



**Statens haverikommission**  
Swedish Accident Investigation Board

**NIB ANNUAL REPORT 2009**

**Swedish Accident Investigation Board**

**SWEDEN**





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## **1 INTRODUCTION**

### **1.1 Laws**

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

### **1.2 Role and responsibility**

The 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 SHK's 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, circ. 1989/90:265), SHK's responsibilities were further increased. SHK was then given the additional responsibility to investigate, from a safety point of view, serious accidents and incidents in shipping, rail traffic, and other activities.

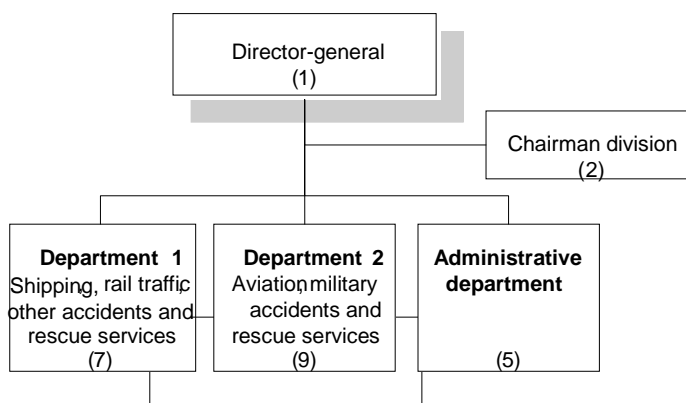
As of 1 April 2006 (bill 2005/06:12 rep. 2005/06:TU7, circ. 2005/06:143) SHK's responsibilities were somewhat restricted. SHK is only to investigate serious accidents and near collision incidents involving aircraft with a total weight of no more than 2 250 kg, which do not require an airworthiness certificate,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

On 1 July 2007 (bill 2006/07:45, 2006/07:110, rep. 2006/07:TU13, circ. 2006/07:199) SHK's responsibilities in the field of rail traffic were increased. Such accidents are to be investigated if they were caused either by collisions between rail vehicles, by derailments, or by other incidents 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 is not transported by rail vehicles, or to the environment, with the total costs of such damage estimated at an amount equal to at least two million Euro. The Swedish Transport Agency no longer investigates accidents in the field of rail traffic in accordance with the new legislation 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 of events and causes of the incident as well as other damages and effects.
- provide grounds for decisions regarding measures aimed at preventing similar incidents from occurring or at limiting the effects of such incidents.
- provide material for an assessment of rescue services actions involved in the incident and, if necessary, for improvements of the rescue services.

### 1.3 Organisation



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

## **2 THE INVESTIGATION PROCESS**

### **2.1 Matters under investigation**

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

SHK investigates incidents which have occurred in Sweden.

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

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

A near collision incident shall be investigated if:

- it involved a serious risk for 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 regulatory authorities regularly accompanies the investigation.

### **2.3 Investigation work**

SHK shall, as far as possible, clarify the course of events and the cause of the incident as well as other damages and effects. SHK's mandate also includes providing material for an assessment of the operations by the rescue services at an accident. If necessary, SHK shall provide material and recommendations to the respective regulatory or safety authority for decisions on suitable measures.

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

During an investigation, SHK, in accordance with current regulations, shall always consist of at least one chairperson and one chief investigator.

Considering the wide range of incidents 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. For the most commonly occurring investigations, SHK has agreements with experts in various fields. For those who are appointed as experts, regardless of where they are employed, they only represent themselves and contribute their expertise in their role.

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 incident, the interested parties, are invited to participate in this meeting. Even representatives of interest groups and trade associations are usually invited.

### 3 INVESTIGATIONS

#### 3.1 Completed investigations 2009

Type of accident	Number of accidents	Number of victims		Damages in € (estimate)	Trend in relation to previous year (increase in %)
		Fatalities	Seriously injured		
Collision	1			460 000	
Derailment	2			90 000	
Fire	1				
Incident	7				

#### 3.2 Investigations begun and completed 2007-2009

##### Investigations completed in 2007

Date of incident	Title	Legal basis	Completed
28-02-2005	Near collision incident between SJ trains 186 and 181 in Gårdsjö, O 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

##### Investigations completed in 2008

Date of incident	Title	Legal basis	Completed
29-03-2006	Collision between passenger train 8789 and derailed cargo car of cargo train 49302 Linköping-Vikingstad, E county, 29-03-2006	i	21-07-2008
19-10-2007	Near collision incident 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 pst at Esplanaden in Sundbyberg, AB county, 13-12-2007	i	19-12-2008
16-01-2008	Near collision incident with non-permitted movement on the Alby-Ångebyn line, Y county, on January 16 2008	i	18-12-2008



