Legislative Council Panel on Transport
Subcommittee on Matters Relating to Railways

Follow-ups on the Service Suspension of Tseung Kwan O Line and Part of Kwun Tong Line on 16 December 2013, and Report on Subsequent Major Incidents on East Rail Line and Light Rail

Purpose

This paper briefs the Subcommittee on recent major service disruption incidents and the actions which have been taken to seek to avoid similar incidents from recurrence.

Railway Service Performance

2. The operation of a safe, reliable and efficient railway service is paramount to Hong Kong's public transportation system. In every year since the rail merger in 2007, 99.9% of the overall railway service of MTR is punctual. In practical terms, this means that of the average 5.2 million passenger trips made on the MTR heavy rail and light rail networks on each normal weekday, 5.195 million passengers safely reach their destinations within 5 minutes of their scheduled arrival times. With respect to train service reliability, the number of incidents of 8 minutes or above as recorded in 2013 (143 nos.) has been the lowest since the rail merger in December 2007 (160 nos. in 2008). Despite that, any single train service incident has to be looked into in order to prevent recurrence of any incident of similar nature.

3. MTR is recognised internationally as one of the world's safest and most reliable railway systems. Because of its share of public transport patronage (around 40%), the public has every reason to expect the MTR Corporation Limited ("MTRCL") to maintain, or even further improve on, its internationally acknowledged high service standard at all times.

4. MTRCL is well aware of the high public expectations on its service and continuously makes effort to explore and introduce improvements in pursuit of greater service excellence. Nevertheless, the MTR is a complex modern urban railway system requiring hundreds of thousands of systems and components to work together seamlessly.

Delays and equipment failures which occur occasionally cannot be fully avoided.

5. MTRCL understands that passengers experiencing a delay will be inconvenienced. The Corporation is committed to providing an efficient and pleasant travelling experience to passengers. It always does its utmost to minimise any delay caused to passengers through restoring normal train service as quickly as possible and before that, providing passengers with the necessary information and contingency assistance to help them continue with their journeys.

Service Suspension of Tseung Kwan O Line and Part of Kwun Tong Line on 16 December 2013

6. At the Subcommittee meeting on 20 December 2013 when the service suspension on the Tseung Kwan O Line and part of the Kwun Tong Line on 16 December 2013 was discussed, the Corporation informed Members that initial technical investigations identified a broken fastening wire in an overhead line support bracket near Tiu Keng Leng Station which caused an overhead line section to come loose. Train service was suspended temporarily for repair works. The fastening wire was sent to an independent laboratory for testing and analysis to ascertain why it broke. It was found that the breakage was due to improper installation of the overhead line support bracket during construction. MTRCL has subsequently rectified the situation with improvement measures. The Electrical and Mechanical Services Department ("EMSD"), as the safety regulator, has also conducted an independent investigation, the findings of which are in agreement with MTRCL's own conclusion of the cause of the incident. Details are set out in **Annex A**.

Review of Contingency Arrangements

7. MTRCL is fully aware of and understands the dissatisfaction of passengers during the train service suspension on 16 December 2013. Many passengers were delayed and the Corporation sincerely apologised for the inconvenience caused. MTRCL agrees that there is room for improvement in how the situation should be handled, especially in the areas of information dissemination, timely communication with passengers and activation of the spare track section during service disruptions.

8. Joint review meetings were held between MTRCL and the Transport Department ("TD") to identify areas for improvement in December 2013 and January 2014. It was noted that the content of the information broadcast in the MTR network was generally useful to passengers, and the situation both within and outside MTR stations was generally in order.

9. However, there is room for improvement in respect of the information disseminated through other channels. Updates via the MTR Mobile app "Traffic News" could have been provided in a more timely manner, and "Rail Service Suspension – Passenger Guides" should not have contained outdated information, as was the case for the leaflets distributed at Tiu Keng Leng Station which did not reflect the changes in bus routes implemented in November 2013. The Tiu Keng Leng Passenger Guide leaflet has since been updated. On the use of the diversionary cross-harbour track on the Kwun Tong Line, both MTRCL and TD have agreed that the re-routing of trains through this diversionary track section in the event of similar service disruptions in future should become a standard measure.

10. An account of MTRCL's contingency plans for rail service disruptions is at **Annex B**. Members passed three motions and raised some specific questions in relation to the incident at the Subcommittee meeting on 20 December 2013. Our response is set out at **Annex C**.

East Rail Line Incidents on 9 and 18 February 2014

11. On 9 February 2014, East Rail Line service was delayed after an insulator on the overhead line near University Station broke, triggering the overhead line's safety protection system to cut off power supply on the southbound track from University Station to Tai Wai Station. To facilitate repairs, power supply was turned off on the southbound track between Fo Tan and Tai Po Market stations. The service of the whole East Rail Line was maintained by implementing bi-directional working of trains on the northbound track at reduced frequencies. Free MTR shuttle bus service was operated as well between Sha Tin and Tai Po Market stations to supplement the limited train service.

