

## Tri-State Oversight Committee



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## Three-Year Safety and Security Review of the Washington Metropolitan Area Transit Authority

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### Shop Safety and Equipment Inspections

Elements 14, 16, 18, and 19

**Review Conducted: September-October 2014**

Draft Report: November 14, 2014

**Final Report: January 26, 2015**

## **Introduction**

Representatives from the Maryland Department of Transportation (MDOT), the District of Columbia Department of Transportation (DDOT), and the Virginia Department of Rail and Public Transportation (DRPT) comprise the Tri-State Oversight Committee (TOC), which provides regular oversight of the Washington Metropolitan Area Transit Authority (WMATA) Metrorail system. To comply with State Safety Oversight Final Rule 49 Code of Federal Regulations Part 659 (Part 659), the Federal Transit Administration (FTA) requires states to designate a State Safety Oversight (SSO) agency to administer safety and security programs for rail transit and fixed guideway systems within their jurisdictions. Specifically, 49 CFR Part 659 requires TOC to conduct an on-site safety review of each element of the WMATA System Safety Program Plan (SSPP) at least once every three years. These reviews must assess WMATA's implementation with all 21 elements of its SSPP and seven elements of its Security and Emergency Preparedness Plan (SEPP), along with related plans and procedures. Beginning in 2013, the TOC has split its Three-Year Safety and Security Review topic areas into separately occurring reviews spread out during a three-year period.

The following report documents the observations and findings of the TOC's review of shop safety and equipment inspections. Generally, this review focused on industrial safety within Service & Inspection (S&I) shops and the proper inspection of equipment contained within those facilities. These topics are primarily the responsibility of the offices of Plant Maintenance (PLNT) and Car Maintenance (CMNT), with support from the Department of Safety and Environmental Management (SAFE). The relevant SSPP elements for this review were all or part of:

- Element 14: Facilities and Equipment Inspections
- Element 16: Training and Certification
- Element 18: Local, State, and Federal Requirements
- Element 19: Hazardous Materials

The TOC Program Standard and Procedures defines WMATA requirements for these elements in Section 12 and in Appendix B. Specific requirements are cited further, below.

## **Methodology**

In advance of the review, the TOC requested and reviewed relevant WMATA plans, procedures, checklists, and reports. The on-site portions of the review occurred Sept. 24-26, Oct. 2, and Oct. 8, 2014. During the on-site review sessions, the review team interviewed WMATA personnel and reviewed various documents and records to assess compliance with procedures. Persons interviewed and documents reviewed are noted at the end of this report. As the review progressed, TOC representatives discussed preliminary findings and addressed questions from WMATA personnel. This report identifies conditions evident during the review period, regardless of the current progress of potential remediation activities.

Findings are categorized as Findings of Non-Compliance or Findings of Compliance with Recommendation. A Finding of Non-Compliance refers to an instance of WMATA operating out of compliance with an applicable internal or external written requirement, plan, policy, rule, standard, or procedure. Findings of Non-Compliance may be safety-critical in nature. If a Finding of Non-Compliance is identified, WMATA is required to develop an appropriate Corrective Action Plan (CAP) and take action to achieve compliance with the applicable requirement.

A Finding of Compliance with Recommendation refers to a condition whereby WMATA may technically be conducting business in compliance with existing WMATA, TOC, or FTA procedures and requirements; however, there may be no relevant written plan, policy, or procedure in place, or the existing plan, policy, or procedure is not in accordance with industry best practices or standards (such as those by the American Public Transportation Association). Even if there is no “non-compliance” issue, these findings may also be safety-critical in nature. In response to a Finding of Compliance with Recommendation, WMATA is required to formally respond in writing, and is strongly urged to develop an appropriate CAP to update relevant plans, policies, rules, and/or procedures, or to address a particular identified resource or organizational issue. If WMATA determines no CAP is necessary, the agency must complete a hazard analysis in accordance with its hazard management procedure in order to justify taking no action and accept the level of risk associated with the finding.

This review, including all findings presented in this report, intends to assist WMATA with enhancing system safety throughout Metrorail operations. **Upon receipt of this final report, WMATA has 45 days to respond with Corrective Action Plans in response to all findings. Corrective Action Plans must include the proposed action, the person/department responsible, and the targeted completion date. Within 45 days, WMATA must also respond with actions taken in response to each of the S&I facility deficiencies observed during the field inspections and noted under the “Current Conditions” section.**

The TOC would like to thank WMATA personnel for their time, cooperation, and forthrightness throughout the review process.

