



Metropolitan Transportation Authority

State of New York

February 13, 2019

Honorable Andrew M. Cuomo
Governor of New York State
NYS State Capitol Building
Albany, NY 12224

Honorable Thomas P. DiNapoli
Office of the State Comptroller
59 Maiden Lane, 31st Floor
New York, NY 10038

RE: Response to Report #2017-S-8 – Long Island Rail Road: Maintenance, Inspection, and Testing of the Event Recorder System

Gentlemen:

On November 7, 2018, the Office of the State Comptroller issued the above referenced audit report. As required by Section 170 of the Executive Law, I am providing you with the attached response which addresses the recommendations contained in the report.

A copy of the final audit report is attached for your convenience.

Sincerely,

A handwritten signature in blue ink, appearing to read "Fernando Ferrer".

Fernando Ferrer

c: Helene Fromm, MTA Chief of Staff
Michael J. Fucilli, Auditor General, MTA Audit Services

Attachment



Long Island Rail Road

February 8, 2019

Mr. Fernando Ferrer
Acting Chairman
Metropolitan Transportation Authority
2 Broadway
New York, NY 10004

**RE: MTA Long Island Rail Road
Maintenance, Inspection, and Testing of the Event Recorder System
Report 2017-S-8**

Dear Acting Chairman Ferrer,

As required by Section 170 of the Executive Law, detailed below are the updated actions that have been taken to address the recommendations contained in the above-referenced report. The report contained four recommendations, and as detailed in our response dated September 21, 2018, and again in this letter, the Long Island Rail Road's (LIRR) already has made significant progress implementing them.

In conjunction with its primary goal of ensuring the safety of its employees, customers and the communities it serves, the LIRR employs a robust maintenance and inspection program to ensure that the ERS functions properly and that spare recorders are available if needed. The LIRR's Inspection, Testing and Maintenance (ITM) plan has been submitted to Federal Railroad Administration as required. Also, during its audit the OSC did not find any instance where the LIRR operated a train in passenger service with an event recorder out of compliance with federal regulations.

As part of its ongoing maintenance program relative to Event Recorders, the LIRR ensures that its Rolling Stock consistently exceeds to CFR standards, and adheres to maintenance prescribed by the Original Equipment Manufacturer (OEM). Regarding the units themselves, the LIRR identifies any issues and trends related to ERS's during monthly Shop Module and MU Process Improvement Team meetings. In addition, the LIRR's electronics shop monitors failed ERs being repaired (F-Account) on a weekly basis. These procedures also help to ensure the appropriate level of ER inventory is continuously on-hand.

Below is a status report on the four specific recommendations included in your report.

Recommendation No. 1

- Develop detailed inspection, testing, and maintenance policies and procedures. Identify the tasks related to the inspection, testing, and maintenance required by the CFR.

LIRR Response:

In addition to maintaining Inspection, Testing and Maintenance (ITM) policies and procedures in its ITM Plan in accordance with CFR 238.107 (last requested by and submitted to the Federal Railroad Administration in 2016), the LIRR's Maintenance of Equipment Department (MofE) further modified the policies and procedures in the 4th quarter of 2018 to:

- Establish further guidance regarding how an event recorder (ER) download should be analyzed and what information should be used to determine if the download results match the manufacturers' specification of what is considered normal range.
- Update the process to include determination of necessary ER inventory, ensuring ER repairs are done promptly so adequate inventory is available, and corrective actions required in the event of a shortage.
- Document old and new serial numbers when ERS's are replaced.

LIRR Implementation Status: *Fully Implemented*

Recommendation No. 2

- Expand ER testing to determine and ensure that the channels are functioning and document the tests were performed for each PI. Maintain a physical and electronic copy of ER downloads from PIs.

LIRR Response:

As indicated in our September 21, 2018 responses, part of the current Periodic Inspection (PI) process of a Rolling Stock Unit (RSU) includes a download of the ER and verifying whether all ER channels are functioning. LIRR had already implemented a signal status sheet to document that the ER download is present and that all signals are recording within tolerances. The status sheets are scanned and maintained electronically.

LIRR Implementation Status: *Fully Implemented*

Recommendation No. 3

- Document the job titles that can perform the ERS tests and ensure that employees testing the ERS receive the required initial and periodic refresher training.