12. On 18 February 2014, a similar incident took place. At around 4:20 pm, a faulty overhead line insulator on the northbound track near Fanling Station affected power supply in the section. To facilitate urgent repairs, the northbound track between Tai Po Market Station and Lo

Wu/Lok Ma Chau stations was closed. Using bi-directional working on the southbound track, train service to all East Rail Line stations was maintained, although at a frequency lower than normal. To minimise inconvenience to passengers, free MTR shuttle buses were deployed as a supplementary service along this section. At the other end of the line, a five-minute service was maintained between Tai Po Market and Hung Hom stations. After MTRCL's engineering staff completed repair works, normal train service resumed at 7:21 pm.

13. Details of the two incidents are set out in **Annex D**.

Light Rail Incidents on 17 December 2013 and 22 January 2014

14. The Light Rail incident on 17 December 2013 arose from smoke and subsequently fire damaging an air-conditioning unit in the rear vehicle of a Light Rail coupled-set on Route 706. As regards the incident on 22 January 2014, a faulty overhead line insulator caused a 2.5 hour suspension of Light Rail service at eight stops between Hang Mei Tsuen and Yuen Long. Findings of the technical investigations and follow-up actions by MTRCL are set out in **Annex E**.

Overhead Line System

15. The East Rail Line incidents on 9 and 18 February 2014 and the Light Rail incident on 22 January 2014 involved faulty overhead line insulators. These faulty insulators came from the same supplier with those used on the East Rail Line overhead line system manufactured in the Mainland while those used on the Light Rail system from the UK. This section briefs the Subcommittee on the details of the incidents.

Overhead Line System Design

16. To provide traction power to trains and Light Rail vehicles in their networks, MTRCL uses overhead line power supply systems. It is the most commonly used method to supply power in railways around the world. Trains and Light Rail vehicles draw electrical current from overhead lines with pantographs fitted on the roof of trains and Light Rail vehicles.

17. In general, overhead lines are securely kept in position by cantilevers attached to overhead line support structures and held in

tension by balanced weight anchors. The ends of each overhead line wire are connected to insulators to prevent electrical currents from flowing to the ground. If not properly insulated, a short circuit will occur, resulting in loss of power.

18. The overhead line system is designed with a safety protection system which will cut off the power supply whenever any irregularity such as excessive flow of electrical current or short circuit is detected.

Inspection and Maintenance Regime

19. MTRCL has in place stringent procedures for the inspection and maintenance of overhead lines. Maintenance personnel conduct visual inspection every two to three days. Regular inspections using sophisticated equipment such as Track and Overhead Line Geometry Recording Vehicle are conducted on a one-to-three-month interval depending on traffic on the line, while technicians on elevated platforms conduct close-up inspections and routine maintenance of overhead line equipment once a year. During inspection, any irregularity identified is immediately rectified and equipment replaced if necessary.

20. Insulators used in the overhead line system are designed to be highly durable. Different types of insulators are currently used in the MTR system. They are made of porcelain, resin, glass or fibre glass. MTRCL's regime of inspection and maintenance is even better than that advised by suppliers and practiced in similar metros in a number of major railway systems around the world such as London Underground and UK Network Rail.

21. MTRCL's investigations into the incidents conclude that there are quality issues with the insulators that caused the recent service disruptions on East Rail Line and Light Rail. MTRCL has since replaced all insulators that arrived in the same batch as the faulty one causing the Light Rail incident on 22 January 2014, totalling 39 pieces.

22. In regards to the East Rail Line incidents on 9 and 18 February 2014, the insulators involved were manufactured by the same UK supplier in their Mainland factories and delivered to MTRCL from 2009 onwards. The faulty insulators were used to connect the high voltage overhead line to the overhead line support structures at critical locations on the East Rail Line where they are subject to both a high tensile load and a significant voltage difference of 25,000 volts at one end and zero volt at the other. Arrangements have been made to replace all such

insulators procured since 2009 and installed at the 65 critical locations on the East Rail Line. In addition, as an added precautionary measure, MTRCL has decided to replace similar insulators used for different purposes at 63 non-critical locations on the East Rail Line which are not required to sustain a high tensile load and a significant voltage difference at the same time and have lower chance of breakage as well as affecting train operations.

23. MTRCL will follow up with the manufacturer on the quality issue of the insulators in question and has stopped purchasing insulators from the concerned company for the time being.

24. MTRCL will also do sampling tests of other models of insulators in the whole MTR network to ensure that the insulators for all railway lines are of quality, irrespective of when and where they were manufactured.

25. On top of the above measures, MTRCL has engaged independent overhead line expert from overseas to conduct a comprehensive review of MTRCL's overhead line system, covering key aspects like technical specifications, procurement, quality control, installation and repairs/maintenance.