### **Current Conditions**

PLNT is responsible for the maintenance of building structures as well as larger or facility-related equipment, such as lifts, air handling systems, and overhead cranes. There is no maintenance plan compiling all assets and describing the preventive maintenance process, but the assets are listed in a spreadsheet and programmed in MAXIMO to print out based on their assigned frequencies (see Finding NC-4 below). PLNT has about 20 different craft trades (i.e. carpenters, masons, etc.) each with a leader in addition to general mechanics working within seven geographic regions, each with a supervisor and Assistant Superintendent. There is a Superintendent responsible for all seven regions. WMATA only hires mechanics with prior experience; as a result,

instruction for new hires involves only on-the-job training (OJT) to acclimate them to the transit industry and safety courses required by the Occupational Safety and Health Administration (OSHA) [OSHA-required safety training was covered during the TOC Three-Year Safety and Security Review of System Safety elements in 2013]. WMATA reported that contracts for new equipment procurements typically include vendor-provided training on the new assets, and then are covered by OJT. The TOC will explore PLNT's overall OJT structure in greater detail during the November 2014 stations maintenance review.

PLNT reports that its inspection checklists act as inspection procedures because the steps are sufficiently detailed. However, TOC observed that checklists note what inspectors must assess but not how to do so or proper thresholds for measurements (See Finding NC-1 below for details). PLNT checklists include an asset number, which translates to an asset location in MAXIMO. PLNT has been working to improve document control, including annual review of checklists. Because this improvement is already monitored under CAP 13-017, resulting from a 2012 Internal Safety and Security Audit, TOC will not open a new CAP regarding this issue, but rather will continue to track, monitor, and verify the implementation of the existing CAP.

PLNT convenes a different type of monthly meeting each week of the month, down to the level of PLNT supervisor meetings with their staff to discuss issues and disseminate information. TOC observed a sample of minutes from the supervisor-staff meetings as well as Local Safety Committees (LSC), verifying that issues are consistently noted on meeting minutes until resolved. LSC minutes were also posted in all maintenance facilities the TOC visited.

CMNT is responsible for industrial safety within its S&I shops, as well as all tools and equipment its personnel use that are not under PLNT's purview. CMNT asset inspections each involve a detailed Job Plan that act as the preventive maintenance procedure, though there are no designated spaces for mechanics to list any information (See Finding NC-3 below). CMNT assesses industrial safety in its facilities through less formal daily checks as well as formal monthly "12-point inspections." CMNT addresses deficiencies involving or caused by its personnel, but issues involving other departments (such as lighting) require CMNT to call the Maintenance Operations Center to log a new ticket number.

In addition to CMNT inspections, Deputy and Executive Compliance Officers conduct monthly inspections and act as a resource for their designated shop locations. The SAFE Environmental Management and Industrial Hygiene (EMIH) group also reviews and approves hazardous materials, including restrictions of use, and is dispatched by the Maintenance Operations Center for spills or particulate monitoring if requested. The SAFE Safety Officer assigned to each shop conducts less formal walk-through inspections for industrial safety issues and informs department managers of deficiencies.

TOC reviewed three consecutive months worth of records for five assets each under care of PLNT and CMNT and 12-point inspection records, as well as biannual fire drill records and others all listed under the Documents Reviewed section. Very few inspections were late including some slightly exceeding the one-week lateness tolerance identified by PLNT during the Silver Line opening; as such, PLNT and CMNT inspections otherwise exhibited excellent on-time compliance.

During preventive maintenance inspections, minor repairs and adjustments were noted on checklists or work orders. Any inspection that required further corrective action received a new work order in MAXIMO.