**Investigations completed in 2009**

<b>Date of incident</b>	<b>Title</b>	<b>Legal basis</b>	<b>Completed</b>
07-08-2007	Near collision incident between 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 incident at road crossing between lorry with trailer and passenger train 3763 on the Stora Höga-Kode line, O county, on 11 April 2008	i	31-03-2009
09-06-2008	Near collision incident 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 incident between passenger train 7343 and freight train 9450 on the Borås-Värnamo line, O county, 09-06-2008	i	09-06-2009
19-01-2006	Near collision incident with train 2510 in Västerhaninge, AB county, on 19 January 2006	i	25-06-2009
17-06-2008	Near collision incident between train 7081 and a carriage 76910 being shunted at Klockarbäcken on the Umeå – Brännland line, AC county, on 17 June 2008	i	06-10-2009
29-07-2008	Near collision incident between 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 a carriage 73664 being shunted at Kimstads station, Östergötland county, on 21 December 2008	i	15-12-2009
16-05-2005	Fire in a subway train at Rinkeby station, AB county, on 16 May 2005	i	22-12-2009
26-07-2007	Derailment of train 412 at Gnesta station, Södermanland county, on 26 July 2007	i	22-12-2009

**Basis for investigation:** i = in accordance with railway safety directives, ii = in accordance with national legislation (possible areas that are excluded in Art. 2, Paragraph 2 i), iii = voluntary investigations – other criteria (national laws without reference to the railway safety directive).

### **3.3 Investigations begun in 2007-2009 but not completed**

#### **Investigations begun in 2007**

<b>Date of incident</b>	<b>Title</b>	<b>Legal basis</b>
05-08-2007	Incident with train 219 at Stockholm Öst AB county, 05-08-2007	i

#### **Investigations begun in 2008**

<b>Date of incident</b>	<b>Title</b>	<b>Legal basis</b>
05-06-2008	Train derailment on the Rotebro-Uppland Väsby line 04-06-2008	i

#### **Investigations begun in 2009**

<b>Date of incident</b>	<b>Title</b>	<b>Legal basis</b>
02-05-2009	Non-permitted movement in Östavall	i

**Reason for investigation:** **i** = in accordance with railway safety directives, **ii** = in accordance with national legislation (possible areas that are excluded in Art. 2, Paragraph 2 i), **iii** = voluntary investigations – other criteria (national laws without reference to the railway safety directive).

### 3.5 Summaries of completed investigations in 2009



#### **RJ 2009:01**

Near collision incident between trains 90161 and 52517 at Stockholm Central Station, AB county, on 7 August 2007

On Tuesday 7 August 2007, a near collision incident occurred between the work trains 90161 and 52517 at Stockholm Central when train 90161 passed signal Cst 566 indicating stop. Train 52517 was travelling from Sundbyberg to Stockholm Central on track D1 at the same time as train 90161 was travelling in the opposite direction from Stockholm Central to Hagalund on track C1.

Train 52517 had “go” signals towards Stockholm Central. At Norra Bantorget ("Northern Railway Square") the tracks of the two trains crossed, meaning that train 90161 had to stop at signal Cst 566 until train 90161 had passed the position. The previous signal, Cst 456, gave an advance signal to train 90161 that the next signal, Cst 566, was indicating stop.

The confusing and information rich environment, combined with the driver's inexperience of driving on track C1, led to signals 456 and 566 going unnoticed and the stop signal 566 being passed by. In addition, track C1 was not equipped with ATC, meaning that the driver did not receive any information in the driver's cabin that signal 566 was indicating stop. As track C1 was not equipped with ATC, the train's ATC equipment was not activated when signal 566 was about to be passed.

The two drivers noticed that they were about to cross each others' tracks and stopped the trains about 22 metres apart.



#### **RJ 2009:02**

Accident during shunting in Hallsberg, T-county, on 26 September 2006

On 26 September 2006, a depot driver was moving a locomotive at the storage tracks for locomotives in Hallsberg. After a first unsuccessful attempt to move the locomotive, the depot driver got out to investigate why the locomotive would not move. When the depot driver was outside the locomotive, it began to move. The speed increased and the locomotive stopped after having collided with four other locomotives that were parked at the end of the track.

When the depot driver left the locomotive, all controls were in the drive position and the brake pressure sensor, whose function it is to prevent the locomotive from running with the brake engaged, was bypassed. When the locomotive's devices received enough air pressure so that the electrical circuits for propulsion could be switched on, the locomotive was set in motion. The locomotive's thrust exceeds its braking capacity, which is why the locomotive can move even with the brakes fully applied.

In order for a locomotive to be driven, its driver must engage a safety device. If it is not engaged, it will switch off the propulsion and apply the emergency brakes. The safety device on the locomotive model in question had been modified in the early 1980s, with the result that the propulsion was not switched off if the safety device was disengaged, but only caused the emergency brakes to be applied. At the time it was considered sufficient, as the brake pressure sensor would switch off the propulsion.

Rescue services were called late to the scene of the accident and were not on site until approximately 35 minutes after it had occurred. The Swedish Rail Administration's electrical work supervisor arrived approximately 40 minutes after the accident had occurred. The emergency call was held up at the Swedish Rail Administration's traffic management which, at first, did not realise how serious the accident was. When it became clear that help might be needed there was intense pressure on the dispatcher, which may have further have delayed the sounding of the alarm.

The investigation concludes that it took a long time before the emergency workers were on site.



**RJ 2009:03**

Level-crossing accident between a lorry with a trailer and passenger train 3763 on the Stora Höga-Kode line, O county, on 11 April 2008.