26. As the railway safety regulator, EMSD will actively participate in MTRCL's tests of the insulators and verify findings of the tests. EMSD will also monitor the progress of MTRCL's external expert review and enlist the assistance of an independent expert to conduct a review on the findings of MTRCL's expert review. In the light of the findings of EMSD's independent expert, the Government will decide whether or not there is a need to extend the scope of the review to cover other parts of the MTR network, and if so, the purpose would be to identify possible systemic defects or problems in other parts of the MTR network.

Conclusion

27. MTRCL has emphasised it takes every incident seriously. It has carried out investigation to determine the root cause and implemented follow-up actions to prevent future recurrence. The cause and circumstances of each incident, once identified, will be followed up vigorously and promptly, and the Government will closely monitor progress. We will keep the Subcommittee informed.

Transport and Housing Bureau
February 2014

Annex A

Service Suspension of Tseung Kwan O Line and Part of Kwun Tong Line on 16 December 2013

Findings of Technical Investigations

At around 12:30 pm on 16 December 2013, a broken fastening wire for an overhead line support bracket near Tiu Keng Leng Station caused a nearly five-hour suspension of train service on the Tseung Kwan O Line and part of the Kwun Tong Line.

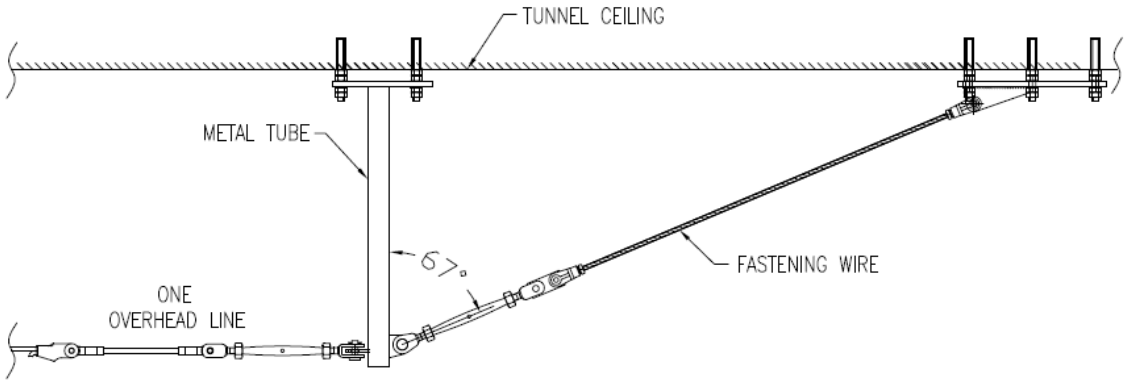
2. To determine the cause of the breakage, the wire was sent to an independent laboratory for testing and analysis. It was found that the materials of the fastening wire were sound. The breakage was due to excessive load which caused the wire to reach its ultimate strain limit over time. However, the elongation was gradual and not obvious through regular inspection. When the wire broke, the bracket dangled loose, slackening tension in the two overhead lines it was holding and causing them to droop.

3. After reviewing the design drawings of the concerned triangular-shaped support bracket from when Tseung Kwan O Line was built, the independent laboratory considered that the excessive load and ultimate breakage of the wire were due to the following two factors:

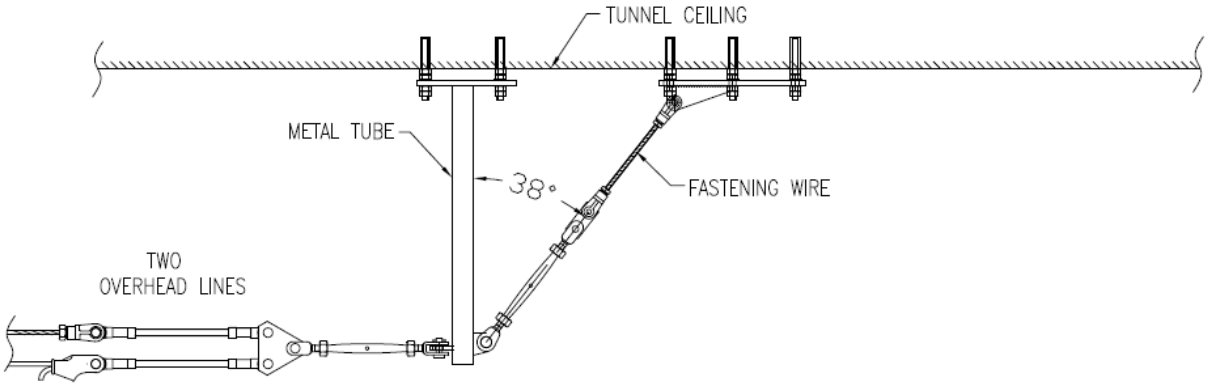
(a) the support bracket was holding two overhead line wires instead of the typical configuration of one bracket holding one overhead line wire; and

(b) the angle of the fastening wire from the metal holding tube was at 38° rather than the 67° shown in the typical configuration drawing as below.