The TOC conducted inspections of the Branch Avenue, Alexandria, and West Falls Church S&I facilities. Overall, conditions at all three facilities excelled in industrial safety housekeeping. Only a few issues were systemic or serious; those are described as findings later in this report. **For all other minor deficiencies that follow, TOC requests that WMATA not initiate a CAP but simply report action taken to correct the issue:**

#### Alexandria Yard

- A pressure washer was standing in front of a power disconnect switch near the southwest shop doors. There was no floor marking prohibiting placement of items in this location.
- Although a well-organized and high-profile bottle labeling station was apparent in this facility, some unlabeled bottles were observed in the pit areas. CMNT reported that bottle labeling has improved over the past few months at this facility.
- Non-flammable items such as tarps were located in a flammable storage cabinet near the employee tool storage and workbenches.
- An emergency exit door in the basement level northeast corner was jammed shut. PLNT reported that a work order ticket was initiated following this observation.

#### West Falls Church Yard

- A crate blocked the walkway alongside Track 21E, forcing passerby to move close to train third rail collector shoes.
- Oil was leaking from a pipe onto the floor in the basement near the northeast exit stairwell.
- Two fire extinguishers in the PLNT Maintainers room were last inspected in 2013.

#### Branch Avenue Yard

- A fire extinguisher on forklift G30E/CX-06080 located near the spare parts storeroom was last inspected in February 2014.

### **Findings of Non-Compliance (NC)**

**Finding of NC 1: PLNT does not have inspection procedures to guide technicians' preventive maintenance inspections.** Although PLNT reports that its checklists are sufficiently detailed, the checklists describe what to do but not how to do it. For example, procedures would note the Personal Protective Equipment (PPE) and tools required, how to conduct inspection checklist steps, and measurements tolerances that are acceptable. Original Equipment Manufacturer manuals exist but are not WMATA-specific or commonly referred to during inspections. WMATA SSPP Section 14.4 states, "Checklists are developed from procedures manuals, standards and manufacturers' manuals and are used to perform and document the inspections described above." 49 CFR Part 659.19(n) requires procedures and checklists for inspections.

Recommended Corrective Action: PLNT should develop inspection procedures guiding preventive maintenance inspections, describing what PPE and tools are necessary, how to conduct each step, and tolerances that are acceptable. PLNT may be able to transform existing checklists to include this information, similar to the Job Plans in use by CMNT. Each procedure should include managerial approval and document control measures. WMATA should provide TOC with the updated inspection procedures for review.

**Finding of NC 2: PLNT mechanics use monthly inspection checklists for many inspections that should have been annual, semi-annual, or quarterly inspections.** The TOC's record review found several assets – including multiple rail lifts at the Branch Avenue and West Falls Church S&I facilities in July-August 2014 -- that were assessed using monthly checklists but shown as completed in MAXIMO as an annual, semi-annual, or quarterly inspection. Because less frequent inspection types feature different steps, it is important for the required, proper checklist to be used for each inspection.

Recommended Corrective Action: Ensure that the proper frequency checklist is used for each inspection by verifying that MAXIMO prints the proper checklist and reminding mechanics of the requirements. WMATA should provide TOC with evidence of steps taken to ensure that the correct checklists are being used.

**Finding of NC 3: CMNT inspections have procedures but no guiding checklists to confirm steps taken or measurements recorded.** Although the Job Plan procedures are detailed, only the MAXIMO work order shows inspection completion. It is possible for mechanics to inadvertently skip steps or leave measurements unknown without a checklist. WMATA SSPP Section 14.4 states, "Checklists are developed from procedures manuals, standards and manufacturers' manuals and are used to perform and document the inspections described above." Above this statement, maintenance facilities and various types of equipment are listed under Section 14.2 as being subject to inspection.

Recommended Corrective Action: CMNT should develop inspection checklists guiding preventive maintenance inspections and transform its detailed Job Plans to include spaces to check off steps and record vital information. WMATA should provide TOC with the new inspection checklists for review.

**Finding of NC 4: There is no maintenance plan identifying all assets and their preventive maintenance techniques and procedures.** Equipment and infrastructure assets are programmed in MAXIMO for PLNT and CMNT to print out based on their assigned frequencies. 49 CFR Part 659.19(n) requires the SSPP or a document referenced in the SSPP to contain:

- (1) Identification of the facilities and equipment subject to regular safety-related inspection and testing;*
- (2) Techniques used to conduct inspections and testing;*
- (3) Inspection schedules and procedures;*

49 CFR Part 659.19(o) requires “a description of the maintenance audits and inspections program, including identification of the affected facilities and equipment, maintenance cycles, documentation required, and the process for integrating identified problems into the hazard management process.”

