

= Eckwersheim derailment =

On 14 November 2015 , a TGV train derailed in Eckwersheim , Alsace , France , while performing commissioning trials on the second phase of the LGV Est high @-@ speed rail line , which was scheduled to open for commercial service five months later . The derailment resulted in 11 deaths among those aboard , while the 42 others aboard the train were injured . It was the first fatal derailment in the history of the TGV and the third derailment since the TGV entered commercial service in 1981 .

The test train was traveling eastbound on the southern track when it entered a curve at 265 km / h ( 165 mph ) ? which was 89 km / h ( 55 mph ) above its assigned speed ? causing the rear bogie of the lead power car to derail to the left ( outside of curve ) due to centrifugal forces . The lead power car separated from the rest of the train , and the rear of the lead power car struck the concrete parapet on the abutment to a bridge over the Marne ? Rhine Canal . The power car slid along the left parapet of the bridge and overturned , sliding down the embankment and coming to a rest 150 metres ( 490 ft ) beyond the end of the bridge . Cars 2 ? 7 derailed before the bridge and travelled off the embankment with enough speed to overshoot the canal and come to rest 80 ? 130 m ( 260 ? 430 ft ) beyond the beginning of the bridge . Cars 8 ? 9 came to rest on the east bank of the canal and the rear power car ended up partially submerged in the canal . According to investigators , late braking , which led to the train entering the curve at excessive speed , was the immediate cause of the accident . Criminal and technical investigations are ongoing . French national rail operator SNCF suspended test trials at high speeds until the lessons learned from the investigation were integrated into testing process . The scheduled opening of the second phase of the LGV Est for commercial service was delayed three months , from 3 April 2016 to 3 July 2016 .

= = Background = =

The LGV Est européenne ( often shortened to LGV Est ) is a high @-@ speed rail line connecting Paris and Strasbourg . Development has been divided into two phases . The first phase , from Vaires @-@ sur @-@ Marne near Paris , to Baudrecourt opened on 10 June 2007 . Construction on the 106 km ( 66 mi ) second phase , from Baudrecourt to Vendenheim , near Strasbourg , began in 2010 . The final weld of rails on the second phase occurred in March 2015 , marking the completion of the line , although some work remained . At the time of the derailment , the line was scheduled to open for commercial service on 3 April 2016 , following commissioning trials and training for operators .

The scheduled tests for the line consisted of four phases :

Factory testing of components of the line , completed in 2013 ? 14 ;

On @-@ site testing of components and functioning of subsystems , completed in 2013 ? 2014 ;

Static testing of subsystems with slow @-@ moving trains , completed from late 2014 to August 2015 ;

Dynamic testing of the line with trains operating at high speed , began in September 2015 and scheduled to have been completed in November 2015 .

A specialized test train , Dasye set 744 in a commemorative livery , arrived to conduct the fourth phase of testing , which began on 28 September 2015 . During this phase , more than 200 test runs would be performed on the line . The test runs would test ride smoothness , performance of the catenary , radio communications , and the signalling system . During some runs , the test train would operate at 10 % above the planned operational speeds for the line when it enters service . Some automated safety systems were disabled to allow the test train to operate beyond normal operating conditions . Orientation training for operators was scheduled to take place between January and March 2016 prior to the start of commercial service on the line , which was scheduled for 3 April 2016 at the time of the accident . In January 2016 , SNCF announced that the opening of the line would be delayed until to 3 July 2016 .

= = Accident = =

== Departure ==

Tests scheduled for 11 and 14 November were to traverse each of the two tracks , in both directions of travel and at a test speed 10 % above the speed limit when the line is in commercial service . On the afternoon of 14 November , the test train was scheduled to depart Meuse TGV Station at 14 : 18 and arrive at Strasbourg Station at 15 : 17 . At 14 : 26 , authorization was given to begin the test and the test train left Meuse TGV Station two minutes later . During this test , the test train traveled eastbound on Track 2 , the southern track on the east @-@ west oriented LGV Est , in the direction opposite normal operation ( Strasbourg towards Paris ) . The Meuse @-@ Strasbourg run was the last series of tests on the line during the fourth phase of tests .

The train reached a maximum speed of 352 km / h ( 220 mph ) on sections where the speed limit will be 320 km / h ( 200 mph ) . As the train approached the flying junction in the commune of Vendenheim , it should have slowed from 352 to 176 km / h ( 220 to 110 mph ) before reaching Kilometer Point ( KP ) 403 @.@ 809 , where the speed limit for commercial service will be 160 km / h ( 100 mph ) . As the track begins a long , right @-@ hand curve into the flying junction , it is raised on an embankment , approximately 5 ? 8 m ( 16 ? 26 ft ) high , and crosses a bridge over the Marne ? Rhine Canal . The flying junction marks the end of the LGV Est line , after which the train was to continue on an existing , non @-@ high @-@ speed rail line leading to Strasbourg Station .

