1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9000

Index of 1990 Conference Papers

Publisher
2000 International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Index of 1990 Conference Papers

Paper No.	Author	Remarks
9001		Introduction papers and schedule
9002	Isamu Yamashita	Opening Speech
9003	Schichiro Yamanouchi	Keynote Report I
9004	Georges Dobias	Keynote Report II, New concept for railway safety
9005	Jean Louis Meyer	Experience gained by SNCF with regard to the safety of high speed operation
9006	Henk van der Flier	Contribution of psychological tests to railway safety
9007	Dieter Metz	Safety strategy for the man - machine system railway
9008	Koji Sasaki	East Japan Railway Company Safety Plan
9009	Shin Kanke	Railway Safety for Labour Unions
9010	Kunio Yanagida	Guest Speech - The progress of technology vs. safety "blind spots in the age of big systems"

Publisher
2000 International Rail Safety Conference

Publisher

2000 International Rail Safety Conference

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9001

Introduction papers and schedule

Publisher
2000 International Rail Safety Conference

INTERNATIONAL RAILWAY SAFETY CONFERENCE M & L

国際鉄道安全会議

EAST JAPAN RAILWAY COMPANY

International Railway Safety Conference M & L

Dates: October 30 ~ November 1, 1990
Place: Hotel Metropolitan, Tokyo

Organized by
East Japan Railway Company
East Japan Railway Workers' Union

Supported by
Ministry of Foreign Affairs, Japan
Ministry of Transport, Japan
Ministry of Posts and Telecommunications, Japan
Ministry of Labor, Japan

Conference Schedule

October 30 (Tuesday)

9:00 ~ 9:10	Opening Speech Isamu Yamashita, Chairman East Japan Railway Company, Japan
9:10 ~ 9:30	Keynote Report I Shuichiro Yamanouchi, Executive Vice President East Japan Railway Company, Japan
9:30 ~ 9:50	Keynote Report II New Concept For Railway Safety Georges Dobias, Director General INRETS, France
9:50 ~ 10:10	Experience Gained by SNCF with Regard to the Safety of High Speed Operation Jean-Louis Meyer, Director for Railway Safety Directorate French National Railways (SNCF), France
10:10 ~ 10:30	Contribution of Psychological Tests to Railway Safety Henk van der Flier, Head of Psychology Department Netherlands Railways (NS), Netherlands
10:30 ~ 10:50	Coffee break
10:50 ~ 11:10	Safety Strategy for the Man - Machine - System Railway Dieter Metz, Senior Manager German Federal Railway (DB), Federal Republic of Germany
11:10 ~ 11:30	East Japan Railway Company Safety Plan Koji Sasaki, General Manager Safety Research Laboratory East Japan Railway Company, Japan
11:30 ~ 11:50	Railway Safety for Labour Union Shin Kanke, General Secretary East Japan Railway Workers' Union, Japan
11:50 ~ 13:00	Lunch (Sakura 4th Floor, Asahi and Aoba, 3rd Floor)
13:00 ~ 14:00	Guest Speech The Progress of Technology vs. Safety - Blind Spots the Age of Big Systems - Kunio Yanagida, Writer, Journalist Japan
14:00 ~ 14:20	Sand - Why Control? Anthony Boland, Executive Manager Rail Safety Audit Group State Rail Authority of New South Wales, Australia
14:20 ~ 14:40	Railroad Safety - The Human Factor P. Cannito, Vice President, Safety & Environmental National Railroad Passenger Corporation (AMTRAK), U.S.A.

14:40 ~ 15:00	Safety Management in New Zealand Railways Corporation Raymond Ryan, Corporate Manager Safety and Risk Management New Zealand Railways Corporation (NZRC), New Zealand
15:00 ~ 15:20	Coffee break
15:20 ~ 15:40	British Rail's Safety Management Programme David Rayner Board Member & Managing Director Operations & Engineering, British Railways Board (BR), U.K.
15:40 ~ 16:00	Maintain the Policy of "Safety First, Emphasis on Prevention" in Traffic Operation Liu Yongwen Senior Engineer, Safety Supervisor China's Railways (CR), China
16:00 ~ 17:00	Guest speech Akira Esaka, Management Critic Japan
17:30 ~ 19:00	Reception (Aoba, Hikari and Asahi, 3rd Floor)

October 31 (Wednesday)

9:00 ~ 10:20 Panel discussions (Part I)

Coordinator: Midori Miyazaki
Newscaster

Panelists: Masayuki Nishie
Anthropologist
Henk van der Flier
Head of Psychology Department, NS
Pierre Messulam
Deputy Officer
Human Factors, SNCF
Masatake Matsuda
Executive Vice President
East Japan Railway Company
Akira Matsuzaki
President
East Japan Railway Workers' Union

10:20 ~ 10:40 Coffee break

10:40 ~ 12:00 Panel discussions (Part II)

12:00 ~ 13:00 Lunch (Sakura, 4th Floor, Asahi and Aoba, 3rd Floor)

13:00 ~ 13:20 Question?
JR Aizu Wakamatsu Station Employees
East Japan Railway Company, Japan

13:20 ~ 13:40 Building a Workplace Where Workers Initiate Safety
Kazuhiro Niizuma
Member of J.R.U.
Japan

13:40 ~ 14:40 Short Presentation

13:40 ~ 13:55 MAV Safety Devices
Machovitsch Laszlo
Technical & Economical Councellor
Hungarian State Railways (MAV), Hungary

13:55 ~ 14:10 Heinz Krueger
Director, Operating Department
German State Railway (DR)
Federal Republic of Germany

14:10 ~ 14:25 Rezac Pavel
Director of the International Relations Department
Czechoslovakia State Railways (CSZ)
Czechoslovakia

14:25 ~ 14:40 Marek Raczkiewicz
Deputy General Director
Polish State Railways (PKP), Poland

14:40 ~ 15:10	Questions and Answers
15:10 ~ 15:20	Closing Speech Akira Matsuzaki, President East Japan Railway Workers' Union, Japan
15:40	Leave Hotel by chartered bus
16:40 ~ 17:40	Exhibition "SAFETY CHALLENGE" at Tokyo Central Station
17:40	Leave Tokyo Central Station by chartered bus
18:40	Arrive Hotel

November 1 (Thursday)

8:30	Assemble at the Lobby of the Hotel
9:25	Leave Ikebukuro Station by AC-DC Electric Multiple-Units, Series 651
	New Train Control System Demonstration
11:48	Arrive Nikko Station
	Leave Nikko Station by bus.
12:00 ~ 13:30	Lunch at Nikko Kanaya Hotel
14:00 ~ 15:30	Tour of Toshogu Shrine
16:08	Leave Nikko Station (by Special Train)
19:05	Arrive Ikebukuro Station
19:30	Breaking up at Hotel

Technical Visit (Optional)

November 2 (Friday)

8:30	Assemble at the Lobby of the Hotel
9:00	Leave by Chartered bus
10:30 ~ 12:00	Tour of Central Research Institute Hitachi, Ltd. (Kokubunji)
12:00 ~ 13:30	Lunch
14:00 ~ 16:30	Tour of Railway Technical Research Institute. (Kokubunji)
18:00	Arrive Hotel

International Rail Safety Conference

1990 TOKYO

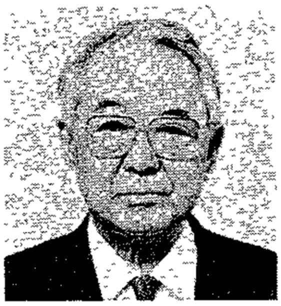
30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9002

Isamu Yamashita

Opening Speech

Publisher
2000 International Rail Safety Conference



Opening Speech

by

Isamu YAMASHITA

Born in 1911

Graduate of Tokyo Imperial University, Mechanical Engineering Department, Faculty of Engineering

Entered Mitsui & Co., Ltd. Shipbuilding Department in 1933. Assumed presidency in 1970 and chairmanship in 1979.

Served as member of the Ad Hoc Commission on Administrative Reform and chairman of the Japanese National Railways Assets Utilization Council.

Present chairmanships include the International Organization for Standardization (ISO) and the council of the Federation of Economic Organization.

Opening Address by Isamu Yamashita, Chairman of East Japan Railway Company
(Draft)

Ladies and Gentlemen:

Representing hosts for this International Railway Safety Conference, I would like to express our heartfelt welcome to all attendants, and special welcome to those representatives who came over here with their long journey. JR East planned this international conference on "Safety in the Railway Industry: A Railway Renaissance for the 21st Century" to renew our pursuit of the optimal approach to railway safety. In planning it, we received tremendous support and cooperation from many organizations, including the Ministry of Transport, the Ministry of Foreign Affairs, the Ministry of Posts and Telecommunications, and the Ministry of Labor. As the host, I have to thank many people from Japan and overseas for their attendance here today. I am particularly grateful that Mr. Dobias from France and many others from abroad have come and let us able to hold this important conference. I would like to extend a heartfelt welcome to all of you here today on behalf of our entire organization.

Three and a half years have passed since the privatization and division of the Japanese National Railways. During these years, we have strengthened our commitment to safety as the highest priority in railway operation, and we are striving to provide safe, comprehensive services to meet the needs of the areas JR serves.

Up to now, it has been taken for granted that railroad operators would perform safety measures as a matter of course. Moreover, in a time in which trains have gradually been eclipsed by automobiles and airplanes, railways have been neglected to some extent.

On the other hand, in those major cities of the world, the number of automobiles recently has increased very much while many people have observed that the road transportation has not improved at all. The others have noted that not only are airports reaching the limit of their capacity, but road access between airports and major cities is inconvenient and considerable time is wasted.

Since the role of railways is being reexamined in Europe, America and Japan and railways around the world are striving for their revival, we have considered what we should do at this juncture to further this renaissance. Immediately after the inauguration of our company, we addressed the design of the stations and trains--the surface aspects which the public encounters directly. And last year we held the highly acclaimed Railway Design & Quality Conference, Tokyo '89 to exchange information with representatives from various countries.

This time we selected safety--the fundamental issue any railway is facing--as the focus for international debate. This is not a matter just for management, but an issue for employees as well. For this reason, we have invited those representatives of railway executives and employees from around the world to participate in this international conference.

The technological innovation has made the equipment safer, but, in the final analysis, the overriding factor is the point of contact between man and increasingly advanced systems, the so-called man-machine interface. Not only is this issue common to all countries, but also it is an important element in other fields as well.

As long as people are operating the railway transportation, an accident might occur, but we have to continue to make sustained efforts of reducing the probability of accidents to zero. No matter how much technological innovations are introduced, if the safety is not always assured by concrete efforts by those people concerned, trains won't be taken as serving the public.

Considering the change in the future working environment, the issues such as employees' abilities, morale, and attitude are also important elements.

For these reasons, we have brought together many authorities from around the world and hosted this major international conference. I expect that the directions and plans that we outline at this meeting will affect not only the future of JR East but also other railways in Japan and around the world as well.

On behalf of the host organization, I am confident that your lively discussions at this conference will surely mark a significant stride in the field.

Thank you.

International Rail Safety Conference

1990 TOKYO

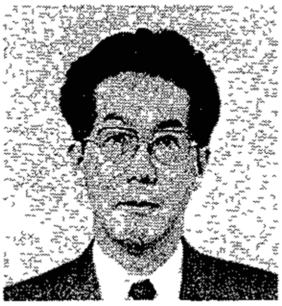
30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9003

Schichiro Yamanouchi

Keynote Report I

Publisher
2000 International Rail Safety Conference



Keynote Report I

by

Shuichiro YAMANOUCHI

Born in 1933

Graduate of Tokyo University, Mechanical Engineering Department, Faculty of Engineering.

Entered Japanese National Railways in 1956. Appointed director, Train Operation Department, and executive director, Japanese National Railways, in 1982 and 1985.

Appointed executive vice-president, East Japan Railway Co. in 1987.

The last decade of this century is likely to be one of dramatic political and economic changes, as evidenced by the reforms in Eastern Europe and the scheduled EC market integration. In this context, the transportation industry as a whole is also on the threshold of transformation and the railway is no exception.

In Japan, the national railway was privatized into six passenger companies and one freight company and management of the new system has proceeded smoothly. The remaining task is to upgrade the railway into a modern transportation system that can be continually developed into the twenty-first century.

A crucial requirement for achieving this goal is that the company be creative as well as sensitive to user needs so that it can develop valuable new services and technologies. The company must possess "design" ability in the broadest sense of the term and the basic requirement for this is a thorough understanding of technology.

The creation of new services means developing a full range of services that meet customer needs and designing the most suitable environment for travel.

To support such a system, high-level technologies and information systems as well as sophisticated maintenance systems must be brought into operation. As a company equipped with modern information systems the railway itself becomes a high technology system.

