新聞稿
Press Release

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Report on the three incidents on East Rail Line in May 2020

The MTR Corporation has submitted its report on the three incidents that occurred on the East Rail Line (EAL) during non-traffic hours testing on 23 and 25 May 2020. The findings have been reviewed and accepted by the Government. The report concludes that the incidents were related to human or procedural factors; they caused no safety impact on passengers or railway operations.

The report outlined the three incidents, two of which occurred during the non-traffic hours on 23 May, the other one occurring during the non-traffic hours on 25 May:

1. The first incident involved a display system grey-out in the Operations Control Centre (OCC). It is concluded that the problem was the result of the activation of a data logging function in the Signalling Automatic Train Supervision Subsystem (ATS). The data logging function will not be used in the normal service operation.

2. The second incident involved the shutdown of the interlocking system. It is concluded this was caused by the simultaneous manual shutdown of two out of the four safety computers instead of the normal sequential shutdown. This was a procedural error.

3. The third incident involved a test train proceeding in the wrong direction and passing a red signal. The incident was attributed to human factor. The trains following the incident train were all protected by the Automatic Train Protection (ATP) Subsystem during non-traffic hours movement.

"We take these incidents very seriously and have investigated the causes in detail. After a thorough investigation, the incident report was submitted to the Government on 17 August. The Electrical and Mechanical Services Department has reviewed the report and has accepted the findings. A number of improvement and enhancement measures are in place to prevent similar occurrences in the future," said Mr C L Leung, Head of E&M Construction of the Corporation.

The Corporation would like to reiterate that the three incidents that took place during the tests were caused by human or procedural factors. The ATP was fully operational during all the three incidents and safe separation between trains was maintained. Nevertheless, a number of enhancement measures have been implemented to strengthen the understandings of relevant staff and the contractor, as well as enhance procedures during operation of the new EAL signalling system.

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With safety being the top priority of the Corporation, the new signalling system of the EAL will complete all necessary testing and drills and obtain approval from the relevant Government departments before being put into passenger service.

Findings of the investigation are set out at annex.

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About MTR Corporation

Every day, MTR connects people and communities. As a recognised world-class operator of sustainable rail transport services, we are a leader in safety, reliability, customer service and efficiency.

MTR has extensive end-to-end railway expertise with more than 40 years of railway projects experience from design to planning and construction through to commissioning, maintenance and operations. Going beyond railway delivery and operation, MTR also creates and manages dynamic communities around its network through seamless integration of rail, commercial and property development.

With more than 40,000 dedicated staff*, MTR carries over 13 million passenger journeys worldwide every weekday in Hong Kong, the United Kingdom, Sweden, Australia and the Mainland of China. MTR strives to grow and connect communities for a better future.

For more information about MTR Corporation, please visit www.mtr.com.hk.

*includes our subsidiaries and associates in Hong Kong and worldwide

Annex

Report for Incidents during the Two Tests for East Rail Line (EAL) Mixed Fleet Operation (MFO) on 22^23 and 24^25 May 2020

1 Executive Summary

1.1 In preparation for the Mixed Fleet Operation (MFO) on the East Rail Line (EAL), two tests were conducted during the Non-Traffic Hours (NTH) of 22^23 and 24^25 May 2020 respectively to demonstrate the operation of the new EAL signalling system. This new signalling system is a Communication Based Train Control system supplied by Siemens Limited under Shatin-to-Central Link (SCL) Project. For both of two tests, the new system was switched over from the existing signalling system to take control of train operations. Both tests were executed with 30 trains running on EAL.

1.2 There was a total of three independent incidents during these two NTH possessions:

(1) Grey-out of Line Overview Display of the Signalling Automatic Train Supervision Subsystem (ATS) operator workstations in Operations Control Centre (OCC) due to activation of a data logging function.

(2) Shutdown of the interlocking computer for the zone between Fo Tan / Racecourse to University stations, due to simultaneous shutdown of one pair of safety computers in this interlocking zone instead of one by one sequential shutdown during the demonstration.