LIRR Response:

As indicated in our September 21, 2018 response, the LIRR MofE employees are trained in the inspection and repair of rolling stock equipment, including ERS in accordance with CFR §238.109 which identifies the designation of "QMP" or Qualified Maintenance Personnel, regardless of job title. The QMP training, as mandated under the CFR, along with on-the-job training, experience and equipment familiarization training provides the knowledge and skillset required for downloading and reviewing time, speed, and other channels were recorded by the event recorder.

Mr. Fernando Ferrer
February 8, 2019
Page 3

Additionally, MofE has reviewed all job qualifications and employee training attendance for accuracy and has communicated all records to the Training Department.

LIRR Implementation Status: *Fully Implemented*

Recommendation No. 4

- Prepare and maintain documentation of the repair work done to make the ERS fully functional including, but not limited to, the repair work done, the employee who did the work, date work was done, and link it to an ERS PI.

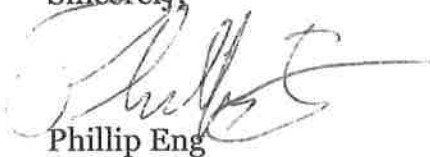
LIRR Response:

The LIRR agrees in part and disagrees in part with this recommendation. During the PI of a RSU, the ER may be removed for repair. Once removed, the ER is treated independently as a separate component from the RSU. The identification of a faulty ER during PI and the actual repairs to the ER are tracked independently. The PI process includes recording if an ER was removed for repair but repair details are documented in CAMS against the ER's serial number and as such, provides the repair history. As of the end of the fourth quarter 2018, LIRR MofE is ensuring that the repair history of each ER recorded in CAMS includes the repair work done, the employee who did the work, and the date work was done. In addition, linking the repair of an ER to the PI during which it was removed provides no benefit.

LIRR Implementation Status: *Fully Implemented*

Please contact me should you require additional information.

Sincerely,



Phillip Eng
President

THOMAS P. DINAPOLI
COMPTROLLER



110 STATE STREET
ALBANY, NEW YORK 12236

STATE OF NEW YORK
OFFICE OF THE STATE COMPTROLLER

November 7, 2018

Mr. Joseph J. Lhota
Chairman
Metropolitan Transportation Authority
2 Broadway
New York, NY 10004

Re: Maintenance, Inspection, and Testing of
the Event Recorder System
Report 2017-S-8

Dear Mr. Lhota:

Pursuant to the State Comptroller's authority as set forth in Article X, Section 5 of the State Constitution and Section 2803 of the Public Authorities Law, we examined Metropolitan Transportation Authority – Long Island Rail Road's (LIRR) Event Recorder System (ERS) for the period January 1, 2014 through to July 31, 2017. The objectives of our audit were to determine whether the LIRR maintains and inspects its ERS and whether it has corrective action plans to fix deficiencies identified.

Background

The LIRR, founded in 1834, has grown to become the largest commuter railroad in North America. It has 124 stations on ten branches and the City Terminal Line that cover about 700 miles of track, transporting about 305,000 riders each weekday. As of December 2016, LIRR's annual ridership was over 89.3 million.

As part of its railway intermodal transportation mission, the LIRR installed various safety features within its infrastructure and trains. A key feature on the train is the ERS – a device that simultaneously monitors and records the key functions (channels,¹ e.g., speed, brakes) of the train and the actions of the engineer. The Federal Railroad Administration (FRA) requires all locomotives to be equipped with ERS.

LIRR cars with ERS are shown in Table 1.

¹ A channel represents a data element, such as speed sent from a speedometer. It is similar to a "column" on a spreadsheet, with all of the channels stored in one record appearing as a "row."

Table 1

Type of Car	Manufacturer	Description	Quantity
C3 Cab Car	Kawasaki	Bi-level cars for diesel service	23
DE30AC	GM Electro-Motive	Diesel electric locomotive	24
DM30AC	GM Electro-Motive	Dual-mode diesel electric locomotive	21
M-7	Bombardier	Multiple-unit electric passenger cars	418*
M-3	Budd/General Electric	Multiple-unit electric passenger cars	87*
Total			573

*LIRR's multiple-unit electric passenger cars are semi-permanently "married" in pairs and share an ERS. The action of both cars is recorded on the ERS. The quantity in this table only includes the car with the ERS.

Under FRA regulation, as stated in the Code of Federal Regulations (CFR), periodic maintenance for the railroad is considered effective if 90 percent of the recorders on locomotives inbound for periodic inspection (PI) in any calendar month are still fully functional. ERS inspections include reviewing data recorded by the ERS, which is only stored for a limited amount of time. If a train is taken out of service for more than two days, it impacts the amount of service time data that is available for review.

