



Washington Metropolitan Area Transit Authority

ANNUAL INTERNAL REVIEW 2017

Metrorail Traction Power Inspection and Maintenance

QICO Internal Review

June 21, 2017



Quality Assurance, Internal Compliance & Oversight (QICO)

"Quality Trumps Quantity"



Table of Contents

1	DEPARTMENT/FUNCTION OVERVIEW	4
2	REVIEW METHODOLOGY	4
2.1	REVIEW SCOPE	5
2.2	REVIEW CRITERIA	6
2.3	RISK ASSESSMENT	6
3	WHAT WORKED WELL?	7
4	AREAS FOR IMPROVEMENT	8
5	OTHER OBSERVATIONS	13
6	SUMMARY OF REQUIRED ACTIONS	14
7	CORRECTIVE ACTION PLANS	16
8	SUPPLEMENTAL MATERIALS	27
8.1	APPENDIX A: RISK ASSESSMENT	28
8.2	APPENDIX B: TRACTION POWER ORGANIZATIONAL ROLES	30
8.3	APPENDIX C: TECHNICAL TERMINOLOGY	31
8.4	APPENDIX D: QICO INTERVIEWS OF KEY PERSONNEL	34
8.5	APPENDIX E: QICO FIELD INSPECTION	47
8.6	APPENDIX F: APPLICATION OF REGULATORY CAPS	67
9	REFERENCE DOCUMENTS	69
9.1	REFERENCE 1: JOB DESCRIPTIONS	70
9.2	REFERENCE 2: PREVENTATIVE MAINTENANCE DATA SHEETS	97
9.3	REFERENCE 3: PREVENTATIVE MAINTENANCE INSTRUCTIONS SCREENSHOTS	111
9.4	REFERENCE 4: TRPM POSITION MANAGEMENT REPORT	114
9.5	REFERENCE 5: TRPM CONTACT LIST	121
9.6	REFERENCE 6: LOGBOOK MEMO & PHOTO	123
9.7	REFERENCE 7: SOP 39 & MCC/TRPM LOTO PROCEDURE	129
9.8	REFERENCE 8: TRPM COMMUNICATION	147
9.9	REFERENCE 9: FTA/CAP No. R-5-35-E	152



Internal Review Summary

Why QICO Performed This Review:

- This internal review is intended to provide Metro senior management with an assessment of the state of Traction Power Inspection and Maintenance (TRPM) and promote the actions needed to address any concerns.
- QICO is independent from the functions it oversees, authorized by the General Manager to conduct objective reviews with unrestricted access to all functions, records, assets and employees under its purview.

QICO's Methodology:

- Developed relevant review activities by identifying and assessing risks to quality of work, compliance with standards, records management, and safety.
- Reviewed maintenance documentation, observed maintenance and inspection work in-progress, and interviewed key personnel.
- Review findings and required actions are rated based on severity of risk, which ranges on a scale from "Insignificant" to "High."

Note: An itemized Corrective Action Plan (CAP) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of CAP implementation go to www.wmata.com/initiatives/transparency/.

June 2017

Metrorail Traction Power Inspection and Maintenance

QICO's Review Results:

Establishment of a new training curriculum, improved document control, and an effective staffing process can improve accountability.

Metrorail's Traction Power Maintenance (TRPM) group oversees both large scale asset renewal and preventative maintenance activities. QICO's review identified **2 Wins (What Worked Well)** and **10 Areas for Improvement** requiring corrective actions:

- ✓ Traction Power supervisors employ effective communication methods to relay information upon shift turnover.
- ✓ The Cable Inspection Team inspected 100% of mainline cable connections for 2016.
- The Traction Power Maintenance Control Policy does not outline technical training required for technicians or supervisors.
- Logbook entries located in power facilities are inconsistent.
- The Traction Power Maintenance Control Policy has not undergone annual review/revision, as required (Last revised May 2014).
- TRPM mechanics utilize O&M manuals in-place of PMI procedures to complete preventative maintenance on new equipment.
- Traction Power supervisors are not performing quality control checks.
- Completed Preventative Maintenance (PM) forms do not always reference the applicable work order number, which is the link between the actual work performed and the electronic record in WMATA's enterprise asset management system (Maximo).
- TRPM corrective maintenance records, as identified in the enterprise asset management database (Maximo), indicate a backlog of open work orders.
- Electronic records management practices lack oversight and control.
- Electrical facilities room inspection records are incomplete.
- Lockout/Tagout procedure currently used by TRPM personnel has not been approved.

Required Actions:

- **QICO-TRPM-17-01:** Clearly define specific training requirements and periodicities for each technician grade and develop methods of capturing on-the-job training in accordance with the Maintenance Control Policy. *(Risk Rating: Elevated)*
- **QICO-TRPM-17-02:** Review and perform necessary revision to maintenance documentation, including the Maintenance Control Policy (MCP), and establish supervisory control to ensure compliance with updated requirements. *(Risk Rating: Elevated)*
- **QICO-TRPM-17-03:** Ensure new Lockout/Tagout (LOTO) procedure is formally approved for proper use in TRPM maintenance activities. The new LOTO procedure must conform to OSHA requirements under section 1910.147. *(Risk Rating: High)*

1 DEPARTMENT/FUNCTION OVERVIEW

Traction Power Maintenance (TRPM)

The Traction Power System for Metrorail supplies 750 Vdc to power railcars. It consists of over 100 [Traction Power Substations \(TPSS\)](#), which transform and rectify power supplied by local electrical utilities (e.g. PEPCO) to energize zones of [third rail \(contact rail\)](#), upon which passing trains contact to draw power. Over 100 [Tie-Breaker Stations \(TBS\)](#) control the ability for traction power substations to assist one another in the event one fails.

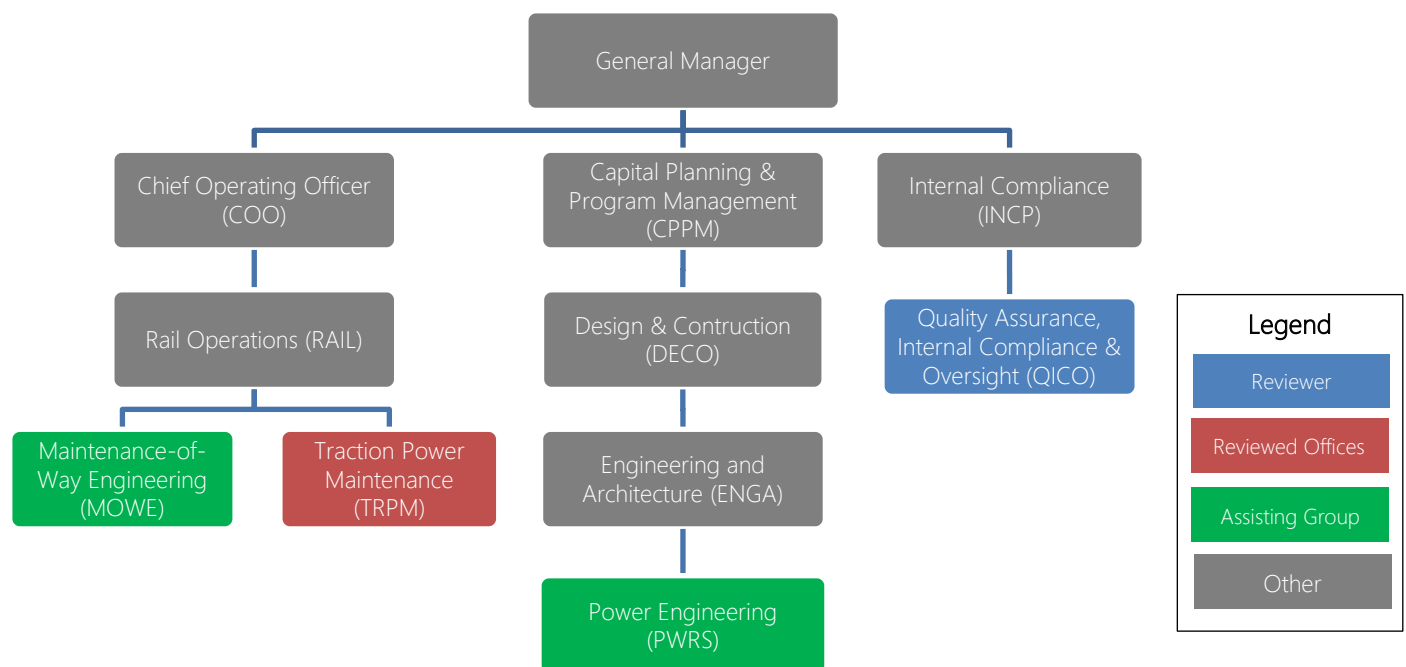
Metrorail's Traction Power System is maintained by Traction Power Maintenance (TRPM), which reports to the Assistant General Manager for Rail Operations (RAIL). TRPM is responsible for the 207 traction power facilities on the 117-mile transit system and 8 major yards. In addition they are responsible for high voltage equipment at over another 192 facilities (passenger stations, bus garages, pumping stations, and chilled water plants).

2 REVIEW METHODOLOGY

Review Stakeholders

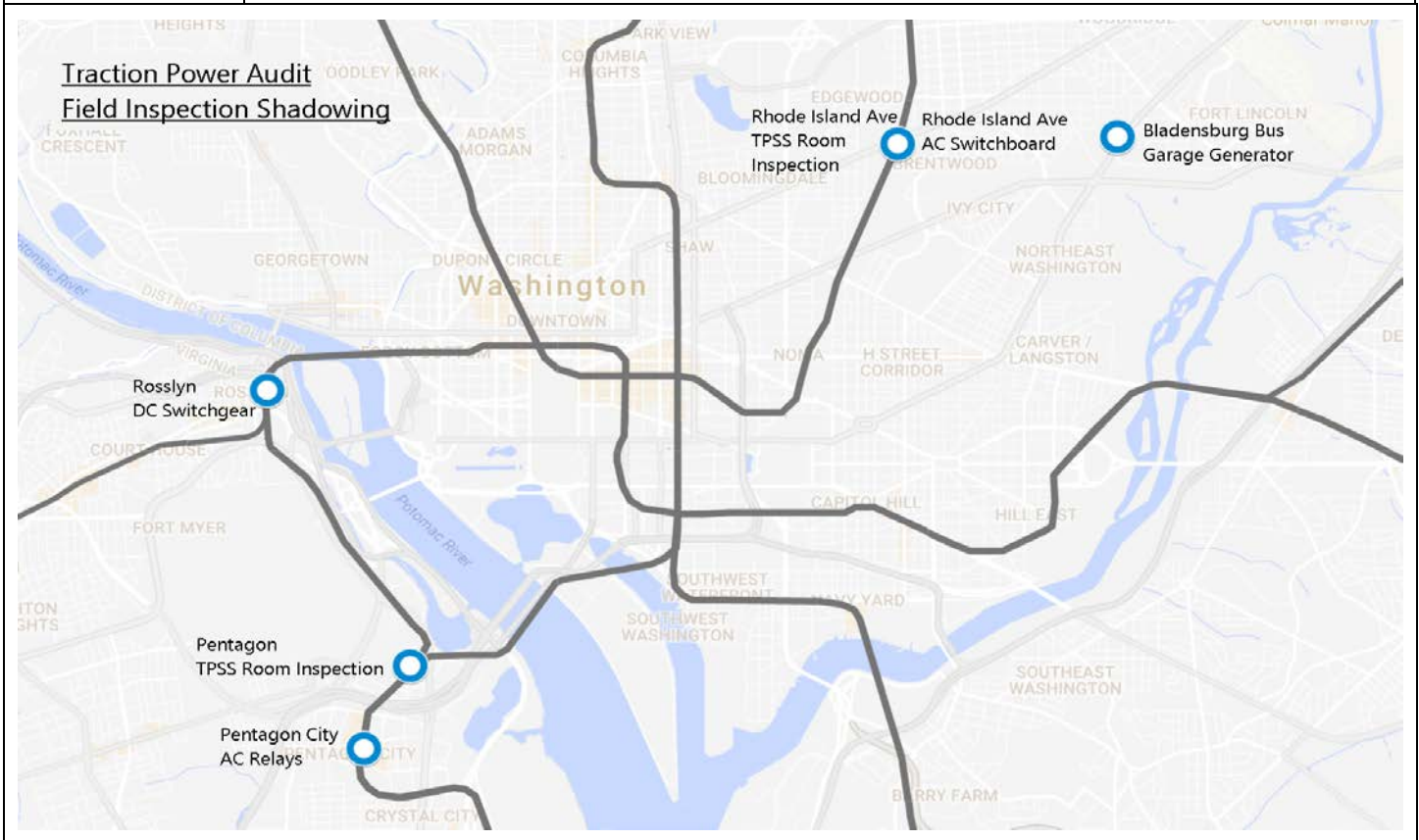
The Infrastructure Assurance branch of the Office of **Quality, Internal Compliance and Oversight (QICO)** conducted an internal review of **Traction Power Maintenance (TRPM)**, which resides in the Department of Rail Services (RAIL) under the Office of the Chief Operating Officer (COO). As shown below, QICO is independent of operations and engineering, reporting directly to the General Manager. QICO performed the review from February 2 – April 28, 2017.

Several groups support Traction Power Maintenance. The traction power group within **Maintenance-of-Way Engineering (MOWE)** originates Engineering Modification Instructions (EMIs) and develops other governing documentation for maintenance of traction power equipment. **Power Engineering (PWRS)** within Engineering and Architecture (ENGA) is the custodian of engineering design and specifications for traction power, and develop standards and strategies to power future railroad needs (e.g. support 100% eight-car operations).



2.1 REVIEW SCOPE

Category	Description
Review of Existing Documentation	<ul style="list-style-type: none"> - Traction Power Branch Maintenance Control Policy (Rev 1, May 2014) – policies for TRPM’s asset management (Maximo), maintenance strategies, track rights, and quality system. - Traction Power Preventative Maintenance Instructions (PMIs) – ensures that TRPM subsystems and equipment are in satisfactory condition. Documents the actual maintenance performed on the equipment and measurements taken per manufacturers’ maintenance instructions. - Completed preventative maintenance forms (data sheets) for 14-day, Monthly, 84-day, and Annual Inspections – ensures the TRPM system continues to provide reliable traction power for train operations. These inspections are essential and standard utility practice that govern the construction, maintenance, operation, and testing of all TRPM systems and apparatus.
Interviews of Key Personnel (Appendix D)	<ul style="list-style-type: none"> - Assistant Chief Engineer, Power Engineering within Maintenance-of-Way Engineering (MOWE) - Regional Maintenance Managers - Superintendent for Cable Inspection - Shift Supervisors - Technicians - Director for Technical Skills And Maintenance Training (TSMT)
Shadowing Field Inspections and Business Processes (Appendix E)	<ul style="list-style-type: none"> - TPSS Room and AC Switchboard Room Inspection at Rhode Island Metro Station (B04), 3/1/17 - TPSS Room Inspection at Pentagon TPSS (C07), 4/27/2017 - Generator at Bladensburg Bus Garage (T05), 3/10/17 - DC Switchgear Inspection at Rosslyn (C05), 3/09/17 - Relay Inspection at Pentagon City (C08), 3/10/17



2.2 REVIEW CRITERIA

Quality Measures		Definition
Quality of Work	Workmanship	Qualitative or quantitative measurement of material characteristics of work performed.
	Performance of Work	Qualitative or quantitative measurement of actions taken to complete work.
	Housekeeping	Assessment of site conditions; i.e. work zone organization and cleanliness.
	Quality Control Measures	Internal management controls that ensure the consistency and reliability of work performed.
	Materials and Tooling	Measureable properties of parts and tools used to perform work.
Records Management	Work Order Management	Protocols established to control maintenance scheduling, documentation, and tracking.
	Processes	Documented requirements for departmental activities.
	Records Storage and Retention	Documented requirements for the maintenance of records and documentation.
Safety	Roadway Worker Protection (RWP)	Documented requirements for work zone setup and personal protective equipment.
	Applicable Job Safety Requirements	Any documented safety requirements that apply to specific work performed.
Compliance with Standards	Technical Specifications	Engineering requirements that outline the minimum requirements for material and workmanship standards.
	Business Practices	Formal documented standards governing business practices; i.e. P/I's, departmental policies, etc.
	Procedural Requirements	Formal documented standards that identify specific actions to be taken; i.e. who, what, when, where, how?
	Regulatory Findings	Findings issued by outside regulatory entities (FTA, NTSB, GAO) that generate recommendations or required actions.
	Internal Findings	Findings issued by internal oversight entities (OIG, QICO, SAFE) that generate recommendations or required actions.

2.3 RISK ASSESSMENT

Note: Required actions are rated based on severity of risk, which ranges from 'Insignificant' to 'High' scale. Refer to [Appendix A](#) (Risk Assessment) for details.

Definitions

Insignificant	Low	Moderate	Elevated	High
Reasonable assumption that this risk will not occur and unlikely to cause the activity to fail to meet part of its objective	Reasonable assumption that this risk will likely not occur & may cause a failure of the business process to meet part of its objectives	Reasonable assumption that this risk may occur & may cause a failure of the business process to meet a significant part of its objectives	Reasonable assumption that this risk will likely occur & likely to cause a failure of the business process to meet a significant part of its objectives	Reasonable assumption that this will occur & will cause a failure of the business process to meet its objectives or cause objective failure in other activities

3 WHAT WORKED WELL?

Measure	Finding	Description
Quality of Work	Supervisors employ effective communication methods to relay information upon shift turnover.	<ul style="list-style-type: none"> - Each shift supervisor completes a "shift turnover report form" at the end of each shift, which consists of workforce attendance, switch orders, and work completed. It is uploaded into the department's shared drive for all TRPM managers to view. <p>(Source: TRPM Shift Turnover Report)</p>
	The Cable Inspection Team inspected 100% of mainline third rail cable connections for 2016.	<ul style="list-style-type: none"> - The Traction Power Maintenance group have submitted recent documentation and provided sufficient evidence to support closure of the Corrective Action Plan (CAP) No. R-5-35-E that requires Metro to replace defective power cables identified during inspections. <p>(Source: CAP No. R-5-35-E Quality Audit Report)</p>

4 AREAS FOR IMPROVEMENT

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details

Measure	Finding	Description
Quality of Work	<p>F-TRPM-17-01: The Traction Power Maintenance Control Policy does not outline technical training required for technicians or supervisors, according to grade or experience.</p> <p><u>Operational Risk Elevated (4.4)</u> ■</p>	<ul style="list-style-type: none"> - Technical Skills Maintenance Training (TSMT) indicated that there is no technical training in place for newly hired Traction Power Maintenance (TRPM) personnel (as of May 15, 2017). As a result, the TRPM training facility at Telegraph Road is not being utilized. - The TRPM Maintenance Control Policy (MCP) does not outline required technical training. It only lists mandatory general and safety courses for non-represented (supervision) and represented (technicians) personnel, without periodicity. - The TRPM Maintenance Control Policy states technical training requirements are contained in Appendix B; however, Appendix B contains no training requirements. - Unstructured on-the-job training is being provided by shift supervisors and senior grade technicians, but is not being documented in accordance with the maintenance control policy. - Cross training between Regional Maintenance (Level One) and Preventative Maintenance (Level Two) is deficient (See Appendix B). Current procedures require Level One to be dispatched to traction power emergencies; when they respond to an emergency they have excessively relied upon contacting Level Two groups to troubleshoot the issue. <p>Recommendation: Clearly define specific training requirements and periodicities for each technician grade and develop methods of capturing on-the-job training in accordance with the Maintenance Control Policy.</p> <p><i>(Source: TRPM training facility tour, TRPM Maintenance Control Policy)</i></p>

4 AREAS FOR IMPROVEMENT

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details

Measure	Finding	Description
Quality of Work	<p>F-TRPM-17-02: Inconsistent logbook entries in traction power substations provide ineffective communication of work completed and ongoing work.</p> <p>Operational Risk Moderate (3, 4) </p>	<ul style="list-style-type: none"> - A memo from 2009 requires personnel who enter AC Rooms, Traction Power Substations and Tie-Breaker Stations to document all work-related information in the facility's paper logbook. - During QICO's Traction Power and AC Switchboard Field Inspection, the supervisor highlighted he had no knowledge of the new equipment being installed in the tie breaker station (TBS) at Brentwood Yard (B99). Logbook entries in facility did not reflect the work being performed. - Per TRPM's Maintenance Control Policy, it is critical that accurate and complete records be created. Record keeping for electrical power equipment consists of Book of Plans, Log Book, Blue "Do not repair or operate" Tags, and data sheets. - Utilizing the logbook correctly allows personnel entering a power facility to be cognizant of that location's past maintenance history and current safety hazards. <p>Recommendation: Incorporate requirements for the capture of logbook entries for power facilities into the maintenance control policy or other governing document.</p> <p><i>(Source: 2009 Logbook Memo, Logbook Photo, Traction Power Substation & AC Switchboard Room PM Field Inspection report)</i></p>
Compliance with Standards	<p>F-TRPM-17-03: The Traction Power Maintenance Control Policy has not undergone annual review/revision, as required in the document. (Last revised May 2014).</p> <p>Governance Risk Moderate (2, 5) </p>	<ul style="list-style-type: none"> - QICO reviewed the TRPM Maintenance Control Policy (MCP), which copied heavily from the Automatic Train Control Maintenance Control Policy in its initial revision (2012). It still contains many erroneous references to automatic train control (requires editing). <i>"This policy is established to ensure that all business and mission critical automatic train control systems have a maintenance capability..." (Traction Power Maintenance Control Policy, 2014)</i> - The control policy was last revised in May 2014 and is not compliant with its policy of annual revision. It does not reflect the significant changes that have occurred since 2014, including roles and responsibilities (e.g. which electrical systems are maintained by TRPM), asset management (reflecting MAP-21 and FTA's 2016 asset management directive), and the QA/QC section. <p>Recommendation: Ensure the Maintenance Control Policy is properly reviewed and updated in accordance with requirements set within the document.</p> <p><i>(Source: TRPM Maintenance Control Policy)</i></p>



4 AREAS FOR IMPROVEMENT

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A \(Risk Assessment\)](#) for further details

Measure	Finding	Description
Compliance with Standards	<p>F-TRPM-17-04: TRPM mechanics utilize O&M manuals in-place of PMI procedures to complete preventative maintenance on new equipment.</p> <p>Operational Risk Moderate (3, 4) ■</p>	<ul style="list-style-type: none"> - Preventative Maintenance Instructions (PMIs) are needed to properly perform maintenance on traction power equipment. These instructions are not available for all traction power equipment (e.g. Powell Series 34.5 kv AC Type Switchgear), resulting in inspectors relying on Operations & Maintenance (O&M) manuals submitted by vendors during equipment contract closeout. - Per Maintenance Control Policy, before the implementation of new electrical power equipment and systems, the Superintendent and Asst. Superintendent, Electrical Power shall ensure that ENGA-approved PMIs are on-hand and included in Maximo before acceptance. - Technicians have been utilizing WMATA intranet to obtain preventative maintenance documents; this library is not properly updated or controlled. Furthermore, the Authority's enterprise repository (Documentum) does not have the updated PMIs. <p>Recommendation: Clearly define the role of O&M manuals and PMI procedures for use in the preventative maintenance process.</p> <p>(Source: PMI List Snapshot)</p>
Compliance with Standards	<p>F-TRPM-17-05: Traction power supervisors are not performing quality control checks as required in the Maintenance Control Policy.</p> <p>Governance Risk Elevated (3, 5) ■</p>	<ul style="list-style-type: none"> - According to TRPM's Maintenance Control Policy, shift supervisors are responsible for reviewing and certifying both the acceptable performance of inspections and the accuracy of the documentation in Maximo. TRPM did not produce evidence that any spot checks are being performed for either of these two measures. <p>Recommendation: Reinforce requirements to ensure supervisory quality control checks are completed as specified.</p> <p>(Source: TRPM Maintenance Control Policy)</p>

4 AREAS FOR IMPROVEMENT

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A \(Risk Assessment\)](#) for further details

Measure	Finding	Description
Records Management	<p>F-TRPM-17-06: Completed Preventative Maintenance (PM) forms do not always reference the applicable work order number, which is the link between the actual work performed and the electronic record in WMATA's enterprise asset management system (Maximo).</p> <p>Operational Risk Low (2, 4) </p>	<ul style="list-style-type: none"> - QICO reviewed a sample of 150 preventative maintenance (PM) data sheets from January 2017 and discovered that 15.3% do not have an applicable Maximo work order number documented. Currently, data sheets do not contain a work order entry field. Technicians either write a work order number at the top of the sheet or it is copy and pasted from Maximo during the scanning process. - The work order number is useful as a point of reference for the shift supervisor when reviewing PM data sheets and is critical to the process of linking the work performed to its electronic record in Maximo. <p>Recommendation: Implement a field to capture work order number in all preventative maintenance data sheets.</p> <p><i>(Source: System-Wide Preventative Maintenance Data Sheets)</i></p>
Records Management	<p>F-TRPM-17-07: TRPM corrective maintenance records, as identified in the enterprise asset management database (Maximo), indicate a backlog of open work orders in various statuses.</p> <p>Operational Risk Elevated (3, 5) </p>	<ul style="list-style-type: none"> - There are 1,093 open power work orders (within POWR section) in the Authority's Enterprise Asset Management System (Maximo) prior to the start of the calendar year (1/1/2017). Many of these work orders are in an approved (APPR) status. The maintenance control policy states, "Ensure no more than 50 unresolved PWR work orders for the past 31 to 365 days." - There is a large number (300+) of unclosed work orders from 2008 to 2009 under the labor group "POWRIRP." - Traction Power's preventative maintenance and inspection group (Level 2, Test Tech, listed in Maximo as POWRTT), has more than 150 open work orders in Maximo from 2016. - Traction Power's regional room inspection group (Level 1, listed as POWRHVA13, POWRHVB04, POWRHVE99, POWRHVK99, POWRHVN01 in Maximo) have 175 open work orders dated 2014. <p>Recommendation: Verify the current status of open work orders. Update the database to reflect current status. Implement supervisory controls to ensure accurate status of work orders.</p> <p><i>(Source: Maximo Query, Retrieved 5/10/2017)</i></p>

4 AREAS FOR IMPROVEMENT

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details

Measure	Finding	Description
Records Management	<p>F-TRPM-17-08: Electronic recordkeeping practices of maintenance activities lack consistent oversight and control.</p> <p>Governance Risk Low (2, 4) ■</p>	<ul style="list-style-type: none"> - Maintenance Control Policy (MCP) record management section states preventative maintenance records/documentation be stored in Maximo and Documentum. - Shift supervisors are currently scanning data sheets into the Traction Power Maintenance (TRPM) shared drive, but there are no supervisory controls in place to ensure all data sheets are uploaded correctly and within a specific timeframe. As of 5/9/2017, March 2017 data sheets have not been uploaded into the TRPM shared drive. <p>Recommendation: Ensure recordkeeping practices comply with Maintenance Control Policy, exploring the possibility of utilizing the enterprise asset management database (Maximo).</p> <p><i>(Source: TRPM Shared Drive)</i></p>
Records Management	<p>F-TRPM-17-09: Electrical facilities room inspection records are incomplete and inconsistent.</p> <p>Operational Risk Moderate (2, 5) ■</p>	<ul style="list-style-type: none"> - During review of TRPM's completed preventative maintenance data sheets, QICO found certain room inspection data sheets to be inconsistent and incomplete, mainly Tie Breaker room inspections. This is due to the fact that the Preventative Maintenance Instruction (PMI) for AC and DC electrical facilities has only one data sheet pertaining to both types of facilities (e.g. Traction Power Substation vs Tie Breaker Station vs AC Switchboard Room). - There should be clear instructions on how to fill out data sheet pertaining to the specific electrical facility that is being inspected. - Technicians are using a recently revised version of the <i>DC & AC Facilities Inspection Data Sheet (Rev 4, 03/17/2017)</i>. As of May 18th 2017, it has not been approved by engineering, the latest revision on engineering's sharepoint site is Rev 3, 08/05/2011 <p>Recommendation: Implement clear instructions on AC & DC Electrical facility inspection data sheet, or within PMI procedure, instructing personnel on how to fill out checklists according to facility type, and establish clear practices for distribution.</p> <p><i>(Source: Preventative Maintenance Data Sheets, Snapshot of Current PMI List on WMATA intranet, DC Facilities Inspection Data Sheet Revision 4)</i></p>

4 AREAS FOR IMPROVEMENT

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A \(Risk Assessment\)](#) for further details

Measure	Finding	Description
Safety	<p>F-TRPM-17-10: Lockout/Tagout procedure currently used by TRPM personnel has not been approved.</p> <p>Safety Risk High (5, 4) ■</p>	<ul style="list-style-type: none"> - Metrorail Safety Rules and Procedures Handbook (MSRPH) SOP #39 is currently the approved Standard Operating Procedure for Lockout/Tagout (LOTO) for Traction Power Substations. - TRPM is currently using the Safetrack Mobile Control Center (MCC) & Traction Power LOTO procedure in-place of SOP #39 for maintenance activities. This new procedure improves upon SOP #39 by specifying the documentation needed (e.g. labelling of keys & sealed envelope) and reducing the time required to perform the task. However, it is not formally approved. <p>Recommendation: Ensure new Lockout/Tagout (LOTO) procedure is formally approved for proper use in TRPM maintenance activities. The new LOTO procedure must conform to OSHA requirements per section 1910.147.</p> <p><i>(Source: Safetrack MCC/TRPM LOTO Procedure, SOP #39)</i></p>

5 OTHER OBSERVATIONS

Measure	Observation	Description
Quality of Work	<p>Cable inspection crews utilizing hand-held thermal imaging sensors do not cross-reference thermal imaging reports generated by CENV, which measure temperatures on live revenue tracks.</p>	<ul style="list-style-type: none"> - Cable inspection crews walk track with handheld infrared scanners, capturing only static hot spots and anomalies. - Cable inspection crews indicated they take a before and after reading of cables while trains are entering and exiting stations. - The Chief Engineer Vehicles (CENV) group utilizes a infrared camera in front of a revenue vehicle to capture thermal video imagery of the third rail traction power infrastructure as a means to identify hot spots before they become failures that cause delays to revenue operation. - Engineering Test Reports indicating the results of thermal imaging are made available on WMATA intranet.

