNO should systematically collect safety-related findings derived from investigations into maritime incidents worldwide and take these into account in its oversight activities.
- The SMNO should make greater use of modern technologies where these help to ensure higher safety standards for maritime shipping under the Swiss flag.

Safety deficit

The safety investigation into the SABINA accident on 15 October 2015 revealed that certain international agreements, in particular the STCW Convention and the SOLAS Con-

vention, are insufficient to ensure high safety standards in maritime shipping. The following aspects in particular are missing:

- Requirements regarding shipping companies' internal training of ship's crews, particularly in relation to safety culture and compliance and vessel-specific technical systems;
- Requirements on shipping companies to prepare and maintain a safety management manual containing all the information necessary to achieve a high standard of safety;
- Requirements for training seafarers in human factors:
 - regular refresher training in the area of personal safety and social responsibilities for ship's crew involved in safety-related duties;
 - the need to address human factor issues, in particular: assessing the fitness for duty of oneself and of other crew members on watch; notifying the captain in the event of actual or suspected unfitness for duty of the officer of the watch or in the event of other safety-related issues; the 'speak-up' concept and culture; Rating Forming Part of a Navigational Watch (RFPNW) as part of training;
 - regular refresher training on human factors for captains and officers of the watch, regardless of their practical experience;
- Requirement for shipping companies to support the crews of their ocean-going cargo ships in making safety-related decisions (crew support);
- Requirement for shipping companies to monitor their ocean-going cargo ships in real time (fleet monitoring);
- Requirement to make bridge resource management part of seafarers' training:
 - training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;
 - regular refresher training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;

Safety recommendation No 200, 21.01.2025

The Swiss Maritime Navigation Office (SMNO) should advocate within the International Maritime Organization (IMO) for high safety standards in maritime shipping including the addition of the following supplementary requirements to current international agreements, in particular the STCW Convention and the SOLAS Convention:

- Requirements regarding shipping companies' internal training of ship's crews, particularly in relation to safety

- culture and compliance and vessel-specific technical systems;
- Requirements on shipping companies to prepare and maintain a safety management manual containing all the information necessary to achieve a high standard of safety;
- Requirements for training seafarers in human factors:
 - regular refresher training in the area of personal safety and social responsibilities for ship's crew involved in safety-related duties;
 - the need to address human factor issues, in particular: assessing the fitness for duty of oneself and of other crew members on watch; notifying the captain in the event of actual or suspected unfitness for duty of the officer of the watch or in the event of other safety-related issues; the 'speak-up' concept and culture; Rating Forming Part of a Navigational Watch (RFPNW) as part of training;
 - regular refresher training on human factors for captains and officers of the watch, regardless of their practical experience;
- Requirement for shipping companies to support the crews of their ocean-going cargo ships in making safety-related decisions (crew support);
- Requirement for shipping companies to monitor their ocean-going cargo ships in real time (fleet monitoring);
- Requirement to make bridge resource management part of seafarers' training:
 - training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;
 - regular refresher training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;

Safety recommendation No 201, 21.01.2025

The International Maritime Organization (IMO) should supplement the relevant international agreements, in particular the STCW Convention and the SOLAS Convention, with the following requirements in order to ensure high safety standards in maritime shipping:

- Requirements regarding shipping companies' internal training of ship's crews, particularly in relation to safety culture and compliance and vessel-specific technical systems;
- Requirements on shipping companies to prepare and maintain a safety management manual containing all

the information necessary to achieve a high standard of safety;

- Requirements for training seafarers in human factors:
 - regular refresher training in the area of personal safety and social responsibilities for ship's crew involved in safety-related duties;
 - the need to address human factor issues, in particular: assessing the fitness for duty of oneself and of other crew members on watch; notifying the captain in the event of actual or suspected unfitness for duty of the officer of the watch or in the event of other safety-related issues; the 'speak-up' concept and culture; Rating Forming Part of a Navigational Watch (RFPNW) as part of training;
 - regular refresher training on human factors for captains and officers of the watch, regardless of their practical experience;
- Requirement for shipping companies to support the crews of their ocean-going cargo ships in making safety-related decisions (crew support);
- Requirement for shipping companies to monitor their ocean-going cargo ships in real time (fleet monitoring);
- Requirement to make bridge resource management part of seafarers' training:
 - training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;
 - regular refresher training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;

Safety deficit

The crew members involved in the accident under investigation were found to have knowledge shortcomings in several areas. This contributed in part to the accident. All these knowledge shortcomings must be regarded as risk factors.

Safety advice notice No 45, 21.01.2025

Swiss shipping companies should provide training and refresher courses for their crew members, particularly in the following areas:

- Thorough induction into the shipping company's safety culture and its compliance requirements, including learning and effectiveness assessments;
- Detailed induction in the ship's technical systems, including learning and effectiveness assessments;
- More training in human factors, specifically:

- regular refresher courses in personal safety and social responsibilities for ship's crew involved in safety-related duties;
- training in how to assess the fitness for duty of oneself and of other crew members on watch; when to notify the captain in the event of actual or suspected unfitness for duty of the officer of the watch or in the event of other safety-related issues; the 'speak-up' concept and culture; Rating Forming Part of a Navigational Watch (RFPNW);
- regular refresher training on human factors for captains and officers of the watch, regardless of their practical experience;
- more training in bridge resource management, specifically:
 - training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;
 - regular refresher training for deck officers on how to make the best possible use of on-board equipment, facilities and alarm systems in order to make the bridge watch as safe as possible and maximise situational awareness;

Safety deficit

The internationally applicable rules of the STCW Convention state that the officer of the watch may not hand over the watch to the relieving officer if there is reason to believe that the latter is unable to perform the duties of the watch effectively. In such cases, the captain must be informed of the situation.

If, as in the present case, the captain is the officer of the watch who is due to be relieved and the relieving officer of the watch is unlikely to be able to perform the duties of keeping watch effectively, the captain must, or should, be aware of this ('short-circuiting the chain of command'). In this situation there is clearly no possibility of escalating: the issue cannot be assessed impartially by a third party of higher rank. For reasons of safety, an officer of the watch should always be able to consult a third party of higher rank in the event of any issues relating to watch duties.

