

To ensure maximum safety and reliability, trains are operated with automatic control and protection systems which regulate the distance between trains, determine the optimal rates of acceleration and braking as well as the coasting speeds on different sections of the track. The routing and timing of train movements are controlled by signalling computer systems according to the scheduled timetables from the Operations Control Centre.

The planning of the service timetable is based on passenger demand, taking into account the morning and evening peaks on normal working days. For instance, during the morning peak hours, 8-car trains with a capacity for 2,500 passengers will run at 2.1-minute intervals, carrying 70,000 passengers per hour per direction on the Tsuen Wan Line. Each of the urban lines, however, is capable of running 34 trains per hour in each direction. This gives a full capacity of 85,000 passengers for each urban line in each direction.

To meet escalating passenger demands, MTR expanded its train fleet from 140 cars in 1979 to 1,050 cars in 2002 (including 88 cars for the Airport Express), 86% of which are in service to meet the daily morning peak demand.

In addition to railway operations and associated businesses, MTR also engages in the development, sale and management of residential and commercial properties above and adjacent to its stations and depots in partnership with property developers. MTR retains a number of shopping centres as long-term investments and provides property management services. The latest landmark is the Two International Finance Centre (Two IFC) office tower located at the Hong Kong Station, being the tallest building in Hong Kong and the third tallest in the world.

MTR also provides consultancy services to organizations worldwide in all areas of expertise required in the planning, construction, operation, maintenance and upgrading of railways plus property development.

Proactive Security Management System (PSMS)

2.1 Overview of PSMS

In fulfillment of the performance requirements stipulated by the HKSAR Government in the Operating Agreement, MTR has set its own objectives to meet the highest standards of safety, reliability and efficiency in the service provided to its passengers and the public at large.

Recognizing the impact of the security of the passengers, staff and premises / property on railway safety and its corporate image, MTR is committed to a policy of achieving and maintaining effective levels of security throughout all aspects of its activities for continuous monitoring and improvement of security standards.

As with safety, security is every MTR staff's responsibility. To make this effective, MTR has established a Proactive Security Management System which provides the clear directions and guidance as to security responsibilities, and the proactive measures necessary to achieve effective levels of security. The PSMS is implemented in order that managers can identify and manage the risks in their functional areas in line with the current best international practices, and maintain security measures that are effective, appropriate and of justifiable cost.

All security measures developed under the PSMS fully align with the safety and operational requirements according to the principle "the safety of people is a prerequisite" adopted by the Corporation. In essence, the PSMS covers the following 10 key elements:

- Establishment of the Corporate Security Policy
- Generation of continuous security awareness
- Setting of rules and guidelines in 5 major areas (personnel-related matters, revenue / cash, premises, property and information)
- Allocation of security responsibilities
- Identification and quantification of risks
- Design of protective measures
- Provision of effective security training
- Implementation of security measures

- Measurement of the effectiveness of security measures
- Test on compliance with security measures in high risk environment.

The PSMS differs from the traditional defensive and reactive security management system, and adopts a positive and proactive approach by identifying, assessing and analyzing security risks. Managers need to incorporate the security requirements under the PSMS into the routine or normal working practices and methods.

The security roles of the line management are broadly covered in the following aspects:

<u>Aspect</u>	<u>Requirement</u>	
• Access control	-	Ensure that systems are in place for the control of access to railway premises, offices, workplaces, rooms, assets, documents and computer systems.
• Security systems	-	Ensure that the integrity of security systems (e.g. doors, keys, intrusion alarm systems, electronic surveillance equipment, passes, etc.) is maintained and any deficiencies found are reported and followed through.
• Review	-	Annually review the systems for ensuring the security of stations, trains and depots.

1.2 Security Risk Identification & Assessment

At the heart of the PSMS are the various aspects of security risk appreciation required for effective planning of counter-measures. These aspects provide valuable input to the evaluation of security risks, involving:

- Identification of security risks
- Reporting of incidents and near misses
- Reporting of vulnerabilities and weaknesses
- Investigation into incidents
- Assessment of incident reports
- Assessment of security risks
- Security Risk Register
- Trend analysis
- Security Alert Indicator.

