



**Statens haverikommission**  
Swedish Accident Investigation Board

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# NATIONAL INVESTIGATION BODY (NIB) ANNUAL REPORT 2010

Swedish Accident Investigation Board

SWEDEN



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# **1 INTRODUCTION**

## **1.1 Legislation**

The Swedish Accident Investigation Board is an independent body. Its activities are regulated by the Accident Investigations Act (1990:712), the Accident Investigations Ordinance (1990:717), and the Instructions for SHK Ordinance (2007:860).

## **1.2 Role and responsibility**

The Swedish Accident Investigation Board (SHK) was established on 1 July 1978 with the task of investigating serious accidents involving civil and military aircraft. A review of SHK's activities resulted in the expansion of its responsibilities to encompass all accidents and incidents in civil aviation as of 1 July 1982.

As of 1 July 1990 (bill 1989/90:104, rep. 1989/90:TU 23, parliamentary communication 1989/90:265), SHK's responsibilities were further increased, it being charged with investigating, from a safety point of view, serious accidents and incidents in shipping, rail traffic, and other activities.

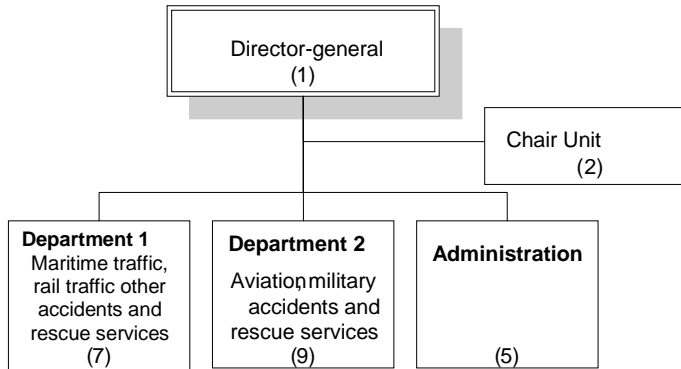
As of 1 April 2006 (prop. 2005/06:12 rep. 2005/06:TU7, parliamentary communication 2005/06:143), SHK's responsibilities were reduced somewhat. SHK now only investigates serious accidents and incidents involving aircraft with a total weight of no more than 2 250 kg which do not require an airworthiness certificate, and if such an investigation is important from a safety point of view. If the incident involves a Swedish aircraft but the incident occurs abroad, an investigation is only conducted if it is of special importance from a safety point of view and no investigation is carried out by the state in whose territory the incident occurred.

As of 1 July 2007 (prop. 2006/07:45, 2006/07:110, rep. 2006/07:TU13, parliamentary communication 2006/07:199), SHK's responsibilities in the field of rail traffic were increased. Accidents to be investigated include those caused by collisions between rail vehicles, by derailments, or by other events of significance to safety, resulting in at least one fatality or at least five serious injuries or resulting in extensive damage to rail vehicles, railway systems, property which was not being transported by the rail vehicle, or to the environment, and where the total costs of such damage are estimated at an amount equal to at least two million euro. In accordance with the new legislation, the Swedish Transport Agency no longer investigates accidents in the field of rail traffic and SHK cannot transfer the task of conducting an investigation to the Swedish Transport Agency.

The purpose of SHK's investigations is to

- clarify the course and cause of an event as well as other damage and effects.
- provide grounds for decisions regarding measures intended to prevent similar incidents from occurring or to limit the effects of such incidents.
- provide material for an assessment of the actions of rescue services concerning the event and, if necessary, for improvements to the rescue services.

### 1.3 Organisation



*SHK's organisation (number of employees).*

## 2 THE INVESTIGATION PROCESS

### 2.1 Cases to be investigated

SHK has been investigating accidents and serious incidents in rail traffic since 1990. The Swedish Transport Agency is the safety and supervisory authority.

SHK investigates events that have occurred in Sweden.

An accident involving rail traffic (railway, subway, or tramway operations) caused by a collision between rail vehicles, derailment, or other event of significance to safety, is to be investigated if

- there was at least one fatality or at least five serious injuries,
- rail vehicles, railway systems, property that was not being transported by a rail vehicle, or the environment sustained damages of at least two million euro.