5 OTHER OBSERVATIONS

Measure	Observation	Description
Quality of Work	Supervisory positions in TRPM currently experience a 25.6% vacancy rate.	<ul style="list-style-type: none"> - Traction Power Maintenance internal records indicate that there are 11 management vacancies out of 43 total management positions. This reflects a 25.6% vacancy rate. - The official organizational Position Management Report dated May 9, 2017, indicates there are 6 management vacancies out of 43 total management positions which reflects a 13.9% vacancy rate within management. - There are vacancies in key management roles such as Superintendents, Assistant Superintendents, Area Managers and Supervisors. - Assistant Superintendent positions (3) have been vacant since 10/05/16, 12/01/16, and 02/01/17. - The Area Manger position has been vacant since 12/25/16. - Shift Supervisor positions (3) have been vacant since 03/13/17, 03/29/17 and 05/01/17. - All vacancies are currently filled with people "acting" in the management role. This places the "acting" individual in a dual role where s/he may not effectively execute either position. - Job descriptions for vacant positions have not been revised since March 1983, over 30 years ago. - The Traction Power Maintenance Control Policy indicates an adequate number of trained supervisors and managers are required to ensure proper oversight of scheduled and unscheduled maintenance and employee adherence to safety standards, policies and procedures. <p>(Source: TRPM Contact List, TRPM Position Management Report)</p>

6 SUMMARY OF REQUIRED ACTIONS

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details

Required Action	Finding	Owner
QICO-TRPM-17-01 Clearly define specific training requirements and periodicities for each technician grade and develop methods of capturing on-the-job training in accordance with the Maintenance Control Policy. 4/Elevated ■	F-TRPM-17-01 ■ The Traction Power Maintenance Control Policy does not outline technical training required for technicians or supervisors, according to grade or experience.	TRPM, TSMT

6 SUMMARY OF REQUIRED ACTIONS

Note: Findings are rated based on risk on a 1 (Insignificant) to 5 (High) scale. Refer to [Appendix A](#) (Risk Assessment) for further details

Required Action	Finding	Owner
QICO-TRPM-17-02 Review and perform necessary revision to maintenance documentation, including the Maintenance Control Policy (MCP), and establish supervisory control to ensure compliance with updated requirements. 4/Elevated ■	F-TRPM-17-02 ■	Inconsistent logbook entries in traction power substations provides ineffective communication of work completed and ongoing. TRPM
	F-TRPM-17-03 ■	The Traction Power Maintenance Control Policy has not undergone annual review/revision, as required in the document.(Last revised May 2014). TRPM
	F-TRPM-17-04 ■	TRPM mechanics utilize O&M manuals in-place of PMI procedures to complete preventative maintenance on new equipment . ENGA
	F-TRPM-17-05 ■	Traction power supervisors are not performing quality control checks as required in the Maintenance Control Policy . TRPM
	F-TRPM-17-06 ■	Completed Preventative Maintenance (PM) forms do not always reference the applicable Work Order number, which is the link between the actual work performed and the electronic record in WMATA's enterprise asset management system (Maximo). TRPM, ENGA
	F-TRPM-17-07 ■	TRPM corrective maintenance records, as identified in the enterprise asset management database (Maximo), indicate a backlog of open work orders in various statuses. TRPM
	F-TRPM-17-08 ■	Electronic recordkeeping practices of maintenance activities lack consistent oversight and control.. TRPM
	F-TRPM-17-09 ■	Electrical facilities room inspection records are incomplete and inconsistent. TRPM, ENGA
QICO-TRPM-17-03 Ensure new Lockout/Tagout (LOTO) procedure is formally approved for proper use in TRPM maintenance activities. The new LOTO procedure must conform to OSHA requirements under section 1910.147. 5/High ■	F-TRPM-17-10 ■	Lockout/Tagout procedure currently used by TRPM personnel has not been approved. TRPM

7 CORRECTIVE ACTION PLANS




INTERNAL REVIEW

Metro's Structure Inspections

In response to the internal review report for Metrorail's Traction Power Inspection and Maintenance dated May 25, 2017. QICO has coordinated with Operations and Engineering departments to develop three comprehensive CAPs. Each CAP outlines the findings, requirements and recommendations addressed, and a detailed action plan outlining responsible parties and specific actionable items.

EXECUTIVE LEADERSHIP OF RESPONSIBLE PARTIES

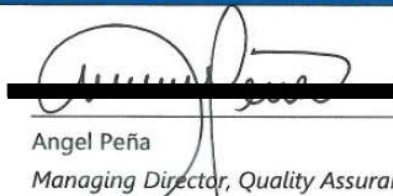
Corrective Action Plan (CAP) Commitment


Joseph Leader
Chief Operating Officer (COO)

6/19/2017
Date

WMATA INTERNAL OVERSIGHT

Corrective Action Plan (CAP) Acknowledgement


Angel Peña
Managing Director, Quality Assurance, Internal Compliance & Oversight (QICO)

06/19/17
Date


Eric Christensen
Chief, Internal Compliance (INCP)

6/19/17
Date


Paul J. Wiedefeld
General Manager & Chief Executive Officer (GM/CEO)

6/20/17
Date

CORRECTIVE ACTION PLAN

Purpose and Scope

On May 25, 2017 QICO issued an internal review of Metrorail’s Traction Power Inspection and Maintenance. This Corrective Action Plan (CAP) has been developed to address the following finding and required actions per **QICO-TRPM-17-01**.

QICO Finding

QICO Recommendation

F-TRPM-17-01: The Traction Power Maintenance Control Policy does not outline technical training required for technicians or supervisors, according to grade or experience

- Clearly define specific training requirements and periodicities for each technician grade and develop methods of capturing on-the-job training in accordance with the Maintenance Control Policy.

Required Action

QICO-TRPM-17-01: Clearly define specific training requirements and periodicities for each technician grade and develop methods of capturing on-the-job training in accordance with the Maintenance Control Policy.

(Risk Rating: Elevated) ■

Plan Description

Operations Management Services (OPMS) and Traction Power Maintenance (TRPM) will finalize the training matrix that identifies requirements and periodicity for each mechanic level. OPMS and TRPM are working with a vendor to develop a new training program for power personnel, which incorporates On-the-Job Training (OJT) as part of the scope. A mentoring program was created in response to Federal Transit Administration Safety Management Inspection CAP R-2-16-d by OPMS contains an OJT log that addresses the need to document OJT activities by required competencies. TRPM will issue a department policy outlining these requirements.

Business Impact – Budget/Cost Estimate

- Process Improvement – A current process/procedure needs to be optimized to address the QICO Required Action. This type of initiative does not need additional resources because current manpower will be used to improve the process.

PLAN SCHEDULE

Actionable items		Description	Responsible Party*	Estimated Start	Estimated Completion
1	Training Matrix	Working with TRPM management to finalize a training matrix that identifies training requirements for each TRPM mechanic level.	Linda Stoffregen (OPMS)	06/12/17	08/14/17
2	On-the-Job Training	Finalize new TRPM training curriculum that includes OJT training.	Linda Stoffregen (OPMS)	06/12/17	12/11/17



PLAN SCHEDULE

Actionable items		Description	Responsible Party*	Estimated Start	Estimated Completion
3	Policy and Instruction	Issue a TRPM Policy and Instruction detailing the OJT requirements and training matrix.	Michael Hass (TRPM)	06/12/17	12/11/17
4	Enterprise Learning Management Module Report	Report – New TRPM employees completed initial training on deliverable # 1.	Linda Stoffregen (OPMS)	10/09/17	12/11/17
5	QICO Verification Report	QICO will evaluate action items submitted to confirm there is reasonable evidence that the findings have been resolved and that this required action was effective, taking into account corresponding action item descriptions and performance measures.	QICO	12/11/17	01/08/18



*In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

COMPLETION DOCUMENTATION

Performance Measures

- 100% completion of training matrix.
- 100% completion of TRPM Policy and Instruction detailing the on-the-job-training requirements.
- Completion of initial courses in new training curriculum by new employees.

RESPONSIBLE PARTIES

OPMS	Linda Stoffregen	
TRPM	Michael Hass	

SECOND LEVEL RESPONSIBILITY

AGM RAIL	Andrew Off	
----------	------------	--

CORRECTIVE ACTION PLAN

Purpose and Scope

On May 25, 2017 QICO issued an internal review of Metrorail’s Traction Power Inspection and Maintenance (TRPM). This Corrective Action Plan (CAP) has been developed to address the following finding and required actions per **QICO-TRPM-17-02**.

QICO Finding	QICO Recommendation
<p>F-TRPM-17-02: Inconsistent logbook entries in traction power substations provides ineffective communication of work completed and ongoing.</p>	<ul style="list-style-type: none"> - Incorporate requirements for the capture of logbook entries for power facilities into the maintenance control policy or other governing document.
<p>F-TRPM-17-03: The Traction Power Maintenance Control Policy has not undergone annual review/revision, as required (Last revised May 2014).</p>	<ul style="list-style-type: none"> - Ensure the Maintenance Control Policy is properly reviewed and updated in accordance with requirements set within the document.
<p>F-TRPM-17-04: TRPM mechanics utilize O&M manuals in-place of PMI procedures to complete preventative maintenance on new equipment</p>	<ul style="list-style-type: none"> - Clearly define the role of O&M manuals and PMI procedures for use in the preventative maintenance process.
<p>F-TRPM-17-05: Traction power supervisors are not performing quality control checks as required in the Maintenance Control Policy</p>	<ul style="list-style-type: none"> - Reinforce requirements to ensure supervisory quality control checks are completed as specified.
<p>F-TRPM-17-06: Completed Preventative Maintenance (PM) forms do not always reference the applicable Work Order number, which is the link between the actual work performed and the electronic record in WMATA’s enterprise asset management system (Maximo).</p>	<ul style="list-style-type: none"> - Implement a field to capture work order number in all preventative maintenance data sheets.
<p>F-TRPM-17-07: TRPM corrective maintenance records, as identified in the enterprise asset management database (Maximo), indicate a backlog of open work orders in various statuses.</p>	<ul style="list-style-type: none"> - Verify the current status of open work orders. Update the database to reflect current status. Implement supervisory controls to ensure accurate status of work orders.
<p>F-TRPM-17-08: Electronic recordkeeping practices of maintenance activities lack consistent oversight and control.</p>	<ul style="list-style-type: none"> - Ensure recordkeeping practices comply with Maintenance Control Policy, exploring the possibility of utilizing the enterprise asset management database (Maximo).
<p>F-TRPM-17-09: Electrical facilities room inspection records are incomplete and inconsistent</p>	<ul style="list-style-type: none"> - Implement clear instructions on AC & DC Electrical facility inspection data sheet, or within PMI procedure, instructing personnel on how to fill out checklists according to facility type, and establish clear practices for distribution.

Required Action

QICO-TRPM-17-02: Review and perform necessary revision to maintenance documentation, including the Maintenance Control Policy (MCP), and establish supervisory control to ensure compliance with updated requirements.

(Risk Rating: Elevated)

Plan Description

F-TRPM-17-02: Traction Power Maintenance (TRPM) will develop a Policy/Instruction (P/I) which will include requirements for standardized log book entries in TRPM maintained rooms. Employees will be trained on the new P/I.

F-TRPM-17-03: Traction Power Maintenance (TRPM) and Maintenance of Way Engineering (MOWE) have developed a scope of work for a consultant to develop the following documents: Inspection Procedures (1000 series), Preventive and Corrective Maintenance Procedures (1100 series), Traction Power System Integration Test and Inspection Procedures (1200 series), and Traction Power Standard Operation Procedures (2000 series). This document will replace the existing TRPM Maintenance Control Policy (MCP).

F-TRPM-17-04: Engineering and Architecture (ENGA) will develop Preventative Maintenance Instructions (PMIs) for all new equipment on WMATA’s Silver Line. ENGA will be using the effort to develop new maintenance documentation in the coming months to update all PMIs for all traction power equipment throughout the entire Metrorail system.

F-TRPM-17-05: Review and perform necessary revision to maintenance documentation, including the MCP, and establish supervisory control to ensure compliance with updated requirements.

F-TRPM-17-06: Rail Services (RAIL) will review all inspection & preventative maintenance data sheets to determine an efficient way to link to the issued work order and establish a policy to implement the results of data sheet analysis. MOWE will review all forms/inspection sheets for field use and insert maximo work order number requirements for mechanics and supervisors to complete.

F-TRPM-17-07: TRPM will provide QICO with quarterly progress reports on the closing of backlogged open work orders.

F-TRPM-17-08: RAIL will analyze options to efficiently capture and store documentation of completed inspections/maintenance for Track and Structures (TRST), Traction Power Maintenance (TRPM), and Automatic Train Control Maintenance (ATCM). In parallel with the development of these documents, TRPM is currently upgrading Maximo to better capture, align and monitor assets. TRPM now requires all PM and inspection documentation to be uploaded to a shared drive for electronic storage. A P/I will be developed to ensure compliance.

F-TRPM-17-09: TRPM will create two (2) separate data sheets for AC/DC room inspections and provide training to employees on how to complete the new data sheets.

Business Impact – Budget/Cost Estimate

- Process Improvement – The current process/procedure needs to be optimized to address the QICO Required Action. This type of initiative does not need additional resources because current manpower will be used to improve the process.

PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
1	Develop Policy/Instruction (P/I) for logbook entries in TRPM maintained rooms.	Create P/I standardizing log book entries in TRPM equipment rooms, documentation of P/I review, and acknowledgement by TRPM personnel.	Doojin Han (TRPM)	07/05/17	08/31/17
2	Implement Log Book Policy/Instruction (P/I)	Document training for TRPM personnel for the implementation of the logbook P/I. Compliance review of the logbook P&I will be outlined in the logbook P&I.	Doojin Han (TRPM)	09/01/17	12/06/17

PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
3	Task Order	Issue Task Order to Consulting firm to develop required documents. Schedule deliverables per the SOW issued.	Moustapha Ouattara (MOWE)	04/21/17	10/23/17
4	Draft TRPM 1000 & 2000 Series documents	Provide copies of Inspection Procedures (1000 series), Preventive and Corrective Maintenance Procedures (1100 series), Traction Power System Integration test and Inspection Procedures (1200 series), Traction Power Standard Operation Procedures (2000 series).	Moustapha Ouattara (MOWE)	10/23/17	03/05/18
5	Approve TRPM 1000 & 2000 Series documents	Authorize Inspection Procedures (1000 series), Preventive and Corrective Maintenance Procedures (1100 series), Traction Power System Integration test and Inspection Procedures (1200 series), Traction Power Standard Operation Procedures (2000 series).	Moustapha Ouattara (MOWE)	03/05/18	05/01/18
6	Develop PMI Procedures	ENGA will develop PMI procedures for all new equipment and devices introduced on the Silver Line.	Ben Ghorban (ENGA)	06/15/17	11/28/17
7	Quality Control Check	Develop Policy/Instruction in accordance with OAP 100-20 for standardizing supervisor quality control checks and documentation of reviews and acknowledgements.	Doojin Han (TRPM)	06/01/17	09/27/17
8	Link Preventative Maintenance Data Sheets to work orders	Review inspection and preventative maintenance data sheets to determine the most efficient means of linking them to work orders issued through the Maximo system for Rail Maintenance groups.	Andrew Off (RAIL)	07/05/17	12/27/17
9	Amend inspection sheets/forms	Review current forms and inspection sheets and incorporate additional requirement for Maximo work order numbers to be added.	Moustapha Ouattara (MOWE)	06/15/17	09/18/17
10	Quarterly Progress Reports (2)	Quarterly report showing progress made closing out backlogged open work orders.	Doojin Han (TRPM)	06/01/17	12/28/17
10.1	Quarterly Progress Report-1	Quarterly report showing progress made closing out backlogged open work orders.-1	Doojin Han (TRPM)	06/01/17	09/20/17
10.2	Quarterly Progress Report-2	Quarterly report showing progress made closing out backlogged open work orders-2	Doojin Han (TRPM)	09/20/17	12/28/17
11	Policy/Instruction	Develop Policy/Instruction to document and standardize the various Maximo review processes currently in effect and implement positive controls for date integrity.	Doojin Han (TRPM)	06/01/17	12/28/17



PLAN SCHEDULE

Actionable items		Description	Responsible Party	Estimated Start	Estimated Completion
12	Develop Shared Drive for TRPM inspection and preventative maintenance reports.	Shared Drive access has been provided to all supervisors and area managers. All PM records are uploaded to the shared drive for management review.	Doojin Han (TRPM)	02/01/17	08/01/17
13	Develop Policy and Instruction.	Develop Policy/Instruction outlining the responsibilities of supervisors and management for the electronic submission and review of records.	Doojin Han (TRPM)	07/05/17	09/05/17
14	Review Options to Capture and Store Documentation	Analyze options to efficiently capture and store documentation of completed inspections/ maintenance for TRST, TRPM and ATCM.	Francesco Palmeri (RCMP)	07/05/17	12/28/17
15	Data sheets for AC/DC Room Inspections	Create two (2) separate data sheets for AC/DC room inspections (e.g. Tie Breaker substation, Traction Power substation).	Moustapha Ouattara (MOWE)	06/19/17	07/17/17
16	Safety/Tool Box Meeting	Handout sign-in sheets to maintenance personnel to acknowledge the implementation of new data sheets for AC/DC room inspections (e.g. Tie Breaker substation, Traction Power substation).	Doojin Han (TRPM)	07/17/17	08/21/17
17	QICO CAP Verification Report	QICO will evaluate action items submitted to confirm there is reasonable evidence that the findings have been resolved and that this required action was effective, taking into account corresponding action item descriptions and performance measures.	QICO	05/01/18	06/01/18

*In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

COMPLETION DOCUMENTATION

Performance Measures

- Evidence of the standardization of logbook entries in TRPM equipment rooms, as established under actionable item #1.
- 95% of active, relevant personnel receive training as prescribed under actionable item #2.
- Evidence of executed task order to consulting firm as prescribed under actionable item #3.
- Final copy of TRPM 1000 & 2000 series documents as prescribed under actionable item #4 & #5.
- Final copies of developed PMI procedures for all new equipment and devices introduced on the Silver Line as prescribed under actionable item #6.
- Evidence of developed P/I for standardized supervisor quality control checks as prescribed under actionable item #7.
- Draft copies of data sheets with addition of work order field as prescribed under actionable item #9.
- Evidence of developed P/I to document and standardize the various Maximo review processes as prescribed under actionable item #11.
- Evidence of developed P/I outlining management responsibilities on electronic submission and review of records as prescribed under actionable item #13.
- Final copy of separate data sheets pertaining to AC/DC room inspection as prescribed under actionable item #15.



- 95% of active, relevant personnel receive training as prescribed under actionable item #16.

RESPONSIBLE PARTIES

MOWE	Moustapha Ouattara	M. Ouattara
DECO	Ben Ghorban	Ben Ghorban
TRPM	Doojin Han	Doojin Han
RCPM	Francesco Palmeri	Palmeri, Francesco

SECOND LEVEL RESPONSIBILITY

AGM RAIL	Andrew Off	Andrew Off
----------	------------	-----------------------

CORRECTIVE ACTION PLAN

Purpose and Scope

On May 25, 2017 QICO issued an internal review of Metrorail's Traction Power Inspection and Maintenance. This Corrective Action Plan (CAP) has been developed to address the following finding and required actions per **QICO-TRPM-17-03**.

QICO Finding

QICO Recommendation

F-TRPM-17-10: Lockout/Tagout procedure currently used by TRPM personnel has not been approved. - Ensure new Lockout/Tagout (LOTO) procedure is formally approved for proper use in TRPM maintenance activities. The new LOTO procedure must conform to OSHA requirements per section 1910.147.

Required Action

QICO-TRPM-17-03: Ensure new Lock-Out-Tag-Out (LOTO) procedure is formally approved for proper use in TRPM maintenance activities. The new LOTO procedure must conform to OSHA requirements under section 1910.147.

(Risk Rating: High) ■

Plan Description

Traction Power Maintenance (TRPM) will develop a procedure with concurrence from the ROCC and approval from SAFE detailing the LOTO requirements. TRPM will issue a safety bulletin with regard to the LOTO procedures. As per OSHA 1910.147 personnel are required to be retrained when they are observed not performing LOTO in accordance to the standards

Business Impact – Budget/Cost Estimate

- Process Improvement – The current process/procedure needs to be optimized to address the QICO Required Action. This type of initiative does not need additional resources because current manpower will be used to improve the process.

PLAN SCHEDULE

Actionable items		Description	Responsible Party*	Estimated Start	Estimated Completion
1	Develop procedure detailing LOTO Procedure	Develop procedure detailing LOTO Procedure which complies with OSHA requirements under section 1910.147.	Michael Hass (TRPM)	07/05/17	09/18/17
2	LOTO Training	TRPM will re-train all employees on LOTO procedures.	Michael Hass (TRPM)	09/15/17	11/28/17



PLAN SCHEDULE

Actionable items		Description	Responsible Party*	Estimated Start	Estimated Completion
3	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	QICO	11/28/17	12/20/17

COMPLETION DOCUMENTATION

Performance Measures

- 100% completion of LOTO Procedure which complies with OSHA requirements under section 1910.147.
- 95% completion of active employees training on LOTO procedure

RESPONSIBLE PARTIES

TRPM	Michael Hass	Michael Hass
------	--------------	-------------------------

SECOND LEVEL RESPONSIBILITY

AGM RAIL	Andrew Off	Andrew Off
----------	------------	-----------------------

8 SUPPLEMENTAL MATERIALS

8.1 APPENDIX A: RISK ASSESSMENT

Risk Assessment

What is Risk?

Risk is defined as an uncertain event or condition that, if it occurs, has a positive or negative effect on the organization's objectives and operations (both threats and opportunities). It is assessed on the combination of the probability of occurrence of risk and the severity of the risk.

Risk management is an attempt to answer the following questions:

- What can go wrong? – The Risk
- How bad are the consequences? – The Impact
- How often does/will it happen? – The Probability of Occurrence
- Is the risk acceptable? – The Risk Treatment, Remediation

Categories of Risk

- *Safety* – Risk associated with harm to customers and employees and critical equipment or asset safety
- *Governance* – Risks associated with internal controls and compliance
- *Operational* – Risk related to inefficient and ineffective business processes, disruption to normal business operations, non-compliance, negative public relations, breach to physical security, etc.
- *External* – Risks related to changing regulations, unfavourable economic conditions, industry or customer needs change, litigation and damage/loss to company assets
- *Financial* – Risks associated with uncollectable receivables, incorrect financial models or analysis, fluctuation in capital levels and adverse movement of interest rates
- *Technological* – Risk associated with unauthorized access to

information, unavailable or unreliable information, technology not meeting business needs and compromised information security

Risk Assessment

The following risk matrix (Figure 1) was used to assess risks within the universe of review areas. The universe (see Table 1) is comprised of the potential range of all review activities and review business units (or departments) that fall within QICO's scope and oversight authority. These business units consist of programs, processes, assets and people which together contribute to the fulfilment of the departments' strategic goals (Goal 1 - Build Safety Culture; Goal 2 - Deliver Quality Service; Goal 3 - Improve Regional Mobility; and Goal 4 - Ensure Fiscal Stability).

Risks are assessed based on the probability of occurrence (see vertical axis in Figure 1) and the significance of their impact (see horizontal axis in Figure 1). The probability ratings are rated on a scale of 1 (minimum) to 5 (maximum) and are driven by the metrics shown on the next page. The impacts ratings are also rated on a scale of 1 (minimum) to 5 (maximum) and are driven by the category of risks, which are then aligned on the metrics shown on the next page.

Each finding is given a severity rating of Insignificant, Low, Moderate, Elevated or High. All areas with Elevated / High ratings are considered to be high risk to the organization's objectives; and need to be mitigated/ reduced in severity at the earliest. The risk ratings to the findings are provided as "Type of Risk" followed by "Severity Rating (Impact, Probability)" (e.g. a finding with "Elevated (4, 3)" would mean a 'significant (4)' impact along with a 'possible (3)' probability of occurrence)

Figure 1: Risk Assessment Matrix

Almost Certain (5)	↑	Low	Moderate	Elevated	High	High
Likely (4)	Probability of Occurrence	Low	Low	Moderate	Elevated	High
Possible (3)		Low	Low	Moderate	Elevated	Elevated
Unlikely (2)		Insignificant	Low	Low	Moderate	Moderate
Rare (1)		Insignificant	Insignificant	Low	Moderate	Moderate
Probability		← Potential Impact of Risk →				
Impact	Negligible (1)	Minor (2)	Moderate (3)	Significant (4)	Major (5)	

8.1 APPENDIX A: RISK ASSESSMENT

Risk Assessment

Probability of Occurrence of Risk Events Defined

Rare | 1 – Reasonable assumption that this risk will not occur

Likely | 4 – Reasonable assumption that this risk will likely occur

Unlikely | 2 – Reasonable assumption that this risk will likely not occur

Almost Certain | 5 – Reasonable assumption that this will occur

Possible | 3 – Reasonable assumption that this risk may occur

Potential Impact of Risk Events Defined

Negligible | 1 – Unlikely to cause the activity to fail to meet part of its objectives.

Significant | 4 – Likely to cause a failure of the business process to meet a significant part of its objectives, or negatively impact the objectives of other activities, which may expose Metro to significant financial losses, reductions to or ineffectiveness of operations, non-compliance with laws and regulations, sizable waste of resources, etc.

Minor | 2 – May cause a failure of the business process to meet part of its objectives, which may expose Metro to minor financial losses, less-effective or efficient operations, some non-compliance with laws and regulations, waste of resources, etc.

Major | 5 – Will cause a failure of the business process to meet its objectives, or cause objective failure in other activities, which may cause or expose Metro to major financial losses, interruptions in operations, failure to comply with laws and regulations, major waste of resources, failure to achieve stated goals, etc.

Moderate | 3 – May cause a failure of the business process to meet a significant part of its objectives, or negatively impact the objectives of other activities, which may expose Metro to significant financial losses, reductions to or ineffectiveness of operations, non-compliance with laws and regulations, sizable waste of resources, etc.

8.2 APPENDIX B: TRACTION POWER ORGANIZATIONAL ROLES

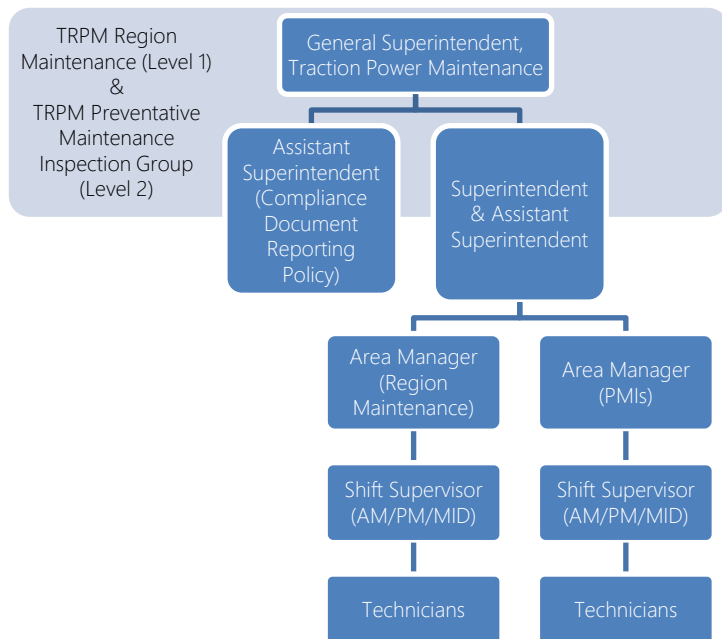
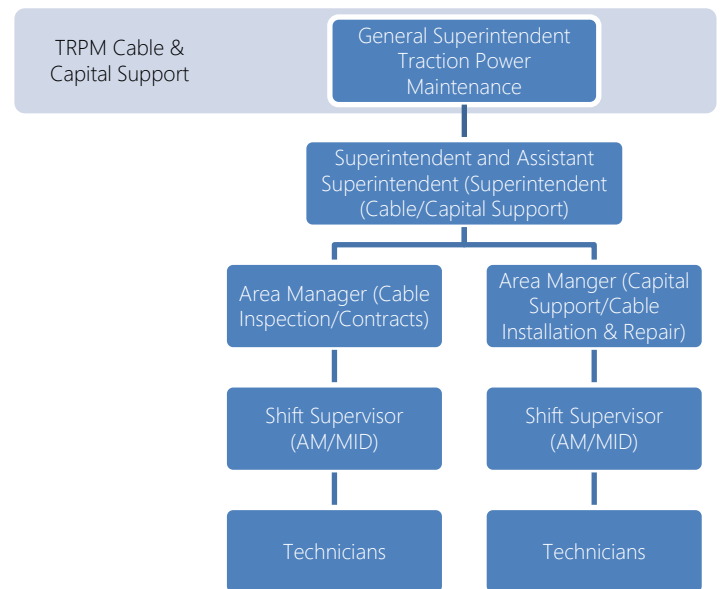
Traction Power Maintenance Overview

The Traction Power Maintenance Department (TRPM) maintains around 400 facilities on the WMATA system on a daily basis. These facilities include Traction Power Substations (TPSS), Tie-Breaker Stations (TBS), Passenger Station AC rooms (AC Switchgear), and facilities containing generators and uninterruptible power systems (UPS). It is also responsible for providing switching protection for all disciplines, general maintenance and inspection, in-service failure replacements, capital replacement projects, emergency response for traction power incidents, and interfacing with three (3) utility companies (BG&E, PEPCO and Dominion Virginia Power).



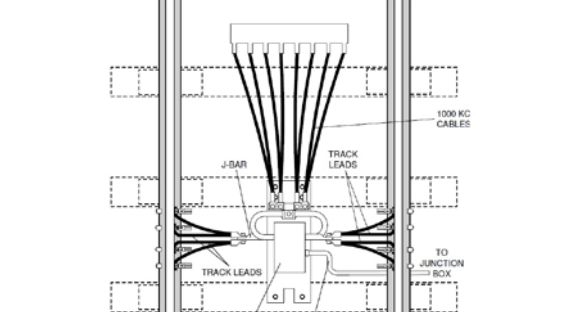
TRPM was recently reorganized in June 2016. The predecessor group was responsible for all power maintenance within the Metrorail system. Currently (May 2017), lower-voltage power elements (e.g. tunnel lights) are maintained by systems maintenance (SMNT), which does not report to the assistant general manager of RAIL.

TRPM has three major groups:

- Cable & Capital Support, which is responsible for inspecting and maintaining traction power cable. The group has two shifts (Days/Nights) but is geographically consolidated.
- Traction Power Regional Maintenance (Level One), which is divided both geographically among several reporting locations (e.g. A13) and by shift (Days/Evenings/Nights). Region maintenance focuses on AC & DC facility inspections, Heat Tape Inspection, and Emergency Trip Station Testing.
- Traction Power Preventative Maintenance Inspection Group (Level Two, also known as "Test Tech"). This group is responsible for preventative maintenance & corrective maintenance on all Traction Power equipment system-wide.