At 20:05 on Friday 11 April 2009, a near collision incident occurred at a level-crossing in Skäggstorp between Stora Höga and Kode involving a lorry with trailer and passenger train 3763. The lorry was on its way up from Gothenburg to Skäggstorp to load an excavator at a housing construction site in a residential area on the other side of the tracks along road 574. At the rail crossing, the truck driver inspected the crossing and elevated the trailer in order to reduce the risk of getting stuck. Despite this, the truck got stuck on the track, shortly after the sound and light signal was activated, and the barriers came down.

At the same time, passenger train 3763 was travelling towards Gothenburg from Uddevalla. The driver had received notice from the advance level-crossing signal that the next level-crossing signal was indicating "movement allowed"<sup>1</sup> and proceeded at a speed of approx. 110km/hr. On the straight track before the level-crossing, the driver discerned something on the tracks. The driver engaged the emergency brakes and ran to the rear of the train, which came to a halt approx. 50m from the lorry and trailer.

The signalling equipment had functioned as intended. The reconstruction of the railway embankment in 1995 may have affected the top profile of the road and reduced the passing clearance at the rail crossing, thereby increasing the risk of getting stuck.

The residential area has grown over the years, giving rise to the development of permanent housing amongst the recreational cottages. This has resulted in increased traffic of heavy vehicles with lower clearances than the types of transport the rail crossing was designed for.

Currently, there is no one party with overall responsibility and coordination between the municipality, the Swedish National Road Administration and the Swedish Rail Administration with regard to issues that have consequences for the infrastructure around rail crossings.

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<sup>1</sup> If the level-crossing signal indicates "movement allowed" it means that the road is closed to traffic.



#### **Report RJ 2009:04**

Near collision incident between a carriage being shunted for transport and train 3539 at Bryngenäs station, Ö county, on 9 June 2008.

On Monday 9 June 2008, a ballast plough was to be transported from Mölndals Nedre station to Herrljunga via Gothenburg. The transport was dispatched as a carriage being shunted for transport and the plough was transported under its own steam. The ballast plough was not equipped with a train protection system of type ATC (Automatic Train Control). The ballast plough driver was also the supervisor for the transport.

When the ballast plough approached Bryngenäs station, it went unnoticed that the advance signal indicated that the next signal, the approach signal, indicated stop. Only just before the ballast plough passed the approach signal, was the stop signal noticed and the brakes applied on the ballast plough. The ballast plough passed the approach signal, drove past one switch and stopped at the next switch.

A commuter train (3539), on its way from Alingsås to Gothenburg, approached from the other direction on the same track at the same time. The train had been waiting at its approach signal and entered the station after the signal had switched to go. The train's conductor noticed that a vehicle was coming towards him, and because the train was going slowly, the train could be stopped immediately and a collision was avoided.



#### **Report RJ 2009:05**

Near collision incident between trains 7343 and 9450 on the Hillared – Limmared line, Ö county, on 9 June 2008.

On Monday 9 June 2008, there was a near collision incident between passenger train 7343 and freight train 9450 on the Hillared – Limmared line.

The line was managed by a remote train dispatcher at the control centre in Gothenburg. The remote train dispatcher felt there were many disruptions and a lot to do during his shift. The train dispatcher was concentrated on trying to get the trains through Lekarekulle, where there was a switch malfunction.

Freight train 9450 left Värnamo for Borås 29 minutes ahead of schedule and entered the train dispatcher's monitoring zone, which went unnoticed by the train dispatcher. Freight train 9450 got a go-ahead for the whole stretch up to Hillared, as the "automatic mode" was switched on at the stations in between. Because the automatic mode was switched on, the train dispatcher did not need to take any measures to get the train to the destination.



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Passenger train 7343, travelling in the opposite direction of freight train 9450, did not get a go-ahead from Hillared to Limmared and contacted the remote train dispatcher to find out why. The train dispatcher checked the line but did not notice any obstacles, after which the train dispatcher gave approval for passenger train 7343 to pass the exit block signal in Hillared towards Limmared showing “stop”. After that the train dispatcher once again turned his attention to working on the switch malfunction in Lekarekulle.

At the same time as passenger train 7343 passed the exit block signal, freight train 9450 neared the approach signal in Hillared. When both trains exited a curve, the drivers saw each other's trains and stopped approx. 238 metres from each other. One of the drivers contacted the train dispatcher, who only then became aware of the near collision incident.



#### **Report RJ 2009:06**

Near collision incident with train 2510 in Västerhaninge, AB county, on 19 January 2006.

On Thursday 19 January 2006 at 06:52, passenger train 2510, consisting of four units, left Västerhaninge for Stockholm. When the driver checked the brakes, the main switches switched off and the emergency braking sequence initiated. After troubleshooting, the driver returned the train to Västerhaninge. The last carriage remained where the train had stopped, without the driver knowing. After the brakes on the carriage had self-released, it rolled in to Västerhaninge and came to a stop just behind the train's other carriages.

The day before, an unsuccessful attempt had been made at disengaging the two units where the coupler came loose. The uncoupling cylinder had been pressurised, but the couplers could not be made to separate.

When test braking was performed on the morning of 19 January, the train had a unit of type X10 at the rear of the train. The X10 is also equipped with an electric drag brake which braked a little earlier than the other carriages, causing a jolt in the train which thus decoupled and in turn caused the main switch to cut and the emergency braking sequence to be initiated. It was cold at the time this may have contributed to the sluggishness of the coupler's mechanical system.

