2017
TRIENNIAL ON-SITE SYSTEM SAFETY REVIEW OF SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

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Final Report

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20174 TRIENNIAL ON-SITE SYSTEM SAFETY REVIEW OF SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

ACKNOWLEDGEMENT

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EXECUTIVE SUMMARY

The California Public Utilities Commission's Safety and Enforcement Division, Rail Transit Safety Branch (RTSB) personnel (Staff) conducted an on-site system safety program review of San Francisco Bay Area Rapid Transit District (BART) in September 2017.

The onsite review, which included an initial Staff meeting with BART personnel, began September 11, 2017, and continued through September 22, 2017. The review focused on verifying BART's implementation of its System Safety Program Plan (SSPP), as well as BART's compliance with State and Federal rules and regulations. The review revealed areas of non-compliance, as discussed below.

A post-review conference meeting took place on November 3, 2017, during which Staff provided BART personnel with a summary of all its findings. Recommendations for Corrective Action Plans are included as part of this report.

Section 2 of this report, titled Introduction, provides a summary of the authority under which the California Public Utilities Commission (CPUC or Commission) performs the triennial reviews and presents a brief chronology of the review. Section 3, Background, includes a description of the BART system. Section 4 explains the procedures used by Staff during the System Safety Review. Staff's 42 findings of non-compliance and 47 recommendations are presented in Section 5, organized by source checklist numbers. Finally, the Appendices include a list of abbreviations and acronyms used in the report and checklists, tabulated findings and recommendations, and the complete set of review checklists with summaries of all review activities and the original comments, findings, and recommendations.

This report reflects Staff's triennial safety review. Staff's triennial security review is contained in a separate report.[1]

[1] On October 16, 2018, the Commission approved Staff's security review and report, "2017 Triennial Security Review Of Bay Area Rapid Transit District," in Resolution (Res.) ST-216, available online at: http://docs.cpuc.ca.gov/SearchRes.aspx?docformat=ALL&DocID=233348029

INTRODUCTION

The Commission's General Order (GO) 164-E[2] *Rules and Regulations Governing State Safety Oversight of Rail Fixed Guideway Systems*, and the Federal Transit Administration's (FTA's) Rule, Title 49 Code of Federal Regulations (CFR) Part 659, *Rail Fixed Guideway Systems: State Safety Oversight*, require the designated State Safety Oversight Agencies to perform reviews of each rail transit agency's system safety program at minimum once every three years. The purpose of the Triennial Review is to verify compliance and evaluate the effectiveness of each rail transit agency's SSPP, and to assess the level of compliance with GO 164-E as well as other Commission safety requirements. Staff conducted the previous On-Site System Safety Review of BART in January and February of 2014.

Staff notified BART's General Manager by letter, dated August 11, 2017, of the scheduling of the Commission's Safety and Security Reviews that both the Safety and Security Reviews would take place between September 11 and September 22, 2017. This notification included preliminary versions of the review checklists for BART to review and provide comments. Staff and BART personnel eventually agreed upon 39 checklists for the Triennial Safety Review, organized according to the 21 essential SSPP elements identified in 49 CFR 659.19 and included within BART's SSPP. The checklists are included in Appendix C.

The review began with an opening meeting on September 11, 2017, attended by CPUC Staff and BART's General Manager, Assistant General Manager of Operations, Chief Safety Officer, Chief of Police, Manager of Security Programs, and additional personnel.

Staff followed with on-site system safety inspections and records review, which continued through September 22, 2017. Staff provided attending BART personnel a verbal summary of any preliminary findings and discussed potential recommendations for corrective actions at the conclusion of each review activity.

On November 3, 2017, Staff conducted a post-review exit meeting with BART management to verbally convey all the findings of the review.

[2] GO 164-D was in effect at the time Staff initiated the review. It has since been updated by GO 164-E. There is no significant difference between GO 164-D and GO 164-E with respect to the requirements regarding Triennial System Security Reviews for Rail Transit Agencies.

BACKGROUND

SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT
SYSTEM DESCRIPTION

The Original System

BART began revenue operations on September 11, 1972, along 28 miles of track in Alameda County, servicing Oakland to Fremont. The second segment opened on January 29, 1973, with 12 miles of track extending to Richmond. A 17-mile segment opened on May 21, 1973, offering service from Oakland to Concord. On November 5, 1973, a new, temporarily disconnected 7.5 mile segment opened between Montgomery Street in Downtown San Francisco and Daly City. The Transbay Tube opened on September 16, 1974, fully connecting the 71.5 miles of track of the original BART system. Embarcadero Station opened on May 27, 1976, bringing the total station count to 34 without any additional track.

Completed Extensions

An extension to the Concord line, continuing to the North Concord/Martinez Station, opened on December 16, 1995, adding 2.25 miles of track to the BART system. The Colma Station opened for revenue service on February 24, 1996, adding 1.6 miles of track south of the Daly City Yard. The Pittsburg/Bay Point Station opened on December 7, 1996, completing the 7.8 mile extension from Concord station which included the North Concord/Martinez Station. The Dublin/Pleasanton extension opened on May 10, 1997, adding 14 miles of track and two stations to the system. The San Francisco Airport extension opened on June 22, 2003 adding four stations and 8.7 miles of track. Finally, the Warm Springs/South Fremont extension opened on March 25, 2017 adding one station and 5.4 miles of track.

The current BART system operates on 107.2 miles of track with 44 stations, on the following six lines:

- Warm Springs/South Fremont - Daly City Line
- Dublin/Pleasanton—Millbrae Line
- Richmond—Millbrae Line
- Pittsburg/Bay Point—SFO Line

- Richmond—Fremont Line
- Oakland Airport Connector

Oakland Airport Connector (OAC)

BART's Oakland Airport Connector (OAC), also known as BART to OAK, began revenue operation on November 22, 2014. The system was designed and constructed by Flatiron Construction and Parsons Transportation along with Doppelmayr Cable Car (DCC) who designed, manufactured, and supplied the Automated People Mover (APM) system and guideway. DCC now operates and maintains the system as part of a 20-year BART Operations and Maintenance Contract.

The OAC is a fully automated driverless transportation system operating along a 3.2 mile partially elevated, partially at-grade, partially below-grade, dual guideway, providing a comfortable and reliable link between the Airport Station and Coliseum Station. The APM system operates with up to four cable propelled 3-car trains. Each station consists of a single-sided passenger boarding platform with a barrier wall and automatic platform door system separating the passenger platform from the guideway tracks. Near the mid-point of the end stations is the maintenance and storage facility (or Wheelhouse).

The initial system consists of four 3-car trains operating in a pinched loop configuration on two separate lanes. The system is expandable, when built to ultimate capacity (4-car trains), to provide a peak period line capacity of 1900 passengers per hour per direction (pphpd).

BART's Oakland Airport Connector is an Automated People Mover system designed to integrate with BART at the Coliseum Station, to convey passengers to and from the Oakland International Airport. The pinched-loop cable-driven system is 3.2 miles in length, including two passenger stations and a vehicle maintenance facility which houses the traction motors. Staff monitored the engineering design and construction phases of this project through the Safety Certification process. BART established this as a separate system and therefore the CPUC treats this system inspection unit that warrants a separate Triennial Review and separate report.

Capital Projects

CPUC provides oversight of all system modifications the System Safety or Engineering Departments decide will require a formal system analysis, in accordance with General

Order 164-D, Section 11, and the SSPP, Section 8. BART has several major system extensions and modifications currently in progress.

Planned Extensions

BART has several system extensions currently in the construction phase.

Santa Clara Valley Transportation Authority/Silicon Valley Rapid Transit (VTA/SVRT) Project

The Santa Clara Valley Transportation Authority/Silicon Valley Rapid Transit (VTA/SVRT) Project is a 16.3-mile extension from the planned Warm Springs Station to Milpitas alongside Union Pacific Railroad tracks, continuing to 28th Street and Santa Clara Street in San Jose, then proceeding underground through downtown San Jose to the Diridon Caltrain Station and finally terminating at the Santa Clara Station. This project has been divided into 2 phases:

- Silicon Valley Berryessa Extension (SVBX) – 10 miles in length which is currently under Construction & Testing
- Santa Clara Valley Extension - 6.3 miles in length which is currently under Federal EIS Review

Staff has been monitoring the engineering design and construction phases of this project through the Safety Certification process, and the Commission approved BART's Safety Certification Plan with Resolution ST-83.

East Contra Costa BART Extension (eBART) Project

The East Contra Costa BART Extension (eBART) Project will provide passenger service along 10 miles of the California State Route 4 corridor connecting east of the Pittsburg/Bay Point Station. The extension will use Diesel Multiple Unit (DMU) vehicles instead of standard BART's electrically driven trains and includes two new stations and a transfer platform to provide timed transfers between eBART and traditional BART trains. Staff has been monitoring the engineering design and construction phases of this project through the Safety Certification process, and the Commission approved BART's Safety Certification Plan with Resolution ST-112.

New Vehicle Procurement Project

BART's new vehicle procurement project currently underway will add up to 1000 new rail cars to its existing fleet. The new cars will be rolled out between 2017 and 2021. Staff

has been monitoring the procurement project through the Safety Certification process, and the Commission approved BART's Safety Certification Plan with Resolution ST-150.

Follow-Up Status of the 2014 BART Triennial Review

The BART 2014 Triennial On-Site Safety Review included 52 findings of non-compliance and 37 recommendations for corrective actions to BART System Safety Department.

Commission Resolution ST-165 adopted the Staff's final report, and ordered that BART submit appropriate plans and schedules based on Staff's recommended corrective actions and implement the submitted plans. ST-165 also ordered BART to submit quarterly status reports on the progress of the corrective actions through completion.

BART developed and submitted Corrective Action Plans (CAPs), including a schedule for completion of each item, to address each of the recommendations, and kept CPUC informed about the progress of the corrective actions as required by General Order 164-D. Some CAPs were completed immediately after the Triennial Safety Review. By March 23, 2016, BART completed all CAPs, fulfilling all recommendations from the 2014 Triennial Review.

SYSTEM SAFETY REVIEW PROCEDURE

Staff conducted the 2017 System Safety Review of BART in accordance with Rail Transit Safety Section (Now Branch) Procedure RTSS-4, *Procedure for Performing Triennial Safety Audits of Rail Transit Systems*. Staff, in collaboration with BART personnel, developed 39 checklists to cover various aspects of system safety responsibilities, based on Commission and FTA requirements, BART's SSPP and other safety-related documents, and Staff's knowledge of BART operations. The checklists are included as Appendix C of this report.

Each checklist identifies safety-related elements and characteristics that Staff either inspected directly or by reviewing reports and records. The completed checklists include findings of non-compliance, and recommendations pertaining to BART's SSPP and its procedures, and/or Commission regulations.

The methods used to perform the review included:

- Discussions and interviews with BART management
- Review of rules, procedures, policies, and records
- Observations of operations and maintenance activities
- Interviews with rank and file employees
- Inspections and measurements of equipment and infrastructure

The review checklists concentrated on requirements that affect the safety of transit operations and are known or believed to be important in reducing safety hazards and preventing safety incidents.

FINDINGS AND RECOMMENDATIONS

The reviewers and inspectors who participated in the On-Site System Safety Review observed 42 findings of non-compliance and provided BART personnel with 47 recommendations to improve BART's system safety program. These findings and recommendations are listed below and are grouped by checklist number.

FINDINGS AND RECOMMENDATIONS

1. **Policy Statement and Authority for System Safety Program Plan: Management Involvement and Commitment to Safety**

   No findings of non-compliance; no recommendations.

2. **System Safety Program Plan Goals and Objectives**

   No findings of non-compliance; no recommendations.

3. **Overview of Management Structure**

   No findings of non-compliance; no recommendations.

4. **System Safety Program Plan: Control and Update Procedure**

   Finding of non-compliance:

   Based on review the San Francisco Bay Area Rapid Transit District, System Safety Program Plan (SSPP) Revision No. 9 dated 2012, it is clear the document has not been updated as necessary. The cover page displays the name of the Chief Safety Officer who left BART in 2012. The description of the Warm Springs and Oakland Airport Connector (OAC) (page 3) both discussed in future tense in starting revenue service.

Also, please review checklist 7 and 11, which discuss other examples where the BART SSPP requires updating.

Recommendations:

BART shall carry out yearly review and update where needed of BART's System Safety Program Plan.

5. System Safety Program Plan: Implementation Activities and Responsibilities

No findings of non-compliance; no recommendations.

6. Hazard Management Process

Finding of Non-Compliance:

1. According to the BART SSPP page 6.1 states: "Hazard identification is a process to discover conditions in the system, that if not altered have the potential to cause accidents, injuries or significant material losses." Page 6.3 states "Unacceptable – A condition that may endanger human life and property. This hazardous condition cannot remain as is but must be mitigated." The following hazardous events are press accounts that were never reported to the CPUC as Hazardous Conditions:

    - June 23, 2017 a debris fire in the Transbay Tube the fire was started by a faulty insulator. Caused major delays and single tracking through the tunnel while the fire was being extinguished.
    - July 30, 2016 a cover board fire at Walnut Creek station. The fire, which was reported around 3 p.m., involved a porcelain insulator that failed, allowing electricity to ground and create an electrical arc that ignited a board covering the third rail, said BART spokesman Taylor Huckaby.

Recommendations:

1. BART shall report in 2 hours hazardous conditions as stated in its SSPP. This includes as the BART SSPP page 6.3 states: Unacceptable Hazard– "A condition that may endanger human life or property. This hazardous condition cannot remain as is and

must be mitigated." Once these fires occurred, BART should have reported them to CPUC Staff as hazardous conditions, including their plan to prevent recurrence.

7. System Modification

Findings of Non-Compliance:

1. CPUC Staff after interviewing BART noticed that BART was not following their own SSPP on system modification projects and CPUC coordination. CPUC involvement on BART system modification projects needs to happen on all future and ongoing projects to keep CPUC informed.
2. Based on the above review and follow up email dated 10/4/17, Staff finds BART SSPP does not clearly state its process for ongoing system modifications when it comes to smaller or major projects. It is currently very confusing to understand when and how the BART Engineering Change Order (BECO) process initiated. Some of the projects are ongoing and so until they are closed a BECO Number cannot be assigned to that project.
3. Based on the above review and follow up email dated 10/4/17, BART states that there were changes in the project management and some of the records maybe incomplete and hard to locate. CPUC Staff did not receive requested supporting documents for review.
4. CPUC Staff upon reviewing BECO related to A78 noticed that the BART failed to follow its BECO process and involve System Safety Department.

Recommendations:

1. BART must provide ongoing information and involve CPUC with all system modification projects on the system.
2. BART must revise its current SSPP to reflect and elaborate on the current process and its practices.
3. BART must have a more controlled process of managing all documents during change of management on any projects and provide all supporting documents upon CPUC request.
4. BART must follow its own BECO procedures and include System Safety review comments on all projects.

8. Safety and Security Certification

No findings of non-compliance; no recommendations.

9. Safety Data Collection and Analysis

No findings of non-compliance; no recommendations.

10. Accident/Incident Investigations

No findings of non-compliance; no recommendations.

11. Emergency Management Program

Findings of Non-Compliance:
BART SSPP (version 9, April 2012) was not updated with current procedure for which Program/Department manages, updates, and implements BART's Emergency Plan. However, BART SSPP (version 10, September 2017) has been updated with the relevant language indicating the BART Emergency Preparedness Program and System Safety Department are responsible for managing, updating, and implementing BART's Emergency Plan. BART's SSPP Version 10 was approved by Staff on November 15, 2017 after the conclusion of the audit.

Recommendation:
See recommendation for checklist 4

12. Internal Safety Audits/Reviews

Findings of Non-Compliance:

According the BART's SSPP Revision No. 9 dated April 2012 the Security Plan Compliance will audit CPUC Decision 87376 (Seventh Interim Decision). When BART staff was asked if the Seventh Interim Order is audited, BART Staff stated no.

When BART staff was asked if BART conducts physical examinations for safety sensitive employees, again the answer was no.

According Seventh Interim Order section 3f. page 6, states:

"A physical examination shall be required for initial certification. The District shall require that employees whose positions affect safety, as defined within the plan,

undergo a physical examination upon initial employment and be required to be reexamined at intervals to be determined by the District. Once the reexamination intervals have been established by the District, they shall be submitted to the Commission for review."

Recommendation:

A physical examination shall be required by" BART "for initial certification. The District shall require that employees, whose positions affect safety, as defined within the plan, undergo a physical examination upon initial employment and be required to be reexamined at intervals to be determined by the District. Once the reexamination intervals have been established by the District, they shall be submitted to the Commission for review," as stated in the CPUC Decision 87376 Seventh Interim Decision.

13. <u>A. Rules Compliance: Observation and Enforcement</u>:

Findings of Non-Compliance:

1. Rolling Stock and Shops Department (RS&S) is not monitoring rules compliance and forwarding reports to System Safety, as outlined in SSPP, Section 1305.

2. No discipline was assessed to RS&S Employee #60386. RS&S provided no documentation of a discipline policy. Furthermore, RS&S Management appeared to be unfamiliar with a clear definition of what discipline is.

3. Upon review of rules compliance records, it was determined that M&E does not meet required testing under Maintenance and Engineering (M&E) Safety Compliance Checks for Managers.

Recommendations:

1. RS&S needs to provide System Safety with reports of compliance/non-compliance inspections, as per SSPP, Sections 202 and 1305, to identify, eliminate, minimize, and/or control safety hazards and risks. This will ensure deficiencies are addressed in appropriate ways.

2. Interdepartmental communications is essential for RS&S to ensure SSPP, Section 1303 Process for Ensuring Rules Compliance is followed.

3. BART has advised they are revising the BART M&E Safety Compliance Checks for

Managers to take into account vacations, leave of absence, etc. to update testing requirements.

13. <u>B. Rules Compliance: Operations Safety Compliance</u>

Findings of Non-Compliance:

1. On 09/12/17 - 0720, Staff observed BART Richmond train, Heavy Rail Vehicle (HRV) #1248 arriving Union City Station not sounding horn when approaching the station platform. When Staff boarded, Staff stood behind the operator and watched as operator ran silent, not sounding horn at any station until Staff disembarked at 19th St Station.

On 09/19/2017, Staff rode in the operating cab of BART Millbrae train, HRV# 327 from Lake Merritt to Civic Center Station with Train Operator (TO) #060165. After Staff entered the passenger compartment at Lake Merritt, and while the train was in motion, TO opened the Cab Door (to allow Staff inside operating cab) rather than allow Staff access before the train went into operation mode.

On 09/21/2017, Staff rode BART Warm Springs train, HRV#1656 from Lake Merritt to Union City with lead HRV#2592. The train stopped at Hayward Yard to pick up BART personnel without making a public announcement, prior to stop, advising that the train will be making a momentary stop and that patrons must remain seated, hold on to a railing and stay clear of the side doors.

2. Staff observed TO #58177 cross multiple yard tracks in the Daley City Yard without wearing a safety vest. Employee also exited authorized walkway in order to walk around a stopped HRV and proceeded to step over the third rail. There was a gap in the third rail approximately 25 feet away which was easily accessible.

