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Panel on Transport

Subcommittee on Matters Relating to Railways
Special meeting on 28 June 2012

**Background brief on MTRCL's contingency arrangements and
maintenance work**

Purpose

This paper provides background information on the contingency arrangements implemented by the MTR Corporation Limited (MTRCL) during railway incidents and its railway maintenance work. It also summarizes the discussions held by the Subcommittee on Matters Relating to Railways (the Subcommittee) on the subjects.

Background

Notification of railway incidents and contingency arrangements

2. To facilitate relevant operators and agencies to gear up resources (e.g. emergency transport support services from other operators) to assist affected passengers, MTRCL is required since 2004, to notify the Transport Department within 8 minutes on any service disruption incident that has occurred for 8 minutes or is expected to last for 8 minutes or more. Train service disruption incidents refer to those incidents that lead to a stoppage of service at a railway station or a stop (in respect of light rail), or on a section of a railway line, or an extension in end-to-end journey time on a railway line of 8 minutes or more.

3. According to MTRCL, the service disruption of Tsuen Wan Line (TWL) on 21 October 2010 caused a three-hour suspension of train service between Yau Ma Tei and Jordan Stations and affected about 100,000 passengers. Moreover, there was confusion in the information conveyed to the stranded passengers and chaos in the boarding activities for e-buses

at Hamilton Street. After conducting a comprehensive review on the incident, MTRCL came up with a series of new measures to improve communication with passengers in the event of a train service suspension, with a view to minimizing the inconvenience to passengers and assisting them to identify the most suitable course of action to continue their journeys. Details of the new measures for better handling of future incidents are set out in paragraphs 4 to 21 of an information paper provided by MTRCL in March 2011 [LC Paper No. CB(1)1585/10-11(05)], a copy of which is attached in **Appendix I** for members' easy reference.

MTRCL's maintenance and infrastructure manpower resources

4. In view of the MTR rail breakage incidents in early 2011, MTRCL engaged the Institute of Railway Technology (IRT) at Monash University, Australia in March 2011 to conduct a review study. The scope of the review study included assessment and comparison of MTRCL standards with international standards and practices adopted by other railway operators in respect of MTRCL's rail procurement; quality control, inspection and maintenance of rails relevant to rail breakages; non-destructive testing technology; and management measures taken upon detection of rail breakages. The result of the review, improvement recommendations from IRT and MTRCL's action plan for implementation are detailed in an information paper provided by MTRCL [LC Paper No. CB(1)2973/10-11(01)]. At the request of the Subcommittee, MTRCL has provided supplementary information on the numbers of maintenance staff before and after the rail merger (including maintenance of rails) and the current numbers of staff responsible for regular inspections of rails (e.g. visual and ultrasonic inspections) as follows –

- there were about 1,200 staff employed under MTRCL's major outsourced maintenance and infrastructure contracts in 2010, which is equivalent to approximately a quarter of its total manpower in the area of maintenance and infrastructure. The number includes 187 staff responsible for conducting visual and using other non-destructive tests for rail inspections; and
- the number of maintenance and infrastructure staff directly employed by MTRCL (including pre-merger MTRC and KCRC) from 2001 to 2010 is set out in Table 1 of **Appendix II**. New railway lines put into operation in recent years are in Table 2 of **Appendix II**.

Previous discussions by the Subcommittee

Contingency arrangements

5. At the meeting on 18 March 2011, the Subcommittee discussed the new measures introduced by MTRCL for better handling of incidents, such as establishment of the Customer Service Rapid Response Unit and review of the emergency bus services. Some members considered the emergency bus services inadequate and asked about the number of emergency buses to be deployed during service disruptions. MTRCL subsequently provided the following supplementary information –

- Generally speaking, according to the agreement between MTRCL and the Public Omnibus Operators Association (POOA), when shuttle bus service is needed as result of a disruption of MTR train service, POOA will arrange about seven buses to provide service within 30 to 45 minutes after receiving MTRCL's notification; an additional of about 40 buses within 1 to 1.5 hour; and about 100 buses in total after two hours. The actual number of buses arranged will depend on the degree of impact to train service and road traffic condition; and
- as the carrying capacity of shuttle buses is much lower than that of railways, shuttle buses cannot replace train carrying capacity completely. Therefore, whenever there is a railway incident, passengers may need to use other MTR lines or alternative methods of public transportation to reach their destinations.

