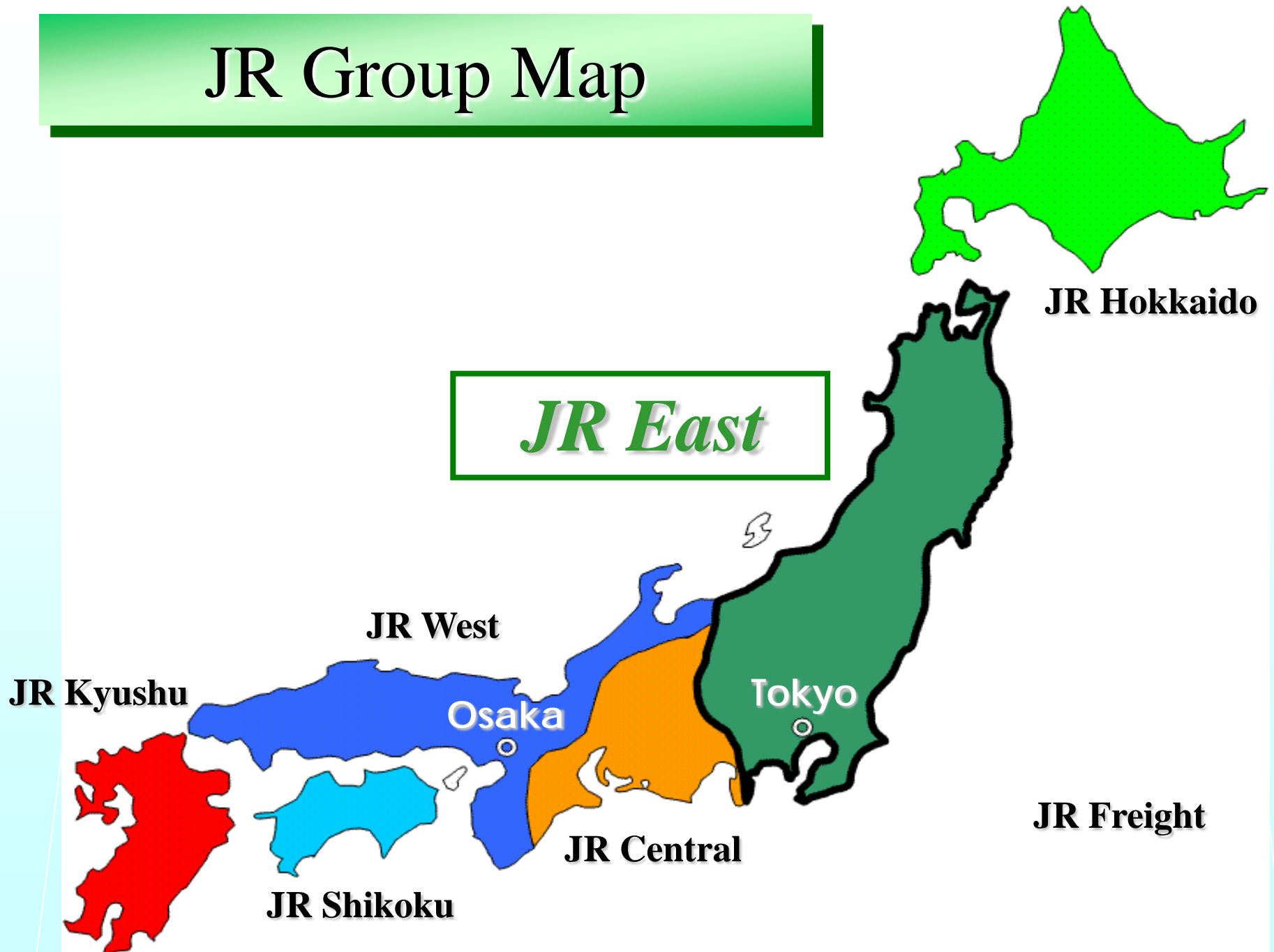


# The risk of derailment and collision, and safety systems to prevent the risk

Tomohisa Nakamura  
Transport Safety Department  
East Japan Railway Company

*International Railway Safety Conference in Hong Kong  
5 October, 2010*

# JR Group Map



# Outline of JR East

( As of 1 April 2010 )

Employees	60,190
Working line-kilometers	7,526.8 km
Stations	1,705
Passengers carried	About 16 million/day
Trains operated	12,761/day
Units of rolling stock	13,173



The Shinkansen



The Shinkansen

- Shinkansen lines
- ( ..... Under construction )
- Conventional lines

# Contents

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# The Mikawashima accident

(occurred on 3 May in 1962)