The starting point of the challenge for this development is safety, which can be sustained only through the harmonious coexistence of technology and human beings.

The Shinkansen, Japan's super express railway system, has an exceptional safety record--no passenger fatalities for the twenty-six years of its operation. The second round of the railway's reforms will implement an even safer railway system and provide passengers with a more relaxing travel environment. The new system will be a modern railway that is representative of the twenty-first century and that allows its staff creativity and fulfillment in their work.

###

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9004

George Dobias

Keynote Report II, New concept for Railway Safety

Publisher
2000 International Rail Safety Conference

Keynote Report II
New Concept for Railway Safety

by

Georges DOBIAS

Born in 1936

Departmental Director of the Ministry of Equipment in the Department of Essonne 1981 to 1984.

Appointed Director of the French Transport Research Institute (IRT) and the National Organization of Road Safety (ONSER)

Director General of the National Institute for Research on Transport and Traffic Safety (INRETS)

Vice-Chairman of the Committee for Development of the Technological R&D Programme in Land Transport.

Professor at the Ecole Nationale des Ponts et Chaussées

NEW CONCEPT FOR RAILWAY SAFETY

Georges DOBIAS
Director General
Institut National de Recherche sur les Transports et leur Sécurité
France

Railway safety is based on two main principles :

- cruise control including speed control,
- space control between trains.

Many automatic or semi-automatic devices have been and are developped to assist the train drivers or even to control them.

This evolution is suitable because the great reliability of these devices, but it changes not only the man-machine interface, but also the role of the train drivers.

The organization of the whole safety system to be discussed to understand the specifities of the role and reliability of men and automatic devices for the future.

This means new regulations, new training, may be new abilities for men in charge of safety matters and a more precise management of learning by expérience.

This evolution needs research not only in technology but also in human factors and a close discussion between labor-unions and management to prepare the necessary changes to improve both the safety and the capacity of the infrastructures.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9005

Jean Louis Meyer

Experience gained by SNCF with regard to the safety of high speed operation.

Publisher
2000 International Rail Safety Conference

Experience Gained by SNCF with Regard to the Safety of High Speed Operation

by

Jean Louis MEYER

Born in 1929

Graduated engineer (Ecole Polytechnique - Paris)

Recruited by SNCF in 1952, in the civil engineering department.

After several appointments in the field as permanent way inspector, signalling inspector and civil & signalling engineer, acted as an engineer in several engineering divisions and was in charge of signalling first and permanent way subsequently.

From 1970 to 1975, Head of the cybernetics department of SNCF Research Department.

From 1975 to 1983, SNCF Regional Manager in Bordeaux.

From 1983 to 1989, Head of the Inspection Générale de Sécurité (body conducting audits and enquiries related with railway safety).

Now Director, Railway Safety Directorate.

ABSTRACT

EXPERIENCE GAINED BY SNCF WITH REGARD TO THE SAFETY OF HIGH SPEED OPERATION

Since September 1981, SNCF has been working TGV trains at speeds of 260, 270 and currently, 300 kph as of the commissioning of the TGV-Atlantic route in September 1989. Safe operation is based on highly efficient rolling stock and infrastructure combined with a failsafe signalling system, every feature being implemented by staff who is both competent and fully prepared to this end.

Traction stock should obviously be able to generate a high tractive forces but safe operation also requires reliable braking characteristics and solutions to be found to such problems as the rising temperature of axle-boxes.

Carefully designed infrastructure is a prerequisite for high speed operation; therefore track-geometry is to be maintained at a very high standard by means of adequate maintenance procedures. Precautions also have to be taken with regard to various obstacles likely to obstruct the tracks.

Train control can only meet safety requirements if it is linked to a failsafe signalling system.

The technical solutions developped by SNCF to this end have proved, in the light of experience, to be appropriate for high speed working and for providing continuous safety enforcement at high speed.

However, railway operations would not exist without human resources to implement it and people can fail irrespective of their skills and conscienciousness. Human errors can have such consequences with high speed train operation that the scope of human intervention has to be reduced, while automation tends to play an increasing role. In this respect, automated systems will provide aid to people who are in control, which applies to driving crews, dispatchers and maintenance staff involved on SNCF high speed routes.

The TGV rolling stock, infrastructure and signalling system can perform their tasks and contribute to safe train working continuously, while the scope for human intervention is more limited than within a conventional operating system and further enhanced by aid and detection-functions performed by specially-designed equipment; train-operations on high-speed routes has thus proved to be safer than on conventional routes, although the latter's record is improving constantly. That

statement is borne out by nine years' operating experience without any accident on a high-speed route.

A substantial safety-margin is constantly maintained, which is exemplified by the numerous high speed tests and the TGV record-speed of 515.3 kph in particular. Following such an experience, SNCF is now considering the implementation of operating speeds well above 300 kph for its future TGV network.

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9006

Henk van der Flier

Contribution of psychological tests to railway safety.

Publisher
2000 International Rail Safety Conference

Contribution of Psychological Tests to Railway Safety

by

Henk van der FLIER

Henk van der Flier received his Ph. D. in psychology from the Free University of Amsterdam in 1980. He has been working at the Free University as a (senior) lecturer and an assistant professor.

He joined the Netherlands Railways in 1983 and became head of the Psychology Department in 1987. His research and Publications have been primarily in psychometrics and industrial and cross-cultural psychology.

CONTRIBUTION OF PSYCHOLOGICAL TESTS TO RAILWAY SAFETY

Dr. Henk van der Flier
Psychology Department
Netherlands Railways

In this presentation it is argued that psychological testing of applicants and personnel performing safety duties may contribute to railway safety in situations where purely technical safety systems are not feasible. The choice of a testing program should preferably be based upon a detailed task analysis specifying task requirements in terms of human attributes that can be measured with psychological tests. The test program of the NS train driver is taken as an example. Next to a general part directed at trainability/attainment it contains specific tests for concentration, selective attention, fast perception, multi-choice reaction and (on an experimental basis) vigilance.
Two validation studies with safety errors (Signals Passed at Danger-SPAD) as a criterion are being discussed. Analyses involve both situational and personal factors. Exposural deviances were taken into account. Distributions of SPAD cases over months of the year, days of the week, hours of the day, duty hours, types of rolling stock, signals, track sections, etc. were compared with relevant exposural details. The direct cause of an SPAD case often seemed to be that a signal was overlooked or not anticipated. On the whole personal factors like age, time on duty, length of service and track and rolling stock experience did not seem to be related to the incidence of SPAD.
Both studies lend support to the hypothesis that results on psychological tests may be predictive of future SPAD errors.
It is concluded that the use of psychological tests in the selection of applicants for safety functions may be a useful element within a total approach to safety. Some arguments with respect to the possible application of psychological tests in periodical examinations are being discussed.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9007

Dieter Metz

Safety strategy for the man-machine system railway

Publisher
2000 International Rail Safety Conference

Safety Strategy for the Man - Machine - System Railway

by

Dieter METZ

Age 57 years

Director for Transportation Specifications, Central Transportation Service, Federal Railways, Mainz and chairman, Safety Commission, Federal Railway, 1971 to 1983.

Director, Transportation Department, Ferderal Railway Direction, Nuremberg, 1983 to 1986.

Curently Board of Management Commissioner for Transportation Safety, Central Office, German Federal Railway.

Dipl.-Ing. Dieter METZ
Senior Manager
German Federal Railway
Headquarter

Safety Strategy
for the man - machine - system
Railway

Appliance of Technology as a Cybernetic System

The present science of safety bases its safety-related considerations on the use of technology on a cybernetic system which consists of the components 'men', 'machine' and 'environment'. In view of the high environmental quality of the railways the considerations concerning the safety strategy have to focus mainly on the safety-related optimization of the interaction men-machine within the global system 'railway'.

Strategy Approaches

The German Federal Railway - like all other railways also - is bound by law to operate safely, to keep its technical facilities in good working conditions and hitherto to be in keeping with the latest technological development taking into account economic principles.

A thoroughgoing safety without any risk is not achievable, we may rather take as a basis a safe condition where risks are on a justifiable low level and do not exceed the marginal risk. However, this marginal risk is not a fixed value; for the safety strategy of the railway this fact results in an everlasting mission to limit the transport risk within the sensible field between altering social values and the protection of the enterprise's existence in the scope of its economic benefit.

The high security level of rail transportation can be exemplified strikingly by the realized level of risk reduction in the case of train runs. Therefore we may say that the strategic objective at the beginning 21st century is less a "safety revolution" but mainly a stabilization of the high security level achieved. And in this field the key subject is the altered interactions men-machine.

Scope of impact influenced by the human responsibility for safety

The safety-related responsibility of men influences principally more or less all areas of the system 'railway': reaching from the planning of railway-related equipment and the operational programs to the execution of transportation.

Considerations on the men-machine-system and its interactions refer mainly on operative actions. Therefore the further comments will focus on this theme. Nevertheless the hitherto findings can be applied also on planning activities.

Development and limits of men's replacement by machines

In the operative field the safety-related functions of men are more and more done by machines. The reason is the known fact that the level of human error probability is higher than that of a machine.

The present state of development is characterized thereby that those functions with a high risk potential are transmitted to technical devices thus far to a total automatization, for example the route control, the safeguarding of train sequence and crossings.Furthermore, modern technology allows a high degree of technical safety in the speed control of trains.

Nevertheless, there are operative areas, for example the control of the running safety of vehicles within a train set, during the shunting movements or the secure transshipment - with an increasing number of hazardous goods - in which safety depends more or less wholly on men.

Regarding the safety strategy we can state

that within the railway sector the prerequisites are created for a replacement in case of regular functions within operative areas with a high risk level

but in daily operation some areas with a higher risk level will remain which require technical solutions to be developed yet.

Altogether men can't be dispensed though. Even in those areas with a high degree of replacement men are still responsible for safety-related functions: In case of malfunctioning or broken down technology the human being serves as a kind of "fallback system" for the continuation of operation.

Change in the safety-related profiles of requirement for the human factor

The increasing technical replacement and, with regard to men, the shifting from regular to auxiliary function leads to an altered safety-related profile of requirement for the staff involved.

Some key points may be mentioned:

the achieved higher productivity by the use of technology extend the areas of responsibility as to distance and function with an disadvantageous effect on the possibility to sum up a situation

the number of parallel courses of safety-related activities increase, involving the risk of temporary excessive charge in case of complex malfunctions

instead of safety-related actions of routine the interventions in case of malfunctions dominate raising the necessity to sum up quickly the complexity of a situation and to know precisely and at once the regulations concerned

the number of regulations, controlling the daily operation, is increasing since, due to the related costs, the standardization of technical equipment in accordance with the latest developments is hardly to realize.

Consequences to secure the safety of action

In the scope of the general safety strategy, i.e. to reduce the risk within partial systems of the railway in accordance with the balance between expenditure and benefit and with regard to priorities, it is necessary to execute risk-minimizing measures to secure the safety of action of men. Here two categories are to be distinguished:

safety-related measures influencing directly the human factor

safety-related measures supporting a significant interface between men and machine in the course of further technical development

Opportunities to influence directly the securement of safety of action are mainly:

1) guarantee of the required qualification of the members of staff at the time of recruiting and during their training

   - qualifying tests and training procedures taking into account especially the ability to manage extraordinary situations

2) regular training

   - special training by simulating cases of malfunctions

3) layout of rules and regulations

   - priority is given to a user-friendly layout not to interests for an economical compilation

4) supporting aids for action

- case-related checking lists

- use of expert systems as far
  as a timely dialog is possible

5) motivation

- identification with the working place
  despite increasing demands

- to maintain useful basic activities
  in non-security-relevant functions

6) controlling

- securing of an appropriate controlling
  by adequately trained managers

In the development of new technical systems it is necessary to pay the same attention to the planning of the technical security, the expedience and the economical use of technology as well as to the projection of the interface to the user which has to be manageable and reasonable.

The overall planning has to include

the ergonomical design of the working place

type and extent of the information offered
  taking into account the human capability
  of acceptance and processing

reasonable demands for the execution of auxiliary
  attendances (planing of the backfall level)

Outlook

The altered safety-related demands on men in the frame of the men-machine-system require both practical and scientific sound studies to secure the safety of action. Especially an overall way of consideration of individual impacts on the human being is essential.

Nearly all railways are involved in this development. The UIC has taken the first steps in the direction of a hitherto international cooperation and adjustment. A renewed proof for the growing interest is the international conference on railway security in Tokyo.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9008

Koji Sasaki

East Japan Railway Company Safety Plan

Publisher
2000 International Rail Safety Conference

East Japan Railway Company Safety Plan

by

Koji SASAKI

Born in 1937

Graduate of Tokyo Institute of Technology, Electrical Engineering Department.

Entered Japanese National Railways in 1962. Appointed board director (general manager, Tokyo Metropolitan Transport Department), East Japan Railway Co. in 1987. Appointed board director and director, Safety Research Laboratory, East Japan Railway Co. in 1990.