Before the train was brought back in to Västerhaninge, the driver put an end carriage between the middle units, meaning that the two final units could no longer be controlled by the operating circuit. This also meant that the driver could no longer check whether he was able to activate all the brakes on the train and was thus unable to detect that a carriage had been decoupled.

After a little more than five minutes, the brakes on the decoupled carriage disengaged automatically. The fact that this happened so quickly was due to defective check valves which made the brake cylinders leak. The brake cylinders were in a defective condition because of insufficient maintenance and a lack of checks to detect leaks in the brake cylinder circuit.



#### **Rapport RJ 2009:07**

Near collision incident between train 7081 and a carriage 76910 being shunted at Klockarbäcken on the Umeå – Brännland line, AC county, on 17 June 2008

On Tuesday 17 June 2008, a near collision incident occurred between passenger train 7081 and carriage 76910 being shunted at Klockarbäcken, which is located on the line between Umeå and Brännland.

The line was managed by a remote train dispatcher at the control centre in Boden. Soon after the train dispatcher had begun his shift, the technical telephone support, ASTA, went down and the train dispatcher experienced the work situation as stressful.

The supervisor for carriage 76910 being shunted called from Umeå and wanted to go to Klockarbäcken and do the switch. During the conversation there was no coordination of the tasks for shunting the carriage and the train dispatcher and supervisor talked over each about which type of carriage should be shunted and on which line. The train dispatcher gave start approval for the carriage being shunted for transport from Umeå to Klockarbäcken and set the exit block signal in Umeå to "go." The carriage being shunted then drove to Brännland to switch.

The train dispatcher was then contacted by the driver of passenger train 7081, which was waiting at Brännland station at signal 2/5 which was showing "stop." The train dispatcher unsuccessfully tried to set signals 2/5 and the exit block to "go." The train dispatcher believed there was something wrong with the signalling system and gave permission for train 7081 to proceed past signal 2/5 and the exit block signal, both of which indicated "stop." The driver repeated the permission and passed the signals.

When passenger train 7081 arrived at the Klockarbäcken stop the driver saw that the switch was in the wrong position and he braked the train, which stopped on the switch. The supervisor had meanwhile just set the switch to send a shunting train onto the passing track at Klockarbäcken and was approaching the switch. The supervisor noticed the passenger train and brought the shunting train to a stop, avoiding a collision with the passenger train.

When the driver of passenger train 7081 saw the switch was in the wrong position, the driver realised there was switching occurring at Klockarbäcken and called the train dispatcher to alert him of the incident.

## **Rapport RJ 2009:08**

Near collision incident between a carriage being shunted for transport and train 10093 at Torneträsk station, Norrbotten county, on 29 July 2008

On the 29 July 2008, it was possible to get a train route in to Torneträsk station even though there was a train on the station's only accessible railway track.

Major reconstruction was underway at the station and ten days earlier, on 19 – 20 July, the station was closed to through traffic for twelve hours. While the station was closed, a new switch was installed in the southern part of the station and traffic was rerouted to track 2 from track 3. Before the closure, the chief signalling technician and the chief inspector discovered that track 2 was to be engaged after the closure. According to the available temporary signal plans, traffic was to continue running, but on track 3. That was what they had also assumed when doing the preparatory work, which had by then been completed. They did not manage to engage the services of a signal designer, so the signal repairmen and the chief inspector instead changed the design *in situ*. It would later become clear that the connections they made resulted in an inability to set the "go" signal from the north, which irritated the train dispatchers. The irritation was further aggravated by the fact that the image the train dispatchers saw on their screen did not match the actual situation at the station.

When the chief inspector found out that it was not possible to set the signal to "go," he realised that when they were making the changeover earlier they had disregarded the dependency of the track signalling circuit on track 3. This was no longer relevant here, and he therefore bypassed this dependency. What he did not check at the time was that there was a signalling-circuit dependency corresponding to track 2 at the signal box, which resulted in it being possible to set the "go" signal from the north to point to track 2, regardless of whether there were any vehicles on the track or not.

Meanwhile, the chief inspector was working some very long shifts and was also under a great deal of pressure from traffic, project and operations management to get the site working as intended. There were no available personnel with the proper skills to relieve the chief inspector.

The reason the staff carried out unplanned changeovers was that the available plans had not been drawn up correctly, and could thus not be used. The temporary signals had been designed by a planning contractor with the aid of planning documentation, part of which made up the description of what was to be planned and drawn up by the chief inspector. This document was correctly drawn up in regards to which track the trains were to run on after closure, but its wording was ambiguous in places. Furthermore, the document was not included in the planning documentation formally approved and remitted by the client, but was instead delivered separately to the planning contractor. The planner who had been engaged to design the temporary signals, drew up a document in which planner 2 clarified the chief inspector's request to provide more clearly worded project documentation. This document contained mistakes which resulted in planning errors which, in turn, led to signal technicians and the chief inspector working under false assumptions.





**Report RJ 2009:09**

Derailment of carriage 73664 being shunted 73664 at Kimstad station, Östergötland county, 21 December 2008.