Safety advice notice No 46, 21.01.2025

When determining the minimum number of crew members on Swiss-flagged ocean-going cargo ships, shipping companies should pay particular attention to ensuring that the captain is never scheduled to conduct the watch (i.e. he should assume the watch only in a rare emergency) and that the watch schedule should not be such that crew members

conducting the watch are fatigued and unable to carry out their duties properly.

Safety deficit

The issue of fatigue was dealt with inadequately in the Safety Management Manual of the shipping company involved in the maritime accident under investigation. Strategies for preventing fatigue were not set out in the Safety Management Manual itself, only in supplementary documents. Furthermore, they were unsuitable for life and work on board a seagoing vessel. Issues relevant to the operation of a seagoing vessel, such as irregular working hours, unforeseen tasks, managing a skeleton crew, night watch duties and the like, were not addressed in the Safety Management Manual.

The requirements of the International Management Code for the Safe Operation of Ships and for Pollution Prevention (International Safety Management Code, or ISM Code for short) regarding a shipping company safety management manual leave considerable room for interpretation. Above all, they allow for the interpretation that it is not a requirement to have documentation on issues relating to fatigue on a seagoing vessel, such as irregular working hours, unforeseen tasks, dealing with understaffing, night watch duties, etc. The shipping company did not therefore mention the issues in its Safety Management Manual, and this was accepted by the ship classification society in charge and the SMNO.

Safety advice notice No 47, 21.01.2025

When drawing up and maintaining safety management manuals, Swiss shipping companies should ensure that these contain all the information necessary to ensure high safety standards.

Safety deficit

The shipping company was unable to intervene when the SABINA set a course leading directly to the island of Bornholm, contrary to the itinerary or the intended port of destination.

Before the shipping company was informed of the situation by land-based authorities shortly before the collision, it had no knowledge whatsoever of the impending collision between one of its vessels and the island of Bornholm. This was because the shipping company did not operate a fleet monitoring system.

Failure to operate relatively simple technical and organisational systems that would enhance fleet safety constitutes a safety shortcoming.

Safety advice notice No 48, 21.01.2025

Swiss shipping companies should systematically support their crews in making safety-related decisions (crew support) and continuously monitor their ocean-going cargo ships (fleet monitoring) – either in-house or via outsourced services.

Safety deficit

The SABINA crew members were asleep in their cabins and were not alerted by the BNWAS to the fact that the bridge was unmanned at an earlier stage, i.e. before the rescue boat crew intervened.

The BNWAS was unable to perform its warning function because it was not switched on during the voyage leading up to the accident. Had the BNWAS been switched on, the captain and the first officer would have been woken in their cabins by an audible alarm no later than 12 minutes and 30 seconds after the second officer – the officer of the watch on duty – had left the bridge. If the BNWAS had been switched on, the captain and first officer would have been able to correct course at around 22:58 UTC and so avert the impending collision with the island of Bornholm. At this time, the SABINA was still at a safe distance of around 10 nautical miles from Bornholm.

On 9 September 2015, the day on which the former first officer of the SABINA was appointed captain of the vessel – and thus around five weeks before the accident – the captain had been reminded in writing by the shipping company that the bridge watch alarm system must be in operation whenever the vessel was at sea.

The captain stated that he had forgotten to switch on the BNWAS when the ship set sail from Aalborg. It is difficult to understand why this was the case, as switching on the BNWAS was an explicit item on the departure checklist. According to an entry in the bridge logbook, all the items on the list had been checked before the ship set sail.

On the morning before the accident, i.e. on 15 October 2015, the shipping company sent a further written reminder regarding operation of the BNWAS.

The captain and nautical officers were therefore undoubtedly aware on the day of the accident and in the hours leading up to it that the BNWAS should be switched on – this was not merely ‘in the back of their minds’, as they had been freshly reminded of it by the shipping company.

Moreover, there were several changes of watch between the ship’s departure from the port of Aalborg at 03:10 UTC and the watch handover at 21:00 UTC, and so the deactivated BNWAS must have been noticed by the officers involved. The watch handover checklist requires the officer taking over the watch to check that all navigation and safety

equipment that may be used during the watch is in good working order. The captain had ordered in writing that this checklist be used. The entries in the bridge logbook showed that the checklist had been completed several times prior to the accident.

The findings lead to the inevitable conclusion that the SABINA’s watch officers deliberately failed to use the BNWAS; doing so would certainly have prevented the accident. This constitutes a reckless violation of a recognised safety regulation in maritime shipping.

All of this, combined with the fact that, even eight months after the accident off Bornholm, the SABINA was still being operated – albeit by a different crew – with the BNWAS switched off for large parts of a voyage suggests that the BNWAS was often deliberately left switched off while the vessel was at sea. The fact that the shipping company felt compelled to issue a reminder to its crews regarding the operation of the BNWAS even before the SABINA’s accident off Bornholm is an indication that there are failings in compliance with BNWAS regulations, not only on the SABINA but also on the company’s other vessels.

Safety advice notice No 49, 21.01.2025

Swiss shipping companies should effectively enforce the use of bridge navigation watch alarm systems on their ocean-going cargo ships in order to ensure high safety standards, and monitor the use of these systems in such a way as to gain a realistic picture of the situation – for example, by making a systematic and comprehensive analysis of data from voyage data recorders (Voyage Operations Quality Assurance – VOQA).

6 Time series



The following sections illustrate the trend over time in a range of data specific to the individual modes of transport. This was taken from the information that the STSB received or collected in connection with incident notifications and the associated preliminary investigations. In each case, the figures cover the period between 2015, when the Ordinance of the Safety Investigation of Transportation Incidents (OSITI) came into force, and the reporting year. The time series data are presented in Annex 4.

6.1 Aviation

Figure 6.1.1 shows the number of incident notifications received and investigations opened per year since 2015. The number of notifications submitted to the STSB rose between 2015 (1,260) and 2024 (1,952), with a sharp drop during the 'Covid years' of 2020 and 2021.

Processing incoming notifications is a high priority, as the next steps must be determined without delay. This task must be carried out by STSB investigators-in-charge, as a high level of specialist knowledge is required to make a rapid and targeted assessment. The high number of notifications is having a negative effect on the work involved in ongoing investigations. The revised Ordinance on the Safety Investigation of Transportation Incidents (OSITI) now clarifies that, in line with overarching European requirements, the authorities must only be notified of 'serious incidents' (as opposed to 'incidents').

