Title : Details of “2013 Safety Vision”
The 5th Five-year Safety Plan for East Japan Railway Company

Theme : How safe is safe enough ?

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Abstract :
Since our establishment in 1987, we have been working consistently to improve safety as our most important mission. As a result, we have improved safety through the execution of four five-year Safety Plan in the past. However, there is no end in the improvement of safety. We are called to create safety by inquiring of the wisdom of humanity and through our own effort.

In this paper, I will report on the details of “2013 Safety Vision”, the 5th Five-year Safety Plan in East Japan Railway Company (JR East).

1 Two perspectives given particular priority in the “2013 Safety Vision”

We developed a new 5-year safety plan, "2013 Safety Vision", to start in fiscal year 2009. In 2013 Safety Vision, we put emphasis on two new perspectives.

・“Human resource development and improvement of systems related to safety”

In our company, a generation change and an introduction of the system is going on in operating organizations. Moreover, our safety is supported by our group companies and our partner companies that work together with JR East.

Therefore, we have decided that branch offices and operating organizations will provide the core employees with knowledge, leadership and technologies concerning safety. In addition, we will improve the safety level together as the JR East group.

・“Accident prevention through risk evaluation”

Our present method to prevent serious accidents is mainly to prevent repeating the accidents or events that had happened. We will continue this approach in the future, but there are also events that seem unimportant only because they have not yet caused major damage.

Therefore, we introduced risk evaluation that takes into consideration the frequency of the events we have experienced in the past, including those with only small damage, and the maximum scale of damage of the events we can imagine. We will give high priority to preventing such accidents by using this evaluation.

2 The Four Pillars of "2013 Safety Vision"

In 2013 Safety Vision, we defined four pillars. The details are explained below.

① Creating a culture of safety

・The five "cultures" which make up a culture of safety

In order to enhance safety, the highest priority issue for our company, it is necessary to build a firm safety culture and have it permeate thoroughly throughout the organization.

The safety culture we aim at is the culture in which we learn and act from the accidents that have occurred and from information about the symptoms of accidents, based on mutual confidence among our staff.

The five "cultures" which make up a culture of safety are introduced below.

Five cultures

＜ **Correct reporting culture** ＞

If we report accidents correctly and take countermeasures to prevent accidents, the same type of accidents will not recur. Reporting correctly and quickly is very important and the starting point for the prevention of accidents.

＜ **Awareness culture** ＞

"Mai hyatto", the experience of near-accidents, is the hidden sign leading to accidents. If we can be notice and be aware of the hidden signs leading to accidents, we will surely be able to prevent accidents. There is a limit to human imagination. The hidden signs leading to accidents can supplement human imagination. Therefore, if we are aware of the hidden signs leading to accidents and share this information, we can prevent the accidents.

＜ **Discussion culture** ＞

If we are too nervous about the feelings of our colleagues to discuss what they don't want to discuss, we cannot prevent similar accidents. We can all be aware of the background of incidents or events and can take proper countermeasures against them only if we discuss them thoroughly, even in cases when we have different opinions, from the viewpoint of investigating their causes, not from the viewpoint of seeking responsibility.

＜ **Learning culture** ＞

Past accidents are valuable lessons, and it is necessary to make the best use of them. It is important to utilize the incidents or events occurring in other places and to take countermeasures to prevent accidents; the fault of another is a good teacher. Learning from accidents continually through the Challenge Safety Campaign or from the data book of past accidents will help us prevent accidents.

＜ **Action culture** ＞

Safety is secured only if we relate reporting, awareness, discussing and learning to safety action. Standard behavior and pointing for confirmation are safety actions. "Thinking and acting for ourselves" is the source of support for safety.

・Details of “Sangen Syugi” , the basis of our company’s activity

“Sangen Syugi” is explained below.

Three actualls

The actual location:

We should go to the actual location to understand what happened and how it happened.

The actual things:

We should examine the actual objects, such as rolling stock, equipment, machines and tools to understand the circumstances.

The actual persons:

We should meet face to face with the persons actually involved, to understand their circumstances.

Safety issues occur at the actual scene. The answers to the issues are also at the actual scene. Therefore, the “Sangen shugi”, which insists on the importance of “three actuals”: “the actual location”, “the actual things” and “the actual persons” is necessary.

We decided “Sangen Syugi” was the basis of our company’s activity.

・Specific ways to carry out the original tenets of the Challenge Safety Campaign *

* Challenge Safety Campaign: Campaign to raise safety awareness among employees

Safety actions by each of us create the whole safety of JR East. Our safety consciousness and sensitivity plays an important role in our sure actions for safety. This campaign seeks to encourage employees to think about safety, discuss it, act on it, and feel satisfaction in achieving it and, through this process, to refine their safety consciousness and sensitivity for further movements for safety.