8.3 APPENDIX C: TECHNICAL TERMINOLOGY

Definitions	Photos
<p>AC Room</p> <p>For each passenger station, two primary feeders (typical) are provided by the local jurisdiction's power company (at 13.8 kVac or 34.5 kVac) -- one for each end of the station. These do not feed the traction power system; they are responsible for auxiliary power for passenger rail stations and other WMATA Metrorail facilities.</p>	 <p>(U Street)</p>
<p>Contact Rail (Third Rail)</p> <p>The Contact Rail is an electrical conductor made of steel running rail for the purpose of supplying 750 Vdc traction power to the railcars. It is sometimes referred to as the "Third Rail." Shown to the right is the contact rail, the contact rail coverboard assembly, and contact rail heater tape, which is responsible for de-icing certain segments of contact rail (outdoor areas with steep grade).</p>	
<p>Generator</p> <p>Provides emergency power to WMATA facilities. Pictured to the right is a generator for the Bladensburg Bus Garage (T05) – despite being a bus facility, the generators are the responsibility of traction power maintenance (TRPM) to inspect and maintain.</p>	
<p>Impedance Bonds (High Current Substation Return)</p> <p>Impedance bonds (Wee-Zee, or WZ Bonds) are an integral part of the Automatic Block Signaling System, which is the wayside portion of the Automatic Train Protection (ATP) System. For the traction power system, certain impedance bonds also carry negative propulsion return current from the running rails to track cross-bonding cables or substation return connections via center tap connections on the bonds.</p>	
<p>Lock Out – Tag Out (LOTO)</p> <p>Used for Exclusive Track Occupancy to manually remove electrical breakers to de-energize the contact rail for a work zone, precluding the possibility of accidental re-energization.</p>	

8.3 APPENDIX C: TECHNICAL TERMINOLOGY

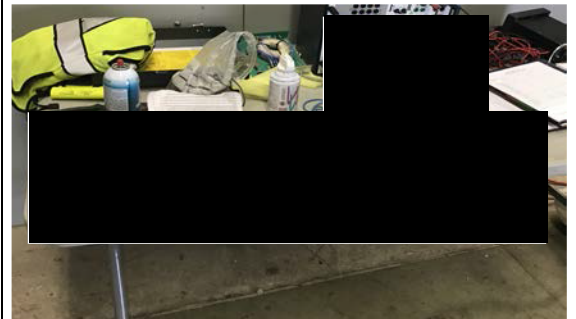
Pigtails and Contact Rail Boots

Traction power is delivered from Traction Power Substations (TPSS) to sections of third rail (contact rail) through traction power cables, which often are buried in conduit along the track. The cables exit the ground through "stub-ups." Contact rail boots (orange boots) turn the cabling 90 degrees and "pig tail" cabling connects to the third rail.



Relay

Shown in the picture are relays for the 50/51 AC breaker. If there is an overcurrent condition (either instantaneous or with a time-delay), the relay will close its contacts and cause the breaker to open (trip), thus isolating the incoming AC feeder.



Switchgear

AC: Consists of several circuit breaker units within a metal-clad enclosure to control equipment and prevent damage due to faults in the utility's AC power supply.

DC: After the current has been transformed and rectified to 750 Vdc, the DC Switchgear provides 750 Vdc to typically 4-8 sections of third rail through a series of breakers.



Tie-Breaker Station (TBS)

Tie Breaker Stations (TBS) are located between adjacent traction power substations. If one TPSS loses power, a closed tie breaker allows power from one TPSS to energize a traction power zone usually serviced by another TPSS. Additionally, a closed tie breaker during normal operation equalizes voltage provided to trains from two TPSS.



Traction Power Substation (TPSS)

There are more than 100 Traction Power Substations within the system which step-down high voltage AC power provided by local utilities (e.g. PEPCO) and rectify the voltage to the 700-750 Vdc required for train operation. Traction power substations are typically spaced at 0.5 - 2 miles apart, and are responsible for electrifying designated sections of third rail. In addition, each Yard has a Yard S&I TPSS.



8.3 APPENDIX C: TECHNICAL TERMINOLOGY

Uninterruptible Power System/Supply (UPS)

During normal service, a battery bank of 60 2-volt batteries (connected in series) is charged to full capacity. In the event that normal high-voltage service fails for Metrorail facilities, the UPS will draw power from the battery bank and invert it from DC to three-phase 480/277 Vac, which will provide emergency power for critical equipment for up to a three-hour period before battery depletion.



8.4 APPENDIX D: QICO INTERVIEWS OF KEY PERSONNEL

QICO PROGRAM	TRPM Internal Review		
LOCATION	Cobb Road Trailer	DATE:	3/02/2017
		TIME:	1315-1430

Background Information	
Name(s): [REDACTED]	Reviewer: [REDACTED]
Position: [REDACTED]	

Interview Notes		
Item Number	Question	Response
1	Can you give us a quick overview of cable inspection program	<ul style="list-style-type: none"> - New program – 1.5 years - Took 4-5 individuals from each power region - Designed an inspection sheet, provided cameras and radios - Inspection during the day 7am-3pm, any issues found are rectified by the nighttime crew - 9 people, 3 crews of 3. 4 night supervisors - Works with SafeTrack Surges, State of Good Repair, Cables off the Ground, and upgrading feeders and breakers - [REDACTED] supports this group; provides materials and equipment when needed - In a year, group walks the entire system 5 times and all yards 4 times.
2	Any Issues that impede your workflow?	<ul style="list-style-type: none"> - Trains not slowing down for personnel, but it was brought to Safety and they supported the resolution - Denied track access if there are already 3/4 teams already on the track, things to help mitigate track access issue is listed below: <ul style="list-style-type: none"> o Call earlier o Email a breakdown to OCC of what they want to do o Shifted time scheduled from M-F, to T-S - Variety of small issues - Turnover is a little high, lots of guys don't like walk - One year shift picks on Christmas Eve, new set of people with the exception of one. - Area Managers need support
3	General Work Process?	<ul style="list-style-type: none"> - Safety Brief - Work Assignments (e.g. location and assignment) - Aim for 4-5 miles of inspections a day - Send work detail to OCC via email - Supervisors try to get out there once a week

4	What is your current Record Keeping practice?	<ul style="list-style-type: none"> - Crude, hard copy - 100 inspection sheets, - Inspection form developed in coordination with FTA, Consultants and Staff - Not scanned in - Pictures are stored on a computer, but no database - Pictures are taken once inspection team sees an issue and another picture is taken after it has been rectified
5	Current Training Program?	<ul style="list-style-type: none"> - We provide training to new inspectors, also provide refresher training courses - Inspectors are not certified like track walkers

QICO PROGRAM	TRPM Internal Review		
LOCATION	Greenbelt Yard	DATE:	3/02/2017
		TIME:	1100-1230

Background Information	
Name(s): [REDACTED]	Reviewer: [REDACTED]
Position: [REDACTED]	

Interview Notes		
Item Number	Question	Response
1	General Work Process?	<ul style="list-style-type: none"> - Safety Meeting - Preventative Maintenance (PM) & Corrective Maintenance (CM) Work Orders - Emergency Calls from OCC & MOC
2	Current Record Keeping practice?	<ul style="list-style-type: none"> - Records are kept by location: year, month, day, and subject matter - Records are kept at every metro station, yards, AC switch rooms, Traction power substations, Tie breakers stations - Started storing on a shared drive since February
3	How do you feel about Maximo and how do you use it?	<ul style="list-style-type: none"> - Not utilized to its full potential - Get work order# from Maximo, technician logs time after PM is completed, turn paperwork into supervisor, supervisor reviews paperwork, paperwork gets reviewed and signed, PM gets closed out
4	Interaction with Maintenance Operations Control (MOC) and Corrective Maintenance Work Orders (WOs)?	<ul style="list-style-type: none"> - MOC generates Corrective Maintenance, either a technician or supervisor can be called - MOC generated Work Orders aren't always clear - Work Orders are created without a location tagged to the issue - MOC seems really inexperienced in the areas that they are responsible - MOC giving directions without knowledge of the system or the assets - During Emergencies OCC and MOC are supposed to be in charge - During Emergencies, MOC doesn't notify the Supervisor, so he isn't knowledgeable of his crew taking on task. - Regarding Emergencies Supervisors are supposed to be notified - MOC contacts crew for emergencies by radio - MOC controller at MOC desk lacks experience (e.g. one emergency was a third rail cover board not on the third rail) changing a 3rd rail cover board is not an emergency - MOC is a stressful job, located at Operations Control Center (OCC) at Carmen Turner Facility - OCC has the responsibility of protecting people and can remotely control the equipment

5	Current Personnel and How do you feel about Training program?	<ul style="list-style-type: none"> - 9-10 people Tues-Thurs – 8 crews - 4 people Friday-Sunday – 2-4 crews - Understaffed, undertrained and unqualified - 15 people would cover 7 days a week - Resume is reviewed, but there isn't any training - Most guys aren't electricians, need 10-15 years to be fully qualified - We need guys with experience 10-15 years, under WMATA guidelines, you have to bring them on as a helper, job doesn't pay enough for them to take the job - No training on particular equipment, missing hands on with equipment - No relationship between an international union and metro union - Mandatory test for helper at 2 year service should be implemented - People are refusing to upgrade, because pick system is based on seniority at position - Time and grade should determine the schedule picking, current structure needs to be revamped. - No Formal/Semi-formal mentorship - Technician classification Level helper, C, B, A, AA – could take up to 4 ½ year to get through
6	Are Parts available at all times?	<ul style="list-style-type: none"> - Hard to find parts - Parts are not placed into the storeroom - 65% of the time, parts are bought outside of WMATA - Parts lists don't seem to be provided to procurement when new equipment is purchased - Engineering should be reviewing the parts that are susceptible to breaking - High-voltage deals with more custom equipment - Low Voltage has everyday parts but they are still issues with having inventory available for their basic work - Trouble getting Heat Tape

QICO PROGRAM	TRPM Internal Review		
LOCATION	K99 Yard	DATE:	3/02/2017
		TIME:	1550-1635

Background Information	
Name(s):	[REDACTED]
Position:	[REDACTED]
Reviewer:	[REDACTED]

Interview Notes		
Item Number	Question	Response
1	General Work Process?	<ul style="list-style-type: none"> - Safety briefing - Work Breakdown Assignment - Review Preventative Maintenance (PM) and Corrective Maintenance (CM) - PMs assigned to Day and evening typically - CMs assigned typically to midnight - Check Maximo for supervisor inspections, spot checks issued via Maximo for supervisors - Check Maximo on time of arrival to work - Review existing tickets to find out what needs to be done - Update Maximo tickets when arrive back to trailer for daily work - Sick Leave is not easy to come by
2	How to do you feel about the current record keeping practice?	<ul style="list-style-type: none"> - Paper to Electronic record keeping needs to be implemented
3	Interaction with Maintenance Operations Control (MOC)?	<ul style="list-style-type: none"> - Personnel on the road call MOC first if there's an issue. They call MOC to open up work order ticket - When MOC creates tickets it's an issue. - MOC created tickets lack detail
4	Current Personnel and How do you feel about Training program?	<ul style="list-style-type: none"> - Personnel (4 crews for day/evening shift, 5 crews on midnight) on Tues, Wed, Thurs, 2 crews on Fri-Mon. 2 people per crew - Employees are good, but not necessarily qualified (i.e. electricians) - Training program not in place over a year, there's a new contract currently in place to address training issue - Lack of experience working on equipment, due to new equipment on Silver line - Personnel don't have the experience to train people in the field - Equipment doesn't have a lot of issues yet, due to it being new - Lower level classified workers are not speaking up to the experienced workers about what they are lacking. - Time and grade should determine the schedule picking, current structure needs to be revamped. - Six month picking is an issue because of the fact that personnel has to be trained all over again.

		<ul style="list-style-type: none"> - Generally have experienced staff and willing to share, but need initiative from the inexperienced worker - Supervisor attempt to pair experience with less experience, but also needs to balance personalities - Time and grade should matter, and there should be limits on the helper position
5	Parts availability?	<ul style="list-style-type: none"> - Need to research parts, custom parts not usually in stock - Equipment and parts information didn't get transferred to the right individuals when it was transitioned into metro - No credit card [to purchase parts] - No planning process in place for getting materials, engineering is involved but is also limited

QICO PROGRAM	TRPM Internal Review		
LOCATION	Alexandria Yard (C99)	DATE:	3/09/2017
		TIME:	1230-1330

Background Information	
Name(s): [REDACTED]	Reviewer: [REDACTED]
Position: [REDACTED]	

Interview Notes		
Item Number	Question	Response
1	Quick Overview of TRPM Engineering?	<ul style="list-style-type: none"> - Operations and maintenance engineering group improved accountability and responsibility - Develop preventative maintenance instructions - Develop EMI – Engineering Maintenance Instructions for specific areas/items - Address any issues that maintenance people cannot address - New installations - Supports Traction Power Maintenance (TRPM) - TRPM still has some non-rail high voltage - Will support TRPM no matter what - Provide additional Quality Assurance for Traction Power efforts - Goal of operations and maintenance engineering group is a focus on getting back to state of good repair - No one is filling a position on an acting basis in the Power Engineering Group now
2	How do you feel about Maximo & current state of the Preventative Maintenance Instructions (PMIs)?	<ul style="list-style-type: none"> - Developing PMIs (there needs to be interaction with TRPM and manufacturers in developing PMI's) - Power Engineering will review PMIs and refine for use in maintenance; Chief Engineer will be final signatory on the PMIs - Will go to a review process to be documented - Working with consultants to update PMI forms - Will develop a 1000, 2000, 3000 series type of instructions - Engineering group is aware of the lack of consistency in the talent available for the mechanics - Engineering Group are working on putting the PMI procedures into Maximo - Engineering do not have a profile in Maximo - Engineering is moving forward with WINDSHIELD and TRPM is expanding its use of MAXIMO to better facilitate their needs
3	Communication with Traction Power Maintenance?	<ul style="list-style-type: none"> - Reach out to TRPM Management Staff including supervisors to figure out what their problems are - Formal meetings with TRPM in near future hopefully

4	How do you feel about Current Inspection Reports?	<ul style="list-style-type: none"> - Looking to improve the report - Future State: it will be digital, ideally an engineer will review every single report, but perhaps review after a certain threshold - Forms to be created in Maximo,
5	How do you feel about the Training program and maintenance staff?	<ul style="list-style-type: none"> - No, they haven't had a training instructor(s) in years - Just relying on the training that was given when new pieces of equipment - A Traction Power Lab is available for use, but not in use. - Contract language needs to include when contractor provides new equipment they need to install the new equipment in the telegraph training facility - Engineering group perhaps as advisors to the training curriculum development (Again discussion that engineering group needs to be involved with TRPM for skills assessment and then have approval on training curriculum content) - The 4 week Traction Power training class needs to be expanded - TSP – Technical Skills Program <ul style="list-style-type: none"> o 2 years, 1 year in carmen turner, 1 year in the field: when you graduate you become a C Mechanic o Supposedly for ATC or Power, but need a deeper understanding of what happened to this program and the specifics of the training accomplished. - 2 year max helper ranking needs to be implemented (something needs to be implemented to push personnel through the ranks)
6	How do you feel about current Pick System?	<ul style="list-style-type: none"> - Change supervisors, move for logistical reasons (day to evening to midnight or region) Many Transit agencies have pick system that does not require employees to physically show and put their request in and wait to hear results (Crews are non-productive for up to 4 or more hours.)
7	How do you feel about current TRPM organizational structure?	<ul style="list-style-type: none"> - Test Tech (PMI group) was a mistake, back in the day they were doing everything - Test Tech get all the training, but the staff in the region deal with the crisis who aren't trained enough to handle it - Propose to phase it out with a few different options - Turn the group into a training/mentoring group
8	How do you feel about Corrective Maintenance Procedures?	<ul style="list-style-type: none"> - Engineering group should be involved in corrective maintenance procedure, corrective issues may need Engineering to help solve an existing issue that has been in place since the gear went into service, also with new and old gear problems arise that need to have Engineering involvement to resolve. - Right now, Engineering can't open tickets, but also issues don't go to engineering because they lack a profile in Maintenance Engineering - Engineering group usually call MOC to indicate an issue
9	How do you feel about the Escort/Switching Crews Process?	<ul style="list-style-type: none"> - This area needs a major discussion with ROCC/MOC staff, TRPM staff and all of engineering as the process within WMATA for "Supervisory Outages" and "Red Tag" outages are unique and not something that you can just say where are going to do this now and it happens.) - Highly laborious process to change the configuration of the power to the rail - Perhaps move to the electronic relay for lockout/tagout - Position where an individual just open doors to TPS, TBS, & AC Switchboard Rooms needs to be reinvented, just a waste of time, personnel needs to be more involved not just sit in a chair the whole time

QICO PROGRAM	TRPM Internal Review				
LOCATION	(C99) Alexandria Yard Phone Interview	DATE:	3/07/2017	TIME:	1620-1710

Background Information	
Name(s):	[REDACTED]
Position:	[REDACTED]
Reviewer:	[REDACTED]

Interview Notes		
Item Number	Question	Response
1	Quick overview of the Preventative Maintenance & Inspection Group and General work process	<ul style="list-style-type: none"> - Test Tech (PMI group) does level 2 maintenance - Test Group covers the following equipment; AC Rooms, Batteries, Emergency and permanent generator, UPS, Battery Banks, Install Gear, Repair new/old gear - 56 people (techs), 72 people including supervisors - 4 day shift - 1 supervisor for evening - 2 shifts on midnight (1 in VA, 6 people and supervisor; and 1 in CTF, 8 people and a supervisor) - Midnight shift – Saturday through Thursday - Most PM work is done during day shifts - Midnight shifts handles all the battery PM's and night do equipment replacement and PM's requiring outages - Work with contractors to get gears into and out of facilities - Assist OB1 and make sure that contractors hired to perform capital improvements (e.g. switchgear replacements) do it per WMATA Standards - Ensure the equipment goes thru acceptance tests and all issues are resolved before the equipment is accepted by OB1 - Check in with various contractors every week - Give feedback on how equipment is installed and demand correction if necessary
2	Any issues that impede your workflow?	<ul style="list-style-type: none"> - Communication for work location access is an issue - Mechanics are denied access into rooms, particularly yards - Yard Master is the person who determines access to the Yard Facilities - Put in GOTRS request for mainline room work, but can still be denied by OCC/MOC - Either MOC or an Asst. Superintendent for Power will assign work orders to Test Tech group for assistance - However they are getting called on a daily basis - Every night switching is being done, help out with switches during surges, called out every night - There major focus is PM work, but more and more they are responding to emergency calls. - MOC will call region forces to respond to the emergency, if the region force needs help they will call PMI staff for help sometimes, at times PMI group can't just talk people through it: lacking training - Getting materials

		<ul style="list-style-type: none"> - Long Procurements - Gear is 30 years old, - Need more space to do repair work
3	Current Training Program?	<ul style="list-style-type: none"> - Testing Techs are more skilled, but not cross trained - Everyone knows the basics, but there are people with specialties, currently working on being more well-rounded - Have an informal mentoring program where crews gets mixed in with individuals with - PMI group has a slightly higher qualification than the regions, mainly because his group of supervisors are part of the original group and have grown up with the equipment and know it inside and out
4	Communication with Manufacturers?	<ul style="list-style-type: none"> - Have an open dialogue with the main manufactures - Can call a manufacturer (Gutor) - Working to get BPAs (Blanket Purchase Agreements) set up with manufactures of the major asset manufactures - Working directly with Procurement, but if issues working with Mike and Assistant Superintendents
5	Corrective Maintenance Process?	<ul style="list-style-type: none"> - Struggling to address corrective Item tickets because of need for materials - No Materials Manager, but working on it in the past 2-3 months - Most of the material is custom - Does have a list of requisitions that are hanging
6	Any Issues with Maximo?	<ul style="list-style-type: none"> - Get a print out of monthly PM from Maximo - All supervisors are responsible for scheduling the work during the week - Do not have any issues accessing Maximo as the break rooms now have computers in them
7	Are there any Quality Control Checks?	<ul style="list-style-type: none"> - Supervisor does go out to check quality of work, unclear how frequently - Supervisor reviews the forms submitted by technicians

QICO PROGRAM	TRPM Internal Review		
LOCATION	(B04) Rhode Island Metro Trailers	DATE: 3/01/2017	TIME: 1400-1530

Background Information	
Name(s): [REDACTED]	Reviewer: [REDACTED]
Position: [REDACTED]	[REDACTED]

Interview Notes		
Item Number	Question	Response
1	Quick overview of Regions Maintenance Group and General work process	<ul style="list-style-type: none"> - Level 1 Preventive Maintenance (PM) comprised of Inspections and Testing on AC/DC rooms, TPS/TBS rooms, Corrective Maintenance (CM), Batteries, Bus Ties, Emergency Trip Stations, Heater Tape. - Every 2 weeks crews do AC/DC Rooms and TPS/TBS rooms inspection <ul style="list-style-type: none"> o equipment and bus tie testing (when Applicable) o results in 75 PMs - Every 84 weeks perform Battery Inspections - Every Quarter Bus Tie Testing - Annual Heat Tape Check - Mechanics and helpers are given a truck and they are responsible for Preventative Maintenance (Level 1) which consist of cleaning rooms and monitoring equipment readings. - Response crews are identified and Maintenance Managers assigned (Custom to [REDACTED]) - Midnight PM crews identify issues, Day/Evening PM crews rectifies issues. - Created additional tracking effort in Maximo for cleaning power facilities (Custom to [REDACTED]) - Current Day layout: 1 hr of safety, 1 hr of cleaning, 6 hrs of PM/CM work - Cleaning of sub-station could take up to 2 shifts - For each shift, crews are designated at primary or secondary on a daily basis and the information is forwarded to MOC - The primary crew is the crew that MOC is designated to contact first in the event of an emergency, or the need to support another maintenance crew. This allows the secondary crew to focus on their assigned work instead of constantly being called away and losing their focus. (Custom to [REDACTED]) - Established a Maintenance Manager – [REDACTED] has identified an individual within each crew to fill this role (Custom to [REDACTED]) - Look to see who is available for a given crew (if someone isn't here they will call in) - Develop a crew assignment sheet, send (email) to MOC so they know who is available - Prepare a safety briefing sheet - Get the trucks ready (loaded with tools), but staff are required to bring their own tools

2	Current personnel and how do you feel about training program?	<ul style="list-style-type: none"> - Shift Staffing Breakdown: 3 supervisors, one per shift: Day (6 am – 2 pm) , Evening (2 – 10 pm), Midnight (10 pm – 6 am) - 8-10 people on shift - Day: 8 people, Evening: 9 people, Midnight: 10 people - Tuesday , Wednesday, Thursday are the highest staffed days; Friday through Monday are the lowest staffed days - This is an optimistic level of staffing, does not account for sick leave, escorting engineers, Pepco, and others - Training is a big issue - Get trained once (2 week class) but may never use it for a year or so (due to warrantee) - Lack of technical library - On the job training, but it depends on who you're paired with (B,A,AA classified Technician) - Contractor training on new gear for a few days - Techs don't have the equipment to test digital equipment
3	Communication with Engineering?	<ul style="list-style-type: none"> - Engineers and Maintenance generally work well together - Communication could be improved, previous engineering management had a culture of "do what I tell you to do" not productive, new management is working on better communication.
4	Issues that impede your workflow?	<ul style="list-style-type: none"> - Biggest Issue: Emergency Response coordinated by MOC, usually have to stop PM work to answer emergency response, - Supervisors are not always notified of emergency this causes them to not know where there crew is at all times, this leads to hesitancy when delegating work. - Personnel gets hired and is provided with a 2 week training class on specific equipment that they might not maintain a year or 2 after the class, knowledge is lost, class isn't long enough or detailed enough to handle daily workload, technicians usually learn from another higher ranking technician (A, B, C) this type of training can be effective and it can be ineffective, depends on who is educating. - Region Maintenance (Level 1) end of each month usually have to personally unlock rooms for Pepco for meter reading. - Region Maintenance (Level 1) are usually the ones contacted by Engineering in order to enter rooms (AC Switchboard, TPSS, TBS) - Lack of accountability - PMI forms are not efficient, needs to be updated by all groups involved in the process (Manufacturer, Maintenance, and Engineering). - Picks – New technicians/mechanic come from a different region/location, tasked with maintaining different equipment from what they were maintaining in their previous region/location, new on-the-job training has to be implemented. This causes less productive work. - Parts – no defined catalog list in store room, sometimes difficult to find a specific part. - Room Access at times can be difficult, have to call MOC to enter DC Rooms, AC Rooms don't have to call MOC, but calls in for anyway as a courtesy.
5	Are there any Supervisory checks?	<ul style="list-style-type: none"> - Supervisors expected 75% time in the field (rarely achieved by the supervisors) more of 50/50 - Maximo dictates how many supervisor checks are required a month. - [REDACTED] created a custom form apart from what is already provided and also provided cameras to document the supervisory checks. - Shift Supervisor required to review all the PM forms.

8.5 APPENDIX E: QICO FIELD INSPECTION

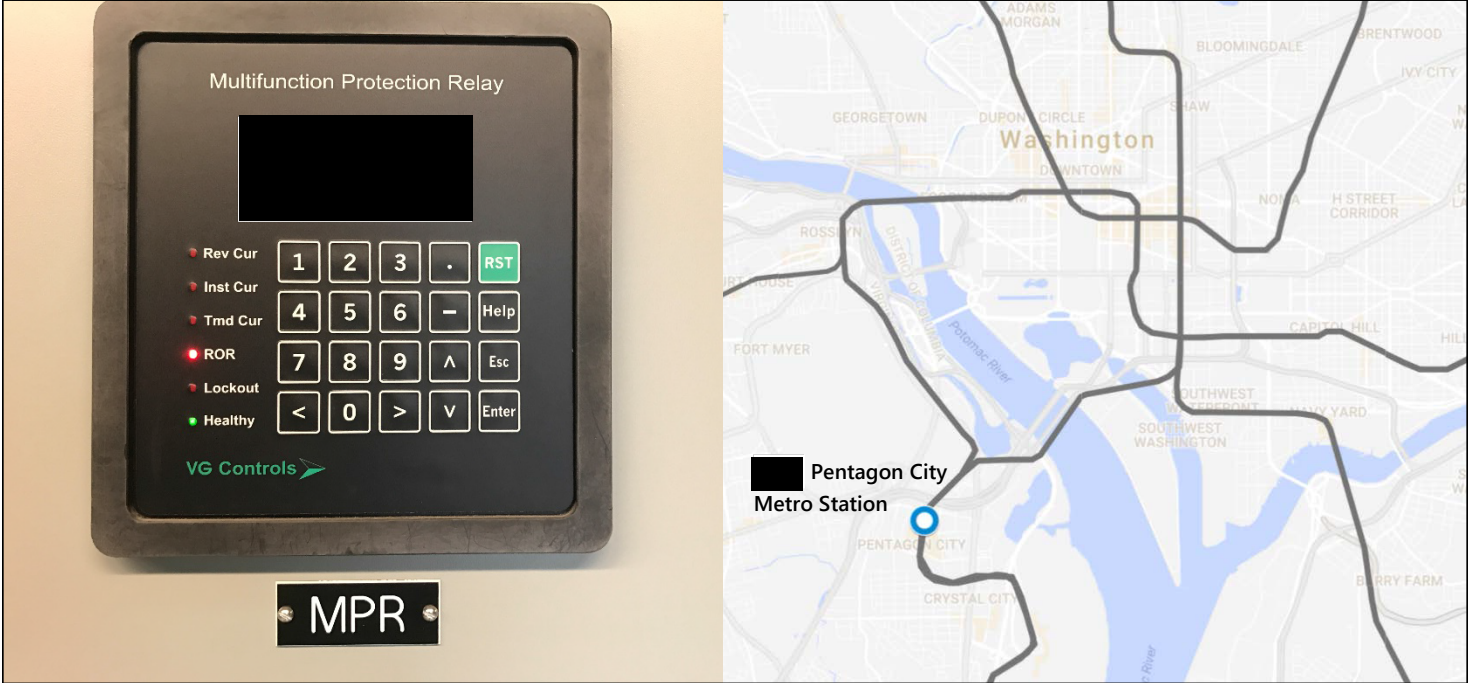


INFRASTRUCTURE ASSURANCE PROGRAM

QUALITY ASSURANCE REPORT

QICO FIELD TEAM	[REDACTED]	REPORT NO:	N/A
AUDITEE	RAIL: TRPM (Traction Power Maintenance)	LOCATION:	(C08) Pentagon City Metro Station
ACTIVITY	AC Overcurrent Relay Preventative Maintenance		
DATE	March 10, 2017 (1300 – 1400)		

EXECUTIVE SUMMARY



PURPOSE

The infrastructure assurance team for **Quality Assurance, Internal Compliance and Oversight (QICO)** accompanied an **AC Overcurrent Relay preventative maintenance (PM)** the afternoon of March 10, 2017 (1300-1400). This was conducted as part of a review of Traction Power Maintenance (TRPM) which is in turn part of the **2017 QICO System wide Internal Review**. Performing these reviews safeguards the mission success of the Authority by providing effective internal oversight of WMATA’s operational processes and assets. This test was performed per the requirements of either 728 / 1090 days depending on the local jurisdiction.

AC Overcurrent Relay PM is focused on reducing hazards to life and property that can result from failure or malfunction of electrical systems and equipment. This effective PM can aid in reducing unscheduled outages by identifying, through regular service intervals, equipment conditions and irregularities which can cause malfunctions or equipment failure. The TRPM preventative maintenance & inspection (PMI) crew was comprised of [REDACTED] (AA Mechanic & Acting Shift Supervisor), [REDACTED] (AA Mechanic). The inspection started with a complete safety briefing; Radio Operations Control Center (OCC) granted permission to enter the Traction Power substation to begin the inspection and testing of the AC 50 /51 relays on the incoming [REDACTED] utility feeders.

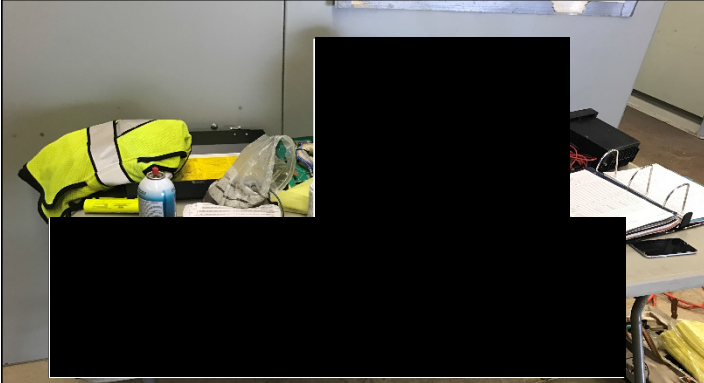
RESULTS

All six 50 / 51 relays on both incoming [REDACTED] feeders were inspected, tested, and calibrated. While five of the six tested within range, one relay required minor adjustments to get it to fall within the required minimum pick up value. These relays provide the protection to the substation in case an overcurrent situation arises. They will trip on an instantaneous element, during a fast rise in current that exceeds the limit or an overload situation that reaches the minimum pick up value and trips and locks out the breaker until technicians arrive and determine the fault.