Staff observed TO #62035 cross multiple tracks without wearing a safety vest. Employee was wearing a black "Hoodie" over their prescribed uniform. Employee never looked in either direction while crossing live tracks.

Two additional TOs were observed not looking both ways before crossing the yard tracks.

3. Staff approached BART Daily City Yard Job # (Contract) H22783 Heating Ventilation and Air Conditioning (HVAC) work at wash rack.

The Employee in Charge (EIC) did not fill out a Job Briefing Safety Booklet nor briefing document. EIC was unaware the west end of his limits was unprotected because the Watchperson had walked off. EIC instructed Safety Monitors to a second assignment of Watchpersons. EIC did not confirm all work crew members were current in their Roadway Worker Protection (RWP) certification. Staff found 2 contractors with expired RWP certification. Contractors working with expired RWP had no Safety Monitor escort. Staff found Safety Monitors were actively working as Watchpersons and over 250 ft away from contractors at each end of the job site. West end Watchperson walked off, passed the EIC and did not inform the EIC that the job would be unprotected from the west end. Upon observing the west end Watchperson approach and pass him, the EIC did not question where the Watchperson was going, nor did the EIC place someone in the Watchperson's position to protect the west end. After return to west end Watchperson position, Watchperson stood between the gage, facing the work crew with his back to the possibility of any approaching trains. Staff observed that this Watchperson never looked behind him, nor left the area of between the gage. When Staff advised Tower Foreworker to tell EIC to instruct west end Watchperson to perform his Watchperson duties properly, from the tower, Staff observed that the conversation ensued between the EIC and the west end Watchperson while the west end Watchperson was still standing between the gage. The EIC was derelict in his EIC duties and responsibilities. Safety Monitors had not taken any notes, performed any inspections or compliance observations and were not escorting Contractors who were not RWP certified.

Recommendations:

1. Ensure compliance observations to Train Operator Manual (T.O.M.) #304(b) Train Horn Use is included in inspection/compliance checklists. Enforce T.O.M. #221 Protection of Train Operators which states doors shall remain closed. Ensure TOs perform their announcement duties as required in T.O.M. #410(b)

2. Enforce OR&P Manual-Revision 7, Rules 2301, 2304, 2505 and 2507, RWP Rule 2507, (B), Exception #3. Enforce Operating Rules and Procedures (OR&P) Manual-Revision 7, Rules 2103, 2502.

3. Enforce General Order 175A, Section 5.1 (a), (d), (h), (i) (j), BART RWP Manual, Section 2113 pg. 5. Enforce General Order 175A, Section 9.4 (a), BART Employee Certification Plan, Section 2.2.2. Enforce General Order 175A, Section 5.1 (j), BART OR&P 8301, Section B (3), (10), (13), and (14). Enforce OR&P Rule 1505, Bulletin 17-28 July 20, 2017.

4. The violations of General Orders, Operating Rules and Procedures, and RWP Rules

and Policies that Staff observed give concern to the lack of enforcement Staff has learned while meeting with several departments during this triennial audit. There should be dedicated personnel who are knowledgeable in the above-mentioned regulations, rules, policies and procedures and trained to observe operations in various departments and given the authority to correct non-compliant or unsafe behavior via coaching and counseling and written reports that can be tracked and analyzed.

5. RWP EIC training from BART is the same training and certification that all personnel who want to enter BART (Right of Way) ROW must obtain. Staff recommends additional training specific for EIC duties and requirements stressing the high level of EIC responsibility.

13. C. Rules Compliance: Operator, Controller, and Maintenance Personnel Hours of Service

No findings of non-compliance; no recommendations.

13. D. Rules Compliance: Contractor Safety Program

Findings of Non-Compliance:

1. On the Daily Monitor Activity Report (DMAR), which the Safety Monitors utilize at job sites, there is no place to ensure Personal Electronic Device (PED) compliance is observed and notated.

2. Staff learned that System Safety does not perform daily or routine scheduled inspections or observations to ensure compliance to BART OR&P as per BART SSPP, Section 1803. Staff could not determine that BART procedures establish a range of activities via scheduled, unscheduled, regular and unannounced compliance checks to enforce compliance to safety requirements.

3. System Safety is missing opportunities to ensure contractor safety on BART's ROW via unscheduled and unannounced, scheduled and regular compliance observations to ensure and enforce compliance to operating rules and procedures, GOs, and Federal and local codes.

Recommendations:

1. BART must add a PED compliance observation box on the Safety Monitor DMAR to

ensure compliance with GO-172.

2. BART System Safety must ensure there are dedicated personnel to perform routine work site inspections to ensure compliance to BART OR&P, State, Federal and local codes and regulations as per SSPP 1803.

3. BART System Safety must be involved in all areas of enforcement and compliance of BART operating rules and procedures, State, Federal, and local codes to ensure contractor safety.

13. E. Rules compliance: Operating Rules and Procedures Manual and Operations Bulletin Revisions

No findings of non-compliance; no recommendations.

13. F. Rules Compliance: Operations Control Center Manual Revisions

No findings of non-compliance; no recommendations

14. A. Facilities and Equipment Inspections: Fire Emergency Systems

No findings of non-compliance; no recommendations.

14. B. Facilities and Equipment Inspections: Stations and Emergency Equipment

Findings of Non-Compliance:

1. BART does not inspect its passenger stations at the required frequency of "at least once every six months within a calendar year" as required by its SSPP, Section 1401. The same finding was also noted in the previous triennial audit.
2. BART did not document "potential and/or actual unsafe conditions during inspections of stations" as required by its SSPP, Section 1402.
3. BART does not retain completed corrective actions as a result of facility inspections. Therefore, Staff could not verify whether all identified safety hazards were properly corrected or were finished or followed up within 30 days as required by its SSPP, Section 1404.
4. Corrective actions generated through facility inspections did not receive proper follow-up as required by the SSPP, Section 1404. The same finding was also

noted in the previous triennial audit.

Recommendations:

1. BART shall ensure station and facilities inspections are performed at least once every six months in a calendar year, per its SSPP, Section 1401.

2. BART shall document safety hazards per its SSPP, Section 1402.

3. BART shall retain completed corrective actions for at least three years so that Staff can audit such records for the next triennial audit.

4. BART shall ensure corrective actions generated through facility inspections are being resolved as required by its SSPP, Section 1404.

14. C. Facilities and Equipment Inspections: Non-Revenue Facilities

Findings of Non-Compliance:

1. Staff did note several defects regarding the conditions at the Oakland Shop (OKS) non-revenue facility:

- Fire extinguishers either missing or obstructed and not properly marked
- Non-revenue Vehicles parked in the foul of tracks
- Forklifts not being inspected before daily use
- Emergency eye wash stations dirty and not being maintained properly with inspection dates
- Exposed electrical wires hanging from conduit
- Grinders missing face shields
- Aerosol cans not properly stored
- Chemicals outside of the shop not properly labeled for identification
- Exterior overhead lights burnt out

Recommendations:

1. BART is not correcting hazardous conditions related to the OKS shop in a timely manner. BART must ensure that the general work environment at the OKS shop is maintained to allow for a clean and orderly work site. All hazardous conditions that are identified must be corrected in a timely manner.

14. D. Facilities and Equipment: Tunnels. Bridges, and Aerial Structures

Findings of Non-Compliance:

1. Several bridge structures had no pier control numbers and were not generated a Requests for Maintenance (RFM); two "No Trespassing" signs on bridge structure fences had graffiti and were not generated a RFM; a bridge structure had a tree growing over railing and was not generated a RFM.
2. BART's Structural Inspection Manual and Cathodic Protection Power Supply maintenance procedure do not have follow-up procedure for generated RFMs. Staff noted many Level 3 RFMs over one year old had no follow-up records in attempt to resolve the hazards.
3. A consultant recommended BART to identify the source of standing water found in a Transbay Tube (TBT) steel shell thickness test done in 2016. However, no corrective action was taken.

Recommendations:

1. BART must add procedure to Structures Inspection Manual for resolving RFMs until satisfaction.
2. BART must add procedure to Cathodic Protection Power Supply maintenance procedure for resolving RFMs until satisfaction.
3. BART to identify the source of standing water found in a TBT steel shell thickness test per consultant's recommendation.

14. E. Facilities and Equipment Inspections: GO 95 Right-of-Way Compliance

No findings of non-compliance; no recommendations.

14. F. Facilities and Equipment Inspections: Train Control and Signal Facilities

Findings of Non-Compliance:

1. At the time of the triennial review, BART was still behind on conducting their routine preventive maintenance.

Recommendations:

1. Staff recommends BART continue forward with their corrective action plan and Staff will recheck progress in the coming months.

14. G. Facilities and Equipment Inspections: Communications Equipment

Findings of Non-Compliance:

1. Staff noted some inspection forms are not being filled out completely including signatures and dates. Staff noted that engineering has not updated some forms after field changes have been made.

2. Staff noted an open work order for two years on damaged pole.

Recommendations:

1. Staff recommends BART retrain staff to properly fill out Preventive Maintenance (PM) inspection forms.

2. Staff recommends BART engineering staff create new procedure changes as engineering changes are made.

3. Staff recommends BART make corrections to communications equipment with signs of defect within a timely manner.

14. H. Facilities and Equipment Inspections: Measurement and Testing Instrumentation

Findings of Non-Compliance:

1. Single car test devices that are being used are not being properly recorded and calibrated according to industry standards, American Public Transit Association (APTA) standards, 3. Calibration requirements, the device shall be tested not less frequently than every 92 days after being placed into service and not to exceed 120 days after calibration. 3.3 Record keeping, single car testing devices and ancillary gages shall be tagged or labeled with the date of its most recent calibration.

Recommendations:

1. Staff reviewed the BART, Rolling Stock and Shops Standard Operating Procedures Book 49 Volume 3 Chapter 2 Section 2, Control of test and measuring equipment (T&ME) - Calibration. Staff was informed that this procedure is being currently revised and not yet finalized. Once this procedure is finalized it must be distributed to all

revenue shops so that each employee understands that they are responsible for ensuring that each tool is in good working condition before use and that it's been properly calibrated with a current calibration date. This procedure also requires an audit at each facility which must be conducted by supervisors and management to ensure accountability.

2. Single car test devices need to be properly calibrated according to the most recent industry standards, as well as documented records of each time the device is being used to ensure the device does not exceed the calibration date requirements. Single car test devices must have a documented daily test performed every time the device is used.

3. Remove all tools that do not require testing off of the master tool calibration list to simplify tools that require calibration, refer to Book: 429 Vol.3, Chapter 2, Section 2, and Attachment 1- Calibration Exclusion list.

4. Have a sign out sheet for employees who take tools off property which need calibration for better documentation.

15. A. Maintenance Audits and Inspections – Rail Vehicles

Findings of Non-Compliance:

1. OKS shop needs general clean up especially around fire extinguishers. Do not block fire extinguishers by gas station area. Hi-rail equipment needs better visual inspections. Fire extinguishers need tags of inspection on all hi-rail equipment. Speed swing inspected needs bolts replace on driver-side hi-rail wheel. Hi-rail vehicles need to be cleaned out too much trash accumulation.

Recommendations:

1. OKS to organize all hi-rail vehicle daily inspections. Each vehicle should have its own folder for daily inspections. Do compliance checks on drivers and document the daily inspection process with employee doing the visual inspections. If any vehicle is involved in an accident, document it in vehicle folder. If a vehicle is not in service for any period of time document the reasons why it is non-operable. If it is not documented, it represents a period on non-compliance of maintenance. All the years of in-service and out-of-service must be documented. Have supervisors sign off all maintenance reports.

15. B. Maintenance Audits and Inspections – Traction Power System

Findings of Non-Compliance:

1. A CPUC engineer was measuring pipe to soil voltages in close proximity to the BART system. When a BART train moved by the voltage reading on the pipe to soil moved out of the proper range. After the BART train left sight the pipe to soil measurements returned to the proper range. Staff contacted Pacific Gas and Electric (PG&E) to determine if stray current from the BART system was a system wide issue. PG&E informed staff stray current is occurring throughout the system.

2. Regarding North Concord Station (CGD):

    - Biannual 1Kv circuit breaker test were conduct yearly

    - Rectifier test which is yearly was conducted alternate years

    - Cast Coil Transformers biannual tests were not conducted in 2016 and only one in 2015.

    - Battery maintenance was not conducted in 2017 and only once in 2016,

    - Substation Fire Alarm Preventative Maintenance was no conducted 2017 or 2016. Only one test in 2015.

    - 35 KV annual circuit breaker test was not conducted in 2017 or 2016. Once test was conducted in 2015.

3. Review of open traction power work orders. BART staff stated the Maximo database is new. Initially BART traction power had approximately 650 open work orders. After review of the open work orders and properly closing work orders the traction power department had approximately 450 open work orders. Based on the exercise it was determined that BART staff wasn't monitoring open, and properly closing work orders.

Recommendations:

1. BART, PG&E and CPUC shall meet to discuss stray current PG&E is stating is emanating from the BART system. BART shall work closely with PG&E to correct the stray current issue.

2. Conduct inspections and preventative maintenance on substations on the prescribed time table dictated by the SOP's.

3. Document and repair destroyed insulators in timely manner.

4. BART shall monitor and close open work orders as well as documenting said closures.

15. C. Maintenance Audits and Inspections: Train Control and Signal Systems Maintenance

Findings of Non-Compliance:

1. Staff noted at all locations the lack of permanent labels on wiring in switch machines and their junction boxes.

Recommendations:
1. Staff recommends BART develop a program to install permanent labels on all wiring at all switch machines and junction boxes.

15. D. Maintenance Audits and Inspections: Tracks and Turnouts

Findings of Non-Compliance:

1.Track and Switch inspection reports do not reflect condition of the track inspected, such as:

a) Non-standard bolts used for guard rail
b) 90lb floating heel block used in place on a 115lb rail switch point
c) Five washers used on long track bolt
d) Bent #1 switch rod not replaced
e) Housekeeping, scrap rail left between rails of track
f) Covers on third rail missing
g) Concrete ties replaced and not properly fastened
h) Broken wire on frog

2. Inspection reports do not specify location and nature of any deviation from the requirements of BART Track Safety Standards (TSS) Book 425 and the remedial or corrective action taken by the person making the inspection. Inspection reports do not describe the defect, location, rank the defect priority and list any actions taken to correct the problem and/or to protect train traffic. Records of periodic track inspections do not show defects and deviations from the adopted standards along with the corrective action taken.

Recommendations:

1. Prepare Inspection Records on the 'current' form, have the person making the inspection sign and specify locations, nature and remedial or corrective actions taken for any deviations; complete all entry fields.

2. Track and Switch Inspection Records shall identify the location and nature of any deviation or defective condition and the remedial/corrective action taken. Comply with BART Track Safety and Maintenance Standards, Book 425, Section S7.5 B and Section M 7.1 B-D.

16. A. Training and Certification Programs: Operators and Foreworkers

Findings of Non-Compliance:

1. When Staff reviewed Train Controller records they found initial certification did not include a written and/or performance test of PED for any employee selected. Further discussion found BART not properly training Train Controllers per BART Transportation Certification Policy: 3.2.1 regarding PED.

2. Staff inspected records of selected Train Controllers and found no test scores per rule 3.2.7 Transportation Department Testing Requirements. Employees must receive a minimum passing grade as outlined; BART personnel could not provide Staff with Train Controller test scores.

Recommendations:

1. BART must adhere to their training policy and requirements as outlined in Transportation Department Initial Certification Requirements, Section 3.2.1 regarding PED Training.

2. BART must clearly note all test scores on written and/or performance-based examinations as per BART Employee Certification Plan (Aug, 2016) 3.2.7.

16. B. Training and Certification programs: Employees and Contractors

No findings of non-compliance; no recommendations.

17. Configuration Management and Control

No findings of non-compliance; no recommendations.

18. Local, State, and Federal Requirements: Employee Safety Program

Findings of Non-Compliance:

1. Employee training defects:
   Employee 057356 training defects
   a. Employee never took training code WTPME008S FPE/GE Traction Power & PM Procedures
   b. Employee never took training code WTTS002 Commercial Driver's License Class B
   Employee 062468 training defect
   c. Employee never took training code WTTS00xCVP CDL Proficiency Check
   Employee 061969 training defect
   d. Employee is 6 months overdue for training code SSOSHA04A Electrical Safety – High Voltage
   Employee 056704 training defect
   e. Employee never took training code PL908 2-Day Supervisor Mandatory Orientation
2. There was either little or no instruction given to employees on how to use online Safety Notices and Unusual Occurrence Reports (UORs) in MAXIMO.
3. No employee interviewed outside of System Safety was aware of the Safety Hotline.

Recommendations:

1. BART must ensure all employees receive their required training.
2. BART must ensure all employees are properly instructed and informed in all aspects of BART's safety programs.

19. Hazardous Materials Program

No findings of non-compliance; no recommendations.

20. Drug and Alcohol Program

No findings of non-compliance; no recommendations.

21. Procurement Process

No findings of non-compliance; no recommendations

22. Personal Electronic Devices

Findings of Non-Compliance:

1. Staff reviewed two incidents of PED violations that occurred by two different Track

Section Managers who were utilizing their personal cell phones. The Track Managers are under AFSCME contract which does not have a PED policy and therefore, fall under BART PED policy. The two Track Managers were given one day suspension versus. BART PED policy which calls for first time offense to be 10 days suspension.

Recommendations:

1. Ensure all PED violations are disciplined consistently per BART PED zero tolerance policy.

23. Roadway Worker Protection

No findings of non-compliance; no recommendations.