Results of Audit

We determined that the LIRR has a maintenance and inspection program for ERS; however, it was not always in compliance with the program. For example, from January 1, 2014 to February 27, 2017, there were five months when the non-functioning ERS exceeded the 10 percent "effective maintenance standard" established by the FRA.

Moreover, of the 243 inspection dates reviewed, there were 55 occurrences of train cars sitting idle for more than two days before an ERS PI was performed, thereby causing the last 48 hours of train activities to be recorded as idle time and not revenue passenger service, time-limiting the availability of data to assess if the ERS is functioning properly. The LIRR also does not have a corrective action plan/program to ensure defects are addressed and corrected on a timely basis.

Inspection and Maintenance

The LIRR inspects its train cars every 92 days in compliance with FRA requirements. For most trains, this inspection includes the ERS devices. However, the M-7 cars are equipped with a self-monitoring microprocessor, which only requires an inspection every 368 days.

The CFR, Title 49, Section 229.25(d)(2), requires that the ERS be tested before any maintenance work is performed. If the ERS fails inspection, repeated maintenance and testing must be performed until a successful test result is achieved. Moreover, a record of the maintenance work needed to attain a successful ERS test must be kept at the facility where the testing was done.

We reviewed whether Maintenance of Equipment (MofE) followed the CFR’s “effective maintenance standard” of 90 percent. For each month from January 1, 2014 to February 27, 2017, we reviewed the number of cars where periodic maintenance was done and calculated the 10 percent ceiling. We found five months when non-functioning ERS units exceeded the 10 percent ceiling (see Table 2).

Table 2

Month and Year	Percentage Non-Functioning	Number of ERS Not Fully Functioning
February 2015	15.4	26
April 2015	16.7	25
May 2015	15.9	17
February 2016	16.6	17
March 2016	17.8	19

In response to our preliminary findings, LIRR officials stated they did not exceed 10 percent in any month. Rather, they stated that the difference in calculation is because they do not include “five year replacement of batteries” in the count of ERS units that are not fully functional. We requested documentation to support that the only reason an ERS was brought in for repair was the battery replacement, but LIRR officials did not provide such documents. We therefore sampled ten of these “battery only repairs” and determined that additional work was done for seven of them, despite the entry showing only that a battery was replaced.

We also examined whether inspections were done on a timely basis. For our sample of 18 cars, we reviewed 243 inspection records. Of the 243 inspections, 88 were supported by inspection report forms. For the inspection report forms reviewed, 84 percent were on time or early and 16 percent were dated more than 92 days after the prior inspection (late). For the 155 supported by electronic records in the Corporate Asset Management System (CAMS), 85 percent of inspections occurred on time or early and 15 percent occurred more than 92 days after the prior inspection (late) (see Table 3).

Table 3

	Early	On Time	Late	Totals
Inspection Reports	63	11	14	88
Percentage	72%	12%	16%	100%
CAMS Electronic Screen Shots	113	18	24	155
Percentage	73%	12%	15%	100%

MofE officials told auditors that car inspections which seemed late were inspected timely. According to MofE officials, they pull the cars out of service when inspections are due to perform maintenance. After maintenance is complete, the supervisors perform the PI on the ERS. According to CAMS, in all 38 instances that the inspections were “late,” they were out of service. However, no corroborating documentation was provided, such as the “Locomotive Repair and Inspection Record.” The earliest inspection occurred 22 days before the next projected inspection date. The number of days “late” ranged from 1 to 22 days.

However, while this may explain delays in the inspection, by bringing the cars out of service more than two days before the inspection date, the data collected by the ERS is impacted as it will reflect idle time and not the train's actual operating performance. ERS data is downloaded as part of the inspection process to determine how the ERS is functioning. During the period January 1, 2014 to April 27, 2017, for our sample of 18 cars, we calculated the elapsed time from the date the cars were taken out of service and the date the cars received PI/maintenance. Out of the 243 inspection dates, there were 55 occurrences of train cars sitting idle for more than two days before an ERS PI was performed, thereby causing the last 48 hours of train activities to be recorded as idle time and not revenue passenger service time.

In their response to the preliminary findings, LIRR officials said they can test the ERS in the maintenance facility more than 48 hours after the train car was in service and appropriately determine ERS functionality. However, certain activities that would be reflected as part of a train in revenue service cannot be tested in the maintenance facility.