## (The first accident)

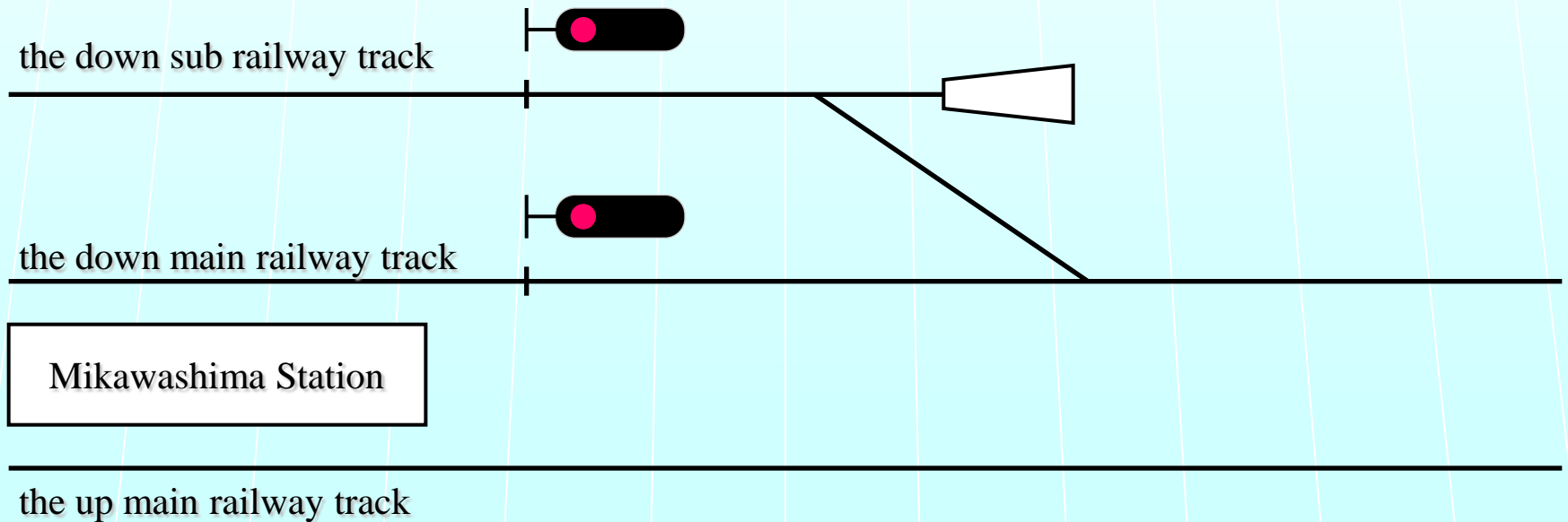
A freight train ran through a red signal. Next, the locomotive and freight train derailed on the down main railway track and derailed cars were obstacle to movement on the down main railway track.

## (The second accident)

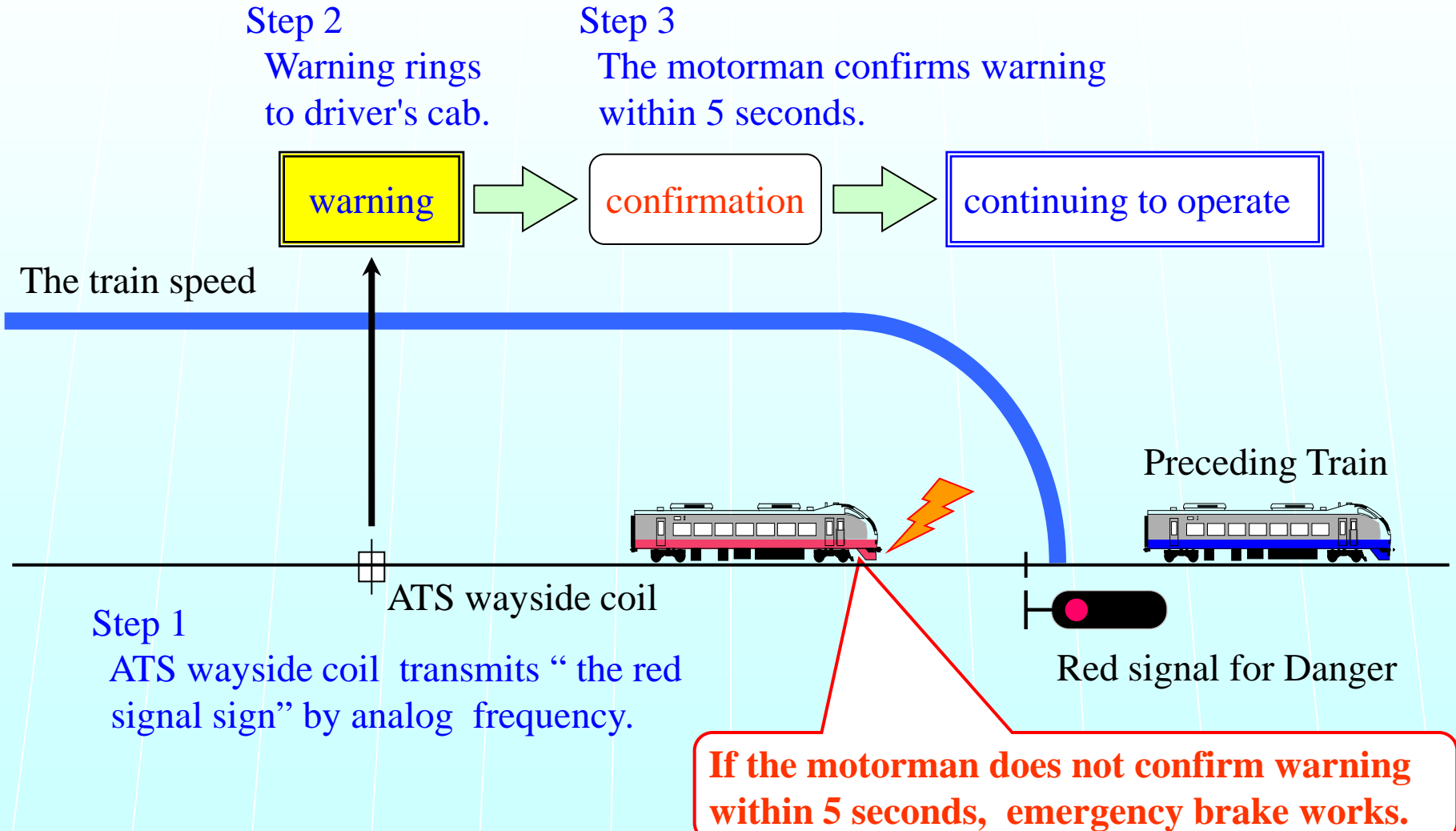
A down passenger train collided with the derailed cars. Next, this down passenger train derailed on the down main railway track and derailed cars were an obstacle to movement on the up main railway track.

## (The third accident)

An up passenger train collided with the derailed down passenger train. Next, this up passenger train derailed.