APPENDICES

APPENDIX A. ABBREVIATION AND ACRONYM LIST

Abbreviation or Acronym:	Definition:
AGMO	BART Assistant General Manager of Operations
ATCS	Automatic Train Control System
ATIS	Automated Track Information System
ATP	Automatic Train Protection
BART	San Francisco Bay Area Rapid Transit District
BECO	BART Engineering Change Order
Cal/OSHA	California Division of Occupational Safety and Health
CAP	Corrective Action Plan
CE	BART Chief Engineer
CFR	Code of Federal Regulations
CM	Configuration Management
Commission	California Public Utilities Commission
CPUC	California Public Utilities Commission
CSO	BART Chief Safety Officer
CTO	BART Chief Transportation Officer
DTS	Data Transmission System
eBART	East Contra Costa BART Extension
ESP	Earthquake Safety Project
FLC	Fire Liaison Committee
FLSSC	Fire Life Safety and Security Committee
FTA	Federal Transit Administration
GM	BART General Manager
GO	CPUC General Order

Abbreviation or Acronym:	Definition:
IIPP	Injury and Illness Prevention Program
ISSA	Internal Safety and Security Audit
JUMSC	Joint Union Management Safety Committee
M&E	Maintenance and Engineering Department
MP	Mile Post
MRB	Material Review Board
MSDS	Material Safety Data Sheet
NTSB	National Transportation Safety Board
NNR	Notice of Needed Repair
OCC	Operations Control Center
OSCP	Operations Safety Compliance Program
OR&P	Operations Rules and Procedures Manual
PE	Preliminary Engineering
PED	Personal Electronic Device
PG&E	Pacific Gas and Electric Company
PHA	Preliminary Hazard Analysis
PM	Preventative Maintenance
QA	Quality Assurance
QR	Quality Report
RS&S	Rolling Stock and Shops Department
RTSB	Rail Transit Safety Branch
SCADA	Supervisory Control and Data Acquisition
SCP	Safety Certification Plan
SSCC	Safety and Security Certification Committee
SSPP	System Safety Program Plan

Abbreviation or Acronym:	Definition:
SSWP	Site Specific Work Plan
Staff	CPUC Personnel
TC	Train Control
TSS	Track Safety Standards
UOL	Unusual Occurrence Log
UOR	Unusual Occurrence Report

APPENDIX B. CHECKLIST INDEX

Checklist No.:	Element/Characteristic:
1	Policy Statement and Authority for System Safety Program Plan: Management Involvement and Commitment to Safety
2	System Safety Program Plan: Goals and Objectives
3	Overview of Management Structure
4	System Safety Program Plan: Control and Update Procedure
5	System Safety Program Plan: Implementation, Activities, and Responsibilities
6	Hazard Management Process
7	System Modification
8	Safety and Security Certification
9	Safety Data Collection and Analysis
10	Accident/Incident Investigations
11	Emergency Management Program
12	Internal Safety Audits/Reviews
13-A	Rules Compliance: Observation and Enforcement
13-B	Rules Compliance: Operation Safety Compliance
13-C	Rules Compliance: Operator, Controller, and Maintenance Personnel Hours of Service
13-D	Rules Compliance: Contractor Safety Program
13-E	Rules Compliance: Operating Rules and Procedures Manual and Operations Bulletin Revisions
13-F	Rules Compliance: Operations Control Center Manual Revisions
14-A	Facilities and Equipment Inspections: Fire Emergency Systems
14-B	Facilities and Equipment Inspections: Stations and Emergency Equipment
14-C	Facilities and Equipment Inspections: Non-Revenue Facilities

Checklist No.:	Element/Characteristic:
14-D	Facilities and Equipment Inspections: Tunnels, Bridges, and Aerial Structures
14-E	Facilities and Equipment Inspections: GO 95 Right-of-Way Compliance
14-F	Facilities and Equipment Inspections: Train Control and Signal Facilities
14-G	Facilities and Equipment Inspections: Communications Equipment
14-H	Facilities and Equipment Inspections: Measurement and Testing Instrumentation
15-A	Maintenance Audits and Inspections: Rail Vehicles
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17	Configuration Management and Control
18	Local, State, and Federal Requirements: Employee Safety Program
19	Hazardous Materials Program
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21	Procurement Process
22	Personal Electronic Devices
23	Roadway Worker Protection

APPENDIX C. CHECKLISTS

CPUC develops a series of checklists prior to each triennial safety review of California Rail Transit Agencies. These checklists are based on the 21 elements which are required to appear in each agency's SSPP, and are customized according to the SSPP and the unique features of the agency under review.

BART received a draft version of these checklists, showing only the Reference Criteria and Element/Characteristics and Method of Verification fields, on August 11, 2017, and CPUC coordinated with BART to modify the checklists to better reflect the nature of the BART system and the intent of CPUC's review. BART provided facilities in appropriate locations throughout the system, and representatives from either agency were carefully selected to attend each checklist activity to maximize the effectiveness of the review. Although each checklist provides guidance for the activities, CPUC reviewers are authorized to inquire about and inspect any aspect of the BART system they determine to be relevant to system safety and the section of the SSPP in question.

CPUC reviewers provided immediate feedback to BART representative regarding any initial findings following a checklist's activities. The reviewers then revise the checklist document to include a summary of their review, findings of non-compliance, recommendations for corrective action, and any additional comments. The 39 complete checklists are provided below.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAYAREA RAPID TRANSIT DISTRICT

Checklist No.	**1**	**Element**	**Policy Statement and Authority for System Safety Program Plan: Management Involvement and Commitment to Safety**
Date of Audit	September 11, 2017 LKS-23	**Department(s)**	BART Senior Management System Safety Department
Auditors/ Inspectors	Daren Gilbert Stephen Artus Steve Espinal Mike Borer Colleen Sullivan Jamie Lau	**Persons Contacted**	Grace Crunican, General Manager Paul Oversier, Assistant General Manager of Operations Jeff Lau, Chief Safety Officer

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Policy Statement and Authority for System Safety Program Plan:
BART Senior Management Involvement and Commitment to Safety
Interview BART's General Manager (GM), Assistant General Manager of Operations (AGMO), Chief Transportation Officer, and Chief Safety Officer (CSO) to discuss:

1. Source, frequency, and depth of safety information provided to Senior Management, whether safety is included as a regular topic at BART Senior Management meetings, and how safety information is communicated.
2. Methods and incentives included in the management performance system to facilitate a system safety culture within the organization.
3. Formal meetings held and attended by BART Senior Management to discuss safety performance, such as ongoing evaluation of goals and targets.
4. The GM's and AGMO's awareness of high priority safety issues related to operations and capital projects.

5. The AGMO's awareness of the status of all corrective actions generated by the Safety Department through internal safety and security audits, the hazard management process, accident/incident investigations, or other channels.

6. The System Safety Department's reporting relationship to BART's executive and senior management, and management's participation in safety activities.

7. Which individuals and departments are involved in making safety decisions, and to what degree senior management is involved?

8. Scope of senior management involvement, coordination, and communication in developing SSPP revisions.

9. What as the General Manager's response to the recent gang robberies on BART trains?

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART's GM , AGMO, and CSO, and reviewed relevant documentation to determine the following in summary:

- The CSO reports directly to the GM, which highlights BART's focus on safety and ensures independence of the safety function at BART.
- The CSO attends weekly meetings every Wednesday where safety statistics are shared and discussed.
- Quarterly performance reports are prepared, which include a section dedicated to safety in which safety performance indicators are presented by the CSO and discussed. The CSO delivers safety presentations at these quarterly meetings. When major incidents occur, the CSO prepares and delivers presentations to BART Board members.
- BART participates in peer reviews and solicits the expertise of professional groups such as American Public Transportation Association to improve its safety culture.
- BART is active in Joint Union Management Safety Committee meetings during which safety reports from each department are discussed.
- BART management is aware of high priority issues such as asset management, state of good repair, resources needed to comply with regulations such as GO 175, employee compliance, and construction safety.
- BART changed performance evaluations to include safety as a line item, which shows the district's commitment to safety and the desire to improve the safety culture at BART.
- BART has a safety incentive program, which rewards employees for good safety

practices.

- The GM conducts operational observations and field visits, and discusses safety issues with the Train Operators and the Station Agents. If safety issues arise during these discussions, the GM discusses them with the CSO.

Comments:
None.

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**2**	**Element**	**System Safety Program Plan: Goals and Objectives**
Date of Audit	September 11, 2017 LKS-23	**Department(s)**	BART Senior Management System Safety Department
Auditors/ Inspectors	Daren Gilbert Stephen Artus Steve Espinal Mike Borer Colleen Sullivan Jamie Lau	**Persons Contacted**	Paul Oversier, Assistant General Manager of Operations Jeff Lau, Chief Safety Officer

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

System Safety Program Plan: Goals and Objectives
Interview BART Senior Management and review appropriate records to:

1. Determine whether BART is making significant progress toward the ongoing goals and objectives identified in SSPP Sections 202 and 203.
2. Obtain examples of how goals are evaluated (metrics and measures) and review documentation used to track BART activities to meet the goals and objectives. For example, if BART set a goal of reducing incidents by 10%, has this been achieved? How is this metric tracked and reported?
3. Determine how safety performance is reported to the Assistant General Manager of Operations (AGMO) or other senior management.
4. Assess the adequacy of safety information provided to the AGMO. Is the AGMO receiving sufficient information to ensure BART is meeting its safety goals and objectives? Are rule violations and other key safety metrics being tracked and reported to the AGMO?

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART's AGMO and CSO, reviewed relevant documentation, and concluded the following in summary:

- BART uses Quarterly Service Performance Reviews and quarterly safety statistics to track its activities to meet the goals and objectives stated in its SSPP. BART has revised its metrics which has enabled them to better evaluate their goals and objectives.
- Safety performance is reported to upper management on a regular and quarterly basis by the CSO, and contains such important safety performance as employee injury and near-miss incidents specific to roadway workers.
- Staff determined that the safety information provided to the AGMO is sufficient to ensure that BART is meeting its goals and objectives with greater emphasis planned on yard hazards and non-revenue maintenance incidents.

Comments:
None.

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**3**	**Element**	**Overview of Management Structure**
Date of Audit	September 11, 2017 LKS-23	**Department(s)**	System Safety Department
Auditors/ Inspectors	Daren Gilbert Stephen Artus Steve Espinal Mike Borer Colleen Sullivan Jamie Lau	**Persons Contacted**	Jeff Lau, Chief Safety Officer Jonathan Rossen, Manager of Employee and Patron Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Overview of Management Structure
Interview BART Senior Management and review appropriate records to:

1. Discuss BART's process for integrating safety into BART operations and maintenance activities.
2. Solicit opinions regarding the effectiveness of the organization and request a few examples of how this organization has worked to resolve identified safety issues.
3. Identify any specific deficiencies in the safety and security program due to limitations in personnel or resources. For example, discuss any difficulties in maintaining schedules for SSPP updates, completing ISSAs, or performing Accident/Incident Investigations.
4. Review Joint Union/Management Safety Committee Meeting agendas and minutes from the past twelve months to verify that the meetings were held according to the requirements in SSPP Section 1801.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART representatives and reviewed relevant documentation and identified the following in summary:

- BART integrates safety into operations and maintenance activities by actively investigating more employee and patron incidents, improving its safety culture, monitoring construction safety of capital projects, and encouraging its employees to bring any safety issues not resolved at the local level to management's attention by submitting a Safety Notice.
- Staff did not identify any difficulties in maintaining schedules for SSPP updates, completing internal audits, or performing investigations but BART Safety is planning on conducting more field inspections to improve the safety program at the district.
- Safety Committee Meetings were held as required by the SSPP.

Comments:
None.

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**4**	**Element**	**System Safety Program Plan: Control and Update Procedure**
Date of Audit	September 11, 2017 LKS-23	**Department(s)**	System Safety Department
Auditors/ Inspectors	Daren Gilbert Stephen Artus Steve Espinal Mike Borer Colleen Sullivan Jamie Lau	**Persons Contacted**	Jeff Lau, Chief Safety Officer Mark Chan, Manager of Engineering Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

System Safety Program Plan: Control and Update Procedure
Interview BART Senior Management and review appropriate records to:

1. Ensure that Management understands and is implementing the procedure requirements in SSPP Chapter 4.
2. Verify that the required annual SSPP review process is being implemented according to the approved process specified in the SSPP, Chapter 4.
3. Review responsibility for SSPP reviews and comments, and verify SSPP reviews and changes progress according to internal timeframes, are comprehensive in scope, and are signed-off by the designated staff.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART's Manager of Engineering Safety and the Chief Safety Officer and reviewed appropriate records and determined the following in summary:

BART management understands the requirement in implementing the Control and Update Procedure requirements in its SSPP. BART staff stated annual reviews of the SSPP are being conducted and if there are necessary changes, BART revises its SSPP. BART stated it has recently revised its SSPP as a result of GO 175 and other needed changes. BART consistently provides the CPUC with a copy of its Annual Certification Letter each year which certifies that the SSPP has been reviewed by BART to determine if modifications or updates are required.

Comments:
None.

Findings:
Based on review of the San Francisco Bay Area Rapid Transit District, System Safety Program Plan, Revision No. 9, dated 2012, it is clear the document has not been updated as necessary. The cover page displays the name of the Chief Safety Officer who left BART in 2012. The description of the Warm Springs and Oakland Airport Connector (OAC) (page 3) both discuss in future tense in starting revenue service.

Also please review checklist 11, which discusses another example where the BART SSPP requires updating.

Recommendations:

1. BART shall carry out yearly review and update when needed of the BART System Safety Program Plan.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**5**	**Element**	**System Safety Program Plan: Implementation, Activities and Responsibilities**
Date of Audit	September 12, 2017 LKS-1856	**Department(s)**	System Safety Department
Auditors/ Inspectors	Stephen Artus Colleen Sullivan	**Persons Contacted**	Jeff Lau, Chief Safety Officer Anthony Onisko, eBART Safety and Training Manager

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

System Safety Program Plan: Implementation, Activities and Responsibilities
Interview BART Senior Management and review appropriate records to:

1. Verify each manager, department, and contractor is charged with responsibility and accountability for SSPP implementation, enforcement, and effectiveness.
2. Identify any challenges each manager, department, and contractor has in performing tasks relating to the SSPP or general safety.
3. Verify management accountability for the performance of safety-related activities, and, if serious or potentially serious deficiencies are found, expand the review to include additional and/or related activities.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART's Chief Safety Officer and reviewed documentation that showed BART management is held accountable for SSPP implementation, enforcement, and effectiveness through the weekly safety meetings and the inclusion

of safety in their performance evaluations. Staff did not identify any challenges in performing tasks related to the SSPP or general safety.

Comments:
None.

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**6**	**Element**	**Hazard Management Process**
Date of Audit	September 11, 2017 LKS-18	**Department(s)**	System Safety Department
Auditors/ Inspectors	Claudia Lam Steve Espinal	**Persons Contacted**	Jeff Lau, Chief Safety Officer Jonathan Rossen, Manager of Employee Patron Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Hazard Management Process
Interview BART representatives and review appropriate records to determine whether:

1. BART is identifying hazards through the sources described in the SSPP, Section 604.
2. The System Safety Department maintains a mechanism to capture and track identified hazards through analysis and resolution.
3. The Chief Safety Officer is reviewing operational hazards to assess severity and reporting unacceptable hazards to CPUC as specified by the SSPP, Section 604.
4. BART has a specified process for reporting hazard resolution activities to CPUC as required by General Order 164-D, Sections 6e and 6f.
5. Identified hazards are being evaluated according to the methods established in the SSPP, Chapter 6.
6. Corrective actions are developed to address identified hazards and identify the individual or department responsible for implementation and a schedule for completion.

7. The System Safety Department follows up on outstanding corrective actions to mitigate or resolve hazards.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART representatives in charge of the hazard management program and reviewed relevant documentation and data. Staff determined the following in summary:

- BART has upgraded its surveillance program since the 2014 Triennial Audit.
- BART is upgrading its database called "SIAA" and working with consultants to make necessary improvement to the database. The database captures and tracks the safety data including identified hazards. SIAA also allows the hazard managers to assign the hazardous categories similar to Mil Standard 882E.
- BART handles hazard data by two departments: Operational Safety, and Employee Patron Safety. BART has over 400 thousand passengers a month with roughly 20 patron injuries a month. The manager of Employee Patron Safety reviews the injuries reports and uses the Mil Standard to determine if a hazard is acceptable.
- BART provided a few hazard analysis reports for review and most of them are violation of rules. However, during an audit, staff noticed that several incidents that should have been reported as unacceptable hazardous conditions were not reported to CPUC in a timely manner.
- BART Safety department meets on the first Wednesday of each month at JUMSY Meeting to report, discuss, and follow up with the staff of the Open Status of the identified hazards and CAPs. Operational Safety CAPs were tracked using the CAP Status tracking report. Employee Patron CAPs were tracked using the "Employee/Patron Safety BART Facilities Corrective Action Report". BART discusses the CAPs quarterly during the CPUC meeting.

Findings:
1. According to the BART SSPP page 6.1 states: "Hazard identification is a process to discover conditions in the system, that if not altered have the potential to cause accidents, injuries or significant material losses." Page 6.3 states "Unacceptable – A condition that may endanger human life and property. This hazardous condition cannot remain as is and must be mitigated." The following hazardous events are press accounts that were never reported to the CPUC as Hazardous Conditions:

- June 23, 2017 a debris fire in the Transbay Tube the fire was started by a faulty insulator. Caused major delays and single tracking through the tunnel while the fire was being extinguished.
- July 30, 2016 a cover board fire at Walnut Creek station. The fire, which was reported around 3 p.m., involved a porcelain insulator that failed, allowing electricity to ground and create an electrical arc that ignited a board covering the third rail, said BART spokesman Taylor Huckaby.

Recommendations:

1. BART shall report in 2 hours hazardous conditions as stated in its SSPP. This includes as the BART SSPP page 6.3 states: Unacceptable Hazard– "A condition that may endanger human life or property. This hazardous condition cannot remain as is and must be mitigated."

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**7**	**Element**	**System Modification**
Date of Audit	September 12, 2017 LKS-1800	**Department(s)**	System Safety Department
Auditors/ Inspectors	**Rupa Shitole** Michael Warren	**Persons Contacted**	Mark Chan, Manager of Engineering System Safety Carlina Leong, Principal Engineer System Safety Wahid Amiri, Project Manager Shrenik Shah, Senior Engineer, Station Capitol Program Joshua Teo, Principal Engineer System Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Engineering Change Order Form (BECO), Book 38
4. BART Facility Standards Database (access onsite)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

System Modification

Interview BART representatives and review appropriate records to determine whether:

1. The SSPP and referenced and supporting procedures specify a process for addressing safety issues and concerns in system modifications.
2. The System Safety Department is involved in assessing system modifications. Verify that, in at least two randomly selected system

modifications implemented in the past three years; the process was consistent with SSPP requirements and included an evaluation of potential hazards arising from the proposed modification.

3. System modification projects meet the specifications or project requirements, and no unauthorized modifications were implemented. Select three system modification projects implemented at random, e.g. fire protection system changes.