Additionally, they stated that the M-7 and M-3 ERS can store up to 14 and 7 days' worth of data on average (depending on the activity level), respectively. However, we found that 4 of the 50 PIs performed on the M-3 cars exceeded seven days. Consequently, those ERS would reflect only idle time.

Maintenance

Pursuant to 49 CFR §238.107 (beginning in January 2002), the LIRR is required to develop an Inspection, Testing, and Maintenance (ITM) plan, which should be reviewed and updated annually. The LIRR is to provide this plan to the FRA upon request. The plan shall include a detailed description of the following: inspection procedures, intervals, and criteria; test procedures and intervals; scheduled preventive maintenance intervals; maintenance procedures; and special testing equipment or measuring devices required to perform inspections and tests.

The minimum functions an ERS must record are outlined in 49 CFR §229.135(b). According to the CFR, an in-service ERS must be installed in cars used as lead locomotives of any train traveling faster than 30 miles per hour. ("Lead locomotive" includes the car from which the train is controlled.) If the event recorder was originally ordered before October 1, 2006 and placed in service before October 1, 2009, it must record the most recent 48 hours of these elements: (1) Train Speed, (2) Selected Direction of Motion, (3) Time, (4) Distance, (5) Throttle Position, (6) Applications and Operations of the Train Automatic Air Brake, (7) Application and Operation of the Independent Air Brake, (8) Application and Operation of the Dynamic Brake, if so equipped, and (9) Cab Signal Aspects, if so equipped and in use.

The LIRR provided advanced maintenance instructions for two car types and PI instructions for another, but did not provide any instructions for four other car types. In addition, none of these documents contained information on how to assess downloaded data.

Moreover, while the LIRR's ITM contains a chapter on ERS for all the car types, it did not include guidance to determine the acceptability of the downloaded values; rather, it only stated

that the download should be viewed. For example, the fourth step for the M-7 reads as follows: "Verify activation of channels by viewing downloads." Discussions with LIRR officials revealed the LIRR does not have any written parameters that are used to assess download results. They also would not verbally share the values they claimed were used to assess the data in the download.

In response to the preliminary findings, the LIRR stated that federal regulations do not require a download for M-7 cars, as this is only required for cars placed into service before October 1, 2009. While the regulation is silent as to downloads, we note that the LIRR's ITM states the download should be viewed for all cars. Therefore, the LIRR needs to determine what action to take to eliminate confusion regarding when and how a download is done and reviewed. Moreover, if the LIRR's policies and procedures require downloads to be done and reviewed, they should define how an ERS download should be analyzed and what information should be used to determine if the download results match the manufacturers' specification of what is considered normal range.

We also determined that one employee who performed ERS inspections did not meet the required qualifications to perform an ERS test. Of the 18 ERS sampled, 15 different employees (13 Gang Foremen, 1 Tinsmith, and 1 Electrician) performed the testing. Initially, we were told during our observations of an ERS download that only a supervisor can test an ERS. A Gang Foreman is a supervisory position responsible for ensuring the completion of tasks by the workers. However, Tinsmith and Electrician are not supervisory positions. Each did three inspections. In response to the preliminary findings, the LIRR clarified that the use of supervisors for ERS tests is limited to the Maintenance Unit Shop. The Diesel Shop, where these two employees worked, assigns the ERS testing task to employees designated as QMPs (Quality Maintenance Personnel) because they received the required initial and periodic refresher training. We reviewed the training records for the two employees in question and found only one met the requirements for the QMP.

Corrective Action Plan

LIRR MofE does not have a formal document that sets forth the actions to take to ensure that spare ERS are functioning and readily available in inventory. The ITM plan includes inspection procedures for the M-7, M-3, and Cab Cars, and the Central Electronic shop monitors the number of non-functioning ERS daily. However, when asked, LIRR officials did not provide information on how the number of functioning ERS in inventory should be determined or the process to ensure that repairs were done promptly to ensure ERS inventory was available. The LIRR's policies and procedures manual also did not include any corrective action that should be taken in case of a shortage.

Some defects found with the ERS during inspection cannot be immediately repaired and result in a request to exchange the defective ERS for a functioning one. When this occurs, an "F" work order is created in CAMS. Electronic shop officials stated that they conduct daily searches for ERS with an "F" work order and collect these ERS to repair. We attempted to track the work flow from the ERS PI to the work order. However, based on our review of a sample of 22 of the 273 work orders created for the ERS on the date (or within a day or two) of the PI, we could not link the work order to the ERS PI.