WMATA should create these descriptions for PLNT and CMNT at a minimum, as TOC will look for these descriptions in other departments’ maintenance plans during future audits.

Recommended Corrective Action: WMATA must create a list or description, in the SSPP or maintenance plans to be referenced in the SSPP, all individual assets requiring inspection along with their preventive maintenance inspection frequencies, inspection techniques, and procedures. WMATA must provide the updated SSPP and/or maintenance plans to the TOC for PLNT and CMNT, at a minimum.

**Finding of NC 5: The WMATA Hazard Communication Procedure is outdated. The procedure was last revised in 2005.** There are obsolete processes described in the procedure, such as the use of printed MSDS despite personnel now being expected to use electronic versions. There are also references to departments that no longer exist. 29 CFR Part 1910.1200 requires the hazard communications procedure and that employers train employees on the hazardous chemicals in their work area before their initial assignment. WMATA is not fully in compliance with the requirement because it is not training personnel on a procedure containing current hazard communication practices.

In addition, the federal government in 2012 released new requirements for hazard communication procedures. WMATA is required to implement these requirements by 2015. WMATA reported that draft revisions were already underway at the time of this review.

Recommended Corrective Action: Continue and complete revisions to the Hazard Communication Procedure revision, incorporating all existing practices and the requirements of the 2012 Final Rule. WMATA should provide TOC with the new Hazard Communication Procedure for review.

**Finding of NC 6: There appears to be a low rate of mechanic awareness regarding how to access Material Safety Data Sheets.** Two out of four mechanics whom TOC asked to access MSDS were unable to do so. It is important that WMATA ensures that personnel understand how to access MSDS, as they have a right to know about the hazards involved with materials in their use. 29 CFR Part 1910.1200 requires that safety data sheets be readily accessible and that employers train employees on the hazardous chemicals in their work area before their initial assignment. Further, WMATA reported that New Employee Orientation contains a hazardous materials overview; however WMATA did not provide the TOC with instruction material specifically intended for personnel who may be working with hazardous materials. WMATA may not fully be in compliance with 29 CFR Part 1910.1200 due to personnel lack of awareness regarding hazard communication practices, as demonstrated during the field review.

Recommended Correction Action: WMATA should take immediate steps to ensure that mechanics and other relevant employees know how to access the MSDS in accordance with OSHA Standard 1910.1200. This includes bulletins and/or reinstruction for existing employees, and an evaluation of initial and refresher training to determine whether changes are needed to better ensure employee awareness. WMATA should provide TOC with documentation of the steps taken to better ensure employee awareness of the MSDS.

**Finding of NC 7: Battery storage rooms at Alexandria and West Falls Church contained vents for natural ventilation but lacked any mechanical ventilation system.** TOC's inspection found that the storage rooms contain battery chargers and/or stored batteries. Hydrogen gas forms when batteries are charging and can pose risk of fire and explosion when concentrations exceed 4 percent. International Code Council International Fire Code section 608.6.1 states:

*Ventilation shall be provided to limit the concentration of hydrogen gas to 1.0 percent of the total volume in the room. Continuous mechanical ventilation shall be provided to maintain hydrogen gas to 1.0 percent of the total volume in the room.*

Recommended Corrective Action: WMATA should conduct air quality testing in storage rooms that contain batteries and batteries under charge to determine the accumulated level of hydrogen gas. Should the volume of hydrogen gas make up more than 1.0 percent of the total volume of air in the battery room, WMATA must install a mechanical ventilation system that provides exhaust to the outside of the building. WMATA must provide the results of the air quality testing in writing to TOC. If the results mandate installation of a mechanical ventilation system, WMATA must also provide verification that the ventilation system has been installed.

**Finding of NC 8: Records for heavy lifting equipment certification at West Falls Church and Branch Avenue S&I shops were not available for review.** OSHA 1910.179(k)(2) states:

*Rated load test. Equipment test loads shall not be more than 125 percent of the rated load unless otherwise recommended by the manufacturer. The test reports shall be placed on file where readily available to appointed personnel.*

Recommended Corrective Action: WMATA should store shop equipment load testing certification documents at each facility, and provide evidence of such recordkeeping to TOC for verification.