(3) A train passed a red signal as the Train Captain did not start

the train in the expected direction during the train initialization process due to human factor. The following trains in the vicinity of the incident train were all protected by the Automatic Train Protection (ATP) Subsystem.

1.3 These incidents were independent events and not related to the system safety. No equipment damage nor injury occurred in any of these incidents.

1.4 The ATP was fully operational during all the three incidents. Safe separation between trains was maintained.

1.5 Improvement actions have been implemented and completed for enhancement in control of data logging activation and training aspect in adhering to procedure. The improvement actions implemented after the incidents are considered by the Corporation and the Independent Safety Assessor as being sufficient to prevent similar incidents from recurrence.

2 The Incidents

There was a total of 3 incidents happened during the first test on 22^23 May 2020 (2 incidents) and the second test on 24^25 May 2020 (1 incident) as detailed below:

The Test on 22^23 May 2020

2.1 During the preparation of the first test on 22^23 May 2020, the following two coincidental incidents took place and the causes of them are independent.

(1) A test train (Trainset T17) passed a red signal (i.e. Signal Passed at Danger) *[hereafter referred as "SPAD incident"];* and

(2) Grey-out of Line Overview Display of the Signalling Automatic Train Supervision Subsystem (ATS) operator workstations in Operations Control Centre (OCC) *[hereafter referred as "ATS Line Overview Display grey-out incident"]*

Incident 1: SPAD

2.2 At the start of the test preparation stage, Train Captains were authorized to operate their trains manually from designated stopping locations, where all trains had been stopped at these locations before commencement of the possession in NTH, in accordance with lineside proceed signal to prepare trains as initialization process.

2.3 The SPAD incident took place between Sheung Shui and Lo Wu during this preparation stage at 02:15am. The incident train was operated under manual driving at a speed not exceeding 11 kph towards Sheung Shui Station instead of towards Lo Wu Station as per the plan. The train passed Signal 2536 with a red aspect, and then stopped at the next signal ahead, Signal 2442. The following trains in the vicinity of the incident train were protected by ATP which was functioning normally.

Incident 2: ATS Line Overview Display grey-out

2.4 Coincidently, the Line Overview Display on the ATS operator workstations in OCC were greyed out between 02:15am and 02:19am. The ATS was fully restored to normal operation after stopping the data logging function at 02:19am. Safety of the CBTC controlled trains was assured by the new signalling system throughout the whole incident.

The Test on 24^25 May 2020

Incident 3: Interlocking Shutdown

2.5 During the execution of the second test on 24^25 May 2020, the following incident took place:

(1) Shutdown of the interlocking computer for the zone between Fo Tan / Racecourse to University stations, which is Siemens Computer Aided Signalling Interlocking Zone 1 *[hereafter referred as "Interlocking shutdown incident"]*

2.6 The EAL mainline is split into five interlocking zones. In each interlocking zone, the interlocking comprises 2 pairs of safety computers which are running concurrently to ensure system safety and availability. The redundancy demonstration of Interlocking Zone 1 was part of the planned test scenario in which one pair of the safety computers were supposed to be shut down sequentially to demonstrate no impact to normal operation.

2.7 However, at 4:03am, one pair of safety computers of Interlocking Zone 1 were shut down simultaneously. The original plan was to do it sequentially. The simultaneous shutdown of one pair safety computers triggered a fail-safe design feature leading to automatic shutdown of the other pair of safety computers.

3 Cause of Incidents

Incident 1: SPAD

3.1 The SPAD incident was caused by human factor of the Train Captain of the incident train (Trainset T17). The Train Captain had not started the train in the expected direction to Lo Wu and considered the Signal 2536 could be passed at danger upon receiving Traffic Controller's call for starting the initialization process.

3.2 The SPAD incident was discovered by Traffic Controllers in OCC after the ATS resumed from the coincident grey out incident.