FINDINGS AND RECOMMENDATIONS

Activities: Staff interviewed the BART representatives responsible for assessing System Modification and determined the following:

1. BART SSPP Revision 9 dated April 2012 Chapter 8 identifies Managing Safety in System Modifications and describes the process as two tiers: one for smaller in-house projects and the other for major projects. The review and monitoring process is defined in the SSPP chapter 8 referencing the BECO Book 38 required process.
2. A list of system modifications for the last 3 years was requested from BART representative, but it was stated that the tracking system does not have the capability to provide such a list. System Safety Department reviews all contracts to verify if all certifiable elements are met.
   Staff reviewed the following projects:
   a. El Cerrito Del Norte Station Modernization Project, Contract No. 05HA-100 – This project considered bringing the old station design up to current standards by providing better lighting, better circulation in and out of the station, extra escalators, etc. The Hazard analysis was handled by consultants. A 35% design review potential hazards preliminary constructability document dated 2/4/2015 was reviewed. Weekly project meetings were held where hazard tracking was discussed. The Contractor was responsible to submit design changes to BART Engineering as required for review and approval. Staff reviewed the Station Modernization BART Comment Resolution Form for submittal No. 05HA001 updated April 28, 2016. The Comment Resolution Form had action code "A = Agrees and will comply/take action" "B = Designer will investigate" & "C = Disagree for

reasons noted" and was incomplete for some entries while some entries had an action code "B" and "C". This project is still under construction.

b. Union City Intermodal Station Phase 2, Contract No. 01VM-110A – This project considered station improvements involving two new elevators, central corridor passage way (walls and ceilings), new station booth, fare gates, area extended back towards the station (east vestibule), lighting, etc. The project was divided into phases like 1, 2, 2A, & 2B, and has not yet been completed (98% completed). Multiple contracts are in place for the six stages of construction (four phases). One initial review of hazard analysis was done per Safety Department and then as needed basis was applied. Staff reviewed BART Comment Resolution Form for submittal No. 01VM-110A PH2 dated 2011 and 2012. There was no formal Preliminary Hazard Analysis done for this project. Outstanding contract work list was provided to staff for review and BART is still waiting for update.

c. A78 interlocking track work repair/recommendation (HMC Project, Contract No. 01RQ-120) – Certificate of conformance dated 7/4/16 (all required as-built drawings and testing was completed). The BECO Form was shared with Staff but the form was missing BECO number because it is still Open and in progress.

d. BECO No. TC001535 related to M15 interlocking repair/ recommendation - Certificate of conformance dated 1/26/16 (all required as-built drawings and safety testing was completed). BECO Form Archived dated 12/2/2016.

3. Staff reviewed the above projects dealing with system modifications and noted no unauthorized modifications occurred. Some of the projects are still ongoing. Design review meetings are conducted on contract build projects like Union City and El Cerrito Stations. System Safety Department attends those ongoing progress meetings. Criteria for existing BART existing Stations dated 3/1/89 document was shared with CPUC Staff. All BART stations under this requirement have gone under the existing analysis per the document. BART holds quarterly meetings with CPUC and discusses all major projects status. March 2017 meeting minutes for the BART CPUC Quarterly meeting were reviewed. Site Specific Work Plan (SSWP) is submitted by contractors to BART for review/approval and if any concerns are raised they get mitigated accordingly. Engineering reviews contractor as-built for proper updates on a monthly basis.

4. CPUC Staff requested information if CPUC involvement on system modification projects was being discussed at any BART meetings. BART Manager of Engineering System Safety stated that only Safety Certification projects were discussed with the CPUC at the quarterly meetings.
5. Reviewed BECO A78, received date 9/1/16 initiated by Train Control Engineering (TCE) Division. The form was incomplete and the initiator did not send a copy to System Safety Department for review as per the BART SSPP.

Comments:

None

Findings:

1. CPUC Staff after interviewing BART noticed that BART was not following their own SSPP on system modification projects and CPUC coordination. CPUC involvement on BART system modification projects needs to happen on all future and ongoing projects to keep CPUC informed.
2. Based on the above review and follow up email dated 10/4/17, Staff finds BART SSPP does not clearly state its process for ongoing system modifications when it comes to smaller or major projects. It is currently very confusing to understand when and how the BART Engineering Change Order (BECO) process is initiated. Some of the projects are ongoing and so until they are closed a BECO Number cannot be assigned to that project.
3. Based on the above review and follow up email dated 10/4/17, BART states that there were changes in the project management and some of the records maybe incomplete and hard to locate. CPUC Staff did not receive requested supporting documents for review.
4. CPUC Staff upon reviewing BECO related to A78 noticed that BART failed to follow its BECO process and involve System Safety Department.

Recommendations:

1. BART must provide ongoing information and involve CPUC with all system modification projects on the system.
2. BART must revise its current SSPP to reflect and elaborate on the current process and its practices.

3. BART must have a more controlled process of managing all documents during change of management on any projects and provide all supporting documents upon CPUC request.
4. BART must follow its own BECO procedures and include System Safety review comments on all projects.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**8**	**Element**	**Safety and Security Certification**
Date of Audit	September 13, 2017 LKS-1800	**Department(s)**	System Safety Department
Auditors/ Inspectors	**Rupa Shitole** Michael Warren	**Persons Contacted**	Mark Chan, Manager of Engineering Safety Joshua Teo, Principal Engineer System Safety Jason Eng, Senior Engineer System Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Facilities Standards Database (access onsite)
4. BART Safety Certification Plans (SCPs) for all major projects:
    a. Central Contra Costa County Crossover Project
    b. Earthquake Safety Project (ESP)
    c. East Contra Costa BART Extension (eBART)
    d. New Vehicle Procurement
    e. Oakland Airport Connector
    f. Warm Springs Extension

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Safety and Security Certification
Interview the BART representative(s) involved in the Safety Certification Program and review the records of all major projects to determine whether:

1. A formal SCP has been submitted by BART and approved by the Commission.

2. Each submitted SCP was consistent with General Order 164-D, the SSPP, and applicable reference documents.

3. There has been effective communication with CPUC staff throughout the lives of current and planned projects, including the Preliminary Engineering Design Phase.

4. All design and construction changes were properly coordinated and addressed in the Safety Certification process.

5. All identified hazards have been eliminated or controlled as required under the SCPs.

6. All certifiable elements for Safety Certified projects during the past three years were identified for the Safety Certification Verification Report (SCVR) and submitted to CPUC in a timely manner, according to the requirements of General Order 164-D.

FINDINGS AND RECOMMENDATIONS

Activities: Staff interviewed representatives from BART System Safety and reviewed applicable documentations and determined the following:

Staff reviewed SCPs and related documents for the following major projects:

a. Central Contra Costa County Crossover Project – Two crossovers (C45 crossover certified December 23, 2014, C47 crossover certified on March 27, 2015 (Three parts of the project divided into tangent track and two crossovers). CPUC resolution ST 103 dated May 21, 2009 was reviewed for BART SCP dated March 27, 2009. CPUC received the BART SCVR for the tangent track letter dated October 29, 2011 (A letter dated November 5, 2012 was sent to CPUC but there were train controls issues in turn this letter was discarded). Staff also reviewed the Certificates of Conformance for different types of testing conducted like train control, traction power, etc. Safety Review Committee meetings were held at BART as periodic progress report to the CPUC. There was no preliminary or final hazard analysis performed for this project. The quarterly progress reports were not available to Staff due to BART losing its data files during the transfer process but the first phase was audited during the 2014 Triennial review. Staff reviewed C45

and C47 documents as well. All phases were put into service without the 21 days waiting period following letter of intent, BART states this was previously discussed and agreed to by the CPUC. No audit of certifiable elements checklists was performed.

b. Earthquake Safety Project (ESP) – The BART SCP dated September 1, 2005 and the CPUC resolution ST-81 dated October 27, 2005 was reviewed. The project (seismic retrofit program) updated other work locations as needed to the SCP but there was no major change. The project is still in works and two contracts are still in progress (Total approximate 28 contracts). BART letter dated October 19, 2007 was the first revision to the SCP including the adding of one location (CPUC staff approved the revised SCP with letter dated November 2, 2017). The other BART letter dated August 18, 2017 was the second revision to the SCP including the tunnel liner in the TBT. Reviewed Certificates of Conformance for some contracts including Hazard Analysis (reviewed the Hazard Analysis Review Committee (HARC) items during construction /Safety Hazard). Reviewed mitigating safety measures, rules, and procedures conformance certification dated and signed 3/20/2014 Contract 15PE110 R Line North Aerial; Contract 15PJ-110B reviewed mitigating safety measures, rules, and procedures Conformance certification for A-line stations 4/7/2015. BART meeting with CPUC was in April 2017 to discuss the progress moving forward and closure of this project. Each contract submits 3 Certificates of Conformance pertaining to the scope/locations of the contract. Certificates of Conformance for R-Line North Contract No. 15PE-110, Certifiable Factors No. 2 & 3 (3/26/14). Certificates of Conformance for A-Line Stations Contract No. 15PJ-110, Certifiable Factors No. 2 & 3 (4/29/15). Certificates of Conformance for Bay Fair Contract No. 15PJ-140, Certifiable Factor No. 1 (10/29/15), Factors No. 2 (6/20/17) & 3 (3/20/17). There is no SCVR complete yet for this project.

c. East Contra Costa BART Extension (eBART) – The BART SCP letter to CPUC dated March 22, 2010 was reviewed for eBART Transfer Platform and Guideway project. Reviewed CPUC Resolution ST-112 dated July 29, 2010 related to BART SCP dated February 4, 2010. Transfer Platform and Guideway Improvements Specification Conformance Certification Element B dated 11/12/15. The certification for element B checklist attachment did have some items that did not fully address the remarks section and BART was notified of this that the certificate was signed off with no exceptions. Elements C, D & E are still open and in progress. Reviewed some Safety and Security Review Committee (SSRC) and FLSC meeting minutes for 2017. FLSC meetings are held as needed and SSRC meetings are held monthly and CPUC designated rep is invited to all the meetings. Hazard

analysis is an agenda item at the SSRC meeting. The SCVR is in progress.

eBart Guideway (Resolution ST-139) – The eBART SCP dated June 2011 and CPUC Resolution ST-139 dated March 22, 2012 were reviewed. Certificate of Conformance for Existing BART Traction Power, Train Control, and Communications is still in progress. Design criteria conformance certification element A (Guideway) signed certificate dated 11/9/15 reviewed. Design criteria conformance certification element B (Stations) signed certificate dated 11/9/15 reviewed. PHA dated June 2017 rev C was reviewed and is still in progress. The PHA is divided into BART and eBART systems. The SCVR is in progress.

d. New Vehicle Procurement – The BART SCP dated May 2012 transmitted to CPUC on September 10, 2012 was reviewed. CPUC Resolution ST-150 dated 3/21/2013 and State Safety Oversight Plan dated May 2017 were also reviewed. Following SSRC Meeting Minutes were reviewed 8/15/17, 7/11/17, 12/20/16 and 8/16/16. Reviewed PHA dated 7/20/16 supplied to SSCRC/CPUC on 7/11/17. Hazard and Vulnerability Tracking Matrix dated 6/6/17 supplied to SSCRC/CPUC on 7/11/17. Draft Interim SCVR for the first 10 vehicles supplied to the CPUC for comments. After acceptance of interim SCVR, BART will put 10 vehicles into revenue service. BART will use these pilot cars to offer feedback to car builder (Bombardier) on vehicle improvements on the remaining fleet. Rest of fleet will be delivered in batches and checked for a predetermined set of requirements and then notification will be sent to CPUC of vehicles acceptance.

e. Oakland Airport Connector – Refer to checklist #7 from 2016 OAC Triennial Review. CPUC Staff reviewed documents related to this project and there were no discrepancies noted.

f. Warm Springs Extension – CPUC resolution ST 80 dated October 27, 2005 related to BART SCP dated August 30, 2005 reviewed. Resolution ST 184 dated September 29, 2016 was related to a fencing variance at Warm Springs Station. BART SCVR letter dated March 16, 2017 to CPUC "Intent to operate". CPUC letter dated March 3, 2017 approving BART to operate into revenue service. The letter contained signed conformance checklists 3/3/17 signed by GM and other project managers including safety and security. Design Criteria Conformance certification for Element A-Guideways, B-Stations, C-Traction Power, D-Ventilation, E-Train Control, and F-Communication were reviewed. PE design conformance certification signed and dated November 13, 2013 submitted to CPUC on February 25, 2014. Certifiable element A – Guideway Fremont Central Park subway and Paseo

Padre Parkway Overpass Bridge were separately completed and the exceptions were completed during construction. Specification Conformance Certification for elements A, B, C, D, E and F dated September 2016 were reviewed (BART letter to CPUC dated 9/10/2013). Certifiable item checklists were reviewed, and the remarks column was filled in as needed. Staff recommends that BART make sure the remarks column is appropriately completed. Safety related testing conformance certification for elements A, B, C, D, E (3/3/17), and F (signed & concurred by BART 2/28/17). System Integration Test completion form (Clearance car test) dated 12-8-2015. Phase III Test Completion form (SCADA Communication Verification SCA301) dated October 4, 2016. SVBX & WSX Track work interface certificate of conformance dated 9/12/16. Certificates for hazard and vulnerabilities resolution for elements A, B, C, D, E, and F dated and signed by Chief of Safety on 9/23/16 (Hazard and vulnerabilities tracking matrix dated August 23, 2016 was included). Certificates for Plans, Rules, and Procedures signed and dated by Chief of Safety 3/1/2017. The matrix had some showing pre-final but the current status is complete per System Safety Engineer (Email dated 9/13/17 received from Deputy Project Manager BART WSX that all required O&M manuals for LTSS contract are complete). Certificates for Training and Drill signed and dated by Chief of Safety 3/1/2017. SSRC meetings minutes were reviewed for CY 2015 and CY 2016 and September 2016 was the last SSRC meeting held.

1. All above projects had formal SCPs submitted by BART for Commission approval.
2. All SCPs were consistent with General Order 164-D, the SSPP, and applicable reference documents.
3. Effective communication with CPUC staff throughout the lives of current and planned projects, including the Preliminary Engineering Design Phase is occurring.
4. All design and construction changes were properly coordinated and addressed in the Safety Certification process via SSRC and other monthly meetings for each project.
5. All identified hazards have been eliminated or controlled as required under the SCPs.
6. All certifiable elements for Safety Certified projects during the past three years were identified for the Safety Certification Verification Report (SCVR) and have or are being submitted to CPUC in a timely manner, according to the requirements of General Order 164-D.

Comments:
Staff noticed and commented on BART's certifiable checklist "remark" column that it should be checked off with a "N/A" if it is not applicable. BART stated that the "remarks" column in the certifiable checklist is left blank on some items because there are no further comments on those items. Some items have "N/A" because they are not applicable to the particular element being certified. This is not documented in writing.

Findings:
None

Recommendations:
None

BART 2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**9**	**Element**	**Safety Data Collection and Analysis**
Date of Audit	September 12, 2017 LKS-1800	**Department(s)**	System Safety Department
Auditors/ Inspectors	**Steve Espinal** Jimmy Xia	**Persons Contacted**	Jim Lovelady, Senior Safety Specialist Jonathon Rossen, Manager of Employee/Patron Safety Carlina Leong, Principal Engineer System Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Safety Data Collection and Analysis
Interview the BART representative(s) responsible for safety data acquisition and analysis, and review the last four publications of the *BART Safety Statistics Report*, and analyze the safety data acquisition and analysis program requirements to determine whether:

1. The data collected includes, at minimum, information concerning employee injury and illness reports, patron accident reports, rules and procedures violations, Unusual Occurrence Reports (UORs), and BART Safety Notifications.
2. The safety data is supplied by, and collected from, all departments, including Operations, Claims Management, and Maintenance, as appropriate.
3. The safety data collected is analyzed and incorporated into BART's Hazard Identification and Resolution Process as necessary.
4. The safety data and analysis is made available to all BART departments for use in planning their safety-related activities.

5. Submitted UORs regarding operations are reviewed and approved by the personnel responsible, and addressed by the appropriate departments.

6. Any discrepancies in UORs and corrective actions were addressed in a timely manner and tracked until completion.

7. What are the standards and techniques used to measure noise on BART trains?

FINDINGS AND RECOMMENDATIONS

Activities:

1) BART staff provided passenger injuries, rules violations, patron statistics, operations records, unscheduled event for 2015 through 2017. Updated the aforementioned information is undated every quarter. This information is presented to Executive Management, and the Manager of Employee/Patron Safety tracks the Corrective Action Plans. BART Safety Notifications emanate from the employees and Senior Safety Specialist will investigate and address any safety concerns. Rules violations typically include horn, clearance and signal issues. Patron injuries are tracked and graphed monthly. Patron injuries are investigated monthly.
2) System safety receives safety information from all departments including Traction power.
3) According to the safety department data collected is analyzed and incorporated into BART's Hazard Identification and Resolution Process as necessary. (Refer to checklist 6).
4) Yes, the safety data and analysis is made available to all BART departments for use in planning their safety-related activities. The safety data graphs were observed in General Manager meeting room and Oakland Shop. The safety data is presented to the BART Board of Directors.
5) Submitted UORs regarding operations are reviewed and approved by the personnel responsible, and addressed by the appropriate departments.
6) Unusual Occurrence Reports are investigated in timely manner. UOR jumper reports are investigated quickly.
7) Manager of Employee/Patron Safety measures the noise on the trains. BART's criteria for excessive noise are weighted average of over 85 dB in an hour. PUC has measured noise levels on many stops and have measured over 100 dB's at some locations. Also between some stations much of the time the dB level is

over 85. Please find the PUC noise investigation in Appendix D in the audit report.

Comments:

1. Staff reviewed the Safety Culture Improvement Program (SCIP). Staff suggested to BART staff to include the program in their System Safety Program Plan (SSPP).

2. BART should review Appendix D and analyze its content to determine if any actions are necessary or appropriate to reduce train noise at the wheel/track interface.

Findings:
None

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**10**	**Element**	**Accident/Incident Investigations**
Date of Audit	September 14, 2017 LKS-18	**Department(s)**	System Safety Department
Auditors/ Inspectors	Colleen Sullivan Steve Espinal	**Persons Contacted**	Rowena Nebreda, Operations Safety Specialist

REFERENCE CRITERIA

1. Code of Federal Regulations, Title 49 Parts 659.33, 659.35, and 659.37
2. CPUC General Order 164-D, Sections 7, 8, and 9
3. CPUC General Order 172, Section 4
4. BART System Safety Program Plan (SSPP) Rev. 9, Chapter 10

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Accident/Incident Investigations
Interview the BART representative(s) responsible, and randomly select at least four CPUC-reportable accidents and/or incidents involving an injury or fatality to determine whether:

1. All accidents and incidents were reported to CPUC according to the requirements in General Order 164-D. (The October 19, 2013 wayside worker fatality accident report was not audited due to the ongoing Order Instituting Investigation (OII).)
2. All accidents and incidents were reported within two hours of occurrence, as required by General Order 164-D, Sections 7.1 and 7.2.
3. All immediately reportable accident or incident notifications to CPUC contained all the information required by General Order 164-D, Section 7.3.
4. All accidents and incidents were investigated in compliance with the requirements of General Order 164-D, Section 8, and the AIIP.

5. Video recordings from inward-facing in-cab cameras are reviewed under the required conditions listed in General Order 172, Section 4.3.

6. A final report was submitted for each accident or incident according to the requirements in General Order 164-D.

7. Each final report includes identification of:

    a. All evidence processed during the investigation;

    b. Findings of the most probable cause(s);

    c. Findings of contributory cause(s);

    d. Corrective Action Plans to address the identified causes with the goal of minimizing the probability of recurrence;

    e. A schedule for implementing the CAPs, including completion date or plan for monitoring progress on an on-going basis.