Typical configuration of the triangular support bracket



Configuration of the incident triangular support bracket



4. As a result, the tensile load on the concerned fastening wire was three times that of the typical configuration.

5. Further mechanical testing was performed on a fastening wire affixed according to the typical configuration. Results showed that either one of the contributing factors would not have led to the breakage even after a long period of time.

6. The concerned support bracket was installed during the construction of Tseung Kwan O Line and has been in place since project completion in 2002. There is no documentation showing why a non-typical configuration was used at the time of installation, nor can record be retrieved of any changes to the design or installation method.

7. The Electrical and Mechanical Services Department ("EMSD") has also conducted an investigation on its own to identify the cause of the incident. An independent expert was engaged to carry out a scanning electron microscope analysis of the wire fracture surfaces and advise on the failure. EMSD has scrutinised the investigation report prepared by MTRCL and agreed with MTRCL's findings on the cause of failure.

Improvement Measures

8. The overhead line support bracket of the same type is used in three locations on the Tseung Kwan O Line. Those in the other two locations each hold one overhead line. They have all been tested to be in good condition and securely fastened.

9. To enhance the robustness of this type of overhead line support and prevent reoccurrence, the following improvement measures have been carried out:

(a) at the incident location, two support brackets have been installed to each hold ONE overhead line wire instead of the original scenario of one bracket holding two overhead line wires. In addition, a second fastening wire has been added to provide greater support. The modifications were completed in January 2014;

(b) the other two overhead line support brackets of the same type installed in Tseung Kwan O Line were fitted with a second fastening wire in January 2014; and

(c) since the concerned triangular-shaped support bracket was designed and installed by the Tseung Kwan O Line overhead line contractor before the rail line was commissioned, MTRCL has taken action to seek information from the contractor on the design and installation method of the concerned bracket.

10. EMSD considered that the improvement measures suggested by MTRCL are appropriate.

Penalty

11. MTRCL will have to pay $7.5 million as the penalty sum for the nearly five-hour service suspension on 16 December 2013 under the service performance arrangement. The fine proceeds will be given back to passengers through the "10% Same Day Second Trip Discount" scheme starting July 2014.

Annex B

MTRCL's Contingency Plans for Rail Service Disruptions

Purpose

MTRCL has drawn up contingency plans for various service disruption situations specific to the needs of individual stations. They are made available to the staff assigned to contingency duties. For information that is of use to passengers, it is made available to them in stations and in the internet. This note gives an account of MTRCL's contingency plans for rail service disruptions.

Handling of Rail Service Disruptions

2. When a serious incident happens and is expected to lead to a prolonged suspension of rail services for 20 minutes or more, MTRCL will, in the first instance, issue a "Red Alert" message to inform Government departments including the Transport Department ("TD"), other public transport operators and media organisations of the incident. Upon notification by MTRCL, other public transport operators will provide appropriate supportive services as best as they can under the co-ordination of TD. On its part, MTRCL will suitably adjust its rail service to minimise impact and arrange free MTR shuttle buses to carry passengers from the affected stations to convenient locations, such as the nearest MTR station with rail service still in operation.

Alert System

3. "Red Alert" is defined as a signal which denotes that serious railway service disruption will continue or is expected to continue for 20 minutes or more, and emergency transport support services from other public transport operators are required. Upon being alerted, public transport operators will urgently mobilise their resources to provide appropriate supporting services as quickly as possible.

4. Prior to the issuance of a Red Alert message, MTRCL may issue an "Amber Alert". "Amber Alert" is defined as an early warning in respect of an incident which may lead to a serious disruption of service.

After receiving this Alert message, other public transport operators will alert their emergency unit, get prepared for possible emergency actions which may be demanded for at short notice and keep close contact with MTRCL.

5. MTRCL is also required to notify TD within 8 minutes on any service disruption incident which has lasted 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 or delay of service at a railway station or a stop (in respect of Light Rail), or on a section of a railway line.

6. Besides, according to the Mass Transit Railway Regulations (Cap. 556A), MTRCL shall report to the Electrical and Mechanical Services Department ("EMSD") any incident that occurs at any part of the entire railway premises and which has a direct bearing on the safe operation of the railway.

Dissemination of Information During Incident

7. Regarding dissemination of information to passengers, MTRCL has formulated measures to ensure effective communication with passengers during service disruption with a view to assisting them to make appropriate alternative travel arrangements. These measures include:

(a) broadcasting details of the service situation at stations and in trains;

(b) providing information of alternative public transport service such as franchised bus routes, bus stop locations and free MTR shuttle bus boarding/alighting points on large information displays installed at stations;

(c) displaying signs from concourse ceilings and at street level to mark routes to free MTR shuttle bus boarding/alighting points when free shuttle bus service is ready;

(d) using LCD screens installed at visible locations near station entry gates of all MTR stations to provide train service

information and other important notices during service disruption;

(e) posting rail service interruption message and information on free MTR shuttle bus services on the MTR website and MTR Mobile App "Traffic News";

(f) displaying alternative public transport information on maps in the concourse of affected stations; and

(g) distributing "Rail Service Suspension – Passenger Guide" to passengers.