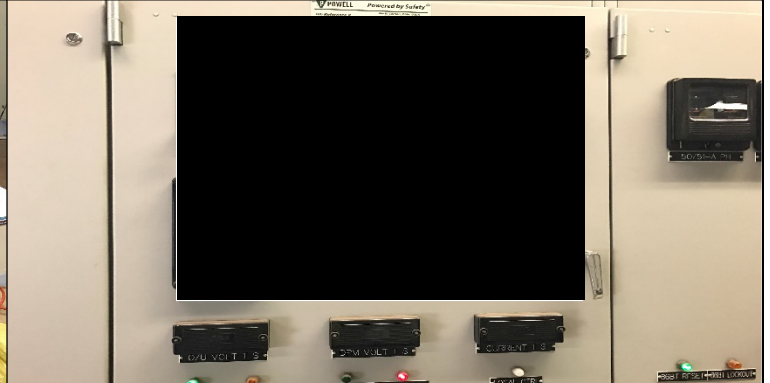
OBSERVATIONS

Item Number	Observation
1	Arrived at location in the middle of Preventative Maintenance (PM) crew AC Relay inspection and they provided us an overview of what they were doing and the equipment they were using.
2	Watched the technicians perform the relay minimum pick up test on five of the six relays and record the results on the proper document.
3	One of the six relays would not trip on minimum pick up and [REDACTED] showed [REDACTED] how to calibrate the relay until it operated correctly on minimum pick up. Also, instructed that it was important to repeat the test to insure relay was not drifting or having other issues.
4	[REDACTED] was new to relay testing and [REDACTED] was very patient and willing to show him each step in connecting the relay, using the relay test set and values to use for the minimum pick up and instantaneous settings. [REDACTED] was also excited to hear that the TRPM management was investigating opening up the Telegraph Road Training center as it provided not only the ability to learn about the switchgear but also to test the relays on the switchgear as well.

ADDITIONAL PHOTOS



50/51 Relays



Incoming Line Breaker with Relays Removed For Inspection

PREPARED BY:	QICO OFFICER	
--------------	--------------	--

APPROVED BY:	QICO MANAGER	
--------------	--------------	--

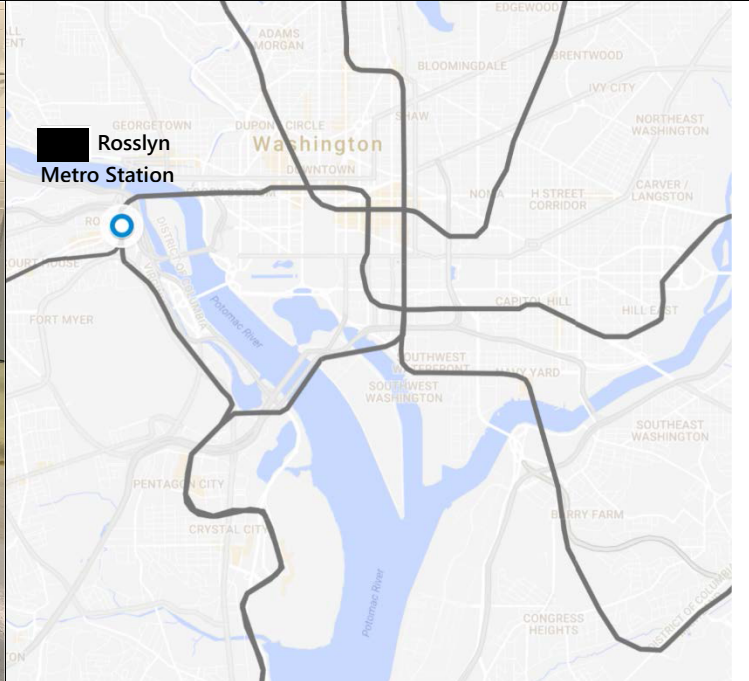
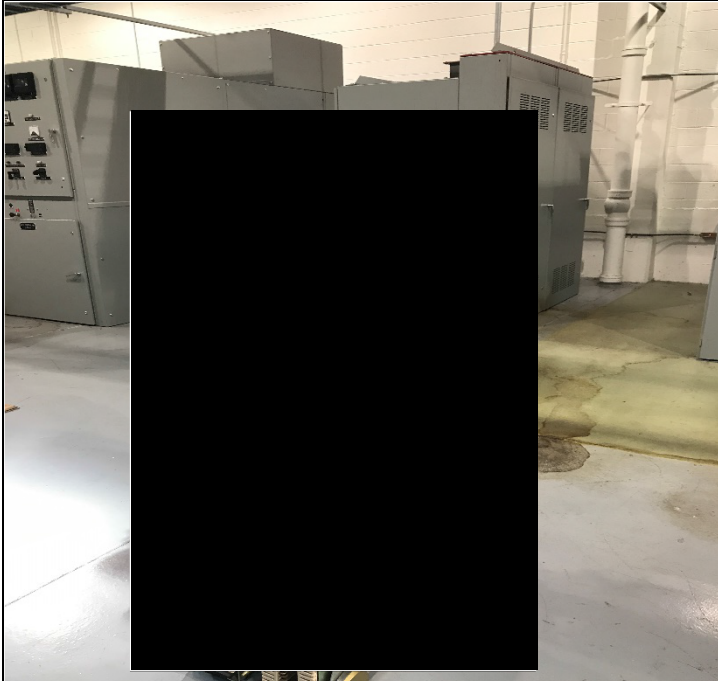


INFRASTRUCTURE ASSURANCE PROGRAM

QUALITY ASSURANCE REPORT

QICO FIELD TEAM	[REDACTED]	REPORT NO:	N/A
AUDITEE	RAIL: TRPM (Traction Power Maintenance)	LOCATION:	(C05) Rosslyn Metro Station
ACTIVITY	750 Volt DC Switchgear Preventative Maintenance		
DATE	March 09, 2017 (1130 – 1230)		

EXECUTIVE SUMMARY



PURPOSE

The infrastructure assurance team for **Quality Assurance, Internal Compliance and Oversight (QICO)** accompanied a **DC Switchgear preventative maintenance (PM)** the afternoon of March 09, 2017 (1130-1230). This was conducted as part of a review of Traction Power Maintenance (TRPM) which is in turn part of the **2017 QICO System wide Internal Review**. Performing these reviews safeguards the mission success of the Authority by providing effective internal oversight of WMATA's operational processes and assets. This inspection verifies that the DC switchgear equipment is operational and properly maintained, this inspection and testing is performed annually.

DC Switchgear PM is focused on eliminating possible failures and to extend its operational life. The circuit breakers will be inspected for alignment tolerances, documented, and if needed, adjusted for abnormal conditions as required. The TRPM Preventative Maintenance & Inspection (PMI) crew was comprised of [REDACTED] (A Mechanic), [REDACTED] (B Mechanic). QICO arrived to witness the preventative maintenance inspection after TRPM personnel started maintenance procedure, and we were provided an overview of the inspection and testing they had performed and were going to do for us to witness.

RESULTS

██████████ and ██████████ were knowledgeable in operation of the breakers they were maintaining. We witnessed them open the breaker locally from the control panel, rack it out and begin cleaning the unit. After it was cleaned, wiped down and all auxiliary contacts sprayed with an aerosol and contact cleaner they began to take the contact measurements using a metric ruler as described in the PMI. After completing this then proceeded to get the contact resistance via the test set they had and all readings were within range. After completing the first breaker they started a second and we were able to observe them properly make an adjustment to the main contacts and test the contact resistance for verification as well as the required static measurements.

OBSERVATIONS

Item Number	Observation
1	Arrived at location in the middle of Preventative Maintenance (PM) crew DC Switchgear inspection and testing.
2	Observed the crew clean, inspect and test two breakers and make adjustments to one of them per the PMI instructions.
3	Rosslyn was one of the dirtiest TPSS stations we have been in, in that all the equipment is covered in dust and contamination coming up from the tracks below through the cable raceways. ██████████ explained that they have to wipe down the equipment or it gets worse.

ADDITIONAL PHOTOS



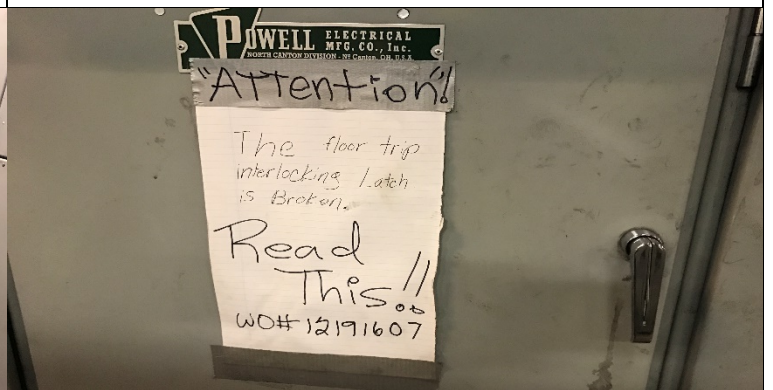
TRPM Technicians Cleaning Breaker



TRPM Technician Wearing FR 40 Cal Suit to Rack Breaker Back In



TRPM Technician Wearing FR 40 Cal Suit to Rack Out Breaker



Sign Posted on Breaker Alerting Personnel of Broken Latch

PREPARED BY:	QICO OFFICER	
--------------	--------------	--

APPROVED BY:	QICO MANAGER	
--------------	--------------	--

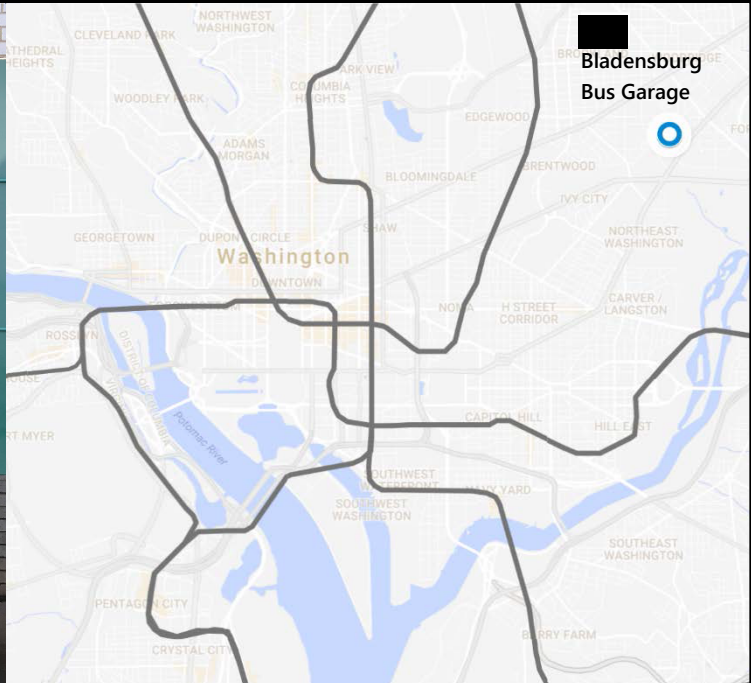


INFRASTRUCTURE ASSURANCE PROGRAM

QUALITY ASSURANCE REPORT

QICO FIELD TEAM	[REDACTED]	REPORT NO:	N/A
AUDITEE	RAIL: TRPM (Traction Power Maintenance)	LOCATION:	(T05) Bladensburg Bus Garage
ACTIVITY	Stationary Emergency Stand-By Power Generator		
DATE	March 10, 2017 (1000 – 1100) & March 11, 2017(1000-1100)		

EXECUTIVE SUMMARY



PURPOSE

The infrastructure assurance team for **Quality Assurance, Internal Compliance and Oversight (QICO)** accompanied a **Generator preventative maintenance (PM) inspection** the morning of March 10, 2017 (1000-1200) & March 11, 2017 (1000-1100). This was conducted as part of a review of Traction Power Maintenance (TRPM) which is in turn part of the **2017 QICO System wide Internal Review**. Performing these reviews safeguards the mission success of the Authority by providing effective internal oversight of WMATA’s operational processes and assets. This inspection verifies that emergency stand by power is properly maintained and operational in the event of a utility power outage.

Standby Power Generator PM is focused on verifying the reliability of stationary emergency stand-by electrical power generators and associated automatic transfer switches, control panels and auxiliary equipment which are installed at various WMATA facilities. The maintenance procedure is divided into two sections; 1). Inspection, which includes cleaning equipment and fluid checks and routine maintenance such as air filter changes and changing the diesel motor fluids if hours or months of operation are reached. 2). Operational test, which includes an operational test of the generator / automatic transfer switch and monitoring of system performance with permission of the facility management (Otherwise test only that generator will run). The TRPM Preventative Maintenance & Inspection crew was comprised of [REDACTED] (AA Mechanic), [REDACTED] (B Mechanic).

QICO arrived to preventative maintenance inspection after TRPM personnel started maintenance procedure, we were given a complete safety briefing at time of arrival. This PM is performed monthly, Bi-Annually and Annually.

RESULTS

Our review of their inspection and testing was terminated due to an emergency at another traction power facility that required the use of the truck they were using. Prior to the emergency call, they had done the cleaning and inspection of the fluids of the generator and had just uncovered that the lock to the electrical room had been tampered (paper stuck in lock key way). They removed the paper, as only qualified personnel are to access this room.

OBSERVATIONS

Item Number	Observation
1	The Generator Inspections were performed during a two-day span because the preventative maintenance (PM) crew had to take their vehicle back to Preventative Maintenance & Inspection Office because another crew needed the battery equipment on the vehicle to respond to an emergency that was happening at a Traction Power Substation elsewhere. PM crew came back to the following day to complete Generator Inspection and do a second unit on the property.
2	██████ and ██████ know the requirements of the preventative maintenance of the various generator units on the WMATA system, these two units were stationary, one was diesel powered and the other was Natural Gas powered. In addition, they shared they maintain the portable units as well.
3	We observed ██████ make temporary repairs to the battery terminal on the unit they were cleaning and inspecting on March 10, just before receiving the emergency call.
4	We also, noted that the diesel powered unit could use wire brushing and painting of the rust areas to prolong the life of the tank.

ADDITIONAL PHOTOS



Diesel Powered Unit



Natural Gas Powered Unit



Location of Maintenance Manual



Generator Transfer Switch in Electrical Room

PREPARED BY:	QICO OFFICER	
--------------	--------------	--

APPROVED BY:	QICO MANAGER	
--------------	--------------	--

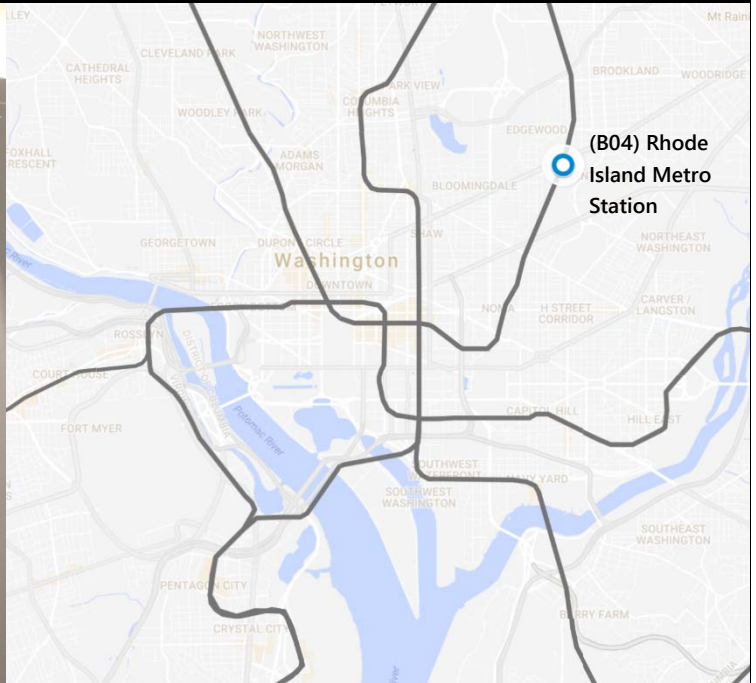


INFRASTRUCTURE ASSURANCE PROGRAM

QUALITY ASSURANCE REPORT

QICO FIELD TEAM	[REDACTED]	REPORT NO:	N/A
AUDITEE	RAIL: TRPM (Traction Power Maintenance	LOCATION:	(B04) Rhode Island Metro Station
ACTIVITY	Traction Power Substation and AC Switchboard Room Inspection		
DATE	March 01, 2017 (1000 – 1200)		

EXECUTIVE SUMMARY



PURPOSE

The infrastructure assurance team for **Quality Assurance, Internal Compliance and Oversight (QICO)** accompanied a **Traction Power Substation and Rhode Island Passenger Station AC Switchboard Room Inspection Preventative Maintenance (PM)** the morning of March 01, 2017 (1000-1200). This was conducted as part of an audit of Traction Power Maintenance (TRPM) which is in turn part of the **2017 QICO System wide Internal Review**. Performing these reviews safeguards the mission success of the Authority by providing effective internal oversight of WMATA’s operational processes and assets. This inspection verifies that the equipment used to provide power to metro stations, traction power system, and trains are operational. This inspection is performed every 14 days.

Traction Power Substation and Rhode Island Passenger Station AC Switchboard Room Inspection is focused on verifying that the substation or electrical room is maintained to be clean and dry and that all the equipment and systems in it are functioning correctly and no conditions have changed since last inspection that will require repairs. The Inspection Data Sheet will provide historical data useful for monitoring the overall condition of the facility, reliability of equipment and identifying chronic problems such as water leaks and repeat equipment failures. A general evaluation of the facility should be also performed to observe and record any factors that may affect the safety, operational reliability or expected lifespan of the equipment. The TRPM crew was

comprised of [REDACTED] (B Mechanic), [REDACTED] (C Mechanic). Acting Area Manager and Shift Supervisor [REDACTED] accompanied inspection as well. The inspection started with a complete safety briefing; Radio Operations Control Center (OCC) granted permission to enter traction power substation and they were advised when we left the facility.

RESULTS

Traction Power Substation (TPSS) facility was clean and all equipment were operational. The recent change by this Regional Group to focus on substation cleanliness as part of the 14-day inspection is evident. There was no extraneous material left within the control room, special tools were appropriately stored on hooks and all control cabinets, junction boxes and equipment was closed or covered as it is supposed to be. One area that this core group is working on with the Preventative Maintenance & Inspection (PMI) group that is evident is the Alarms activated on the picture of the Annunciator Panel. While the five alarms illuminated indicates a piece of equipment having issues, TRPM maintenance staff stated Corrective Maintenance (CM) tickets have been created and they are awaiting the PMI group assistance. It seems repairs have to be made to the control wiring or an auxiliary relay board that has failed, the TRPM maintenance crew do not have the training to trouble shoot or repair.

The Metro Passenger Station AC Switchboard Room entrance was partially blocked by an old AC Breaker rack out device that was supposed to be scrapped. When questioned the TRPM staff stated that the SMNT group must have left it there and we moved it aside to go in. It was apparent that others had been into the room as empty soda and coffee cups were left by the phone and no entry recorded in log book. This AC equipment room had dirt and leaves on the floor and some components remaining from a switchgear change out that was not removed. The hand railing that was cut and moved out of the way to get the equipment in was still not repaired and the Work Order number was taped to the section that was cut with duct tape. In discussion with the TRPM staff, this has been this way for a couple months. This stairway is used by maintenance staff to go up to the battery room to perform maintenance and inspections.

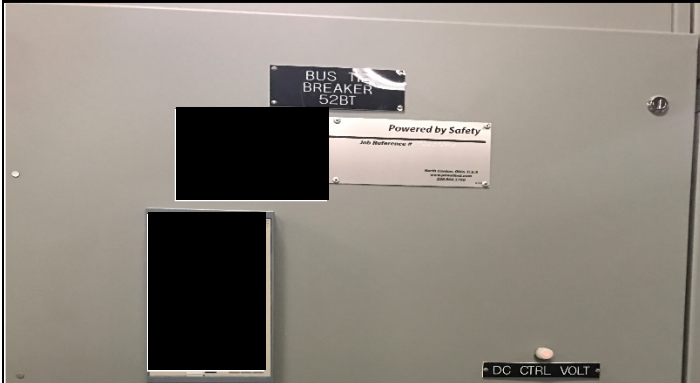
OBSERVATIONS

Item Number	Observation
1	In addition to the Traction Power Substation and Rhode Island Passenger Station AC Switchboard Room Inspection, we went by [REDACTED] Brentwood Yard to take a quick tour of the Tie Breaker facility there and a look at how a Heater Tape Preventative Maintenance is performed. During our tour of the Tie Breaker facility, TRPM personnel observed new equipment being installed but they had no knowledge of task, logbook located in facility did not have any entries documenting the work being performed.
2	Wasn't able to get in touch with MOC Desk by phone when we entered Rhode Island AC Switchboard Room for the inspection.
3	Hand Railing that had been cut to allow for equipment installation a couple months ago still has not been repaired.
4	Picture with the cut tree stumps growing through radiator fins of the traction power transformer was cleaned up after Inaugural inspections in January.
5	Tie Breaker Station (TBS) in [REDACTED] Brentwood Yard was clean and neat and log book was up to date with the exception that TRPM does not know who made changes to the ETS System cabinets in the room.

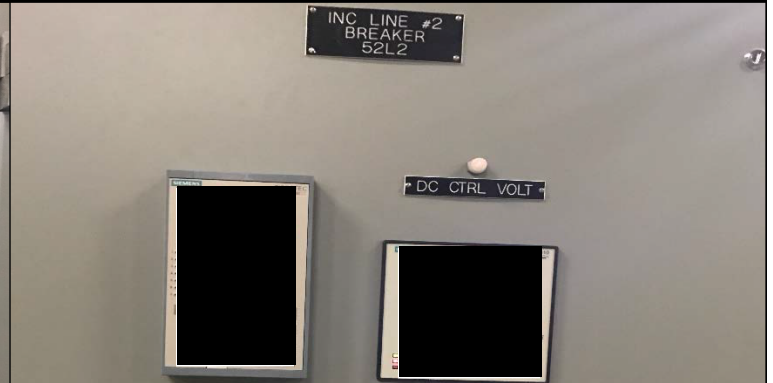
6

Fuse Box for Contact Rail Heat Tape was destroyed and thrown to the side. We were told it was probably destroyed by TRST Track and Structures group.

ADDITIONAL PHOTOS



Bus Tie Breaker 52BT



Incoming Line #2 Breaker 52L2



Transformers Outside TPSS Facility



Tree branch Lodged in TPSS Transformer Radiator Fins



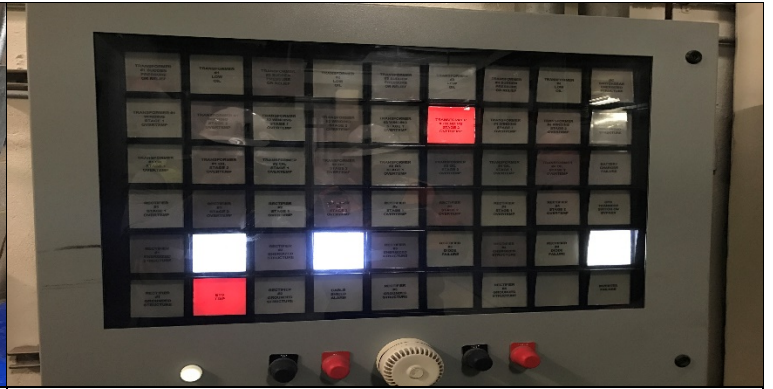
Battery Rack



Battery Hydrometer For Specific Gravity Test



AC Switchboard Room Phone



Broken Annunciator Panel in TPSS Room



Annunciator Panel in AC Switchboard Room



(B99) Brentwood Yard Tie Breaker Facility



Trackside Heater Control Panel



Destroyed Heater Tape Fuse Box near Control Panel

PREPARED BY:	QICO OFFICER	
--------------	--------------	--

APPROVED BY:	QICO MANAGER	
--------------	--------------	--

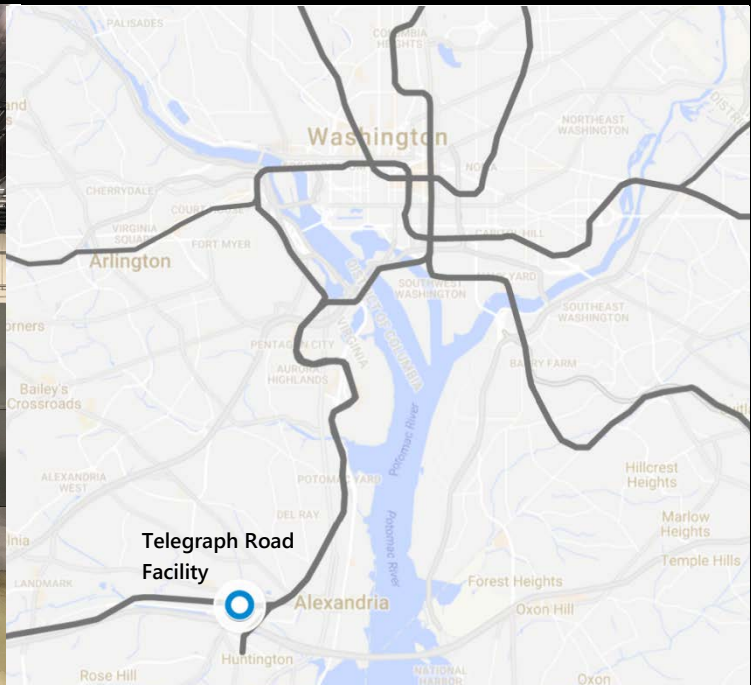


INFRASTRUCTURE ASSURANCE PROGRAM

QUALITY ASSURANCE REPORT

QICO FIELD TEAM	[REDACTED]	REPORT NO:	N/A
AUDITEE	RAIL: TRPM (Traction Power Maintenance)	LOCATION:	Telegraph Road Facility
ACTIVITY	TRPM Training Lab Tour		
DATE	May 09, 2017 (1330 – 1400)		

EXECUTIVE SUMMARY



PURPOSE

As part of the 2017 traction power internal review, the infrastructure assurance team for the **Office of Quality Assurance, Internal Compliance and Oversight (QICO)** toured the TRPM training facility the afternoon of May 09, 2017 (1330-1400). This was conducted as part of a review of Traction Power Maintenance (TRPM) which is in turn part of the 2017 QICO System Wide Review. Performing these internal reviews safeguards the mission success of the Authority by providing effective internal oversight of WMATA's operational processes and assets.

SCOPE

The TRPM training facility tour was focused upon observing training classrooms, laboratory equipment, and laboratory setup.

OBSERVATIONS

Item Number	Observation
-------------	-------------

1	Currently the TRPM training facility isn't being utilized due to lack of instructors and technical training being provided to TRPM personnel.
---	---

ADDITIONAL PHOTOS

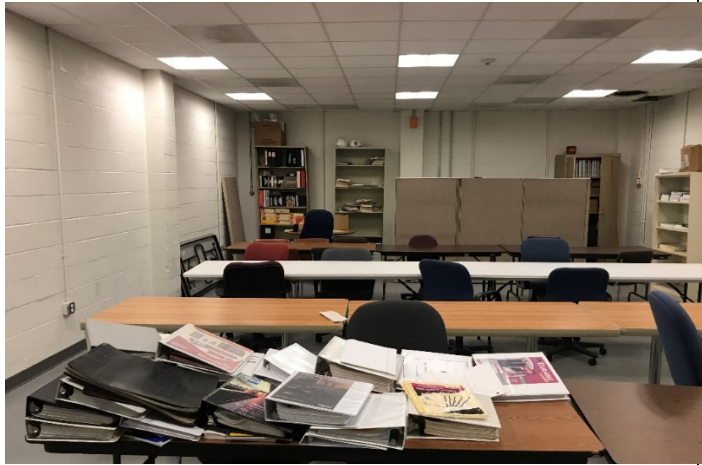


Figure 1: TRPM Training Facility Classroom



Figure 2: Annunciator Panel and DC Breaker Test Receptacles



Figure 3: AC Switchgear Line Up



Figure 4: Auxiliary Panel with Metering and Control handles



Figure 5: DC Breaker and new Smart Relays



Figure 6: DC Breaker removed from cubicle for training

PREPARED BY:	QICO OFFICER	
--------------	--------------	--

APPROVED BY:	QICO MANAGER	
--------------	--------------	--

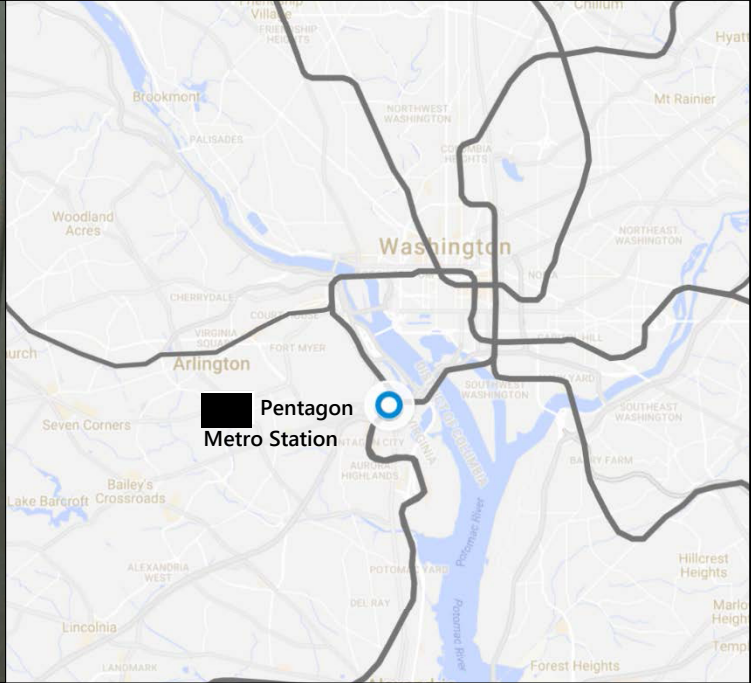


INFRASTRUCTURE ASSURANCE PROGRAM

QUALITY ASSURANCE REPORT

QICO FIELD TEAM	[REDACTED]	REPORT NO:	N/A
AUDITEE	RAIL: TRPM (Traction Power Maintenance)	LOCATION:	(C08) Pentagon Metro Station
ACTIVITY	Traction Power Substation Room Inspection		
DATE	April 25, 2017 (1600 – 1715)		

EXECUTIVE SUMMARY



PURPOSE

As part of the 2017 traction power audit, the infrastructure assurance team for the **Office of Quality Assurance, Internal Compliance and Oversight (QICO)** shadowed a room inspection for the Traction Power Substation (TPSS) near [REDACTED] Pentagon Station. The room inspection is periodically conducted every 14-days by the Traction Power Maintenance group (TRPM), which reports to the assistant general manager of RAIL. QICO shadowed the field inspection (performed by the “evening” shift) and reviewed the corresponding traction power work order ([13333446](#)) for accuracy and completeness.