**Finding of NC 9: Incompatible hazardous materials were not stored separately at multiple S&I locations.** TOC inspections of the West Falls Church, Branch Avenue, and Alexandria S&I facilities found flammable liquid and aerosol material stored together in various flammable material storage cabinets located on the shop floor. International Code Council International Fire Code section 2703.9. 8 states:

*Incompatible hazardous materials in storage and storage of materials that are incompatible with materials in use shall be separated when stored.*

Recommended Corrective Action: WMATA should separate incompatible hazardous materials into their respective compatible flammable storage cabinets, and take steps to ensure continued compliance such as reinstruction of personnel, and emphasis during upcoming CMNT 12-point shop inspections. WMATA should provide TOC with evidence of the separation of the incompatible hazardous materials and the steps taken to ensure continued compliance.

**Finding of NC 10: Oxygen and acetylene compressed gas cylinders were stored together at some S&I locations.** TOC inspections found the incompatible gas cylinders stored near each other in the basement storeroom of the Alexandria S&I facility and at the exterior of the Branch Avenue facility. International Code Council International Fire Code section 2703.9 states:

*Incompatible hazardous materials in storage and storage of materials that are incompatible with materials in use shall be separated when stored. Compressed gases shall be separated greater than 20 feet.*

Recommendation for Corrective Action: WMATA must separate incompatible flammable gases 20 feet from each other in a protective compressed gas cylinder cage at all its facilities. WMATA should provide TOC with evidence of the separation of the incompatible hazardous materials and the steps taken to ensure continued compliance.

**Finding of NC 11: Evacuation plan maps throughout S&I facilities are difficult to decipher.** At Branch Avenue and Alexandria S&I facilities, maps showed no orientation to the user's location (i.e. "You are here"). They were also difficult to decipher, either due to scale/size or lack of a map key.

Recommended Corrective Action: Update all evacuation plan maps to identify the user's location (i.e. "You are here"), to improve legibility, and identify the meaning of important icons. WMATA should provide TOC with the updated evacuation plan maps for review.

**Finding of NC 12: There were no evacuation plan maps visible in the West Falls Church Yard S&I facility.** WMATA should ensure that evacuation plan maps are posted consistently throughout all facilities to aid in emergencies.

Recommended Corrective Action: Ensure that evacuation plan maps are posted consistently in all railcar S&I facilities. WMATA should provide photographic evidence of maps added to the West Falls Church Yard shop, as well as a memo or other report indicating that all railcar S&I facilities have been checked for the presences of evacuation maps and, if necessary, the maps have been added.

### **Findings of Compliance with Recommendation (CWR)**

**Finding of CWR 1: CMNT Job Plans do not have document control features such as revision numbers/dates or managerial approval.** This is important in order for CMNT to verify that mechanics are using the most recent inspection instructions.

Recommended Corrective Action: Initiate a document control process to add revision numbers/dates and manager approval of all procedures. This may be done in conjunction with the corrective action for Finding of NC-3. WMATA should provide TOC with evidence of the new document control process for the Job Plans.

**Finding of CWR 2: There was excessive water leaking from the roof in the Alexandria Yard S&I facility.** PLNT and CMNT have attempted to mitigate this issue by turning off a power stinger beneath one of the leaks and pushing standing water into floor drains. However, there were still several puddles of standing water observed. A yard upgrade project is underway and is scheduled to include a roof replacement in the spring.

Recommended Corrective Action: 1) Initiate additional, immediate actions to mitigate this hazard such as deploying tarps and funneling to an exterior location, and 2) complete the roof repair/replacement project as soon as possible. WMATA should provide TOC with evidence of the actions taken to mitigate the leaking in the interim period, as well as evidence of the completion of the roof repair/replacement.

**Finding of CWR 3: The Branch Avenue S&I facility contains a large pressure (hydro-blaster) parts washer that does not have an associated Job Plan for ongoing preventive maintenance safety inspections.**

Recommended Corrective Action: PLNT should create a Job Plan inspection procedure and checklist based on the recommendations from the original equipment manufacturer. WMATA should provide TOC with the Job Plan for review.

**Finding of CWR 4: Record reviews showed that some issues identified as high-priority by some departments (the users) remained open under other departments' (the maintainers) responsibility for months.** For example, the corrective maintenance log in question showed a broken power washer listed as a high-priority request from CMNT, but it remained open under PLNT responsibility after multiple weeks. Discussion among managers during this review resulted in the understanding that some departments consider their own problems to be exigent even though they are less urgent among all other open repairs. However, the department responsible for the maintenance should follow the requesting department's desired priority and complete the work within a corresponding timeframe.