Train and Free MTR Shuttle Bus Operations during Serious Rail Service Disruptions

8. In the event of serious service disruption, MTRCL will endeavour to minimise the area being affected and provide train service to the farthest extent by:

(a) reversing trains at designated track sections to maintain train service in unaffected sections;

(b) diverting trains through supplementary track sections to bypass the affected section;

(c) diverting trains across lines through designated track sections to reduce the impact of service disruption; and

(d) diverting trains through spare track sections to reduce the impact of service disruption (for example, when the cross-harbour section of Tseung Kwan O Line is suspended, depending on which section is affected, cross-harbour train service can be maintained via the Service Connection Tunnel of Kwun Tong Line to provide linkage between Lam Tin Station and Quarry Bay Station).

9. MTRCL has formulated free MTR shuttle bus deployment plans for railway incidents and agreements have been entered into with bus operators for the provision of such services during railway incidents to take affected passengers to the nearest MTR station still under normal operation to continue their journeys.

Operation of Free MTR Shuttle Buses

10. Free MTR shuttle bus service is a supplementary measure to assist passengers to travel to convenient locations. Given the limited carrying capacity of shuttle buses, it is not intended to be a substitute for normal train service. It brings passengers to the nearest station outside the affected section of a railway line where service is disrupted, to enable them to continue with their journeys. Shuttle buses would also stop at stations in the affected section to provide services to passengers.

Activation of Free MTR Shuttle Bus Services

11. The number of free MTR shuttle buses and the level of shuttle bus service to be deployed during a railway incident will depend on which section of the railway line is involved and the seriousness of the situation. Generally speaking, according to the agreement between MTRCL and the Public Omnibus Operators Association (POOA)[1], when free MTR shuttle bus service is needed, the POOA will arrange about 7 buses to provide service within 30 to 45 minutes after receiving MTRCL's notification; an additional 40 buses, if required, will be deployed within 1 to 1.5 hour; and about 100 buses in total after two hours. The actual number of buses to be deployed will depend on the extent of impact to train service and road traffic condition. Depending on the actual situation, MTRCL may operate additional shuttle buses or modify the operating details of shuttle bus services to suit the need of the affected passengers.

12. Information on the estimated arrival time, locations of and routes to boarding and alighting points of free MTR shuttle buses is included in MTRCL's "Rail Service Suspension – Passenger Guide" which is tailor-

[1] POOA is the confederation of non-franchised public bus operators in Hong Kong. At present, more than 200 non-franchised operators are members of the POOA, and together having a fleet of about 4,000 buses which accounts for about 60% of the total non-franchised buses operating in Hong Kong.

made for each station for distribution in the station. The Guide is also uploaded to MTRCL's website (http://www.mtr.com.hk/eng/getting_around/ebus.html).

13. For the free MTR shuttle bus of Light Rail, details including the locations of shuttle bus stops can be found at MTRCL's website (http://mtr.com.hk/eng/getting_around/stmap_index.html).

14. Since the carrying capacity of shuttle buses will inevitably be far below that of the railway, they could only serve as a support service to assist affected passengers to continue with their journeys. It is not possible for shuttle buses to serve as replacement for the entire railway service. Therefore, lines queuing for such bus service are expected and most passengers may have to change to other unaffected MTR lines or take alternative public transport services to travel to their destinations.

Manpower Deployment

15. In response to a service disruption incident, MTRCL staff would be on duty at each MTR station to carry out crowd management, make public announcements, issue station notices and help passengers on fare matters according to the established procedures in times of incidents. The number of station staff will be increased as needed.

16. MTRCL has also established a 60-member dedicated Customer Service Rapid Response Unit ("CSRRU") to provide additional support focusing on customer service on top of the manpower stationed at individual stations. MTRCL will from time to time review the number of team members of the CSRRU as necessary.

17. Upon calling out the free MTR shuttle bus services during serious service disruption, the Operations Control Centre ("OCC") of MTRCL will mobilise team members of CSRRU to affected stations to provide extra support on:

- setting up facility for the implementation of free MTR shuttle bus services;
- maintaining order at affected stations and free MTR shuttle bus boarding/alighting points;
- making timely reports to the OCC during incidents to facilitate more effective co-ordination with relevant Government departments such as the Police for better crowd management;

- handling enquiry and advising passengers alternative routes and transport choices; and
- providing guidance and assistance to passengers.

18. Upon notification of deployment, CSRRU team members will proceed to the affected stations by the best available means of transport including taxi. The first team would be likely to arrive within 30 minutes in most cases according to past experience. CSRRU team members are easily identifiable in their pink vests.