On Sunday 21 December 2008, an accident occurred when carriage 73664 was being shunted past approach signal 55 to Kimstad which was indicating “stop.” The carriage being shunted continued through the following protection switch, onto the protective track, through the buffer stop, and only came to a halt about 40m after the end of the track. The front part of the carriage being shunted had derailed. The carriage being shunted stopped in a position where it was partly on adjacent tracks, giving rise to a potential collision between a train approaching on the adjacent track and the carriage being shunted.

The driver had previously connected two locomotives in Norrköping and driven to Skärblacka where 12 carriages that were to be transported to Norrköping were hooked up.

When the driver was going from Skärblacka towards Kimstad, he tried to reduce the speed. Because of insufficient braking power, the driver could not stop the carriage being shunted at the signal and passed it. The reason for the vehicle not having sufficient braking capacity was that the main brake line between the locomotives was not open. Thus only the brakes on the first locomotive were activated when the driver braked. The rest of the train, the second locomotive and all carriages, remained unbraked.

The train was not subjected to a complete functional inspection in Norrköping, which resulted in the driver not noticing that the main line was not open through the entire train.

The railway company employing the driver did not have a training course for drivers with KY-training (post-secondary vocational education and training) nor had they focused on training the drivers in routines concerning brake checks and multiple hook-ups. As the driver was relatively green, he had probably not had time to gather enough experience and knowledge of how brake checks of multiple hook-up locomotives should be carried out. The railway company had thus not ensured the driver’s competency in performing his duties with regard to safety.



**Report RJ 2009:10**

Fire in a subway train at Rinkeby station, AB county, on 16 May 2005.

On 16 May 2005, shortly after 08:00, a fire broke out in the chassis of a subway train carriage as the train, to which the carriage was connected, was stopped at Rinkeby subway station. The fire was noticed by a passenger who observed a strange sound and light phenomenon. The passenger contacted the driver who noted that there was smoke coming out from underneath the subway train carriage. The subway station was evacuated, and Rescue services searched for any remaining passengers and extinguished the fire. There were no serious injuries.

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Extensive technical inspections have been carried out in order to determine the cause of the fire. However, the inspections have been made considerably more difficult by extensive damage caused to the carriage.

The fire is now thought to have started from electric arcs flashes occurring in the carriage chassis, likely caused by an electric flashover.

SHK has also reviewed the evacuation of the station and the organisation and safety management of Stockholm's subway.

The investigation further concluded that in the subway, where there are numerous independent contractors, there is a need for a cohesive safety management for the professionals that are active in the subway system.



Report RJ 2009:11  
Derailment of train 412 at Gnesta station,  
Södermanland county, 26 July 2007.

On the 26 July, 2007, train 412 travelling from Gothenburg to Stockholm and consisting of a railcar set of type X2, derailed at Gnesta station. The train was headed by the control unit, with the motor unit (locomotive) at the back.

The derailment was caused by a safety cover on the train's front-most bogie which had come loose and was hanging down. In Gnesta, the safety cover got stuck in the ground and lifted the bogie off the tracks. The bogie then became derailed but followed the track until the train stopped 1 310 metres from the point of derailment.

The inspection showed that the safety cover had come loose because the bolts holding it in place had not been fastened with the correct tightening torque when the cover was installed during maintenance at the stop in Gothenburg before departing to Stockholm. There was nothing else preventing the cover from falling down and causing the derailment once the bolts came off. The construction of the cover and its attachment to the bogie were such that poorly tightened bolts were enough to cause a derailment.

The inspection also showed that the derailment did not have any serious consequences likely due to the construction of the bogie.

The derailed bogie affected the rail mounting elements in such a way that spring brackets were scattered across the surrounding area with some force.

### 3.6 Comments and presentation or background of the investigations

### 3.7 Accidents and incidents investigated in the last 5 years

#### Rail traffic investigations 2007-2009

Investigations accidents / incidents		2007	2008	2009	-	-	TOT
Serious accidents (Art 19, 1 + 2)	Collision						
	Collision with an obstacle		1				1
	Derailment	1	1				2
	Level crossing accident						
	Accident to persons due to moving train						
	Fire in rolling stock						
	Involving hazardous goods						
	Fire	2					2
	Incidences	4	6	1			11
<b>TOTAL</b>		<b>7</b>	<b>8</b>	<b>1</b>			<b>16</b>

## 4 RECOMMENDATIONS

### 4.1 Overview and presentation of recommendations

4.2 Recommendations 2009

<b>Date and time:</b>	07-08-2007		
<b>Location:</b>	Stockholm Central station		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	Train 90161: X40 3332 and 3732 (SJ AB)		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	IU	
	<b>Passengers:</b>	IU	
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	None		
<b>Other damage:</b>	None		
<b>Summary:</b>	See section 3.4		
<b>Publication of final report:</b>	11-09-2009		
<b>Recommendation RJ 2005:01 R1</b>	The Swedish Transport Agency is recommended to urge the Swedish Rail Administration to accelerate work on measures to ATC-equip the so-called ATC-islands		
<b>Recommendation RJ 2005:01 R2</b>	The Swedish Transport Agency is recommended to urge the Swedish Rail Administration, while waiting for the aforementioned recommendation to be implemented, to take measures to improve the visibility, for drivers and for others, of the various signal images in main dwarf signals		
<b>Recommendation RJ 2009:01 R1</b>	The Swedish Transport Agency is recommended to adjust the route descriptions in the railway companies' route books in order to be more user-friendly		
<b>Recommendation RJ 2009:01 R2</b>	The Swedish Transport Agency is recommended to clarify requirements on route knowledge for complex stations, e.g. Stockholm Central		
<b>Recommendation RJ 2009:01 R3</b>	The Swedish Transport Agency is recommended to urge the Swedish Rail Administration to review the design of information environments so that they are adjusted to human requirements		