Railway incidents and maintenance

6. At its meeting on 4 November 2011, the Subcommittee discussed the MTR railway service performance for the period between 1 July and 30 September 2011. The Subcommittee noted that during the said period, the number of delays of 8 minutes or more totalled 86 (63 related to heavy rail network and 23 related to light rail network). Subcommittee members in general expressed dissatisfaction with the large number of delays of 8 minutes or more recorded in the said period. They sought the Administration's comments on the MTR railway service performance and queried whether the frequent occurrence of incidents was linked to the outsourcing of maintenance work of MTRCL and the aging of the MTR rail network. In particular, members noted that there were about 1,200 staff

employed under MTRCL's major outsourced maintenance and infrastructure contracts in 2010, which was approximately a quarter of MTRCL's total manpower in the area of maintenance and infrastructure. Subcommittee members were concerned whether this had adversely affected the work quality of rail inspection and maintenance.

7. Besides, some Subcommittee members pointed out that since 2008, the total investment in maintenance, repair and renewal of railway assets had increased by about 17.5%, whereas the manpower resources (number of full-time maintenance staff) had only increased by about 2.6%. They therefore expressed concern about the adequacy of the increase in maintenance manpower.

8. In response, MTRCL made the following points –

- (a) it had a well established monitoring system to ensure that its outsourced maintenance work met the required standards. It applied the same standards and requirements to maintenance tasks carried out by MTR in-house staff and contractors' staff;
- (b) it had achieved maintenance manpower saving in recent years by automation of work; and
- (c) the number of delays was not linked to the number of contractors' staff.

9. The Administration also made the following points –

- (a) a large majority of the train service delays were actually caused by passenger behaviour and external factors as reflected by the following statistics –

	Average number of railway incidents per month caused by equipment failure/staff factor	Average number of railway incidents per month caused by passenger behaviour and external factor
2008	7	130
2009	8	132
2010	8	139
2011 (Jan to Sept)	11	147

Based on the above, the number of railway incidents was considered acceptable from the regulatory authority's point of

view; and

- (b) since MTRCL's implementation of improvement measures after the service disruption of TWL on 21 October 2010, the Administration was generally satisfied with the performance of MTRCL in the handling of railway incidents.

10. At the same meeting on 4 November 2011, MTRCL briefed the Subcommittee on the findings of the review conducted by a team of experts on rail technology from IRT (paragraph 4 above). The Administration also provided its assessment on the consultancy report of IRT for consultation with the Subcommittee. The Subcommittee noted the major findings of the IRT review on the following aspects –

- (a) procurement process of rails from suppliers;
- (b) control and quality assurance and incoming goods inspection in Hong Kong to check for any damage which might have occurred during shipping;
- (c) MTRCL's rail inspection regime involving visual inspection and non-destructive testing, etc. as well as the frequency of inspection and the training and qualification of personnel carrying out the testing work; and
- (d) management of broken and defective rails, e.g. MTRCL's response to rail breakages.

11. Subcommittee members urged MTRCL to expeditiously implement the improvement recommendations from IRT and to shorten its preparation time to set up a system of independent examination and certification based on the ISO9712 standard from one year to six to nine months.

Latest developments

12. To follow up a train service disruption of the West Rail Line on 3 May 2012, the Subcommittee will hold a special meeting on 28 June 2012 to discuss recent railway incidents as well as MTRCL's contingency arrangements and maintenance work.