This was implemented following clarifying discussions with stakeholders in late 2025. The decline in the number of notifications received in 2025 is attributable to the sharp drop in notifications towards the end of the year. The full impact is expected to become apparent in 2026.

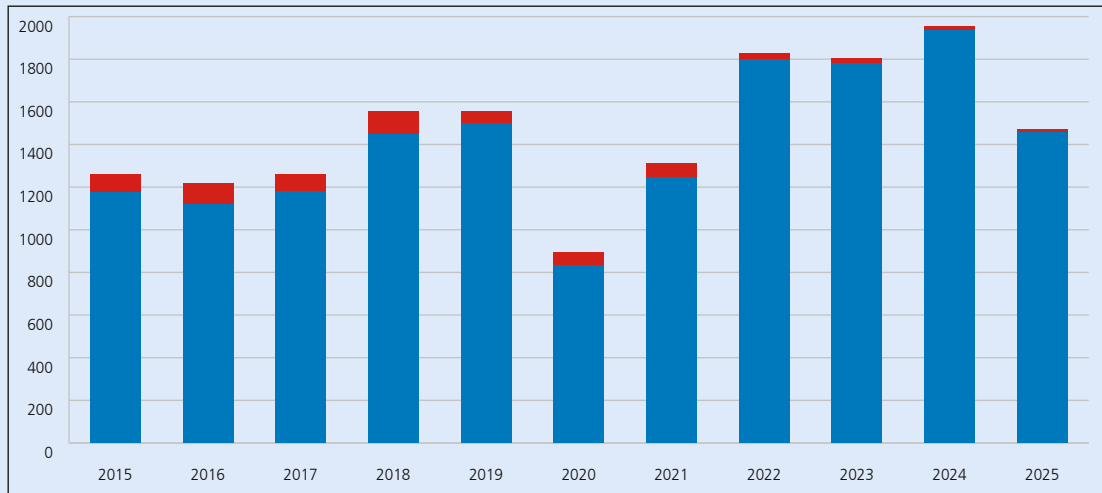


Figure 6.1.1: Number of incident notifications received per year (red and blue) and investigations opened (red) since 2015.

Figure 6.1.2 shows the development in the number of incidents investigated (i.e. 'accident' and 'serious incident') over the various flight phases.² These figures cover events in Switzerland and abroad involving aircraft registered in Switzerland.

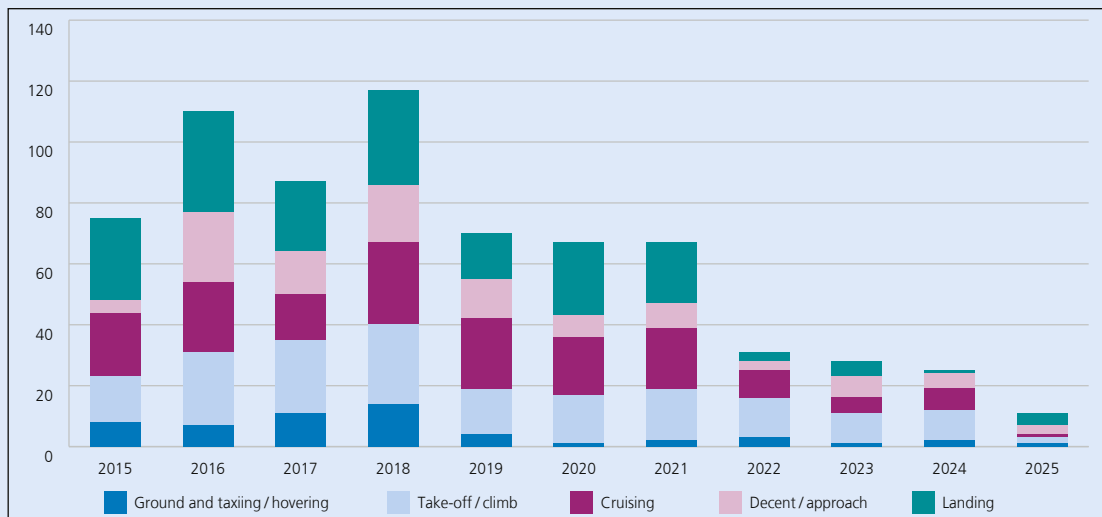


Figure 6.1.2: Total number of accidents and serious incidents investigated since 2015, broken down by flight phase. These figures cover events in Switzerland and abroad involving aircraft registered in Switzerland.

² The German term 'schwerer Vorfall' continues to be used in the Aviation Act and corresponds to the term 'schwere Störung' as used in the OSITI and in Regulation (EU) No 996/2010. The terms 'accident' and 'serious incident' are defined in Article 2 paragraphs 1 and 16 respectively of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.

Building on Figure 6.1.2, Figure 6.1.3 shows the changes over time in aviation accidents that resulted in a fatal or serious injury. This data reflects events that took place in Switzerland, irrespective of where the aircraft was registered, and events abroad involving an aircraft registered in Switzerland.

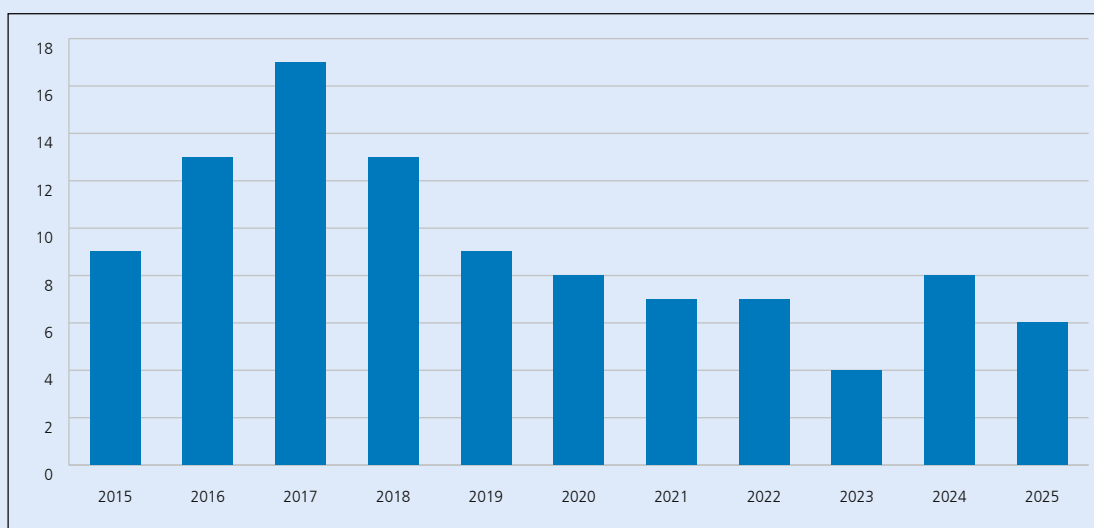


Figure 6.1.3: Development over time of aviation accidents that resulted in a fatal or serious injury.³ The data covers accidents in Switzerland and abroad involving an aircraft registered in Switzerland, as well as accidents involving foreign-registered aircraft that occurred in Switzerland.