The line management, assisted by the Security Department, is responsible for assessing security risks to the passengers, staff and contractors. MTR uses a Security Risk Assessment Matrix (as shown in the Appendix) to rank the security risks into 4 categories.

The definitions of these categories are as follows:

SeR1 – Risk must be reduced save in exceptional circumstances.

SeR2 – Risk must be reduced if it is reasonably practicable to do so.

SeR3 – Risk is tolerable but should be further reduced if it is cost-effective to do so.

SeR4 – Risk is acceptable.

This categorization is in line with the As Low As Reasonably Practicable (ALARP) principle. The ALARP principle basically stipulates that there is a risk level which is intolerable (i.e. SeR1 risk) and another risk level that is acceptable (i.e. SeR4), and in between we have an ALARP region (i.e. SeR2 and SeR3 risks) where risk is tolerable if further risk reduction is impracticable or the cost of risk reduction is grossly disproportionate to the improvement gained. The ALARP principle applies in such a way that the higher the risk, the more resources will be proportionately directed towards reducing it.

The Security Department is required to enter any known security risks into the Security Risk Register which is subject to regular reviews by the Security Panel of the Corporation. The Security Risk Register documents the source and nature of the identified security risks, describing the existing protective measures and assigning a rating against each risk. One of the primary functions of the Register is to track how the security risks are managed. This stringent and comprehensive Security Risk Assessment Matrix has been well received by the MTR line management with security risk management or analysis responsibilities.

Trend Analysis & Security Alert Indicator

MTR has also in place the Security Information Collation System (SICS), which maintains a database of information gathered from both internal and external sources. The SICS will assess criminal or anti-social trends development elsewhere in Hong Kong to see whether there is likely to be an impact on the Corporation. On the security of the Operating Railway in relation to social stability, MTR has adopted a 3-level Security Alert Indicator as follows:

- Red - high risks
- Yellow - some perceived risks
- Green - low risks.

Reviews of the levels appropriate to the time are conducted by the senior management of the Operations Division and the Security Department in consultation with the MTR Police.

1.3 Security as an Integral Part of Railway Safety

Overall speaking, the PSMS outlines the fundamental policies and principles upon which security is managed across the Corporation and provides the line management with guidance on their responsibilities in achieving the objectives of the MTR Corporate Security Policy. However, when cascaded into the context of the Operating Railway, security becomes one of the 15 Safety Tasks with the safety of the passengers, staff, contractors and the general public being an absolute prerequisite of railway operations. In this regard, the MTR Corporation Safety Policy sets out the key philosophy and strategy for the management of safety.

2. Safety Management System (SMS)

3.1 Overview of SMS

For effective implementation of the Safety Policy, MTR has in place organization and management processes to construct and operate the mass transit railway system to the highest standard of safety. This is accomplished within the framework of the Safety Management System (SMS) of the Operations Division, which requires full consideration to be given to operational safety at all stages of extension and asset improvement projects.

The SMS intends to provide a workable framework for all managers and supervisors to incorporate safety into all aspects of tasks for which they are responsible. This is achieved by focusing on the objectives set out in the 15 Safety Tasks below, and managing them through the cyclic Safety Management Process and to the standards established in the Safety Modules:

- Safety Task 1 - Information
- Safety Task 2 - Safe Systems of Work
- Safety Task 3 - Asset, Design and Project Management
- Safety Task 4 - Protective Equipment
- Safety Task 5 - Fire
- Safety Task 6 - Human Resources
- Safety Task 7 - Communication on Safety Matters
- Safety Task 8 - Contractors and Visitors
- Safety Task 9 - Emergency Preparedness and Response
- Safety Task 10 - Accident Reporting and Investigation
- Safety Task 11 - Safety Inspections
- Safety Task 12 - Safety Performance Monitoring
- Safety Task 13 - Funding for Safety
- Safety Task 14 - Review and Audit
- Safety Task 15 - Security.