An incident is to be investigated if

- it involved a serious risk of an accident,
- it indicates serious faults in rail vehicles or railway systems, etc., or
- it indicates other significant shortcomings with regard to safety.

### 2.2 Authorities cooperating in the investigations

A coordinator from concerned supervisory authorities regularly monitors the investigation.

## 2.3 The investigation

As far as possible, SHK must attempt to clarify the course and cause of events as well as other damages and effects. SHK is also charged with providing material for an assessment of rescue service operations after an accident. If necessary, SHK must also make recommendations to the respective supervisory or safety authority on which it may base its decisions on appropriate measures.

SHK's role does not include commenting on matters of liability or damage claims. The investigations are solely aimed at improving safety.

In accordance with current regulations, SHK investigative teams must always consist of at least one chairperson and one chief investigator.

Considering the wide range of events that may be subject to an investigation, SHK occasionally needs to hire external experts who, with their respective expertise, work for the investigation board by gathering facts and performing analyses. SHK has contracts with experts in various fields for the most commonly occurring investigations. Those appointed as experts, regardless of where they are employed, only represent themselves and contribute their expertise in their capacity as experts.

At the end of the fact-finding phase, SHK convenes an incident meeting at which all the facts are presented. All those affected by the event, the interested parties, are invited to attend this meeting. Representatives of interest groups and trade associations are also usually invited.

## 3 INVESTIGATIONS

### 3.1 Investigations completed in 2010

Type of accident	Number of accidents	Number of victims		Damages in € (estimate)	Trend in relation to previous year (increase in %)
		Fatalities	Seriously injured		
Collision					
Derailment	1			430 000	
Fire	2			No information	
Incident	1			0	

### 3.2 Investigations completed and begun 2007-2010

Basis for investigation:

i = Railway Safety Directive,

ii = National legislation (possible areas that are excluded in Art. 2, §2),

iii = Voluntary investigations – other criteria (national legislation without reference in the Railway Safety Directive).

#### Investigations completed in 2007

Date of event	Title	Legal basis	Completed
28/02/2005	Near-collision of SJ trains 186 and 181 in Gårdsjö, Ö county, 28/02/2005	i	15/03/2007
28/02/2005	Accident with train 5525 in Ledsgård, N county, 28/02//2005	i	02/07/2007

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**Investigations completed in 2008**

<b>Date of event</b>	<b>Title</b>	<b>Legal basis</b>	<b>Completed</b>
29/03/2006	Collision between passenger train 8789 and derailed freight wagon of cargo train 49302 Linköping-Vikingstad, E county, 29/03/2006	i	21/07/2008
19/10/2007	Near-collision of trains 67373 and 3743 between Stenungsund and Ytterby, O county, 19/10/2007	i	08/10/2008
13/12/2007	Near-collision at level crossing between lorry and passenger train at Esplanaden in Sundbyberg, AB county, 13/12/2007	i	19/12/2008
16/01/2008	Near-collision with non-permitted movement on the Alby - Ångebyn section, Y county, on 16 January 2008	i	18/12/2008

**Investigations completed in 2009**

<b>Date of event</b>	<b>Title</b>	<b>Legal basis</b>	<b>Completed</b>
07/08/2007	Near-collision of trains 90161 and 52517 at Stockholm Central Station, AB county, on 7 August 2007	i	17/03/2009
26/09/2006	Accident during shunting in Hallsberg, T-county, on 26 September 2006	iii	24/03/2009
11/04/2008	Near-collision at level crossing between lorry with trailer and passenger train 3763 on the Stora Höga - Kode section, O county, on 11 April 2008	i	31/03/2009
09/06/2008	Near-collision between a carriage being shunted for transport and train 3539 at Bryngenäs station, O county, on 9 June 2008	i	13/05/2009
09/06/2008	Near-collision of passenger train 7343 and freight train 9450 on the Borås - Värnamo section, O county, 09/06/2008	i	09/06/2009
19/01/2006	Near-collision of train 2510 in Västerhaninge, AB county, on 19 January 2006	i	25/06/2009
17/06/2008	Near-collision of train 7081 and carriage 76910 being shunted at the Klockarbäcken loop on the Umeå - Brännland section, AC county, on 17 June 2008	i	06/10/2009
29/07/2008	Near-collision of a carriage being shunted for transport and train 10093 at Torneträsk station, Norrbotten county, on 29 July 2008	i	03/12/2009
21/12/2008	Derailment of carriage 73664 being shunted at Kimstads station, Östergötland county, on 21 December 2008	i	15/12/2009
16/05/2005	Fire in subway train at Rinkeby station, AB county, 16 May 2005	i	22/12/2009