The inspection occurred on April 25, 2017 from 1600 – 1715, and consisted of two class B traction power mechanics accompanied by the QICO auditor. After deploying to the entrance location, opening the hatch and descending to the traction power substation, the inspection took about 20-30 minutes to complete. The 14-day TPSS inspection provides a general diagnostic of site conditions at a TPSS, and is not an in-depth inspection of particular components (e.g. it was explained that another PMI is performed just on the round-cell batteries). One inspector was responsible for completing a form in accordance with WMATA’s *“Preventative Maintenance Inspection for AC or DC Electrical Facilities: AC Unit Substations, Auxiliary Electrical Rooms, Traction Power Substations and DC Tie Breaker Substations (14-Day Inspection).”* QICO followed this procedure by retrieving a [revision 3 copy \(August 05, 2011\)](#) from engineering (ENGA)’s intranet site.

OBSERVATIONS

Item Number	Observation
1	The mechanics were punctual, knowledgeable, and safe. Both class B mechanics were knowledgeable about traction power design and were competent performing the inspection. They provided a running commentary to the QICO auditor of what measurements they were taking and why. Proper usage of the multimeter to measure voltage for the round-cell batteries was demonstrated (Figure 3). Forms were filled out legibly and completely.
2	The work order had the correct labor reporting and status. The corresponding work order (13333446 – "POWR, 14 DAY, TRACTION POWER INSPECTION") used to properly schedule the inspection, with tasks to be performed detailed in the "Plans" tab of the work order. Labor for both inspectors was properly represented (including time to deploy). Within 24-hours the work order had been reviewed and the status set to "Finished."
3	The inspectors used a newer form than that included in ENGA's intranet repository. The form that was retrieved by QICO from Power Engineering (ENGA: PWRS) website had a revision date of 08/05/2011. The form used by traction power maintenance (TRPM) was a relatively new revision (03/17/2017, Figure 5), which had updated department acronyms, updated requirements including inspection of emergency trip station (ETS) cabinets, and requirements for a Maximo Work Order number (which was completed).
4	The inspection for the relatively clean C07 Pentagon TPSS took 25 minutes. The estimated PMI time listed on the 14-day inspection procedure is 6-hours for a crew of 2 persons. Inspectors communicated to the QICO auditor that this TPSS (Pentagon) is a relatively problem free station, with fewer incoming AC voltage regulation issues (VEPCO provides more stable output for Pentagon area) and little accumulation of dust. Thus, this inspection is a "best-case scenario," and more time is needed to clean the station or phone-in issues to Maintenance Operations Control (MOC) for either traction power or PLNT issues (e.g. deteriorating louvers). Some of the information in the preventative maintenance instruction (e.g. check platform edge lights) are no longer the responsibility of traction power maintenance, but belong with systems maintenance, who handle non-traction, lower-voltage electrical issues.
5	The form is to be converted by PDF. It is unlikely that the form will be attached to the Maximo Work Order. The form filled out by inspectors is submitted to their shift supervisor, who will store the form on a shared drive. If there are any major issues, the inspectors will usually take a picture and send the picture via email to the end-user (e.g. MOC or shift supervisor). It is unlikely that reports are attached to the Maximo Work Order (not observed by QICO).

ADDITIONAL PHOTOS



Figure 1: Set-Up (Safety Fence Positioned After)



Figure 2: Annunciator Panel Showing No Issues



Figure 3: Voltage of the Rectifier Within Tolerance



Figure 4: Measuring Round-Cell Voltage with Multimeter

DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

Location: 8077 Room # _____ Date: 12/23/16

I. Inspect status of room and equipment. Place a ✓ if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.

II. AC SWITCHGEAR

- Incoming Breakers: 04/05 Rectifier breakers 11-1R ✓
- Bus-Tie Breaker: 03/06 Auto Manual AUX Breakers (Stays in Local)
- Are all switchgear cubicle thermostats set to maximum? Yes No
- Record switchgear cubicle heater current: 0 Amps

III. RECTIFIER TRANSFORMER #1 #2 #3 #4 Check for Leaks.

IV. DC RECTIFIERS

Air filters replaced? Yes No Record DC output voltage #1 100 #2 780 #3 _____ #4 _____

V. DC SWITCHGEAR

Cathode breaker 21-28 ✓ Track feeder breaker series 00/30/60/70/80/90

VI. TELEMEGGERWATTMETER _____ AEMS RTU _____ ANNUNCIATOR CABLE MONITOR _____

VII. ETS CABINET

- All Relays Picked-Up: Yes No Comments: _____
- All 9 & 10 Wires Connected: Yes No Comments: _____

VIII. INVERTER: Record Input VDC 512 Output VAC 277

IX. BATTERY CHARGER: D.C. Voltage Equalizer 312 Float 31.2 (Measure with DVM)
Timer Setting: 0 NEG to GND 16.7 POS to GND 64.0

X. BATTERY ROOM: Battery Type 600V

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open WO # for Low Water.

- Water Levels: Should be between the lines. Added 0 QTS of water to cell(s) 0
- Pilot Cell # 6 Specific Gravity 1.18 Cell Voltage 2.18
- Voltage Leakage: NEG to GND 66.7 POS to GND 64.0
- Corrosion: Batteries 0 Rack 0
- Exhaust Fan Operation Verified 0
- Eye Wash Station: Date of Installation 04/17 # of Refills 5

XI. First-Aid Kit: Yes No Stocked: Yes No COMM WOR _____

XII. TELEPHONE OPERATIONAL: Yes No COMM WOR _____

XIII. PLNT PROBLEMS: WOR _____

XIV. FIRE EXTINGUISHER(S): Sign and Date Monthly if OK. WOR

XV. IS THE FACILITY CLEAN: Yes No ALL ROOM LIGHTS LIT? Yes No

XVI. LOG BOOK: Make Entry in the Log Book (Record Date, Time, Purpose of Visit, and Call#)

XVII. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK

XIII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS WOR: _____

TECHNICIAN(S): 8077 12/23/16 CALL(S): 166 1390

Figure 5: Completed Form

PREPARED BY:	QICO OFFICER	
--------------	--------------	--

APPROVED BY:	QICO MANAGER	
--------------	--------------	--

8.6 APPENDIX F: APPLICATION OF REGULATORY CAPS

Measure	Finding	QICO Review
Regulatory Findings - FTA	<p>R-5-35-A WMATA must establish clear definitions for infrastructure conditions requiring immediate or emergency action, such as "arcing insulator." Status: Under Review</p>	<ul style="list-style-type: none"> - Initial WMATA's CAP closure request was submitted on 12/09/16. FTA is preparing a rejection letter to be issued later this month per meeting on 04/05/17 - No observation occurred during course of this review
Regulatory Findings - FTA	<p>R-5-35-B WMATA must address third rail insulator cleaning and replacement requirements and third rail jumper cable inspection and replacement requirements as part of the "Fire/Life Safety 1000" procedure, or in separate but referenced procedures. Status: Under Review</p>	<ul style="list-style-type: none"> - Initial WMATA's CAP closure request was submitted on 12/23/16. FTA is preparing a rejection letter to be issued later this month per meeting on 04/05/17 - No observation occurred during course of this review
Regulatory Findings - FTA	<p>R-5-35-D WMATA must resume its program for cable insulator resistance testing for its power cables. Insulator resistance test should be performed every 10 years. Status: <i>Open/Past Due</i></p>	<ul style="list-style-type: none"> - Awaiting implementation of cable meggering - No observation occurred during course of this review
Regulatory Findings - FTA	<p>R-5-35-E WMATA must replace all defective power cables that have been identified by traction power inspectors and maintainers. Status: Under Review</p>	<ul style="list-style-type: none"> - Status as of 4/27/2017: - No observation occurred during course of this review
Regulatory Findings - FTA	<p>TOC-EGR-15-003 WMATA (POWR and the Communications Branch within the Office of Systems Maintenance (COMM)) should add the fire extinguishers in the air conditioning (AC), traction power substation, tie breaker station, and COMM rooms, respectively, to Maximo to ensure regular inspections occur. Status: Open/Past Due</p>	<ul style="list-style-type: none"> - No observation occurred during course of this review

8.6 APPENDIX F: APPLICATION OF REGULATORY CAPS

Measure	Finding	QICO Review
Regulatory Findings - FTA	<p>TOC-COL-15-006-T-3-3-A WMATA must identify and correct improperly aligned third rail cable connector assemblies.</p> <p>Status: Under Review</p>	<ul style="list-style-type: none"> - Initial WMATA's CAP closure request was submitted on 03/10/17 - No observation occurred during course of this review
Regulatory Findings – NTSB	<p>NTSB-15-25 Promptly develop and implement a program to ensure that all power cable connector assemblies are properly constructed and installed in accordance with your engineering design specifications, including the weather tight seals that prevent intrusion by contaminants and moisture.</p> <p>Status: Open/Past Due</p>	<ul style="list-style-type: none"> - Revised estimated date: 12/29/17 - No observation occurred during course of this review

9 REFERENCE DOCUMENTS

9.1 REFERENCE 1: JOB DESCRIPTIONS


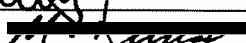
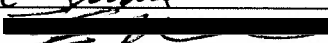
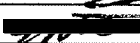


WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY POSITION DESCRIPTION

Job Title: General Superintendent, Traction Power Maintenance **Job Code:** 5018

Department: Rail Services **Grade:** LS-16 **FLSA:** Exempt

Represented **Non-Represented**

Approval Signatures	Date
DEPT 	7 JUL 16
HRCB 	7-20-16
HRTA 	7-20-16
LABR 	7-8-16

REPORTS TO: Assistant General Manager, Rail Services

SUMMARY

This is a senior-level leadership position responsible for effective management of the Office of Traction Power Maintenance. This position is responsible for planning, scheduling, managing, coordinating and directing the Authority’s overall power maintenance programs for rail traction power infrastructure and wayside power infrastructure.

ESSENTIAL FUNCTIONS

Establishes and promulgates operating rules and regulations for traction power maintenance to ensure quality work is performed;

Assists in the planning, development and implementation of preventative maintenance, component overhaul and rehabilitation and replacement programs to ensure that all traction power systems are maintained to the highest operating standards and in accordance with applicable codes and maintenance standards;

Develops schedules and control procedures for maintenance;

Ensures that effective and adequate contingency plans are provided in the event of an emergency and that properly trained personnel and appropriate equipment are available to respond on a timely basis in order to rectify the problem and restore normal operations;

Presents oral and written reports and recommendations to the Board of Directors, General Manager/Chief Executive Officer, and Rail Services management on areas of assigned responsibility as may be appropriate;

Establishes and maintains responsive and cooperative relationships with internal support services and builds effective relationships with other groups throughout the organization;



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY POSITION DESCRIPTION

Manages, supervises and evaluates assigned personnel to include applicant selection, disciplinary actions, and resolution of grievances;

Plans, directs, coordinates and reviews the work plan for assigned staff; assigns work activities, projects and programs; reviews and evaluates work products, methods and procedures; meets with staff to identify and resolve problems;

Responsible for ensuring the safety of employees and that hazards in the work environment are corrected promptly;

Responsible for ensuring that appropriate standards of behavior are maintained in the workplace to prevent unlawful discrimination in any form and for taking necessary action to identify and address any issues promptly.

OTHER FUNCTIONS

Advises Rail Services management on matters which may have an adverse impact on rail operations and formulates suitable recommendations to unique situations and problems that arise.

Ensures entry level and reoccurring training is delivered to provide employees the skills required for technical excellence.

In accordance with financial guidelines, monitors expenditures to ensure budgetary targets are maintained and efficient operation.

Demonstrates commitment to customer service improvements and meeting the Authority's vision.

Develops, recommends and implements strategic business plans and processes.

The essential duties listed are not intended to limit specific duties and responsibilities of any particular position. Nor is it intended to limit in any way the right of managers and supervisors to assign, direct and control the work of employees under their supervision.

BUDGETARY RESPONSIBILITY

This job does not have budgetary responsibilities		<input type="checkbox"/>	
This job has responsible for authorizing payments, purchases, check requests, reconciling the ledger for the department or other such activities.		<input checked="" type="checkbox"/>	
This job has direct responsibility for project or department budgets.		<input checked="" type="checkbox"/>	
This job's budgetary responsibility pertains to: Operating Budget for the Material and Inventory Planning Department		The range that best describes the overall dollar amount for which this job has budgetary authority is:	
A Single Project	<input type="checkbox"/>	Less than \$500,000	<input type="checkbox"/>
Multiple Projects	<input type="checkbox"/>	Between \$500,000 and \$1M	<input checked="" type="checkbox"/>
A Single Department	<input checked="" type="checkbox"/>	Between \$1M and \$5M	<input type="checkbox"/>
Multiple Departments	<input type="checkbox"/>	Greater than \$5M	<input type="checkbox"/>



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY POSITION DESCRIPTION

SUPERVISION

This position is responsible for the direct and indirect supervision of 400+ staff members within the Office of Traction Power Maintenance.

KNOWLEDGE

Knowledge of, or the ability to rapidly attain a knowledge of traction power systems and necessary maintenance actions in order to oversee and contribute to the resolution of complex problems.

Knowledge of electrical power theory and operation practices, high voltage safety procedures, and maintenance and testing procedures.

Knowledge of, or the ability to rapidly attain a knowledge of the Authority's rules and regulations, track maintenance plans and procedures and collective bargaining agreements.

Knowledge of management techniques and budgeting processes.

SKILLS

Excellent verbal and written communication skills.

Skill in building cross-departmental relationships.

ABILITIES

Ability to perform sophisticated analysis and research of complex problems, evaluating alternatives and making creative recommendations.

Ability to communicate effectively and present complex facts clearly and concisely orally and in writing and prepare and present comprehensive reports.

Ability to effectively and equitably deal with labor relations problems and obtain the highest efficiency from assigned staffing.

MACHINES, TOOLS, EQUIPMENT, SOFTWARE, AND HARDWARE REQUIRED: (Please list)

N/A

MINIMUM QUALIFICATIONS

Education

Bachelor's Degree in Civil, Mechanical engineering, Business, Management or a related field.



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY POSITION DESCRIPTION

Experience

Minimum of fourteen (14) years of experience (eighteen (18) years without Bachelor Degree) in rapid transit, high voltage electrical equipment, construction management, quality control or other applicable industry experience and five (5) years of management supervisory experience.

Certification/Licensure

Possession of valid District of Columbia, Maryland, or Virginia motor vehicle operator's permit issued from the jurisdiction of residence.

Preferred

N/A



**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
POSITION DESCRIPTION**

PHYSICAL REQUIREMENTS and WORKING CONDITIONS

Physical Requirements and Working Conditions

PRIMARY WORK LOCATION: (Please check only ONE box)			
Office Environment	<input checked="" type="checkbox"/>	Vehicle	<input type="checkbox"/>
Warehouse	<input type="checkbox"/>	Train	<input type="checkbox"/>
Close quarters	<input type="checkbox"/>	Outdoors	<input type="checkbox"/>

VISUAL ACUITY: Includes the color, depth perception, and field of vision. (Please check only ONE box)	
Required to have close visual acuity to perform an activity such as: preparing and analyzing data and figures; transcribing; viewing a computer terminal; extensive reading; visual inspection involving small defects, small parts, and/or operation of machines; using measurement devices; and/or assembly or fabrication of parts at distances close to the eyes.	<input checked="" type="checkbox"/>
Required to have visual acuity to perform an activity such as: operating machines such as lathes, drill presses, power saws and mills where the seeing job is at or within an arm's reach; performing mechanical or skilled trades tasks of a non-repetitive nature such as ones by carpenters, technicians, service people, plumbers, painters and mechanics.	<input type="checkbox"/>
Required to have visual acuity to operate motor vehicles or heavy equipment.	<input type="checkbox"/>
Required to have visual acuity to determine the accuracy, neatness, and thoroughness of the work assigned (e.g. custodial, food services, general labor, etc.) or to make general observations of facilities or structures (e.g. security guard, inspector, etc.)	<input type="checkbox"/>

OVERALL PHYSICAL STRENGTH DEMANDS: The overall physical requirements of the job. (Please check only ONE box)				
Sedentary	Light	Medium	Heavy	Very Heavy
Exerting up to 10 lbs. occasionally or negligible weights frequently; sitting most of the time.	Exerting up to 20 lbs. occasionally, 10 lbs. frequently, or negligible amounts constantly OR requires walking or standing to a significant degree.	Exerting 20-50 lbs. occasionally, 10-25 lbs. frequently, or up to 10 lbs. constantly.	Exerting 50-100 lbs. occasionally, 10-25 lbs. frequently, or up to 10-20 lbs. constantly.	Exerting over 100 lbs. occasionally, 50-100 lbs. frequently, or up to 20-50 lbs. constantly.
<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>





WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY POSITION DESCRIPTION

PHYSICAL ACTIVITY : The physical activity of the job (Indicate frequency for all that apply)				
C Continuously Two-thirds (2/3) or more of the time.	F Frequently From one-third (1/3) to two-thirds (2/3) of the time.	O Occasionally Up to one-third (1/3) if the time.	R Rarely Less than one (1) hour per week.	N Never Never occurs.
Physical Activity	Frequency	Description		
Standing	R	Remaining upright on the feet, particularly for sustained periods of time.		
Sitting	F	A continuous period of being seated, especially when engaged in a particular activity.		
Walking	O	Moving about on foot to accomplish tasks, particularly for long distances or moving from one work site to another.		
Lifting	R	Raising objects from a lower to a higher position or moving objects horizontally from position to position. Requires the substantial use of the upper extremities and back muscles.		
Stooping	R	Bending body downward and forward by bending the spine at the waist.		
Pushing/Pulling	R	Using upper extremities to press against something with steady force to thrust forward, downward or outward OR to draw, drag, haul or tug objects in a sustained motion.		
Reaching	R	Extending hand(s) and arm(s) in any direction.		
Repetitive Motions	O	Making substantial movements (motions) of the wrists, hands, and/or fingers.		
Fine Dexterity	R	Picking, pinching, typing or otherwise working, primarily with fingers rather than with whole hand or arm as in handling.		
Kneeling	R	Bending legs at knee to come to a rest on knee or knees.		
Crouching	R	Bending the body downward and forward by bending leg and spine.		
Crawling	R	Moving about on hands and knees or hands and feet.		
Grasping	R	Applying pressure to an object with fingers and palm.		
Balancing	R	Maintaining body equilibrium to prevent falling when walking, standing or crouching on narrow, slippery or moving surfaces.		
Hearing	C	Perceiving the nature of sounds at normal speaking levels and having the ability to receive detailed information through oral communication, and making fine discriminations in sound.		
Talking	C	Expressing or exchanging ideas by means of the spoken word; those activities where detailed or important spoken instructions must be conveyed to other workers accurately, loudly, or quickly.		
Climbing	R	Ascending or descending ladders, stairs, scaffolding, ramps, poles and the like, using feet and legs and/or hands and arms. Body agility is emphasized.		
Feeling	R	Perceiving attributes of objects, such as size, shape, temperature or texture by touching with skin, particularly that of fingertips.		
NON-PHYSICAL ACTIVITY: (Indicate frequency for all that apply)				
C	F	O	R	N



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY POSITION DESCRIPTION

Continuously	Frequently	Occasionally	Rarely	Never
Two-thirds (2/3) or more of the time.	From one-third (1/3) to two-thirds (2/3) of the time.	Up to one-third (1/3) of the time.	Less than one (1) hour per week.	Never occurs.
Description of Non-Physical Activities				Frequency
Time pressure				C
Emergency situation(s)				C
Frequent change of tasks				C
Irregular work schedule / overtime				C
Performing multiple tasks simultaneously				C
Working closely with others as part of a team				C
Tedious or exacting work				O
Noisy / Distracting work environment				O
Other (Specify)				

ENVIRONMENTAL FACTORS: The conditions the incumbent will be subject to in the job. (Indicate frequency for all that apply)				
C	F	O	R	N
Continuously	Frequently	Occasionally	Rarely	Never
Two-thirds (2/3) or more of the time.	From one-third (1/3) to two-thirds (2/3) of the time.	Up to one-third (1/3) if the time.	Less than one (1) hour per week.	Never occurs.
Description of Environmental Factors				Frequency
Mechanical Hazards				R
Chemical Hazards				R
Electrical Hazards				R
Fire Hazards				R
Respiratory Hazards				R
Extreme Temperatures				R
Noise/Vibration				R
Wetness/Humidity				R
Exposure to infectious diseases				R

MEDICAL GROUP: (Only check if a medical exam is required for the job)	
Satisfactorily complete the medical examination for this job, if required. Incumbent must be able to perform the essential functions of the job with or without reasonable accommodation(s).	<input type="checkbox"/>



WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
POSITION DESCRIPTION

PROTECTIVE EQUIPMENT REQUIRED: (Please list)

Employee Signature		
Name (Printed)	Signature	Date



8110

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

CLASS SPECIFICATION

Assistant Superintendent, Electrical Power, TS-7

DEFINITION OF CLASS:

This is administrative, technical, maintenance and supervisory work of a complex nature. Employee in this class is responsible for assisting in the planning, scheduling, coordinating and supervision of the Authority's electrical power facilities, equipment and personnel for the traction power, unit substations and electrical maintenance areas. Employee has latitude for independent judgment and action within established guidelines. Employee is supervised by the Superintendent, Power Systems Maintenance.

EXAMPLES OF DUTIES:

Directs the Construction, Inspection, Test and Material Control activities of the Section.

Assists in the development of and supervises the implementation of technical and administrative plans for electrical systems maintenance activities. This includes the coordination and supervision of individuals involved in all electrical power maintenance.

Participates in the technical evaluation of new equipment and techniques to insure that the Authority's electrical power systems provide the maximum opportunity for cost effective and efficient operation.

Ensures that all electrical power systems meet the various government regulatory agencies and Authority standards with special consideration being given to the safety of individuals.

Conducts training programs for field personnel.

Enforces personnel safety policies in all assigned work areas.

Assists in investigations of equipment failures and personal injury accidents, determines causes and initiates corrective action.

Recommends approval and arranges for the purchase of necessary supplies, tools and test equipment.

Assists in the preparation of and presents oral/written reports/recommendations relative to personnel requirements, training needs/equipment evaluation.

Conducts frequent field inspections to observe operations, maintenance, training and troubleshooting procedures. Inspects equipment rooms to ensure a high state of cleanliness exists and that storage and preservation are maintained. Submits written report on conditions found, observations of training, cleanliness, storage and personnel performance.

Assists in establishing work priorities. Maintains check on work progress, recommending improvements in work methods and techniques and assures the scheduling of available personnel for emergency repair services. Responds to power failures as required.

Assists in evaluating complaints and grievances with supervisors, employees or their representatives and attempts to resolve complaints in accordance with sound employee relations practices.

Periodically performs the duties of the Assistant Superintendent Maintenance Operation Center.

Works variable hours and shifts.

Performs related duties as required.

KNOWLEDGE, SKILLS AND ABILITIES:

Knowledge of, or the ability to rapidly attain a thorough knowledge of the Authority's rules and regulations, rapid rail electrical power maintenance operational plans and procedures and current Collective Bargaining Agreements.

Ability to plan, coordinate, supervise and evaluate the personnel and overall electrical power maintenance activities for the Authority.

Ability to work effectively with consultants, contractors, suppliers and Authority personnel with whom interface is required.

Ability to stay abreast of the state-of-the-art technology in electrical power systems.

Ability to troubleshoot complex technical problems and demonstrate expertise to effectively make complex technical decisions.

Ability to respond to emergency conditions.

Ability to communicate effectively both orally and in writing.

MINIMUM QUALIFICATION AND EXPERIENCE:

Graduation from an accredited college or university with a Bachelor's Degree in Electrical Engineering or a related field. Extensive experience in supervision, operation, maintenance and training in rapid transit/railroad electrical systems maintenance management. Incumbent must possess a strong power systems and operations background with demonstrated ability and experience in directing an extensive electrical power system/maintenance program with a thorough understanding of related testing and other governmental requirements.

Or, an equivalent combination of education and experience.

LICENSE:

Possession of, or the ability to rapidly obtain a District of Columbia, Maryland or Virginia motor vehicle operator's license issued from state of residence.

MEDICAL GROUP:

Ability to complete satisfactorily the medical examination for this class.

Approvals:

DEPT/OFFICE: [REDACTED] Date: 12-58

PERS/COMP: [REDACTED] Date: 12-58

LABR: _____ Date: _____

CLASS SPECIFICATION

Supervisor (Area), Electrical-Power, TS-6

DEFINITION OF CLASS:

This is technical, supervisory work involving close and continuing association with the installation, testing preoperation system checkout and operating maintenance and management of the Electrical Power Distribution System. Employee in this class is responsible for organizing, coordinating and directing the electrical operating and maintenance plan of the Authority and for participating in the establishment of electrical traction operating and safety procedures. Incumbent is responsible for the coordination of electric operating procedures in conjunction with the electric power utilities which provide primary high voltage service for the traction power system. Employee has latitude for independent judgment and action within established guidelines. Employee is supervised by the Superintendent, Electrical Power.

EXAMPLES OF DUTIES:

Reviews work priorities and makes assignments to Supervisors. Maintains check on work progress, recommending improvements in work methods and techniques and assures the scheduling of available personnel for emergency repair services. Develops necessary maintenance personnel utilization plans and recommends procedures required.

Assists in the development, implementation and administration of on the job training programs; provides input for the formulation and review of the Job Educational Training Standards. Trains, evaluates and (re) certifies employees in accordance with the employee Certification, Training and Promotional Program. Documents and maintains employee consolidated training records. May attend (in) formal training programs to maintain level of expertise. Recommends personnel actions. Discusses and resolves complaints and grievances with employees in accordance with collective bargaining agreements and personnel policies.

Develops the maintenance plans and procedures for the Electrical Power System and coordinates it with the WMATA Maintenance Planning System and Engineering personnel.

Develops plans for storage and distribution of maintenance materials coordination with WMATA material management guidelines.

Participates in the establishment of operational safety rules in close coordination with power utilities and other WMATA offices as they relate to Electrical Power System operation. Enforces Safety policies in all assigned work areas.

Evaluates causes for failures in the Electrical Power and support equipment, initiating positive measures to improve equipment performance. Ensures accountability of all electronic/electrical equipment assigned.

Coordinates warranty management and reliability programs and substantial completion sign-off within established WMATA guidelines.

Performs periodic inspections to ensure assigned equipment is at an acceptable standard and meets quality control inspections. May be required to perform control inspections in areas other than those assigned.

Prepares and submits, to the Superintendent, all documentation required for budgetary, statistical analysis, reliability, and availability reports.

Inspects the installation of, and verifies all tests for new electrical power facilities to insure conformity to WMATA specifications.

Coordinates with Maintenance Planning and Control, all contractor support, start-up support, all scheduled and unscheduled activities pertaining to new and existing Electrical Power facilities.

Serves as Superintendent, Electrical Power, in his/her absence, as directed. May work variable hours.

Performs related duties as required.

KNOWLEDGE, SKILLS AND ABILITIES:

Knowledge of or the ability to acquire knowledge of WMATA and power utilities rules and regulations particularly in the operations and safety fields associated with electrical power facilities. Extensive knowledge of materials and supplies utilized in electrical power facilities. Knowledge of the rules, regulations, operations and maintenance procedures, safety rules, and labor agreements of the Authority. Knowledge of the National Electrical Code. Knowledge of, or ability to attain knowledge of First Aid and Cardiopulmonary Resuscitation procedures.

Ability to comprehend and interpret technical manuals, schematics, and drawings of the manufacturer. Ability to establish and to maintain effective working relationships with co-workers and the public. Ability to communicate effectively orally and in writing. Ability to work variable days, shifts, and locations.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from an accredited college or university with a Bachelor's Degree in Electrical Engineering or related fields with progressively responsible experience in installation, testing, operations and maintenance of electrical traction power systems equipment for direct current propulsion rapid transit operations. Extensive supervisory experience in the electrical field. Considerable experience working with high voltage protection and transformation equipment in voltage classes up to 34.5 KV, preferably in power utility fields. Experience in fields of cable plant and third rail inspection, test and maintenance desirable.

Or, an equivalent combination of education and experience.

LICENSE:


Possession of, or ability to acquire a District of Columbia, Maryland, or Virginia motor vehicle operator's license from the state of residence.

MEDICAL GROUP:

Ability to complete satisfactorily the medical examination for this class.

Ability to distinguish basic colors for wire and safety identification.

Ability to perform strenuous physical tasks, i.e., lifting of objects weighing 25 to 50 pounds.

Approved by:  *[Handwritten Signature]*

Date: Mar 10, 1983

Revised: 12/10/82

CLASS SPECIFICATION

Shift Supervisor, Electrical-Power, TS-5

DEFINITION OF CLASS:

This is supervisory and technical electrical power distribution work. Employee in this class is responsible for supervising the installation, testing and operating maintenance and management of the electrical power distribution system. Employee has latitude for independent judgment and action within established guidelines. Employee is supervised by the Supervisor, Electrical Power.

EXAMPLES OF DUTIES:

Supervises the routine, preventative and unscheduled maintenance, inspection, testing, modification and repair of all equipment associated with electrical power distribution systems, (both AC and DC substations) and emergency trip station facilities. Assigns duties to personnel by workload priority, giving instructions in proper work methods/techniques; conducts inspections and monitors schedules for timely and satisfactory completion of work.

Assists in the development, implementation and administration of on the job training programs; provides input for the formulation and review of the Job Educational Training Standards. Trains, evaluates and (re) certifies employees in accordance with the Employee Certification, Training and Promotional Program. Documents and maintains employee consolidated training records. May attend (in) formal training programs to maintain level of expertise. Recommends personnel actions. Discusses and resolves complaints and grievances with employees in accordance with collective bargaining agreements and personnel policies.

Implements the electrical operating and maintenance plan of the Authority and participates in establishment and administration of electrical power distribution operating and safety procedures.

Ensures materials are available for assigned maintenance activities; accounts for electronic/electrical equipment assigned; and recommends measures to improve equipment performance.

Prepares, submits and reviews necessary reports and maintenance documentation.

Operates Authority vehicles as required. May work variable hours.

Serves as Supervisor, Electrical Power, in his/her absence, as directed.

Performs related duties as required.

KNOWLEDGE, SKILLS AND ABILITIES:

Knowledge of, or the ability to acquire a knowledge of rules and regulations of the Authority and associated power utilities, particularly in the operation and safety fields associated with electrical power facilities.

Knowledge of the rules and regulations, operations and maintenance procedures, safety rules, and labor agreements of the Authority. Knowledge of the National Electrical Code.

Knowledge of, or ability to attain knowledge of First Aid and Cardiopulmonary Resuscitation procedures.

Ability to recognize that the integrity of vital circuitry must be maintained particularly during testing, troubleshooting, and repair of equipment. Ability to read, use, and interpret schematics, wiring diagrams, operational manuals, manufacturers' maintenance instructions, PMI's rule books, etc. Ability to evaluate conditions of all electrical power equipment and to make proper decisions in conjunction with WMATA procedures. Ability to predict, identify, and resolve problems in electrical power equipment.

