

## **Legislative Council Panel on Transport**

### **Review of Mass Transit Railway Service and Incidents**

#### **Introduction**

At the Panel meeting on 10 September 2002, the Administration undertook to review the performance of the Mass Transit Railway (MTR) system in light of the incidents which happened since August this year. This paper reports to Members the findings of the review.

#### **Background**

2. In accordance with the Mass Transit Railway Ordinance and the Operating Agreement (OA) signed between the Government and the MTR Corporation Limited (MTRCL) on 30 June 2000, the Commissioner for Transport (C for T) is the authority for monitoring MTR service performance while the Chief Inspecting Officer (Railways) of the Hong Kong Railway Inspectorate (HKRI) is responsible for looking after the safety aspects. MTRCL is required to meet the stringent service performance and safety requirements stipulated in the OA.

#### **Handling of Service Disruptions**

3. The OA provides that MTRCL must inform C for T of any service interruption or delay which may affect the safe and efficient conveyance of passengers. There are an established alert system and contingency plans in place for relevant Government departments and public transport operators to respond promptly to MTR incidents.

4. When an incident occurs, MTRCL will make an evaluation of the possible duration of the disruption and issue an "Amber Alert" to the Transport Department (TD) and other transport operators as an early warning of a probable serious disruption of service. This is to alert the recipients to keep in touch with MTRCL and make preparation for possible emergency action at short notice. A "Red Alert" will be issued by MTRCL as a signal to indicate that a serious disruption has continued or is expected to continue for over 20 minutes, and emergency transport services from other public transport operators are required. Depending on the circumstances, a "Red Alert" may be issued without an "Amber Alert". Upon being alerted, the recipients should urgently mobilize their resources to provide appropriate supporting services.

5. TD operates the Emergency Transport Coordination Centre which provides a focal point for liaison with public transport operators on traffic and transport arrangements during serious traffic and transport disruptions including MTR incidents.

6. MTRCL would submit a report after the occurrence of an incident leading to serious disruption of service. TD and HKRI would then look into the following aspects -

- (a) whether the incident has any safety implications, including any injuries on passengers;
- (b) impact on passengers and the alternative transport arrangements by MTRCL, if any;
- (c) recovery actions taken;
- (d) the cause of the incident; and
- (e) follow-up remedial or improvement measures identified or taken by MTRCL.

Where necessary, TD and HKRI will conduct reviews with MTRCL to ensure that appropriate rectification measures are being taken by the Corporation to avoid recurrence of similar incidents, and MTR services continue to be provided in a safe, efficient and reliable manner.

7. For the recent MTR incidents, the Government has received reports from MTRCL. We note that most incidents were related to the Tseung Kwan O Line, Kwun Tong Line and the new Korean trains. The faults causing the incidents have been identified and remedial measures have been or are being taken by the Corporation. (Details are set out in **Annex A.**) The Administration has conducted a review on the performance of the MTR system in the light of these incidents. Our assessment of different aspects and the remedial measures to be taken are set out in the following paragraphs.

### **Assessment on MTR Railway Systems**

8. HKRI has carried out a study to find out whether the recent MTR incidents were due to an increase in failures of the engineering systems of the railway. The review of service disruptions from 1999 to August 2002 has shown that signalling and trains were the two systems causing most of the service delays and a rise in problems relating to these two systems is noted.

Tables showing the number of disruptions from 1999 to August 2002 are at **Annex B**. Details of the findings are set out below.

### Signalling System

9. Signalling equipment can be broadly classified into two categories, namely trackside equipment which are those installed at the trackside or plantrooms; and train-borne equipment which are those installed on trains. Both trackside and train-borne equipment are computer-based equipment which work together for the safe and reliable performance of trains. HKRI is of the view that the rise in signalling failures, particularly on the train-borne equipment, is a result of the introduction of new projects since early 2001 which requires modification of the signalling system. These projects include the automatic turnaround operation in February 2001, Quarry Bay Congestion Relief Work in August 2001, the introduction of new Korean trains in April 2002 and the opening of the Tseung Kwan O Line in August 2002. It is worth noting that these signalling problems caused delays and inconvenience to commuters but did not pose any safety risk on passengers.

10. MTR's new signalling system for the Tseung Kwan O Line and Korean trains was first tested in the factory before delivery. After installation, the functions of all equipment were verified again on site. Test runs were then conducted using both the new Korean trains and the other existing trains to ensure that the signalling system functioned as designed. The performance of these trial runs under the new signalling system was monitored by the HKRI and TD. Test results were satisfactory.

