



Annual Report 2014

Rail Safety Investigations

Dutch Safety Board

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Dutch Safety Board

The aim in the Netherlands is to reduce the risk of accidents and incidents as much as possible. If accidents or near-accidents nevertheless occur, a thorough investigation into the causes of the problem, irrespective of who is to blame for it, may help to prevent similar problems from occurring in the future. It is important to ensure that the investigation is carried out independently from the parties involved. This is why the Dutch Safety Board itself selects the issues it wishes to investigate, mindful of citizens' position of dependence with respect to public authorities and businesses. In some cases, the Dutch Safety Board is required by law to conduct an investigation.

Dutch Safety Board
Chairman: T.H.J. Joustra
E.R. Muller
M.B.A. van Asselt

General Secretary: M. Visser

Visiting address:	Anna van Saksenlaan 50 2593 HT The Hague The Netherlands	Postal address:	PO Box 95404 2509 CK The Hague The Netherlands
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Telephone:	+31 (0)70 333 7000	Fax:	+31 (0)70 333 7077
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Website: www.safetyboard.nl

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The reports issued by the Dutch Safety Board are open to the public.

All reports are also available on the Safety Board's website www.safetyboard.nl

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1 INTRODUCTION

Each year, in accordance with the European Railway Safety Directive, the Dutch Safety Board publishes an annual report summarising its activities in the domain of rail traffic.

Besides the present report covering 2014, the Dutch Safety Board publishes its corporate Annual Report covering all investigation areas (including rail) as well organisational and financial developments. The Annual Report 2014 is available on our website: www.safetyboard.nl.

2 THE DUTCH SAFETY BOARD

2.1 Legal Basis

The Kingdom Act instituting the Dutch Safety Board came into force on 1 February 2005, with the Board Member officially being sworn in on 7 February of that year by the Minister of the Interior and Kingdom Relations.

The Dutch Safety Board has a broad legal mandate. Apart from rail accidents and incidents, occurrences in all other transport sectors are covered. Moreover, safety investigations are concerned with non-transport issues such as food safety, accidents in the industry (including construction) and crisis management.

The Board has specific and extensive competencies when it comes to the performance of its investigations. The Kingdom Act sets out strict safeguards for the independence of the Board and for the protection of information. Note that any information gathered in the course of an investigation will not be passed on to third parties. The competencies of the Dutch Safety Board's investigators are regulated in the Kingdom Act. The essence of the Act is that investigators must be given the greatest possible access to all relevant information. They are allowed to enter buildings in order to gather information, which may include radar images, tape recordings, documents and witness statements, and may take items with them for further investigation. In addition, the investigators can stipulate that wreckage left after an accident should not be removed from the scene straight away, and that during the initial phase of an investigation the accident site should as far as possible be left in its original state. Naturally, the victims' needs and the provision of aid will take precedence at all times, as do efforts to limit the damage done to equipment and the harm done to the environment. Where possible, the Board's investigators will utilise information on an incident that has been compiled by the police and the judicial authorities. In contrast, the Dutch Safety Board's investigators do not give any information to the police or the judicial authorities.

2.2 Purpose of investigation

In accordance with the Kingdom Act Dutch Safety Board and with applicable EU law, the purpose of the Dutch Safety Board's work is to prevent similar incidents

from happening in the future. Accordingly, the Board's investigation aims not only to uncover the actual causes of incidents but also – and in particular – to bring to light the underlying causes of the incident, so that any shortcomings in the applied system can be revealed. If the investigation reveals any systematic safety-related shortcomings then the Board will formulate recommendations so that these shortcomings can be put right. In rail investigations, recommendations are usually addressed to the competent authorities and to organisations and companies active in the field.

The Board would like to emphasize that issues of blame or liability are not part of its legal mandate. Information gathered during the course of an investigation – including statements provided by the Board, information that the Board has compiled, results of technical research and analyses and drafted documents (including the published report) – cannot be used as evidence in criminal, disciplinary or civil law proceedings.