Relevant papers

13. A list of relevant papers is at **Appendix III**.

Council Business Division 1
Legislative Council Secretariat
25 June 2012

Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

Follow up actions on
MTR Tsuen Wan Line Service Disruption on 21 October 2010

Purpose

Following the meeting of the Subcommittee on Matters Relating to Railways (“the Subcommittee”) on 4 November 2010 which discussed the train service suspension between Yau Ma Tei and Jordan Stations on the Tsuen Wan Line on 21 October 2010, this paper provides information on the follow up actions carried out by the MTR Corporation. It also provides the findings of the technical investigation conducted by the supplier into the failure of the concerned traction motor/circuit breaker.

Review of the Incident

2. The Corporation is fully aware of and understands the concerns of passengers during the train service suspension on 21 October 2010. Many passengers were delayed and the Corporation would like to sincerely apologise for the inconvenience caused. The Corporation agrees that there was room for improvement in how the situation was handled, especially in the areas of information dissemination, shuttle bus arrangement, co-ordination with the Police and timely communication with the Transport Department.

3. A comprehensive review was conducted taking into account the comments offered by passengers, members of the public and Members of this Subcommittee. A series of new measures to improve communication with passengers in the event of a train service suspension have been introduced with a view to minimising the inconvenience to passengers and assisting them to identify the most suitable course of action to continue their journeys. Efforts are also being made to communicate more proactively with passengers to raise awareness on what they can do and what is available to assist them during a train service suspension or major disruption.

Introduction of new measures for better handling of future incidents

4. When a train service suspension occurs, the Corporation will in the first instance need to ascertain the situation and make assessment on the impact to train service. It will then deploy extra manpower and arrange for shuttle buses as necessary. The Corporation hopes members of the public

will understand that the arrangement for the contingency services could take some time to put in place after the occurrence of the incident. But the Corporation will keep passengers informed of the situation and developments through public announcements which will advise them to first consider taking alternative MTR routes or other public transport.

5. Improvements have also been made to ensure passengers are provided with immediate information. Details are as follows:

Communication with Passengers

Improvement actions	Status
<p><u>System-wide Review of Public Announcements</u> Enhanced public announcements with details of service suspension and advice on alternative transport choices.</p>	<ul style="list-style-type: none"> ● Completed and implemented
<p><u>Giant Information Displays</u> Giant pull-down maps showing alternative transport information such as franchised bus routes, bus stop locations and Free MTR Shuttle Bus pick-up points. Signs displayed from concourse ceilings and at street level to mark routes to Free MTR Shuttle Bus pick-up points</p>	<ul style="list-style-type: none"> ● Installations at 20 interchange stations completed in January 2011 ● Installation at all 84 stations to be completed by 2nd Quarter, 2011 
<p><u>New Customer Communication System</u> LCD screens to be gradually installed at station entry gates to provide train service information and other important notices during service suspensions or major disruptions.</p>	<ul style="list-style-type: none"> ● Installed at Yau Ma Tei and Jordan Stations ● Installation at 20 interchange stations to be completed by 2nd Quarter, 2011 ● All stations to have LCD screens by end 2013

	
<p><u>Station-specific Response</u> Station-specific Rail Service Suspension Passenger Guides available at each station and on the MTR website.</p>	<ul style="list-style-type: none"> Completed 
<p><u>Enhanced training for staff</u> Enhanced training for staff in both the Operations Control Centre and at stations on preparing more customer-oriented public announcements.</p>	<ul style="list-style-type: none"> Ongoing with first round completed in November 2010

6. While the deployment for extra staff and arrangement of Free MTR Shuttle Bus may take time, improvements have also been made in these areas-