Recommended Corrective Action: Management from PLNT, CMNT, POWR, and other offices as needed should convene a meeting to clarify their maintenance priorities and those of other departments requesting corrective maintenance. WMATA should provide TOC with meeting minutes and/or a resulting change in procedure from the meeting.

#### Persons Interviewed

- [REDACTED]
- [REDACTED] Safety Officer
- [REDACTED] Safety Officer
- [REDACTED] Car Maintenance
- [REDACTED] Corporate Quality Assurance
- [REDACTED] Plant Maintenance
- [REDACTED] Car Maintenance
- [REDACTED] Car Maintenance
- [REDACTED] Safety Specialist
- [REDACTED] Plant Maintenance
- [REDACTED] Quality Assurance and Warranty
- [REDACTED] Car Maintenance
- [REDACTED] Car Maintenance
- [REDACTED] Car Maintenance
- [REDACTED] CMNT [No title provided; TOC requests title from WMATA]
- [REDACTED] CMNT [No title provided; TOC requests title from WMATA]
- [REDACTED] CMNT [No title provided; TOC requests title from WMATA]
- [REDACTED] SAFE [No title provided; TOC requests title from WMATA]

#### Documents Reviewed

- 71 CMNT Job Plans for various equipment assets

- CMNT 12-Point Safety and Health Inspection Checklist records, June-August 2014, for Shady Grove, Glenmont, and Branch Avenue yard maintenance facilities
- CMNT shop safety inspection punch lists, June-August 2014, for Shady Grove and Branch Avenue yard maintenance facilities
- WMATA Hazard Management Procedure, July 2011
- WMATA Hazard Communication Program, Policy/Instruction 4.2/1, May 2005
- Draft WMATA Hazard Communication Program revision, Policy/Instruction 4.2/1, October 2014
- WMATA Construction Safety and Environmental Manual, March 2013
- Product approval samples (wipe clean glass cleaner; gum remover; SL-608 Cherry, and Orange Action II)
- Recently approved Safety Data Sheets (screenshot)
- Rejected Safety Data Sheets (screenshot)
- MSDS Evaluation Sheet samples (4680, 4681, 12305, and 13592)
- 33 PLNT blank maintenance checklists
- Sample of PLNT completed maintenance checklists
- PLNT corrective maintenance work order logs for Shady Grove, Glenmont, and Branch Avenue yard maintenance facilities
- SAFE/CQAL Corrective Action Request and associated hazard documentation for shop fuel nozzles
- Hazard documentation for shop entrance procedure signage
- Safety Data Sheets and secondary labels: Premiere ice melter and Oxysmart
- Monthly Deputy and Executive Environmental Compliance Officer Checklists: August-October 2014, for West Falls Church, Alexandria, and Branch Avenue yard maintenance facilities Sept-Oct WFC
- Consolidated Plan, Alexandria Rail Yard, July 2014
- SAFE Detailed Safety Inspection, West Falls Church CMNT building B; May 28, 2013
- WMATA System Safety Program Plan, January 2014
- WMATA Environmental Management Policy Manual, July 2013
- PLNT SOP 209-06, Engaging Employees in Safety Meetings, December 2013
- Records for Branch Avenue equipment inspections: rail lifts (several), overhead cranes (3), air compressor (2), wash bay, synthetic rope slings (2), wire rope slings (2), and sand blaster, June-August 2014
- Records for Alexandria hoist proof load testing, May-June 2014
- Log for Branch Avenue equipment calibration
- Records for Alexandria equipment inspections: rail lifts (12), overhead cranes (3), air compressors (2), power washer, sand blast, drill press, electrohydraulic table lift, pneumatic table lift, scissor lifts (2), and boiler, June-August 2014
- Records for Alexandria wheel lathe weekly and monthly inspections, 2014
- Records for West Falls Church equipment inspections: overhead cranes (3), numerous rail lifts, air compressors, power washer, sand blaster, drill press, electrohydraulic table lift, pneumatic table lift, and scissor lifts (2), June-August 2014

- Records for 2014 fire drills: Branch Avenue and Alexandria