This approach is reinforced by a number of sub-systems, namely Safety Responsibility Statements, Safety Audit System, Risk Control System and Safety Critical Items. Besides, various safety groups are in place to assist the line management in discharging their safety responsibilities while the Safety Committee is set up to monitor safety performance at a strategic level.

3.2 Measures for Station Security

To help achieve a high standard of safety in the MTR stations, station staff are all well aware of the need to observe and comply with the safety responsibilities of their positions held and be alert at all times to detect any unsafe happenings within the railway premises. Various preventive measures are taken at all times to minimize hazards. These include stopping passengers from bringing dangerous and

inflammable substances, e.g. gas cylinders, fireworks, metallic balloons, etc. as well as unauthorized and too bulky items into the stations. During the routine course of duty, station staff will make frequent station inspections, particularly on stairs, escalators, passenger lifts, platforms, subways, entrances, and in addition, passenger conveyers, Transport Interchange areas and baggage handling areas where applicable, to ensure that accident preventive measures are taken and suspicious objects, if any, reported and dealt with in a timely manner.

To maintain the highest level of station security, access to the station control room, electrical equipment & plant room, automatic fare collection room, cash transfer area, baggage handling area at the Airport Express Line, etc. is allowed only to authorized staff or contractors who are executing their duties. In this regard, electronic access control cards are issued to the eligible staff with the appropriate access level programmed. This electronic security access control system would report records of door use for audit purpose, e.g. for non-public areas where very sensitive documents, data records or critical equipment items are placed.

With the completion of the Station Management System project in July 2003, a standardized and unique operational system is now in place in all 37 urban line stations to allow station controllers to quickly handle operational situations, especially emergencies. Station electrical, mechanical, signalling and communications equipment have been integrated into one single operation platform under which operators can control station lighting, automatic fare collection system, public address system and CCTV in a speedy way. The benefits brought by the Station Management System are even more obvious in emergency situations. The decision support function helps to remind station controllers of the procedures in handling emergencies.

In the daily operation of MTR stations and the railway, top priority is always given to the preservation of life in the event of accident, incident, emergency or fire. Contingency plans well suited to individual locations and site requirements have been in place to facilitate the evacuation of passengers, staff, contractors and the general public in a safe and efficient manner. There are also more specific operational / engineering manuals, procedures and instructions, e.g. the Accident, Incident and Emergency Procedures Manual, the Rules and Procedures Manual, the Station Operations Manual, the Administration Manual, etc. which detail the

procedures for handling different kinds of accidents, incidents and emergencies by front line staff. These well-tried-out procedures and instructions also cover the handling of such possible terrorist attacks on the MTR railway system as below:

- Threats / attacks of bombs and unidentified gases / substances
- Hijacking of trains, etc.

The Chairman of the Corporation may decide to set up a Crisis Management Committee at Headquarters, depending on the circumstances of the incident. The Crisis Management Committee thus set up will provide strategic planning and logistics support to a crisis which would have an immediate and negative impact on the public's confidence in the Corporation, and centralize the release of information to the public. To ensure the effectiveness and responsiveness of this ad hoc committee to deal with potential crises of different sorts, a Corporate Crisis Management Exercise with the participation of the Chairman and / or the Chief Executive Officer of the Corporation is held every year.

Apart from this, other major incident live exercises are also regularly conducted to test the response and co-ordination of the Corporation with emergency services (e.g. the Hong Kong Police Force, Fire Services Department, etc.) and other relevant authorities in handling serious railway emergencies.

3.3 Other Safety Enhancement for Urban Rail Operations

MTR places heavy emphasis on fire safety management, which is an essential element of the Corporation's Safety Policy. This is to ensure that a high standard on fire safety is achieved and maintained throughout the design, installation, operation and maintenance of the railway assets. MTR adopts the following risk-based fire safety management strategies:

- Adoption of a risk-based fire engineering approach in the design of projects and rolling stocks
- Application of appropriate regulatory and international standards for materials, design, maintenance and modification works
- Provision of appropriate fire detection and suppression systems in Corporation premises including trains and tunnels