# Automatic Train Stop (ATS)



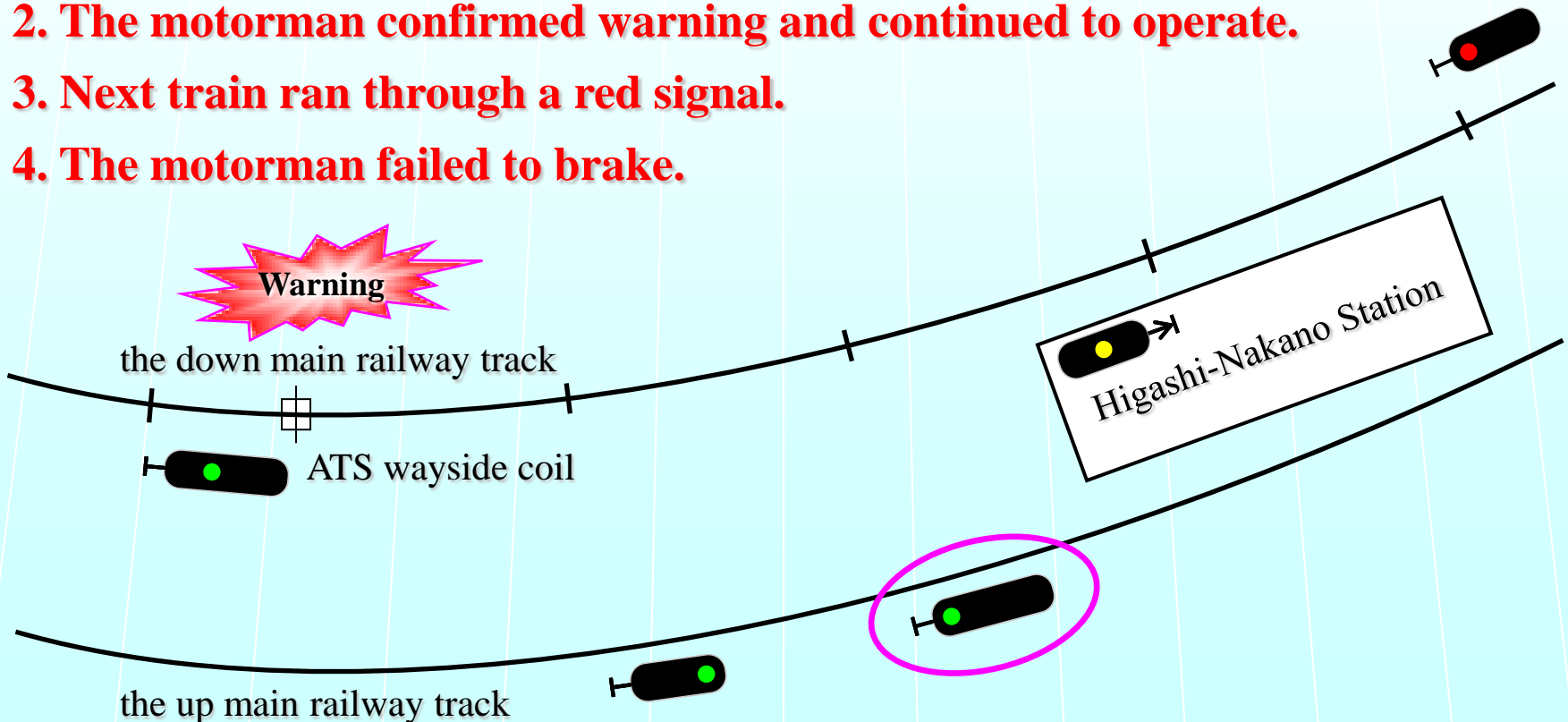


# The Higashi-Nakano accident

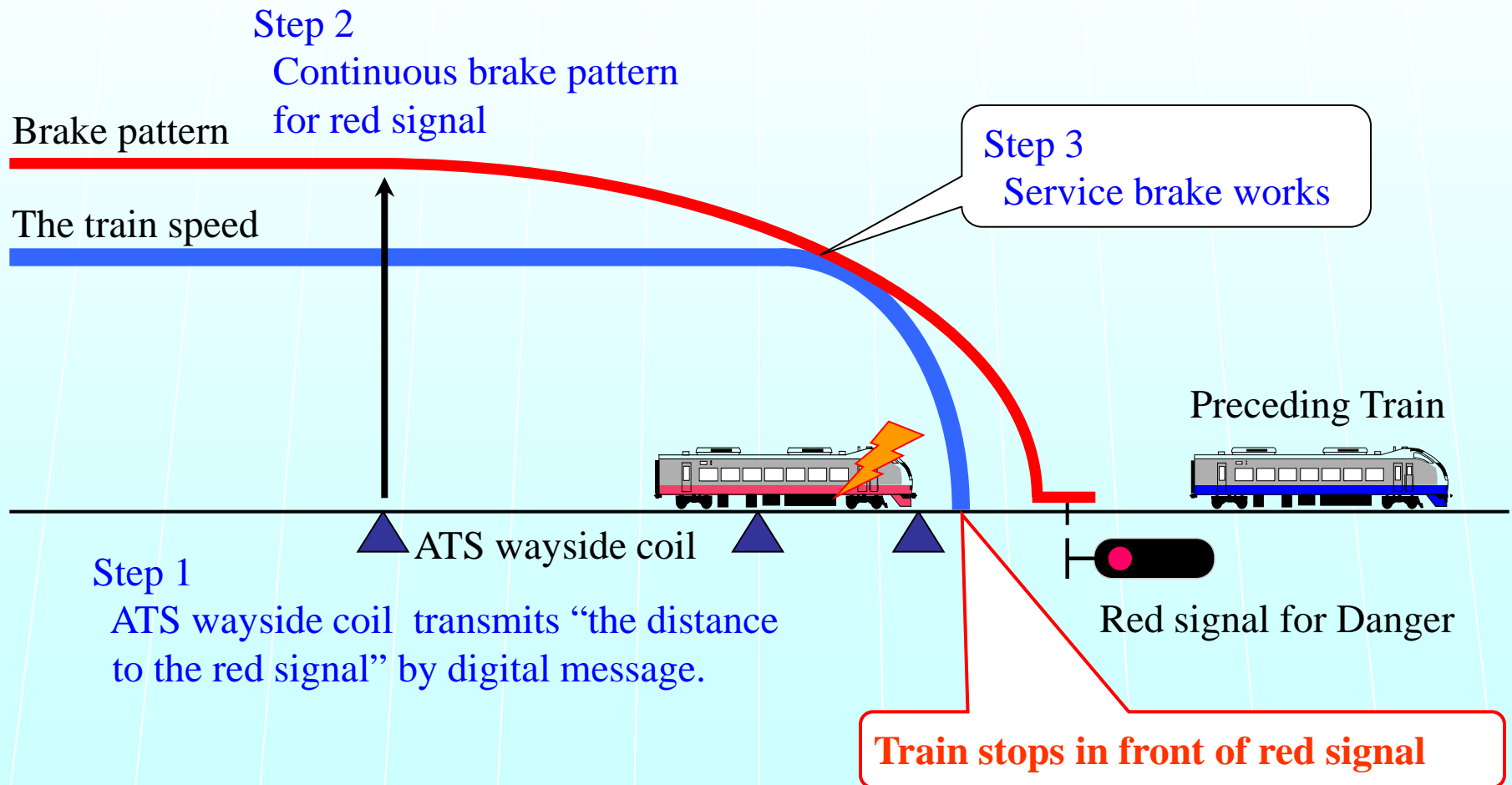
(occurred on 5 December in 1988)