Regular Review and Updating

19. MTRCL will continue to regularly review and update its contingency plans for rail service disruption in consultation with relevant Government departments, in the light of operational experience gained. In this regard, as a result of the experience gained in the operation of the contingency for the service suspension on Tseung Kwan O Line and Kwun Tong Line on 16 December 2013, MTRCL will update information on alternative public transport in the "Rail Service Suspension – Passenger Guide" more timely with the facilitation from TD. MTRCL is considering measures to further improve the signage about the free MTR shuttle buses within stations and at designated bus boarding points, and to enhance the dissemination of information about the train service information at stations during service disruption. MTRCL will also explore means to ensure prompt uploading of information regarding rail service disruption and emergency bus arrangements to its website/mobile apps.

Annex C

Response to Questions and Motions Raised by Members at the Subcommittee Meeting on 20 December 2013

At the Subcommittee meeting on 20 December 2013, Members raised questions and motions on (a) the deployment of maintenance staff by MTRCL and its outsourcing arrangement; (b) MTRCL's risk management system and contingency plans for railway service disruptions; and (c) reduction of remunerations and bonuses of the senior management of MTRCL in case of serious railway incidents. The requested information is set out below.

Deployment of Maintenance Staff and Outsourcing Arrangement

2. The day-to-day inspection and maintenance of Tseung Kwan O Line has been outsourced since the line was opened in 2002. MTRCL has in place a detailed monitoring system to ensure that all maintenance works meet its requirements and service standards. Indeed, MTRCL applies the same stringent standards to maintenance tasks carried out by both its in-house staff and contractors. MTRCL's engineers are also responsible for monitoring and providing instructions on outsourced works to ensure that service quality meets required standards. Systems overhaul, upgrades and emergency repair works on Tseung Kwan O Line remain the duty of MTRCL's in-house engineering staff. The number of in-house and outsourced maintenance staff deployed in the MTR network is tabulated below:

	Number of in-house and outsourced maintenance staff in the MTR network			
	2010	**2011**	**2012**	**2013**
Number of in-house maintenance staff	3,828 (76.4%)	3,891 (75.4%)	3,960 (77.3%)	4,013 (77.0%)
Number of outsourced maintenance staff	1,182 (23.6%)	1,269 (24.6%)	1,166 (22.7%)	1,201 (23.0%)

Job nature	**Number of outsourced maintenance staff**			
	2010	**2011**	**2012**	**2013**
Station Maintenance	731 (61.8%)	781 (61.5%)	674 (57.8%)	695 (57.9%)
Rolling Stock Maintenance	143 (12.1%)	174 (13.7%)	160 (13.7%)	156 (13.0%)
Infrastructure Maintenance	308 (26.1%)	314 (24.7%)	332 (28.5%)	350 (29.1%)
Total	**1,182**	**1,269**	**1,166**	**1,201**

3. While the number of service delays may vary from year to year, the overall service performance of Tseung Kwan O Line is more or less the same as that of the other railway lines. For example, in 2013, there were a total of 143 delays of 8 minutes or above attributing to equipment failure or human factor in the MTR network (the average number of service delays of each railway line is 13) of which 17 occurred on Tseung Kwan O Line. Also, taking the record of past three years (i.e. from 2011 to 2013) as an example, there were a total of 479 delays of 8 minutes or above attributing to equipment failure or human factor in the MTR network of which 44 (9.2%) occurred on Tseung Kwan O Line, which is comparable to the average number of service delays of each railway line in the entire MTR network (43.5 nos.).

Risk Management System and Contingency Plans for Railway Service Disruptions

4. The Risk Management System ("RMS") of MTRCL is a core part of the Safety Management System which drives continuous improvement in safety performance systematically through proactively identifying risks and capturing lessons learnt from incidents internally and externally. The RMS adopts a systematic "Plan, Do, Check, Act" approach for managing risks which covers the full asset life-cycle from project inception to operations. The process is integrated with MTRCL's day-to-day business processes to ensure that the risks are managed effectively and coherently across MTRCL.

5. The RMS is subject to regular independent review by external professional bodies to ensure it is fit-for-purpose and in line with industry good practice. It is considered internationally to be world class. The

system is robust and remains fit for purpose. As for MTRCL's contingency plans for railway service disruptions, they are set out in **Annex B**.

Remunerations and Bonuses of the Senior Management of MTRCL be Reduced in case of Serious Railway Incidents

6. Members expressed the view that the remunerations and bonuses of the senior management of MTRCL should be reduced in case of serious railway incidents. The Government has reflected these concerns to the Board of MTRCL, and urged it to seriously look into the matter. The Board of MTRCL has taken note of Members' concerns and will review accordingly. In the light of the East Rail Line incidents in February 2014, the Government has reiterated the concerns on the issue. The Government will keep in view development.

Annex D

East Rail Line Incidents on 9 and 18 February 2014

Incident on 9 February 2014

At 11:21 am on 9 February 2014, the safety protection equipment of the East Rail Line overhead line system was triggered, cutting off power supply on the southbound track from University to Tai Wai stations. A Train Captain on a Hung Hom-bound train near University Station reported to the Operations Control Centre that a short overhead line section had sagged down. MTRCL's engineers deployed to the site found a damaged insulator south of University Station.