## Appendix 2

<b>Date and time:</b>	26-09-2009		
<b>Location:</b>	Hallsberg		
<b>Type of incident:</b>	Accident during shunting		
<b>Type of train and train no.:</b>	Electric locomotive Rc2 1094		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	IU	
	<b>Passengers:</b>	IU	
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	1	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	Rc2 1094, heavy collision damage. Rc2 1122, heavy collision damage. Rc4 1299, minor damage. Rc4 1164, minor damage. Rc4 1178, minor damage. The costs of the damage to the locomotives were estimated at SEK 4.5 million by Green Cargo		
<b>Damage to railway infrastructure:</b>	Track V3 was pushed out of position and the buffer stop at the eastern end of the track was pressed out about 10 metres. The cost of repairing the track is reported to be SEK 55,000 according to the Swedish Rail Administration.		
<b>Other damage:</b>	A minor leak of transformer oil from a locomotive.		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	23-03-2009		
<b>Recommendation RJ 2009:02 R1</b>	The Swedish Transport Agency is recommended to cooperate with the railway industry to assess whether the current system for the railway companies' follow-up of staff is an efficient instrument for detecting shortcomings		
<b>Recommendation RJ 2009:02 R2</b>	The Swedish Transport Agency is recommended to review whether there is a need to introduce requirements that driver training should include practical emergency stop drills		
<b>Recommendation RJ 2009: 02 R3</b>	The Swedish Transport Agency is recommended to review procedures for accident alarms, how checklists are designed, and to what extent instructions may be required for those who send out accident alarms. The recommendation also includes a review of whether practice drills are needed for alarms and the measures taken during an alarm.		



### Appendix 3

<b>Date and time:</b>	11-04-2008, 20:05		
<b>Location:</b>	Stora Höga - Kode		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	X50, two units, no. 3289		
<b>Road vehicles:</b>	Lorry Scania, TKC 736, and low-lying trailer, TGC 919		
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	IU	1
	<b>Passengers:</b>	IU	0
<b>Number of fatalities:</b>	<b>Staff:</b>	0	0
	<b>Passengers:</b>	0	0
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	0
	<b>Passengers:</b>	0	0
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	0
	<b>Passengers:</b>	0	0
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	None		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	30-03-2009		
<b>Recommendation RJ 2009:03 R1</b>	The Swedish Transport Agency is recommended to ensure that the infrastructure manager increases the use of obstacle detection systems at level-crossings		
<b>Recommendation RJ 2009:03 R2</b>	The Swedish Transport Agency is recommended, together with the infrastructure manager and road authority, to develop joint standards and work procedures. In addition, cooperation between the municipality and other stakeholders should be developed so that the traffic environment at crossings is assessed on an ongoing basis and after any changes are made.		
<b>Recommendation RJ 2009:03 R3</b>	The Swedish Transport Agency is recommended to ensure that information about level crossings with specific risks is made readily available for the planning of different types of road transport		





**Appendix 4**

<b>Date and time:</b>	09-06-2008, 10:39		
<b>Location:</b>	Bryngenäs		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	Drive unit type X11 no. 3212		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	Damage to switch 22 in Bryngenäs		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	11-05-2009		
<b>Recommendation RJ 2009:04 R1</b>	The Swedish Transport Agency is recommended to introduce requirements as soon as possible for the use of train protection systems on vehicles that traffic infrastructure that is equipped with train protection systems		
<b>Recommendation RJ 2009:04 R2</b>	The Swedish Transport Agency is recommended to improve the procedures for granting approval and supervision so that any lack of regulation critical to traffic safety is detected		



## Appendix 5

<b>Date and time:</b>	09-06-2008, 19:30		
<b>Location:</b>	Hillared - Limmared		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	Passenger train 7343: X52 no. 9038. Freight train 9450: Rc4 1184 and all 24 carriages.		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	IU	
	<b>Passengers:</b>	IU	
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	None		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	09-06-2009		
<b>Recommendation RJ 2009:05 R1</b>	The Swedish Transport Agency is recommended to urge the Swedish Rail Administration to review the permissible size of the area supervised by a train dispatcher, from a traffic safety point of view, so that the dispatcher could remain in control of the area even in case of faults.		
<b>Recommendation RJ 2009:05 R2</b>	The Swedish Transport Agency is recommended to advise the Swedish Rail Administration to review systems available to a train dispatcher which ensure a train dispatcher's capacity to make decisions critical to traffic safety		
<b>Recommendation RJ 2009:05 R3</b>	The Swedish Transport Agency is recommended to urge the Swedish Rail Administration to take measures to stimulate attentiveness during monitoring work		
<b>Recommendation RJ 2009:05 R4</b>	The Swedish Transport Agency is recommended to advise the Swedish Rail Administration to create follow-up systems where shortcomings and weaknesses of train dispatcher's work can more readily be observed, e.g. by being able to simulate and practice various scenarios		
<b>Recommendation RJ 2009:05 R5</b>	The Swedish Transport Agency is recommended to work on updating BV-FS 2000:4, so that both the physical and mental faculties of an employee are assessed before reengaging in a safety-critical function		
<b>Recommendation RJ 2009:05 R6</b>	The Swedish Transport Agency is recommended to ensure that independent contractors review and improve applications and regulations to meet the requirements of both BV-FS 2000:4 as well as in-house rules and procedures		
<b>Recommendation RJ 2009:05 R7</b>	The Swedish Transport Agency is recommended to review the rules for passing signals that do not indicate "go" with the purpose of implementing safer barriers		