11. To address the problems with the signalling system after commissioning the Tseung Kwan O Line, MTRCL has been working closely with the supplier to find out the cause of each failure and implement improvement measures. Most improvements have been made through software upgrading. In addition, since mid August, MTRCL has deployed an additional staff on board of all in-service Korean trains to assist the train operator on fault diagnosis and recovery in order to shorten any delay time. The Corporation will also minimize the number of Korean trains put into passenger service until a higher reliability of the systems concerned is achieved.

### Train Doors of Korean Trains

12. While the majority of the delays involving the new Korean trains were due to train-borne signalling defects as mentioned in paragraphs 9 to 11 above, there were several train delays caused by the failure of doors. HKRI's study of these incidents reveals that they are generally caused by the reliability

of the door control circuit, resulting in doors failing to close or not being detected to be fully closed when the trains were at stations. As a safety protection mechanism, the train-borne computer would automatically prohibit the trains from moving when there was a door failure. Passengers were therefore required to leave the trains and take the following ones. Passenger safety was not put at risk.

13. MTRCL has identified with the train supplier that some components in the train door control circuit have to be changed and the software has to be upgraded. Replacement and software upgrading are in progress.

#### Depot-bound Trains Carrying Passengers

14. The cases of depot-bound train carrying passengers have aroused concern on incidents caused by human error. Such incidents however have not posed any safety risk to passengers. MTR is an advanced railway system designed in such a way that passenger safety is protected by various engineering systems. All train movements are protected by the Automatic Train Protection (ATP) system. This system will not allow trains to be routed into “No entry” track and will keep trains separated by a safe distance.

15. To minimize the chance of staff error, MTRCL has recently issued a new instruction requiring the Operations Control Centre to double check with the train operator at the last station before a train is routed back to depot. Moreover, human behavior will be part of MTRCL’s regular safety management review to be carried out by an independent expert in the first quarter of 2003.

#### Other Major Equipment of the Railway System

16. The number of delays caused by problems with other major equipment such as permanent way, overhead line, platform screen door, has been rather small (less than 10 each year). There is no indication of any major systemic error, and this reflects that the maintenance of the railway is effective in keeping up equipment performance at high levels.

#### **Assessment on MTR Maintenance and Outsourcing**

17. There has been a concern on the maintenance level of the MTR. This section provides details of the Government’s assessment.

### Maintenance System of MTRCL

18. The Corporation has established a maintenance system in line with international practice. Its maintenance strategy includes preventive maintenance, condition-based maintenance, reliability-centred maintenance and life cycle analysis which are all modern maintenance philosophies. The Corporation has also put in place a Management Information System to effectively monitor the maintenance activities. A Quality Management System certified to international standard ISO9001:2000 has also been established to ensure the quality of maintenance work.

19. MTRCL's maintenance management system is subject to review by external experts every three years and the Quality Management System is subject to audit by an external auditor annually. These reviews ensure that maintenance will always be properly managed by the Corporation.

### Maintenance for Tseung Kwan O Line

20. The 15 modernized trains for serving the Tseung Kwan O Line are maintained by the contractor who carried out the trains modernization project in 1998 to 2001. The contractor is also responsible for the maintenance of the Tseung Kwan O Depot facilities. The contractor is considered to have adequate knowledge and experience in carrying out the maintenance of the trains. Other station and infrastructure systems of the Tseung Kwan O Line are maintained by the original suppliers or contractors during the one year Defects Liability Period.

21. The contractor's workers are trained and certified on the specific maintenance procedures and standards of MTRCL. They use the same set of maintenance procedures, work instructions and follow the same maintenance schedule as those adopted by MTRCL's in-house maintenance staff. The performance requirements of the contractor in maintenance have been clearly defined and are the same as those for MTRCL in-house staff. Maintenance works are also carried out under the supervision, inspection and audit of MTRCL to ensure the quality and safety standard of the work. In accordance with the ISO9001:2000 requirement, the maintenance system is subject to annual audit by an accredited auditor.

22. Irrespective of any outsourcing arrangement, MTRCL's in-house staff remain responsible for the immediate handling of equipment defects and urgent faults. The contractor is required to follow up on any equipment fault as recorded on the daily fault record.

23. HKRI, having reviewed all the arrangements of MTRCL's maintenance work, concludes that comprehensive maintenance and contractor management systems are in place.