26/07/2007	Derailment of train 412 at Gnesta station, Södermanland county, 26 July 2007	i	22/12/2009
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### Investigations completed in 2010

Date of event	Title	Legal basis	Completed
20/07/2007	Fire in tamping machine SPR 3208B, on the Bäckeфорs - Ed section, O county, 20 July 2007	i	27/01/2010
24/11/2007	Fire in rail maintenance vehicle DSS 1866B, in Grötingen, Z county, 24 November 2007	i	31/03/2010
05/08/2007	Near-collision of passenger train 219 and a shunting movement at Stockholm östra, AB county, 5 August 2007	i	25/10/2010
04/06/2008	Accident, derailment of train 814 on the Rotebro - Upplands Väsby section, AB county, 4 June 2008	i	21/12/2010

### 3.3 Investigations begun in 2009 - 2010 but not completed

#### Investigations begun in 2009

Date of event	Title	Legal basis
02/05/2009	Non-permitted movement in Östavall	i

#### Investigations begun in 2010

Date of event	Title	Legal basis
01/02/2010	Accident while laying track in Lingham	i
13/03/2010	Near-collision, Skutskär south	i
04/06/2010	Impact accident Karlberg	i
12/09/2010	Collision, X2000 and excavator-loader, Kimstad	i
15/09/2010	Level crossing accident, Stenungssund	iii
17/11/2010	Precursor to accident to person, Skavstaby	i

### 3.5 Summaries of investigations completed in 2010



#### **RJ 2010:01**

#### **Fire in tamping machine SPR 3208B, on the Bäckefors - Ed section, O county, 20 July 2007**

On 20 July 2007 at 11:10, a fire broke out on a tamping machine on the section between Bäckefors and Ed.

A combination of machinery vehicles was being transported as a short haul train between Trollhättan and Kornsjö to be further transported to Norway.

The vehicle combination consisted of a PLB 4080 plough, a DSS 4604 dynamic track stabiliser and an SPR 3208B tamping machine that were interconnected and each had an individual driver.

Smoke was discovered coming from the tamping machine on an uphill gradient four kilometres from Bäckefors. The short haul train stopped at Tingvalla, approximately two kilometres north of Bäckefors, and flames shot out of the tamping machine while the personnel were running towards it to investigate.

At the time, the alarm-acknowledged lamp on the tamping machine was illuminated. The fault was reported but not addressed and was not included in the machinery records despite the fact that the fault had existed for several years. There was no fire detection alarm on the machine.

A spraybar had been replaced in the engine a few weeks prior to the event. The replacement had been carried out in the track environment by machine operators in accordance with Scania's instructions except that the nut had not been tightened to the required torque.

There is nothing to prevent the machinery personnel themselves from performing maintenance and repairs. Furthermore, there is no follow-up routine through which repairs or maintenance are examined or reviewed by the head mechanic of the Swedish Rail Administration.

#### **RJ 2010:02**

#### **Fire on rail maintenance vehicle DSS 1866B, in Grötingen, Z county, 24 November 2007**



On 24 November 2007 at 14:35, a fire broke out on a rail maintenance vehicle near Grötingen station.