## Appendix 6

<b>Date and time:</b>	19-01-2006, 7:30 – 7:50		
<b>Location:</b>	Västerhaninge – Jordbro		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	Drive units x1 no. 3067 and 3090 Passenger train 2510		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	IU	
	<b>Passengers:</b>	IU	
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	None		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	25-06-2009		
<b>Recommendation RJ 2009:06 R1</b>	The Swedish Transport Agency is recommended to carry out a risk assessment analysing the consequences of the amended maintenance procedures for commuter trains (no. X1) in Stockholm and to take measures to reduce any possible risks that such analysis might point out		
<b>Recommendation RJ 2009:06 R2</b>	The Swedish Transport Agency is recommended to introduce procedures designed to enable the Agency to detect changes in the working rules and practices of the independent contractors that are likely to result in risk assessments and supplementary measures		



## Appendix 7

<b>Date and time:</b>	17-06-2008, 7:50		
<b>Location:</b>	Klockarbäcken stop, Umeå-Brännland		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	Train 7081: Rc6 1335 and six carriages. Carriage being shunted 76910: T44 382 and six carriages.		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Number of fatalities:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Number of seriously injured:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Number of mildly injured:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	The switch at the line stop was ripped up.		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	05-10-2009		
<b>Recommendation RJ 2009:07 R1</b>	The Swedish Transport Agency is recommended to update BV-FS 2000:4, so that both the physical and mental faculties are assessed before reengaging in a safety function.		
<b>Recommendation RJ 2009:07 R2</b>	The Swedish Transport Agency is recommended to review the rules for passing signals that do not show "go" with the purpose of implementing safer barriers		
<b>Recommendation RJ 2009:07 R3</b>	The Swedish Transport Agency is recommended to advise the Swedish Rail Administration to review and improve applications and regulations to meet the requirements of both BV-FS 2000:4 as well as in-house rules and procedures		
<b>Recommendation RJ 2009:07 R4</b>	The Swedish Transport Agency is recommended to advise the Swedish Rail Administration to adapt support systems and rules so that they are in harmony with each other		
<b>Recommendation RJ 2009:07 R5</b>	The Swedish Transport Agency is recommended to advise the Swedish Rail Administration to create follow-up systems where shortcomings and weaknesses of train dispatcher's work can more readily be observed, e.g. by being able to simulate and practice various scenarios		





**Appendix 8**

<b>Date and time:</b>	29-07-2008, 17:55		
<b>Location:</b>	Torneträsk station		
<b>Type of incident:</b>	Near collision incident		
<b>Type of train and train no.:</b>	Passenger train 10093: Passenger carriages no: BC2 , WL6, BC4, BC4, BC4, WL6, B2, R7, BF4, B2 and electric locomotive of type RC. Carriage being shunted for transport: Motor trolley of type 121 M and open carriage no. Os.		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	None		
<b>Damage to railway infrastructure:</b>	None		
<b>Other damage:</b>	None		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	03-12-2009		
<b>Recommendation RJ 2009:08 R1</b>	The Swedish Transport Agency is recommended to ensure that the Swedish National Rail Administration's safety management system also fully covers the construction of systems critical to safety and that this meets the requirements in the Swedish Transport Agency's regulations for the rail sector		
<b>Recommendation RJ 2009:08 R2</b>	The Swedish Transport Agency is recommended to ensure that the Swedish National Rail Administration's safety management system also covers the project management, planning, and that it is able to detect shortcomings and deviations by the contractor		
<b>Recommendation RJ 2009:08 R3</b>	The Swedish Transport Agency is recommended to ensure, in connection with the verification of safety permits for infrastructure managers, that they have a safety management system at their disposal to cover the construction of safety-critical components and subsystems, and that this safety management system meets the requirements contained in the Swedish Transport Agency's operating regulations		