As described in Section 5.1, where an investigation reveals safety deficits, the STSB will issue safety recommendations and safety advice notices. Figure 6.1.4 below shows the number of safety recommendations and safety advice notices published by the Aviation Division each year. Annex 4 also contains a table showing the number of times a given aspect of operations – technical, human, operational or organisational – was identified as the safety deficit on which the safety recommendation or advice notice was based.

³ The terms 'fatal injury' and 'serious injury' are defined in Article 2 paragraphs 5 and 17 respectively of Regulation (EU) No 996/2010 of the European Parliament and of the Council of 20 October 2010 on the investigation and prevention of accidents and incidents in civil aviation.

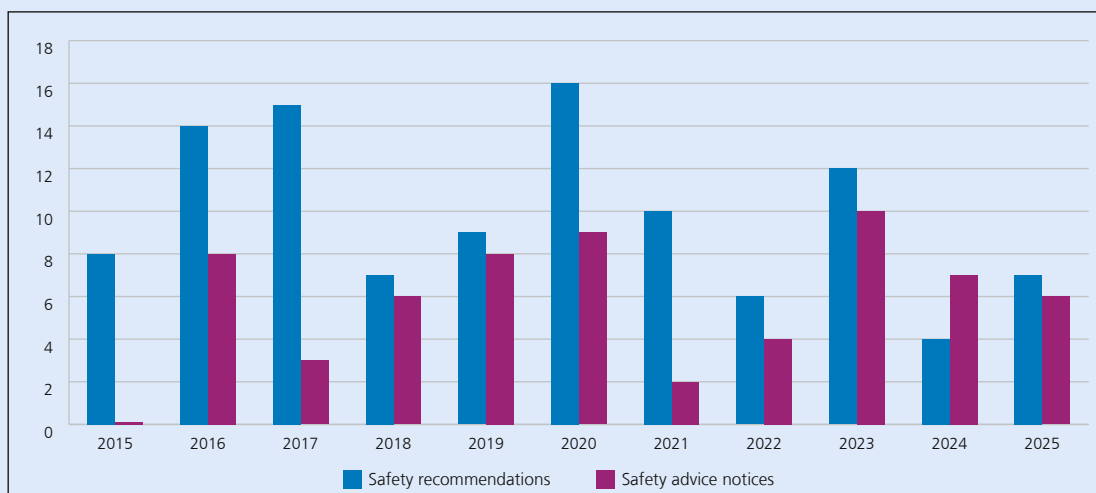


Figure 6.1.4: Number of safety recommendations and safety advice notices published since 2015 by the Aviation Division.

6.2 Railways, trams, cableways, buses, inland and maritime navigation

Figure 6.2.1 shows how the number of incident notifications and opened investigations has changed since 2015 for railways, trams, cableways, buses, and inland and maritime navigation. The number of notifications varies between just under 300 and 400 per year, with increases and decreases over the years but no clear trend.

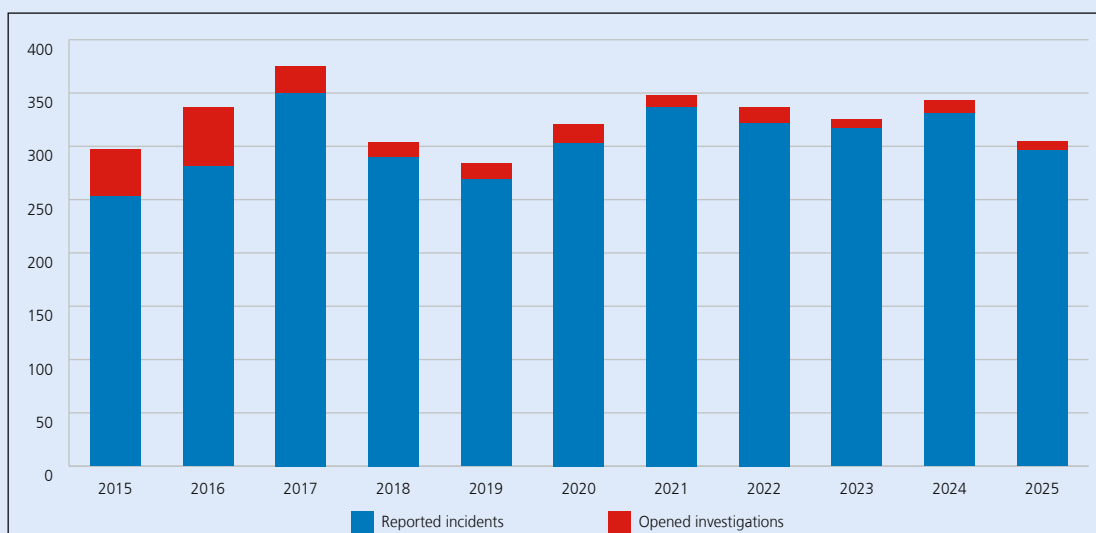


Figure 6.2.1: Number of incident notifications per year (blue plus red) and investigations opened (red) for railways, trams, cableways, buses, and inland and maritime navigation.

The number of investigations opened each year is shown in Figure 6.2.2, broken down according to the individual modes of transport. As expected, most investigations were opened into incidents on the railways, since this mode of transport significantly exceeds others in terms of transport volume and service frequency. Since 2017 the decision on whether or not to open an investigation has been made consistently according to the potential prevention value of the case. This approach has reduced the number of investigations and thus resulted in a targeted and efficient use of resources.