Free MTR Shuttle Bus Arrangement during Train Service Suspension

Improvement actions	Status
<p><u>Improved Shuttle Bus Plan</u> A review of the current shuttle bus deployment plan including the location of pick-up and drop-off points conducted in conjunction with the relevant Government departments to discuss the problems encountered and identify solutions for improvement.</p>	<ul style="list-style-type: none"> Completed. As a result, shuttle bus stops at some stations have moved to more appropriate locations. For example, the Free MTR Shuttle Bus Stop at Yau Ma Tei Station is now located at Waterloo Road rather than Nathan Road.
<p><u>Enhanced Drills with External Parties</u> Incorporation of the deployment of shuttle buses into regular drills and</p>	<ul style="list-style-type: none"> First joint exercise with Hong Kong Police, Fire Services Department and Transport

<p>exercises with the Police and other emergency services to test the effectiveness and coordination between the MTR and relevant external parties.</p>	<p>Department was held in the early morning of 25 February 2011 when the effectiveness of new communication initiatives was tested. Regular drills will continue to be conducted.</p>
<p><u>Deployment of More Resources</u> Assigning more staff with enhanced training, mainly from the Customer Service Rapid Response Unit to man Free MTR Shuttle Bus pick-up points to assist in crowd management and offer help to passengers.</p>	<ul style="list-style-type: none"> Recruitment of Customer Service Rapid Response Unit members in progress. Unit in full operation from 2nd Quarter, 2011.
<p><u>Improved Signage</u> The signage system in stations and at street level directing passengers to Free MTR Shuttle Bus pick-up points to be enhanced to make them more visible and provide clearer information.</p>	<ul style="list-style-type: none"> Colour-coded signage in hot pink marking the route to Free MTR Shuttle Bus pick-up points introduced at 20 interchange stations in January 2011. Installation in all stations by mid-2011.  

Crowd Management In and Outside MTR Stations

Improvement actions	Status
<p><u>Customer Service Rapid Response Unit</u> Establishment of a 60-member dedicated Customer Service Rapid</p>	<ul style="list-style-type: none"> Recruitment in progress. Unit in full operation from 2nd Quarter, 2011

<p>Response Unit to provide assistance to passengers and maintain order at stations and Free MTR Shuttle Bus pick-up points when required. Based at strategic locations around the MTR network, individual teams will be deployed to affected stations during a train service suspension or major train service disruption. Members will be easily identifiable in hot pink vests.</p>	
<p><u>Improved On-street Crowd Management</u> Staff to be assigned to monitor and report the street-level situation to Operations Control Centre and/or Station Control Rooms to facilitate more effective coordination with relevant parties such as the Police for better crowd management.</p>	<ul style="list-style-type: none"> • Completed
<p><u>Customised Cue-cards</u> As a useful tool for back-up staff deployed to stations affected by major train service disruptions, customised cue-cards containing necessary information such as the location of Free MTR Shuttle Bus pick-up points and designated exits leading to the Bus pick-up points to be produced.</p>	<ul style="list-style-type: none"> • Completed

7. The use of customised cue-cards and the deployment of the dedicated Customer Service Rapid Response Unit will enhance assistance to passengers during major service disruptions or train service suspensions, ensuring better handling of passenger enquiries on-site and achieving more effective crowd control.

8. The improved shuttle bus plan, laid down after a comprehensive review on different aspects of practical execution, can facilitate better coordination between the MTR and relevant Government departments. With regular drills, the MTR and relevant Government departments can ensure the smooth execution of the plan, efficiently directing the affected passengers to the designated pick-up points, and maintaining good order at shuttle buses pick-up points.

9. In the meantime, communication with the Transport Department has also been strengthened while more effective communication for MTR staff will be introduced.

Improvement actions	Status
Full manning of the Communication Control Centre throughout the traffic day.	Effective from late October 2010
Specific staff assigned the duty of ensuring timely communication with relevant Government departments during train service disruptions as required.	Effective from late October 2010
<p><u>Digital Radio System</u> A new digital radio system to enhance communication between the Operations Control Centre and staff at stations to ensure staff are kept up-to-date on changes in train service arrangements for communication to passengers.</p>	<ul style="list-style-type: none"> System installation has commenced on Tung Chung Line/ Airport Express and is expected to complete in 4th quarter, 2011. Gradual roll-out thereafter.