The vision of the Challenge Safety Campaign is introduced below.

The vision of the Challenge Safety Campaign

- An individual employee uncovers safety issues and thinks about how to handle them.
- Employees all discuss what they should do and formulate objectives that can be achieved.
- In order to achieve the objectives that they have thought about together, they all take their own actions, continuing on a day-by-day basis.

We have, however, discovered the problem that many employees in operating organizations have a passive attitude and they cannot argue about safety actively. In Safety Vision 2013, we will recognize this starting point of the campaign and activate it from many points of view; we will name this challenge “the Challenge Safety Renaissance”.

Examples of the Challenge Safety Campaign in various ways

・Daily conversation and meeting about safety

・Sharing "Mai hyatto *" * Mai hyatto: the experience of near-accidents

・PKY (Planning Kiken Yochi - foreseeing the unsafe)

・Free discussion about safety

・Arguing about an event that requires attention and implementing countermeasures that we can take

・Challenge Safety Action meeting and other activities.

② Rebuilding a safety management system

・Details of future human resource development and handing down of safety information

Employees in operating organizations are responsible for safety.

However, a generation change is going on in operating organizations. Branch offices and operating organizations must provide the core employees with knowledge, leadership and technologies concerning safety, and also must train their successors carefully. Therefore, we will identify "key safety leaders" and "safety professionals" to develop human resources.

We will also work to ensure that safety knowledge is passed on to newer employees.

The details are explained below.

The roles of key safety leaders

We will develop the employees who fill these three requirements:
thorough knowledge, instruction ability, and ability to train successors.

・<u>Thorough knowledge</u>

Having thorough knowledge concerning weak points, safety rules, equipment, work, and past accident records

・<u>Instruction ability</u>

Being able to instruct employees in knowledge that must be understood thoroughly and in weak points that must be overcome

・<u>Ability to train successors</u>

Steady development of newer employees who will be their successors

The roles of safety professionals

- We will train employees in leadership and in thorough knowledge of safety rules, train operation rules, and past accident records.
- Safety professionals will formulate the countermeasures against accidents, give advice in abnormal situations, formulate safety measures, and lead the Challenge Safety Campaign.
- Branch offices will develop the safety professionals over the long term, as the employees with knowledge, technologies and good sense concerning safety.

The approaches of succession of safety knowledge

- **Organization of chroniclers (narrators of oral-history)**

  We will set up organizations whose members are employees with a wealth of safety knowledge and practical ability, including retired employees, with chroniclers (narrators of oral-history) as core members, in order to pass safety knowledge on to future generations of employees.

- **Expansion of the Accident History Exhibition Hall**

  We will develop the hall as the place where we can study from past accidents, by installing displays of rolling stock involved in accidents and facilities for learning from these experiences.

- **Compiling a "technical history of safety (an illustrated scroll)" and "serious accidents dictionary"**

  We will compile two books to use in educational programs. One is the "technical history of safety (an illustrated scroll)", that gives detailed historical evidence about safety systems. The other, the "serious accident dictionary", will cover a variety of accident cases of different types.

・Contents of safety improvement in JR East Group

Our safety is supported by our group companies and our partner companies that work together with JR East. We take particular care to work together as the JR East Group for the prevention of railway operation accidents and of industrial accidents.

The details are introduced below.

The approaches of safety improvement in JR East Group

- Our group companies will also follow the "Sangen Shugi".
- Safety divisions of group companies will be support and enhanced.
- We will examine new ways of improving facilities speedily in accordance with the opinions of the group companies.
- Group companies will examine new ways to improve facilities using their own funds.
- We will set up longer intervals for track maintenance between trains so that workers can be assured of a reasonable working schedule.
- We will improve the technical capabilities and safety consciousness of the permanent staff of group companies.
- Taking seriously the recent situation of frequent occurrences of industrial accidents, we will take thorough measures to eliminate accidents caused by trains hitting workers, by electric shocks, and by falls.

・The idea of "stop trains if you sense danger!", the basis of our company's activity

Safety and stability have a different meaning. While regarding safety as the high-priority issue, we put importance on both safety and stability. For both of these, standard ways of working are important. Safety means protecting lives, and stability means maintaining on-time train operation.

Haven't you ever taken a risk with accident prevention procedures (safety) for the sake of on-time train operation (stability)?

For instance, they are the following cases.