2.3 Organisation

The Dutch Safety Board consists of a Board with three permanent members. The Board is supported by a bureau consisting of support staff and some 40 investigators.¹

The overall budget of the Safety Board in 2014 was € 11,2 mln.

¹ For the Rail sector: three investigators and an investigation manager.

3 INVESTIGATION PROCESS

3.1 Occurrences to be investigated

Cases to be investigated are accidents where the safety of passengers and staff members, level crossings, infrastructure, rolling stock, safety of protective systems or external safety (the risk for neighbours or the environment in case of accidents with dangerous goods or serious derailments) is involved.

Mandatory investigations are those occurrences that qualify as ‘serious accidents’: collision or derailment of trains, at which at least one person dies or five or more persons get seriously injured or the damage can be instantly valued by the investigating organisation at the amount of at least € 2 million.

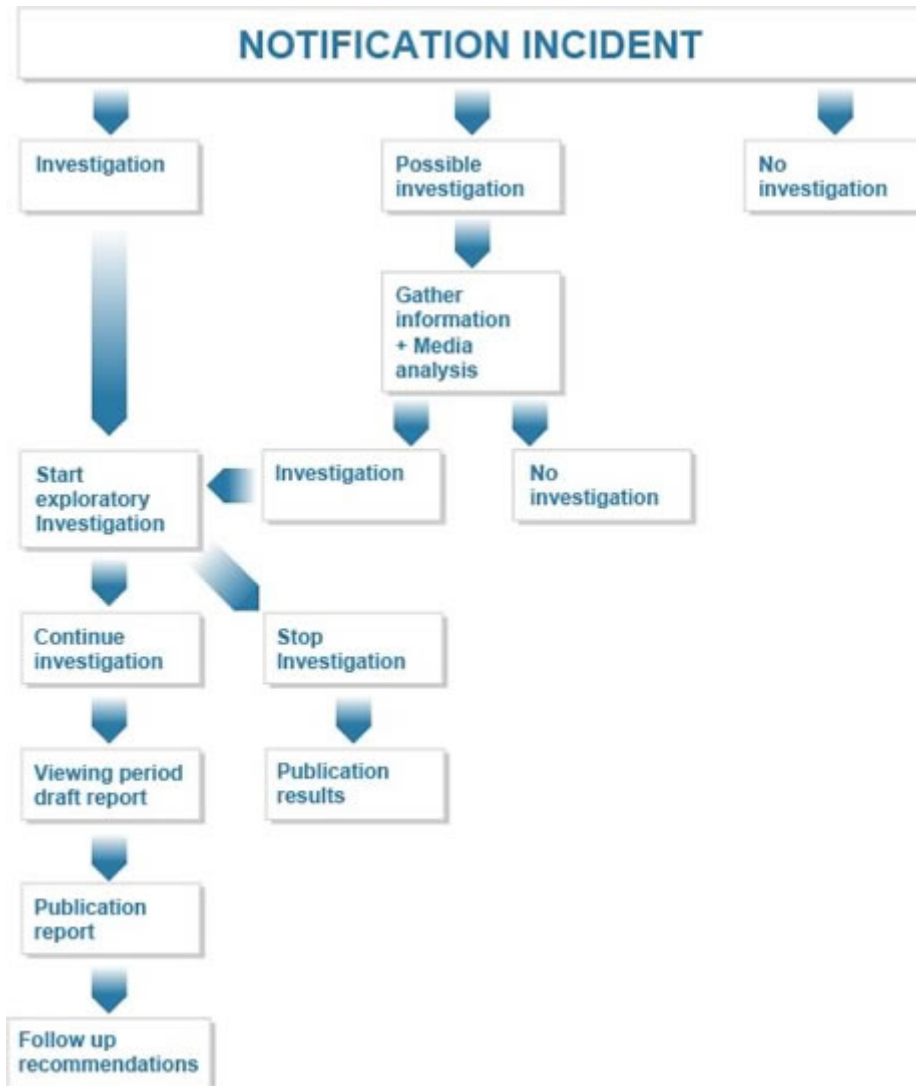
In addition to these legal considerations, and given the limited capacity, the Dutch Safety Board has developed criteria to select the occurrences to be investigated. An important criterion is the question whether something could be learned from the accident, i.e. whether any systemic failures are thought to have contributed to the accident. The objective is to investigate those accidents where the Board’s added value is greatest.