10. Members of the public can familiarise themselves in advance with arrangements during a train service suspension by obtaining a Rail Service Suspension Passenger Guide at a nearby station or downloading it from the MTR website. The new communication measures are also promoted via three segments broadcast on TVB from 3 March 2011, as well as a 5-minute video being shown at 20 MTR stations.

Technical investigations and improvement measures

11. Immediately after the incident, the Corporation conducted a technical investigation into the cause of the 21 October 2010 incident.

12. In summary, an electrical short-circuit in one traction motor on board the incident train (T48) had resulted in an excessive amount of high current being drawn through the train's power supply system. The train's circuit breaker could not stop the high current flow. The overhead line direct current circuit breaker (DCCB) tripped open to cut off power supply in the relevant section as a second line of protection. However, during the process to restore power supply to the overhead line section, T48's pantographs were not lowered as required. The strong electrical current and intense heat generated from repeated short-circuiting each time power passed through the overhead line resulted in weakening of the mechanical strength of the overhead line, which ultimately broke. The findings and immediate actions taken were reported in the paper submitted to the Subcommittee for its meeting held on 4 November 2010.

13. The traction motor/circuit breaker supplier was tasked in October 2010 to investigate and determine the root causes as to why the traction motor short-circuited and the circuit breaker did not stop the flow of electrical current. The supplier submitted its report to the Corporation in December 2010.

Traction Motor Failure

14. Further investigation indicated that the failure of the traction motor was a result of a small piece of carbon having chipped off the carbon brush inside the traction motor. Loose carbon dust dispersed within the traction motor chamber, spreading electrical current all around the traction motor, which ultimately caused it to short-circuit.

15. A fleet check of carbon brushes installed in the same type of traction motors has been conducted and all were found to be intact and in normal condition.

Circuit Breaker Failure

16. According to the supplier's report, when the traction motor short-circuited, an excessive amount of high current was drawn through the train's power supply system. The on-train circuit breaker operated in an attempt to stop the current flow. However, the current flow was too large and damaged the circuit breaker, rendering it ineffective.

17. Over-current protection in the train electrical system is designed in totality. The circuit breaker as installed on T48 is designed to interrupt irregular current flow up to a specified strength (20kAmp) due to space constraint on train underframes. When electrical current strength exceeds the on-train circuit breaker's designed capacity, the overhead line protection

steps in with the DCCB tripping to cut off power supply, as was the case in this incident.

18. In the recovery process, the on-train and overhead line equipment are protected through the standard operational procedure to lower the train's pantographs when restoring power supply. The procedure has a proven track record of effectiveness and it was only in this case that the pantographs were not actually lowered even though the Train Captain had confirmed that he had done so according to instruction from the Operations Control Centre.

Improvement Measures

19. A fleet check of the same type of traction motors and circuit breakers has been conducted and all components are confirmed to function normally. Nevertheless, the frequency of inspection on pantographs, circuit breakers and traction motors has been enhanced from once every 45 days to once every 23 days.

20. A positive visual indication in the driving cab is being designed to give definite confirmation to Train Captains that pantographs have indeed been lowered after operation of the pantograph control button. All trains which do not currently have this function will be installed with the positive visual indicator by the end of 2012. In the interim, when pantographs have to be lowered, Train Captains are being instructed to press the pantograph control button twice.

21. With the availability of a more compact design for on-train circuit breakers that can interrupt higher current flows (30kAmp) in the market in the recent years, the Corporation will replace the same type of on-train circuit breakers by the end of 2011.