Additionally, Electronic shop employees are required to document all the work performed to make the ERS fully functional. However, we found they did not accurately and sufficiently document repair work performed to bring the ERS back to functioning order, and it was difficult to track the work flow of the ERS to determine the timeliness of repairs or how significant the repairs were. We provided Electronic officials with ten randomly selected ERS (8 M-7 and 2 M-3) from the repair list. LIRR officials located CAMS reports for seven M-7 ERS with handwritten dates that did not match the dates in CAMS. Furthermore, the CAMS reports did not show the work that was done, the date of the work order, the date completed, who performed the work, and who created the task. CAMS only identified the materials that were ordered from Stores and pricing. We were not provided any other documentation of the repair work. Additionally, no documentation was provided for the other three ERS. Since the M-3s do not have serial numbers, the records for two ERS could not be traced through the system. For the remaining repair, the serial number was missing and it could not be traced. It is therefore difficult to see how LIRR can monitor when repairs for each of the ERS will be complete.

An effective internal control system safeguards significant assets by utilizing serial numbers as a control mechanism to track and monitor, among other things, the repair history of critical equipment to ensure proper accountability. Assets with serial numbers (i.e., ERS) should be tracked by their identifying serial numbers to ensure accountability and to identify problems with particular equipment. However, the LIRR inconsistently tracks this information.

The LIRR provided a maintenance list for all ERS repaired from January 1, 2014 to February 27, 2017. The list showed 180 ERS replaced in M-7 train cars. We reviewed the list to determine whether the ERS' serial numbers were recorded and found that 148 had the serial numbers of both the malfunctioning ERS and the new ERS, 30 did not have the old serial numbers, and 2 did not have the new serial numbers. ERS in the M-3 cars and diesel locomotives do not have serial numbers. They are tracked in CAMS using the component number (type of train, such as diesel locomotive and train car number). These inconsistencies exist because CAMS does not capture the old serial number in an ERS replacement work order.

Recommendations

1. Develop detailed inspection, testing, and maintenance policies and procedures. Identify the tasks related to the inspection, testing, and maintenance required by the CFR.
2. Expand ERS testing to determine and ensure that the channels are functioning and document the tests were performed for each PI. Maintain physical and electronic copies of ERS downloads from PIs.
3. Document the job titles that can perform the ERS tests and ensure that employees testing the ERS receive the required initial and periodic refresher training.
4. Prepare and maintain documentation of the repair work done to make the ERS fully functional, including, but not limited to, the repair work done, the employee who did the work, the date work was done, and ensure that it is linked to an ERS PI.

Audit Scope, Objectives, and Methodology

The objectives of our audit were to determine whether the LIRR maintains and inspects its ERS and whether it has corrective action plans to fix deficiencies identified. The audit scope period was from January 1, 2014 to July 31, 2017.

To accomplish our objectives, we reviewed policies and procedures for maintaining equipment and records for ERS inspections along with any paperwork and forms. We evaluated the internal controls related to the maintenance and inspection of the ERS and the corrective actions to address any deficiencies. We judgmentally selected a sample of 18 of the reported 573 train cars with ERS. The sample represents a pro rata distribution of train cars from an aggregate population of 2,622 from the MTA's two commuter railroads and New York City Transit. The sample was selected using a random number generator.

We met with LIRR officials in MofE, Corporate Safety, and Information Resources. Auditors also went to the Hillside Maintenance Complex and Richmond Hill Facility to observe the testing of ERS and the downloading of their data.

We also judgmentally selected a sample of 10 ERS from the 122 that were repaired during our scope period. The sample was selected using a random number generator. We asked LIRR MofE Electronic officials to provide us with the documented repair work that brought the ERS back to a fully functional condition.

We conducted our performance audit in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

In addition to being the State Auditor, the Comptroller performs certain other constitutionally and statutorily mandated duties as the chief fiscal officer of New York State. These include operating the State's accounting system; preparing the State's financial statements; and approving State contracts, refunds, and other payments. In addition, the Comptroller appoints members to certain boards, commissions, and public authorities, some of whom have minority voting rights. These duties may be considered management functions for purposes of evaluating organizational independence under generally accepted government auditing standards. In our opinion, these functions do not affect our ability to conduct independent audits of program performance.

Reporting Requirements

A draft copy of this report was provided to MTA officials for their review and formal comment. Their comments were considered in preparing this final report and are attached in their entirety at the end of it. Our rejoinders to certain comments are included in the report's State Comptroller's Comments, which are embedded in the MTA's response.