Incident 2: ATS Line Overview Display grey-out

3.3 The "Paktel data logging" function was activated manually after the switchover to the new signalling system for logging of additional data under peak loading condition.

3.4 The "Paktel data logging" function is a standard built-in function of the ATS subsystem. It was attempted to use this built-in logging function to record all interlocking data by the ATS for providing a convenient event logging and retrieval mechanism in case any incident happens.

3.5 With the activation of the "Paktel data logging" function and upon running of all test trains within a short time interval, the ATS experienced a sharp rise of incoming and outgoing messages for logging which degraded its message processing performance. This delayed message processing affected timely data handling between ATS and Interlocking subsystems via respective data communication channels.

3.6 This consequentially triggered the request of a full update of interlocking data of each affected zone by ATS and resulted in temporary grey-out of ATS line overview display in OCC intermittently for about five minutes until the "Paktel data logging" function had been stopped.

3.7 Based on system data records and subsequent investigation, the Signalling Contractor completed in-depth analysis and concluded that the ATS Line Overview Display grey-out incident was caused by activation of the data logging function which degraded processing performance. This caused temporary interruption on the ATS system overview display with no impact on safety of the signalling system in light of the fact that ATP was fully operational and ensured safe separation between trains. This logging function will not be activated for normal train operation.

Incident 3: Interlocking Shutdown

3.8 Regarding the interlocking shutdown incident on 24^25 May 2020, the Contractor's engineer shut down simultaneously one pair of safety computers of Interlocking Zone 1 during the demonstration of the redundancy management function instead of the sequential shutdown which will result into the intended outcome, i.e. the Contractor's engineer did not follow the required procedure to do the test.

3.9 Simultaneous shutdown of one pair of safety computers within the same processing cycle triggered a fail-safe design feature leading to shutdown of redundant pair of safety computers. At the time of the interlocking shutdown, all the trains in Zone 1 were automatically controlled to stop running and kept stationary to ensure safety.

4 Preventive and Improvement Measures

4.1 The following preventative and improvement measures have been implemented and completed after the incidents:

Incident 1: SPAD

a) After the SPAD incident, enhancement in the training and assessment of Train Captains on "Restricted Manual" mode driving has been implemented.

Incident 2: ATS Line Overview Display grey-out

b) The Signalling Contractor has committed in any event to take extra precaution to risk assessment and consequential impact to system stability performance with comprehensive simulation tests and assessment criteria before activation of built-in diagnostic / data logging functions.

c) Project configuration control procedure, which applies for all site configuration changes during test and commissioning phase, has also been enhanced for the on-going SCL works.

d) The “Paktel data logging” function will not be used for the normal train operation.

Incident 3: Interlocking Shutdown

e) Relevant maintenance manuals have been updated to highlight those precautions and appropriate methods of shutting down safety computers. The manuals also describe the underlying design features and system response phenomena for better understanding on the system performance and maintenance needs by relevant maintenance staff. Briefings to relevant staff have been provided.

5 Independent Safety Assessor’s Review

5.1 An Independent Safety Assessor has been employed to provide independent opinion on safe operation of the new signalling system since the project design phase. The Independent Safety Assessor has reviewed the incidents and considered the system safety of the new signalling system was not impaired during the ATS Line Overview Display grey-out incident and Interlocking shutdown incident. The improvement actions implemented after the incidents are considered as sufficient to prevent similar incidents from occurring.

6 Conclusion

6.1 The three incidents on 23 and 25 May 2020 were isolated events and not affecting the system safety. The new signalling system is safe and operationally ready for passenger services to commence in EAL.

6.2 The SPAD incident was caused by human factor of the Train Captain of the incident train for which enhanced training has been arranged.

6.3 The ATS Line Overview Display grey-out incident was caused by activation of the “Paktel data logging” function, which will not be used for normal train operation.

6.4 The Interlocking shutdown incident was related to simultaneous manual shutdown instead of sequential shutdown of safety computers. Revision to relevant maintenance manual has been arranged together with necessary briefing to relevant staff.