2. Knowing it would take a few hours to replace the damaged insulator and that the southbound track between Fo Tan and Tai Po Market stations would have to be closed to facilitate repairs, the Operations Control Centre immediately notified the Transport Department. Subsequently at 11:44 am, a Service Disruption notification (Amber Alert) was issued to request the assistance of other public transport operators to strengthen their services in the area.

3. MTRCL maintained whole line operations by implementing the bi-directional working of trains through the affected section via the northbound track. Service frequency was maintained at 20-minute intervals between Fo Tan and Tai Po Market stations. Train service between Hung Hom and Fo Tan stations as well as between Tai Po Market and Lo Wu stations were operated at 6-minute intervals while a 15-minute service frequency was provided between Tai Po Market and Lok Ma Chau stations.

4. MTRCL also arranged free MTR shuttle bus service to operate between Sha Tin and Tai Po Market stations. More than 300 bus trips were operated, carrying some 21,000 passengers.

5. Following replacement of the damaged insulator and completion of the necessary safety checks, normal East Rail Line train service resumed at 3:19 pm. The longest service delay occurred during the incident was around 50 minutes. A penalty sum of $1 million will be incurred by MTRCL. The fine proceeds will be given to passengers through the "10% Same Day Second Trip Discount" scheme starting July 2015.

Incident on 18 February 2014

6. At around 4:20 pm on 18 February 2014, a damaged overhead line insulator on the northbound track near Fanling Station affected power supply in the section. To facilitate urgent repairs, the northbound track between Tai Po Market Station and Lo Wu/Lok Ma Chau stations was closed. A Service Disruption notification (Red Alert) was issued at 4:30 pm to request the assistance of other public transport operators to strengthen their services in the area.

7. Using bi-directional working on the southbound track, train service to all East Rail Line stations was maintained, although at a frequency lower than normal. Service between Tai Po Market and Lo Wu/Lok Ma Chau stations was operated at 20 and 30 minute intervals respectively. To minimise inconvenience to passengers, free MTR shuttle buses were deployed as a supplementary service along this section. At the other end of the line, a five-minute service was maintained between Tai Po Market and Hung Hom stations. After MTRCL's engineering staff completed repair works, normal train service resumed at 7:21 pm.

8. The longest service delay occurred during the incident was around 80 minutes. A penalty sum of $2 million will be incurred by MTRCL. The fine proceeds will be given to passengers through the "10% Same Day Second Trip Discount" scheme starting July 2015.

Findings of Technical Investigations

9. The insulators involved in the two disruptions of 9 and 18 February 2014 are of the same type and make, having been manufactured by Allied Insulators Limited (UK) in their factories in the Mainland of China. They were among stock orders placed by MTRCL since 2009. Investigations into the 9 February incident had ascertained material defects in the equipment, which weakened its insulation property and increased the likelihood of internal short circuit.

10. The faulty insulators have been installed at 65 critical locations on the East Rail Line to connect the high voltage overhead line to the overhead line support structures. The insulators are subject to both a high tensile load and a significant voltage difference of 25,000 volts at one end and zero volt at the other. MTRCL has already made arrangements to replace all Allied insulators procured since 2009 and installed at the 65 critical locations by 28 February 2014.

11. Other prudent measures implemented by MTRCL to prevent a recurrence include:

- before removal of the suspected faulty insulators at 65 critical locations, constant thermal checks were conducted during service hours on the concerned insulators to detect any early signs of short-circuiting and provide rapid response when necessary and feasible;

- same-type insulators procured since 2009 and used for different purposes at 63 non-critical locations on the East Rail Line, which are not required to sustain high tensile load and significant voltage difference and have lower chance of breakage as well as affecting train operations, will also be removed as an added precautionary measure;

- random sampling of other models of overhead line insulators in the whole MTR network will be arranged;

- sampling test in verifying the mechanical tensile property upon goods receiving, plus high voltage insulation property test before installation for each, will be arranged;

- follow-up with the manufacturer on the quality issue of the insulators in question; and

- stop purchasing insulators from the concerned company for the time being.

12. On top of the above measures, MTRCL has engaged an independent overhead line expert from overseas to conduct a comprehensive review of MTRCL's overhead line system, covering key aspects like technical specifications, procurement, quality control, installation and repairs/maintenance.

East Rail Line Faulty Train

13. It is noted that in the afternoon of 9 February 2014, a fault on an East Rail Line train calling in at Kowloon Tong Station at 3:29 pm also drew public attention as it raised questions on whether the event was related to the overhead line incident earlier in the day. In this instance, an indication in the driving cab alerted the Train Captain of a power fault

on the train. The Operations Control Centre decided to take the train out of service for inspection, as an added precautionary measure, and arranged for the approximately 1,900 passengers on board to alight and take the following train. A 4-minute delay was incurred.

14. On inspection, maintenance staff found that the bolt connecting one of the train's pantographs to the train car circuit breaker was broken, affecting the smooth flow of power in the train.