### **Arrangements for Handling of Contingencies**

24. HKRI has also reviewed the arrangements for handling emergency situations.

25. MTRCL has established systems for the effective and efficient management of crowd and evacuation. There are comprehensive procedures to deal with various scenarios of emergency. All station staff are trained to carry out crowd control and evacuation of passengers according to the documented procedures. The MTR stations are constructed with non-inflammable materials and designed for the easy evacuation of passengers without the need of assistance from staff. MTRCL has developed a contingency plan for integrated manpower backup in order to ensure an efficient and systematic deployment of manpower and resources from the less affected stations or lines in case of incidents. The Fire Services Department and the Police will be called on and are able to arrive in a few minutes to assist where necessary.

26. HKRI is satisfied that the manpower levels at MTR stations are adequate and the staff are competent in handling crowd control and passenger evacuation in case of emergency. The crowd control arrangements and staffing level should however be reviewed from time to time, taking into account the changes in travel pattern for each station and the passenger volumes during different hours of operation, in particular after the operation of new railway lines and new interchanges.

### **Alerting Procedure and Information Dissemination**

#### Alert System for MTR Incidents

27. The Government and MTRCL have reviewed the alerting procedure with a view to minimizing the lead time for activating contingency arrangements when MTR incidents occur.

28. To ensure that emergency transport services and crowd control would be arranged expeditiously by relevant Government departments and other transport operators, MTRCL has agreed to undertake the following actions -

- (a) to instruct staff of the Operations Control Centre to make better use of the Amber Alert whenever necessary to allow more time for TD and other public transport operators to make preparation for supporting transport services; and
- (b) to speed up the communication between MTRCL and TD through simplifying the Alert forms and using direct telephone line in addition to using fax once a decision to issue an Amber/Red Alert is made.

29. Upon receipt of Amber/Red Alerts, TD would assist in the liaison with other transport operators to strengthen their services as necessary and monitor the provision of supplementary services by other operators.

#### Dissemination of Information

30. There have been complaints from passengers that they were not informed at the scene of the cause of what had happened and that there was inadequate information at MTR stations to guide them to use alternative transport services.

31. TD's review shows that there are adequate channels for communication among the Operations Control Centre, stations and train operators. However, there are scopes to strengthen and streamline the communication flow for speedy and better coordinated messages. MTRCL is suggested that the Operations Control Centre should centrally coordinate as far as possible the issue of key messages to passengers in case of a serious service disruption to avoid disseminating confused or conflicting messages to passengers. It is noted that the information disseminated to the passengers are properly recorded to facilitate subsequent reviews.

32. To improve the dissemination of information, MTRCL will make better use of the communication channels to provide passengers with more timely information about a service disruption including the expected duration of the disruption. The Corporation will also provide better signs within the station areas guiding passengers to alternative transport services. TD, on the other hand, will review with the bus operators the provision of information to passengers inside public transport interchanges and bus stops adjacent to MTR stations for better provision of information to passengers.

## **Conclusion**

33. The Government has thoroughly reviewed the performance of MTR services. Our review concludes that the MTR system is in general performing at high safety and service standards with adequate maintenance. On the other hand, the recent rise in problems relating to signalling system for those new projects and new train doors is an area of concern. To address this concern, we have worked with MTRCL to identify remedial measures to rectify the problems and ways to improve its contingency handling procedures.

34. The Government has an established mechanism to monitor the service levels and safety matters of the MTR. We will continue to monitor closely the performance of MTRCL and the implementation of remedial and improvement measures.

35. Members are invited to note the content of this paper.

Environment, Transport and Works Bureau  
October 2002



**Summary of MTR Incidents since August 2002**

Summary: (\*) 4 incidents with service delays over 20 minutes in August and one in September.

<b>Date</b>	<b>Incident</b>	<b>Follow-up actions by the Government</b>	<b>Cause / Recovery and remedial measures by MTRCL</b>
5 August (*)	Train borne signalling equipment failure on a Korean train at Kwun Tong Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report.</li> <li>• Review meeting held with MTRCL on 12 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Caused by failure of transient train-borne computer.</li> <li>• The computer software upgraded.</li> </ul>
5 August	Compressed air leakage of an English train at Yau Tong Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report.</li> <li>• Review meeting held with MTRCL on 12 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Caused by a defective air compressor.</li> <li>• The air compressor replaced.</li> </ul>
5 August (*)	Train door indicator failure of a Korean train at Lok Fu Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report.</li> <li>• Review meeting held with MTRCL on 12 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Caused by fault of the train door control circuit.</li> <li>• The software upgraded.</li> </ul>
10 August	Trackside machine failure near Kwun Tong Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report.</li> <li>• Review meeting held with MTRCL on 12 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Caused by broken point detection wire inside a trackside Point Control Box.</li> <li>• The broken wire replaced.</li> </ul>
12 and 15 August	Passengers nipped or trapped by train doors	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report.</li> <li>• Observed and checked train door operation at Kowloon Bay Depot on 12 and 15 August. MTRCL requested by HKRI to remind all train operators and station staff to closely monitor the door closing by both line of sight and CCTV. Trains should not be started in case of uncertainties.</li> </ul>	<ul style="list-style-type: none"> <li>• 12 August: A passenger was not familiar with the operation of the new Korean train doors and stood too close to the closing doors, resulting in muscle of an upper arm nipped by doors.</li> <li>• 15 August: A passenger tried to prevent the train doors from closing twice to let her company into the train, resulting in fingers nipped by the train doors.</li> </ul>