FINDINGS AND RECOMMENDATIONS

Activities:

1. BART provided Staff with a list of all reportable incidents occurring from 2014 through 2017, along with selected Unusual Occurrence Reports. The following four incidents were selected at random, and Staff performed a detailed review of each Incident Report to verify compliance with 49 CFR 659, GO 164-D, GO 172, and BART's SSPP (BART incident number followed by CPUC transit incident number in parentheses):

    UOR 15-082 (INCT 2015080018) – Embarcadero Station Train vs. Patron, August 24, 2015

    - Initial notification was submitted to the CPUC within two hours.
    - The final Incident Report was submitted to the CPUC within 60 days.
    - No corrective action plan was necessary for this incident.
    - The final Incident Report included all of the evidence processed during the investigation and the most probable cause.
    - The final Incident Report included an analysis of in-cab camera footage for lead car 389.

    UOR 15-103 (INCT 2015100008) – San Bruno Station Train vs. Patron, October 13, 2015

- Initial notification was submitted to the CPUC within two hours.
- The final Incident Report was submitted within 60 days.
- No corrective action plan was necessary for this incident.
- The final Incident Report included all of the evidence processed during the investigation and the most probable cause.
- The final Incident Report included an analysis of in-cab camera footage for lead car 316.

UOR 16-107 (INCT 201609009) – 16th Mission Street Station Train vs. Patron, September 9, 2016

- Initial notification was submitted to the CPUC within two hours.
- The final Incident Report was submitted within 60 days.
- No corrective action plan was necessary for this incident.
- The final Incident Report included all of the evidence processed during the investigation and the most probable cause.
- The final Incident Report included an analysis of in-cab camera footage for lead car 327.

UOR 17-025 (INCT 2017020008) – Hayward Station Train vs. Patron, February 9, 2017

- Initial notification was submitted to the CPUC within two hours.
- The final Incident Report was submitted within 60 days.
- No corrective action plan was necessary for this incident.
- The final Incident Report included all of the evidence processed during the investigation and the most probable cause.
- The final Incident Report included an analysis of in-cab camera footage for lead car 2532.

Comments
None.

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**11**	**Element**	**Emergency Management Program**
Date of Audit	September 14, 2017 LKS-1800	**Department(s)**	Operations Department System Safety Department
Auditors/ Inspectors	Howard Huie Michael Warren Daniel Kwok	**Persons Contacted**	Kevin Franklin, Manager of Security Programs Marla Blagg, Manager of Emergency Preparedness Chris Byrne, Supervisor of Operations Training Shanon Mathews, Senior Operations Safety Specialist

REFERENCE CRITERIA

1. Code of Federal Regulations, Title 49 Part 659.23 – System security plan: contents
2. CPUC General Order 164-D
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART System Security Plan (SSP)
5. BART Emergency Plan

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Emergency Management Program
Interview the appropriate BART representatives involved in BART's Emergency Planning, Training, and Drill/Exercise Program, and review appropriate records to:

1. Randomly select five Station Agents and five Train Operators, and ensure they have completed and passed BART's Emergency Training Program as specified in sections 1104 and 1602 in the SSPP.
2. Verify a drill/exercise schedule has been created and followed.
3. Verify emergency responders and other outside agencies are invited to participate in BART's emergency planning as appropriate.

4. Determine if BART's Emergency Plan is annually reviewed by the Safety Department and is updated as necessary.

5. Determine when the last three drills/exercises were performed, within the last three years, and whether Post-Drill/Exercise Action Report was developed in a timely manner. Were there any corrective actions produced from the After Action Report? If so, were they tracked to completion?

6. Determine whether BART conducts periodic FLSSC meetings with external fire, police, and regulatory agencies.

7. Determine whether BART has created a Fire Department Training Schedule that has been developed and followed throughout the year, to provide local Fire Departments familiarization with BART's: stations, facilities, wayside, system and vehicle familiarization as well as resource training and emergency procedures.

FINDINGS AND RECOMMENDATIONS

Activities:

1. Staff randomly selected the following Train Operators and Station Agents to ensure they have taken and passed BART's Emergency Training Program:

Train Operator	Training Dates
56282	2/29/2016
	10/13/2014
55210	2/27/2017
	9/21/2015
57778	11/14/2016
	4/20/2015
55192	4/2/2017
	9/28/2015
56196	3/7/2016
	3/9/2015

Station Agents:	Due:	Last Trained:

56629	4/14/2020	4/10/2017 5/12/2014
55824	2/13/2018 (currently in training, 10/2/2017)	2/9/2015 2/13/2012
56470	10/10/2017 (was recently trained)	6/12/2017 2/27/2017 10/6/2014
60095	3/25/2019	3/21/2016 11/4/2013
63172	11/13/2019	8/29/2016 (new certification)

2. Staff was provided with completed drill matrix with its respective amount of drills from 2014 (31), 2015 (33), 2016 (27), and 2017 (61) to date to review. Staff reviewed the following emergency drills:
    - 2016 Operation Shakedown Exercise Plan, dated June 2, 2016. Staff reviewed the completed report. Topics of the report include: General Information, Exercise Logistics, Player Information and Guidance, Evaluation and Post Exercise Activities, and CAPs.
    - 2016 Regional Table Top Exercise, dated Oct 11, 2016. The list of participants included but not limited to CHP, CPUC, Cal OES, Alameda County Sheriffs Department, Amtrak, Marin County, SFMTA, SCVTA, Sonoma County, Water Emergency Transportation Authority, PG&E, etc. The list of participants totalled 34 including BART.
    - 2015 SCVTA TTX (I-Step TSA Exercise), dated August 11, 2015. The list of participants include: Altamont Corridor Express, Amtrak, BART, Caltrain, Capitol Corridor, FBI, SFMTA, Santa Clara County Office of Emergency Services, Santa Clara County Sheriff's Office, SCVTA, TSA, and Union Pacific.
    - 2014 Mass Transit Bay Area Operational Exercise (I-Step TSA Exercise), dated April 17 – 18, 2014. Topics of the drill included: Administrative Handling Instructions, Executive Summary, Contents, Exercise Background, Data Capture & Analysis, Risk Based Security Strategy, Summary of Objective Accomplishment, Lessons Learned Strengths, and Lessons Learned Areas of Improvement. The participating agencies include: Alameda County Sheriff's Department, Amtrak, BART, BART Police, Bay Area Urban Areas Security Initiative, CPUC, Caltrans, City of Oakland Office of Emergency Services, Contra Costa County OES,

FBI, Oakland PD, SFMTA, SFPD, San Mateo County Transportation Authority, TSA, US Coast Guard.

3. BART's Emergency Matrix shows a summary of participants for each exercise. Each Exercise Plan and Report shows the complete list of participants. See the list of emergency exercises and its respective participants.
4. BART Emergency Management Program reviews Emergency Plan annually. System Safety Department no longer reviews the Emergency Plan as stated in BART SSPP (version 9). Memos from the Emergency Management Program stating dates of review are the following:

Memo Dates:
12/01/2014
12/18/2015
12/18/2016

5. Staff reviewed the following last three emergency drills:
    - June 2, 2016: Operation Shakedown Exercise Plan – After action CAPs complete
    - October 26, 2015: (July 14, 2016): Hayward Yard Oil Spill - After action CAPs complete
    - April 17-18, 2014: (TSA) Bay Area Operational Exercise – After action CAPs complete
6. BART Operations has Rapid Transit Fire Liaison Committee Meetings quarterly, and has also created a communications working group. BART has the following FLSSC meetings for new extensions:

Project (frequency of meeting):	**Dates Reviewed:**
Warm Springs (monthly)	April 15, 2014 July 29, 2014 March 17, 2015 June 16, 2015 January 5, 2016 September 15, 2016
eBART (quarterly)	July 28, 2014 October 6, 2014 April 6, 2015 October 5, 2015 March 14, 2016 November 7, 2016

New Vehicle Procurement (2014, bi-monthly| 2015-2016, monthly)	July 9, 2014 November 5, 2014 July 14, 2015 September 1, 2015 February 16, 2016 September 20, 2016

Staff verified representatives of external fire, police, and regulatory agencies are present at meetings or are invited/on the email distribution for the meeting minutes.

7. BART uses a "Fire Department Training" matrix to track Fire Training exercises. Staff reviewed the 2017, 2016, 2015, and 2014 matrices.
    - Matrix shows 2014 – 14 Fire Familiarization and/or Functional Exercises were performed.
    - Matrix shows 2015 – 33 Fire Familiarization and/or Functional Exercises were performed.
    - 2016 – 19 Fire Familiarization and/or Functional Exercises were performed.
    - 2017 – 17 Fire Familiarization and/or Functional Exercises were performed, as of September.

    BART also hosted and/or participated in the following emergency drills/exercises:
    - Transbay Tube Drill, dated January 10, 17, 24, 2016
    - M-Line Aerial Track Fire Drill, dated November 15, 2015
    - Berkeley Hills Tunnel Fire and Functional Exercise, dated April 13, 20, 27, 2014

    Participants include but were not limited to BART PD, BART front line employees and Emergency Medical Services (EMS) and Management, and SFMTA.

Comments:

None.

Findings:

1. BART SSPP (version 9, April 2012) was not updated with current procedure for which Program/Department manages, updates, and implements BART's Emergency Plan. However, BART SSPP (version 10, September 2017) has been updated with the relevant language indicating the BART Emergency Preparedness Program and System Safety Department are responsible for managing, updating, and implementing

BART's Emergency Plan. BART's SSPP Version 10 was approved by staff on November 15, 2017, after the conclusion of the audit.

Recommendations:

None. See Recommendation checklist #4.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**12**	**Element**	**Internal Safety Audits/Reviews**
Date of Audit	September 14, 2017 OSA	**Department(s)**	System Safety Department
Auditors/ Inspectors	**Steve Espinal** Jimmy Xia	**Persons Contacted**	Jeff Lau, Chief Safety Officer Denis Ring, Acting Manager of Operations Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Internal Safety and Security Audit (ISSA) Schedule (2015-present)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Internal Safety Audits/Reviews
Interview the BART representatives involved in ISSAs, and review appropriate records to:

1. Determine if a three-year internal audit schedule was developed and submitted to CPUC.
2. Verify that all elements of the SSPP were evaluated within the past three years.
3. Verify that each audit lists the involved BART departments, the safety-related activities addressed, and the reference criteria for the audit.
4. Determine whether the ISSAs adequately address interdepartmental and interagency communication issues, and whether or not BART has a process for addressing and overcoming departments' non-responsiveness and failures to implement audit recommendations.
5. Determine how expertise for auditing specific functions is evaluated, and how personnel are assigned per the SSPP, Section 1203, to ensure

ISSA quality. An example of a function is signal inspection.

6. Verify that audits have been properly documented and included references for documents and activities reviewed, criteria for evaluation, and notes to support findings and recommendations.

7. Verify that Annual Reports are accompanied by letters from the chief executive or designee, stating BART's compliance status with its SSPP and Corrective Action Plans (CAPs) for elements determined not to be in compliance.

8. Verify that Corrective Actions to address findings from audit reporting, as specified in the SSPP, Section 1206, were scheduled, tracked, and implemented.

FINDINGS AND RECOMMENDATIONS

Activities:

1. The three-year audit schedule is located in Appendix B in each BART ISSA Program Annual Report. For instance, the 2016 report shows the audit schedule and scope of internal audits for remainder of cycle 2017 and 2018.
2. As shown in Appendix A – a summary of audits is collectively shown for each respective 3-year audit cycle (2013 to 2015 and 2016 to 2018). Each year they rotate departments subject to ISSAs (e.g. For instance, one-year maintenance and engineering and another year Operations.)
3. Each audit lists the involved BART departments, the safety-related activities addressed, and the reference criteria for the audit.
4. BART Safety Department generates CAP's reports. If the CAP's are not corrected in a timely manner they will be entered in to Annual Report. Every quarter, a CAP report is sent to department management. Department managers have 15-day notices, 30-day notices, and final notice to complete CAP's. Safety Department generates a quarterly report that shows CAP status. Departments get a draft, with notification to them to implement CAPs. Afterwards, they will receive final notices.
5. Staff discussed the qualifications of the BART ISA auditors. There were audit checklists where BART auditors lacked education and training related to specific checklist. For instance, on Checklist 14-07, a licensed Electrical Engineer was auditing Structures Inspection Records; this auditor was not a licensed civil engineer auditing structural records. The audit included a review of the paperwork. No actual structures were

visually inspected. Also Checklist Numbers 14-04, 14-05 and 14-12 were audited by BART staff with no track training.

6. The audits were well documented including Findings and Corrective Action Plans.
7. The annual reports did include an accompanying letter from the General Manager.
8. Corrective Action Plans are closely monitored and followed through completion.

Comments:

1. The audit reports clearly describe the process and items reviewed. It generates Findings and follows up on its Corrective Action Plans (CAPS). As a whole, BART Safety Department's CAP process is satisfactory.
2. BART does an excellent job in reviewing the paperwork associated with completed work. BART staff must also inspect actual physical structures during ISSA process including the aerials, tunnels and track.
3. BART ISA report for the year 2016, final report is dated 1/23/2016, which is a typographical error. It should have been 1/23/2017 as the audit checklists contained in the report are completed throughout 2016.
4. According to BART SSPP Revision No. 9, Dated April 2012, "Auditors must be technically qualified to perform the audits and shall be independent from the first line of supervision responsible for the activity being audited." According to General Order 164-D "Each RTA shall perform each internal safety and security audit in accordance with written checklists by personnel technically qualified to verify compliance and judge the effectiveness of the SSPP activity and Security Plan activity being audited." Staff is concerned that BART's internal auditors may not always have the appropriate level of technical expertise to review the areas of the internal audit they are assigned.

5. Inspecting records for completeness is ineffective if these are not compared to actual conditions in the field. CPUC Track Inspectors have found that Inspection Records do not always reflect the conditions in the field. Please refer in this audit to the track audit checklist (15-D) and the comments regarding track inspection records not reflecting actual track conditions.

Findings:

According to BART's SSPP Revision No. 9 dated April 2012 the Security Plan Compliance will audit CPUC Decision 87376 (Seventh Interim Decision). When BART staff was asked if the Seventh Interim Order is audited, BART Staff replied no.
When BART staff was asked if BART conducts physical examination for safety sensitive employees, again the answer was no.

Seventh Interim Order section 3f. page 6, states:

"A physical examination shall be required for initial certification. The District shall require that employees whose positions affect safety, as defined within the plan, undergo a physical examination upon initial employment and be required to be reexamined at intervals to be determined by the District. Once the reexamination intervals have been established by the District, they shall be submitted to the Commission for review."

Recommendations:

"A physical examination shall be required by" BART "for initial certification. The District shall require that employees, whose positions affect safety, as defined within the plan, undergo a physical examination upon initial employment and be required to be reexamined at intervals to be determined by the District. Once the reexamination intervals have been established by the District, they shall be submitted to the Commission for review." As stated in the CPUC Decision 87376 Seventh Interim Decision.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**13-A**	**Element**	**Rules Compliance: Observation and Enforcement**
Date of Audit	September 15, 2017 LKS-1800	**Department(s)**	Transportation Department Maintenance and Engineering Department
Auditors/ Inspectors	**Mike Rose** Richard Fernandez Matt Ames Mike Borer	**Persons Contacted**	Tamar Allen, Chief Maintenance and Engineering, Officer Roman Kotlyar, Manager of Operations Support and Review Denis Ring, Acting Manager of Operations Safety Tera Stokes-Hankins, Group Manager Operations Support and Review John Mazza, Asst Chief M&E Roy Aguilar, Chief Transportation Officer Jeff Lau, Chief Safety Officer

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. CPUC General Order 172
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Operations Rules and Procedures (OR&P) Manual
5. BART Operations Control Center Rules and Procedures Manual (OCC Manual) Rev. 25
6. BART Personal Electronic Device Usage Restriction Rules (PED Rules)
7. BART Management Procedure 84: Operations Safety Compliance Program
8. Seventh Interim Order (Investigation on the Commission's own motion into the safety appliances and procedures of the SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT Decision No. 87376)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Rules Compliance: Observation and Enforcement
Review appropriate records from the three primary departments identified in the BART Operations Safety Compliance Program (OSCP)—Transportation, Maintenance and Engineering (M&E), and Rolling Stock and Shops (RS&S)—to:

1. Verify that Operations supervisors are performing regular observations as part of Train Operator Evaluations Program, in accordance with the SSPP, Section 1304.

2. Verify that the Safety Department has performed at least one audit of the Transportation Department, including the Train Operator Evaluations program, in the past triennial audit cycle.

3. Verify that the OSCP is performing exercises and evaluations of personnel in the Transportation, M&E, and RS&S Departments, in accordance with SSPP, Section 1305

4. Verify that operations and maintenance employees are evaluated based on their performance during unannounced observations to assess their compliance with safety rules, procedures, and/or practices.

5. Determine whether any accidents/incidents were determined to have resulted from inadequate operations procedures and verify appropriate CAPs were implemented in response.

6. Verify that the Safety Department receives reports from the Operations and M&E Departments regarding rules compliance assessment and testing. Are issues of non-compliance identified from the rules compliance process, reported to the System Safety Department, and addressed in appropriate ways?

7. Based on the Seventh Interim Order Part 3 section f : A physical examination shall be required for initial certification . The District shall require that employees whose positions affect safety, as defined with the plan, undergo a physical examination upon initial employment and be required to be reexamined at intervals to be determined by the District. Review physical examination records.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed personnel from BART System Safety, Transportation, Maintenance and Engineering (M&E) and Rolling Stock and Shops (RS&S). Transportation

personnel presented documents showing observations and compliance checks in accordance with SSPP, Section 1203 and 1304 and forwarded the compliance checks and observations to System Safety as per SSPP, Section 1305. An internal audit from 2016 along with the Train Operator Evaluations program was reviewed and found to be in accordance as outlined. Staff discovered RS&S employee #60386 to have failed 19 of 35 observations. A discussion on employee #60386 ensued as to why no discipline issued for said failures. Staff found RS&S Personnel did not understand any violation of a policy or rule infraction is a requirement for discipline. Staff found in the discussion RS&S did not notify System Safety of any violations from RS&S regarding Employee #60386.

Staff learned It is the task of the System Safety Department to monitor safety performance of the District's operation. This data includes employee injury and illness reports, patron accident reports, rules and procedures violations, Unusual Occurrence Reports and BART Safety Notices.

Comments:
None.

Findings:

1. RS&S is not monitoring rules compliance and forwarding reports to System Safety, as outlined in SSPP, Section 1305.

2. No discipline was assessed to RS&S Employee #60386. RS&S provided no documentation of a discipline policy. Furthermore, RS&S Management appeared to be unfamiliar with a clear definition of what discipline is.

3. Upon review of rules compliance records, it was determined that M&E does not meet required testing under M&E Safety Compliance Checks for Managers.

Recommendations:

1. RS&S needs to provide System Safety with reports of compliance/non-compliance inspections, as per SSPP, Sections 202 and 1305, to identify, eliminate, minimize, and/or control safety hazards and risks. This will ensure deficiencies are addressed in appropriate ways.

2. Interdepartmental communication is essential for RS&S to ensure SSPP, Section 1303 Process for Ensuring Rules Compliance is followed.