Tokyo metropolitan area is operated many trains. Therefore, there are a lot of signals. Warning very often rang to the motorman's cab and the motorman very often confirmed warning, too. As a result, the motorman failed to brake and this accident occurred.

1. **ATS wayside coil transmitted “ the red signal sign”.**
2. **The motorman confirmed warning and continued to operate.**
3. **Next train ran through a red signal.**
4. **The motorman failed to brake.**



# Automatic Train Stop Pattern (ATS-P)





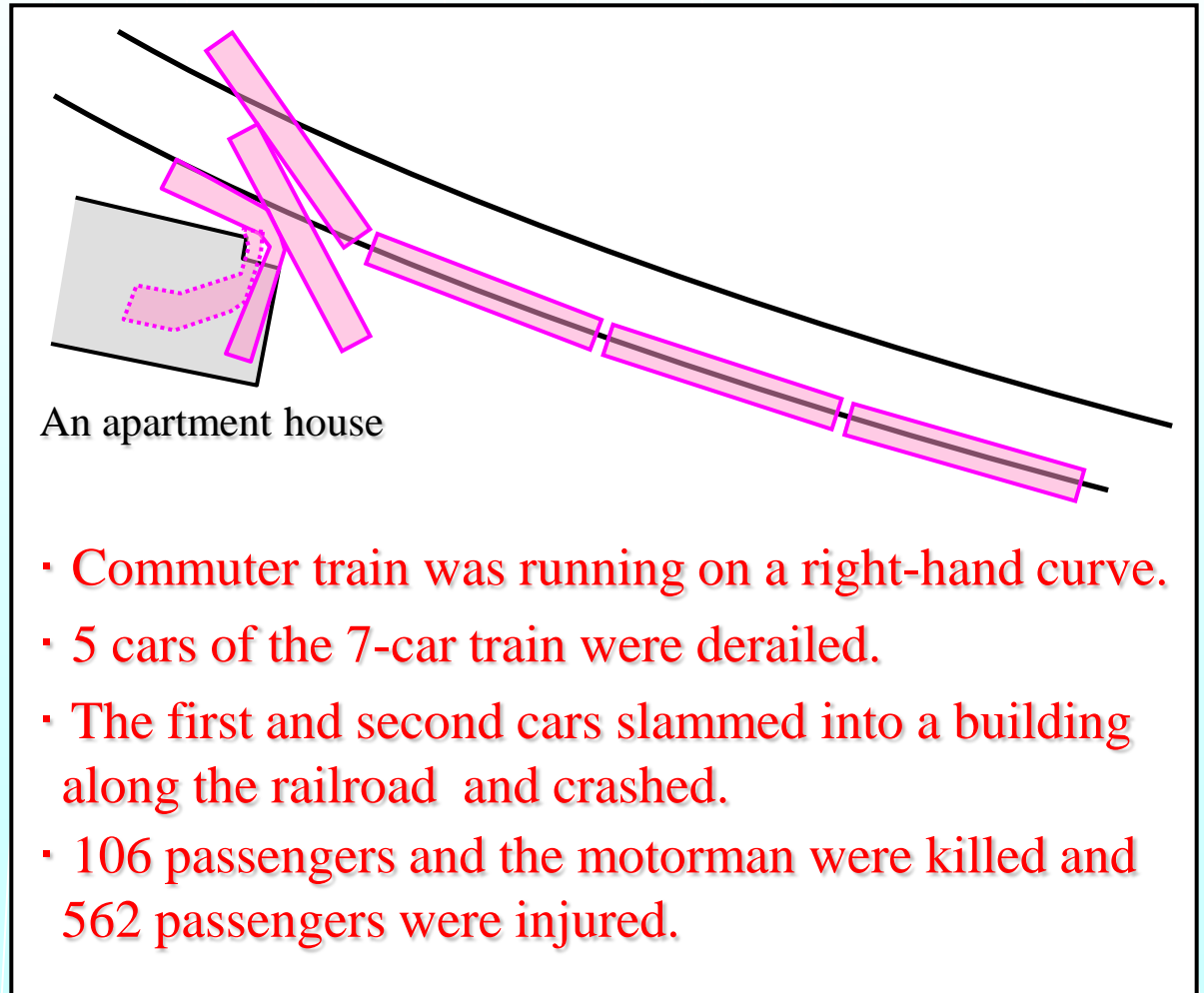
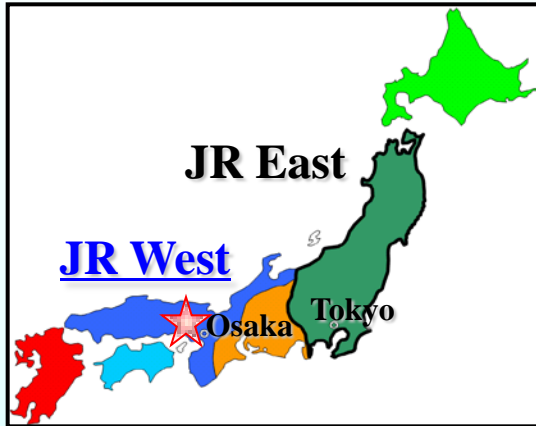
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# The Fukuchiyama-Line accident