Within 90 days after the final release of this report, as required by Section 170 of the Executive Law, the Chairman of the Metropolitan Transportation Authority shall report to the Governor, the State Comptroller, and the leaders of the Legislature and fiscal committees advising what steps were taken to implement the recommendations contained herein, and where the recommendations were not implemented, the reasons why.

Major contributors to this report were Robert C. Mehrhoff, Joseph F. Smith, Aurora Caamano, Paisley Fisher, and Menard Petit-Phar.

We wish to thank the management and staff of the Metropolitan Transportation Authority—Long Island Rail Road for the courtesies and cooperation extended to our auditors during this audit.

Very truly yours,



Carmen Maldonado
Audit Director

cc: M. Fucilli, MTA Auditor General
D. Jurgens, MTA, Audit Director
NYS Division of the Budget

Agency Comments and State Comptroller's Comments

2 Broadway
New York, NY 10004
212 878-7000 Tel

Joseph J. Lhota
Chairman



Metropolitan Transportation Authority

State of New York

September 24, 2018

Ms. Carmen Maldonado
Audit Director
The Office of the State Comptroller
Division of State Government Accountability
59 Maiden Lane, 21st Floor
New York, NY 10038

Re: Draft Report #2017-S-8 (LIRR: Maintenance, Inspection, and Testing of the Event Recorder System)

Dear Ms. Maldonado:

This is in reply to your letter requesting a response to the above-referenced draft report.

I have attached for your information the comments of Phillip Eng, President, LIRR, which address this report.

Sincerely,

A handwritten signature in cursive script that reads "Joseph Lhota".

Joseph J. Lhota

c: Veronique Hakim, MTA Managing Director
Michael J. Fucilli, Auditor General, MTA Audit Services

Attachments

The agencies of the MTA

MTA New York City Transit
MTA Long Island Rail Road

MTA Metro-North Railroad
MTA Bridges and Tunnels

MTA Capital Construction
MTA Bus Company

Jamaica Station
Jamaica, NY 11435-4380
718 558-8254 Tel
718 657-9047 Fax

Phillip Eng
President



Long Island Rail Road

September 21, 2018

Mr. Joseph Lhota
Chairman
Metropolitan Transportation Authority
2 Broadway
New York, NY 1004

**RE: MTA Long Island Rail Road
Maintenance, Inspection, and Testing of the Event Recorder System
Report 2017-S-8**

Dear Chairman Lhota,

As required by Section 170 of the Executive Law, detailed below are the updated actions that have or will soon be taken to address the recommendations contained in the State Comptroller's (OSC) Audit of the Long Island Rail Road's (LIRR) Maintenance, Inspection, and Testing of the Event Recorder System (ERS), which the OSC commenced in February 2017 to determine whether the LIRR adequately maintains and inspects its ERS.

In conjunction with its primary goal of ensuring the safety of its employees, customers and the communities it serves, the LIRR employs a robust maintenance and inspection program to ensure that the ERS functions properly and that spare recorders are available if needed. The LIRR's Inspection, Testing and Maintenance (ITM) plan has been submitted to Federal Railroad Administration as required. Of particular note is that in the course of its audit the OSC did not find a single instance of the LIRR knowingly operating a train in passenger service with an event recorder out of compliance with federal regulations.

As part of its ongoing maintenance program relative to Event Recorders, the LIRR ensures that its Rolling Stock consistently conforms to CFR minimum standards, and adheres to maintenance prescribed by the Original Equipment Manufacturer (OEM). Regarding the units themselves, the LIRR identifies any issues and trends related to ERS's during monthly Shop Module and MU Process Improvement Team meetings. In addition, the LIRR's electronics shop monitors failed ERs being repaired (F-Account) on a weekly basis. These procedures also help to ensure the appropriate level of ER inventory is continuously on-hand.

It should be noted that during the 6+ months that the OSC conducted this audit, the LIRR made several attempts to explain to the auditors CFR requirements, maintenance procedures, ER system operations, etc. These explanations appear not to have been understood by the auditors as evidenced by the LIRR's clarification in its response dated September 28, 2017 to the OSC's Preliminary Letter and this response. In some cases, the OSC did not understand failures verses preventative maintenance work on ERs - specifically, the fact that ERs removed for preventative maintenance do not count toward the 10% ceiling failure rate established by the CFR. This and other examples are noted under "Other Clarifications".