Conclusion

22. The MTR Corporation takes seriously every incident that causes a train service suspension and sincerely apologises to passengers who were inconvenienced as a result of the Tsuen Wan Line incident on 21 October 2010. Comprehensive investigation and review have been conducted, and a number of improvement measures have been or are in the process of being implemented to reduce recurrence and to minimise the inconvenience caused to passengers in the event of a train service suspension.

MTR Corporation
March 2011

Table 1

**Number of maintenance and infrastructure staff
employed by MTRCL
(including pre-Merger MTRC and KCRC)
from 2001 to 2010**

2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
3426	3406	3653	3649	3685	3789	3747	3724	3758	3828

Table 2

New railway lines put into operation in recent years

New railway line	Year of service commencement
Tseung Kwan O Line (North Point to Po Lam)	2002
West Rail Line (Tuen Mun to Nam Cheong)	2003
Ma On Shan Line	2004
East Rail Line (Hung Hom to East Tsim Sha Tsui)	2004
Disneyland Resort Line	2005
Airport Express (Airport to Asia World-Expo)	2005
Lo Ma Chau Extension	2007
West Rail Line (Nam Cheong to East Tsim Sha Tsui)	2009
Tseung Kwan O Line (Tseung Kwan O to LOHAS Park)	2009

**Recent railway incidents, MTRCL's contingency arrangements
and maintenance work**

List of relevant papers

Date of meeting	Committee	Minutes/Paper	LC Paper No.
4.11.2010	Subcommittee on Matters Relating to Railways	Administration's paper on Tsuen Wan Line train fault incident	CB(1)277/10-11(02) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp1104cb1-277-2-e.pdf
		Minutes of meeting	CB(1)1068/10-11 http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/minutes/rdp20101104.pdf
21.2.2011	Subcommittee on Matters Relating to Railways	Administration's paper on recent railway incidents involving MTR rail cracks	CB(1)1323/10-11(02) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0221cb1-1323-2-e.pdf
		MTRCL's paper on recent railway incidents involving MTR rail cracks	CB(1)1323/10-11(03) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0221cb1-1323-3-e.pdf
		Minutes of meeting	CB(1)3029/10-11 http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/minutes/rdp20110221.pdf

Date of meeting	Committee	Minutes/Paper	LC Paper No.
18.3.2011	Subcommittee on Matters Relating to Railways	Administration's paper on MTR Tsuen Wan Line service disruption on 21 October 2010	CB(1)1585/10-11(03) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0318cb1-1585-3-e.pdf
		Administration's paper on recent railway incidents involving MTR rail cracks	CB(1)1585/10-11(04) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0318cb1-1585-4-e.pdf
		MTRCL's paper on follow-up actions on MTR Tsuen Wan Line service disruption on 21 October 2010	CB(1)1585/10-11(05) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0318cb1-1585-5-e.pdf
		MTRCL's paper on recent railway incidents involving MTR rail cracks	CB(1)1585/10-11(06) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0318cb1-1585-6-e.pdf
		Minutes of meeting	CB(1)2913/10-11 http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/minutes/rdp20110318.pdf
4.11.2011	Subcommittee on Matters Relating to Railways	MTRCL's paper on review of MTRCL's Rail Procurement and Maintenance Regime	CB(1)2973/10-11(01) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp0318cb1-2973-1-e.pdf

Date of meeting	Committee	Minutes/Paper	LC Paper No.
		Administration's paper on Government's Assessment on the Consultancy Report on Rail Commissioned by the MTR Corporation Limited	CB(1)2973/10-11(02) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp1-2973-2-e.pdf
		MTRCL's paper on railway service performance for the period between 1 July and 15 August 2011	CB(1)2973/10-11(03) http://www.legco.gov.hk/yr10-11/english/panels/tp/tp_rdp/papers/tp_rdp1-2973-3-e.pdf
		Minutes of meeting	CB(1)783/11-12 http://www.legco.gov.hk/yr11-12/english/panels/tp/tp_rdp/minutes/rdp20111104.pdf

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