3. BART has advised they are revising the BART M&E Safety Compliance Checks for Managers to take into account vacations, leave of absence, etc. to update testing requirements.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**13-B**	**Element**	**Rules Compliance: Operations Safety Compliance**
Date of Audit	September 13 -21, 2017 Ride Checks Unspecified Mainline Locations OCC	**Department(s)**	Transportation Department Maintenance and Engineering Department
Auditors/ Inspectors	**Debbie Dziadzio** Mike Rose Richard Fernandez	**Persons Contacted**	Shanon Matthews, Sr Operations Safety Specialist

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Operations Rules and Procedures (OR&P) Manual
4. BART Personal Electronic Device Usage Restriction Rules (PED Rules)
5. BART Wayside Worker Protection Program
6. BART Track Safety Standards

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Rules Compliance: Operations Safety Compliance
Interview BART representatives responsible for Operations Safety, perform random observations and operations inspections, and review appropriate records to determine whether:

1. Maintenance Workers:
    a. Know and understand applicable wayside safety rules;
    b. Comply with the PED Rules when performing any duties on or near

railways;

c. Know and understand the rules and procedures for mainline operations.

2. Operators:

   a. Are in compliance with the OR&P Manual;

   b. Comply with PED Rules while inside operator cabins;

   c. Are properly trained and knowledgeable in handling accidents/incidents and emergency response situations and coordinating with the Operations Control Center (OCC) during the same.

3. Controllers:

   a. Are properly preparing and maintaining records, reports, and logs;

   b. Perform duties in accordance with standard operating procedures, rule books, and bulletins;

   c. Are trained and knowledgeable in dealing with accidents/incidents and emergency response situations and coordinating with BART personnel and other agencies during the same.

Randomly select several controllers, operators, and maintenance personnel, and perform ride-along or on-site inspections to verify their compliance with applicable rules, that they have the proper safety equipment, that their radios are functioning, and that they are complying with the PED Rules.

FINDINGS AND RECOMMENDATIONS

For this checklist, Staff rode BART system for 10 days, riding Richmond, Pittsburg/BayPoint, Daly City, Millbrae and Warm Spring lines. Staff went to Daly City yard to observe Maintenance workers and BART RWP rules being applied. Staff also went to OCC and interviewed and observed Controllers. During the past two weeks, Staff had the opportunity to interview BART representatives from various departments to learn about BART Operations.

Observations while Staff rode BART System:

Comments:
Staff rode BART for approximately 25 trips. BART TOs were in compliance to various OR&P and Train Operator Manual (T.O.M.) requirements with the exception of the 3 instances listed below.

Staff approached Station Agents and displayed State ID. All Stations Agents allowed Staff access at all stations.

Findings:

1. On 09/12/17 - 0720, Staff observed BART Richmond train, HRV #1248 arriving Union City Station not sounding horn when approaching the station platform. When Staff boarded, Staff stood behind the operator and watched as operator ran silent, not sounding horn at any station until Staff disembarked at 19th St Station.

   On 09/19/2017, Staff rode in the operating cab of BART Millbrae train, HRV #327 from Lake Merritt to Civic Center Station with TO#060165. After Staff entered the passenger compartment at Lake Merritt, and while the train was in motion, TO opened the Cab Door (to allow Staff inside operating cab) rather than allow Staff access before the train went into operation mode.

   On 09/21/2017, Staff rode BART Warm Springs train, HRV #1656 from Lake Merritt to Union City with lead LRV#2592. The train stopped at Hayward Yard to pick up BART personnel without making a public announcement, prior to stop, advising that the train will be making a momentary stop and that patrons must remain seated, hold on to a railing and stay clear of the side doors.

September 21, 2017 - Observations at OCC are as follows:

Comments:
Staff interviewed BART Power Support personnel and inquired regarding BART OCC Manual policy as it pertains to new, canceled, revised bulletins and policy and was advised per Checklist 13-F.

Staff sat with Controller and reviewed work order logs. Staff found the Controller extremely knowledgeable in her duties and responsibilities.

Staff reviewed 'sign-for' bulletins that are centrally located in OCC as described in Checklist 13-F.

Findings:
None

September 9, 2017 - Observations at Daly City Yard:
These observations are currently under investigation by BART System Safety:

Comments:

1. Staff observed seven TOs crossing yard tracks. Four TOs practiced safe procedures, looking both ways, expecting a train on any track in any direction at any time. Staff observed TO #62005 violate PED policy. When Staff notified the Tower Foreworker, the Foreworker notified Daly City Yard TS who administered discipline per BART PED policy.

Findings:

1. Staff observed TO #58177 cross multiple yard tracks without wearing a safety vest. Employee also exited authorized walkway in order to walk around a stopped HRV and proceeded to step over the third rail. There was a gap in the third rail approximately 25 feet away which was easily accessible.

   Staff observed TO #62035 cross multiple tracks without wearing a safety vest. Employee was wearing a black "Hoodie" over their prescribed uniform. Employee never looked in either direction while crossing live tracks.

2. Two additional TOs were observed not looking both ways before crossing the yard tracks. Staff approached BART Daily City Yard Job # (Contract) H22783 HVAC work at wash rack.

EIC did not fill out a Job Briefing Safety Booklet nor briefing document. EIC was unaware the west end of his limits was unprotected because the Watchperson had walked off. EIC instructed Safety Monitors to a second assignment of Watchpersons. EIC did not confirm all work crew members were current in their RWP certification. Staff found 2 contractors with expired RWP certification. Contractors working with expired RWP had no Safety Monitor escort. Staff found Safety Monitors were actively working as Watchpersons and over 250 ft away from contractors at each end of the job site. West end Watchperson walked off, passed the EIC and did not inform the EIC that the job would be unprotected from the west end. Upon observing the west end Watchperson approach and pass him, the EIC did not question where the Watchperson was going, nor did the EIC place someone in the Watchperson's position to protect the west end. After return to west end Watchperson position, Watchperson stood between the gage, facing the work crew with his back to the possibility of any approaching trains. Staff observed that this Watchperson never looked behind him, nor left the area of between the gage. When Staff advised Tower Foreworker to tell EIC to instruct west end Watchperson to perform his Watchperson duties properly, from the tower, Staff observed that the conversation ensued between the EIC and the west end Watchperson while the west end Watchperson was still standing between the gage. The EIC was derelict in his EIC duties and responsibilities. Safety Monitors had not taken any notes, performed any inspections or compliance observations and were not escorting Contractors who were not RWP certified.

<u>Recommendations:</u>

1. Ensure compliance observations to T.O.M. #304(b) Train Horn Use is included in inspection/compliance checklists. Enforce T.O.M. #221 Protection of Train Operators which states doors shall remain closed. Ensure TOs perform their announcement duties as required in T.O.M. #410(b)

2. Enforce OR&P Manual-Revision 7, Rules 2301, 2304, 2505 and 2507, RWP Rule 2507, (B), Exception #3. Enforce OR&P Manual-Revision 7, Rules 2103, 2502.

3. Enforce General Order 175A, Section 5.1 (a), (d), (h), (i) (j), BART RWP Manual, Section 2113 pg. 5. Enforce General Order 175A, Section 9.4 (a), BART Employee Certification Plan, Section 2.2.2. Enforce General Order 175A, Section 5.1 (j), BART OR&P 8301, Section B (3), (10), (13), and (14). Enforce OR&P Rule 1505, Bulletin 17-28 July 20, 2017.

4. The violations of General Orders, Operating Rules and Procedures, and RWP Rules and Policies that Staff observed give concern to the lack of enforcement Staff has learned about this while meeting with several departments during this triennial audit. There must be dedicated personnel who are knowledgeable in the above-mentioned regulations, rules, policies and procedures and trained to observe operations in various departments and given the authority to correct non-compliant or unsafe behavior via coaching and counselling and written reports that can be tracked and analyzed.

5. RWP EIC training from BART is the same training and certification that all personnel who want to enter BART ROW must obtain. Staff recommends additional training specific for EIC duties and requirements stressing the high level of EIC responsibility or discipline for non-compliance.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**13-C**	**Element**	**Rules Compliance: Operator, Controller, and Maintenance Personnel Hours of Service**
Date of Audit	September 18, 2017 LKS-14	**Department(s)**	Operations Department Maintenance and Engineering Department System Safety Department
Auditors/ Inspectors	**Richard Fernandez** Mike Rose	**Persons Contacted**	Tera Hankins-Stokes, Manager of Transportation Operations Support and Review Tonya Holmes, Manager of Time and Labor Denis Ring, Acting Manager of Operations Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. ATU Labor Agreement
4. AFSCME Labor Agreement

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Rules Compliance: Operator, Controller, and Maintenance Personnel Hours of Service

Select at least 10% safety-sensitive employees at random from each of the following classifications:

- Train Controller
- Power and Support Controller
- Train Operator
- Tower Foreworker
- Transit Vehicle Mechanics
- Track Maintenance
- Signals Maintenance

- Revenue Vehicle Maintenance

Inspect the employees' time cards for a three-month period during the past 12 months to determine whether:

1. Shifts were in compliance with the requirements that safety-sensitive employees may not remain on duty for more than 12 consecutive hours, or for more than 12 hours in any 16 hour period.

2. Each initial on-duty status was preceded by eight consecutive hours of off-duty status.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff was provided employee rosters of BART personnel from the following classifications: Train Controller, Power and Support Controller, Train Operator, Tower Foreworker, Transit Vehicle Mechanicals, Track Maintenance, Signals Maintenance and Revenue Vehicle Maintenance. The Staff selected a minimum 10% of safety sensitive employees at random from each classification.

Staff chose a three-month period, December 1, 2016 to February 28, 2017 to inspect employees' time cards to ensure that safety-sensitive employees did not remain on duty for more than 12 consecutive hours, or for more than 12 hours in any 16-hour period. There were no findings to report for this requirement. Staff also verified that each initial on-duty status was preceded by 8 consecutive hours of off-duty status, for which there were no Findings.

Comments:
The information required to conduct this review was presented in a timely and efficient manner, therefore the Staff has no recommendations.

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**13-D**	**Element**	**Rules Compliance: Contractor Safety Program**
Date of Audit	September 14, 2017 LKS-1800	**Department(s)**	Operations Department System Safety Department
Auditors/ Inspectors	**Debbie Dziadzio** Richard Fernandez Mike Rose	**Persons Contacted**	John Fu, Project Manager Carin Shoemaker, Senior Operations Supervisor, Operations Liaisons Jason Eng, Sr Engineer, System Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Operating Rules and Procedures Manual (OR&P)
4. BART Management Procedure 31

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Rules Compliance: Contractor Safety Program
Interview the BART representative responsible for the Contractor Safety Program and review appropriate BART documentation to determine whether:

1. BART has developed and implemented a control document clearly establishing its responsibilities and requirements for the contractor safety program, including:
    a. Training and certification for contractors and their employees.
    b. The rules, regulations, and procedures applicable to contractors and their employees.
2. BART's procedures and practices clearly identify that BART is ultimately in charge on its system, and that contractors and their employees must comply with all established safety rules and procedures.

3. BART procedures require regular internal audits and inspections of construction sites to monitor compliance with its safety requirements.

4. BART procedures establish the range of activities for monitoring Contractors and their employees, and enforcing compliance with safety requirements through regular unscheduled and unannounced compliance checks, as well as by scheduled periodic audits and inspections.

5. The Safety Department has reviewed construction plans, performed site inspections, reviewed and approved contractor safety plans, and ensured contractors operate in compliance with BART OR&P Manual, all as specified in the SSPP, Section 1803.

6. BART's monitoring and enforcement activities are properly recorded, distributed, and filed.

7. There is sufficient interagency coordination among various contractors regarding safety issues.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff and BART personnel randomly selected Contract #I5TF-111 (Installation of Safety Barriers in Right of Way – System Wide). The contract was used to answer all questions regarding this checklist.

Staff interviewed BART personnel and learned that the BFS (BART Facility Standard), which is included on all contracts, contains language that clearly establishes its responsibilities and requirements for contractor safety.

From a previous checklist, Staff reviewed training, certification, and recertification for current contractors authorized to work on BART's ROW (Right of Way). The training and certification training includes BART OP&R Manual, RWP, and PED.

Staff learned that construction inspectors, who work for the Resident Engineer (RE) make daily inspections of work sites. Also, Safety Monitors, usually BART retired employees who hold current RWP certification, are at most job sites. Safety Monitors can perform the duties of a Watchman, and EIC, or accompany a contractor to ensure safe procedures are being utilized. The Safety Monitors use a DMAR (Daily Monitor Activity Report) which is a checklist for inspections where the Safety Monitors can

check for PPE, Radio, Work Plan, SSWP, Safety Briefings, Dynamic envelope, start and finish work times. Attached is a copy of the daily job briefing roster. There are no procedures for required compliance observations from System Safety.

After reviewing notebook associated with above listed contract, it was determined that the Safety Dept reviews construction plans, review and approve contractor safety plans. Staff reviewed Health & Safety Plan, Site Specific Work Plan, Track Allocation, Safety Monitor requirements. Staff noted there were no listed System Safety observations and/or compliance checks to ensure enforcement of operating rules and procedures, CPUC GOs, local codes and regulations.

Staff learned that the construction inspector's inspections are downloaded in a Dbase Intranet system for various people to review. The Safety Monitor DMAR is emailed to the Supervisor who copies the Construction Management (RE). The information is not sent to System Safety.

The contractor process has sufficient interagency coordination regarding safety issues, i.e. track allocation to permits to EIC to OCC, OCC to headend of train, etc. System Safety is missing is the process.

Comments:

1. BART System Safety must take a more proactive role to ensure contractor safety on BART's ROW via observation compliance checks as per BART SSPP.

2. After reviewing the above listed contract and an additional contract (#17DA-110 – Oakland Shop Pit Expansion), it was determined that there is no verbiage in the entire contract process (i.e. RFP, bid, acceptance, final contract) that clearly identifies BART to be ultimately in charge on its system and that contractors and their employees must comply with all established safety rules and procedures. BART must ensure language is included in the final contract that clearly states BART is ultimately in charge on its system and that the contractors and their employees must comply with all established safety rules and procedures.

Findings:

1. On the DMAR, which the Safety Monitors utilize at job sites, there is no place to ensure PED compliance is observed and notated.

2. Staff learned that System Safety does not perform daily or routine scheduled inspections or observations to ensure compliance to BART OR&P as per BART SSPP, Section 1803. Staff could not determine that BART procedures establish a range of activities via scheduled, unscheduled, regular and unannounced compliance checks to enforce compliance to safety requirements.

3. System Safety is missing opportunities to ensure contractor safety on BART's ROW via unscheduled and unannounced, scheduled and regular compliance observations to ensure and enforce compliance to operating rules and procedures, GOs, and Federal and local codes.

<u>Recommendations:</u>

1. BART must add a PED compliance observation box on the Safety Monitor DMAR to ensure compliance with GO-172.

2. BART System Safety must ensure there are dedicated personnel to perform routine work site inspections to ensure compliance to BART OR&P, State, Federal and local codes and regulations as per SSPP 1803.

3. BART System Safety must be involved in all areas of enforcement and compliance of BART operating rules and procedures, State, Federal, and local codes to ensure contractor safety.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**13-E**	**Element**	**Rules Compliance: Operating Rules and Procedures Manual and Operations Bulletin Revisions**
Date of Audit	September 21, 2017 OCC 0900	**Department(s)**	System Safety Department Operations Department
Auditors/ Inspectors	Richard Fernandez Mike Rose Debbie Dziadzio Matt Ames	**Persons Contacted**	Jeff Lau, Chief Safety Officer Denis Ring, Acting Manager of Operations Safety Fred Edwards, Asst Chief Transportation Officer, OCC Kimberly Johnson, OCC Training Supervisor

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Operations Rules and Procedures (OR&P) Manual

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Rules Compliance:
Operating Rules and Maintenance Procedures Manual and Operations Bulletin Revisions
Interview BART representative responsible for operations rules and procedures and review necessary documentation to determine whether:

1. The OR&P Manual and all active Operating Bulletins are reviewed and revised if necessary on an annual basis.
2. The results of each annual review of the OR&P Manual and Operating Bulletins are documented in a memorandum to file, providing a summary of the results and the Chief Safety Officer's (CSO's) determination whether revisions are needed.

3. All Operating Bulletins were approved by the CSO with the concurrence of affected departments.

4. Operating Bulletins were issued in a timely manner and provided to affected personnel.

5. A record is maintained of all Operating Bulletins issued, and employees receiving the bulletins.

6. Active Operating Bulletins are posted in specified locations, and inactive bulletins are removed in a timely manner.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART representatives and learned that the OR&P Manual is reviewed and revised annually at the beginning of the new year by BART System Safety. Operating Bulletins that pertain to policy will be reviewed, canceled and written into Policy. Bulletins that remain in current form are posted on-line and pushed to Department Superintendents who send to their Managers and Supervisors. It is the Manager's and Supervisor's responsibility to ensure all BART personnel (i.e. techs, TOs, track, RS&S, etc) read and sign for the current Bulletins. Crafts have the ability to log onto BART's IT system to read and review Bulletins. The Crafts logging onto the system each have an identifier and can be tracked via the IT system. TOs must read a hard copy and manually sign on a sign-for sheet after reading and review. Active Bulletins are posted in centrally located areas. For TOs, at their individual reporting stations, for crafts, at their individual work location.

Staff reviewed cover sheets entitled, "Annual Review of the OR&P Manual" for 2014, 2015, 2016. The cover sheet is entered into a current Bulletins notebook and reflects all revisions and cancellations from the previous year to the current Bulletin notebook. All Operating Bulletins are approved by BART Chief Safety Officer in concurrence with all affected departments.

Comments:
None

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**13-F**	**Element**	**Rules Compliance: Operations Control Center Manual Revisions**
Date of Audit	September 21, 2017 OCC 0900	**Department(s)**	System Safety Department Operations Department
Auditors/ Inspectors	**Richard Fernandez** Mike Rose Debbie Dziadzio Matt Ames	**Persons Contacted**	Fred Edwards, Assistant Chief Transportation Officer, OCC Kimberly Johnson, OCC Training Supervisor Jeff Lau, Chief Safety Officer Denis Ring, Acting Manager of Operations Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Operations Control Center Rules and Procedures Manual (OCC Manual) Rev. 25

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Rules Compliance: Operations Central Control Manual Revisions
Interview BART representative responsible for operations rules and procedures and review necessary documentation to determine whether:

1. The OCC Manual is reviewed and revised, as necessary, on an annual basis.
2. Revisions to the OCC Manual are made either through Operating Bulletins, or other written documents signed by the appropriate Department Managers.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff interviewed BART representatives and learned that the OCC Manual is reviewed and revised annually at the beginning of the new year. Current Bulletins (sign-fors) that pertain to policy will be reviewed, canceled and written into Policy. Temporary Bulletins will stay in the sign-for book and continue to be reviewed annually until no longer applicable. BART representatives advised that when procedures and/or policies need to be revised, currently communications are sent from various departments to OCC and vice versa via email. After operation changes have been reviewed by all department heads, including System Safety, a new Bulletin will be initiated. At that time, the sign-for (bulletin) will be in a notebook at OCC, centrally located. It is the responsibility for the Controllers to ensure they are current in their knowledge of sign-fors, as per OCC Rules and Procedures Manual Book 486, Revision 25 #208, 1.