- Allocation of responsibilities to individuals with regard to fire safety
- Establishment and maintenance of Corporation policies, standards and procedures necessary to achieve the overall fire safety requirements of new projects and the Operating Railway
- Establishment and maintenance of suitable communication channels at an appropriate level within the Corporation and with relevant government departments (e.g. the Hong Kong Railway Inspectorate, Fire Services Department, Buildings Department) on fire safety issues
- Establishment and maintenance of a fire safety culture amongst MTR staff and contractor staff through promotion, training, drills and exercises
- Establishment and maintenance of emergency evacuation procedures together with appropriate emergency plans to minimize business disruption in the event of a fire incident
- Regular reviews of the implementation of fire safety principles and any incidents on the railway to ensure ongoing and continuous improvement where necessary.

3. A Recent Incident Effectively Handled by MTR Operations Staff

A fire on board a train in the immersed tube – it is a scenario that has been played out numerous times over the years in classroom training sessions, tabletop exercises and emergency drills among the MTR operations staff. But on 5 January 2004, the emergency call (the first arson attack in the MTR's 25-year history that injured 14 people and forced 1,200 passengers to be evacuated) that came through at 9:12 am from the Tsuen Wan Line train T61 was a real thing.

For everyone on duty that morning from the Passenger Train Operator, Mr. Edmond Cheung, to his colleagues at the Operations Control Centre and the Admiralty Station – there was no time for hesitation. They were crystal clear on what they had to do. Get the train to the platform, evacuate the passengers and put out the fire. Everything worked according to the procedures laid down.

The train arrived at the Admiralty Station Platform 4 at 9:14 am. Evacuation of passengers was completed by 9:16 am and station staff had extinguished the fire before the arrival of the fire fighters. Not only was the emergency situation put quickly under control, but normal train service was resumed within 30 minutes.

4. Conclusion

MTR has in place management systems and associated processes for effectively identifying, assessing, controlling and managing the railway security and safety hazards. These processes, which begin in the early stages of a railway project planning and construction and continue through to operation, have been proven to be effective and practical, and have helped the Corporation achieve world-class operational safety performance.

This has been exemplified by the handling and successful containment of the 5 January wilful arson incident in which the following factors have allowed the MTR to quickly bring passengers to safety and defuse the emergency situation efficiently without causing any serious injuries:

- Effective implementation of operational and emergency procedures (including staff training and regular drills)
- Speedy staff response
- Appropriate train design
- Efficient means of communication.

Appendix: MTR Corporation Security Risk Assessment Matrix

		Consequences			
		Relatively unimportant	Moderately serious	Very serious	Extreme
Service Disruption	System	--	--	--	Any
	Line	--	--	20 – 60 mins	Hours
	Station	--	20 – 60 mins	Hours	1 day
Loss of Corporation assets	< \$100,000	\$100,000 – 1,000,000	\$1,000,000 – 10,000,000	\$10,000,000 +	
Normal sentence imposed to offenders committing crimes against passengers / staff / third parties / Corporation	= 5 years' imprisonment	5 ≥ 10 years' imprisonment	10 ≥ 20 years' imprisonment	> 20 years' imprisonment	
Non-financial impact	Minor degradation of service, impact limited to a single area of the business, management intervention required	Significant degradation of service, impact to multiple areas of business, can be managed with significant management intervention	Major degradation of service, impact to widespread areas of the business, would not threaten viability but require significant mobilization of resources and significant management intervention	Threatens long-term viability of the business	
Likelihood					
Very high – every week (> 50/yr)	SeR2	SeR2	SeR1	SeR1	
High – every month (11 – 50/yr)	SeR3	SeR2	SeR2	SeR1	
Medium – every year (1 – 10/yr)	SeR4	SeR3	SeR2	SeR2	
Low – less than yearly (< 1/yr)	SeR4	SeR4	SeR3	SeR2	

Legend

Colour	Legend	Action required
	SeR1	Risk must be reduced save in exceptional circumstances
	SeR2	Risk must be reduced if it is reasonably practicable to do so
	SeR3	Risk is tolerable but should be further reduced if it is cost-effective to do so
	SeR4	Risk is acceptable