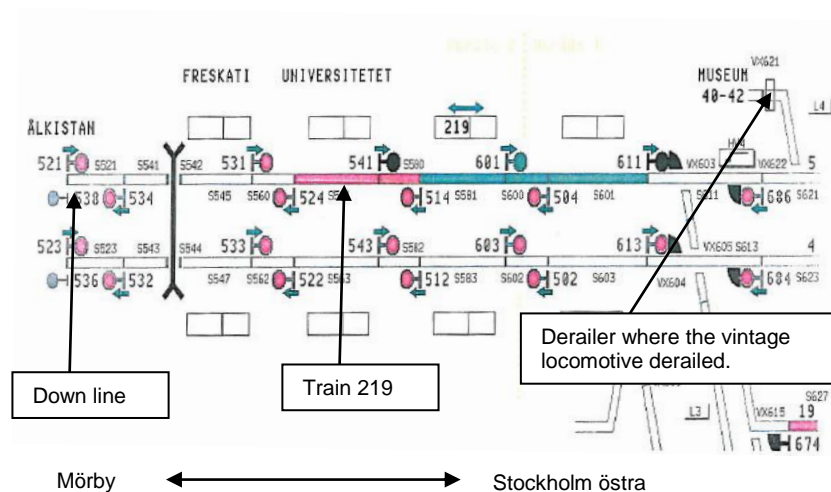
Maintenance vehicle DSS 1866B was being transported inactive in a freight train from Vännäs to Ånge and departed at 10:00. After 250 km, near the Grötingen station area, the train driver saw smoke coming from one of the wagons near the back of the train. The driver found that the smoke was coming from DSS 1866B.

The driver drove the train to Grötingen station, parked, and waited for the emergency services. The fire spread very quickly with high flames which breached the engine compartment and burnt off the overhead contact line.

At that time, the machine had an inoperative shift fork. The link arms had been disconnected from the gearbox clamps to enable transport of the vehicle.

Earlier, the machine's personnel had worked on its electrical wiring.

There is nothing to prevent the machinery personnel themselves from performing maintenance and repairs. Furthermore, there is no follow-up routine through which repairs or maintenance are examined or controlled by the head mechanic of the Swedish Rail Administration.



**RJ 2010:03**

**Near-collision of passenger train 219 and a shunting movement at Stockholm östra, AB county, 5 August 2007**

On Sunday, 5 August 2007, a near-collision occurred at Stockholm östra (east) between train 219 and a derailed shunting movement.

A vintage locomotive was to be shunted (switched) from one siding to another siding at the museum at Stockholm östra. The shunting foreman perceived a down derailer as permission to start the shunting and showed the hand signal "forward" to the driver of the vintage locomotive, who started the movement. When the locomotive passed the derailer, it folded up under the locomotive, the locomotive derailed, and was in a position which meant that adjacent tracks were not free from obstacles. At the same time, train 219 was approaching Stockholm östra and had a "go" signal past the spot where the locomotive had derailed. Because there were no connections in a track circuit, it was possible for train 219 to receive the "go" signal even though the derailed locomotive meant that the line was not free from obstacles. The shunting foreman and locomotive driver realised that train 219 would pass the spot and took steps to stop it, which they succeeded in doing.

The direct cause of the event was that shunting to the main line began without oral starting permission from the dispatcher.

An underlying cause for the event developing into a near-collision was that the derailer could move to the on position and the interlocking route could be used even though the track section over the derailer and towards the point was occupied by a rail vehicle. This was possible because the track circuit for the section was not connected to the signalling system following a rebuild. Another underlying cause of the incident was that the traffic safety instructions did not contain rules on how an oral starting permission should be given.

SHK has not been able to determine why the track circuit was not connected because the rebuild documentation is missing from the archives of the Stockholm public transport company (SL). However, the fact that the system was put into service without the track circuit being connected clearly shows that SL, at the time, lacked a sufficiently extensive system to ensure that systems put into service functioned as intended. That the fault was not discovered before the event occurred indicates that the inspection and follow-up system was not comprehensive.

#### **RJ 2010:04**

#### **Accident, derailment of train 814 on the Rotebro - Upplands Väsby section, AB county, 4 June 2008**



On Wednesday, 4 June 2008, at 08:53, the first axle of the forward locomotive on passenger train 814 derailed on the section between Rotebro and Upplands Väsby. The trainset consisted of 10 carriages with a locomotive at both the front and rear.

The trainset had travelled several times that day on the route between Stockholm and Uppsala and the previous driver had noted a wheel flat on the locomotive. The driver inspected the wheels, both in Uppsala and Stockholm, and found no defects. The driver had also reported the matter to operational management.