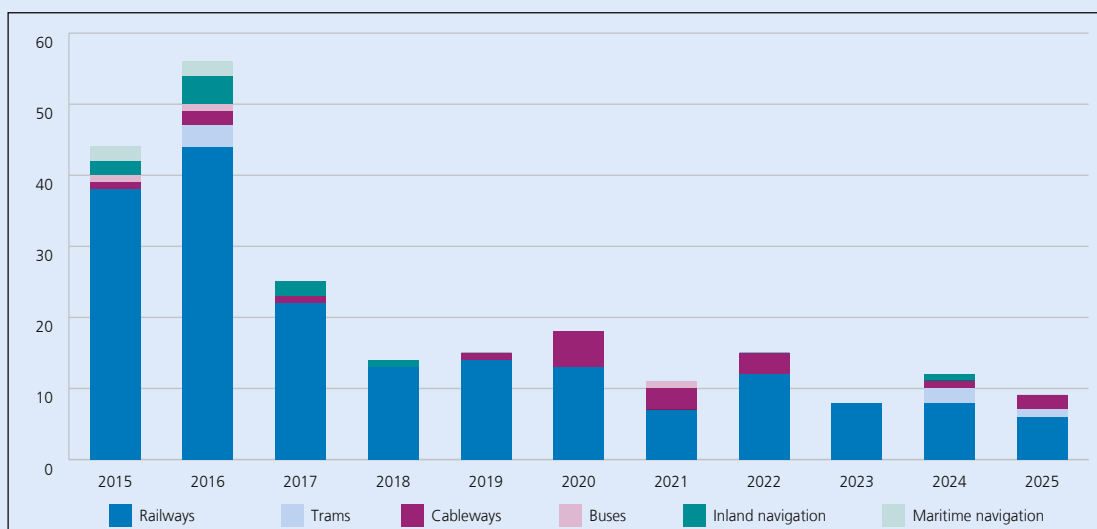


Figure 6.2.2: Number of investigations opened per year since 2015 concerning railways, trams, cableways, buses, inland and maritime navigation.

As is the case with the number of investigations opened, the majority of incident notifications also concern rail travel. Figure 6.2.3 illustrates what types of event led to notifications. Besides derailments and unclassified incidents (each accounting for approx. 20%), collisions (approx. 15%), accidents involving people (approx. 15%) and near-misses (approx. 10%) account for the largest proportion of notifications.

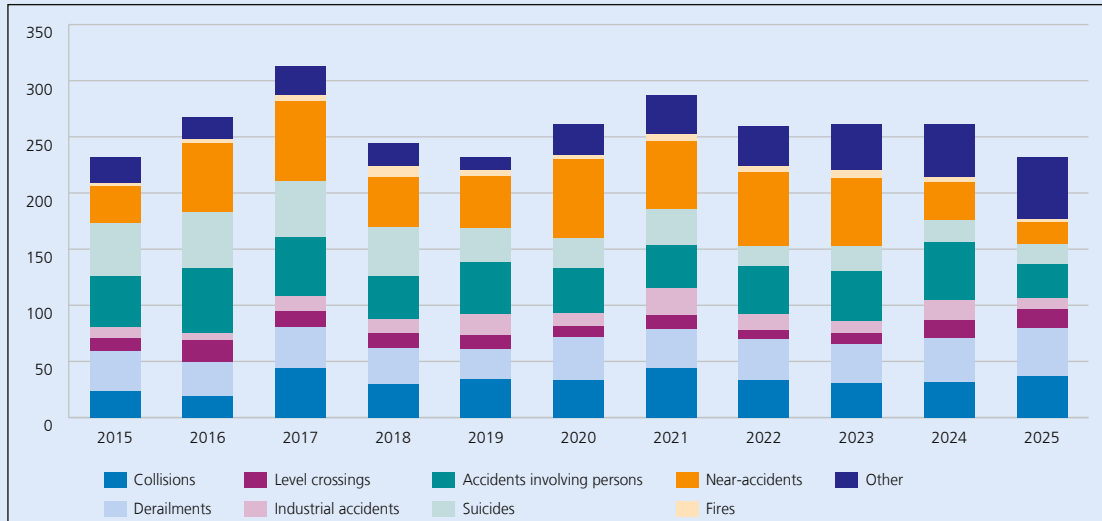


Figure 6.2.3: Number of incident notifications per year since 2015 for railways, broken down by type of event.

Depending on the outcome of its investigations, the STSB will publish safety recommendations or safety advice notices (see Section 5.1). The development over time of the number of recommendations and advice notices published is presented in Figure 6.2.4. Annex 4 contains a table showing the number of times a given aspect of operations – technical, human, operational or organisational – was identified as the safety deficit on which the safety recommendation or advice notice was based.

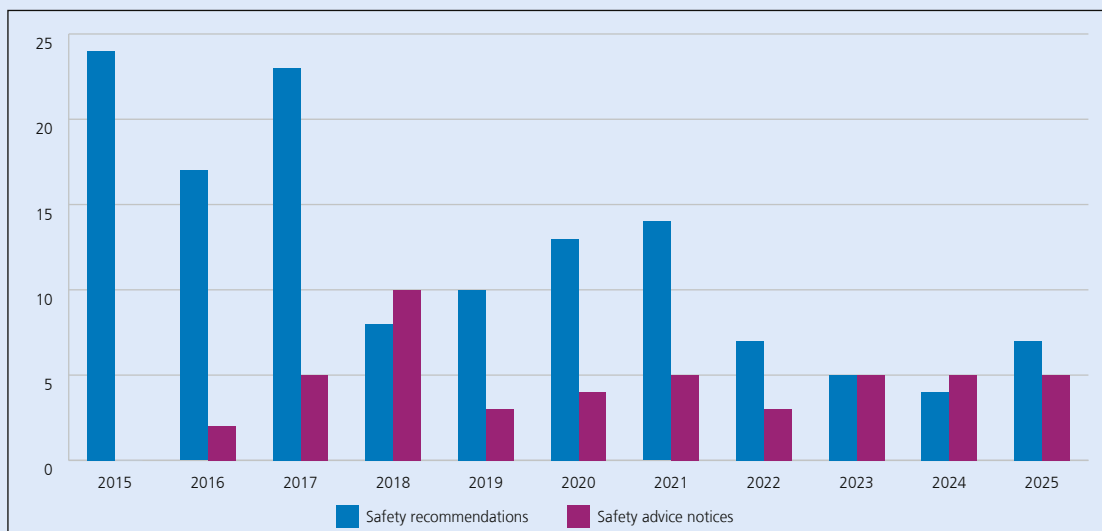


Figure 6.2.4: Number of safety recommendations and safety advice notices published per year since 2015.