Date	Incident	Follow-up actions by the Government	Cause / Recovery and remedial measures by MTRCL
		<ul style="list-style-type: none"> <li>• Review meeting held with MTRCL on 29 August.</li> <li>• Further discussions on enhancements to the new train doors on 12 September. HKRI following up on possible enhancements.</li> </ul>	<ul style="list-style-type: none"> <li>• MTRCL conducted press briefing on 16 August to demonstrate the safety features of the Korean trains. As advise by the Government, MTRCL placed additional warning signs, made more frequent announcements to alert passengers not to stand close to the closing doors, deployed additional staff at busy platforms and publicise train door safety through videos in stations.</li> </ul>
14 August (*)	Braking system failure of a train at Prince Edward Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report.</li> <li>• Review meeting held with MTRCL on 29 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Caused by broken electrical contact in the traction control system.</li> <li>• The defective component replaced.</li> </ul>
20 August	Minor fault of Korean train at Ngau Tau Kok Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to provide investigation result.</li> <li>• Review meeting held with MTRCL on 29 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Problem with the train-borne computer.</li> <li>• Continuous fine-tuning of computer systems.</li> </ul>
21 August (*)	Platform screen door failure at Yau Ma Tei Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to provide investigation result.</li> <li>• Review meeting held with MTRCL on 29 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Caused by a short circuit on a computer circuit board which controlled the Platform Screen Door.</li> <li>• Defective component replaced.</li> </ul>
21 August	Minor train fault at Mongkok Station	<ul style="list-style-type: none"> <li>• Requested MTRCL to provide investigation result.</li> <li>• Review meeting held with MTRCL on 29 August.</li> </ul>	<ul style="list-style-type: none"> <li>• Problem with the train-borne computer.</li> <li>• Continuous fine-tuning of computer systems.</li> </ul>
3 September	A depot-bound train carried passengers on Kwun Tong Line	<ul style="list-style-type: none"> <li>• Requested MTRCL to submit report and further information on top of standard report.</li> <li>• Review meeting held with MTRCL on 17 September.</li> </ul>	<ul style="list-style-type: none"> <li>• The Operations Control Centre (OCC) did not inform the train operator that the train had been assigned to return to depot.</li> </ul>

Date	Incident	Follow-up actions by the Government	Cause / Recovery and remedial measures by MTRCL
		<ul style="list-style-type: none"> <li>● HKRI ensured that there was no safety risk to passengers. Following up with MTRCL on possible display on trains or at tracks to alert the train operators of the destination.</li> </ul>	<ul style="list-style-type: none"> <li>● MTRCL reminded staff to have clear communication with each other and issued a new instruction for the OCC to double check with the train operator before a train is routed to the depot.</li> </ul>
5 September (*)	Train failure at North Point Station causing suspension of Tseung Kwan O Line service	<ul style="list-style-type: none"> <li>● Enquiry made immediately after the incident to confirm it was only an alarm fault and had no safety implications.</li> <li>● Requested MTRCL to submit report.</li> <li>● Requested MTRCL to consider thorough checking of all trains and improve maintenance.</li> <li>● Review meeting on alert procedures held with MTRCL on 20 September.</li> <li>● Discussion with MTRCL on technical findings and possible enhancements held on 12, 20 and 23 September. Following up with MTRCL on details of improvement measures.</li> </ul>	<ul style="list-style-type: none"> <li>● A trip switch of the “train divided” monitoring circuit was defective, resulting in a false alarm which, due to its failsafe design, stopped the train immediately and prevented it from making further movement. The defective train had to be pushed away from the running line by the following train.</li> <li>● The defect was caused by the breakage of a PVC conduit underneath the train. A fleet check has been carried out. Further improvement measures identified and being implemented.</li> </ul>
10 September	Korean train failure at Prince Edward Station causing service delay	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide investigation results.</li> <li>● Review meeting held with MTRCL on 17 September.</li> </ul>	<ul style="list-style-type: none"> <li>● Caused by failure of an electronic part in train.</li> <li>● Defective component replaced.</li> </ul>