When the driver of train 814 was driving from Stockholm to Uppsala, he noticed vibrations and knocking noises from the locomotive. The driver performed a deceleration test in Solna and the knocking sound then changed to that of "normal" wheel knocking. As the train passed Rotebro, the locomotive began to shake and vibrate heavily, and the driver then heard a loud bang under the locomotive followed a few seconds later by another loud bang. The driver applied the emergency brakes and the train stopped after approximately 1 109 metres.

The immediate cause of the accident was that the wheel flange on the first axle's left wheel burst due to fatigue and split off, which caused the locomotive to derail. SHK has not been able to establish what initiated the fatigue fracture.

The underlying cause of the wheel flange splitting off was that the device to keep the flange in place, should it burst, did not function as intended.

Another underlying cause of the wheel flange burst was a lack of experience-feedback from previous events with broken wheel flanges. Had experience-feedback been more systematic and led to analysis of underlying causes, measures could have been taken in

the form of more exhaustive wheel flat inspections. This could have reduced the likelihood of wheel flanges being allowed to run with fractures that grew unchecked.

Another underlying cause of the derailment was that operations support did not have sufficient instructions and procedures on how they should respond to reports of serious wheel flats.

### 3.6 Comments and presentation or reason for the investigations

### 3.7 Accidents and incidents investigated in the last five years

#### Rail traffic investigations 2007-2010

Investigation of accidents / incidents		2007	2008	2009	2010	-	TOT
Serious accidents (Art 19, 1 + 2)	Collision				1		1
	Collision with an obstacle		1				1
	Derailment	1	1				2
	Level crossing accident				1		1
	Accident to persons due to moving train				2		2
	Fire in rolling stock						
	Involving dangerous goods						
	Fire	2					2
	Incident	4	6	1	2		13
<b>TOTAL</b>		<b>7</b>	<b>8</b>	<b>1</b>	<b>6</b>		<b>22</b>

## 4 RECOMMENDATIONS

### 4.1 Overview and presentation of recommendations

### 4.2 Recommendations 2010

See annexes 1-4.



<b>Date and time:</b>	20/07/2007		
<b>Location:</b>	Bäckefors - Ed		
<b>Type of event:</b>	Fire in tamping machine		
<b>Type of train and train no.:</b>	SPR 3208B, DSS 4604, PLB 4080 (Swedish Rail Administration Production Machinery)		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Personnel:</b>	3	
	<b>Passengers:</b>	0	
<b>Number of fatalities:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of slightly injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	Total damage to SPR 3208B		
<b>Damage to railway infrastructure:</b>	Burnt off overhead contact line		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	27/01/2010		
<b>Recommendation RJ 2010:01 R1</b>	The Swedish Transport Agency is recommended to review the need for certification of maintenance and repair personnel.		
<b>Recommendation RJ 2010:01 R2</b>	The Swedish Transport Agency is recommended to ascertain how Infranord ensures that documentation is produced for locomotive function and drawing follow-ups in the event of rebuilds or other changes.		
<b>Recommendation RJ 2010:01 R3</b>	The Swedish Transport Agency is recommended to ensure that Infranord reviews how locomotive function is to be assured in their own rebuilds, extensions, or when something is connected to a locomotive.		
<b>Recommendation RJ 2010:01 R4</b>	The Swedish Transport Agency is recommended to ensure that Infranord is sure how repair records should be maintained for annual follow-up, locomotive approval, and inspection.		
<b>Recommendation RJ 2010:01 R5</b>	The Swedish Transport Agency is recommended to ensure that Infranord reviews the safety management system for personnel training and procedures for the handover of machines between personnel.		