Ability to supervise, evaluate, and train personnel. Ability to work variable days, shifts and locations throughout variable weather conditions. Ability to communicate effectively orally and in writing. Ability to establish and to maintain successful working relationships with co-workers and the public.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from high school or possession of a high school equivalency certificate with some college training in electrical engineering preferred. Progressively responsible experience in the installation, testing, operations and maintenance of electrical traction power systems equipment for direct current propulsion of rapid transit operations, industrial power distribution or related fields is required. Considerable experience working with high voltage protection and transformation equipment in voltage classes up to 34.5 KV, preferably in power utility fields is required. Experience in fields of cable plant and contact rail inspection, test and maintenance and supervisory experience in the electrical field are desirable.

Or, an equivalent combination of education and experience.

LICENSE:

Possession of, or ability to acquire a District of Columbia, Maryland, or Virginia motor vehicle operator's license issued from the state of residence.

MEDICAL GROUP:

Ability to complete satisfactorily the medical examination for this class.

Ability to distinguish basic colors for wire and safety identification.

Ability to perform strenuous physical tasks, i.e., lifting of objects weighing 25 to 50 pounds.

Approved by: _____

Date: Mar 10, 1983

Revised: 12/10/82

CLASS SPECIFICATION

Mechanic AA (Electrical-Power)

DEFINITION OF CLASS:

This is responsible electrical/electro-mechanical repair work of a complex nature. Employee in this class is responsible for performing complex troubleshooting, switching, electrical inspection, repair, adjustment, testing and normal operating maintenance on high and low voltage substation and power system equipment. Employee is responsible for implementing inspection and test procedures to ensure the efficient and safe operation of electrical equipment and cable plant associated with power substations and power distribution systems. Employee has latitude for independent judgment and action within established guidelines. Employee is supervised by a Shift Supervisor, Power Distribution.

EXAMPLE OF DUTIES:

Performs highly skilled electrical/electro-mechanical work in the scheduled maintenance, installation repair, modification and testing of electrical power distribution systems, transformers, power conversion equipment, etc., in accordance with wiring diagrams, schematics, manufacturers' instructions and applicable electrical codes.

Performs maintenance and electro-mechanical repair and renewal of substation and distribution cable plant equipment.

Performs complex electrical inspections and tests on high voltage switch gear, transformers, power conversion equipment and direct current (DC) switch gear.

Diagnoses, inspects, tests, repairs and troubleshoots solid state/electronic devices, e.g., inverters, circuit breaker tripping devices, sensing circuits, etc., to effectively render malfunctioning equipment operable.

Performs electrical inspection and tests on the cable distribution plant(s).

Maintains records of tests and writes reports of inspection and test as required.

Performs tasks in conformance with safety procedures and practices and may instruct employees in high voltage safety procedures.

Responds to electrical trouble reports, determines problems and repairs and restores equipment to service. Responds to emergency breakdowns.

Prepares maintenance activity and related reports as required.

May operate an Authority vehicle between work areas.

May work variable hours.

Performs related duties as required.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from high school or possession of a high school equivalency certificate with acceptable vocational training in high voltage electrical systems operations and maintenance. Extensive progressively responsible experience in the installation, troubleshooting, testing and maintenance of high voltage electrical equipment and responsible experience in high amperes DC power conversion equipment. An equivalent combination of education and experience may be acceptable.

Have knowledge of and the ability to perform all duties of Mechanic A (Electrical-Power).

Thorough knowledge of electrical plans, public utility, or commercial high voltage power distribution diagrams and operating and maintenance instructions and procedures to correct and effectively maintain Authority electrical, power distribution and related systems within established safety and maintenance guidelines and accepted practices.

Knowledge of electronic circuits, functions and equipment to allow for the effective diagnosis and repair of power distribution systems.

Ability to distinguish basic colors for wire and safety identification.

Ability to work from ladders, scaffolding, hi-rise equipment and manholes.

Ability to utilize electrical-mechanical test instruments and equipment.

Ability to communicate effectively both orally and in writing.

Ability to deal courteously and effectively with others.

Ability to work variable hours.

LICENSE:

Possession of or the ability to rapidly attain a District of Columbia, Maryland or Virginia motor vehicle operator's license issued from jurisdiction of residence.

MEDICAL GROUP:

Ability to satisfactorily complete the medical examination for this class.

Approved by: 

Date: August 21, 1980

CLASS SPECIFICATION

Mechanic A (Electrical-Power Technician) *HV*DEFINITION OF CLASS:

This is a technical electronic/electro-mechanical Power Maintenance work. Employee in this class is responsible for performing skilled troubleshooting, switching, electrical inspection, repair, adjustment, testing and normal operating maintenance on high and low voltage substation and power system equipment. Employee has some latitude for independent judgment and action within established guidelines. Employee is supervised by a Shift Supervisor, Electrical Power.

EXAMPLE OF DUTIES:

Performs skilled electrical/electro-mechanical work in connection with scheduled maintenance, installation, repair, modification and testing of electrical power distribution systems, transformers, power conversion equipment, high voltage switch gear and Direct Current (DC) switch gear in accordance with wiring diagrams, schematics, manufacturers instructions and applicable electrical codes.

Performs difficult and moderately complex wiring installation and maintenance work as assigned. Measures, cuts, threads, bends, assembles and installs conduit and other required wiring.

Inspects, tests, repairs and troubleshoots solid state/electronic components, e.g., inverters, circuit breaker tripping devices, sensing circuits, etc., to effectively render malfunctioning systems operable.

Assist the Mechanic AA to perform work of a complex nature. Attends assigned on-the-job and formal training classes; may provide technical assistance to subordinate personnel.

Uses common types of electrical test equipment and designated special tools associated with the job assignment.

Responds to electrical trouble reports, determines problem(s) and repairs/restores equipment within capability of skill.

Performs any electrical renovations/installation work assigned. Completes routine reports and records as required.

May work variable hours.

May operate Authority vehicle between work areas.

Performs related duties as required.

KNOWLEDGE, SKILLS AND ABILITIES:

Have knowledge of and have performed satisfactorily all duties of Mechanic B for six months and demonstrated ability to perform at the Mechanic A level.

Knowledge of electronic circuits, functions and equipment to allow for the effective repair of power distribution systems.

Knowledge of electrical wiring codes, safety regulations, electric equipment troubleshooting and the ability to read, use and interpret schematics, diagrams and maintenance instructions.

Knowledge of assigned electrical test equipment and specialized tools.

Ability to perform tasks outlined in the established Job Educational Training Standard (JETS) or a related proficiency evaluation system to the proficiency level specified. Ability to pass Mechanical A promotional eligibility requirements.

Ability to perform difficult and sometimes moderately complex electrical test/repair work.

Ability to participate in training programs.

Ability to work from ladders, scaffolding, hi-rise equipment and in manholes.

Ability to work variable hours.

Ability to communicate effectively orally and in writing.

Ability to establish and to maintain effective working relationships with co-workers and the public.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from high school or possession of a high school equivalency certificate with vocational training in high voltage electrical systems, operations and maintenance. Considerable experience in installation, testing and maintenance of high voltage electrical equipment to include experience in high amperes DC power conversion equipment.

Or, an equivalent combination of education and experience.

LICENSE:

Possession of, or the ability to obtain a Maryland, Virginia or District of Columbia motor vehicle operator's permit issued from jurisdiction of residence.

MEDICAL GROUP:

Ability to complete satisfactorily the medical examination for this class.

Ability to distinguish basic colors for wire and safety identification.

Ability to perform strenuous physical tasks, i.e., frequent lifting of objects weighing up to 50 pounds and occasionally to 75 pounds.

Refer to the current **Union Contract** for the current **Progression Rates** for this position.

Approved by: _____

Date: _____

CLASS SPECIFICATION

Mechanic B (Electrical-Power)

DEFINITION OF CLASS:

This is responsible electrical/electro-mechanical repair work of a difficult nature. Employee in this class is responsible for participating in/performing semi-skilled electrical inspection, repair, adjustment, testing and normal operating maintenance on high and low voltage substation and power system equipment. Employee has limited latitude for independent judgement and action within established guidelines. Employee is supervised by a Shift Supervisor, Power Distribution.

EXAMPLE OF DUTIES:

Performs semi-skilled electrical/electro-mechanical work in connection with scheduled maintenance, installation, repair, modification and testing of electrical power distribution systems, transformers, power conversion equipment, high voltage switch gear and direct current (DC) switch gear in accordance with wiring diagrams, schematics, manufacturers' instructions and applicable electrical codes.

Performs wiring installation and maintenance work as assigned. Measures, cuts, threads, bends, assembles and installs conduit and other required wiring. Removes, replaces, inspects and tests electronic components and/or circuits on assigned equipment under the direction of a higher classified employee.

Assists the Mechanic A/Mechanic AA in repairing equipment.

May be required to work from scaffolding, ladders, hi-rise equipment and in manholes.

Uses common types of electrical test equipment and designated special tools associated with the job assignment.

Responds to electrical trouble reports, determines problem(s) and repairs/restores equipment within capability of skill.

Performs electrical renovations/installation work assigned. Completes routine reports and records as required.

Participates in training programs as necessary.

May work variable hours.

May operate Authority vehicle between work areas.

Performs related duties as required.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from high school or possession of a high school equivalency certificate with vocational training in high voltage electrical systems maintenance and experience in installation, testing and maintenance of high voltage electrical equipment. Some experience in high amperes DC power conversion equipment desirable. An equivalent combination of education and experience may be acceptable.

Knowledge of electrical wiring codes, safety regulations, electric equipment troubleshooting and the ability to read, use and interpret schematics, diagrams and maintenance instructions.

Knowledge of assigned electrical test equipment and specialized tools as well as a basic knowledge of power distribution electronic circuits and components.

Ability to rapidly attain knowledge of Authority's rules and regulations, maintenance department rules and regulations and related safety rules.

Ability to participate in training programs.

Ability to work from ladders, scaffolding, hi-rise equipment and in manholes.

Ability to work variable hours.

Ability to distinguish basic colors for wire and safety identification.

Ability to communicate effectively, both orally and in writing.

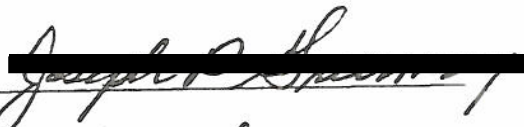
Ability to deal courteously and effectively with others.

LICENSE:

Possession of, or the ability to rapidly obtain a Maryland, Virginia or District of Columbia motor vehicle operator's permit issued from jurisdiction of residence.

MEDICAL GROUP:

Ability to satisfactorily complete the medical examination for this class.

Approved by: 

Date: August 21, 1980

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

CLASS SPECIFICATION

Mechanic C (Electrical-Power Technician) *HV*DEFINITION OF CLASS:

This is technical electronic/electro-mechanical power maintenance work. Employee in this class is responsible for participating in and performing routine to moderately skilled electrical inspection, repair, adjustment, testing, and normal operating maintenance on high and low voltage substation and power system equipment. Employee has limited latitude for independent judgment and action within established guidelines. Employee is supervised by a Shift Supervisor, Electrical-Power.

EXAMPLE OF DUTIES:

Performs routine to moderately skilled electrical/electro-mechanical work in connection with scheduled maintenance, installation, repair, modification, and testing of electrical power distribution systems, transformers, power conversion equipment, high voltage switch gear, and direct current (DC) switch gear in accordance with wiring diagrams, schematics, manufacturers' instructions and applicable electrical codes.

Performs routine to moderately skilled electrical wiring renovations, installation, and maintenance work.

Measures, cuts, threads, bends, assembles, and installs conduit and other required wiring of a routine to moderately skilled nature.

Assists higher level Mechanics in repairing equipment and in performing work of a more difficult and complex nature.

Removes, replaces, inspects, and tests electronic components and/or circuits on assigned equipment under the direction of a higher classified employee.

Attends assigned on-the-job and formal training classes.

Uses common types of electrical test equipment and designated special tools associated with job assignment.

Responds to equipment breakdowns, determines problem(s), and repairs/restores equipment within capability of skill.

-2-

Completes routine reports and records as required.

May provide technical assistance to subordinate personnel.

May operate Authority vehicle between work areas.

May work variable hours.

Performs related duties as required.

KNOWLEDGE, SKILLS AND ABILITIES:

Have knowledge of and have performed satisfactorily all duties of Mechanic Helper for at least one year and demonstrated ability to perform at the Mechanic C (Electrical-Power Technician) level.

Knowledge of electrical wiring codes, safety regulations, electric equipment and troubleshooting.

Knowledge of assigned electrical test equipment and specialized tools as well as a basic knowledge of power distribution electronic circuits and components.

Ability to pass Mechanic C promotional eligibility requirements.

Ability to read, use and interpret schematics, diagrams, and maintenance instructions.

Ability to attain knowledge of Authority rules, regulations, maintenance rules and regulations, and related safety rules.

Ability to participate in training programs.

Ability to work from ladders, scaffolding, hi-rise equipment and in manholes.

Ability to communicate effectively orally and in writing.

Ability to establish and to maintain effective working relationships with co-workers and the public.

Ability to work variable hours.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from high school or possession of a high school equivalency certificate, vocational training in high voltage electrical systems maintenance, and some experience in installation, testing, and maintenance of high voltage electrical equipment are required. Some experience in high amperes DC power conversion equipment is desirable.

Or, an equivalent combination of education and experience.

LICENSE:

Possession of, or the ability to obtain, a District of Columbia, Maryland, or Virginia motor vehicle operator's permit issued from the jurisdiction of residence.

MEDICAL GROUP:

Ability to complete satisfactorily the medical examination for this class.

Ability to distinguish basic colors for wire and safety identification.

Ability to perform strenuous physical tasks including frequent lifting of objects weighing up to 50 pounds and occasionally to 75 pounds.

Approvals:

DEPT/OFFICE: [Signature] DATE: 2/20/91

PERS/COMP: [Signature] DATE: 3/22/91

LABR: Local 689 Represented DATE: 3/20/91

100% of Op. Rate

Class Established: 01/08/91

Refer to the current Union Contract for the current Progression Rates for this position.

Code No.: 4661
ELEC PWRHV : 5051
ELE MNTN & TST: 5059
ELEC BNCH : 5062
EL-MECH : 5073
ATC : 5111
GEN COM I/R : 5200
AFCS : 5226

WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY

JOB DESCRIPTION

POSITION: Mechanic Helper, L689
DEPT/OFFICE: RAIL/SMNT
REPORTS TO: Supervisor of Unit Assigned

DATE: 12/3/98

REVIEWED:

RAIL: [REDACTED]

HRMP: [REDACTED]

LABR: Local 689, ATU
[REDACTED] 11/27/98

POSITION SUMMARY:

This is entry level maintenance work. Employee in this class is responsible for locating minor malfunctions and performing routine maintenance tasks on electronic, electrical, electro-mechanical and mechanical equipment which requires the performance of repetitive operations in prescribed sequence using designated applicable diagrams, manufacturer's specifications, equipment manuals and appropriate regulatory codes. Employee performs assignments within specified instructions detailing results expected, time limits and acceptable quality in a shop/field environment. Employee will work in one of the designated maintenance areas. Employee has limited latitude for independent judgment and action within established guidelines. Employee is supervised by the Supervisor of the unit to which assigned.

DUTIES:

Works in one of the Metrorail maintenance areas to include, but not limited to, Automatic Fare Collection (AFC), Automatic Train Control (ATC), Communications, Computers, Power, Precision Measuring Equipment, Rail, etc. Follows prescribed procedures, performs routine diagnostic disassembly, repair and re-assembly of electronic, electrical, electro-mechanical, mechanical components and equipment in a shop and/or field environment.

Uses precision measuring equipment such as meggers and ohmmeters to test for defective wiring and connections; micrometers to check for excessive wear on bushings, bearings, and gears; oscilloscopes and analyzers to troubleshoot, align, adjust, and calibrate circuits; and other instruments as required under close direction and supervision.

Performs general maintenance such as oiling, cleaning, greasing and making minor

Code No.: 4661
ELEC PWRHV : 5051
ELE MNTN & TST: 5059
ELEC BNCH : 5062
EL-MECH : 5073
ATC : 5111
GEN COM I/R : 5200
AFCS : 5226

Ability to communicate effectively.

Ability to establish and to maintain effective working relationships with co-workers and the public.

Demonstrated skill or certification in soldering required where necessary.

MINIMUM QUALIFICATIONS AND EXPERIENCE:

Graduation from high school or possession of a high school equivalency certificate and satisfactory completion of an acceptable vocational school and/or training course in basic electronics and electro-mechanics. Some electronics, electro-mechanical experience to include maintenance of digital and analog circuitry.

Candidate's continued employment will be dependent upon a favorable official police background investigation.

LICENSE:

Possession of a valid District of Columbia, Maryland or Virginia motor vehicle operator's permit issued from jurisdiction of residence.

Possession of FCC General Radio Telephone License is desirable.

MEDICAL GROUP:

Ability to satisfactorily complete the medical examination for this job. The employee must be able to perform the essential functions of this job either with or without reasonable accommodations.

Ability to distinguish basic colors for wire and safety identification.

Ability to perform strenuous physical tasks, i.e., frequent lifting of objects weighing up to 50 pounds and occasionally to 75 pounds.

FLSA NON-EXEMPT

Refer to the current **Union Contract** for the current **Progression Rates** for this position.

9.2 REFERENCE 2: PREVENTATIVE MAINTENANCE DATA SHEETS



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: A01 Room # W102 DATE: 1-10-17

Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order# and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR
1. Incoming Main Feeder Main Secondary Bus-tie Essential N/A Non-Essential N/A
2. Are all switchgear cubicle thermostats set to maximum? Yes No
4. Record switchgear cubicle heater current. Amps

II. UPS - INVERTER - CHARGER
Type Gulon
1. Air filter dirty? Yes No Replaced? Yes No

III. BATTERY ROOM
Battery type AT+T

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open W.O# for low water.

1. Water levels: Should be between the lines. Added qts of water to cell(s)
2. Pilot Cell #: Specific Gravity Cell Voltage
3. Voltage Leakage: NEG to GND 0 POS to GND
4. Corrosion: Batteries Yes No Rack Yes No
5. Exhaust Fan Operation Verified Yes No Work Order#
6. Eyewash Station: Date of installed container 9-26-16 # of refills available 4

IV. VERIFY OPERATION OF PLATFORM Lights: ETS Edge Lights

V. FIRST-AID KIT: Available Yes No Stocked Yes No

VI. TELEPHONE OPERATIONAL: Yes No Comm. W.O.#

VII. LOG (record date, time, purpose of station entry and call#)

VIII. PLNT W.O. NUMBERS

IX. CONDITION OF FACILITY (WET, DRY, HOT, COLD, DUSTY)

X. FIRE EXTINGUISHER(S): Sign and date monthly if ok W.O.#

XI. SUBSTATION/ROOM LIGHTS WORKING? Yes No (if not, note in remarks)

XII. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? Yes No

XIII. CLEAN THE FACILITY AND THE EXTERIORS OF ALL INSTALLED EQUIPMENT

REMARKS/FSRs: Busties, dirty room, Filters, Lights

TECHNICIAN(S): CALL#(S)

SUPERVISOR: CALL#

A01 TBS



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: A01 Room # TBS DATE: 1-7-17

- I. Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.
- II. A.C. SWITCHGEAR
 - 1. Incoming breakers 01/02/04/05 Rectifier breakers 11-18
 - 2. Bus-tie breaker 03/06 Auto Manual Aux. breakers (stays in local)
 - 3. Are all switchgear cubicle thermostats set to maximum? Yes No
 - 4. Record switchgear cubicle heater current. Amps
- III. RECTIFIER TRANSFORMER #1 #2 #3 #4 Check for leaks.
- IV. DC RECTIFIERS
Air filters replaced. Yes No Record DC output voltage #1 #2 #3 #4
- V. DC SWITCHGEAR
Cathode breaker 21-28 Track feeder breaker series 30/40/50/60/70/80/90
- VI. TELEMEGGERWATTMETER AEMS RTU ANNUNCIATOR CABLE MONITOR
- VII. BATTERY CHARGERS D.C. Voltage Equalize Float (Measure with DVM)
Timer setting Neg to GND Pos to GND
- VIII. INVERTER Record input VDC Output VAC
- IX. BATTERY ROOM Battery type
Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open FSR# for low water.
 - 1. Water levels: Should be between the lines. Added qts of water to cell(s)
 - 2. Pilot Cell #: Specific Gravity Cell Voltage
 - 3. Voltage Leakage: NEG to GND POS to GND
 - 4. Corrosion: Batteries Rack
 - 5. Exhaust Fan Operation Verified
 - 6. Eyewash Station date of installed container N/A # of Refills N/A
- X. First-Aid Kit: Yes No Stocked Yes No
- XI. TELEPHONE OPERATIONAL: Yes No Comm. FSR#
- XII. PLNT PROBLEMS, FSR#:
- XIII. FIRE EXTINGUISHER(S) Sign and date monthly if ok FSR#
- XIV. IS THE FACILITY CLEAN: Yes No ALL ROOM LIGHTS LIT? Yes No
- XV. LOG BOOK: Make entry in the log book (record date, time, purpose of visit, and call#)
- XVI. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? YES NO
- XVII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS/FSRs: dry

TECHNICIAN(S): [REDACTED] CALL#(S): [REDACTED]

SUPERVISOR: [REDACTED] CALL# [REDACTED]



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: _____ Room # 109 DATE: 1-24-17

- I. Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.
- II. A.C. SWITCHGEAR
 - 1. Incoming breakers 01/02/04/05 _____ Rectifier breakers 11-18 _____
 - 2. Bus-tie breaker 03/06 _____ Auto _____ Manual _____ Aux. breakers _____ (stays in local)
 - 3. Are all switchgear cubicle thermostats set to maximum? Yes _____ No _____
 - 4. Record switchgear cubicle heater current. _____ Amps
- III. RECTIFIER TRANSFORMER #1 _____ #2 _____ #3 _____ #4 _____ Check for leaks.
- IV. DC RECTIFIERS
 - Air filters replaced. Yes _____ No _____ Record DC output voltage #1 _____ #2 _____ #3 _____ #4 _____
- V. DC SWITCHGEAR
 - Cathode breaker 21-28 N/A Track feeder breaker series 30/40/50/60/70/80/90
- VI. TELEMETER/WATTMETER _____ AEMS RTU _____ ANNUNCIATOR _____ CABLE MONITOR _____
- VII. BATTERY CHARGERS D.C. Voltage Equalize _____ Float _____ (Measure with DVM)
 - Timer setting _____ Neg to GND _____ Pos to GND _____
- VIII. INVERTER Record input VDC _____ Output VAC _____
- IX. BATTERY ROOM Battery type ATM
 - Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open FSR# for low water.
 - 1. Water levels: Should be between the lines. Added _____ qts of water to cell(s) _____
 - 2. Pilot Cell #: _____ Specific Gravity _____ Cell Voltage _____
 - 3. Voltage Leakage: NEG to GND _____ POS to GND _____
 - 4. Corrosion: Batteries _____ Rack _____
 - 5. Exhaust Fan Operation Verified _____
 - 6. Eyewash Station date of installed container _____ # of Refills _____
- X. First-Aid Kit: Yes No _____ Stocked Yes No _____
- XI. TELEPHONE OPERATIONAL: Yes _____ No _____ Comm. FSR# _____
- XII. PLNT PROBLEMS, FSR#:
- XIII. FIRE EXTINGUISHER(S) Sign and date monthly if ok FSR# _____
- XIV. IS THE FACILITY CLEAN: Yes _____ No ALL ROOM LIGHTS LIT? Yes _____ No _____
- XV. LOG BOOK: Make entry in the log book (record date, time, purpose of visit, and call#)
- XVI. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? YES _____ NO _____
- XVII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS/FSRs: Duty

TECHNICIAN(S): _____ CALL#(S) _____

SUPERVISOR: _____ CALL# _____



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: A01 Room # (W) 09 DATE: 2-1-17

I. Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR

- 1. Incoming breakers 01/02/04/05 Rectifier breakers 11-18
- 2. Bus-tie breaker 03/06 Auto Manual Aux. breakers (stays in local)
- 3. Are all switchgear cubicle thermostats set to maximum? Yes No
- 4. Record switchgear cubicle heater current. Amps

III. RECTIFIER TRANSFORMER #1 #2 #3 #4 Check for leaks.

IV. DC RECTIFIERS
Air filters replaced. Yes No Record DC output voltage #1 #2 #3 #4

V. DC SWITCHGEAR
Cathode breaker 21-28 Track feeder breaker series 30/40/50/60/70/80/90

VI. TELEMETER WATTMETER AEMS RTU ANNUNCIATOR CABLE MONITOR

VII. BATTERY CHARGERS D.C. Voltage Equaliz. Float (Measure with DVM)
Timer setting Neg to GND Pos to GND

VIII. INVERTER Record input VDC Output VAC *Inverter short*

IX. BATTERY ROOM Battery type ATT

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open FSR# for low water.

- 1. Water levels: Should be between the lines. Added qts of water to cell(s)
- 2. Pilot Cell # Specific Gravity Cell Voltage
- 3. Voltage Leakage: NEG to GND POS to GND
- 4. Corrosion: Batteries HA Rack
- 5. Exhaust Fan Operation Verified
- 6. Eyewash Station date of installed container W/A # of Refills

X. First-Aid Kit: Yes No Stocked Yes No

XI. TELEPHONE OPERATIONAL: Yes No Comm. FSR#

XII. PLNT PROBLEMS, FSR#:

XIII. FIRE EXTINGUISHER(S) Sign and date monthly if ok FSR#

XIV. IS THE FACILITY CLEAN: Yes No ALL ROOM LIGHTS LIT? Yes No

XV. LOG BOOK: Make entry in the log book (record date, time, purpose of visit, and call#)

XVI. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? YES NO

XVII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS/FSRs: Dirty room

TECHNICIAN(S) CALL#(S)

SUPERVISOR: CALL#

B01 AC1



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: Dol Ac 1 Room # 102 DATE: 12/13/2017

Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order# and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR

- 1. Incoming Main Feeder Main Secondary Bus-tie Essential Non- Essential
- 2. Are all switchgear cubicle thermostats set to maximum? Yes No
- 4. Record switchgear cubicle heater current. 3 Amps

II. UPS - INVERTER - CHARGER

- Type [REDACTED]
- 1. Air filter dirty? Yes No Replaced? Yes No

III. BATTERY ROOM

Battery type At 94 round cell

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open W.O# for low water.

- 1. Water levels: Should be between the lines. Added qts of water to cell(s)
- 2. Pilot Cell #: [REDACTED] Specific Gravity 1.28 Cell Voltage [REDACTED]
- 3. Voltage Leakage: NEG to GND 0 POS to GND [REDACTED]
- 4. Corrosion: Batteries Yes No Rack Yes No
- 5. Exhaust Fan Operation Verified Yes No Work Order#
- 6. Eyewash Station: Date of installed container 12-8-16 # of refills available 4

IV. VERIFY OPERATION OF PLATFORM Lights: ETS Edge Lights

V. FIRST-AID KIT: Available Yes No Stocked Yes No

VI. TELEPHONE OPERATIONAL: Yes No Comm. W.O.#

VII. LOG (record date, time, purpose of station entry and call#)

VIII. PLNT W.O. NUMBERS

IX. CONDITION OF FACILITY (WET, DRY, HOT, COLD, DUSTY) Dry

X. FIRE EXTINGUISHER(S): Sign and date monthly if ok W.O.#

XI. SUBSTATION/ROOM LIGHTS WORKING? Yes No (if not, note in remarks)

XII. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? Yes No

XIII. CLEAN THE FACILITY AND THE EXTERIORS OF ALL INSTALLED EQUIPMENT

REMARKS/FSRs: Room Needs to be cleaned

TECHNICIAN(S): [REDACTED] CALL#(S): [REDACTED]

SUPERVISOR: [REDACTED] CALL# [REDACTED]

B01 TPSS



SMNT - POWER BRANCH

DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: B01 Room # TPSS DATE: 1/13/17

I. Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR

- 1. Incoming breakers 01/02/04/05 Rectifier breakers 11-18
- 2. Bus-tie breaker 03/06 Auto Manual Aux. breakers (stays in local)
- 3. Are all switchgear cubicle thermostats set to maximum? Yes N/A No N/A
- 4. Record switchgear cubicle heater current. N/A Amps

III. RECTIFIER TRANSFORMER #1 #2 #3 #4 N/A Check for leaks.

IV. DC RECTIFIERS

Air filters replaced. Yes N/A No N/A Record DC output voltage #1 #2 0 #3 #4 N/A

V. DC SWITCHGEAR

Cathode breaker 21-23 Track feeder breaker series 30/40/50/60/70/80/90

VI. TELEMEGGERWATTMETER N/A AEMS RTU ANNUNCIATOR CABLE MONITOR N/A

VII. BATTERY CHARGERS D.C. Voltage Equalize Float (Measure with DVM)

Timer setting N/A Neg to GND Pos to GND

VIII. INVERTER Record input VDC Output VAC

IX. BATTERY ROOM Battery type Lucient

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open FSR# for low water.

- 1. Water levels: Should be between the lines. Added N/A qts of water to cell(s) N/A
- 2. Pilot Cell #: Specific Gravity N/A Cell Voltage
- 3. Voltage Leakage: NEG to GND POS to GND
- 4. Corrosion: Batteries Rack
- 5. Exhaust Fan Operation Verified
- 6. Eyewash Station date of installed container N/A # of Refills 0

X. First-Aid Kit: Yes No Stocked Yes No

XI. TELEPHONE OPERATIONAL: Yes No Comm. FSR# N/A

XII. PLNT PROBLEMS, FSR#:

XIII. FIRE EXTINGUISHER(S) Sign and date monthly if ok FSR# N/A

XIV. IS THE FACILITY CLEAN: Yes No ALL ROOM LIGHTS LIT? Yes No

XV. LOG BOOK: Make entry in the log book (record date, time, purpose of visit, and call#)

XVI. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? YES NO

XVII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS/FSRs: (15201)
Incoming feeder Breaker #2 and Breaker #12 are rack out on the floor and tagged. Also breaker #22 and Bus-tie Breaker are racked out on the floor. Breaker #21 missing 76 relay.