## Appendix 9

<b>Date and time:</b>	21-12-2008, 14:20		
<b>Location:</b>	Kimstad station		
<b>Type of incident:</b>	Derailment		
<b>Type of train and train no.:</b>	T44 317 and 318, Habiins 33 80 2745 561-1 and Habbiins 33 80 2742 204-1.		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	1	
	<b>Passengers:</b>	0	
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	The locomotives 317 and 318 as well as the first two carriages sustained damage.		
<b>Damage to railway infrastructure:</b>	Damage to safety track and track 3 in Kimstad.		
<b>Other damage:</b>	Spillage of diesel oil.		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	15-12-2009		
<b>Recommendation RJ 2007:02 R1</b>	The Swedish Transport Agency is recommended to minimize the risk of individual errors in determining a train's braking capacity by introducing checklists, for example		
<b>Recommendation RJ 2007:02 R5</b>	The Swedish Transport Agency is recommended to consider whether overarching principles and standards need to be formulated for the safety track, focusing on how vehicles should brake safely with regard to risk of damage to both vehicles and the environment beyond the track termination		
<b>Recommendation RJ 2009:01 R1</b>	The Swedish Transport Agency is recommended to draw on the experiences from the sample tests in order to determine which qualities to assess in connection with the psychological assessment		
<b>Recommendation RJ 2009:02 R2</b>	The Swedish Transport Agency is recommended to review how the proposals for measures in the Swedish Rail Agency's report 2007:6 KY – training, professional training, and competency have been implemented		
<b>Recommendation RJ 2009:03 R3</b>	The Swedish Transport Agency is recommended to consider whether the Swedish Rail Agency's traffic regulations need to be changed so that brake checking tests may only be used when it is not possible to carry out any other type of brake verification, and that no activity is planned in such a way as to make brake testing obligatory		



## Appendix 10

<b>Date and time:</b>	16-05-2005 8:00		
<b>Location:</b>	Rinkeby station, Stockholm		
<b>Type of incident:</b>	Fire		
<b>Type of train and train no.:</b>	Subway train carriages type C14. The train consisted of eight carriages. Directly affected carriage duo was C14 1300-1301.		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>	1	
	<b>Passengers:</b>	IU	
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	2	
<b>Damage to rolling stock:</b>	Very extensive damage to C14 1301. Significant damage to C14 1300. Limited damage to other carriages.		
<b>Damage to railway infrastructure:</b>	Limited damage to the site of the fire in Rinkeby.		
<b>Other damage:</b>	Smoke and soot damage in Rinkeby station.		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	18-12-2009		
<b>Recommendation RJ 2009:10 R1</b>	The Swedish Transport Agency is recommended to consider the need for a clearer regulation of the requirements of its safety management system, approval of technical systems, and management of shared risks for activities where several parties are involved, such as in the subway		
<b>Recommendation RJ 2009:10 R2</b>	The Swedish Transport Agency and the Swedish National Electrical Safety Board are recommended to ensure that the train operating company inspects the construction of the C14-vehicles so as to guarantee the vehicles' function for the entire remainder of their service life		
<b>Recommendation RJ 2009:10 R3</b>	The Swedish Civil Contingencies Agency (MSB) is recommended to ensure that a tactical plan of action is drawn up which makes it possible to put out fires, save the lives of and evacuate a greater number of persons from a subway station platform level		
<b>Recommendation RJ 2009:10 R4</b>	The Swedish Civil Contingencies Agency (MSB) is recommended to ensure that guidelines are established in cooperation with the Swedish Work Environment Authority and the Swedish National Board of Housing, Building and Planning so as to ensure necessary evacuation options in complex environments for the public which are located underground, such as the existing subway, by providing clear instructions regarding, for example: - that evacuation paths, e.g. escalator shafts, are protected from being filled with smoke, - evacuation signal, - exit path markings and emergency lighting, - that emergency evacuation paths are accessible.		

## **Appendix 10**

<b>Recommendation RJ 2009:10 R5</b>	<b>The Swedish Civil Contingencies Agency (MSB) is recommended to ensure that the inspection work is prioritised so as to clearly illustrate how the municipality's rescue services are organised and planned so that rescue services can begin within an acceptable period of time and are carried out efficiently. The inspection should, among other things, follow up on how the municipality cooperates with other stakeholders regarding planning, training, operation practice, tactical character of operations and alerting in order to be able to manage comprehensive and complex operation situations, such as accidents in the subway</b>
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## Appendix 11

<b>Date and time:</b>	2007-07-26, 9:20		
<b>Location:</b>	Gnesta station		
<b>Type of incident:</b>	Derailment		
<b>Type of train and train no.:</b>	UB2X 2521, Passenger train 412.		
<b>Road vehicles:</b>			
		<b>People on board</b>	<b>In the road vehicle</b>
<b>People on board:</b>	<b>Staff:</b>		
	<b>Passengers:</b>		
<b>Number of fatalities:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of seriously injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Number of mildly injured:</b>	<b>Staff:</b>	0	
	<b>Passengers:</b>	0	
<b>Damage to rolling stock:</b>	Master vehicle, UB2X 2521 and following vehicles, UB2 2873, damaged passenger train 412.		
<b>Damage to railway infrastructure:</b>	Track damaged on a stretch of approx. 1,300 metres.		
<b>Other damage:</b>	Macadam and spring attachments flying through the air damaged the waiting hut, fence and cars.		
<b>Summary:</b> See section 3.4			
<b>Publication of final report:</b>	21-12-2009		
<b>Recommendation RJ 2009:11 R1</b>	The Swedish Transport Agency is recommended to use the experiences from the derailment and the significance of the running gear to the consequences of a derailment in its work of approving vehicles and in the European regulatory work		
<b>Recommendation RJ 2009:11 R2</b>	The Swedish Rail Administration is recommended to study in detail the circumstances of suspension frames flying through the air so as to reduce the risks for people and property in the vicinity of the railway tracks		