(occurred on 25 April in 2005)

This accident occurred on 25 April in 2005, on the Fukuchiyama Line of JR West in Amagasaki City, Hyogo Prefecture near Osaka.

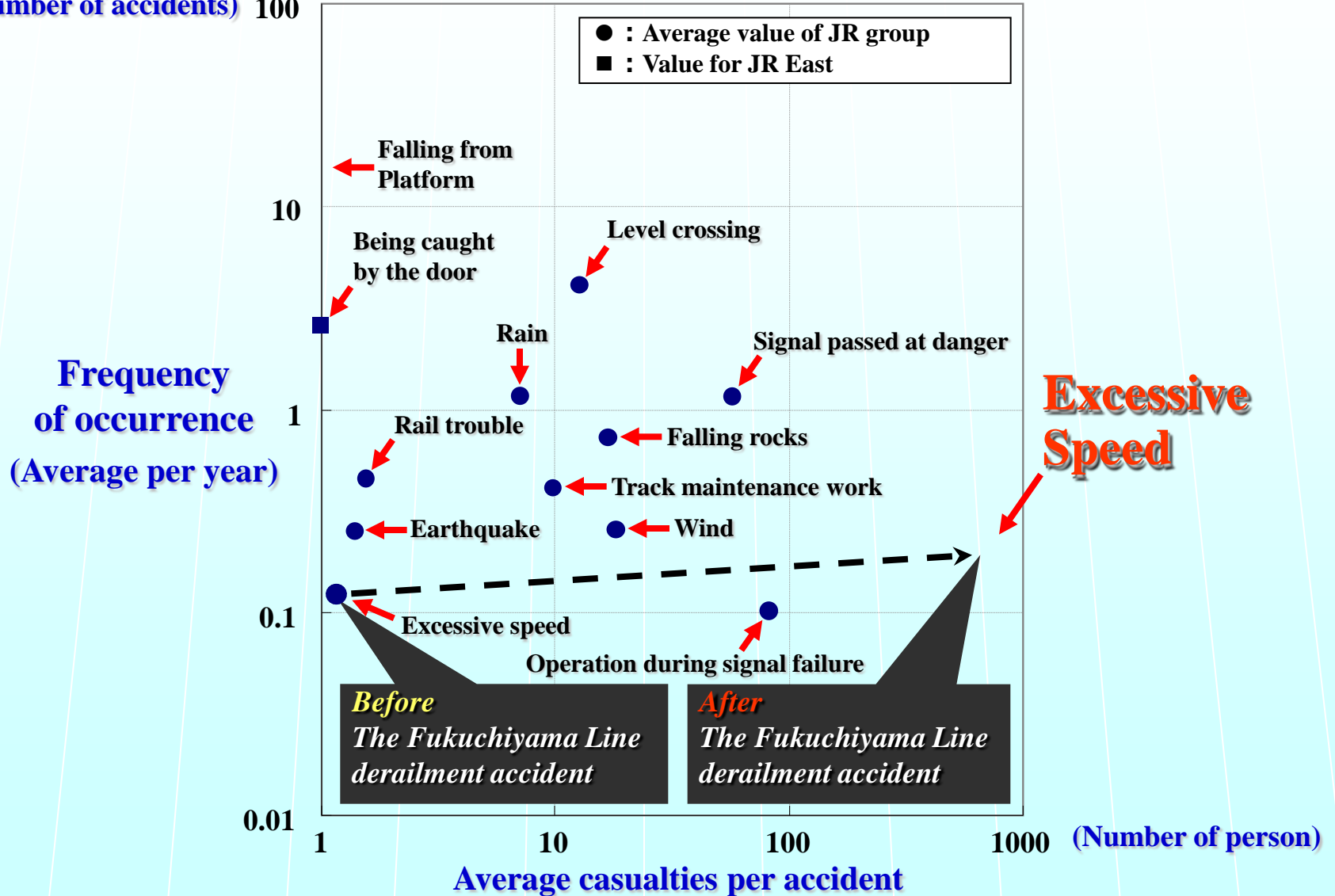


An apartment house

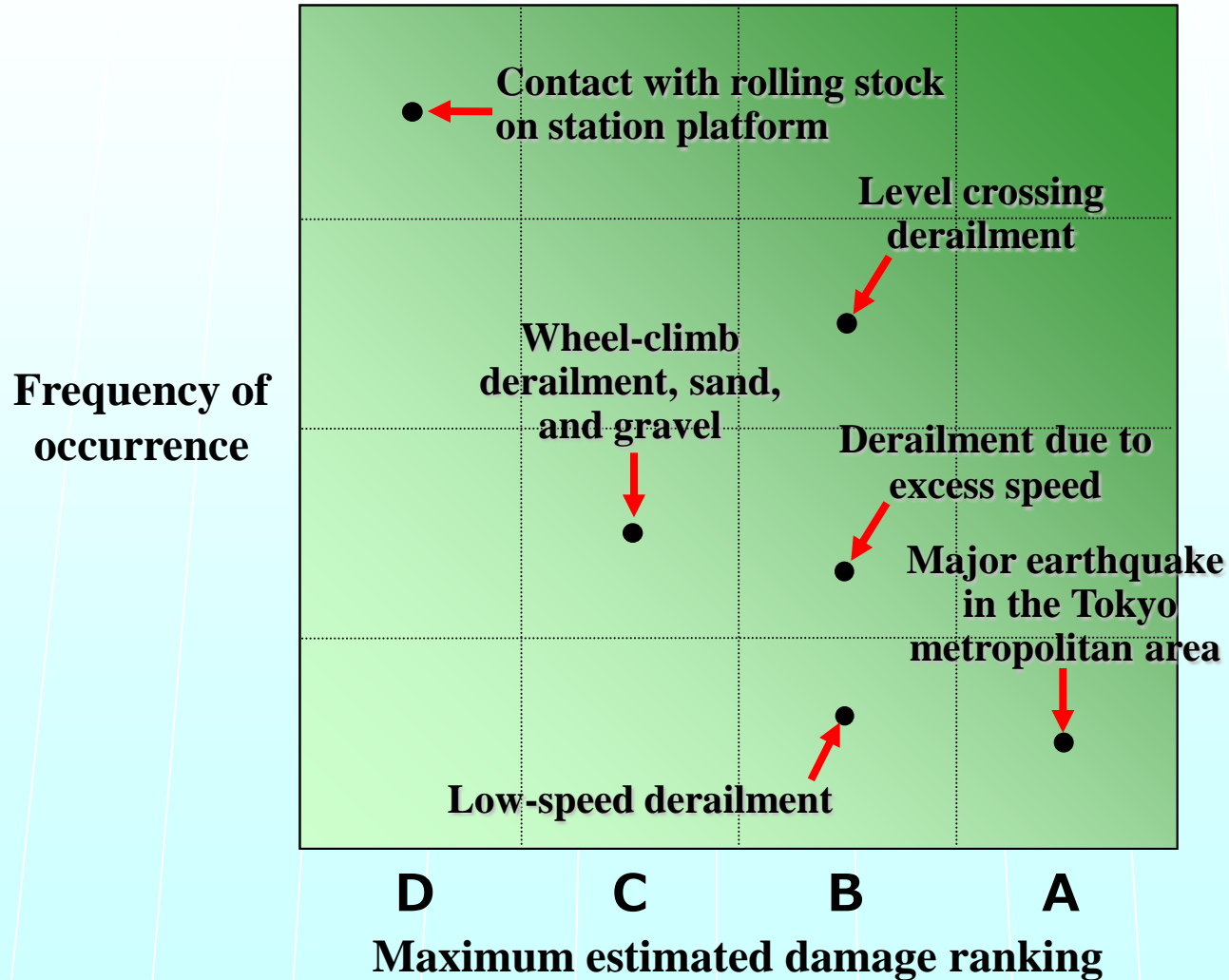
- Commuter train was running on a right-hand curve.
- 5 cars of the 7-car train were derailed.