East Japan Railway Company Safety Plan

Creation of the Safety Master Plan

Railway systems are giant man-machine systems, the human element being the railway workers and the machine element, trains and rail lines. The safety of the system is assured when both these elements properly perform their functions.

At the same time, railway systems increasingly need to respond to change, carving out their future through new technologies and the creation of new services. To achieve this, East Japan Railway Company developed and is now implementing a safety master plan based on the shift from a "conservative safety" concept to one of "challenging safety."

Constructing a Modern System

Based on analysis of accidents over a twenty-year period, we found that delays in modernizing the system have resulted in repetitive accident patterns for signal violation accidents, accidents at railroad crossings, and accidents related to poor track maintenance, natural disasters, and fires in trains. The company is currently undertaking the revision of the system and development of related technology.

A Revolution in Consciousness

It is important to analyze the incidents that are the root causes of accidents to discover signs of potential accidents and thereby ensure safety. Therefore, it is necessary to gather information and analyze all incidents, moving away from seeking to determine who is personally responsible to find the true causes of the accident and create systems and conditions that prevent human error. In addition, we have initiated safety inspections by top management and "challenge safety" movements at the ground level, while working to develop a feeling of mutual trust.

Management for Accident Prevention

The company is carrying out a five-year investment plan to introduce safety measures, making safety the number one management priority.

In addition, comprehensive training centers have been established at all group companies to offer structured education and training. In addition, a Safety Countermeasures Department has been set up to provide central accident and injury control, and a Safety Research Center has been established to design safety systems.

Further Progress

The company has taken the first step in introducing modern systems. These systems however, will be operated by people, with safety being created on site. It is increasingly important to develop conditions where people will work aggressively and creatively to improve safety. Consequently, the development of mutual trust between administration and on-site employees, the emphasis on good communication and exchange between workplaces, and management that values human dignity will result in improved safety.

International Rail Safety Conference

1990 TOKYO

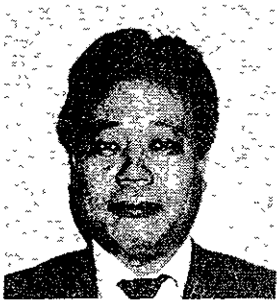
30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9009

Shin Kanke

Railway Safety for Labour Unions

Publisher
2000 International Rail Safety Conference



Railway Safety for Labour Unions

by

Shin KANKE

Born in 1944

Entered Japanese National Railways in 1963.

Elected vice-chairman, Central Executive Committee, East Japan RailwayWorkers' Union (J.R.E.U.), in 1987. Elected union secretary-general in 1989.

Railway Safety for Labour Unions

East Japan Railway Workers' Union
Central Headquarters

I. Past Efforts and Training Aimed at Achieving Safety

1. Starting Points

    a. Accident at Higashi Nakano Station on December 5, 1988

    b. Pursuit of responsibility and making examples of people

2. The Two Safety Symposiums and Efforts in the Workplace

    a. Management-labor consultation and its results

    b. Learning from accidents/incidents in the workplace

    c. Learning from other industries

II. Learning from Overseas Labor Unions

The success of the International Railway Safety Conference of Labor Unions

III. Creating a Safer Railway System

1. The importance of the human element

2. The necessity of frank exchange of opinions

IV. Statement from the East Japan Railway Company Workers' Union

"Development based on open discussion of safety problems"

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9010

Kunio Yanagida

Guest Speech
The Progress of technology vs safety "blind spots in the age of big systems"

Publisher
2000 International Rail Safety Conference

Guest Speech

The Progress of Technology vs. Safety
~ Blind Spots in the Age of Big Systems ~

by

Kunio YANAGIDA

Born in 1936

Graduate of Tokyo University Economics Department

Entered Japan Broadcasting Corporation (NHK) in 1960. Resigned 1974. Became NHK news analysis committee member in 1983.

Japan's foremost authority on aircraft accidents.

The Progress of Technology vs. Safety

— Blind Spots in the Age of Big Systems —

1. Global Viewpoints

1-(1) Viewpoints in considering blind spots of accidents and disasters

- In any accident, some of the different factors which have caused the accident are inherent to the particular system or organization and others are of a general nature which will afford a common lesson to many different systems.
- When we study the railway safety in future, it is first of all necessary to dig up the faults and weak points inherently associated with the current railway system. This way alone, however, will make our viewing angle narrow and will probably allow us to overlook faults and weak points of a new greater railway system to be developed and introduced in future, for which remedies should be planned in advance.
- In order to prevent such overlooking, we have to extend our viewpoints to various fields other than railway including aeronautics, space technology, nuclear power technology, petrochemical industry, architecture, automobile industry etc. We should study these fields on a daily basis to learn the problems common to modern technological systems, which have been revealed by the accidents so far experienced in those fields.
- In this lecture, I would like to present the problems

accompanying with the today's technological systems based on the result of the studies which I have been conducting for more than two decades on accidents and disasters encountered in the world. I shall be very happy if this information could help you further work on the future railway system.

1-(2) Situation in 1980s.

- o The history of world industries tells us that different industrial systems, traffic facilities and urban architectural buildings actually began to gain a huge size, complicated structure and high speed in the middle of 1950s. After 1970s, the tendency was further spurred by the development of computers and microelectronics.
- o Introduction of advanced technologies has made a great contribution to improvements in reliability and safety of such systems.
- o However, it is far away from the fact to say that the current technological systems have entirely overcome the problems of safety. This is demonstrated by the accidents which occasionally take place.
- o What kind of problems exist then? The accidents and disasters that have occurred during this decade, i.e., in 1980s, exhibit an outrageously horrible nature which we have never experienced before in terms of both magnitude and regional extent on the globe.
- o Let me name major accidents and disasters encountered in 1980s.

[U.S.A.]

- o Explosion of the space shuttle Challenger

- Radioactive gas emitted from an uranium enrichment plant in Oklahoma
- Accident of a nuclear weapon reactor in Savanna River
- A number of airplane accidents including the crash of Florida Airline B737 in Washington DC
- The upper body of Aloha Airline B737 blown off above Maui Island of Hawaii
- Broad-area communication network paralyzed due to the fire at the Hinsadale telephone facilities in the suburban Chicago.
- Skyscrapers' fires in Los Angeles and New York
- Highway breakdown because of San Francisco Earthquake

[Mexico]

- Buildings destroyed due to Mexico Earthquake

[U.K.]

- Explosion and fire at the oil-drilling platform in the North Sea oil fields
- Fire at a subway station in London
- Double collision of commuter trains in suburban London

[France]

- French Airline A320 crashed in
- Commuter train collision in Lyon, Paris

[Switzerland]

- Fire at an agricultural chemical plant in the suburban Basel and pollution of the Rhein due to emission of poisonous chemical substances

[U.S.S.R.]

- Nuclear power accident in Chernobueyli
- Passenger train burnt down due to the explosion of natural

gas pipe-line in Bashikirskaya ASSR

- o Express train derailed and burnt down between Leningrad and Moscow
- o Fire of a USSR passenger boat in Osaka Port and the crash of another USSR passenger boat against an iceberg in the North Sea
- o Aerofloat Il-62 crashed in the suburban Moscow

[Poland]

- o Poland Airline Il-62 crashed in the suburban Warsaw

[Japan]

- o Japan Airline B747 crashed at Mount Osutaka in Gunma Prefecture
- o 7 cars of a train fallen down from Amarube Bridge on JNR Sanin Line
- o Train collision in JR Higashinakano station in Tokyo
- o Train fire in Ikoma Tunnel in Kintetsu Higashi-Osaka Line
- o Submarine crashed against a fishing boat at the entrance of Tokyo Bay
- o Chain car collision and fire in Nihonzaka Tunnel on Tomei Highway
- o Big fire of Hotel New Japan in Tokyo
- o Broad-area communication network paralyzed because of the fire of a underground cable system near Setagaya Telephone Office in Tokyo

[China]

- o Express train collision in the suburban Shanghai
- o China Republic Airline Trident crashed near Guilin
- o Southwest Airline Il-18 crashed in the suburban Chongqing

[India]

- o Express train fallen down into a lake from a steel bridge in Kerala Province

[Others]

Serious jetplane crashes caused by the airlines in developing countries such as Iran, Saudhi Arabia, Taiwan, Yugoslavia, Spain, Equador, Turkey, Columbia, Mexico, South Africa, Cuba.

1-(3) Common problems

- o These accidents and disasters differ from each other in both the systems in use and the ways they have occurred. Tracing back the root cause of them, however, we find common problems underlying such accidents regardless of the diffrences in system and nation. I believe that solution of such problems is one of the most important task that have to be achieved by the future technological system.
- o The most important of those problems are mentioned below.
  - (1) Coexistence of the "advanced" phase and "unadvanced" phase of technology
  - (2) Weak points in the area around the core of the system
  - (3) Greater weight of human factors
  - (4) New human factors due to the development of automation
  - (5) Superannuated systems, equipment and materials
  - (6) Decision making of the management

2. Problems Associated with the Modern Technological System

2-(1) Coexistence of the "advanced" phase and "unadvanced" phase of technology

- o The "advanced" phase refers to the system, equipment and machinery utilizing advanced technologies. The "unadvanced" phase naturally refers to the conventional system, equipment and machinery with a relatively low reliability, and also includes man, organizations and cultural background (foundation) which could not live up to the speed of technical progress.
- o Corporations in any industry seldom replace all their conventional technological systems at one time with new ones for updating. It is usual procedures to partially introduce new technical systems while leaving some of the conventional systems, equipment and machines as they are. This often leads to the following problems.
  - (1) While corporations make an intensive capital investment, together with placing a good number of manpower, in a new technological system in the "advanced" phase, they tend to be reluctant to invest enough and keep attention for maintaining safety in the old technological system as they know it will "retire" soon.
  - (2) Design of the newly introduced technological system in the "advanced" phase may be largely oriented to stark hardware, so that the organization, man and cultural context involved in operation and maintenance of the system would find difficult to adapt themselves to the new system. In this case, there will be an unmatching between the system in terms of hardware and human beings. Especially, if the country where the designer and manufacturer belongs is different from the country of the user corporation, gaps in

cultural context including the sense of moral may cause serious problems.

(3) There may be two different systems, new and old, in the same corporation or plant. If operators and maintenance engineers are exchanged between these two systems without sufficient training and education, human errors will take place.

2-(2) Weak points in the area around the core of the system

o Even if the basic design of the system is faultless with its accident-free normal operation maintained since the start of commercial operation, it is not an unusual case that an unexpected trouble develops in the aspect which has been out of consideration at the point of basic design and leads to the breakdown of the whole system.

o Those aspects which have been out of consideration at the point of basic design may be as follows.

(1) Maintenance, inspection and repair works

These works are apt to result in such errors as setting a valve in a wrong place, overlooking an abnormality, misplacing the parts, and riveting in a wrong position.

(2) Related equipment and operations in the periphery of the system

Works for filling a reservoir of the system with a chemical reaction agent or fuel from tankers, troubles with the sewage system, troubles with the exhaust system, contacts between the railway main line and a marshalling yard, grade level crossings, etc.

(3) Works contracted to subcontractors, including those in (1) and (2).

(4) As the core of system operation is automated, the operator's attention is directed to relatively small things other than the core part, resulting in neglected monitoring of the essential part.

- The area outside the core of the system is here referred to as a "peripheral zone of the system".
- The problems associated with the "peripheral zone of the system" is becoming more complicated and diverse as the system grows bigger.

2-(3) Greater weight of human factors

- Analyzing different factors which have given rise to an accident, the greatest part of them are found to be of human factors.
- It is to be noted here that human factors should not be understood as limited to the phase of operators' errors. Since human judgment, decision and operation are involved in every phase of design, manufacturing, operation, maintenance, inspection, repair, management and administration, we must be aware that human factors as causes of accidents have an extreme variety across many of those phases.
- Notable causes provoking human errors are given below.

(1) Psychological and physiological strain

(2) Excessive devotion to the pursuit for economic interest

(3) Excessive devotion to the pursuit for better performance

(4) Adherence to the prestige of a nation or a corporation or the honor of an individual

(5) Depressed morale and enthusiasm

- o Among the problems listed above, I would like to particularly examine the human factors related to automation for a higher performance and the one involved in the decision making by the management.

2-(4) New human factors introduced by development of automation

- o Automation of machines and equipment has been promoted with a view to (i) enhancement of performance and efficiency, (ii) improvement in reliability and (iii) removal of human errors and other improvements. It has actually made a great success.
- o However, there are not a few cases where development of automation has provoked new human errors at the same time.
- o Promoted automation may cause the following influences upon human beings.

  (1) If an extremely advanced, convenient automation system is introduced all of a sudden, there may be an unbalance at the man-machine interface.