- Hesitating to stop a train because it would cause a delay, when seeing that the train is starting with an umbrella tip caught by a door
- Closing the doors without checking the signal, just because it is departure time
- Exceeding the speed limit accidentally just to make up for a delay
- Skipping what should be done, such as follow-up tests or work after delayed late-night work, so that the first train can start on time

We are regarding safety as the high-priority issue. Therefore, we will set the principle of "stop trains if you sense danger!" our group-wide standard of conduct.

③ Taking sure steps to reduce risks

・Details of our risk evaluation

Our present method to prevent serious accidents is mainly to prevent repeating the accidents or events that had happened. We will continue this approach in the future, but there are also events that seem unimportant only because they have not yet caused major damage.

This time, we introduced risk evaluation that takes into consideration the frequency of the events we have experienced in the past, including those with only small damage, and the maximum scale of damage of the events we can imagine. We will give high priority to preventing such accidents by using this evaluation.

Evaluating the damage rank first

Examples

A: Hanshin-Awaji Earthquake, Tokyo metropolitan area large earthquake (assumption)

B: Osutakayama airplane disaster, Tsurumi collision, Mikawashima collision, Fukuchiyama line derailment

C: Shigaraki-kougen Railway collision, Uetsu Line derailment

D: People being hit by a train at a station platform

We will classify events in this way and will analyze the correlation between the frequencies of these accidents or events and the damage from them. The figure to the following is an example of the analysis. (See Figure 1)

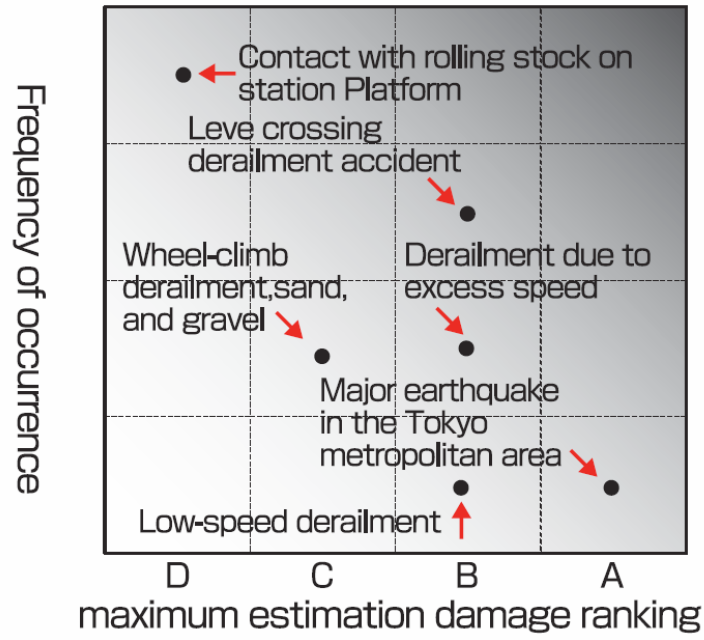

Figure 1: An example of the analysis

Light and shade of the color of the background in the figure shows the priority level. This figure shows that we will take firm countermeasures against accidents leading to major damage, even though their frequencies of occurrence are small. Also, we will take firm countermeasures against accidents or events which occur many times, even though each of them causes only small damage.

According to this evaluation, we will advance the following measures, along with others.

- **Countermeasures against Tokyo metropolitan area large earthquake**
  Detecting and stopping trains at an early stage, examining the earthquake-proof measures on each line
- **Countermeasures against level crossing accidents**
  Countermeasures that prevent pedestrians from crossing just in front of moving trains, countermeasures against secondary damage, installation of crossing obstacle detectors according to the danger level at crossings outside of the Tokyo metropolitan area.
- **Countermeasures against excessive speed ;**
  Countermeasures against miscommunication
  For train drivers, the installation of ATS*-P or ATS-Ps and countermeasures to prevent excessive speed at temporary speed restrictions
  * ATS: automatic train stop
  For dispatchers, improving train radio systems and installing a system with automatic communication to drivers and conductors on trains.
- **Countermeasures against low-speed wheel-climb derailment**
  Constructing an experimental line to investigate the mechanisms of derailments
- **Safety measures for station platform**
  Installing movable platform barriers, increasing the number of emergency train stop devices, measures for safety of escalators and elevators, countermeasures that prevent passengers from being unshipped.
- **Countermeasures against natural disasters**
  Reliable countermeasures against rock falls and landslips

④ Promoting active installation of safety facilities

Since the division and privatization of the Japanese National Railways in 1987, we have invested more than 2,200 billion yen under our four 5-year safety plans. Our safety record has steadily improved. We will continue this for the 5-year period from 2009. Our safety investments over the 5 years beginning in 2009 will be approximately 750 billion yen.