- The first and second cars slammed into a building along the railroad and crashed.
- 106 passengers and the motorman were killed and 562 passengers were injured.

# Analysis of risk based on result

(Number of accidents) 100



# Our risk evaluation

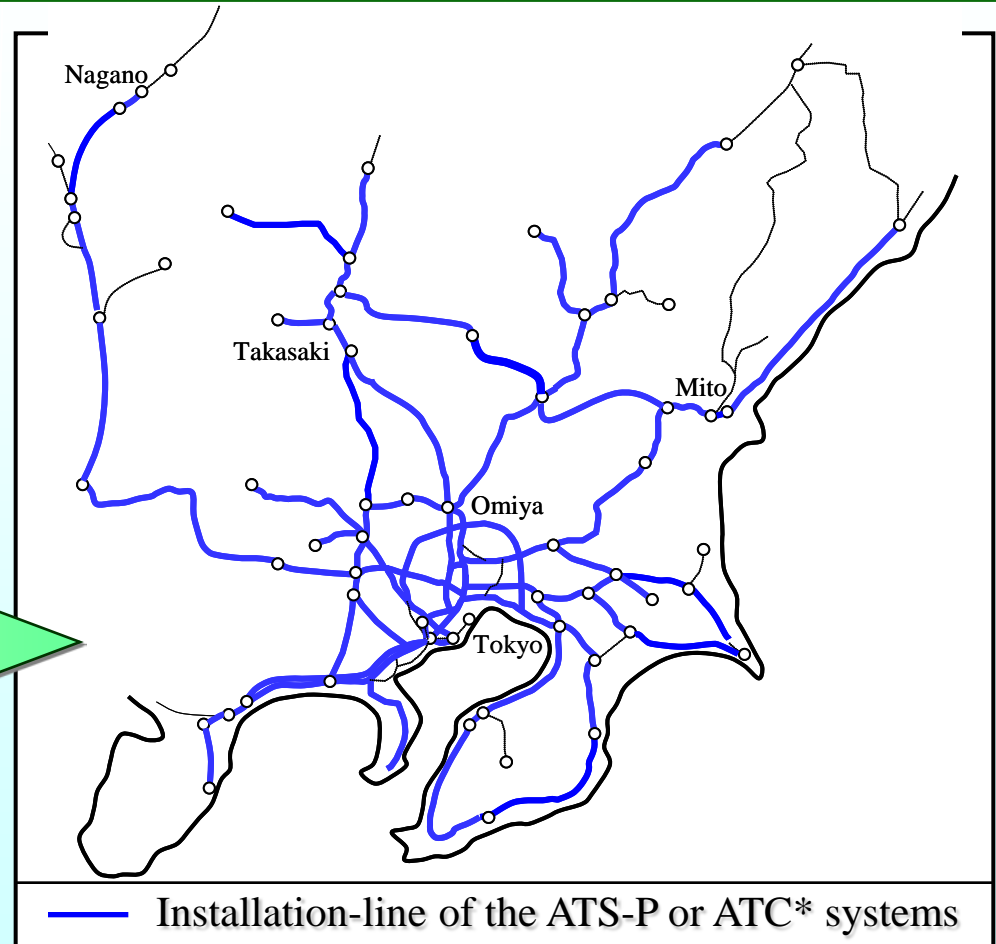
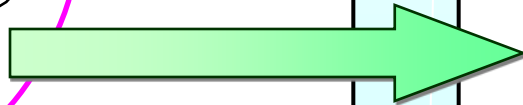
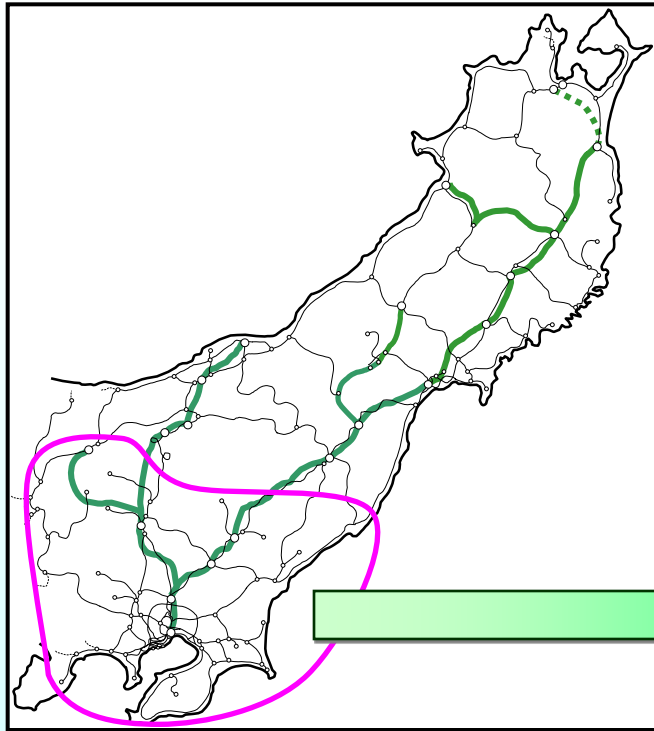