  (2) When the operator gets used to the automation system, he or she tends to "overestimate" the system as if it might be almighty.

  (3) If the operator too much depends on the automation system, switching from "auto" to "manual" tends to be delayed in emergency.

(4) If the operator leaves the operation works to the automation system for a long time, he or she may be trapped in the blind spots such as "boredom" and "lost enthusiasm".

(5) If the operator too much depends on the automation system, he or she tends to neglect the basic requirements for safety such as monitoring the meters and indicators.

2-(5) Superannuated (aging) systems, equipment or materials

o Problems of corrosion and metal fatigue due to superannuation are classical.

o However, as new materials are developed and design processes make a remarkable progress, people are becoming oblivious to the grave result to be caused by such corrosion or metal fatigue.

o Besides, the technological systems produced in 1960s and 1970s are beginning to superannuate.

o Many of such technological systems have been designed without any exact estimation of service life based on sufficient fatigue break tests. Moreover, the system itself is huge, complicated and kept operated constantly. This fact, together with other environmental conditions, is found accelerating corrosion and metal fatigue of the materials more quickly than expected in many cases.

o This problem is particularly marked in airplanes.

o Such a general situation pushes us to review the safety standard in design.

2-(6) Decision making in the management

- Among the most important human factors are decisions made by the management in terms of the choice of design policy and maintenance and inspection processes as well as decisions on "Go or No Go"n operation.
  - If decisions regarding such items are made in favor of the prestige and honor of the top management while rather suppressing the consideration on safety, that technological system almost necessarily breaks down.
  - So far, human factors have been understood mostly as errors made by operators and maintenance personnel. However, analyzing the factors of the accidents which actually took place reveals us that, in not a few cases, fundamental measures for safety could not be planned without digging up human factors in the management.

3. Safety Program in the Big-System Age

3-(1) Basic approach to the safety program

- The achievement of Japan's Shinkansen that there has been no fatal accident for the past 26 years seems indicating a general approach to be taken by a technological system.
- It may be referred to as a total system established in due consideration of appropriate introduction of advanced technology, exclusion of the fuzziness at the "peripheral zone of the system" and interference with environment and harmony with human beings. What should then be actually done ?

3-(2) To remove blind spots in the technological system

- In order to remove blind spots of the modern technological system as revealed by different accidents in this decade, it will be necessary at least to consider remedies against the problems analyzed above.

(1) When introducing an advanced technological system,

(i) Establish the form of operation matching our own cultural climate.

(ii) Thoroughly educate and train the workforce

(iii) When exchanging the staff between the "advanced" technological system and the "unadvanced one", perform it very carefully.

(iv) Do not neglect the safety guidelines of the old system.

(2) To avoid development of blind spots at the "peripheral zone of the system", it is important to execute comprehensive quality control and operation control over the whole process from maintenance, inspection and repair to the peripheral equipment.

(3) To avoid human errors

(i) Organize study activities in individual working groups to examine incidents (small accidents) and near-miss taking place on an everyday basis, for instance, in the form of the quality control activity by each work unit as is seen in the manufacturing industry.

(ii) Develop a teamwork training system such as the CRM (Cockpit Resource Management) developed in the aeronautic industry based on the theory of human behavioral science.

(iii) Attempt to establish the technological system as well as the workplace which always encourage operators, maintenance workers and other personnel to keep their enthusiasm for works.

(iv) Introduce a fail-safe design so that a human error, if any, would not lead to any accident.

(4) To prevent human errors associated with automation

(i) Develop the degree of automation matching the cultural climate of the corporation.

(ii) In designing the automation system

Avoid a "hardware centered design" and

attempt at a "human centered design".

Regarding this point, the report given by NASA in US in 1989 "Flight Deck Automation: Promises and Realities" will provide you with good information.

(5) As for the problem of superannuation, thoroughly check the materials in use and service life of the structure, for instance by means of fatigue break tests and make a program of remedies based on the result.

(6) In the management, establish an organizational assurance system with which the person responsible for safety can be free from any kind of pressure so as to adhere to the principle of safety first.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9011

Tony Boland

Sand - Why Control?

Publisher
2000 International Rail Safety Conference

Sand - Why Control?

by

Tony BOLAND

Mr. Tony Boland, BSc (Tech), is the Executive Manager, Rail Safety Audit Group of the New South Wales State Rail Authority, Australia.

Prior to his appointment to the new high profile safety group, Mr. Boland was Director of Operations of the State Rail Authority.

He has also held positions of Chief Mechanical Engineer, Manager Rolling Stock and Brake Engineer during a 34-year railway career.

He has had considerable experience in research at the railway testing laboratories, giving him a thorough knowledge of railways research, engineering and operations.

In his current position Mr. Boland is responsible for overviewing all rail operations, ensuring they are complying with operational and engineering standards and procedures.

He has visited a number of overseas rail systems to study their safety procedures and has introduced a system of Safety Plans to deal with potential hazards.

The Safety Audit Group monitors safe operations in much the same way as an international audit monitors finances.

The Group is targetted at the safe operation of trains and the travelling public, as well as property owners adjacent to SRA property.

Mr. Boland, as Executive Manager, Rail Safety Audit Group, headed the recent Railway Board of Inquiry into the fatal Brooklyn collision, in which six (6) people died and more than one hundred (100) were injured.

1. Summary

Sydney, the largest city in Australia, lies in a land basin on the East Coast of Australia surrounded by natural barriers.

To the East lies the Pacific Ocean, to the North, South and West the mountains of the Great Dividing Range.

These mountains have presented many challenges to railway engineers throughout the years both in providing the tracks and in the subsequent operation of the lines.

In approaching Sydney from the North the line crosses the Hawkesbury River at a point 59kms from the city, it then climbs the Cowan Bank on its journey to the city.

This bank is some 8.6 kms of double track with a nominal ruling grade of 1 in 40 (2.5 per cent).

During the early hours of the evening of the 6th May 1990 a vintage steam excursion train, whilst climbing towards Sydney, came to a stand approximately halfway up the grade.

Whilst the crew was attempting to get the train underway a double deck electric multiple unit collided with the rear of the excursion train with the subsequent loss of 6 lives and 100 passengers injured.

The SRA Board of Inquiry found that the excessive use of sand by the locomotive of the excursion train was a significant contributing factor in the cause of the collision.

This paper is intended to provide an overview of the events leading up to the collision as ascertained by the Board of Inquiry and the subsequent actions taken by State Rail.

2 Introduction

The New South Wales Government railway system first began operations in 1855.

Today State Rail conducts a billion dollar rail operation, with annually some 246 million passenger journeys and more than 54 million tonnes of freight hauled over 11,000 kilometres of track within New South Wales.

Among State Rail's wide variety of operations has been the running of historical excursion services, using vintage rolling stock and steam locomotives, on behalf of various Historical and Preservation Societies. The use of steam locomotives ceased for normal services in New South Wales in March 1973.

During the Australian Bi-Centennial Celebrations in 1988 these excursions represented some 200,000 passenger journeys over 7000 kilometres of track throughout New South Wales without any significant accident or injuries to the travelling public.

On the evening of 6 May 1990 this record was tragically altered.

A six carriage excursion train carrying 268 passengers and hauled by Pacific class steam locomotive number 3801 was returning to Sydney on the main Northern line when it came to a stand approximately halfway up the 1 in 40 (2.5 per cent) Cowan Bank. The overall length of the train, including the locomotive, was 149.6 metres.

At 19 hours 4 minutes 45 seconds the computer-controlled register for the1500 volt overhead electrical wiring supply system recorded an interruption in the power supply on the Cowan Bank.

Subsequent events were to show that this power interruption was caused by a four car double-deck electrical multiple unit train colliding with the rear of the steam excursion train and the resultant collision caused portion of the train wreckage to become entangled with the overhead wiring.

Five passengers (steam train 4, electric train 1) and the driver of the electric train were killed.

A total of 100 passengers from both trains was injured.

At the present time an inquest into the manner and cause of deaths in the accident is part heard and will conclude in December 1990. Nothing in this paper is intended to predict the outcome of the inquest. It is intended only to report the matter from the point of view of the Board of Inquiry. The public interest in prompt publication of the Board's investigations has caused the author to proceed with the paper despite the unexpected unavailability of the Coroner's findings.

3 The Location

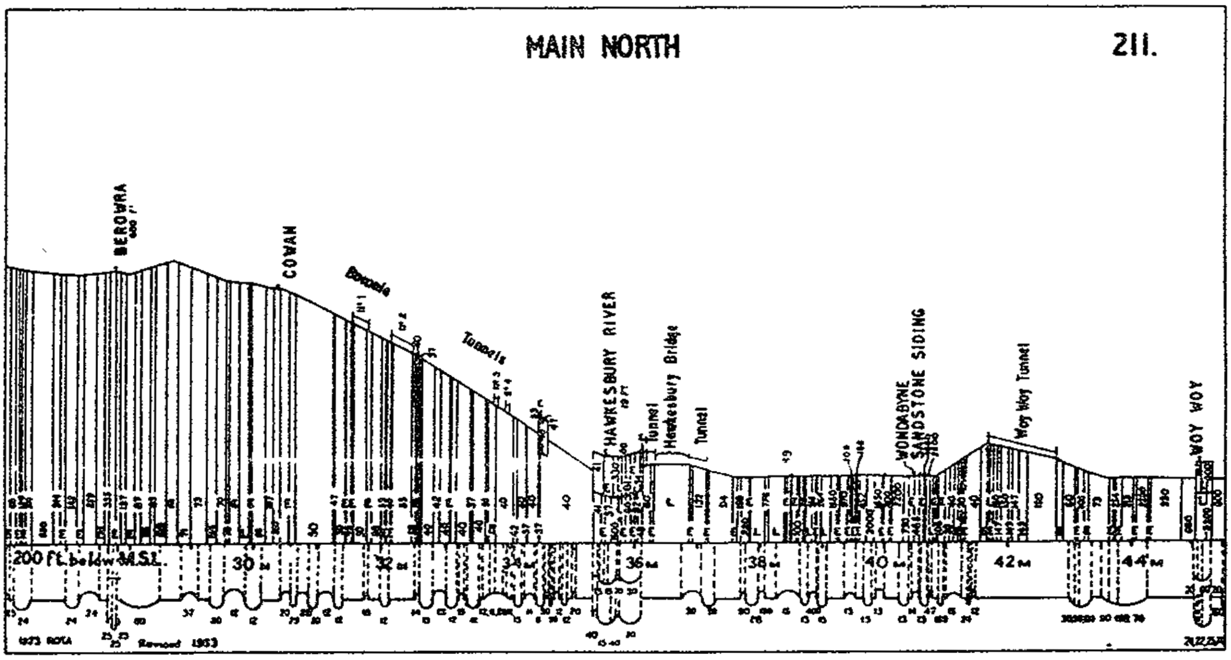
The Cowan Bank is on the main northern line from Sydney, between Hawkesbury River station and the township of Cowan.

Whilst the gradient of the bank is nominally classified as 1 in 40 (2.5 per cent) for its 8.6 kms length, there are several short sections (up to approx. 150 metres) of grades up to 1 in 35 (2.86 per cent) contained within its length.

The track negotiates a variety of terrain as it winds its way up the side of the mountain, passing through four tunnels and a number of right and left hand curves ranging in curvature from 11 chain to 30 chain radii (229 - 610 metres).

The track is Class 1XC with concrete sleepers and continuously-welded 60kg/metre standard rails.
Both the Up and Down single direction main lines between Hawkesbury River and Cowan are operated under automatic signalling and are covered by the regulations for train signalling by track block and automatic systems on double lines.

This is a block system permitting one or more trains travelling in the same direction, controlled by intervening automatic signals, to occupy the lines between two signal boxes at the same time.



4 Signalling

Diagram No.1 shows the layout of signalling in the area.

Signal 35.4 is the Up starting signal at Hawkesbury River and is controlled by track circuits and No. 10 lever at Hawkesbury River Signal box.

Signal 34.6 is an automatic signal situated 1.413 km past signal 35.4 and approximately 1300 metres from the collision site. This signal shows either a green light when at proceed or a red light when at stop. A small red marker light is provided to the side of the post and is illuminated when the signal is at stop or if the green lamp is burnt out.

When signal 34.6 shows a green light a tonnage indicator labelled "34.6 AT CLEAR" shows in the Hawkesbury River signal box. Regulations require the signalperson to hold freight trains at Hawkesbury River until signal 34.6 is at clear.

Signal 33.4 is the next automatic signal and is located 1872 metres past signal 34.6.

A distant signal is provided 449 metres in approach to signal 33.4 and 81 metres beyond the portal of No. 3 tunnel.
The distant signal is known as "33.4 Distant" and indicates to the driver of a train the status of signal 33.4 .