== Derailment ==

As the train entered the right @-@ hand curve into the flying junction , the rear bogie of the lead power car derailed to the left ( outside of the curve ) at 15 : 04 : 42 at approximately KP 404 @.@ 003 . Violent transverse movements at the rear of the lead power car caused it to separate from the rest of the train . The rear of the lead power car struck a concrete parapet ( KP 404 @.@ 209 ) on the leading abutment to the bridge over the Marne ? Rhine Canal . The impact broke apart the lead power car and caused oil to leak from the lead power car 's transformer , which ignited and was spread across the bridge and canal banks . The rear bogie of the lead power car remained where it impacted the concrete parapet . The transformer of the lead power car landed on the east bank of the canal . The remainder of the lead power car slid along the left parapet of the bridge . At the end of the bridge , it overturned , slid down the embankment and came to a rest 150 metres ( 490 ft ) beyond the end of the bridge .

Cars 2 ? 7 derailed before the bridge and traveled off the embankment with enough speed to overshoot the canal and come to rest 80 ? 130 m ( 260 ? 430 ft ) beyond the beginning of the bridge . Cars 8 ? 9 came to rest on the east bank of the canal and the rear power car ended up partially submerged in the canal .

== Response and casualties ==

At 15 : 05 , the train disappeared from the approach zone for the Vendenheim junction on the display being monitored by staff at the signalling control center . At 15 : 10 , the control center initiated emergency procedures for the loss of a train and closed the non @-@ high @-@ speed rail lines that pass through the Vendenheim junction . At approximately the same time , one of the companies involved in the construction of the line received a call from an employee aboard the train , who informed them of the derailment . Shortly before 17 : 45 , the local mass casualty plan was enacted . Emergency medical and fire rescue services along with 100 gendarmes responded to the incident . At its height , 104 engines from three départements responded to the incident ? 65 from Bas @-@ Rhin and 39 from Moselle and Haut @-@ Rhin . Those with minor injuries were treated by responders from the French Red Cross , which operated at the school in Eckwersheim . The French Minister of Ecology , Sustainable Development and Energy , Ségolène Royal , and the Secretary of State for Transport , Alain Vidalies , travelled to the site shortly after the crash . The president of

SNCF , Guillaume Pepy , and the president of SNCF Réseau , Jacques Rapoport , also travelled to the site in the hours after the accident .

The train was carrying 53 persons , including four children , ages 10 ? 15 , who were not officially authorized to be aboard . The derailment resulted in 11 deaths , which included four employees of SNCF , five technicians from the engineering firm responsible for the tests , and two guests . Ten died at the crash scene , one died the following evening , and one seriously injured person remained in hospital as of February 2016 . Among the dead was the director of the LGV Est line for SNCF Réseau , which owns France 's railroad infrastructure . Despite breaking in two pieces and the severe impact with the parapet , there were no deaths among the seven people in the front cab . The second @-@ to @-@ last car impacted the canal wall and was the car with the highest death toll . It was the first fatal derailment in the history of the TGV and the third derailment since the TGV entered commercial service in 1981 .

= = Investigation = =

Three investigations have been opened . The French Land Transport Accident Investigation Bureau ( BEA @-@ TT , Bureau d 'Enquêtes sur les Accidents de Transport Terrestre ) is responsible for investigating rail accidents in France and will conduct a non @-@ judicial technical investigation . A criminal investigation and internal investigation by SNCF have also been opened . Among the subjects which SNCF will investigate is whether there was a dereliction of duties by an SNCF employee that resulted in the unauthorized children riding on the train . The president of SNCF has exclaimed : " This is not a practice that SNCF recognizes . A test train is a test train . " The derailment occurred the day after the November 2015 Paris attacks , initially sparking fears that the derailment was the work of terrorists .

On 19 November , SNCF announced the initial findings of their investigation . The train 's event recorder indicated that the train entered the curve at 265 km / h ( 165 mph ) and was travelling at 243 km / h ( 151 mph ) at the moment it derailed , which investigators have determined to be a result of centrifugal forces . The speed at the moment of derailment was 67 km / h ( 42 mph ) above the train 's assigned operating speed on the curve . According to the SNCF , the " immediate cause " of the accident was " a late braking sequence " ; the braking should have begun at least 1 km ( 1 @,@ 100 yd ) or 12 seconds earlier . The investigation has found no fault for the accident in the infrastructure , train , or member of the technical team . There were seven people in the driving cab at the time of the accident , all of whom survived . Investigators have suggested that this may have been a factor in the late braking . SNCF will begin disciplinary proceedings and take punitive measures against employees responsible for , among other things , the " reckless presence " of children on the test train , presence of seven people in the cab , the lack of rigor in creating lists of those onboard and controlling access to the train , and " without doubt " the human errors in the cab .

= = Aftermath = =

SNCF held a minute of silence , for the victims , during the course of operations on Monday , 16 November . The following day , a memorial service was held in the church in Mundolsheim , which was attended by SNCF President Guillaume Pepy . SNCF suspended all test trials at high speeds until the lessons learned from the investigation can be integrated into testing processes . The scheduled opening of the second phase of the LGV Est for commercial service has been delayed by three months , from 3 April 2016 to 3 July 2016 . Trains will operate on the single intact track until the damaged track is repaired , which will take 7 months once the judicial inquiry lifts its hold on the track .