TECHNICIAN(S): CALL#(S)

SUPERVISOR: CALL#



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: B01 TP Room # _____ DATE: 1-25-2017

I. Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR
1. Incoming breakers 01/04/05 Rectifier breakers 11-18
2. Bus-tie breaker 03/06 Auto Manual Aux. breakers (stays in local)
3. Are all switchgear cubicle thermostats set to maximum? Yes No
4. Record switchgear cubicle heater current. _____ Amps

III. RECTIFIER TRANSFORMER #1 #2 #3 #4 Check for leaks.

IV. DC RECTIFIERS
Air filters replaced. Yes No Record DC output voltage # _____ #2 _____ #3 _____ #4 _____

V. DC SWITCHGEAR
Cathode breaker 21-28 3 Track feeder breaker series 30 40/50/60/70/80/90 _____

VI. TELEMETER WATTMETER _____ AEMS RTU _____ ANNUNCIATOR CABLE MONITOR _____

VII. BATTERY CHARGERS D.C. Voltage Equalize _____ Float _____ (Measure with DVM)
Timer setting _____ Neg to GND _____ Pos to GND _____

VIII. INVERTER Record input VDC _____ Output VAC _____

IX. BATTERY ROOM Battery type A+G+
Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open FSR# for low water.

- 1. Water levels: Should be between the lines. Added _____ qts of water to cell(s) _____
- 2. Pilot Cell #: _____ Specific Gravity _____ Cell Voltage _____
- 3. Voltage Leakage: NEG to GND _____ POS to GND _____
- 4. Corrosion: Batteries _____ Rack
- 5. Exhaust Fan Operation Verified
- 6. Eyewash Station date of installed container 9-16 # of Refills 0

UPS Guter

X. First-Aid Kit: Yes No Stocked Yes No

XI. TELEPHONE OPERATIONAL: Yes No Comm. FSR# _____

XII. PLNT PROBLEMS, FSR#:

XIII. FIRE EXTINGUISHER(S) Sign and date monthly if ok FSR# _____

XIV. IS THE FACILITY CLEAN: Yes No ALL ROOM LIGHTS LIT? Yes No

XV. LOG BOOK: Make entry in the log book (record date, time, purpose of visit, and call#)

XVI. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? YES NO

XVII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS/FSRs: Room needs to be cleaned

TECHNICIAN(S): _____ CALL#(S) _____

SUPERVISOR: _____ CALL# _____



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: C 01 Room # 5106 DATE: 01/01/2012

Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order# and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR
1. Incoming Main Feeder Main Secondary Bus-tie Essential Non-Essential
2. Are all switchgear cubicle thermostats set to maximum? Yes No
4. Record switchgear cubicle heater current. Amps

II. UPS - INVERTER - CHARGER
Type Control
1. Air filter dirty? Yes No Replaced? Yes No

III. BATTERY ROOM
Battery type AT-T

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open W.O# for low water.

- 1. Water levels: Should be between the lines. Added qts of water to cell(s)
- 2. Pilot Cell #: Specific Gravity Cell Voltage
- 3. Voltage Leakage: NEG to GND POS to GND
- 4. Corrosion: Batteries Yes No Rack Yes No
- 5. Exhaust Fan Operation Verified Yes No Work Order#
- 6. Eyewash Station: Date of installed container # of refills available

IV. VERIFY OPERATION OF PLATFORM Lights: ETS Edge Lights

V. FIRST-AID KIT: Available Yes No Stocked Yes No

VI. TELEPHONE OPERATIONAL: Yes No Comm. W.O.#

VII. LOG (record date, time, purpose of station entry and call#)

VIII. PLNT W.O. NUMBERS

IX. CONDITION OF FACILITY (WET, DRY, HOT, COLD, DUSTY)

X. FIRE EXTINGUISHER(S): Sign and date monthly if ok W.O.#

XI. SUBSTATION/ROOM LIGHTS WORKING? Yes No (if not, note in remarks)

XII. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? Yes No

XIII. CLEAN THE FACILITY AND THE EXTERIORS OF ALL INSTALLED EQUIPMENT

REMARKS/FSRs: Need water in batteries dirty 3 Boosters

TECHNICIAN(S): CALL#(S)

SUPERVISOR: CALL#



SMNT - POWER BRANCH
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: C01 AC1 Room # 5106 DATE: 01-25-17

Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order# and explanation under REMARKS if correction of defects is required.

II. A.C. SWITCHGEAR

- 1. Incoming Main Feeder Main Secondary LOTO Bus-tie Close Essential Non- Essential
- 2. Are all switchgear cubicle thermostats set to maximum? Yes No
- 4. Record switchgear cubicle heater current. 5.0 Amps

II. UPS INVERTER - CHARGER

- Type SPILTOR
- 1. Air filter dirty? Yes No Replaced? Yes No

III. BATTERY ROOM

Battery type Round Cells AT AT

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open W.O# for low water.

- 1. Water levels: Should be between the lines. Added qts of water to cell(s)
- 2. Pilot Cell #: Specific Gravity N/A Cell Voltage
- 3. Voltage Leakage: NEG to GND POS to GND
- 4. Corrosion: Batteries Yes No Rack Yes No
- 5. Exhaust Fan Operation Verified Yes No Work Order# N/A
- 6. Eyewash Station: Date of installed container 7-21-16 # of refills available 4

IV. VERIFY OPERATION OF PLATFORM Lights: ETS Edge Lights

V. FIRST-AID KIT: Available Yes No Stocked Yes No

VI. TELEPHONE OPERATIONAL: Yes No Comm. W.O.# N/A

VII. LOG (record date, time, purpose of station entry and call#)

VIII. PLNT W.O. NUMBERS N/A

IX. CONDITION OF FACILITY (WET, DRY HOT, COLD, DUSTY)

X. FIRE EXTINGUISHER(S): Sign and date monthly if ok W.O.# N/A

XI. SUBSTATION/ROOM LIGHTS WORKING? Yes No (if not, note in remarks)

XII. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? Yes No

XIII. CLEAN THE FACILITY AND THE EXTERIORS OF ALL INSTALLED EQUIPMENT

REMARKS/FSRS: Incoming Line Breaker is energized 01/24/17
Secondary Main Rack out / Bus Tie BRK Closed

TECHNICIAN(S): CALL#(S)

SUPERVISOR: CALL#



SMNT - POWER BRANCH

DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

LOCATION: C02 TB Room # 122 DATE: 01/21/17

- I. Inspect status of room and equipment. Place if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.
- II. A.C. SWITCHGEAR
 - 1. Incoming breakers 01/02/04/05 N/A Rectifier breakers 11-18 N/A
 - 2. Bus-tie breaker 03/06 N/A Auto N/A Manual N/A Aux. breakers N/A (stays in local)
 - 3. Are all switchgear cubicle thermostats set to maximum? Yes N/A No
 - 4. Record switchgear cubicle heater current. N/A Amps
- III. RECTIFIER TRANSFORMER #1 N/A #2 N/A #3 N/A #4 N/A Check for leaks.
- IV. DC RECTIFIERS
 - Air filters replaced. Yes N/A No N/A Record DC output voltage #1 N/A #2 N/A #3 N/A #4 N/A
- V. DC SWITCHGEAR
 - Cathode breaker 21-28 N/A Track feeder breaker series 30 0 40/50/60/70/80/90
- VI. TELEMETERING WATTMETER N/A AEMS RTU N/A ANNUNCIATOR N/A CABLE MONITOR
- VII. BATTERY CHARGERS D.C. Voltage Equalize N/A Float N/A (Measure with DVM)
 - Timer setting N/A Neg to GND N/A Pos to GND N/A
- VIII. INVERTER Record input VDC N/A Output VAC N/A
- IX. BATTERY ROOM Battery type N/A

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open FSR# for low water.

 - 1. Water levels: Should be between the lines. Added N/A qts of water to cell(s) N/A
 - 2. Pilot Cell #: N/A Specific Gravity N/A Cell Voltage N/A
 - 3. Voltage Leakage: NEG to GND N/A POS to GND N/A
 - 4. Corrosion: Batteries N/A Rack N/A
 - 5. Exhaust Fan Operation Verified N/A
 - 6. Eyewash Station date of installed container N/A # of Refills N/A
- X. First-Aid Kit: Yes No Stocked Yes No
- XI. TELEPHONE OPERATIONAL: Yes No Comm. FSR#
- XII. PLNT PROBLEMS, FSR#: None
- XIII. FIRE EXTINGUISHER(S) Sign and date monthly if ok FSR#
- XIV. IS THE FACILITY CLEAN: Yes No ALL ROOM LIGHTS LIT? Yes No
- XV. LOG BOOK: Make entry in the log book (record date, time, purpose of visit, and call#)
- XVI. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK TAGS AND BLUE TAGS? YES NO
- XVII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS/FSRs:

TECHNICIAN(S): CALL#(S)

SUPERVISOR: CALL#

TRPM - POWER
DC TRACTION POWER AND TIE BREAKER FACILITY INSPECTION

Location: _____ Room # _____ Date: _____

I. Inspect status of room and equipment. Place a ✓ if operational with no defects. Place an X and record Work Order # and explanation under REMARKS if correction of defects is required.

II. AC SWITCHGEAR

1. Incoming Breakers: 01/02/04/05 _____ Rectifier breakers 11-18 _____
2. Bus-Tie Breaker: 03/06 _____ Auto _____ Manual _____ AUX Breakers _____ (Stays in Local)
3. Are all switchgear cubicle thermostats set to maximum? Yes _____ No _____
4. Record switchgear cubicle heater current. _____ Amps

III. RECTIFIER TRANSFORMER #1 _____ #2 _____ #3 _____ #4 _____ Check for Leaks.

IV. DC RECTIFIERS

Air filters replaced? Yes _____ No _____ Record DC output voltage #1 _____ #2 _____ #3 _____ #4 _____

V. DC SWITCHGEAR

Cathode breaker 21-28 _____ Track feeder breaker series 30/40/50/60/70/80/90 _____

VI. TELEMEGGERWATTMETER _____ AEMS RTU _____ ANNUNCIATOR _____ CABLE MONITOR _____

VII. ETS CABINET

1. All Relays Picked-Up: Yes _____ No _____ Comments: _____
2. All 9 & 10 Wires Connected: Yes _____ No _____ Comments: _____

VIII. INVERTER: Record Input VDC _____ Output VAC _____

IX. BATTERY CHARGER: D.C. Voltage Equalize _____ Float _____ (Measure with DVM)

Timer Setting _____ NEG to GND _____ POS to GND _____

X. BATTERY ROOM: Battery Type _____

Note: Do not check specific gravity of Round Cells. Do not add water to Round Cells. Open WO # for Low Water.

1. Water Levels: Should be between the lines. Added _____ QTS of water to cell(s) _____
2. Pilot Cell # _____ Specific Gravity _____ Cell Voltage _____
3. Voltage Leakage: NEG to GND _____ POS to GND _____
4. Corrosion: Batteries _____ Rack _____
5. Exhaust Fan Operation Verified _____
6. Eyewash Station: Date of Installed Container _____ # of Refills _____

XI. First-Aid Kit: Yes _____ No _____ Stocked: Yes _____ No _____

XII. TELEPHONE OPERATIONAL: Yes _____ No _____ COMM WO# _____

XIII. PLNT PROBLEMS: WO#: _____

XIV. FIRE EXTINGUISHER(S): Sign and Date Monthly if Ok. WO# _____

XV. IS THE FACILITY CLEAN: Yes _____ No _____ ALL ROOM LIGHTS LIT? Yes _____ No _____

XVI. LOG BOOK: Make Entry in the Log Book (Record Date, Time, Purpose of Visit, and Call#)

XVII. IS FACILITY STOCKED WITH NECESSARY SPARE FUSES, INDICATING LAMPS, BREAKER TOOLS, BLOCK

XIII. CLEAN THE FACILITY AND ALL INSTALLED EQUIPMENT COMPLETED

REMARKS WO#s: _____

TECHNICIAN(S): _____ CALL#(S) _____

SUPERVISOR: _____ CALL# _____

WO# _____

9.3 REFERENCE 3: PREVENTATIVE MAINTENANCE INSTRUCTIONS SCREENSHOTS

Traction Power Preventive Maintenance Inspection

<input type="checkbox"/> Type	Name	Modified
	default	5/8/2017 3:23 PM
	01 -- ABB 750 Volt DC Type FBK-S (Semi-High Speed) Circuit Breaker 365 Days Inspection Rev2, 07052011	12/16/2015 9:40 AM
	02 -- ABB BBC ITE 750 VDC FBK-H (High Speed) Circuit Breaker-365 Day Inspection-Rev 2, 07052011	12/16/2015 9:40 AM
	03 -- ABB-BBC-ITE 13.8kV HPL-C Load Interrupter Switches-All Locations- Rev1, 07052011	12/16/2015 9:40 AM
<input checked="" type="checkbox"/>	04 -- AC or DC Elecl. Facilities, AC Unit Subs, Aux Elecl Rooms,TPSS, TBSS-14 Day Inspection-Rev 3, 08052011	12/16/2015 9:40 AM
	05 -- ANSALDO 750V DC Breaker and Switchgear-270 Day Inspection-Rev 3, 08192011	12/16/2015 9:40 AM
	06 -- Battery Maintenance 84 Day Inspection - Battery Maintenance 364 Day Inspection -Rev 1, 08222011	12/16/2015 9:40 AM
	07 -- Chiller Plant AC Distribution Systems,MCCs and Starters 364 day Inspection-08252011	12/16/2015 9:40 AM
	08 -- Fan Shaft Power Systems, Lighting, Automatic Transfer Switches, Voltage Regulators, MCCs- Rev 1, 08052011	12/16/2015 9:40 AM
	09 -- Fed Pioneer 480V AC Type H-2_HL-2_H-3_HL-3 Air Crct Brkrs-Swchgr_728-1090 Day Inspctn Rev 1_07052011	12/16/2015 9:40 AM
	10 -- FPE 13.8 kV AC LI Load Interrupter Switch- 728 and 1090 Day Inspection-Rev 1, 070520112011	12/16/2015 9:40 AM
	11 -- FPE 13.8 kV AC Type DST-2 Air-Magnetic Breaker and Switchgear- 728 and 1090 Day Inspection- Rev 1, 07052011	12/16/2015 9:40 AM
	12 -- FPE 480V AC TYPES FP and FM-25, -50, -75 Circuit Breaker and Switchgear- 728-1090 Day Inspection- Rev 2, 08192011	12/16/2015 9:40 AM
	13 -- GE Load Interrupter Switch 13.8kV AC Type SE-100S-728 and 1090- Rev 1, 07052011	12/16/2015 9:40 AM
	14 -- ITE (Gould) 38 kV AC Type 38HKV1500 Vacuum Breaker and Switchgear-728 and 1090 Day Inspection-Rev 1, 08042011	12/16/2015 9:40 AM
	15 -- Overcurrent Relays 34.5kV_and_13.8kV AC Systems-728 and 1090 Day Inspection- Rev 1, 08052011	12/16/2015 9:40 AM
	16 -- Powercon 38kV AC Switchgear with Westinghouse 38 kV AC Type Vacuum Breaker-1090 Day Inspection-Rev 1, 08052011	12/16/2015 9:40 AM
	17 -- Siemens RL480V AC Breakerand Switchgear-728 and 1090 Day Inspection-Rev 2, 08052011	12/16/2015 9:40 AM
	18 -- Track Feeder Cable-1000 KCMIL-Rev 4, 06.16.2015	12/16/2015 9:40 AM
	19 -- WESTINGHOUSE 480 VAC TYPE DS rev3, 2010-10-07	12/16/2015 9:40 AM
	20 -- 34.5 and 13.8 kV AC Under Overvoltage Relays 728-1090 Day Inspection	12/16/2015 9:40 AM
	21 -- 750V DC Breaker Reclosure Relay (TYPE 8283) 7281090 Day Inspection	12/16/2015 9:40 AM
	22 -- 750Volt DC Westinghouse Switchgear 184 Days	12/16/2015 9:40 AM
	23 -- ABB 13.8 kV AC Type 15VHK Vacuum Breaker and Switchgear-728-1090 Day Inspection-Rev 2, 06202013	12/16/2015 9:40 AM
	24 -- Automatic Bus Tie 480V AC Switchgear Operational Test- Semi-Annual -Rev 2, 06202013	12/16/2015 9:40 AM
	25 -- Emergency Trip Station _ETS_-1092 Day Inspection-Rev3 06202013	12/16/2015 9:40 AM
	26 -- GE 34.5kV AC Type VH-34.5-1500 Model -2L Vacuum Breaker and Switchgear-728 and 1090 Day Inspection- Rev2, 06202013	12/16/2015 9:40 AM

Traction Power Preventive Maintenance Inspection

<input type="checkbox"/>	Type	Name	Modified
		30 -- GEC EEC CPC 750Volt DC Switchgear-Annual Inspection- Rev 3, 06202013	12/16/2015 9:40 AM
		31 -- ITE BBC ABB 13.8 kV AC Type 15HK Air Magnetic Breaker_Switchgear-728 Day Inspection-Rev 2, 06202013	12/16/2015 9:41 AM
		32 -- ITE GOULD 480V AC Power Circuit Breakers- Types K-225-K-2000_Types K-600s-K-2000S-728_1090 Day Inspection -Rev 2	12/16/2015 9:41 AM
		33 -- Lighting Inspection and Relamping of WMATA Owned or Operated Facilities-Rev 4, 06202013	12/16/2015 9:41 AM
		34 -- Oil-Filled Transformer Class OA, OA-FA_Signed	12/16/2015 9:41 AM
<input checked="" type="checkbox"/>		35 -- Powell 13.8 kV AC Type P60000 Vacuum Brkr_Series P-51000 Mtl Clad Switchgear-728_1090 Day Inspctn-Rev 2, 06202013	12/16/2015 9:41 AM
<input checked="" type="checkbox"/>		36 -- Powell 13.8 kV AC Type PV-E Electrically Operated Ground_Test Device-728_1090 Day Inspctn- Rev 2, 06202013	12/16/2015 9:41 AM
		37 -- POWERCON 34.5 and 13KV TYPE PIF LOAD INTERRUPTER SWITCH PMI-clean copy	12/16/2015 9:41 AM
		38 -- Siemens 13.8 kV AC Type GMI Vacuum Breaker and Switchgear- 728 and 1090 Day Inspection- Rev 2, 06202013	12/16/2015 9:41 AM
		39 -- Siemens 38kV AC Type 38-3AF_CPC Type SVB3-35 Vacuum Breaker_Switchgear-728_1090 Day Inspctn-Rev 2, 06202013	12/16/2015 9:41 AM
		40 -- Siemens-Allis 13.8 kV AC Type FC-500B Air Magnetic Breaker and Switchgear-Rev 2, 06202013	12/16/2015 9:41 AM
		41 -- Siemens-Allis 38kV AC Type V V-1500 Vacuum Breaker and Switchgear -728_1090 Day Inspection- Rev 2, 06202013	12/16/2015 9:41 AM
		42 -- Square D 13.8 kV AC Type VAD-3 Vacuum Breaker and Switchgear - 728_1090 Day Inspection, Rev 2, 06202013	12/16/2015 9:41 AM
		43 -- Third Rail Heat Tape System-365 Day Inspection-Rev 3, 06202013	12/16/2015 9:41 AM
		44 -- Toshiba 13.8 kV Type VK 10M40 Vacuum Breaker_Switchgear-1090 Day Inspection- Rev 2, 06202013	12/16/2015 9:41 AM
		45 -- TRANSFORMER-DRY-PMI_Signed	12/16/2015 9:41 AM
		46 -- Westinghouse 35KV Load Interrupter Switch Type WLI-clean copy	12/16/2015 9:41 AM
		47 -- Whipp and Bourne 750V DC Type MM74 Circuit Breaker-Rev 3, 06202013	12/16/2015 9:41 AM
		48 -- 15 kV AC Westinghouse Draw-Out Type FSP Load Interrupter Switch 7281090 Day Inspection	12/16/2015 9:41 AM
		49 -- Traction Rectifiers PMI_Signed	12/16/2015 9:41 AM
		50 -- 13.8 kV AC Westinghouse Type DHP AIR Magnetic Breaker_Swgr. 728-1090 day inspec	12/16/2015 9:41 AM
		51 -- 13.8kV AC Westinghouse Type VCP-W Vacuum breaker and switchgear - 7801090 day inspection - Rev 2, 06202013	12/16/2015 9:41 AM
		52 -- 13.8kV Westinghouse Load Breaker Interrupter Switch Type AWP 728-1090 day inspection	12/16/2015 9:41 AM
		53 -- GE 750V DC MC6 Breaker Annual Inspection	12/16/2015 9:41 AM
		54 -- HV INSTRUMENT TRANSFORMERS(POTENTIAL TRANSFORMERS)	12/16/2015 9:41 AM
		55 -- RELAY SOLID-STATE 76 DC OVERCURREN RELAY PMI	12/16/2015 9:41 AM

9.4 REFERENCE 4: TRPM POSITION MANAGEMENT REPORT

Report ID: WTHRPOS1

POSITION MANAGEMENT REPORT

09-MAY-2017

<u>Dept</u>	<u>Dept Name</u>	<u>Position Number</u>	<u>Salary Plan</u>	<u>Grade/ Step</u>	<u>Union</u>	<u>Job Code</u>	<u>Position</u>	<u>Emplid</u>	<u>Name</u>	<u>ReportsTo</u>
[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]	[REDACTED]

9.5 REFERENCE 5: TRPM CONTACT LIST

8100 Professional/ Alexandria	[REDACTED] General Superintendent	[REDACTED]	[REDACTED]
Alexandria	[REDACTED] - Superintendent	[REDACTED]	[REDACTED]
Cobb Rd	[REDACTED] -Superintendent	[REDACTED]	[REDACTED]
Cobb Rd	[REDACTED] -Assistant Superintendent	[REDACTED]	[REDACTED]
K99	[REDACTED] *Acting Assistant Superintendent- Operations	[REDACTED]	[REDACTED]
E99	[REDACTED] * Acting Assistant Superintendent- Midnight-Operations	[REDACTED]	[REDACTED]
Alexandria	[REDACTED] *Acting Assistant Superintendent- QC & Review	[REDACTED]	[REDACTED]
E99	[REDACTED]	[REDACTED]	[REDACTED]
Region	Name	Office	Cell
A99	[REDACTED] *Acting A.M.	[REDACTED]	[REDACTED]
B04	[REDACTED] *Acting A.M.	[REDACTED]	[REDACTED]
E99	[REDACTED] - Area Manager	[REDACTED]	[REDACTED]
K99	[REDACTED] *Acting Supervisor * Acting A.M	[REDACTED]	[REDACTED]
N99	[REDACTED] - Area Manager *Acting Supervisor *Acting Supervisor	[REDACTED]	[REDACTED]
Cobb RD	[REDACTED] - Area Manager [REDACTED] - Area Manager	[REDACTED]	[REDACTED]
8100 Professional Place	[REDACTED]	[REDACTED]	[REDACTED]
PMI CTF	[REDACTED] *Acting A.M.	[REDACTED]	[REDACTED]
PMI CTF	[REDACTED]	[REDACTED]	[REDACTED]
PMI CTF	[REDACTED]	[REDACTED]	[REDACTED]
PMI B98	[REDACTED] *Acting Supervisor	[REDACTED]	[REDACTED]
PMI K99/CTF	[REDACTED]	[REDACTED]	[REDACTED]
PMI K99	[REDACTED] *Acting Supervisor	[REDACTED]	[REDACTED]
PMI K99	[REDACTED]	[REDACTED]	[REDACTED]
PMI CTF	[REDACTED]	[REDACTED]	[REDACTED]

9.6 REFERENCE 6: LOGBOOK MEMO & PHOTO

M E M O R A N D U M



SUBJECT: Log Book Entries [REDACTED]
FROM: TSSM - [REDACTED]
TO: All Power Personnel

DATE: August 3, 2009

IN REPLY

REFER TO: _____

During recent field visits to various AC, Traction Power and Tie-Breaker substations, I've noticed that log book entries at not always sufficient nor accurate.

I'm requiring each Region Manager and Supervisor to monitor this important reporting function to ensure that we are documenting the condition of equipment and the general conditions of these rooms. With that in mind, please adopt and implement the following requirements immediately and follow up to make sure all personnel understand the importance of the requested information.

The following is required by all personnel who enter these facilities:

- Date
- Time In and Time Out
- Name (Print)
- Call Number
- MOC Operator
- **Specific** purpose as to the nature of your visit; i.e. inspection, directed by MOC, emergency, Maximo work order (Note: record Maximo number), housekeeping duties, etc. Provide as much detail as possible. This information will assist the next technician who has to respond.

Upon entering the room there are a few things you need to consider. First and foremost, take that moment to "**Stop, Look, Listen and Smell**". This, in fact, could help guide you to resolving problems. It is without doubt that by observing and documenting conditions or status of the "flags", "annunciator panel", "looking for water leaks", etc., that the "**moment**" can be considered to be a necessary step towards completing a job safely.

Print Name _____

Sign Name _____

Call Number _____

**Washington
Metropolitan Area
Transit Authority**

1-30-17
TIE & Battery inspection
w/O # 13153051

2/13/17
Room Inspection

02/26/17

1745

1845

Houston

Room Inspection w/O # 13222934

Checked inventory

Checked lighting

Battery bank read 134.4 vdc - it should be 133.8

check all AC outlets

Inverter/Charger normal

2-27-17 Room Insp 1276/1207
Time 8:30 AM

3-7-17 Room Inspection

3/11/17 Rm Inspection
w/O # 13249292

84 DAY INSPECTION

w/O # 13237561

3-17-17 GROUND SHACKS NO POWER PANEL T.P. PANEL
IN B99 TB #11/13 IS ON BUT WE WIGGLED IT ARCHING
SOUND AND POWER CAME ON DEAD FRONT VERY
LOOSE (TRANS W/ HUB - HAMMER BREAK WRENCH)

12/18/16 R/I BAT #41, and removed B/T #304-
S/O # 2016353513
5:24 Houston

12-20-16 AC/DC STATUS INSPECTION 1190, 1267
George

12/23/16 R/O Breaker #43 B/T #1632 LOTO SOP 39
MOC
Houston Switching Cancelled
0040

12/24/16 R/O BKR 43 44 Place BT
Houston 302, 303

12/26/16 R/I BKR 43 44 Removed BT 302, 303

12/30/16 ROOM INSP W/O # 13087259
BATTERY ROOM INSP W/O # 13073982

1/2/17 TIE BKR INSP Completed
W/O # 13113758

1/16/17 TIE BREAKER INSP Completed
W/O # 13134248

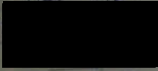
1/23/17 Visual Room Inspection
1947
2010

11-8-16 Room Inspection
GORDON WO# 12999169
10:10 HRS - 10:17 HRS



11/21/16 Tested ETS from BOX 50 to 41
Campbell 10:76 PMI

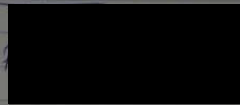
11-23-16 R/I BKRS 41, 42, 43, 44, YCR70, YCR88



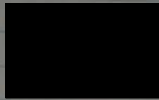
Removed B/tags 302, 303, 304, 305, 1632
1639.

03W# 2016326518

SW # 2016303507



11-23-16 Room Inspection
GEORGE BOND WO# 13030081



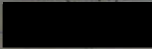
12/2/16 R/I Breaker 88 Bk tags 1652
R/I " " S/O 2016336520



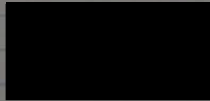
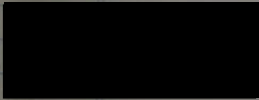
12-7-16 Room Inspection



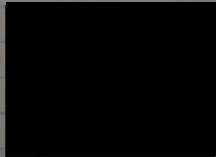
12-9-16 R/O BKR 41 B/T 1639



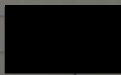
12-10-16 R-I BKR 41# Removed B/T-1639



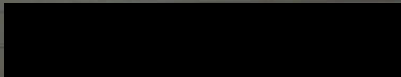
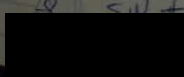
12-14-16 Room Inspection
WO# 13056885



12-14-16 ESCORT IT



12/18/16 R/O BKR #41 B/T # 304
SW # 2016353583



BATTERY RM

9-8-16 Room Inspection

9-14-16 R/O BRK #70 PLACE B/L 232
1027 HRS

9/14/16 TRANSFER BACK UP GENSET FOR TEMP FEED TO ROOM

9/14/16 R/I Brk YCR -70 1231, 1267

9-15-16 R/O BRK #YCR 70 PLACE B/L 167

9-15-16 R/I Brk # YCR 70

9-29-16 Room Inspection WO# 12874941

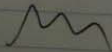
10-6-16 Room Inspection WO# 12907686

10/9/16 ESCORTED COM IN TO TB TO CHECK CAMERAS
W/L #1252 / FIREMAN 1414

10-18-16 Room Inspection
WO# 12937412

10-25-16 Room Inspection
WO# 12969655

10/29/16 R/O Brks #41, #42, #43, #44 PLACE BT
#302, #303, #304, #305
R/O YCR BRKS #70, #88
placed BT #1632, #1639



9.7 REFERENCE 7: SOP 39 & MCC/TRPM LOTO PROCEDURE

SAFETRACK

MCC/ TRPM LOTO Guideline

Switch Order

Area Manager and Supervisors review switch order and identify LOTO requirements based upon the switch order.

**WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY
GENERAL ORDERS AND TRACK RIGHTS SYSTEM
SWITCH ORDER**

SWITCHING ORDER: 2016230500 STATUS: Approved
 LOCATION & EQUIPMENT REQUESTED: COSTP (C159+28) C06TP (C212+72) TRK 1
 COSTP (C159+28) C06TP (C212+72) TRK 2
 DATES NEEDED: 08/17/2016 THRU 08/17/2016 TIME FROM: 00:30 TO: 04:30
 DATE APPROVED: 08/12/2016 TIME APPROVED: 09:18

LOCK OUT / TAG OUT: Yes
 EQUIPMENT CONFIRMED DE-ENERGIZED BY UNIT: _____

OUTAGE REQUESTED BY: _____ OF: ENSW/IRPG PHONE: _____
 EMERGENCY CONTACT: _____ EMERGENCY CONTACT PHONE: _____
 RED-TAG-NO: 2016230500-A RAIL SUPPORT REQUEST: 201619800007 RED TAG STATUS:
 GIVEN TO: _____ OF: _____ ON: _____ AT: _____
 CLEARED BY: _____ OF: _____ ON: _____ AT: _____
 REMARKS: _____

CANCELLATION DATE: _____ TIME: _____ REASON: _____

DE-ENERGIZED							ENERGIZED						
DESK OPR	TECH NO	DATE	TIME	LOCATION	EQUIPMENT	TAG PLACED	DESK OPR	TECH NO	DATE	TIME	LOCATION	EQUIPMENT	TAG REMOVED
				C05TP	31						C05TP	31	
				C06TB	41						C06TB	41	
				C06TB	45						C06TB	45	
				C06TB	43						C06TB	43	
				C06TP	33						C06TP	33	
				C05TP	32						C05TP	32	
				C06TB	42						C06TB	42	
				C06TB	44						C06TB	44	
				C06TP	34						C06TP	34	

Pre-Planning for LOTO Outage

- Obtain switch order from GOTRS. Its should state “Lock Out Tag Out : Yes.”
- Identify what type of LOTO will be required based upon the switchgear design. ex. Lock in the cubicle door handle, chain/ wire around the breakers, etc..

Labeled Keys

Label the keys to match the labeled locks.