When the signal 33.4 is at stop the distant signal shows a single yellow light (caution).

When the signal 33.4 is at yellow (caution) or green (clear) the distant signal shows a green light.

When a train is between the signal "33.4 Distant" and the automatic signal 33.4 the distant signal shows a green light.
The distant signal has a small white marker light permanently illuminated.

The automatic signals are controlled by track circuits which extend to the next signal plus one track circuit beyond. This track circuit is known as the overlap and provides a margin of safety between following trains.

A signal post telephone is provided on the post of signal 34.6 and rings ahead to Cowan signal box.

Drivers may pass automatic signals at stop on authority of a signalperson or, if the signalperson cannot be contacted, after waiting for one minute. The driver is then required to proceed cautiously with his train under control ready to stop short of any obstruction.

5 Signalling Equipment

The track circuits on which the steam train was standing at the time of the collision, 34.6B and 34.6C, are alternating current 50Hz double rail track circuits fitted with non-resonated impedance bonds.

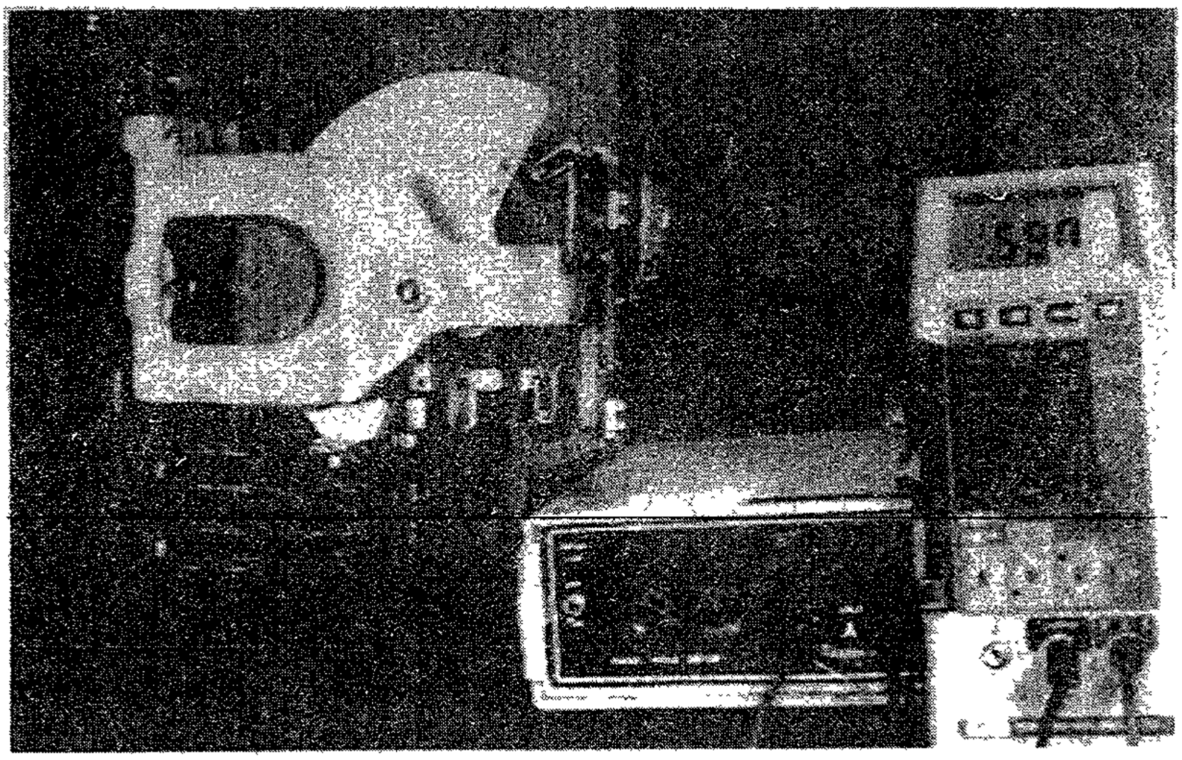
Track circuit 34.6A is a modulated audio frequency jointless track circuit.

The signal control relay for signal 34.6 and the track relay for track circuit 34.6A are 50V DC BRB 930 miniature relays.

The track relays for track circuits 34.6B and 34.6C are shelf mounted double element AC vane track relays.

The control relay for signal "33.4 Distant" is a shelf mounted double element AC vane line relay used in a single element mode.

Line side signalling cables are multi-core PVC insulated cables.



6 Electrical Traction Supply

The Electric traction supply provided on the Cowan Bank is State Rail's standard supply of 1500 volts DC.

It is fed from the Hawkesbury River sub-station and the Cowan sub-station.

Circuit breakers are provided for the protection of the tracks and all operations of these circuit breakers are logged by the electrical Operating Centre Computer.

A short circuit as would be caused by contact of derailed vehicles with the overhead traction supply would trip (turn off) the supply at the circuit breakers and is automatically recorded by the computer.

7 The Collision Site

The collision occurred at approximately track kilometrage 54.3 on a left hand curve of 229 metres radius with a steep rising grade of 1 in 35 (2.86 per cent).

This location was approximately 48 metres after a train emerges from the southern portal of the No.3 tunnel.

The maximum permissible train speed at this location was 60kph for the electric train and 55kph for the steam excursion train.

8 The events leading up to the collision

The steam excursion train passed Hawkesbury River station at 1843 hours and it was clear to the Board from evidence of the train crew and others that it was proceeding without trouble up the Cowan Bank until a severe wheel slip occurred within the No.4 tunnel.

Prior to the wheel slip the train speed was approximately 25 to 30 kph but after the wheel slip the speed reduced to about 5 to 8 kph.

The Board of Inquiry in its deliberations on the cause of the collision believes sometime prior to the wheel slip a handbrake had been applied on one of the carriages of the train consist.

After the slip the train partially recovered its momentum, as the driver applied sand to the rails, however the train speed continued to reduce and it eventually came to a stand with the rear of the train approximately 50 metres clear of the southern portal of the
No. 3 tunnel.

Of particular significance was the fact that after coming to a stand the train was unable to move from that point.

The Board in accepting the reasons why the train came to a stand was also concerned as to what was significant in this inability to lift the train in relation to the train initially coming to a stand.

The permissible load for this train was calculated on the basis of a non stopping train ascending the nominal 1 in 40 (2.5 per cent) grade.

This calculated load was confirmed by subsequent actual tests using the dynamometer car.

Surveys have shown the grade at the point where the train came to a stand was one of the steepest sections on the Cowan Bank being a section of track 140 metres in length of 1 in 35 (2.86 per cent) grade.

The actual weight of the train was measured and found to be more than 6 tonnes heavier than that which was calculated using existing published data in rollingstock diagram books.

Allowing a notional 3.5kg resistance per tonne this extra load would be marginal on the steeper graded section and had there been no interference by way of an applied handbrake the Board believes that the load would have been hauled through the section albeit at a slower speed.

When consideration is taken of the effect on the rolling resistance of the train by the sand which was observed on the rail head at the collision site and the actual grade of the track where the train had come to a stand it is understandable why the train was unable to lift its load at this location.

When the steam excursion train came to a stand it was standing on both 34.6B and 34.6C track circuits. The locomotive and four carriages being on track circuit 34.6C and the rear two carriages on track circuit 34.6B

In the process of attempting to lift the train up the grade it would appear to the Board that a series of backwards movements, equivalent to approximately 4 metres at a time, were conducted for a total distance of approximately 15 metres.

These movements are standard procedures when attempting to lift a load on such a grade as it enables the steam locomotive's connecting rods and cranks to be positioned for maximum thrust.

The Board found that in this instance these movements enabled the leading pony bogie of the steam locomotive to be moved back onto the rail which had been previously effected by the sanding process prior to the train coming to a stop.

The possiblity that all thirty eight (38) wheel-sets of the train (including the locomotive) had been insulated from the track circuits was obviously not considered at the time.

The subsequent events satisfied the Board that the train was in fact insulated and this had the effect of giving the driver of the following train, which was standing at signal 34.6, a green light to proceed on his journey.

This led to the inevitable collision given that no train protection had been provided to the rear of the stationary steam train.

9 Locomotive Sanding Equipment

The sanding system on the 38 class steam locomotive consists of a sand box mounted on the top of the boiler, with outlet pipes coupled to sand traps housed on each side of the boiler.

Sand traps are provided for each of the four direct sanding outlets to the rails.

The flow of sand to the rail is actuated by air pressure admitted to the sand traps from the driver's control valve.

Sanding tests conducted on locomotive 3801 after the collision have shown the sand delivery rates were:-

	Left (Driver's Side)	Right
Leading pipe	7.22lb/min. (2.19litre/min.)	0.50lb/min (0.15litre/min.)
Second pipe	3.82lb/min. (1.16litre/min.)	1.10lb/mi (0.33litre/min)
Total	11.04lb/min. (3.35litre/min.)	1.60lb/min. (0.48litre/min.)

10 Action after the Collision

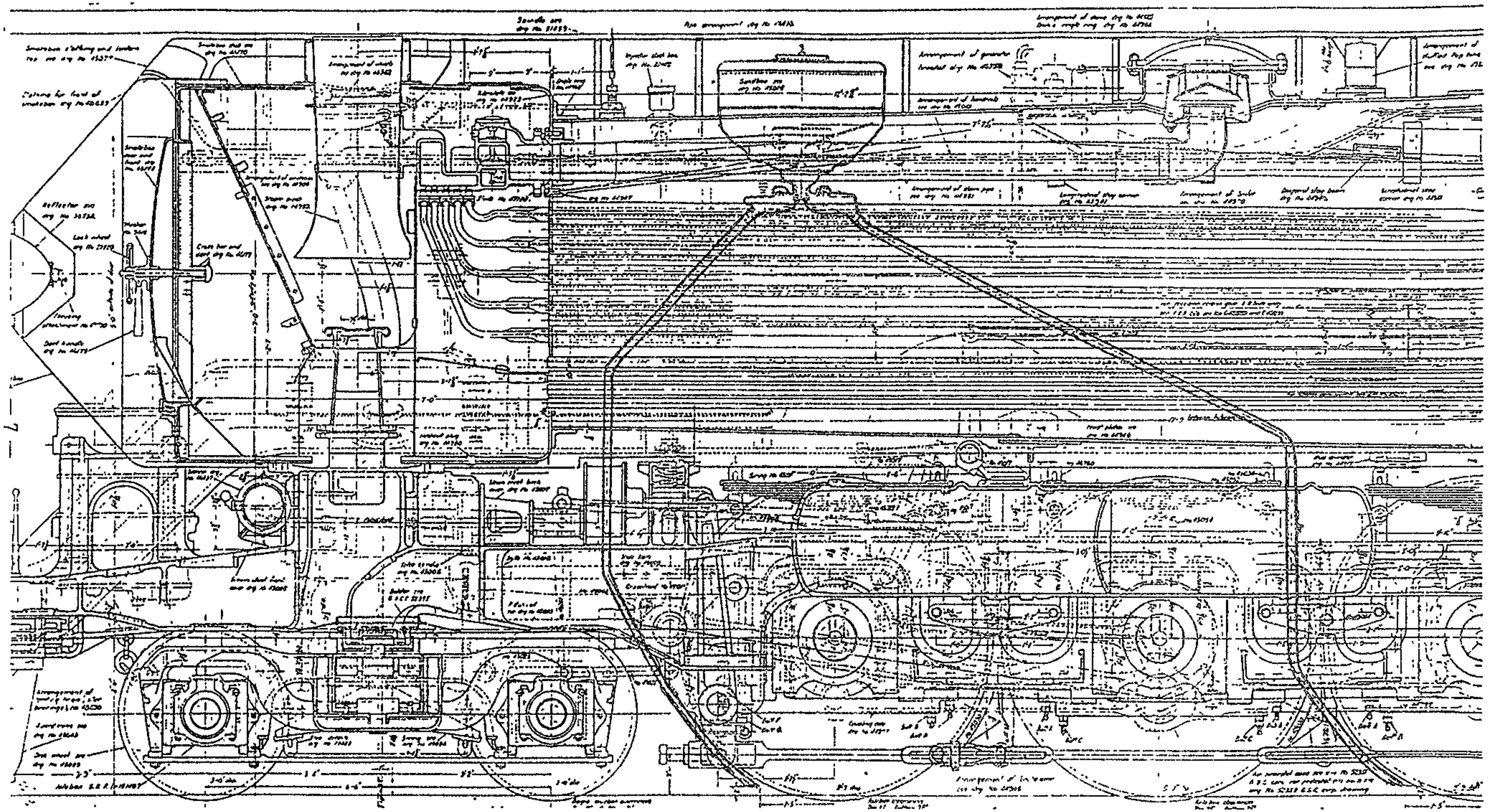
10.1 RESCUE

The value of major disaster exercises, particularly Sydney's "OPERATION UNDERGROUND" in September 1989, was most evident at the scene of the collision.