Annexes⁴



- Annex 1: Lists of the number of notifications, as well as opened, ongoing and completed investigations and interim reports and studies published with regard to aviation
- Annex 2: Lists of the number of notifications, as well as opened, ongoing and completed investigations and interim reports and studies published with regard to public transport and maritime navigation
- Annex 3: Additional details of incidents and investigations in aviation and public transport
- Annex 4: Time series data (Section 6)

⁴ The statistics include cases occurring in the territory of the Principality of Liechtenstein or involving its aircraft.

Annex 1

Lists of the number of notifications, as well as opened, ongoing and completed investigations and interim reports and studies published with regard to aviation

Notifications and opened, ongoing and completed investigations

Aviation						
Year	Number of notifications	Opened investigations	Completed investigations ⁵			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	1470	12	13	8	5	60
2024	1952	19	31	16	15	70
2023	1803	24	53	22	31	89
2022	1828	27	36	15	21	135
2021	1309	66	70	9	61	157
2020	894	59	40	9	31	164
2019	1566	64	76	14	62	162
2018	1556	119	83	22	53	156
2017	1259	86	93	30	48	111
2016	1219	92	58	27	31	142
2015	1260	86	33	33	n/a	n/a

Extensive investigations completed

Number	Registration	Date of incident	Location	Safety recommendation	Safety advice notice
2432	HB-TSN/ D-ECZZ	18.09.2024	10NM from runway 06 at Friedrichshafen Airport (EDNY) (DEU)	604	
2431	OE-9485	23.08.2024	1 km south-east of the Chistehorn, Niedergesteln (VS)	557	
2430	HB-ZWC	12.03.2024	Egg, 3 km south of Weinfelden, Bussnang (TG)		64, 65
2426	HB-JHL	11.07.2023	English Channel (GBR)	601, 602, 603	66, 67
2427	HB-ZTV	16.03.2022	Riale Carcale, Gordola (TI)	599, 600	62, 63
2428	HB-LUP	21.03.2021	9NM south-west of Grenchen aerodrome (LSZG) (BE)		
2429	HB-ZVN	11.11.2020	Sion aerodrome (LSGS) (VS)		
2365	HB-KFY	29.08.2017	Raron airfield (LSTA) (VS)		

⁵ Figures prior to 2020 show the number of reports published, not the number of investigations completed.

Summary investigations completed

Registration	Date of incident	Location	Type of incident
ZS-GUA	16.06.2024	Mont Crosin, 3 km west of Courtelary aerodrome (LSZJ) (BE)	Loss of control during flight
HB-ZUI	20.01.2024	Rougemont (VD)	Engine failure
CS-PHM/HB-SHB	10.02.2023	2.5NM west of St Gallen aerodrome Altenrhein (LSZR) (SG)	Near miss
HB-XII	18.12.2021	Alphubel mountain landing site (LSVF) (VS)	Loss of control during flight resulting in a hard landing
D-4363/J-3088	30.06.2018	7.1 km west-northwest of Frick-tal-Schupfart aerodrome (LSZI) (AG)	Near miss

Cessations of investigations or factual reports

Registration	Date of incident	Location	Type of incident
HB-TDA	21.01.2024	Speck Fehraltdorf aerodrome (LSZK) (ZH)	Loss of power while climbing
HB-SGU	31.03.2023	Lommis aerodrome (LSZT)	Loss of control during flight
D-6378/HB-OQB	01.08.2022	Uetendorf (BE)	Accident during glider tow

Annex 2

Lists of the number of notifications, as well as opened, ongoing and completed investigations and interim reports and studies published with regard to public transport and maritime navigation

Notifications and opened, ongoing and completed investigations

Public transport and maritime navigation						
Year	Number of notifications	Opened investigations	Completed investigations ⁶			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	305	9	11	11	0	15
2024	343	12	12	9	3	16
2023	325	8	9	7	2	19
2022	337	15	20	9	11	20
2021	346	11	17	11	6	24
2020	321	19	21	10	11	32
2019	283	15	15	8	7	35
2018	304	14	32	13	17	33
2017	376	25	38	27	12	50
2016	332	64	39	13	26	79
2015	296	87	31	18	13	n/a

Extensive investigations completed

Number	Mode of transport	Type of incident	Date	Location	Safety recommendation	Safety advice notice
2024090301	Railways	Industrial accident	03.09.2024	Schlieren (ZH)		
2024062201	Railways	Runaway train	22.06.2024	Bernina Lagalb (GR)		
2024032502	Railways	Industrial accident	25.03.2024	Blonay – Montreux (VD)		
2024011001	Railways	Runaway train	10.01.2024	Zurich Wipkingen (ZH)		
2024010302	Cableways	Collision of vehicles	03.01.2024	Visperterminen (VS)		
2023110702	Railways	Fire	07.11.2023	Realp (UR)	202, 203, 204	50
2023081002	Railways	Train derailment	10.08.2023	Gotthard Base Tunnel, Faido (TI)	205, 206, 207, 208	54
2022121902	Cableways	Industrial accident	19.12.2022	Laax (GR)		51, 52, 53
2022060203	Railways	Collision between two trains	02.06.2022	Henggart (ZH)		

⁶ Figures prior to 2020 show the number of reports published, not the number of investigations completed.

Number	Mode of transport	Type of incident	Date	Location	Safety recommendation	Safety advice notice
2015101502	Maritime navigation	Grounding	15.10.2015	Off the coast of Rønne, Bornholm (DNK)	189, 190, 191, 192, 193, 194, 195, 196, 197, 198, 199, 200, 201	45, 46, 47, 48, 49
2015062601	Maritime navigation	Accident at work whilst at the shipyard	26.06.2015	Constanța (ROU)	188	44

Cessations of investigations

Number	Mode of transport	Type of incident	Date	Location
2024050501	Railways	Derailment during shunting	05.05.2024	Cadera/Poschiavo (GR)

Annex 3

Additional information on aviation incidents and investigations

Air accidents and serious incidents involving Swiss-registered aircraft with investigation