Note that for less serious incidents, there may be official bodies other than the Board – such as inspectorates and judicial authorities – who are carrying out their own investigation. In addition, and in accordance with the Board’s philosophy, the parties directly involved will normally carry out their own investigation into what happened.

3.2 Investigation and reporting

After the decision is taken to investigate an accident, the investigation formally starts. The investigation process itself can be broken down into a number of phases: after an incident, the first stage is always to set in motion an exploratory investigation – which will take no longer than one or two months – in order to establish whether there is a systematic safety shortcoming worthy of a full investigation by the Board. Note too that the occurrence of a series of incidents may be reason to launch an investigation. In the next phase, a plan of action is

drawn up. The investigation itself will result in a (draft) final report that after verification by the parties involved will be published. All reports of the Dutch Safety Board are available on its website: www.safetyboard.nl



Special guidance committees are set up for the purpose of conducting specific investigations. A guidance committee consists of external experts and is presided by a Board Member. It advises about the set-up of an investigation, the conclusions and recommendations. It is the Board which finally decides on the content of the reports.

Once the report has been published and sent to those who are the subject of its recommendations, these stakeholders will be given a maximum of six months (in the case of government institutions) or twelve months (in the case of private

organisations) to respond. The response has to be sent to the minister responsible for the relevant operational sector. A copy of this response must be sent simultaneously to the chairman of the Dutch Safety Board and to the Minister of Security and Justice. In this way, the appropriate ministry can fulfil its legal duty to monitor the follow-up actions taken in the light of the Board's recommendations.

4 RAIL INVESTIGATIONS

4.1 Investigations completed in 2014

Type of accident	Number of accidents	Number of victims		Damages in € (<i>approx.</i>)
		Deaths	Serious Injuries	
Collisions	0	0	0	
Derailments	1	0	0	circa 2,5 mln €

4.2 Investigations started in 2014

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis	Completed (date)
15-01-2014	Derailment, Hilversum	i	18-12-2014

Basis for investigation: i = According to the EU Safety Directive, ii = National legal basis (covering possible areas excluded in Article 2, §2 of the EU Safety Directive), iii = Voluntary – other criteria.

4.3 Safety Studies

No safety studies were conducted by the Dutch Safety Board or commissioned to other parties in 2014.

4.4 Summary of investigations completed in 2014

Train derailment Hilversum

On 15 January 2014, a passenger train derailed at a switch just outside Hilversum station. After the first section of the train had travelled in a straight direction over the switch, the rear section of the train was suddenly directed onto the adjacent track, as a result of which the train derailed. A train travelling in the opposite direction on the adjacent track was successfully brought to a standstill approximately two hundred metres before reaching the derailment site, thereby avoiding a collision. As a consequence of the derailment, a number of passengers suffered minor injuries, while serious material damage was caused to the track infrastructure and the train. The Dutch Safety Board investigated this accident, partly on the basis of its potential seriousness.

When the train travelled over the switch, a part of the switch mechanism (point machine) broke. A technical investigation revealed that the part failed due to fatigue. The fatigue fracture arose because the part in question was in practice exposed to forces that were higher and more dynamic than those taken into account in the design. In addition, this part revealed finishing defects. These additional forces were caused by the fact that during train passages, the insides of the train wheels scraped against the switch blades.

This 'hitting' action caused the switch blade to oscillate, whereby additional forces were applied to the part, for which it was not designed. These additional forces eventually led to a fatigue fracture. The hitting of the switch blade (known as flange-back contact) was caused by the poor maintenance condition of the switch. Various parts of the switch were so worn that they could no longer fulfill their function, namely supporting and guiding the switch blade. As a consequence, when shifting back and forth, the switch blade experienced such a degree of resistance that it remained too close to the rail. This in turn meant that the wheels of passing trains regularly scraped along the switch blade, while this was not supposed to happen. It became clear from the investigation that these flange-back contacts were not caused by the train traffic but by the state of maintenance of the infrastructure.