This was in terms of the liaison and co-ordination which was achieved between the various agencies who attended the scene.

As well as the onsite control centre established at the scene, a command post was set up in a nearby public community hall, where all survivors not requiring prompt hospitalisation were transported for immediate post-disaster identification and counselling.

Overall control of the incident was maintained at the State Emergency Centre in Sydney where designated representatives of all State emergency services and State Rail co-ordinated all required actions.



38 CLASS LOCOMOTIVE — SANDING ARRANGEMENT

10.2 SIGNALLING

The signalling circuits and equipment between Hawkesbury River signalbox and the Cowan signalbox were immediately subjected to extensive on-site testing by State Rail's Signalling Standards Section and supervised by independent witnesses.

These investigations found the signalling circuits and equipment to be in order with no evidence of factors that could produce unsafe operation other than the presence of the excessive sand in evidence on the rail under the whole length of the steam train.

The sanding on the right hand rail (in the direction of travel) was thinly spread with the rail surface quite apparent, whilst the left hand rail (driver's side) was appreciably heavier.

In particular the rail on the driver's side, under the length of the steam train, was coated to the extent that the top surface of the rail was not visible. This sand had the appearance of a thick white paste. Heavy deposits of sand were also visible along the foot of the rail.

10.3 SANDING APPLICATION TRIALS

A replica six-carriage train was assembled and trials were conducted in an endeavour to replicate the events of May 6 utilising a 44 class diesel electric locomotive equipped with similar sand traps.

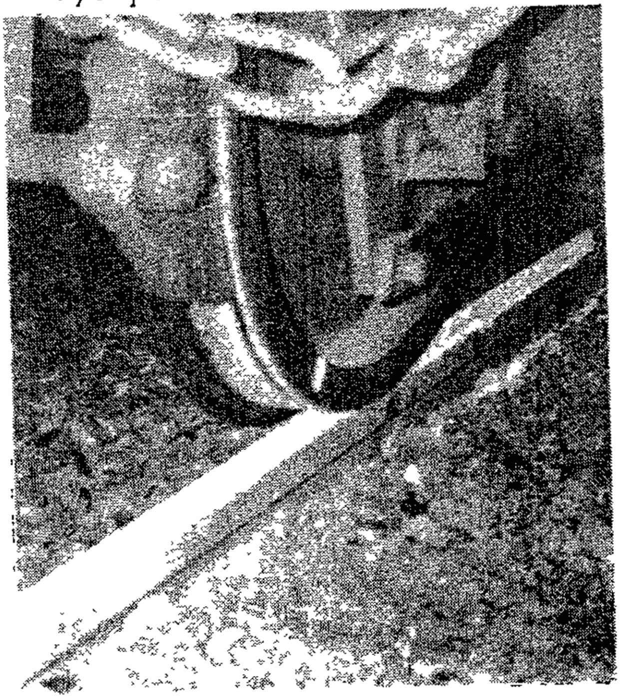
The sanding equipment of the locomotive was adjusted to provide a practical comparison to that measured on steam locomotive 3801.

A test site was established at a location which was equipped with typical double rail AC 50 hertz track circuits with non resonated impedance bonds at each end similar to the track circuits existing on Cowan Bank.

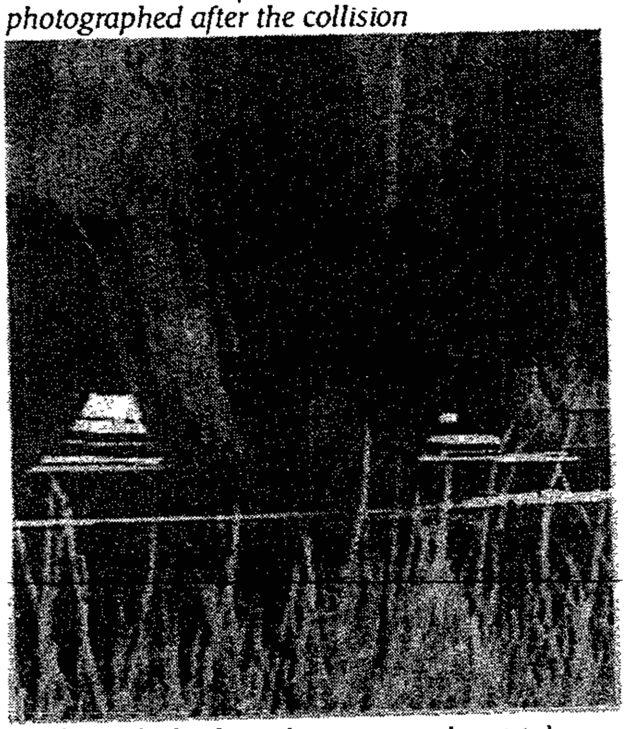
Two adjacent track circuits respectively 420 and 340 metres long were monitored by measuring instruments throughout the tests.

The test site had a nominal rising grade against the test train of 1 in 235 (0.44 per cent) for the first 300 metres of track followed by a grade of 1 in 116 (0.86 per cent) for the remainder of the test section.

The first pass of the test train over the measured test sections was at a continuous speed of approximately 5 kph.



Actual condition of wheel and rail photographed after the collision



Replicated wheel condition at sanding trial

During this passage of the test train a loss of shunt was observed while part of the train (Locomotive and one and a half cars - total 12 axles) entered the second track circuit.

A similar loss of shunt was also observed whilst the last (8 axles) of the train were still traversing the first track circuit.

When the train cleared the second track circuit it was brought to a stand and arrangements made to have the train propelled back to the start point.

As the grade was now falling in the direction of travel for the test train it was possible to maintain the speed of the train at a slower speed than that achieved on the first pass (estimated at approximately 3 to 4 kph).

As the whole of the test train re-entered the test section (ie the locomotive entered the test circuit) a momentary loss of shunt occurred.

The train was stopped and moved forward slowly for a distance of some 12 metres where a total loss of shunt again occurred.

The train crew was directed to stop and after a reaction time of approximately 5 seconds the train came to a stand.

The loss of shunt was still sustained on the track circuit.

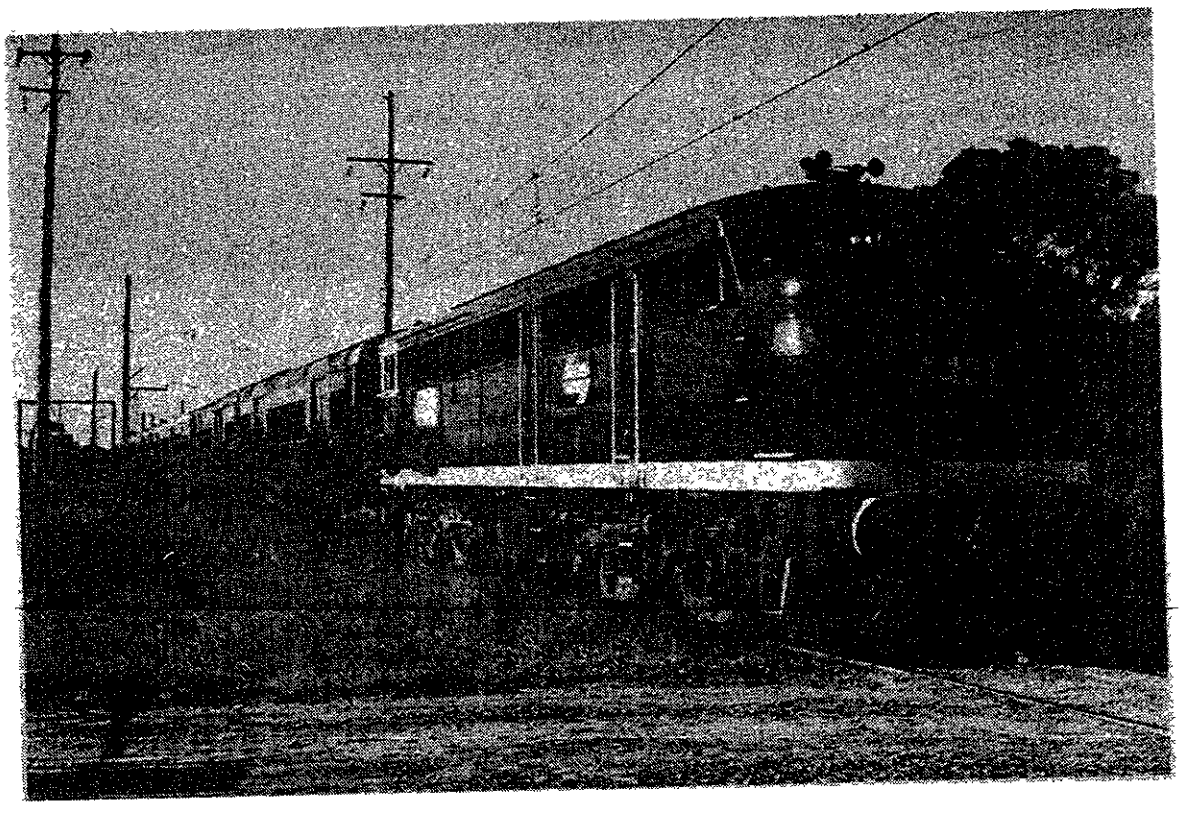
The test train remained in this position for some 90 minutes and the loss of shunt was sustained throughout this period of time.

An examination of the accumulation of sand on top of the rail head revealed it was generally about lmm in thickness.

The wheels of the test train had a consistent accumulation of sand on the wheel treads which intensified at the root of the flange.

Six weeks later at the same test site a repeat series of tests were conducted and these tests confirmed the findings of the first test.

(Below) A replica 6-carriage train was assembled and trials were conducted in an endeavour to replicate the events of May 6.



11 Actions implemented

11.1 INSTRUCTIONS TO LOCOMOTIVE CREW

The standing operational instructions for the use of sand by locomotives were reissued to staff.

These instructions provide for sand to be used sparingly and where possible, not on points or crossovers.

Wheelslip control locomotives (EMD SUPER SERIES) are to be worked in the automatic mode.

Locomotives with manual foot button control features are not to have this feature operated continuously.

After 5 seconds of manual sanding, a 5 second pause is to be exercised before the next application of manual sand is applied.

Locomotives when running without a train are not to use sanding equipment

11.2 INSTRUCTIONS TO SIGNALS MAINTENANCE STAFF

Signal maintenance staff have been instructed that any case of excessive sanding is to be brought to the immediate attention of the respective District Signals Engineer in order that appropriate investigations and disciplinary action(s) can be taken.

11.3 INSTRUCTIONS TO LOCOMOTIVE MAINTENANCE STAFF

A physical examination was conducted of every sanding appliance fitted to locomotives in New South Wales to identify the sanding rate of each appliance.

Details of these individual sanding rates were recorded in State Rail's computerised locomotive information system to enable an effective overview to be maintained.

Responsibility was placed on depot foremen to ensure all locomotives, prior to leaving the shed or departing the depot, had correctly operating sanding equipment.

In particular no locomotive was permitted to depart the depot with continuously blowing sanding equipment.

11.4 DESIGN

Investigations have begun into the following aspects of sanding for locomotives.

- Self clearing sanding equipment, which would enable the track to be cleared of deposited sand following the passage of the locomotive.
- The need for all locomotives in multiple consists to have each locomotive's sanding equipment depositing sand.
- The number of sanding outlets on locomotives.
- Alternatives to using sand.
- Impact on State Rail operations if sanding was not permitted.
- A general revision of all regulation pertaining to the use of sand in locomotive operations.

12 Conclusion

While ever the need exists for the use of sand within the Railway Heavy Haul Industry, stringent control of its use and the maintenance of sanding equipment must prevail.

13 The Rail Safety Audit Group

The Rail Safety Audit Group was created in January 1989 and from the start a very structured approach was adopted to ensure the culture of safety was taken up within the organisation.

Initial actions were to identify, in conjuction with senior staff in engineering and operations, all potential hazards within the system.

By the use of fault tree analysis each potential hazard was coupled with causes, and the specifications and controls needed to minimise the effect on State Rail's customers.

From each of the potential hazards a risk analysis was undertaken with individual Line and Regional Managers.

This was based on danger to life and limb, property damage cost and potential to occur.

Some 200 potential hazards were identified and prioritised.

The State Rail Board, reaffirming its commitment to the safety program, approved a plan to concentrate on the top 20 per cent of the potential hazards in the first year, followed by 20 per cent a year thereafter.

Each line and region then prepared a System Safety Plan as well as an action plan to con-trol its top 20 per cent of potential hazards.

These Systems Safety Plans are signed off by the Line or Regional manager,the Group General Manager and the Chief Executive.

The results of the plan are then audited by the Rail Safety Audit Group to ensure compliance.