Comments:
BART representatives advised that their future plans for IT Development include a tracking system to ensure all pertinent personnel receive necessary communications for initiation of Bulletins and/or policy changes.

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-A**	**Element**	**Facilities and Equipment Inspections: Fire Emergency Systems**
Date of Audit	September 14, 2017 OSA	**Department(s)**	System Safety Department Maintenance and Engineering Department
Auditors/ Inspectors	**Steve Espinal** Jimmy Xia	**Persons Contacted**	Richard Watson, Superintendent Joe Ortiz, Upgrade Section Manager Voltaire Vivero, Upgrade Foreworker

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. California Code of Regulations Title 19, Division 1
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Book 4, Mechanical Maintenance Procedures
5. BART Book 31, Electrical Maintenance Procedures

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Fire Emergency Systems
Review BART's records of Preventative Maintenance (PM), testing, and unscheduled maintenance activities for two separate periods during the last three years, for at least two randomly selected separate reported areas for each of the following components:

1. Ventilation:
    a. All ventilation systems were inspected at the correct frequency;
    b. The required ventilation system inspections were properly documented, and noted defects were corrected in a timely manner.
2. Sprinkler System:
    a. All sprinkler systems were inspected at the correct frequency;
    b. The required sprinkler system inspections were properly documented, and noted defects were corrected in a timely manner.

3. Wet Standpipes:
    a. All wet standpipes were inspected at the correct frequency;
    b. The required standpipe inspections were properly documented and noted defects were corrected in a timely manner.
4. Under-Car Deluge:
    a. All under-car deluge systems were inspected at the correct frequency;
    b. The required under-car deluge system inspections were properly documented and noted defects were corrected in a timely manner.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff interviewed BART personnel responsible for inspection and maintenance of the Fire Emergency Systems and reviewed the following records of PM activities completed during the last three years for several randomly selected areas of the following components:

1. Ventilation:
    a. Inspection records on BART Maximo database for annual inspections of the following line vent fans completed in 2015, 2016, and 2017:
        i. Fan KV-17 located at 12th St Station
        ii. Fans KV-22 and KV-23 located at 19th St Station
        iii. Fans MV-19 and MV-20 located at Embarcadero Station
        iv. Fans MV-23 and MV-25 located at Montgomery Station
        v. Fans MV-31 and MV-33 located at Powell Station
    b. Inspection records on BART Maximo database for bimonthly inspections of the Transbay Tube (TBT) Exhaust Fans, consisting of BV-01 and BV-02 located at the Oakland Vent Structure and BV-03 and BV-04 located at the San Francisco Vent Structure, completed during the last three years (2014-2017)
2. Sprinkler System:
    a. Sprinkler System Quarterly Inspection Forms completed during the last three years (from 2014 to mid-September 2017) for the following stations: W20 South San Francisco Station, W30 San Bruno Station, R10 Ashby Station, R20 Berkeley Station, R30 North Berkeley Station
3. Wet Standpipes:
    a. Class I Standpipes Inspection Forms for semi-annual inspections of the following wet standpipe zones completed during the last three years (from 2014 to mid-September 2017):

i. C75 – Training trailer north of C70 North Concord/Martinez Station
ii. M20 Montgomery Station to M30 Powell Station
iii. A10 Lake Merritt Station to the Portal
iv. W30 San Bruno Station to Maintenance of Way 21

4. Under-Car Deluge:
    a. Under Car Deluge System PM Record Forms BART uses to document the required quarterly PMs and 5-year PMs completed during the last three years (from 2014 to mid-September 2017) for the following stations: M16 Embarcadero Station, M20 Montgomery Station, M30 Powell Station, M40 Civic Center Station, K10 12th St Station, K20 19th St Station

Staff noted the following from the interviews and records review:

1. Ventilation:
    a. Line vent fans KV-17, KV-22, KV-23, MV-19, MV-20, MV-23, MV-25, MV-31, and MV-33 and TBT exhaust fans BV-01, 02, 03, and 04 were inspected at the correct frequency applicable to these fans.
    b. The inspections of these fans were properly documented as indicated in the inspection records for these fans on BART Maximo database.
    c. Defects discovered during the inspections of the ventilation systems at the selected locations during the selected time frame were corrected in a timely manner.
    d. According to BART Maximo records, based on the latest inspections performed in 2017, all ventilation systems at the selected locations function as designed.
2. Sprinkler System:
    a. The sprinkler systems at W20 South San Francisco, W30 San Bruno, R10 Ashby, R20 Berkeley, and R30 North Berkeley Stations were inspected at the correct frequency.
    b. The inspections of these sprinkler systems were properly documented using the Sprinkler System Quarterly Inspection Forms.
    c. Defects discovered during the sprinkler system inspections performed at W30 San Bruno, R10 Ashby, R20 Berkeley, and R30 North Berkeley Stations were corrected in a timely manner. There were no defects noted for W20 South San Francisco Station during the time frame selected.
3. Wet Standpipes:
    a. The wet standpipes at the four selected zones were inspected at the correct frequency.

b. The inspections of the wet standpipes were properly documented using the Class I Standpipes Inspection Forms.
c. Records indicate that noted defects were corrected in a timely manner.

4. Under-Car Deluge:
    a. The quarterly and 5-Year under-car deluge system inspections for M16 Embarcadero, M20 Montgomery, M30 Powell, M40 Civic Center, K10 12th St, and K20 19th St Stations were performed at the correct frequency.
    b. The quarterly and 5-Year inspections of the under-car deluge systems were properly documented using the Under Car Deluge System PM Record Forms.
    c. Defects discovered during the inspections of the under-car deluge systems at the selected stations during the selected time frame were corrected in a timely manner.

Comments:

1. On the Under Car Deluge System PM Record Form for the quarterly PM performed at M40 Civic Center Station on track M2 dated 2/10/16, on which there are no discrepancies noted, the check box next to "No discrepancies found" near the bottom of the form was not marked/checked off by the BART inspector who performed the PM.
2. The quarterly under car deluge system PM for K20 19th St Station on Track CX that was, according to BART staff, performed on 12/14/16, but was not documented or not completed using the Under Car Deluge System PM Record form.
3. On the Sprinkler System Quarterly Inspection form for R30 North Berkeley Station dated 12/13/16, the checkbox under the "No" column was marked for "Bracing & pipe hangers undamaged" under the "Sprinkler and Wet Standpipe Risers" section of the form.
4. On the Sprinkler System Quarterly Inspection form for W30 San Bruno Station dated 1/3/17, the checkbox under the "No" column was marked for "Bracing & pipe hangers undamaged" under the "Sprinkler and Wet Standpipe Risers" section of the form.
5. Staff discussed the issues mentioned above with BART personnel and requested them to take follow-up action in order to address them. BART personnel stated that they will ask the inspectors who performed the inspections to review these forms for accuracy and email the scanned PDF version of the corrected documentation to staff soon after the conclusion of this checklist review.
6. Consequent to this checklist review, on 9/19/2017, the BART Upgrade Foreworker sent an email to staff, containing the attachment of the scanned PDF version of the corrected inspection PM records corresponding to the four issues noted above. Per his email, the fire tech that performed the inspection was counseled about the

discrepancies found by staff, and BART will make sure that all reports will be viewed/checked by the person in charge to prevent this issue from occurring again. Based on his email and the corrections made on the attached records, the issues noted above have been resolved.

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-B**	**Element**	**Facilities and Equipment Inspections: Stations and Emergency Equipment**
Date of Audit	September 18, 2017 LKS-1856	**Department(s)**	System Safety Department Maintenance and Engineering Department
Auditors/ Inspectors	Jamie Lau Sal Herrera Shane Roberson	**Persons Contacted**	Reginald Lewis, Senior Safety Specialist Jonathan Rossen, Manager of Employee and Patron Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Stations and Emergency Equipment
Interview BART facilities and equipment inspectors, and review appropriate records to determine whether:

1. Passenger stations have been inspected at least once every 6 months, as required by the SSPP, Section 1402, for the past 3 years. Review inspection records for 5 randomly selected stations to verify that the stations were checked for the following potential and/or actual unsafe conditions:
    a. Combustible, Flammable, and Hazardous Materials
    b. Debris or Trash
    c. Ventilation of Floor Scrubbers and Battery Rooms
    d. Fire Hose Cabinet Damage
    e. Discharged or Missing Fire Extinguishers

f. Trip and Fall Hazards

g. Defective Non-Skid Surfaces

h. Malfunctioning Emergency Exit Doors Panic Hardware and Alarm

i. Inadequate Lighting

j. Missing Light Covers

k. Malfunctioning Maintenance Phone Sets for Fire Department

l. Inadequate Annunciator Lamps Operation

m. Inoperable Elevator Phones

n. Malfunctioning Elevator Controls

o. Inoperable Keyed PA Phone

p. PABX Problems

q. Potholes and Uneven Walking Surfaces

2. Inspections were properly documented, and discrepancies were corrected within 30 days, as required by the SSPP, Section 1404.

3. Potential hazards identified through scheduled inspections were tracked through the Hazard Management Process to resolution, and according to the requirements of the SSPP, Section 1502.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff learned from BART Senior Safety Speciailist, Mr. Reginald Lewis, that assigned BART safety staff are scheduled to inspect stations twice a year. Around December of each year, Mr. Lewis is tasked to schedule BART station inspections for the following year. Each BART safety staff is assigned a master key that can open any facility door in a station.

Yearly inspection assignment is displayed on Mr. Lewis's white board showing a year's status. Once the station is inspected, Mr. Lewis will move that particular station tag down six months on the 12-month calendar (see Figure 1).

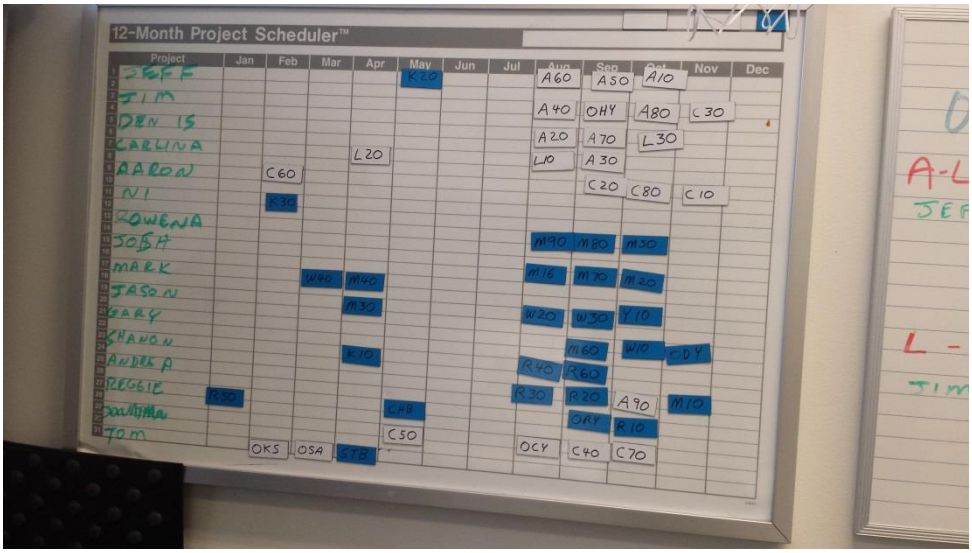

Figure 1

Once inspection findings returned, identified safety hazards must be either corrected or follow up within 30 days.

Staff learned that Mr. Lewis does not retain records for completed work orders related to facility findings. Thus, Staff was unable to review past completed work orders.

On 9/18/17, Staff inspected BART station facilities and equipment, and reviewed appropriate records for the following locations:

1. Montgomery Station:
    a. One inspection record found in year 2015.
    b. No inspection record found in year 2014.
    c. The following conditions found in field were not documented in previous inspections:
        i. SFFD fire hose cabinet near Elevator #53 was broken.

ii. Grease on station platform near Elevator #53.
iii. Broken glass on a map display near Elevator #53.
iv. Master key cannot open Room 303.
v. Fire Extinguisher M20-011 was last checked in July 2016.

d. No corrective actions found for all identified safety hazards as a result of station inspections.

2. 19th Street Station:
   a. One inspection record found in year 2016
   b. No inspection record found in years 2015 and 2014.
   c. No corrective actions found for all safety hazards as a result of station inspections, except for the August 2017 inspection.
3. Berkeley Station:
   a. No inspection record found in years 2015 and 2014.
   b. The following conditions found in field were not documented in previous inspections:
      i. Fire extinguisher in Room 202 was last inspected in August 2015.
      ii. Room 105 had trash hindering walkway.
   c. No corrective actions found for all identified safety hazards as a result of station inspection in February 2017.
   d. No corrective actions found for all identified safety hazards as a result of station inspection in January 2016, except for removing a sharp container and inspecting an eyewash station.
4. Rockridge Station:
   a. No inspection record found in year 2014.
   b. No corrective actions found for all identified safety hazards as a result of station inspections in September 2016, and August 2015.
   c. No corrective actions found for all identified safety hazards as a result of station inspections in February 2015, except for a missing BBP door signage.
   d. No corrective actions found for all identified safety hazards as a result of station inspections in March 2016, except for testing an eyewash station.
   e. The following conditions found in field were not documented in previous inspections:
      i. Cable raceway on the ceiling of Room 203 had a covering panel not secured to the ceiling, therefore a head injury hazard if the panel were to fall off. Also, an adjacent panel was missing and exposing the cables (see Figure 2).
      ii. "Exit" sign was not lit above a platform to concourse staircase (see Figure 3).

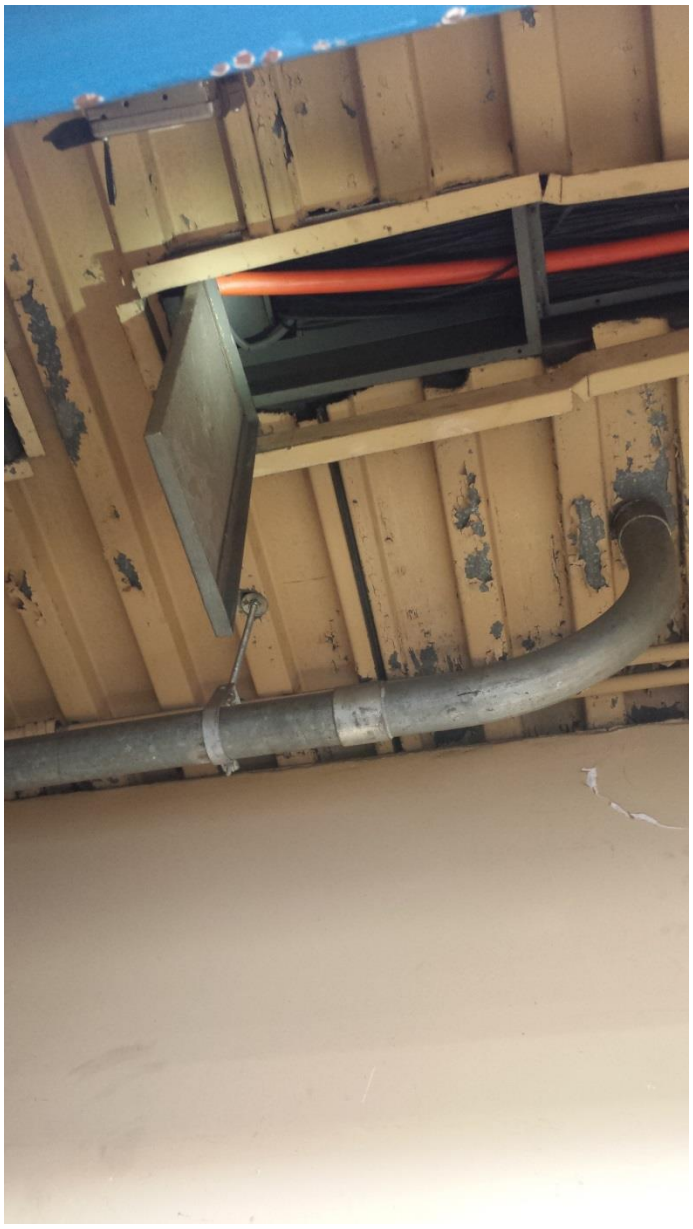

Figure 2

Figure 3

5. Lake Merritt Station:
    a. One inspection record found each in years 2015 and 2014.
    b. No corrective actions found for all identified safety hazards as a result of station inspections.
    c. The following conditions found in field were not documented in previous inspections:
        i. Fire Hose A10-009 and A190992 glasses were broken.
        ii. Elevator #140's permit expired on 5/31/17.
        iii. Emergency exit doors alarm did not trigger upon opening
        iv. Emergency exit staircase had a bag of trash hindering access
        v. Electrical room's temperature control was set for 70F but did not operate at 90F.
        vi. Electrical room's exit sign was not lit.
        vii. Electrical room's phone was inoperable.
6. Fruitvale Station:

    a. One inspection record found in year 2016.
    b. No inspection record found in year 2014.
7. Coliseum Station:
    a. One inspection record found each in years 2016 and 2015.
    b. No inspection record found in year 2014.
8. San Leandro Station - No inspection record found in year 2014.
9. Orinda Station - One inspection record found each in years 2014 and 2015.
10. Lafayette Station - No inspection record found each in years 2014 and 2015.
11. Walnut Creek Station - No inspection record found in year 2014.
12. 12th Street Station - No inspection record found each in years 2014 and 2015.
13. MacArthur Station - No inspection record found each in years 2014 and 2015.
14. Castro Valley Station - No inspection record found in year 2015.
15. West Dublin Station - One inspection record found in year 2016.
16. Dublin/Pleasanton Station:
    a. One inspection record found in year 2016.
    b. No inspection record found in year 2014.
17. West Oakland Station:
    c. One inspection record found in year 2016.
    d. No inspection record found in year 2014.
18. Embarcadero Station:
    e. One inspection record found in year 2015.
    f. No inspection record found each in years 2014 and 2016.
19. Powell Station:
    g. One inspection record found in year 2015.
    h. No inspection record found in year 2014.

Furthermore, Staff reviewed the "BART Facilities Safety Inspection Discrepancies" matrix showing currently open corrective actions for identified safety hazards. None of the identified hazards that are over 30 days old had follow-up actions noted.

<u>Findings:</u>

1. BART does not inspect its passenger stations at the required frequency of "at least once every six months within a calendar year" as required by its SSPP, Section 1401. The same finding was also noted in the previous triennial audit.
2. BART did not document "potential and/or actual unsafe conditions during inspections of stations" as required by its SSPP, Section 1402.
3. BART does not retain completed corrective actions as a result of facility inspections. Therefore, Staff could not verify whether all identified safety hazards were properly corrected, or were finished or followed up within 30 days as required by its SSPP, Section 1404.

4. Corrective actions generated through facility inspections did not receive proper follow-up as required by the SSPP, Section 1404. The same finding was also noted in the previous triennial audit.