The details are introduced below.

・Improvement of facilities to prevent accidents which are caused by improper operation or maintenance

New actions

・Ascertaining the causes of accidents through building an experimental line, and taking countermeasures against these causes (See Image 1)

・Examining countermeasures against excessive speed at sections that have temporary speed restrictions, such as by using ATS system ground equipment

・Examining countermeasures against miscommunication, such as providing a disaster alarm system

・Developing a new train approach warning device which does not depend on track circuits

Countermeasures to be added continuously

・Installing more ATS-P and ATS-Ps where necessary and where legally required

・Improving train control systems (ATOS, CTC, PRC, automatic systems that do not require station operation staff)

・Developing a system for sending train protection radio messages automatically

・Improving train radio, such as digitization

・Systematization of communication

・Completing the installation of emergency brake systems on rolling stock, so that trains will stop automatically if the driver becomes unconscious

・Adding more electric snow-melters or bearing base plates

・Systematization of railway track-closure procedures

・Designing maintenance vehicles so that they cause short-circuits on block-signal systems

・Taking countermeasures against the possibility of opening train doors when the train is not at a platform

・Developing axle box temperature detection devices and other safety equipment (See Photo 1)

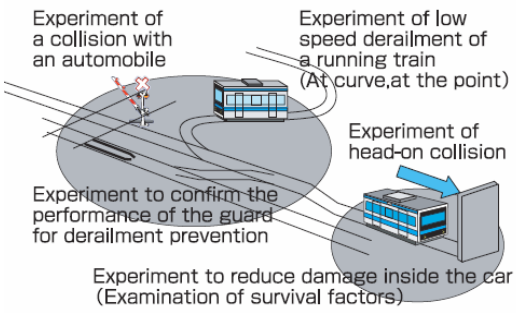

Image 1: Image of the experiment line

Photo 1: Axle box temperature detection device

・Improvement of facilities to prevent accidents by natural disasters or other external factors

New actions

・Examining countermeasures for a large earthquake in the Tokyo metropolitan area, such as an automatic train stopping system for when a large earthquake is detected

・Examining the methods for using weather information to restrict train operations (See Image 2)

Countermeasures to be added continuously

・Continuing the countermeasures against earthquakes, such as measures that keep Shinkansen trains close to the track when there is a derailment, a measure against rail breaks, rahmen viaducts, and seismic reinforcement of supporting columns (See Photo 2)

・Improving the early earthquake detection system

・Installing windbreak fences

・Introducing a strong-wind warning system

・Expanding the use of countermeasures against rock falls and landslips

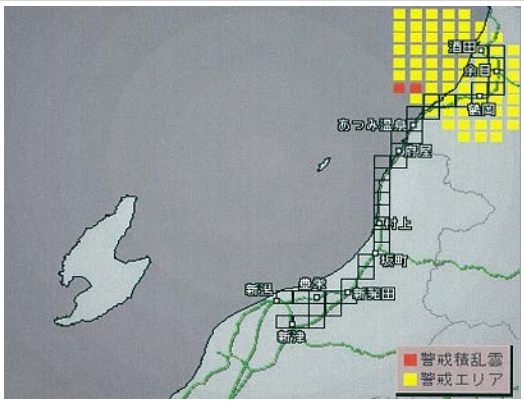

Image 2: Utilization of the weather information

Photo 2: Seismic reinforcement of the viaduct

・Improvement of facilities on station platforms and at level crossings

New actions

・Introducing automatic platform gates on the Yamanote Line (See Image 3)

・Examining countermeasures against side-effect damage from level crossing accidents, such as preventing trains from derailing and blocking adjacent tracks (See Image 4)

・Examining new countermeasures for preventing pedestrians from crossing directly in front of moving trains at level crossings

・Taking countermeasures to prevent passengers from falling from platforms

・Taking safety measures for escalators and elevators, including the prevention of passenger injuries

Countermeasures to be added continuously

・Installing more emergency train stop devices and improving them by expanding their coverage area

・Installing more platform detection devices and using them when trains are coupled or uncoupled

・Installing more level-crossing obstruction detectors

・Upgrading level crossings for greater safety

Image 3: Platform edge doors

Image 4: Guard for prevents deviation
(An example of countermeasure against secondary damage from level crossing accidents)
Note: We will test and analyze the effect of these ideas on the experimental line.

3 Conclusions

There is no end for safety. The wisdom and the efforts of humanity are required to build up safety. Therefore, we will be engaged in safely related issues first, before other issues, and will challenge continually and completely for “ultimate safety”.