Year	Accidents with extensive investigation	Accidents with summary investigation	Total accidents	Serious incidents (incl. airproxes)	Airproxes investigated	Total accidents and serious incidents	Fatalities
2025	8	0	8	1	0	9	3
2024	8	1	9	14	6	23	5
2023	6	4	14	11	4	25	3
2022	8	1	9	15	6	24	3
2021	10	14	24	31	14	55	8
2020	14	16	30	32	9	62	10
2019	16	6	22	34	11	56	5
2018	14	16	30	64	25	94	38
2017	22	23	45	28	6	73	18
2016	22	17	39	48	16	87	5
2015	14	2	16	13	2	29	4

Air accidents and serious incidents involving Swiss-registered aircraft with up to 5,700 kg maximum take-off mass (MTOM)

Year	Accidents with extensive investigation	Accidents with summary investigation	Total accidents	Serious incidents (incl. airproxes)	Airproxes investigated	Total accidents and serious incidents	Fatalities
2025	8	0	8	0	0	8	3
2024	7	1	8	8	3	16	4
2023	6	4	14	7	4	21	3
2022	8	1	9	15	6	24	3
2021	9	14	23	28	12	51	8
2020	14	16	30	30	8	60	10
2019	16	6	22	26	8	48	5
2018	13	16	29	47	16	76	18
2017	22	23	45	23	4	68	18
2016	22	17	39	31	7	70	5
2015	14	2	16	5	1	21	4

Accidents and serious incidents with and without injury involving Swiss-registered aircraft in Switzerland

		Total	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Aircraft up to 2,250 kg MTOM	with injury	30	5	1	7	3	3	3	5	2	1	0	2
	without injury	240	32	21	41	43	25	28	30	8	7	5	1
Aircraft of 2,250–5,700 kg MTOM	with injury	1	0	0	0	0	0	0	0	0	0	1	1
	without injury	21	0	3	1	2	3	5	3	3	1	0	0
Aircraft exceeding 5,700 kg MTOM	with injury	1	0	0	0	1	0	0	0	0	0	0	0
	without injury	44	7	9	3	13	2	2	4	0	3	1	0
Helicopters	with injury	22	2	3	5	2	2	0	0	4	0	4	2
	without injury	86	10	14	6	14	10	8	9	5	5	5	0
Motor gliders and gliders	with injury	15	1	3	2	3	0	2	1	3	0	0	0
	without injury	41	6	8	5	7	2	8	3	2	0	0	0
Balloons and airships	with injury	1	0	0	0	0	0	0	0	0	1	0	0
	without injury	4	1	0	0	2	0	1	0	0	0	0	0
Ultralight aircraft	with injury	0	–	0	0	0	0	0	0	0	0	0	0
	without injury	2	–	2	0	0	0	0	0	0	0	0	0
Total ⁷	with injury	70	8	7	14	9	5	5	6	9	2	5	5
	without injury	438	56	57	56	81	42	52	49	18	16	11	1

⁷ The total number of accidents and serious incidents may differ from the sum of the individual categories. The reason for this is the allocation of events involving several aircraft of different categories. These are recorded in those individual categories but are only counted as one event in the total.

Accidents and serious incidents with and without injury involving foreign-registered aircraft in Switzerland

		Total	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Aircraft up to 2,250 kg MTOM	with injury	9	1	3	1	2	0	0	1	0	1	0	1
	without injury	24	3	6	4	0	4	1	3	1	2	0	0
Aircraft of 2,250–5,700 kg MTOM	with injury	2	0	0	1	0	0	0	0	1	0	0	0
	without injury	3	0	0	0	1	0	1	1	0	0	0	1
Aircraft exceeding 5,700 kg MTOM	with injury	0	0	0	0	0	0	0	0	0	0	0	0
	without injury	33	5	8	3	4	6	2	2	1	1	1	0
Helicopters	with injury	2	0	1	0	1	0	0	0	0	0	0	0
	without injury	1	0	0	0	0	0	0	0	0	1	0	0
Motor gliders and gliders	with injury	5	2	0	0	0	1	0	1	0	0	1	0
	without injury	6	0	1	0	1	2	1	0	0	0	1	0
Balloons and airships	with injury	0	0	0	0	0	0	0	0	0	0	0	0
	without injury	1	0	0	0	0	1	0	0	0	0	0	0
Ultralight aircraft	with injury	0	–	0	0	0	0	0	0	0	0	0	0
	without injury	1	–	0	0	0	0	0	1	0	0	0	0
Total	with injury	18	3	4	2	3	1	0	2	1	1	1	1
	without injury	69	8	15	7	6	13	5	7	2	4	2	1

Accidents and serious incidents with and without injury involving Swiss-registered aircraft abroad

		Total	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Aircraft up to 2 250 kg MTOM	with injury	8	2	0	1	1	2	1	0	0	1	0	0
	without injury	34	3	3	4	10	6	2	2	1	3	0	1
Aircraft of 2 250–5 700 kg MTOM	with injury	1	0	0	0	0	0	1	0	0	0	0	0
	without injury	11	0	2	0	4	3	0	0	1	1	0	1
Aircraft exceeding 5 700 kg MTOM	with injury	1	0	0	0	0	0	0	0	0	0	1	0
	without injury	40	5	15	7	5	2	0	0	0	1	5	1
Helicopters	with injury	0	0	0	0	0	0	0	0	0	0	1	0
	without injury	3	0	0	0	0	0	0	2	0	0	1	0
Motor gliders and gliders	with injury	5	0	1	1	0	1	1	0	0	1	0	0
	without injury	6	0	1	0	3	1	0	0	1	0	0	0
Balloons and airships	with injury	0	0	0	0	0	0	0	0	0	0	0	0
	without injury	2	0	1	0	1	0	0	0	0	0	0	0
Ultralight aircraft	with injury	0		0	0	0	0	0	0	0	0	0	0
	without injury	1		0	0	1	0	0	0	0	0	0	0
Total	with injury	15	2	1	2	1	3	3	0	0	2	2	0
	without injury	97	8	22	11	24	12	2	4	3	5	6	3

Additional information on public transport incidents and investigations

Notifications and opened, ongoing and completed investigations – railways

Railways						
Year	Notifications	Opened investigations	Completed investigations			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	232	6	8	7	0	11
2024	261	8	8	5	3	13
2023	261	8	7	5	2	12
2022	271	12	16	9	7	11
2021	286	7	11	8	5	18
2020	261	13	16	8	8	26
2019	232	14	16	9	8	28
2018	244	13	29	14	16	35
2017	313	22	34	24	10	46
2016	267	44	33	12	22	64
2015	232	38	28	17	11	69