The wear to the switch did not occur overnight. Maintenance should have led to repair. This was not the case. The investigation revealed that ProRail did not see any safety risk in flange-back contacts and as a consequence did not consider it necessary to prevent such contacts. A further contributing factor was that over the past few years, no incidents or accidents in the Netherlands have occurred as a result of flange-back contacts. ProRail outsources the maintenance of the railway infrastructure to contractors. Maintenance is governed by contract regulations and provisions. The maintenance regulations imposed on contractors by ProRail were insufficient to prevent flange-back contacts.

The regulations demonstrated gaps which were not compensated for by suitable maintenance by the contractor. It is relevant in this connection to note that increasingly, maintenance is becoming focused on the objective of preventing train service disruptions. The wear to the switch parts did not result in any disruptions. The absence of such disruption problems meant that the contractor responsible for carrying out the maintenance was not alert to the deterioration of these parts, and failed to pay sufficient attention to this situation in its maintenance activities. This situation was exacerbated by the fact that six months prior to the train derailment,

a change in maintenance contractor had taken place, whereby the maintenance condition of the switch in question was not explicitly discussed. The Dutch Safety Board observed that the supervision by ProRail had no corrective effect. ProRail above all supervised the execution of maintenance work 'on paper', and itself had no knowledge of the actual condition of the switch. As a consequence, a heavily-used switch had become unsafe, without this situation being observed and dealt with.

The scenario that emerged in Hilversum was not foreseen in advance by any of the parties involved. The manufacturer of the point machine (Bombardier) and ProRail followed different principles, in respect of the load on the point machine. In its design process, Bombardier assumed that the point machine would only be exposed to normal operating forces, while ProRail did not prevent the occurrence of additional forces. The investigation revealed that the discrepancies in operating principles were not identified in time, as a result of insufficient information exchange on these issues between Bombardier and ProRail.

A number of technical problems with point machines of this type occurred several years previously. These could have revealed the failure mechanism if the parties had operated a broader perspective on learning. In tackling the previous problems, Bombardier and ProRail restricted themselves to eliminating the direct causes. As a consequence, the risk of fatigue due to flange-back contact was not adequately dealt with, despite indications that such a risk could occur. Furthermore, insufficient lessons were learned from several previous train accidents. A scenario comparable to that in Hilversum occurred in a train derailment in 2007, in Grayrigg (England). If the knowledge of this serious accident had been utilised, it would have been known that the hitting of switch blades (flange-back contacts) even over a short period of time can massively reduce the lifetime of switch parts and as such represents a safety risk that needs to be managed.

The safe usability of a switch is the result of cooperation between several parties; in this case, Bombardier, ProRail and the maintenance contractors. The degree to which these parties succeed in correctly harmonising the various processes in the chain is decisive for the safety of the overall system. The derailment in Hilversum revealed that on these aspects, there is room for improvement in current practice.

4.5 Comment and introduction or background to the investigations

(E.g. commenced but not followed through for specific reasons, issues or problems, resource issues etc. Some explanatory notes or comments if the IB feels it would be helpful to the reader to understand better the general or specific issues of context around investigations.)

Date of occurrence	Title of the investigation (Occurrence type, location)	Legal basis	Reason of non following or suspension of investigations	Who, why, when (decision)
NA				

Basis for investigation: i = According to the Safety Directive, ii = On national legal basis (covering possible areas excluded in Article 2, §2 of the Safety Directive), iii = Voluntary – other criteria.

4.6 Accidents and incidents investigated during last five years

Accidents investigated (year of occurrence)		2010	2011	2012	2013	2014	TOT
Serious accidents (Art 19, 1 + 2)	Train collision	1		2			3
	Train collision with an obstacle	1					1
	Train derailment					1	1
	Level-crossing accident						0
	Accident to person caused by RS in motion						0
	Fire in rolling stock						0
	Involving dangerous goods						0
Other accidents (Art 21.6)	Train collision						0
	Train collision with an obstacle						0
	Train derailment						0
	Level-crossing accident						0
	Accident to person caused by RS in motion						0
	Fire in rolling stock						0
	Involving dangerous goods						0
Incidents							0
TOTAL		2	0	2	0	1	5

5 RAIL RECOMMENDATIONS

5.1 Implementation of recommendations

In the past five years (2010-2014) five accidents occurred that were investigated by the Dutch Safety Board. Four of these accidents resulted in safety recommendations to be implemented by the parties involved. One report, about a train collision on the 'Rotterdam Maasvlakte' published in 2013, did not include recommendations.