# Amendment of the law

After Fukuchiyama-Line derailment occurred, the Ministry of Land, Infrastructure and Transport revised the technical standards.

- We must install the systems to prevent excessive speed at curves, junctions, line terminals and so on.
- These are required to be installed on major rail lines by the end of June 2011 or the end of June 2016, depending on the line's train speed and frequency.

# Countermeasures taken by JR East

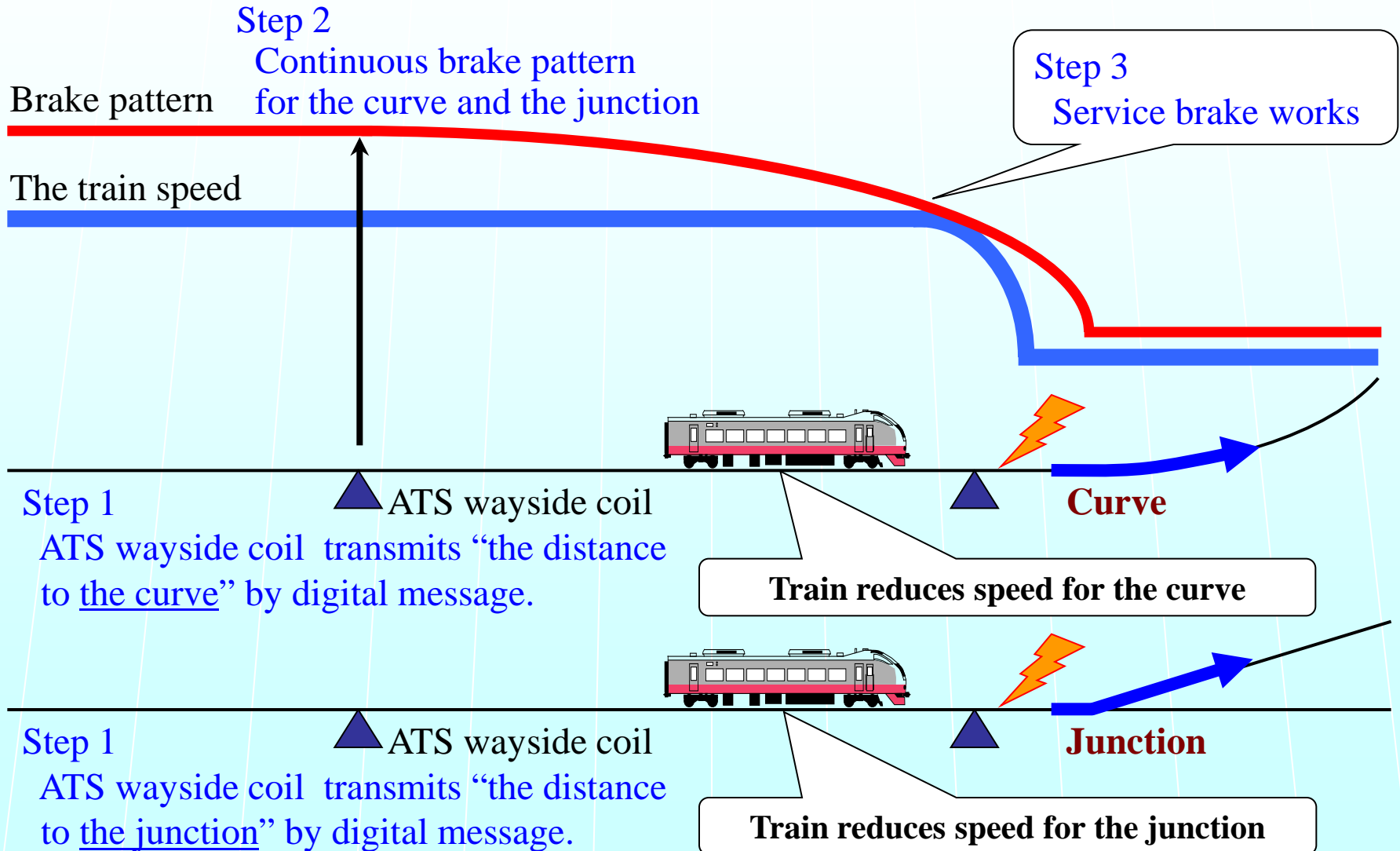


**ATS-P systems had been installed on 2,321.6 km of railway line.**  
**ATS-P systems cover 95 percent of JR East's traffic volume.**

\* ATC···Automatic Train Control ( ATC systems had been installed on 156.8 km of railway line. )

# New countermeasures for Fukuchiyama-Line accident

**The following is new countermeasures to prevent excessive speed**





# New countermeasures for Fukuchiyama-Line accident

The following is the progress of new countermeasures to prevent excessive speed along with amendment of the law.