<b>Date and time:</b>	24/11/2007		
<b>Location:</b>	Gröttingen		
<b>Type of event:</b>	Fire in rail maintenance vehicle		
<b>Type of train and train no.:</b>	DSS 1866B (Swedish Rail Administration Production Machinery)		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Personnel:</b>	3	
	<b>Passengers:</b>	0	
<b>Number of fatalities:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of slightly injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	Total damage		
<b>Damage to railway infrastructure:</b>	Burnt off overhead contact line		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	31/03/2010		
<b>Recommendation RJ 2010:01 R1</b>	The Swedish Transport Agency is recommended to review the need for certification of maintenance and repair personnel.		
<b>Recommendation RJ 2010:02 R2</b>	The Swedish Transport Agency is recommended to ascertain how Infranord ensures that documentation is produced for locomotive function and drawing follow-ups in the event of rebuilds or other changes.		
<b>Recommendation RJ 2010:03 R3</b>	The Swedish Transport Agency is recommended to ensure that Infranord reviews how locomotive function is to be assured in their own rebuilds, extensions, or when something is connected to a locomotive.		
<b>Recommendation RJ 2010:04 R4</b>	The Swedish Transport Agency is recommended to ensure that Infranord is sure how repair records should be maintained for annual follow-up, locomotive approval, and inspection.		
<b>Recommendation RJ 2010:05 R5</b>	The Swedish Transport Agency is recommended to ensure that Infranord reviews the safety management system for personnel training and procedures for the handover of machines between personnel.		

See Annex 1 for the Swedish Transport Agency's reply to the recommendations.



<b>Date and time:</b>	05/08/2007		
<b>Location:</b>	Stockholm östra station		
<b>Type of event:</b>	Near-collision		
<b>Type of train and train no.:</b>	Multiple unit X10p, Locomotive X4P 37		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Personnel:</b>	3	
	<b>Passengers:</b>	no information	
<b>Number of fatalities:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of slightly injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	Minor damage to locomotive X4P 37		
<b>Damage to railway infrastructure:</b>	Collision with derailer		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	25/10/2010		
<b>Recommendation RJ 2010:03 R1</b>	The Swedish Transport Agency is recommended to check, in conjunction with authorisation and auditing of the infrastructure manager, that the safety management system ensures that safety-critical equipment meets the requirements for performing operations safely.		
<b>Recommendation RJ 2010:03 R2</b>	The Swedish Transport Agency is recommended to carry out a compliance audit of requirements on archiving documentation of personnel competence and completed inspections.		
<b>Recommendation RJ 2010:03 R3</b>	The Swedish Transport Agency is recommended to investigate the feasibility of establishing a qualification registry (similar to the registry of driver licenses) for all personnel with duties of importance to traffic safety in order to facilitate transition between different operators.		
<b>Recommendation RJ 2010:03 R4</b>	The Swedish Transport Agency is recommended to check, in conjunction with the approval of traffic safety instructions, that there are clear rules for conducting safety-critical communications in order to avoid misunderstandings.		



<b>Date and time:</b>	04/06/2008		
<b>Location:</b>	Rotebro - Upplands Väsby		
<b>Type of event:</b>	Derailment		
<b>Type of train and train no.:</b>	Traction vehicles: electric locomotives Rc6 1348 and Rc6 1372; carriages: A7M 5517, B10 5547, B7FA 5330, B7 5399, B10 5553, BF4 5465, B 10 5541, B10 5558, B10 5532, A7 FA 5254		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Personnel:</b>	2	
	<b>Passengers:</b>	no information	
<b>Number of fatalities:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of slightly injured:</b>	<b>Personnel:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	Damage to the head locomotive		
<b>Damage to railway infrastructure:</b>	Extensive damage to the superstructure including sleepers, fortification material, rails, and insulation		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	20/12/2010		
<b>Recommendation RJ 2010:04 R1</b>	The Swedish Transport Agency is recommended to explore the possibility of ensuring the implementation of a comprehensive study on the risks of material fatigue on wheel flanges caused by long runs or high speeds.		
<b>Recommendation RJ 2010:04 R2</b>	The Swedish Transport Agency is recommended to ensure that railway undertakings, during periodic or emergency maintenance, have procedures to ensure that wheels are adequately inspected so that wheels with incipient fractures are prevented from leaving the workshop without being attended to.		
<b>Recommendation RJ 2010:04 R3</b>	The Swedish Transport Agency is recommended to ensure that railway undertakings have procedures that help personnel take the correct action when faults are reported that may have serious safety implications.		