This of course provides the closing of the loop

- Identification of potential hazard
- Production of System Safety Plans
- Commitment by the senior management through 'signing off' of the plan
- Auditing by Rail Safety Audit.

The establishment of a safety data base has enabled the Rail Safety Audit Group to record particular types of safety incidents by type, exposure to people and exposure to property.

This permitted an analysis of trends to identify that which requires immediate corrective action.

The Rail Safety Audit Group have been able to provide a specialised service for Safety Plan development and compliance auditing.

Under the direction of the Executive Manager the four managers in the group cover the following specialist areas :-

- Rollingstock
- Infrastructure and Signals
- Operations
- Fire and Dangerous Goods.

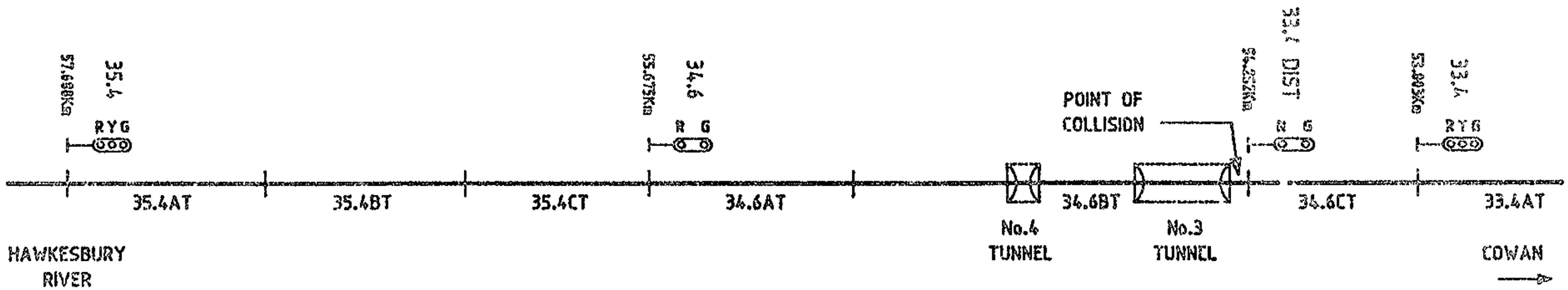
14 Acknowledgements

This paper is based on investigations conducted by the Rail Safety Audit Group, in conjunction with State Rail's technical groups, into the cause of the rear end collision on Cowan Bank. Their respective efforts are appreciated.

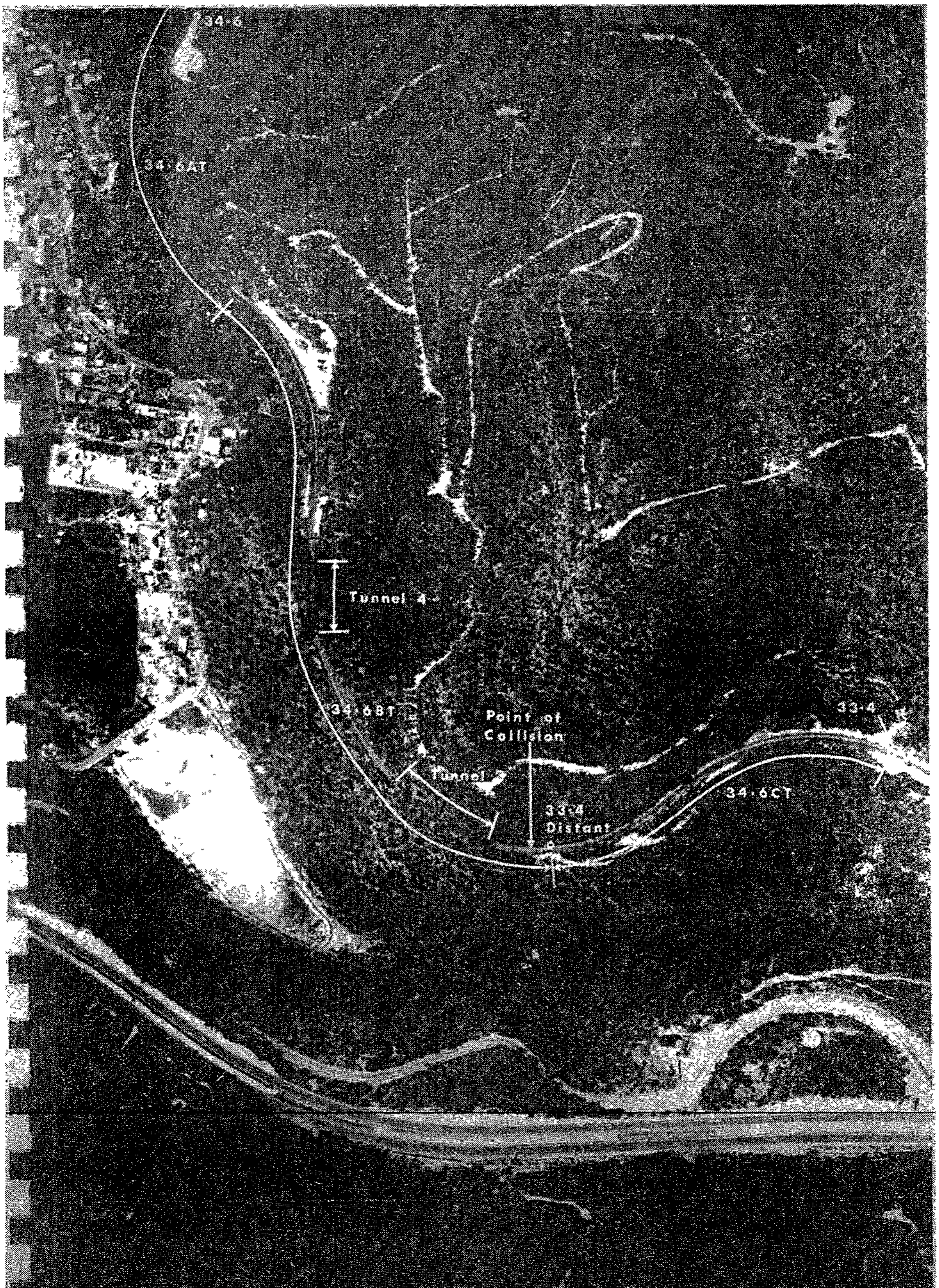
The author also wishes to place on record his appreciation of the outstanding efforts of all the personnel of the rescue agencies on the night of May 6,1990. Their accomplishments on that night justified the preplanning exercises and highlighted the advantages of such exercises.

Noting this International Symposium, the author would also like to place on record his appreciation of the contribution made by the independent member of State Rail's Board of Inquiry into the collision, Mr.T.Adams of British Rail.

DIAGRAM 1



TRACK PLAN - UP MAIN LINE BETWEEN HAWKESBURY RIVER AND SITE OF COLLISION


34·6
34·6AT
Tunnel 4
34·6BT
Point of
Collision
Tunnel
33·4
Distant
33·4
34·6CT

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9012

P. Cannito

Road Safety
The Human Factor

Note: *This paper was basically a visual presentation, accordingly as such there is no written paper.*

Publisher
2000 International Rail Safety Conference

Road Safety
The Human Factor

by

P. CANNITO

- Brief history of Amtrak
- Workplace safety through employee involvement
- Employee safety committees
- Safety Training Observation Program. Training supervision to observe and correct unsafe practices utilizing a positive approach.
- Labor/Management Safety Training Program - utilization of interactive video to train personnel on various safety related issues.
- Safety - a line management responsibility.
- Philosophy of Amtrak's Operating Group - safety is our top priority - only those who can manage safety will be allowed to manage.
- Amtrak's safety record - how has this 19 year old railroad progressed in safety related matters over its short history.
- What works at Amtrak - can it work at other railroads worldwide?

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9013

Ray Ryan

Safety Management in New Zealand Railways Corporation

Publisher
2000 International Rail Safety Conference

Safety Management in New Zealand Railways Corporation

by

Ray RYAN

Ray Ryan, has worked in the Railway Industry since graduating from the Auckland University in 1960 with a degree in Civil Engineering. During his professional career, he has been involved in a broad range of Engineering, Transportation and Business activities within New Zealand Railways. He has held positions of responsibility from graduate Engineer to Deputy Chief Civil Engineer. His more recent assignment as project manager has included development of Single Manned Train crewing for Main Line trains, revised shunting procedures incorporating the use of radio technology and introduction Alternative Signalling (Track Warrant Control) for low traffic density lines. His current role is the development of safety and risk management policy at corporate level in New Zealand Railways Corporation. He is a Fellow of the Institution of Professional Engineers of New Zealand and a Member of the Chartered Institute of Transport.

Safety & Risk Management Unit

Office of the Chief Executive

SAFETY MANAGEMENT IN NEW ZEALAND RAILWAYS CORPORATION

EXTRACT

Over the past 10 years, New Zealand Government Railways has moved from that of a Department of State to a Commercial Corporation trading in a deregulated transport market.

The principal change in focus has been from a transport service industry to one of a market driven, customer needs business.

New Zealand Land Transport Law is being redrafted from that of a specific New Zealand Railways Act to that incorporating Quality Assurance for the management of total safety in all Railway Companies.

Within New Zealand Railways, the challenge has been addressed by reshaping the organisational structure into business focused units, introducing modern management practices, a move toward contracted resources, use of modern technology, and restructuring the debt.

Major changes to operationing practices, revised maintenance strategies, and asset reduction has turned the financial result from a traditionally Government subsided loss to a truly breakeven situation in 1990.

During the business transition, safety performance in both operations and personnel was carefully monitored to identify any changes from historical trends. Safety management is moving from that of striving for absolute safety to Loss Control, incorporating Risk Management as part of the Corporation's Total Quality Management regime.

The Safety and Risk Management group, which reports directly to the Chief Executive, is playing an important part in this process by developing new policy, undertaking management audits, risk analysis, and monitoring loss.

R.S.Ryan, BE. FIPENZ. MCIT
Corporate Manager
Safety and Risk Management Unit
NEW ZEALAND RAILWAYS CORPORATION

NZR Corporation
Railways Building Private Bag Wellington New Zealand
Tel. (04) 725-599 Ext 8340 Fax: (04) 732-872

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9014

David Rayner

British Rail's Safety Management Programme

Publisher
2000 International Rail Safety Conference

British Rail's Safety Management Programme

by

David RAYNER

BRITISH RAILWAYS BOARD

INTERNATIONAL RAILWAY SAFETY CONFERENCE
TOKYO, OCTOBER/NOVEMBER, 1990

ABSTRACT OF B.R. KEYNOTE ADDRESS

OBJECTIVE OF ADDRESS

To share with the International Railway Community lessons BR have learned in the wake of the Clapham Junction accident in December 1988, and how this has focused attention on human factors, leading to the development of a Comprehensive Safety Management Programme.

SPECIFIC ISSUES TO BE COVERED

1. Review and findings of investigative work into the link between behaviour and attitudes to personal safety and public safety. Comparison to Japanese practice and identifies some challenges for European Railways.

2. BR adoption of 'Total Quality Management' culture to Safety Management. The BR "Quality Through People" programme, with its balanced development of systems and people/leadership issues; current training, development of Quality Improvement Teams and comparison with Quality Circles and TQM practice.

3. Importance of the 'Ownership of Safety': issues for Government and taxpayer. Issues of organisation for railways: business leadership of the production functions vital for success and demonstration of commitment to safety.

4. Research Projects into understanding and recognising the human factors and error potential:

   - Signals Passed at Danger; analysis and driver attitudes and behaviour. Recent accidents and growing realisation of lifestyle issues, aptitude, education, social environment: integration of drivers into business teams.

   - Findings of British safety researcher Professor James Reason: active and latent risks, quantitative and qualitative indices of safety across transport and other industries.

   - Development of "Design-Build-Operate-Maintain Model", interaction and provision of a systematic feedback loop for decision makers.

5. Protective Systems and active/passive role of staff: ATP and drivers, Civil Engineering mechanisation and role of staff trackside protection. Possession strategy and handsignalling.

6. Co-ordination into an industry Safety Plan and Safety Management Programme, that addresses constant dialogue and involvement with all staff; responsibility awareness; aptitude/training/competence systems; proper measurement and objectives on safety performance; risk assessment and the development of processes for evaluating priorities on the funding of safety, including the human resourcing and training costs as well as hardware investment.

DAVID RAYNER,
MANAGING DIRECTOR,
OPERATIONS & ENGINEERING,
BRITISH RAILWAYS BOARD.

31.8.90

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9015

Yongwen Liu

Maintain the Policy of "Safety First Emphasis on Prevention" in Traffic Operation

Publisher
2000 International Rail Safety Conference

Maintain the Policy of "Safety First Emphasis on Prevention" in Traffic Operation

by

LIU, Yongwen

Part 1 The characteristics of China's railways

1.1 China's railways serve as "main artery" in national economy. Turnover proportions against the total are: passenger 60%, freight more than 70%.