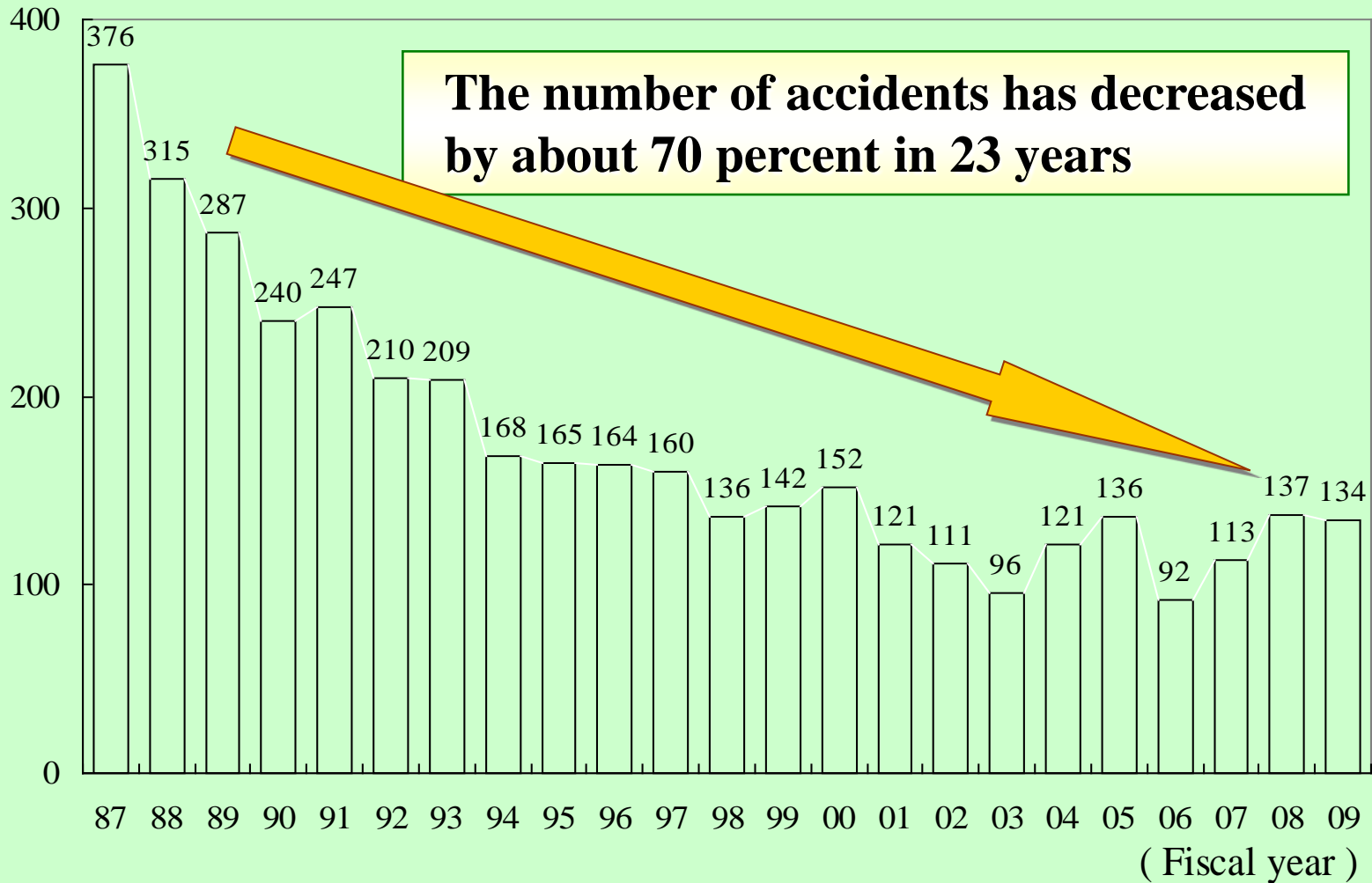
	Target	Installations as of the end of fiscal 2009 (ended March 31, 2010)	Planned completion
Curves	1,470 locations	1,470 locations	Completed (the end of March 2010)
Junctions	1,896 locations	1,083 locations	the end of June 2016
Line terminal	131 locations	105 locations	the end of June 2016

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# Trend in the number of accidents since our establishment

( Number of accidents )




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# Conclusions

- Our ATS system is exactly the history of the railway system safety.
- We not only take these countermeasures but also try to evaluate potential risks that can cause very great damage in the future.
- We take countermeasures for high priority risks.
- We think that this risk management will improve the railway system safety.



Thank you for your attention !!