15. The concerned bolt has been replaced and a detailed check has been conducted to confirm that similar bolts on all East Rail Line trains are in good condition.

Annex E

Light Rail Incidents on 17 December 2013 and 22 January 2014

Incident on 17 December 2013

At around 8:50 am on 17 December 2013, when a Route 706 Tin Shui Wai-bound coupled-set Light Rail vehicle ("LRV") arrived at Tin Wu Stop, a passenger informed the Light Rail Train Captain that smoke was emitting from the air-conditioning unit on the ceiling inside the rear LRV. After inspection, the Light Rail Train Captain immediately arranged for the approximately 160 passengers on-board to alight at Tin Wu Stop to take the next LRV. He also informed the Light Rail Operations Control Centre of the situation. With authorisation from the Light Rail Operations Control Centre, the Light Rail Train Captain drove the empty LRV to the nearby Hung Tin Road Emergency Platform ("the platform"), a spare platform used for train service regulation or urgent situations.

2. After arrival at the platform at 9:01 am, the Light Rail Train Captain observed small flame coming out of the top of the LRV. Fire Services Department was summoned while the Light Rail Train Captain used a fire extinguisher to douse the flames. At 9:07 am, Fire Services personnel arrived at the platform to handle the situation. Subsequent inspection confirmed serious damage to the air-conditioning unit and the roof of the LRV.

3. During the incident, Light Rail service was not affected and no injury was reported.

Findings of Technical Investigation

4. Following the incident, MTRCL engaged an independent consultant to carry out an investigation to identify the cause of the incident. As the air-conditioning unit was seriously damaged, the consultant identified two possible causes through simulations:

(a) external fire source contacted the air-conditioning unit in the LRV compartment; or

(b) electrical fault in the air-conditioning unit.

Improvement Measures

5. The same model of the air-conditioning unit is fitted only in Phase III LRVs commissioned in 1997. Following the incident, a fleet check of the 20 Phase III LRVs was conducted to confirm that all air-conditioning units are in good condition.

6. Although no definitive conclusion could be drawn on the exact cause of the fire, MTRCL and the consultant have worked out the following measures to prevent future recurrences:

(a) replaced the return air filters inside the Phase III LRV air-conditioning units with a higher grade filter with higher fire retardance;

(b) replaced all of the air-conditioning units' plastic control panel covers with metal covers; and

(c) removed all plastic temperature control boxes for air-conditioning units.

Incident Handling

7. After the incident, MTRCL conducted a review and concluded that the Light Rail Train Captain followed the established procedures to handle the incident in a timely manner by immediately asking all passengers to alight. The concerned LRV was then driven to a safe location away from passengers. During the course of the handling, the safety of passengers was assured.

Incident on 22 January 2014

8. At around 6:00 am on 22 January 2014, a faulty overhead line insulator near Tong Fong Tsuen Stop triggered the overhead line safety protection system to cut off power supply between Hang Mei Tsuen Stop and Tong Fong Tsuen Stop, as well as between Hang Mei Tsuen Stop and Hung Shui Kiu Stop. As a result, Light Rail service at eight stops between Hang Mei Tsuen Stop and Yuen Long Terminus was suspended. Five Light Rail routes including 610, 614, 615, 751 and 761P were diverted. Light Rail service within Tin Shui Wai area remained unaffected while services from Tin Shui Wai to Yuen Long and from Tin Shui Wai to Tuen Mun were disrupted.

9. MTRCL issued a "Red Alert" at 6:15 am to notify the relevant authorities and other public transport operators and request for their assistance to strengthen services in the affected area. MTRCL informed passengers of the service disruption through centralised public announcements at MTR stations, Light Rail stops and on LRVs, as well as through electronic displays, the MTR Mobile app "Traffic News" and the MTR website.

10. MTRCL followed procedures to activate established contingency arrangements by deploying free shuttle bus services to serve passengers in the affected section. A total of 130 shuttle bus trips were made, carrying more than 7,600 passengers. MTR staff also assisted passengers to leave the LRVs which were stopped within the affected sections and guided them to take shuttle buses. After the completion of urgent repair works, Light Rail service resumed normal at 8:32 am. As the service disruption lasted for over two hours, a penalty sum of $3 million will be incurred by MTRCL. The proceeds will be given to passengers through the "10% Same Day Second Trip Discount" scheme starting July 2015.

Findings of Technical Investigation

11. MTRCL's investigation into the cause of the incident found that the broken insulator was installed in May 2013, which was also found to

have quality issue (i.e. inadequate mechanical strength). MTRCL has placed orders for another model of insulators with higher mechanical strength with a different supplier.

Improvement Measures

12. To prevent similar situations from reoccurring, MTRCL has taken a series of improvement measures, including:

(a) conducted fleet check of the Light Rail overhead line system and replaced all the 39 insulators with quality issue with new ones;

(b) removed from stock all insulators of the same type of the concerned insulator that broke on 22 January 2014 and enhanced the Corporation's stock control processes; and

(c) testing of other batches of insulators to ensure their good quality.