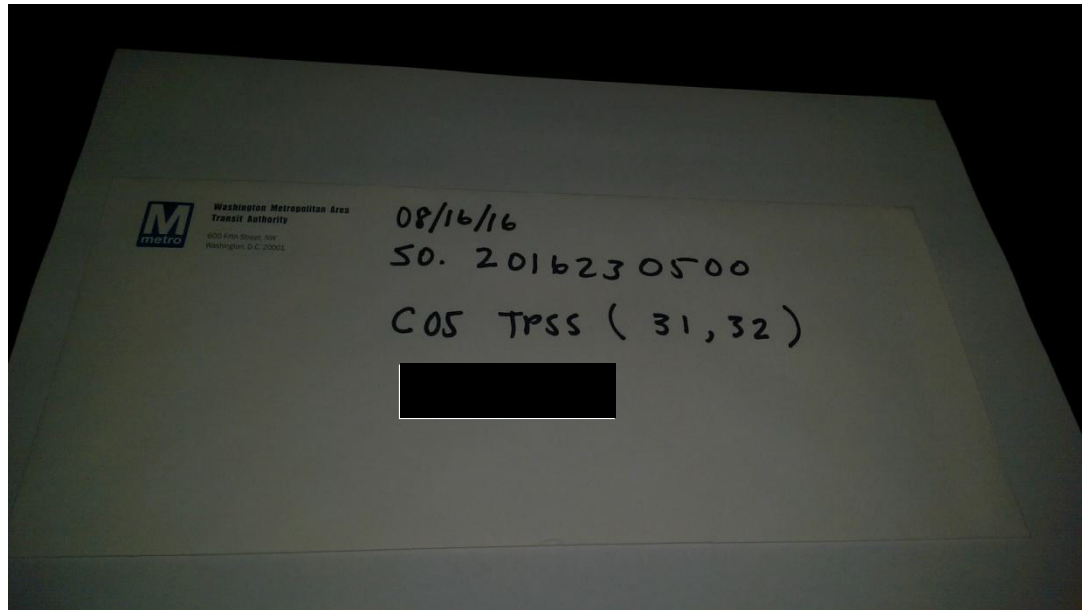
The labeled locks should be issued to crews with the labeled keys inserted in the locks.



Labeled Envelope

The envelope should have the following information.

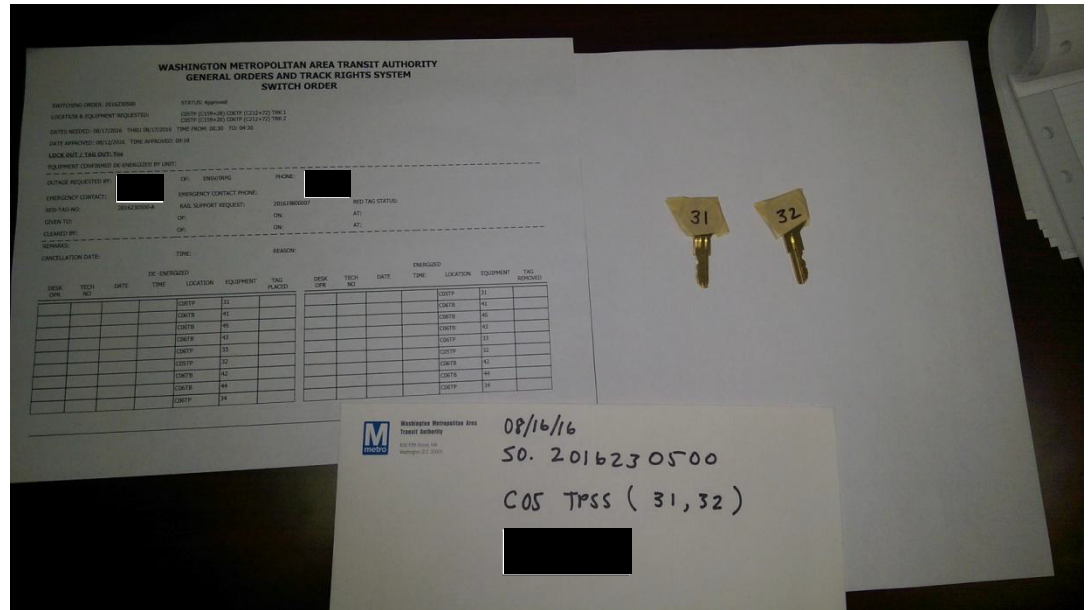
1. Date.
2. Switch Order Number
3. Switching Location & Breakers
4. Key number- should correspond to breaker number for simplicity.
5. Unit numbers of the crew.



Switch Order, Labeled keys in Sealed Envelope

Once LOTO is completed, put the keys in the envelope, with a copy of the switch order and seal the envelope in the room to prevent keys from falling out.

The switching crew should have a separate copy of the switch order for their switching assignment.



MCC Key Sign In/ Out Form

Turn in sealed labeled envelope to MCC and complete the MCC sign in/ sign out form.

MCC is responsible for placing all envelopes in and securing the Lock Box

RED TAG # 2016 222 524A DATES 08-09-2016 to 08-19-2016	
NAME	
CALL NUMBER	
TIME	
KEY #, BREAKER #	
TPS/TBS	
NAME	
CALL NUMBER	
TIME	
KEY #, BREAKER #	
TPS/TBS	
NAME	
CALL NUMBER	
TIME	
KEY #, BREAKER #	
TPS/TBS	
NAME	
CALL NUMBER	
TIME	
KEY #, BREAKER #	
TPS/TBS	
NAME	
CALL NUMBER	
TIME	
KEY #, BREAKER #	
TPS/TBS	
POINT OF CONTACT	

CM: A1 717+10 to A1 937+15

SOP #39 LOCKOUT/TAGOUT PROCEDURE FOR TRACTION POWER SUBSTATIONS

39.1 PURPOSE

The purpose of this procedure is to ensure consistency and establish guidelines for WMATA and contractor personnel to use in coordinating and executing the steps of this Lockout/Tagout (LOTO) procedure, in order to provide a safe work environment and to provide safeguards against accidental or unexpected activation of traction power substation electrical equipment, related circuits and tie breaker station.

39.2 SCOPE

This document establishes requirements for the use of a Lockout/Tagout (LOTO) procedure, for all WMATA employees and contractors, desiring to perform work on the wayside in the area controlled by a traction power substation that is occupied by personnel also performing work within the substation. This document also requires the use of existing Lockout/Tagout (LOTO) procedure outlined in OAP 200-2, Policy/Procedure # 16, by personnel performing work on the high voltage traction power equipment and low voltage AC and DC equipment within the traction power substation and tie breaker room.

39.3 DEFINITIONS

39.3.1 Clearance Report: A report made by the personnel participating in the LOTO, who will inform the power coordinator that all personnel and equipment are clear of the work area.

39.3.2 Contractor : A person or business entity that is hired by WMATA to perform work, but is not an employee of WMATA.

39.3.3 Inspection Report: A report resulting from the inspection of the wayside when a LOTO key holder and/or piggy backer is absent during restoration and/or a piggy backer failing to make a clearance report at the scheduled stop time. The report is made by the Power Coordinator who advises ROCC and MOC of the results of the inspections, status of personnel, equipment, and work area.

39.3.4 Lockout/Tagout Procedure: A procedure involving the practice of using tags to increase the visibility and awareness that equipment is not to be energized and using keyed security devices to prevent accidental or unexpected activation of electrical equipment.



- 39.3.5 Piggyback: A term used to describe the procedure which allows additional work gangs to work in the work area of a person holding rights to the work area under a third rail power red tag outage, supervisory outage or no power outage.
- 39.3.6 Power Coordinator: A qualified WMATA employee responsible for executing LOTO procedures.
- 39.3.7 Roadway Worker in Charge (RWIC): A qualified employee responsible for the Roadway safety for all workers and work gangs within their working limits.
- 39.3.8 Tie Breaker Station: The facility which houses DC track feeder breakers.
- 39.3.9 Traction Power Substation (TPSS): The facility which transforms and rectifies local utility high voltage alternating current to 750 Volts Direct Current (VDC).

39.4 RESPONSIBILITIES

- 39.4.1 Supervisors and managers are responsible for:
 - 39.4.1.1 Familiarization and compliance with the guidelines established in OAP 200-2- P/P # 16, SOP # 28, SOP # 41, MSRPH and other applicable rules and procedures.
 - 39.4.1.2 Ensuring assigned personnel are properly trained in accordance with the requirements set forth in this procedure.
 - 39.4.1.3 Enforcement of LOTO procedure, applicable publications, policies and procedures.
 - 39.4.1.4 Maintaining current copies of this procedure and other associated policies and procedures, at work sites, field offices, reporting locations and other designated locations.
 - 39.4.1.5 Ensuring assigned personnel are adequately equipped with the tools, equipment, materials and instructions required to execute this procedure in the proper and safest manner possible.
 - 39.4.1.6 Approving and disapproving piggyback requests for scheduled and unscheduled maintenance activities.



- 39.4.1.7 Providing WMATA and contractor personnel assigned to perform LOTO duties, with copies of approved piggyback request forms, red tag outage switching orders and track rights and support request form if required.
- 39.4.2 WMATA and contractor personnel assigned LOTO duties are responsible for:
 - 39.4.2.1 Familiarization and compliance with the guidelines established in OAP 200-2-P/P # 16, SOP # 28, SOP # 41, MSRPH and other applicable rules and procedures.
 - 39.4.2.2 Ensuring the steps of this procedure are executed in a safe and expedient manner, while keeping in compliance with all related SOPs, OAPs, and MSRPH rules associated with performing LOTO duties.
 - 39.4.2.3 Enforcement of LOTO procedure and other applicable WMATA publications, policies and procedures.
 - 39.4.2.4 Ensuring each member of the WMATA and Contractor workforces has a valid ID card, and that contractor ID cards include a Traction Power Substation Equipment Safety Training Certification Label.
 - 39.4.2.5 Red tag outage switching orders, rail support request and track rights form if required and other required documents.
 - 39.4.2.6 Providing privately owned pad locks with keys for securing the group lockbox.
 - 39.4.2.7 Not leaving the area with keys, when privately owned pad locks are installed on the LOTO group Lockbox.
 - 39.4.2.8 Ensuring all initial and alternate key holders complete the process for turning over the key holding responsibilities in the event the initial key holders must leave the area or the work continues through a shift change.
- 39.4.3 The TSSM Power Coordinator is responsible for:
 - 39.4.3.1 Completing the LOTO Clearance and Inspection Checklist and documenting all other activities resulting from the execution, implementation, and enforcement and reporting of the LOTO procedures, Piggyback procedures, red tag procedures and other related activities.
 - 39.4.3.2 Ensuring all documentation provided for tracking and logging the LOTO activities, is completed, signed, filed in the designated site binder and submitted daily to other locations as required.



- 39.4.4 The Roadway Worker in Charge (RWIC) is responsible for:
- 39.4.4.1 Coordination of de-energization and restoration of power with the Power Coordinator.
 - 39.4.4.2 Making three attempts, using any means of communications available, to contact an absent key holder, when he/she cannot be contacted for the removal of a privately owned pad lock for LOTO restoration procedures.
 - 39.4.4.3 Making three attempts, using any means of communications available, to contact the responsible piggybacker when a clearance report has not been provided or he/she cannot be contacted at the scheduled stop time.
 - 39.4.4.4 Inspection of the work area performed when the responsible piggybacker has not provided a clearance report or cannot be contacted at the scheduled stop time.
 - 39.4.4.5 Reporting the results of the inspection to ROCC/MOC, advising that he/she will cut the privately owned pad lock installed on the group lock box.
- 39.4.5 ROCC/MOC are responsible for:
- 39.4.5.1 Familiarization and compliance with the guidelines set forth in this procedure.
 - 39.4.5.2 Familiarization and compliance with the guidelines established in OAP 200-2-P/P # 16, SOP # 28, SOP # 41, MSRPH and other applicable rules and procedures.
 - 39.4.5.3 Monitoring, and documenting the activities resulting from the execution, implementation, verification and reporting of the LOTO procedures, piggyback procedures, red tag procedures and other related activities.
 - 39.4.5.4 Verification of LOTO procedures through RWIC.
 - 39.4.5.5 Possessing information on track rights and request forms, red tag outage switching orders and other required documents.
 - 39.4.5.6 Providing authorization to the TSSM Power Coordinator after completion of the inspection of the work area, to complete the LOTO restoration procedure and/or restore third rail power in accordance with OAP 200-2, PP # 16, SOP # 28, when the responsible piggybacker has not provided a clearance report or cannot be contacted at the scheduled stop time.



39.5 PROCEDURES

Procedure #	Content
39.5.1	Lockout/Tagout De-Energization Procedures
39.5.2	Lockout/Tagout Restoration Procedures

39.5.1 Lockout/Tagout De-Energization Procedures:

39.5.1.1 All WMATA and Contractor personnel involved in the LOTO procedure shall perform all steps of this procedure, in a safe manner.

39.5.1.2 The TSSM Power Coordinator shall coordinate and ensure all steps are properly and safely executed:

39.5.1.2.1 Verify proper operation of telephones and hand held radios with ROCC and MOC.

39.5.1.2.2 Obtain copies of the LOTO De-Energization Procedure Checklist, power switching orders, support request and track rights form if required and approved piggyback request form and other required documentation.

39.5.1.2.3 Verify with the piggyback crew leader that the chain markers of the work area are correct.

39.5.1.2.4 Inventory and verify that the tools and equipment required for the LOTO and red tag power outage activities are present.

39.5.1.2.5 Verify that all personnel scheduled to participate in the LOTO activities are present at the affected traction power substation.

39.5.1.2.6 Using the copy of the red tag switching orders, identify the circuit breakers to be locked out and tagged out.

39.5.1.2.7 Using the Substation drawings, locate, de-energize and tag out the circuit breaker that provides 125 or 135 VDC control power for the affected traction power circuit breakers.

39.5.1.2.8 Inspect all circuit breaker cubicles scheduled to be locked and tagged out and verify that it is safe to install the lock out devices and pad locks.

39.5.1.2.9 Install the lock out devices, pad locks and tag out tags on the breaker cubicles in a safe manner.



- 39.5.1.2.10 Perform an inspection and verify the security of the lock out devices, pad locks and that no debris or other existing objects are in the cubicle.
- 39.5.1.2.11 Collect and place the breaker cubicle keys for the high security pad locks installed on the lock out devices, on the breaker cubicles, inside the “Key Lock Box”.
- 39.5.1.2.12 Place the Key Lock Box containing the padlock keys, into the “Group Lock Box”.
- 39.5.1.2.13 Ensure all privately owned pad locks used by the LOTO participants, are installed on the “Group Lock Box”.
- 39.5.1.2.14 Instruct RWIC to contact ROCC to request permission to go wayside to test the affected third rail sections for de-energization, in accordance with OAP 200-2, P/P #16, SOP # 28 and SOP # 41.
- 39.5.1.2.15 Instruct the RWIC to contact ROCC and confirm the affected third rail sections have been tested and confirmed de-energized and request permission to install the protective equipment if not already installed.
- 39.5.1.2.16 Instruct the RWIC to install or verify and confirm to ROCC, that protective equipment have been properly installed in the work area in accordance with the approved chain markers, SOP # 28 and SOP # 41.
- 39.5.1.2.17 Ensure that all LOTO participants, sign the LOTO log book listing their name, phone numbers, supervisor’s name, supervisor’s phone number, the number of the assigned pad lock installed on the Group Lock Box, expected time of departure, and make a check mark indicating the witnessing of the LOTO procedure.
- 39.5.1.2.18 Inform all personnel holding keys to the privately owned pad locks on the group lock box that all locks will have to be removed when the piggyback rights holder has completed the work and cleared the work area and that any key holder not present or cannot be contacted at that time, will have their locks cut and removed from the group lock box in accordance with the guidelines set forth in this procedure.



39.5.1.2.19 Inform all key holders that in the event the initial key holders must leave the area or the work continue through a shift change, the group lock box key shall be given to an alternate key holder. The original key holder shall document the LOTO log listing the name of the alternate key holder and time of departure. The new key holder shall also sign the LOTO log book listing the time and name of the person from which he received the group lock box pad lock key, his/her name, phone numbers, supervisor's, name, supervisor's phone number, the number of the assigned pad lock installed on the Group Lock Box and expected time of departure.

39.5.1.2.20 Shall notify ROCC/MOC and any other authorities, that the LOTO De-Energization procedures have been completed.

39.5.1.2.21 Shall complete the LOTO De-Energization procedure checklist and ensure all other related paper work has been properly documented, signed and filed in the site binder.

39.5.2 Lockout/Tagout Restoration Procedures:

39.5.2.1 The TSSM Power Coordinator shall:

39.5.2.1.1 Ensure the RWIC or designee is instructed to confirm with ROCC/MOC, following the clearance and inspection of the work area that all personnel and equipment are clear of the work area, protective equipment removed and the work area inspected for re-energization.

39.5.2.1.2 Obtain copies of the LOTO Restoration Procedure Checklist, Switching orders, support request and track rights form, LOTO log book and prepare to begin the restoration procedures.

39.5.2.1.3 Inventory and verify that the tools and equipment required for the LOTO and red tag power restoration activities are present.

39.5.2.1.4 Verify that all personnel required are to participate in the LOTO restoration procedures are present at the affected traction power substation and tie breaker room.

39.5.2.1.5 Determine if any personnel holding keys for the locks on the group lock box are absent or have not made a clearance report at the schedule stop time.



- 39.5.2.1.6 If key holder(s) are absent, make three attempts, using any means of communications available, to contact the absent key holder(s). If no response is received, instruct RWIC to perform an inspection of the wayside in an attempt to locate missing key holder(s) and to determine the status of the work area.
- 39.5.2.1.7 Upon completion of the inspection of the work area, if absent key holder(s) still cannot be located and/or if equipment was found in the work area:
 - 39.5.2.1.7.1 Advise RWIC to clear any tools and equipment and re-inspect the work area for re-energization of third rail power.
 - 39.5.2.1.7.2 Cut and remove a privately owned pad lock from the group lock box.
 - 39.5.2.1.7.3 Complete the LOTO restoration procedure and/or;
 - 39.5.2.1.7.4 Restore third rail power in accordance with OAP 200-2, PP # 16, SOP # 28 and SOP # 41 if required.
- 39.5.2.1.8 If the absent personnel were located, contact ROCC/MOC, and;
 - 39.5.2.1.8.1 Complete the LOTO restoration procedure and/or;
 - 39.5.2.1.8.2 Restore third rail power in accordance with OAP 200-2, PP # 16, SOP # 28 and SOP # 41 if required.
- 39.5.2.1.9 When permission is granted, cut the pad lock and complete the LOTO Clearance and Inspection checklist documenting the activities resulting from the inspection.
- 39.5.2.1.10 Instruct all personnel holding keys for pad locks installed on the group lock box, to remove their pad locks and document the LOTO log book as required.
- 39.5.2.1.11 Using the copy of the switching orders, identify the correct breakers cubicles and remove the lock out devices and pad locks in a safe manner.
- 39.5.2.1.12 Upon completion of the removal of the pad locks, lock out devices and the tagout tags, perform an inspection and verify that no debris or other objects are remaining in the breaker cubicles.



- 39.5.2.1.13 Release the red tag to ROCC/MOC for restoration of third rail power in accordance with OAP 200-2 P/P # 16 and SOP # 28.
- 39.5.2.1.14 Notify ROCC/MOC when third rail power restoration activities have been completed.
- 39.5.2.1.15 Inventory and secure all LOTO equipment.
- 39.5.2.1.16 Ensure the LOTO Restoration procedure checklist and other related paper work has been properly documented, signed and filed in the site binder.

39.6 REFERENCES

- 39.6.1 OAP 200-2 – Maintenance Operation Center Policy Procedure # 16 – Electrical Power Outage/Restoration.
- 39.6.2 SOP # 28 - Removal and restoration of third rail power for work by WMATA maintenance forces mainline revenue system.
- 39.6.3 SOP # 41 – WMATA Escorts
- 39.6.4 Lockout Tagout De-energization Procedure Checklist
- 39.6.5 Lockout Tagout Restoration Procedure Checklist
- 39.6.6 Lockout/Tagout (LOTO) Procedure Log Book Form
- 39.6.7 Lockout/Tagout Clearance and Inspection Report Checklist
- 39.6.8 TRAINING AND CERTIFICATION

WMATA and Contractor management and supervisory personnel shall develop and execute training programs that will provide employees with the knowledge and skills necessary to safely and effectively perform the steps of the Lockout/Tagout Procedure. These training programs at a minimum shall include but is not limited to, conducting reading sessions, question and answering session and signing a statement of understanding of the Lockout/Tagout procedure. This training is applicable to WMATA, Contractor and other personnel required to perform LOTO duties, individuals responsible for supervising and managing such activities and personnel that request such activities.





WASHINGTON METROPOLITAN AREA TRANSIT AUTHORITY STANDARD OPERATING PROCEDURES

39.6.9 TOOLS AND EQUIPMENT

The tools and equipment required for performing LOTO duties may include but are not limited to:

- All required PPE
- Portable radio
- Approved third rail voltage tester (Hot Stick)
- Bolt Cutters
- Multimeter
- Flashlight
- High Security Pad Locks
- Privately Owned Pad Locks
- Circuit Breaker Cubicle Lock Out Device
- Tagout Tags
- Block Tags
- Pad lock labeling kit
- LOTO Site Binder
- LOTO De-energization Procedure Checklist
- LOTO Restoration Procedure Checklist
- Key Lock Box
- Group Lock Box



9.8 REFERENCE 8: TRPM COMMUNICATION

TRPM Shift Turnover Report			
Location	[REDACTED]	Date	04/19/2017
Supervisor	[REDACTED]	Shift	DAYS
Crew Information			
Actual Crew Size	5	Vacancy-list name(s)	
Maximo – list work orders completed.			
PMs Completed	13307906, 13302925		
	13288736		
	13307922		
CMs Completed			
Switching- list switch order(s)			
Switch Orders			
Incident- If so, describe. Incident Response Form to be filled.			
Comments			
<p>ONE CREW ON STANDBY B07 ETS ISSUE.</p> <p>[REDACTED] TPSS BRKR #33 REPLACED 201X RELAY. BRKR #33 IN SERVICE.</p> <p>[REDACTED] TPSS BRKR #33 CLEANED AND EXERCISED. BRKR #33 IN SERVICE</p> <p>[REDACTED] STATION IN BUSTIE CONFIGURATION. BOTH INCOMING LINES AVAILABLE.</p> <p>[REDACTED] TPSS PMI ATTENDED ARCHING ISSUE. STATION READY TO NORMALIZE.</p>			
Supervisor Signature	[REDACTED]	Date	04/19/2017
Area Manager Review Signature	[REDACTED]	Date	04/19/2017
Upload to TRPM Shared Drive			

TRPM Shift Turnover Report			
Location	██████████	Date	04/19/17
Supervisor	██████████	Shift	MIDS
Crew Information			
Crew Size	9	Vacancy-list name(s)	1353 in class
Maximo – list work orders completed.			
PMs completed.	13300474 ██████ T/P BATT PM . 13307929 ██████ T/P DC INSPECTION		
CMs completed	██████ 13420217		
Switching- list switch order(s)			
Switch Orders	S.O.# 2017108509 A03T/B TO A06 T/B		
	S.O.# 2017109513 A08 AC1 FDR # 14896		
Incident- If so, describe. Incident Response Form to be filled.			
Comments			
<p>Two crews walked between ██████████ correcting the ETS discrepancies for forth coming surge work.</p> <p>██████ T/P Brkr.,#31 had to be closed by the crew.</p> <p>██████ standing by at ██████ for ETS.</p> <p>Did not have approved rights at B07 for PM crew work on the ETS problem.</p> <p>██████ T/P Brk #33 had to be closed by the crew.</p> <p>██████ T/P Brk #33 would not trip remotely / locally. ██████ x relay stays energized until brk is racked out . ██████ timer stays energized no matter if brk is racked out</p> <p>██████ T/P Brk # 33 / 35 would not close remotely / locally . crew found racking handle shutter was not completely down. had to hold shutter door down while closing breaker.</p>			
Supervisor Signature	██	Date	04/19/17
Area Manager Review Signature	██	Date	04/19/2017
Upload to TRPM Shared Drive			

TRPM Shift Turnover Report			
Location	██████████	Date	4/19/2017
Supervisor	██████████ (Acting)	Shift	DAY
Crew Information			
Crew Size	6	Vacancy-list name(s)	██████████ (VAC)
			██████████ (SICK)
Maximo – list work orders completed.			
PMs completed.	13331255, 13333452, 13333481		
CMs completed	13421466, 13334571, 13420627		
Switching- list switch order(s)			
Switch Orders			
Incident- If so, describe. Incident Response Form to be filled.			
Comments			
<p>PMI moved generator 21209 to support mobile command.</p> <p>TCR transfer switch at ██████████ is on reserve feed due to feeder 736 being down. 13418991</p> <p>██████████ TP: need OT ██████████ fuses for disconnect switch. 13418980.</p> <p>Restored 08 (feeder 730) at ██████████ TP, out since 12/16.</p>			
Supervisor Signature	██████████	Date	4/19/2017
Area Manager Review Signature	██████████	Date	19Apr2017
Upload to TRPM Shared Drive			

TRPM Shift Turnover Report			
Location	█ West Falls Church	Date	04/19/2017
Supervisor	█	Shift	EVE
Crew Information			
Crew Size	8	Vacancy-list name(s)	
Maximo – list work orders completed.			
PMs Completed	13304852, 13304819, 13304786, 13304823, 13304781, 13304870, 13304820		
CMs Completed			
Switching- list switch order(s)			
Switch Orders			
Incident- If so, describe. Incident Response Form to be filled.			
Comments			
<p>-Verify status of Feeder #396 at various locations. -Feeder #396 is energized -All incoming breakers in TP and AC rooms are racked out. -C █ AC is normalized</p>			
Supervisor Signature	█	Date	04/19/2017
Area Manager Review Signature	█	Date	05/09/2017
Upload to TRPM Shared Drive			

9.9 REFERENCE 9: FTA/CAP No. R-5-35-E



Deliverable 2 - Revision 1:
Quality Audit Report

R-5-35-e



METRO REGULATORY COMPLIANCE PROGRAM

CORRECTIVE ACTION PLAN (CAP) QUALITY AUDIT REPORT

LEAD AUDITOR	██████████	AUDIT CONTROL NO.	A-FWSO-20170317-03
CAP NO.	R-5-35-e	AUDIT PERIOD	01/07/2017-03/15/2017
ACTION COORDINATOR	██████████	ORIGINAL DUE DATE	01/07/17
RECOMMENDATION	CAP Closure	REPORT DATE	03/15/2017

OVERVIEW	
Category	Description
Objective	Verification of the adequacy and completion of CAP R-5-35-e compliance with FTA's Safety Directive 15-5 required action
Scope	Verify additional documentation provided in response to FTA comments demonstrate sufficient evidence to support closure of R-5-35-e.
Required Action	Metro must replace all defective power cables that have been identified by traction power inspectors and maintainers.
Executive Summary	The submitted documentation is recent and provides sufficient evidence to request closure on CAP R-5-35-e.

ACTIONABLE ITEM REVIEW		
Actionable Item	Documentation Submitted	QICO Verification & Remarks
Deliverable # : 1 Quarterly report on replacement of defective insulator cables/boots	Record: Submissions included the following: <ul style="list-style-type: none"> • Matricies capturing repairs (Dates from 10/2016 to 03/2017) • 139 Closed Maximo work orders for cable repairs (Dates from 10/2016 to 03/2017) • 13 open Maximo work orders for cable repairs (Dates from 10/2016 to 03/2017) • 22-page document outlining closed work order list for cable repairs (Dates from 10/2016 to 03/2017) • 2-page document outlining open work order list for cable repairs (Dates from 10/2016 to 03/2017) 	The submitted a quarterly report with cable repair matrices capturing repairs made from October 2016 to March 2017. A status update was provided of the defective insulator cables/boots replacement program and the repairs made to the newly, permanent, and temporary installed power cable replacement repairs. This submission has been reviewed by QICO and it is concluded to be sufficient to request closure on CAP R-5-35-e.

PERFORMANCE MEASURES	
Measure	QICO Verification & Remarks
Percentage completion of replacements and non-compliance reports issued by QAAW	Percentages are broken down by line and are illustrated in the attachment entitled 'Summary Of Orange Boots_R-5-35-E'



METRO REGULATORY COMPLIANCE PROGRAM
CORRECTIVE ACTION PLAN (CAP) QUALITY AUDIT REPORT

REPORT DISTRIBUTION:

QICO: [REDACTED]
TRPM: [REDACTED]

PREPARED BY:	QICO OFFICER	[REDACTED]	[REDACTED]
--------------	--------------	------------	------------

APPROVED BY:	QICO MANAGER	[REDACTED]	[REDACTED]
--------------	--------------	------------	------------



Deliverable 2:
Quality Audit Report

R-5-35-e



FTA SMI CAP VERIFICATION

QUALITY AUDIT REPORT

Control No. A-FSMI-20161216-01

AUDIT TEAM QICO [REDACTED] (Lead)

AUDIT PERIOD 12/05/2016 – 12/16/2016

REQUIRED ACTION Replace all defective power cables that have been identified by traction power inspectors and maintainers

CAP NO. R-5-35-e

DEPARTMENT TRPM

ACTION OWNER [REDACTED]

REPORT DATE December 23, 2016
Month Day Year

AUDIT RECOMMENDATION CAP Closure

OVERVIEW	
Category	Description
Audit Objective	Verify Traction Power Maintenance (TRPM) compliance with approved Corrective Action Plan for CAP #R-5-35-e.
Audit Scope	Conduct interviews and review relevant documentation as objective evidence – to verify completeness and adequacy of deliverables – in compliance with CAP # R-5-35-e commitments.
Executive Summary	QICO has reviewed and analyzed all documentation submitted for this CAP and determined that the information provided satisfies CAP # R-5-35-e deliverables. The audit documentation submittals and responses from TRPM is considered complete in satisfying R-5-35-e commitments, and this CAP is recommended for closure. Refer to the "Audit Results" section of this report below for details.

AUDIT RESULTS		
Deliverable	Documentation	Status & Comments
Deliverable # 1: "Quarterly report on replacement of defective insulator cables/boots"	Record: TRPM submitted the following documentation for QICO review. <ul style="list-style-type: none"> Cable repair maxtrix from January 2015 to July 2015 QICO Cable Repair verification report 	CLOSED: QICO has reviewed and analyzed the documentation provided by TRPM, and concur that it satisfies the requirements for deliverable #1 of FTA CAP #R-5-35-e.

PERFORMANCE MEASURES	
Measure	Status & Comments
"Percentage completion of replacements and non-compliance reports issued by QAAW"	CLOSED: Based on the Cable repair matrix provided by TRPM they have replaced a total of 117 jumper cables out of 125. TRPM current percentage completion of jumper cables, which required repair is 94%. After careful review of the documents provided, QICO believes that the performance measure has been addressed.

REPORT DISTRIBUTION:

QICO: [REDACTED]
TRPM [REDACTED]

PREPARED BY:	QICO OFFICER	[REDACTED]	[REDACTED]
APPROVED BY:	QICO MANAGER	[REDACTED]	[REDACTED]