1.2 China's railways combine passenger and freight traffic, railway construction and railway related industrial production into one system. Much of the construction and technical renovation is carried out on the existing railways.

1.3 In China's railways, there is a long standing gap between traffic demand and traffic capacity, and the gap may continue to exist for a long time.

The above three points call for special attention to China's railway traffic safety.

Part 2 Measures taken for the safety operation of China's railways

2.1 Establishment of a complete set of rules and regulations.

2.2 Amplification of safety control system.

2.3 Measures of joint safety control with the traffic and locomotive department in the lead.

2.4 Renovation or renewal of technical equipments.

2.5 Deployment of advanced technical protective devices.

Owing to the above mentioned measures, the state of safety is going from good to better, nevertheless, the situation of China's railway safety is not so stable as we wish. The occurrence of accidents fluctuates.

Part 3 Measures to be taken to further improve the safety operation of China's railways

3.1 Further education with the policy of "safety first, emphasis on prevention". Correctly handle the relationship between safety and efficiency, quantity and quality, human and equipment.

3.2 Step up the study of safety phychology with the psychological characteristics of drivers and safety controllers.

3.3 Do a better job of training for all workers and staffs.

3.4 Perfect the joint safety control with the traffic and locomotive departments in the lead.

3.5 Implement safety responsibility system of various kind.

3.6 Enforce award and punishment system.

3.7 Improve the existing traffic equipments, including tracks, locomotives and rolling stocks, signal and telecommunication, railway crossings and rescue equipments, etc.

3.8 Development and application of high tech to insure the safe running of trains, such as the general locomotive operation recorder compatible with every signal mode, checking device for the locomotive angle cock at the state of being abnormally closed, checking device for train pipe pressure at the rear of trains, receiving device that prevents trains from being received into the occupied siding, computerized wheel set counting device, track defect detector, prevention of fire and explosion on passenger trains, application of combustion resistant materials on coaches, development of the new technique for inspecting the combustibles and explosives, e.g. gas sensor and portable explosives detector, prevention of axle burning and fracture, development of new type signal checking equipment, hump operation monitor system, etc.

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9016

Akira Esaka

Guest Speech

Note: *There are no written notes associated with the Guest Speaker's speech.*

Publisher
2000 International Rail Safety Conference

Guest Speech

by

Akira ESAKA

Born in 1936

Graduate of Kyoto University Literature Department

Worked at advertising agency as marketing bureau director and general manager.

Currently working independently as a business management critic.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9017

Panel Discussion

Note: *There are no written notes associated with the Panel Discussion.*

Publisher
2000 International Rail Safety Conference

PANEL DISCUSSION

Coordinator:

Midori MIYAZAKI

Born in 1958

Graduate of Keio University Law Department.

Graduate of Keio University Graduate School International Politics.

Newscaster for NHK's "News Center 9 p.m." since 1982.

Panelists:

Masayuki NISHIE

Born in 1937

Graduate of Waseda University First Department of Politics and Economics.

Graduate of Waseda University First Department of Literature.

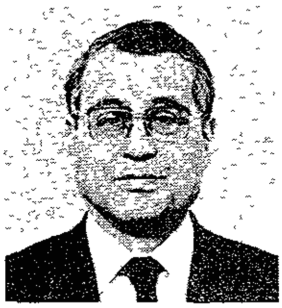
Graduate of Waseda University Graduate School Literary Research Section, master's course.

Appointed professor, Waseda University, in 1983.

Henk van der FLIER

Henk van der Flier received his Ph. D. in psychology from the Free University of Amsterdam in 1980. He has been working at the Free University as a (senior) lecturer and an assistant professor.

He joined the Netherlands Railways in 1983 and became head of the Psychology Department in 1987. His research and Publications have been primarily in psychometrics and industrial and cross-cultural psychology.



Masatake MATSUDA

Born in 1936

Graduate of Hokkaido University Graduate School, Law Research Section.

Entered Japanese National Railways in 1961.

Appointed councilor, Management Administration Department, concurrently councilor, Finance Department, and concurrently director, Reconstruction Promotion Headquarters, Japanese National Railways in 1986.

Appointed managing director, concurrently general manager, Corporate Planning Headquarters, East Japan Railway Co., in 1987.

Appointed executive vice-president, East Japan Railway Co. in 1990.

Akira MATSUZAKI

Born in 1936

Entered Japanese National Railways in 1955.

Elected president, Central Executive Committee, East Japan Railway Workers' Union (J.R.E.U.) and vice-president, Japan Confederation of Railway Workers Unions (J.R.U.) in 1987.

Pierre MESSULAM

Born in 1960

Graduate of Ecole Normale Supérieure, Paris PHD of Mathematics in "stochastic control"

Graduate of Ecole Nationale Supérieure des Mines de Paris: Diploma of "ingénieur du Corps National des Mines", e.g. one of the technical corps of the French Government

For four years, nuclear safety inspector and then deputy regional nuclear inspector on behalf of the French Government in charge of monitoring safety controls on 15 reactors.

Currently deputy officer in charge of the (SNCF) French National Railways' "*Human Factors*" section.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9018

JR Aizu Wakamatsu Station Employees

Questions ?

Questions ?

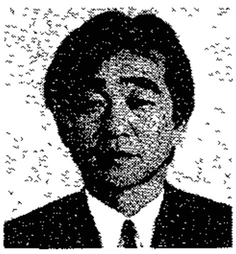
JR Aizu Wakamatsu Station Employees

Masumi KIMURA

Born in 1959

Entered Aizu Wakamatsu Station, Japanese National Railways, in 1980.

Appointed to transportation staff, Aizu Wakamatsu Station, East Japan Railway Company, in 1987.



Shinichi MUTO

Born in 1951

Entered Aizu Wakamatsu Station, Japanese National Railways, in 1969.

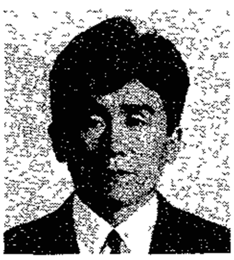
Appointed to transportation guidance staff, Aizu Wakamatsu Station, East Japan Railway Company, in 1988.

Kazuro NIIDA

Born in 1951

Entered Aizu Wakamatsu Station, Japanese National Railways, in 1970.

Appointed assistant stationmaster, Sendai Station, East Japan Railway Company, in 1990.



Noriyuki YAMADA

Born in 1957

Entered Aizu Wakamatsu Station, Japanese National Railways, in 1976.

Appointed to transportation guidance staff, Aizu Wakamatsu Station, East Japan Railway Company, in 1990.

Yukihiko WATANABE

Born in 1959

Entered Koriyama Station, Japanese National Railways, in 1978.

Appointed to transportration guidance staff, Aizu Wakamatsu Station, East Japan Railway Company, in 1990.

Previously, the Operational Accident Prevention Research Working Group reported on the importance of verification under the theme of "verification with awareness." Ironically, just a few days after releasing our report, there was an accident at our station. We realized that it is not enough for us alone to think about safety, and we reconsidered our actions.

The current Operational Accident Prevention Research Working Group gathered the opinions of many employees regarding accident prevention. We compiled our report to be read by as many employees as possible and to propose to the entire company accident prevention methods.

The report uses the experiences of an employee who caused an accident and felt great shame at being blamed at roll call by the assistant stationmaster and the railroad police. This employee vowed never to cause another accident and attended the accident prevention meetings. The report also draws on the opinions of other employees and the measures introduced at our station and by the company as a whole.

Still, we had been feeling that something was lacking. To forget all the troubles, we went out touring. On our way, we happened to see a traffic sign, and just then a child jumped out in front of us. Fortunately, we were able to avoid the child, giving us a great feeling of relief. Thinking back on the incident, it struck us that the traffic sign was the company's countermeasure. Being made aware that a child might cross in front of us was our countermeasure.

Currently the company is investing large amounts of money in safety-related equipment. But still, the most important thing is the safety awareness of each employee using that equipment. Consequently, unless a revolution in our consciousness and a concerted effort is made on our part, accidents will not be eliminated.

We have created a slide presentation with an employee as the main character showing that if this change in awareness occurs in the minds of each of us, accidents will be prevented.

We are using this slide presentation at our study groups and training sessions to raise the level of awareness of accident prevention.

We have had over 700 days without an accident since September 26, 1988, helping us to develop self confidence. At the Aizu Wakamatsu Station, we are constantly striving to confirm this quiet self confidence.

1990 TOKYO

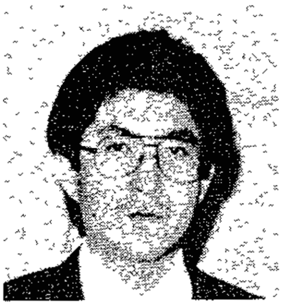
30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9019

Kazuhiro Nizuma

Building a Workplace Where Workers Initiate Safety

Publisher
2000 International Rail Safety Conference



Building a Workplace Where Workers Initiate Safety

by

Kazuhiro NIIZUMA

Born in 1959

Entered Japanese National Railways in 1977.

Elected executive committee member, Niigata Branch, East Japan Railway Workers' union (J.R.E.U.), in 1988. Elected chief officer, Young Men and Women Department, Niigata Operations Office Sub Branch, East Japan Railway Workers' Union (J.R.E.U.), in 1989.

Introduction

– Workplace conditions, the starting point for safety considerations –

When the Japanese National Railways was privatized and became JR, a union member committed suicide because of an accident. This suicide incident occurred because of the workplace environment created by management and labor, which caused this good worker to suffer to the point where he ended his life. The starting point of accident prevention is in creating a workplace where such a tragedy will never happen again, a workplace where people work to achieve safety.

Efforts

During July and August, management and labor conducted the following activities:

Task force meeting	3 meetings	18 hours
Study meeting	2 meetings	7 hours
Meeting of all members	8 meetings	24 hours
Continuing task force discussions	10 meetings	30 hours
Planning committee meeting	6 meetings	20 hours

Survey of all union members

Reactions of Those Surveyed and of Those who Participated in Discussions

1. Both labor and management believe that accidents are caused by carelessness and a lack of alertness.
2. Accident countermeasures are needed to correct this carelessness and a lack of alertness.
3. Accident prevention is a part of the personnel management safety problem.
4. Evaluation of those with no accident records is not sufficient. On the other hand, treatment of those who caused accidents is extremely harsh.
5. Thorough discussion of accidents and mutual trust between those involved in accidents is needed.

Overview of Planning Committee

1. Learning from accidents
2. The problem of idle thoughts and low awareness

3. Not getting the true story about accidents

Conclusion

– Building an Environment Where Workers Initiate Safety –

Accidents always involve people. Therefore, mutual trust among people is the foundation for accident prevention.

International Rail Safety Conference

1990 TOKYO

30 October - 1 November 1990
Hotel Metropolitan, Tokyo, Japan

Paper 9020

Laszio Machovitsch

MAV Safety Devices

Publisher
2000 International Rail Safety Conference

MAV Safety Devices

by

Laszlo MACHOVITSCH

L. Machovitsch

MAV Safety Devices

(Summary)

Budapest, 89.9.1

1. GENERAL CHARACTERISTICS OF THE MAV NETWORK

1.1 Operational Characteristics

The structure of the MAV network (main network, main lines and branch lines).

The most important characteristics of the MAV network (speed, forms of traction, single- and double-track lines).

Operating characteristics of the network (passengers and tons of freight carried per kilometer, distribution of suburban traffic, export-import traffic and transshipping traffic).

1.2 Present State of Safety Devices

The equipping of the lines with safety devices (signaling devices, track devices, safety devices for level crossings, train controller devices) and devices to control operation (remote supervision and remote control).

2. DEVELOPMENTS IN SAFETY DEVICES

2.1 Consequences of recent developments

- The need to introduce Eurocity trains between Budapest and the main cities in neighboring countries as well as the holding of the world exhibition jointly in Vienna and Budapest in 1995 and the consequent need to raise the speed limits on several of the existing lines.

- Avoiding or reducing the sources of danger (possible errors in driving the train by the driver, exceeding the speed limits on lines with low speed limits, no reduction in speed when passing a level crossing if the latter is faulty, etc,) and improvements in accident statistics (running a signal, errors at the signal box that allow a train to come in the opposite direction on the same track, lack of attention by road users at level crossings, etc.).
- The need to provide modern and energy-efficient operational control.

2.2 Current and Planned Developments

Introduction of new components and safety principles in safety devices.

Introduction of new signaling devices and block devices on the main and branch lines.

Introduction of new systems of signaling for a modern system of control (error diagnosis in the locomotive, devising a more energy-efficient way of driving the train, and monitoring the speed of the train while braking).