Railway accident investigation report

Railway operator: East Japan Railway Company
Accident type: Train derailment
Date and time: About 14:47, March 11, 2011.
Location: About 326,285m from the origin in Tokyo station, in the premises of Sendai station, Tohoku Shinkansen, Sendai City, Miyagi Prefecture.

SUMMARY
The 7932B train, the test run train starting from Sendai rolling stock depot bound for Shiroishizao station, Tohoku Shinkansen, East Japan Railway Company, departed from Sendai rolling stock depot on schedule, on March 11, 2011. The driver of the train, entering to the premises of Sendai Station at about 72 km/h, felt the strong shake and, at the same time, noticed that the stop signal of the cab signal device turned on, he immediately applied an emergency brake. After the train stopped, he found that all the 2 axles of the front bogie of the fourth vehicle had derailed to the left. The train was operated as a test run, and 12 rolling stock inspectors and a driver were on board the train, but no one was injured. The 2011 Great East Japan Earthquake, named also as ‘the 2011 off the Pacific Coast of Tohoku Earthquake’, that the moment magnitude was 9 and the hypocenter was offshore of Miyagi Prefecture, occurred just before the accident, and the maximum seismic intensity 7 was observed in northern Miyagi Prefecture.

PROBABLE CAUSES
It is considered highly probable that the train derailed by the earthquake ground motion due to the main shock of ‘the 2011 off the Pacific Coast of Tohoku Earthquake’, because it is considered highly probable that there was no problem in the railway facilities including tracks, the derailed train and the train operation, furthermore it is considered highly probable that the train derailed just after the main shock of ‘the 2011 off the Pacific Coast of Tohoku Earthquake’ had arrived at Sendai city. However, the reason why only two axles of the front bogie of the fourth vehicle had derailed, could not be verified. It is considered probable that the process to the derailment was the upper-center mode rolling vibration of the vehicle, because the frequency component of the earthquake ground motion by ‘the 2011 off the Pacific Coast of Tohoku Earthquake’ corresponding with the natural frequency of the viaduct at the accident site, was amplified by the oscillation phenomena of the structure and caused the large displacement at the top of the viaduct. It is considered probable that the damage was less serious because the urgent train stop system against earthquake had decelerated the train to a low speed just before the derailment, and the train was not derailed seriously by the function of the anti-deviation guide against earthquake.