In total 22 recommendations were made and 18 reactions were received. Some of the parties addressed in the recommendations regarding the derailment in Hilversum in 2014, still had time to react at the time of writing. About half of the recommendations were directed to the Dutch Ministry of Infrastructure and the Environment or its Inspectorate. The other half were directed to a variety of other organisations, including ProRail (the infrastructure manager of the Dutch national railway) and NS Reizigers (the principal passenger railway operating company in the Netherlands).

Year of Occurrence	Recommendations issued	Implementation status					
		Implemented		In progress		Not implemented	
		No.	%	No.	%	No.	%
2010	7	4	57%	2	29%	1	14%
2011	0						
2012	8	4	50%	2	25%	2 ²	25%
2013	0						
2014	7			7*	100%*		
Total	22	8	36%	11	50%	3	14%

**at the time of writing the annual report the response time of the recommendations issued in 2014 had not yet expired.*

² In 2012 one of the addressed parties did not respond to the recommendation issued by the Dutch Safety Board. We therefore assume that this recommendation has not been implemented.

5.2 Recommendations 2014

In the report *Train derailment Hilversum* (see summary in par. 3.4) the following recommendations were made.

To ProRail

1. Organise railway maintenance in such a way that the safety risks are explicitly and demonstrably managed, irrespective of other interests (such as availability and costs). Develop stimuli for maintenance contracts that offer contractors maximum encouragement in actively promoting railway safety. Monitor to ensure that contractors actually carry out the necessary maintenance and that this maintenance has the desired result.
2. Ensure that relevant design, user and maintenance information on all railway infrastructure parts is available to the various chain partners. Also encourage active knowledge sharing on (near) accidents and innovative developments (both nationally and internationally).
3. Tighten up regulations governing the (design, laying and inspection/maintenance of) switches in such a way that flange-back contacts are effectively countered. Incorporate the tightened regulations as mandatory in the (current and future) contractual agreements with the companies involved.

To ProRail and the maintenance contractors

4. Together, ensure an up-to-date and complete picture of the technical condition of the railway infrastructure. Use this information for adequate management (asset management) whereby – besides monitoring the functionality and service life – safety is demonstrably guaranteed.
5. Make sure when transferring a maintenance contract, that all relevant information about the technical condition and maintenance history of the railway infrastructure in question is transferred fully and in an accessible manner to the future contractor.

To Bombardier

6. When supplying railway parts (such as the EBI switch point machine), provide users with clear, safety-related user specifications. Monitor to ensure that these requirements are met in practice, and warn users if this is not the case.

To the State Secretary for Infrastructure and the Environment

7. Make sure that the safe usability of the railway infrastructure is granted sufficient weight in relation to other interests (such as capacity and punctuality). Integrate this vision in the current rethink of the policy framework for railway safety, and bring about a situation whereby ProRail and the maintenance contractors are able to successfully act in accordance with it.

Appendix: Reports 2005-2014

Rail safety investigation reports published by the Dutch Safety Board (2005 – 2014).

Published	Title
2014	Train derailment Hilversum
2013	Train collision Rotterdam Maasvlakte*
2012	Collision between intercity and sprinter, Amsterdam
2011	Metro fire and collision, Amsterdam
2011	Collision between two goods trains and a passenger train, Barendrecht
2011	Collision rail-grindingtrain, Stavoren
2010	Derailment of goods train near Amsterdam Muiderpoort station
2008	Derailment at Randstadrail
2006	Derailments Amsterdam Central Station
2005	Passing a red sign at Amsterdam Central Station

**in Dutch only.*