<b>Date</b>	<b>Incident</b>	<b>Follow-up actions by the Government</b>	<b>Cause / Recovery and remedial measures by MTRCL</b>
13 September	Train failure at Tseung Kwan O Station	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide report.</li> <li>● Review meeting held with MTRCL on 17 September.</li> </ul>	<ul style="list-style-type: none"> <li>● Caused by a fault of train borne computer.</li> <li>● Continuous fine-tuning of computer systems.</li> </ul>
17 September	Korean train failure at Diamond Hill Station	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide report.</li> </ul>	<ul style="list-style-type: none"> <li>● Caused by a fault of train borne computer.</li> <li>● Continuous fine-tuning of computer systems.</li> </ul>
19 September	Korean train failure at Kwun Tong Station	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide report.</li> </ul>	<ul style="list-style-type: none"> <li>● Caused by a fault of train borne computer.</li> <li>● Continuous fine-tuning of computer systems.</li> </ul>
22 September	Draught glass in a train of Island Line broke suddenly causing injury to a passenger	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide investigation report. Following up on possible enhancements.</li> </ul>	<ul style="list-style-type: none"> <li>● Cause is yet to be confirmed but would be probably due to impurity during glass production.</li> <li>● MTRCL is pursuing the issue with the supplier and studying means to minimize risk of injury.</li> </ul>
23 September	Train fault at Tai Wo Hau	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide report.</li> <li>● Following up with MTRCL together with the incident on 5 September.</li> </ul>	<ul style="list-style-type: none"> <li>● Caused by defective trip switch of the train.</li> <li>● Defective component replaced.</li> </ul>
25 September	Signalling problem at Quarry Bay Station	<ul style="list-style-type: none"> <li>● Requested MTRCL to provide investigation result.</li> </ul>	<ul style="list-style-type: none"> <li>● Caused by a short circuit of a component on track.</li> <li>● Defective component replaced.</li> </ul>

<b>Date</b>	<b>Incident</b>	<b>Follow-up actions by the Government</b>	<b>Cause / Recovery and remedial measures by MTRCL</b>
26 September	Train door problem at Wong Tai Sin Station	<ul style="list-style-type: none"><li>• Requested MTRCL to provide investigation result.</li></ul>	<ul style="list-style-type: none"><li>• Problem with door open button.</li><li>• Defective component replaced.</li></ul>
8 October	Computer problem on train at Wong Tai Sin Station	<ul style="list-style-type: none"><li>• Requested MTRCL to provide investigation result.</li></ul>	<ul style="list-style-type: none"><li>• Caused by a fault of train borne computer.</li><li>• Continuous fine-tuning of computer systems.</li></ul>

---- Ends ----

**No. of Incidents with Delays of 5 minutes or more for the Years 1999 to 2002(up to Aug)**  
**(Breakdown by cause of failure)**

**(a) Delays of 5 min. to 9 min.**

Cause of Failure	No. of Incidents			
	1999	2000	2001	2002(Jan-Aug)
Signalling - Trackside	18	17	55	36
Signalling - Trainborne	22	30	70	117
Train	73	60	52	49
Other Major Equipment*	3	1	2	3
Passenger Action	14	35	46	49
Miscellaneous *	3	13	25	28
Total	133	156	250	282

**(b) Delays of 10 min. to 19 min.**

Cause of Failure	No. of Incidents			
	1999	2000	2001	2002(Jan-Aug)
Signalling - Trackside	9	7	28	25
Signalling - Trainborne	24	20	17	2
Train	23	19	14	7
Other Major Equipment*	2	2	0	4
Passenger Action	16	10	16	15
Miscellaneous*	5	3	7	7
Total	79	61	82	60

**(c) Delays of 20 min. or more**

Cause of Failure	No. of Incidents			
	1999	2000	2001	2002(Jan-Aug)
Signalling - Trackside	1	1	2	6
Signalling - Trainborne	4	1	3	0
Train	1	7	3	1
Other Major Equipment*	3	1	0	1
Passenger Action	7	8	5	4
Miscellaneous*	1	1	3	2
Total	17	19	16	14

\* Notes:

- 1) Other major equipment includes permanent way, overhead line and platform screen door.
- 2) Miscellaneous includes civil work, station maintenance, external factors, etc.