The agencies of the MTA
MTA New York City Transit
MTA Long Island Rail Road

MTA Metro-North Railroad
MTA Bridges and Tunnels

MTA Capital Projects
MTA Bus Company

State Comptroller's Comment - Auditors asked the LIRR to provide evidence that work on ERS was for the purpose of preventive maintenance. However, LIRR officials did not provide the information requested. Moreover, when auditors pulled a sample of what was described as battery replacements of ERS (preventive maintenance), they determined that, in addition to the work described, other repair work was performed.

The OSC's report contains several findings and recommendations intended to improve the LIRR's compliance with the maintenance and inspection of Event Recorders. Below is a more detailed response to these specific findings and recommendations.

Recommendation No. 1

- Develop detailed inspection, testing, and maintenance policies and procedures. Identify the tasks related to the inspection, testing, and maintenance required by the CFR.

LIRR Response:

The LIRR agrees with this recommendation, however, the LIRR already maintains Inspection, Testing and Maintenance (ITM) policies and procedures in its ITM Plan (Plan) in accordance with CFR 238.107 that was last requested by and submitted to the Federal Railroad Administration in 2016. The OSC Auditor was informed and made aware of the existing policies and procedures.

State Comptroller's Comment - Auditors reviewed the LIRR's ITM policies and procedures and found them lacking in detail. However, we are pleased that the LIRR has taken, or will take, actions to improve the quality of the information recorded for the inspection and repair of the ERS. By so doing, it should be clear as to what work was done and when.

It should be noted that by 4th quarter 2018, the LIRR will further modify the aforementioned policies and procedures as follows:

- Establish further guidance regarding how an event recorder (ER) download should be analyzed and what information should be used to determine if the download results match the manufacturers' specification of what is considered normal range.
- Update the process for determining the necessary ER inventory including ensuring that ER repairs are done promptly so adequate inventory is available, and corrective actions in the event of a shortage.
- Document old and new serial numbers when damaged ERS are replaced with new ERS.

LIRR Implementation Status: *Implemented and On-going*

Recommendation No. 2

- Expand ER testing to determine and ensure that the channels are functioning and document the tests were performed for each PI. Maintain a physical and electronic copy of ER downloads from PIs.

LIRR Response:

The LIRR already complies with this recommendation. Part of the current Periodic Inspection (PI) process of a Rolling Stock Unit (RSU) includes a download of the ER and verifying whether all ER channels are functioning. LIRR has already implemented a signal status sheet to document that the ER download is present and that all signals are recording within tolerances. The status sheets are scanned and maintained electronically.

State Comptroller's Comment - The implementation of a status sheet that shows the ER channels are recording within tolerances occurred after the audit fieldwork; therefore, the LIRR was not in compliance with the recommendation when it was made.

LIRR Implementation Status: *Fully Implemented and In Practice*

Recommendation No. 3

- Document the job titles that can perform the ERS tests and ensure that employees testing the ERS receive the required initial and periodic refresher training.

LIRR Response:

The LIRR agrees with this recommendation. LIRR MofE employees are trained in the inspection and repair of rolling stock equipment, including ERS in accordance with CFR §238.109 which identifies the designation of "QMP" or qualified maintenance personnel, regardless of job title. The QMP training, as mandated under the CFR, along with on the job training, experience and equipment familiarization training provides the knowledge and skillset required for downloading and reviewing time, speed, and other channels were recorded by the event recorder.

By 4th quarter 2018, to ensure that employee training is up-to-date, the LIRR MofE will document the job titles by Shop that can perform ER tests and confirm that all employees with those titles have received the required training for QMP designation.

LIRR Implementation Status: *Implemented and On-going, as required.*

Recommendation No. 4

- Prepare and maintain documentation of the repair work done to make the ERS fully functional including, but not limited to, the repair work done, the employee who did the work, date work was done, and link it to an ERS PI.

LIRR Response:

The LIRR agrees in part and disagrees in part with this recommendation. During the PI of a RSU, the ER may be removed for repair. Once removed, the ER is treated independently as a separate component from the RSU. The identification of a faulty ER during PI and the actual repairs to the ER are tracked independently. The PI process includes recording if an ER was removed for repair but repair details are documented in CAMS against the ER's serial number and as such, provides the repair history. Effective immediately, LIRR MofE will ensure that the repair history of each ER recorded in CAMS includes the repair work done, the employee who did the work, and the date work was done. In addition, linking the repair

of an ER to the PI during which it was removed provides no benefit.

State Comptroller's Comment - We are pleased that the LIRR has taken, or will take, actions to improve the quality of the information recorded for the inspection and repair of the ERS. By so doing, it should be clear as to what work was done and when.