Notifications and opened, ongoing and completed investigations – trams

Trams						
Year	Notifications	Opened investigations	Completed investigations			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	26	1	0	0	0	1
2024	33	2	2	2	0	0
2023	28	0	0	0	0	0
2022	12	0	0	0	0	0
2021	21	0	0	0	0	0
2020	23	0	0	0	0	0
2019	24	0	0	0	0	0
2018	27	0	1	0	1	0
2017	30	0	1	0	1	1
2016	32	3	1	0	1	2
2015	33	0	0	0	0	2

Notifications and opened, ongoing and completed investigations – cableways

Cableways						
Year	Notifications	Opened investigations	Completed investigations			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	27	2	2	2	0	2
2024	26	1	1	1	0	2
2023	15	0	0	0	0	2
2022	26	3	2	0	2	2
2021	20	3	4	4	1	1
2020	20	5	5	2	3	2
2019	12	1	0	0	0	2
2018	14	0	0	0	0	1
2017	10	1	3	2	1	4
2016	18	2	1	1	0	4
2015	10	1	1	1	0	2

Notifications and opened, ongoing and completed investigations – buses

Buses						
Year	Notifications	Opened investigations	Completed investigations			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	15	0	0	0	0	0
2024	13	0	0	0	0	0
2023	12	0	1	1	0	0
2022	18	0	0	0	0	1
2021	8	1	0	0	0	1
2020	12	0	0	0	0	0
2019	9	0	0	0	0	0
2018	14	0	0	0	0	0
2017	18	0	1	1	0	0
2016	12	1	2	1	2	2
2015	18	1	0	0	0	3

Notifications and opened, ongoing and completed investigations – inland navigation

Inland navigation						
Year	Notifications	Opened investigations	Completed investigations			Ongoing investigations
			Total:	Extensive:	Summary:	
2025	4	0	0	0	0	1
2024	10	1	1	1	0	1
2023	8	0	1	1	0	1
2022	5	0	0	0	0	2
2021	10	0	2	2	0	2
2020	5	0	0	0	0	5
2019	4	0	1	0	1	5
2018	4	1	0	0	0	5
2017	3	2	1	0	1	4
2016	6	4	2	1	1	3
2015	2	2	2	0	2	1

Annex 4

Time series data (Section 6)

Aviation (Section 6.1)

Total number of accidents and serious incidents reported per year, broken down by flight phase (aircraft registered in Switzerland and abroad)

Year	Total	Ground and taxi- ing/hover flight	Take-off/climb	Cruise flight	Descent/ approach	Landing
2025	11	1	2	1	3	4
2024	25	2	10	7	5	1
2023	28	1	10	5	7	5
2022	31	3	13	9	3	3
2021	67	2	17	20	8	20
2020	67	1	16	19	7	24
2019	70	4	15	23	13	15
2018	117	14	26	27	19	31
2017	87	11	24	15	14	23
2016	110	7	24	23	23	33
2015	75	8	15	21	4	27

Development over time of air accidents resulting in injury, broken down by aircraft category (aircraft registered in Switzerland and abroad, as well as aircraft registered abroad in Switzerland)

Year	Motorised aircraft	Gliders	Helicopters	Total ⁸
2025	4	0	2	6
2024	2	1	5	8
2023	3	1	0	4
2022	3	1	3	7
2021	6	2	0	7
2020	5	3	0	8
2019	5	2	2	9
2018	7	3	3	13
2017	1	4	3	17
2016	5	3	5	13
2015	7	0	2	9

⁸ The total number of accidents and serious incidents may differ from the sum of the individual categories. The reason for this is the allocation of events involving several aircraft of different categories. These are recorded in those individual categories but are only counted as one event in the total.

Number of safety recommendations and safety advice notices published per year

Year	Technical	Human	Operational	Organisational	Total ⁹
2025	4	0	11	3	18
2024	1	0	5	4	11
2023	8	2	7	5	22
2022	3	0	2	5	10
2021	5	0	2	3	10
2020	3	0	5	8	16
2019	6	0	2	1	9
2018	2	0	2	3	7
2017	7	0	2	6	15
2016	7	1	1	5	14
2015	2	0	4	2	8

Railways, trams, cableways, buses, inland and maritime navigation (Section 6.2)

Investigations opened per year, broken down by mode of transport

Year	Railways	Trams	Cableways	Buses	Inland navigation	Maritime navigation	Total
2025	6	1	2	0	0	0	9
2024	8	2	1	0	1	0	12
2023	8	0	0	0	0	0	8
2022	12	0	3	0	0	0	15
2021	7	0	3	1	0	0	11
2020	13	0	5	0	0	0	18
2019	14	0	1	0	0	0	15
2018	13	0	0	0	1	0	14
2017	22	0	1	0	2	0	25
2016	44	3	2	1	4	2	56
2015	38	0	1	1	2	2	44

⁹ The total number of factors may differ from the sum of safety recommendations and safety advice notices, as some factors address more than one area.

Incidents reported per year, broken down by event type – railways

Year	Colli-sions	Derail-ments	Railway crossings	Industrial accidents	Accidents involving persons	Suicides	Near accidents	Fires	Other	Total
2025	37	42	17	10	31	17	20	3	55	232
2024	32	39	16	17	52	20	33	5	47	261
2023	29	34	12	22	45	23	60	7	30	261
2022	33	37	8	14	43	17	66	6	35	271
2021	44	35	12	24	39	32	60	6	35	286
2020	33	39	9	12	40	27	70	4	27	261
2019	34	27	12	19	46	31	46	5	12	232
2018	30	32	13	13	38	43	45	10	20	244
2017	44	36	15	13	53	49	72	5	26	313
2016	19	30	20	6	58	50	61	4	19	267
2015	24	35	12	9	46	47	33	3	23	232

Number of safety recommendations and safety advice notices published per year

Year	Technical	Human	Operational	Organisational	Total
2025	5	0	16	19	40
2024	2	0	4	3	9
2023	4	1	4	1	10
2022	5	0	3	2	10
2021	7	2	2	3	14
2020	6	0	4	3	13
2019	4	2	1	3	10
2018	1	1	6	0	8
2017	9	1	7	6	23
2016	6	1	3	7	17
2015	6	4	1	13	24



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