LIRR Implementation Status: *Fully Implemented and In Practice*

Other Clarifications

Following are examples of clarifications to the OSC's final draft report.

1. Under Background on page 2, the report states: *"If a train is taken out of service for more than two days, it impacts the amount of service time data that is available for review."*

Under Results of Audit on page 2, the report states: *"there were 55 occurrences when train cars were sitting idle for more than two days before an ERS PI was performed; thereby causing the last 48 hours of train activities to be recorded as idle time and not revenue passenger service, time-limiting the availability of data to assess if the ERS is functioning properly."*

As stated in the report, an ER on an M-3 and M-7 is capable of storing hours of recorded car activity equal to 7 and 14 days, respectively depending on how active the various channels are.

The above statements imply that there is a certain amount of data required to verify that an ER is functioning properly. MofE's standard is to download 24 - 48 hours of data to verify the ER (the storage capacity minimum to be in compliance with the CFR is 48 hours). Therefore, taking a car out of service for more than two days before its PI will not have an impact.

State Comptroller's Comment – LIRR's "examples of clarification" not only illustrate the need for the agency to document how periodic inspections should be performed on ERS, but also reflect a continued pattern of not providing information relevant to audit findings until the draft response. In the preliminary findings, we wrote that ERS were sitting idle for more than two days before PI was performed. The LIRR responded that the ERS in the M-7 and M-3 can store up to 14 and 7 days' worth of data on average (depending on the activity level), respectively, with no mention of how idle time is recorded. Based on this explanation, we determined that there were M-3 cars that were idle for more than 7 days. Now the LIRR indicates that "MofE's standard is to download 24-48 hours of data to verify the ER" and that idle time is not recorded except for when inspections occur. However, the standard is not documented in LIRR procedures, and the recording of idle time was not previously mentioned. In keeping with the LIRR's response that improvements will be made to modify policies and procedures, the MofE standard and other criteria for when train cars are removed from service and remain idle should also be documented.

The statements also imply that an ER in an idle car is still recording; thus recording idle time. When an idle car is sitting in the shop waiting for its PI, the ER is not recording. Thus the total hours stored on the ER when the car arrived in the shop is still available when the ER is tested. However, the ER on an idle car will record only if its Master Controller is active or "keyed-in" which occurs when the inspection being performed requires that the technician keys-in, such as ATC (Automatic Train Control). However, for the limited number of times this occurs, the fact that only certain channels on the ER would be recording based on the test being performed combined with the short amount of time cars are moving in the shop the activity recorded in the ER in these instances is minimal.

2. Under Results of Audit on page 4, the report states: *"Additionally, they (LIRR) stated that the M-7 and M-3 ERS can store up to 14 and 7 days' worth of data on average (depending on the activity level), respectively. However, we found that 4 of the 50 PIs performed on the M-3 cars exceeded seven days. Consequently, those ERS would reflect only idle time."*

This statement refers to 4 M-3's receiving PI's more than seven days after having been brought into the shop. The ER's that record hours of car activity and are governed by the CFR that are only those in the lead position. The four ER's cited by the auditors on cars whose PI's exceeded 7 days after they were brought in, were not in the lead position and, therefore had not been recording data. That being said, it should be noted that such ER's are tested as the PI will generate some of the signals needed to validate the ER and other activities such as cycling the cars around the shop or power testing would provide the rest. Also, refer to Clarification #1 regarding the status of an ER recording when the car is idle.

3. Under Results of Audit on Page 3 Table 2 *"We found five months when non-functioning ERS units exceeded the 10 percent ceiling (see Table 2)."* Similar to that noted above, there was a lack of understanding by the auditors of ER recorded activity and out of service time. Specifically, the auditors apparently did not understand failures versus proactive preventative maintenance practices. ER's removed from the RSU during PI and sent to the Support Shop for preventative maintenance (i.e., battery replacements) would not constitute a failed ER. The quantity of ER's removed for failures (i.e., a failed Hardened Memory Module or failure to record a channel(s)) is much lower than indicated on Table 2 and never in excess of 10%.

State Comptroller's Comment - LIRR officials indicate that the work on the ERS was proactive preventive maintenance; however, they did not provide documents to support their statements. Moreover, our review of the sampled repairs that were deemed proactive preventive maintenance (battery replacement) determined that repair work, in addition to the described preventive maintenance, occurred.

Please contact me should you require additional information.

Sincerely,


Phillip Eng
President