Recommendations:

1. BART shall ensure station and facilities inspections are performed at least once every six months in a calendar year, per its SSPP, Section 1401.
2. BART shall document safety hazards per its SSPP, Section 1402.
3. BART shall retain completed corrective actions for at least three years so that Staff can audit such records for the next triennial audit.
4. BART shall ensure corrective actions generated through facility inspections are being resolved as required by its SSPP, Section 1404.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-C**	**Element**	**Facilities and Equipment Inspections: Non-Revenue Facilities**
Date of Audit	September 18, 2017 LKS-1856	**Department(s)**	System Safety Department Maintenance and Engineering Department
Auditors/ Inspectors	**Adam Freeman** James Matus Steve Espinal	**Persons Contacted**	Reginald Lewis, Senior Safety Specialist Jonathan Rossen, Manager of Employee and Patron Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Non-Revenue Facilities
Interview BART facilities and equipment inspectors, and review appropriate records to determine whether:

1. Non-revenue facilities have inspected at least once every 6 months for the past 3 years, as required by the SSPP Section 1402. Randomly select and review two of each facility type to verify:
    a. Train Control Rooms
    b. Electrical Control Rooms
2. Administrative Facilities have been inspected at least once every 6 months for the past 3 years. Select two locations and review inspections to verify.
3. Inspections were properly documented, and discrepancies were corrected within 30 days, as required by the SSPP, Section 1404.
4. Potential hazards identified through scheduled inspections were tracked through the Hazard Management Process to resolution, and according to the requirements of the SSPP, Section 1502.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff performed inspections and interviewed BART system safety department, as well as the facilities and equipment inspectors responsible for BART's non-revenue facilities Oakland Shop (OKS) and Oakland Shop Annex (OSA), to determine whether the appropriate non-revenue facilities and equipment inspections and maintenance is being performed in accordance with BART's SSPP and CPUC, General Order 164-D.

Staff reviewed a random sampling of records related BART'S system safety inspection programs and audits conducted at the non-revenue vehicle shops, each audit does contain concerns and discrepancies that are noted along with photos, these audits are followed up with rechecks at a later date, each discrepancy is recorded on a BART facilities safety inspection discrepancy list. Reference and Engineering books for reference on maintenance is available to employees in the computer program with time tables.

Staff reviewed completed PM records in Maximo related to the following facility inspections conducted at the OKS non-revenue facility:

1) Overhead crane and hoist system-monthly.
2) Ventilation system/Exhaust fans-monthly.
3) Hot water boilers.
4) Shop roll up doors.

Comments:

General cleanup needed at the OKS non-revenue facility, tripping hazards inside and outside of the facility.

Findings:

Staff did note several defects regarding the conditions at the OKS non-revenue facility:

- Fire extinguishers either missing or obstructed and not properly marked
- Non-revenue Vehicles parked in the foul of tracks
- Forklifts not being inspected before daily use
- Emergency eye wash stations dirty and not being maintained properly

with inspection dates

- Exposed electrical wires hanging from conduit
- Grinders missing face shields
- Aerosol cans not properly stored
- Chemicals outside of the shop not properly labeled for identification
- Exterior overhead lights burnt out

Recommendations:

1. BART is not correcting hazardous conditions related to the OKS shop in a timely manner. BART must ensure that the general work environment at the OKS shop is maintained to allow for a clean and orderly work site. All hazardous conditions that are identified must be corrected in a timely manner.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-D**	**Element**	**Facilities and Equipment Inspections: Tunnels, Bridges, and Aerial Structures**
Date of Audit	September 19, 2017 OSA	**Department(s)**	Structures Department System Safety Department Electrical & Mechanical Engineering Dept.
Auditors/ Inspectors	Jamie Lau Matt Ames	**Persons Contacted**	Tom Delaney. Superintendent (Structures) Bill Ludricks, Foreworker (Structures) Gary Fleming, Manager (Electrical)

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. Structures Inspection Manual, Rev. 2
4. Maintenance and Engineering Maintenance Procedures, Book 4

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Tunnels, Bridges, and Aerial Structures
Interview BART facilities and equipment inspectors, and review appropriate records to determine whether:

1. Structures inspections were performed.
2. Inspections were properly documented and noted, and discrepancies were corrected in a timely manner.
3. Potential hazards found during inspections were tracked until resolution.
4. The System Safety Department is aware of all safety hazards pertaining to civil structures.
5. Determine if the Transbay Tube is being maintained including cathodic protection and leaks repaired.

FINDINGS AND RECOMMENDATIONS

Activities:

On 9/19/2017, CPUC Staff interviewed BART Way and Facilities Maintenance personnel regarding its inspection program. BART personnel follow Structures Inspection Manual, "Book 130", for inspection and hazard resolution procedures.

BART structures must be inspected bi-annually. Corrective actions as a result of inspections are entered to an asset management system, Maximo, as Requests for Maintenance (RFMs). RFMs are given priority code from "Level 1" to "Level 4", with Level 4 being most serious. The RFMs are forwarded to the appropriate departments handling the resolution. The resolution duration varies among different departments and had no required due dates; however, a Level 4 priority is expected to be resolved immediately, with possible stop train service until hazards are cleared. Level 4 RFMs would trigger a contact to BART's Operations Central Control (OCC). All open items are tracked through Maximo, and followed up by Mr. Thomas Delaney during monthly inter-departmental meetings.

Staff also learned that the System Safety Department will be made aware of all safety hazards pertaining to civil structures, if such hazards were reported to OCC, meaning reaching a Level 4 priority. In the past three years, Mr. Delaney indicated there was no Level 4 structural finding.

Staff randomly reviewed several inspection records of recently inspected aerial and bridge structures. According to their inspection dates, they were inspected within 2 years as required by Book 130.

On the same day, Staff visited the same aerial and bridge structures to verify BART's inspection findings.

On 9/21/17, Staff interviewed the BART Engineering personnel responsible for maintaining the cathodic protection system (CPS). Staff learned BART follows Maintenance and Engineering Maintenance Procedure, "Book 4", Cathodic Protection Power Supply, in maintaining its CPS. CPS must be inspected bi-annually by BART's Maintenance personnel. There are 30 anodes being monitored. The inspection of CPS is done within the lower gallery of the Transbay Tube (TBT), where the CPS rectifiers are located. For findings that cannot be repaired immediately by Maintenance personnel, they will be documented and sent to Engineering personnel; the Engineering personnel will determine further actions.

Staff reviewed CPS inspection records, and found the system was inspected at least once every two years as required by Book 4. Staff field visited CP rectifier 47AC (on a later date, 9/30/17) and observed no leakage.

In the past, CPS experienced water leakage from at upper gallery, where water seeped through the upper gallery floor, and caused water damage to the ceiling of lower gallery. As a resolution, BART installed a drain pipe connected to each of CP "top hat" at the upper gallery, and extends the pipe with release valve to the lower gallery (pipe installed from upper to lower gallery). During CPS inspection, Maintenance personnel would check water presence by releasing the valve at the lower gallery. Water presence would mean leakage from CPS.

On 9/30/2017, Staff visited BART's Transbay Tunnel (TBT) to verify BART's inspection findings on the tunnel structures and CPS.

Staff had the following findings, either as observed from field or through record review:

Aerial:

C3002 - aerial structures across Hardy Dog Run Park (Claremont/Hudson St), Hayward:

- Numerous wooden steps were noted "rotted out" since May 2010 inspection; RFM still opens.
- P58 was noted having a spall over a traffic lane and "piece of concrete appears to be ready to spall onto Telegraph Ave" since March 2000; RFM still opens.

Bridges:

A5002 - bridge structures across D Street, Hayward:

- P787 had a tree growing over railing; no RFM was generated.
- A790 was noted having overgrown vegetation interfering with inspection since May 2007 inspection; RFM still opens.
- P787's parapet wall was noted a falling hazard due to a delamination over traffic lane since July 2015 inspection; RFM still opens.
- P789's parapet wall was noted a falling hazard due to a delamination over traffic lane since December 2010 inspection; RFM still opens.

A5004 - bridge structures across Orchard Street, Hayward:

- Pier control numbers were missing on P796, P797 and P799; no RFM was generated.
- Found graffiti on "No Trespassing" sign on a A800 fence; no RFM was generated.

- A796 was noted having overgrown vegetation interfering with inspection since March 2013 inspection; RFM still opens.
- P797's parapet wall, and top of pier and girder were noted a falling hazard due to a delamination over traffic lane and sidewalk since March 2013 inspection; RFM still opens.
- P799 was noted having overgrown vegetation interfering with inspection since March 2013 inspection; RFM still opens.
- A800 was noted having "barbed wire cut leaving access to climb over top" since March 2013 inspection; RFM still open.
- A800 was noted having water "coming from ground and running down embankment and puddling at south face of pier A799" since March 2013 inspection; RFM still opens.

A5005 - Aerial section across 4 support structures on Harder Road, Hayward:

- Pier control number was missing on P804; no RFM was generated.
- Found graffiti on "No Trespassing" sign on a A805 fence; no RFM was generated.
- P802's parapet wall was noted a falling hazard due to a delamination over traffic lane since August 2015 inspection; RFM still opens.
- G803's parapet wall was noted a falling hazard due to a delamination over pedestrian walkway and bike lane since March 2013 inspection; RFM still opens.
- G803's parapet wall was noted a falling hazard due to a delamination over traffic lane since August 2015 inspection; RFM still opens.

Transbay Tunnel (TBT):

M1 Track

- MP 4.006, Tube 48, was noted a "vertical crack runs up west wall" and with rust stain and minor seepage along a "medium" width crack since February 2012 inspection; RFM still opens.
- MP 6.95 was noted a "running rail laying in invert" since March 2014 inspection; RFM still opens.
- MP 5.70 was noted "numerous areas of discarded rail laying in invert" since March 2016 inspection; RFM still opens.

M2 Track

- MP 5.532, Tube 24, was noted "Door #24 is hard to open from the trackway" since February 2001 inspection; RFM still opens.
- MP 5.920 was noted two pieces of "rail in invert" since February 2012 inspection; RFM still opens.
- MP 6.14 to 5.74 was noted about 50 pieces of "rail in invert" since March 2014 inspection; RFM still opens.

Upper Gallery

- Tube 1 to 57 was noted with majority of access hatches being severed or damaged locking hinges since April 2014 inspection; RFM still opens.
- Tube 56 was noted access hatch lock not operating correctly since January 2012 inspection; RFM still opens.

Steel Shell

In 2016, BART hired a corrosion consultant to test the TBT steel shell thickness as a result of 2014 Triennial Safety Audit. The study noted that standing water was found in test core #7; the source of the water was unknown at the time. The consultant recommended sampling and testing the water for its chemical constituents in order to determine its source. Staff found BART has not taken the recommended corrective action on this matter.

Findings:

1. Several bridge structures had no pier control numbers and were not generated an RFM; two "No Trespassing" signs on bridge structure fences had graffiti and were not generated a RFM; a bridge structure had a tree growing over railing and was not generated a RFM.
2. BART's Structural Inspection Manual and Cathodic Protection Power Supply maintenance procedure do not have follow-up procedure for generated RFMs. Staff noted many Level 3 RFMs over one year old had no follow-up records in attempt to resolve the hazards.
3. A consultant recommended BART to identify the source of standing water found in a TBT steel shell thickness test done in 2016. However, no corrective action was taken.

Recommendations:

1. BART must add procedure to Structures Inspection Manual for resolving RFMs until satisfaction.
2. BART must add procedure to Cathodic Protection Power Supply maintenance procedure for resolving RFMs until satisfaction.
3. BART to identify the source of standing water found in a TBT steel shell thickness test per consultant's recommendation.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-E**	**Element**	**Facilities and Equipment Inspections: GO 95 Right-of-Way Compliance**
Date of Audit	September 19, 2017 Multiple Locations	**Department(s)**	System Safety Department Maintenance and Engineering Department Grounds, Way, and Facility Department Power Maintenance Department
Auditors/ Inspectors	**Steve Espinal** Jimmy Xia Shane Roberson Sal Herrera	**Persons Contacted**	Rich E. Watson, Superintendent Traction Power Glen Eddy, Facilities Maintenance Supervisor

REFERENCE CRITERIA

1. CPUC General Order 95
2. CPUC General Order 164-D
3. Resolution ST-77, April 21, 2005
4. BART System Safety Program Plan (SSPP) Rev. 9
5. BART Book 31, Electrical Maintenance Procedures

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: GO 95 Right-of-Way Compliance
Select at least two (2) of mainline or yard track sections at random from each of the following areas:

1. A/L Lines
2. W/Y Lines

Interview BART facilities and equipment inspectors, review appropriate records, and perform visual inspections and measurements to determine whether for each track section:

1. Right-of-Way inspection and maintenance standards and programs are

compliant with General Order 95.

2. Inspections were properly documented and noted, and discrepancies were corrected in a timely manner.

3. Potential hazards found during inspections were tracked from recommendation, Corrective Action Plans, and implementation.

4. All right-of-way components are in compliance with the applicable reference criteria, or variances were submitted properly and approved by CPUC.

FINDINGS AND RECOMMENDATIONS

Activities:

1) Staff reviewed BART's Fence Barrier Inspection records 2015-2017. Records include dates, fence inspected, person responsible and description of defect(s) found. At the time of the audit there were no work orders for broken fencing. The fencing is inspected on foot, high rail vehicles and on the train. However checklist 14-D found barb wire cut off at track ID A800

   The cover board works orders were reviewed on Maximo. There were eight cover board work orders outstanding and in process of completion. During the field inspection there were no third rail sections seen without cover boards. Areas inspection included sections of both the A and W lines.

2) The fencing records are kept as hard copies. The prior three years of fencing records were provided upon request.

   The third rail inspection and cover board records are kept in in a database called Maximo.

3) One insulator on the track way across the street from the Oakland Shop was destroyed. Upon interview this was not documented. During the audit the insulator was repaired. During the inspection no hazards were discovered.

Field Inspections

W-Line
Colma Substation on the El Camino Real
The electric door at the station was not functioning.

Substation contained new eye wash equipment, water level in the batteries were in range. During the inspection infrared inspection of the rectifier diodes were conducted. All the diodes were measured at 32 degrees celcius. The phone systems were functioning. The two fire extinguishers were last inspected February 9, 2017. There was some debris located outside of the substation that should be addressed periodically.

W- Line
San Bruno Station
Fencing was in good condition and the surroundings were clean. In the Substation the water levels in the battery were in range. The fire extinguishers were inspected February 7, 2017. The land line telephones were functioning. The Insulators at the station were inspected using an infrared gun. The insulators inspected were at 22-23 degrees celcius.

A-Line
Coliseum Station
There were new eye wash stations. The fire extinguisher was inspected on 4/20/17. The fencing was in good shape and station was clean. The back bus was inspected using the infrared gun.

A-Line
Berkeley Station
BART staff conducted a monthly inspection. Negative grounding inspections are conducted monthly and annually. The fire extinguisher was inspected on 8/3/17.

Other Related Issues
Staff raised the concerns of recent fires on the system caused by failing insulators. Bart staff stated they attempted to wash the insulators with soap and water. BART staff also attempted liquid carbon dioxide liquid on the insulators. The problems pointed out by BART staff is the system has approximately 110,000 insulators and a limited window to clean the insulators. The only time insulators can be changed out is when the system is out of service and third rail is deenergized from 1 am to 4 am.

The insulator change out program is gearing up to change insulators also replacing cables. Traction power is hoping to change out insulators two to three stations a year. The insulator change out program is initially focused on San Francisco . Bart staff can replace 10 to 12 insulators a night.

Inspections from a moving train include: fencing, cover boards, insulator, cross bond shunts and track problems. Annually BART staff inspects the traction power system by walking

the track. BART uses a high railer four times a year to inspect the traction power system. Track staff does inform traction power staff of power related issues.

Comments:

1) Colma Station had considerable debris in the walls that should be cleaned up.

2) CPUC commented other utilities use deionized water, denatured alcohol and Electronic Cleaner LX-113 to clean insulators.

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-F**	**Element**	**Facilities and Equipment Inspections: Train Control and Signal Facilities**
Date of Audit	September 20, 2017 MET-G	**Department(s)**	Operations Department Maintenance and Engineering Department
Auditors/ Inspectors	**Shane Roberson** Sal Herrera Steve Espinal	**Persons Contacted**	**Mario Guitierrez, Superintendent**

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Book 20
4. BART Preventative Maintenance Database (access onsite)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Train Control and Signal Facilities
Interview BART's representative responsible for Automatic Train Protection (ATP) maintenance and Interlocking Plan maintenance, and randomly select four vital relay PM records from the past 12 months to review. Determine whether:

1. ATP Maintenance Program:
    a. A standard operating procedure describing BART's comprehensive PM program for the ATP system is current, approved, and implemented.
    b. The ATP system was inspected and tested at the frequencies specified in the SSPP, Section 1501, for the past 12 months.
    c. The required PM activities were documented on standardized inspection report forms.
    d. Defects and non-compliance noted on the inspection report forms

were corrected and signed off in a timely manner.

e. All identified ATP system safety-related anomalies have been rectified.

2. Signal Systems and Power Switch Maintenance Program:

   a. A standard operating procedure or other directive describing BART's PM program for interlocking plants is current, has been approved, and is being implemented.

   b. At-grade interlocking plants have been inspected and tested at the specified frequency for the past 12 months. Review records for at least two at-grade interlockings.

   c. Aerial interlocking plants have been inspected and tested at the specified frequencies for the past 12 months. Review records for at least two aerial interlockings.

   d. Underground interlocking plants have been inspected and tested at the specified frequencies for the past 12 months. Review records for at least two interlockings in tunnels, subways, or the trans-bay tube.

   e. All required PM activities were documented on standardized inspection report forms.

   f. Potential hazards identified through scheduled inspections were tracked through to resolution.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff reviewed the current work order PM's due for all train control SOP's.

Comments:

1. In December of 2016 Staff conducted a records audit and found all train control PM's were out of compliance with their own SOP's inspection intervals. Staff noted that Bart has been behind in all SOP PM's for several years. On 4-4-17 Staff received a CAP addressing the ongoing issues of late inspection intervals.

2. Staff noted BART has increased its PM staffing from 23 to 34 employees on graveyard shift. BART has dedicated these employees to only properly closing PM's.

3. Staff noted even though BART is still behind in their PM's, BART has been making progress towards correcting the issues. BART has informed staff that they should be caught up on all PM's in spring of 2018. CPUC staff will check the progress with closing PM's in 2018.

Findings:

1. At the time of the triennial review, BART was still behind on conducting their routine preventive maintenance.

Recommendations:

1. Staff recommends BART continue forward with their corrective action plan and Staff will recheck progress in the coming months.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-G**	**Element**	**Facilities and Equipment Inspections: Communications Equipment**
Date of Audit	September 21, 2017 LMA	**Department(s)**	Maintenance and Engineering Department
Auditors/ Inspectors	**Shane Roberson** Sal Herrera Steve Espinal	**Persons Contacted**	Randy Radford, Superintendent Steve Arisco, Section Manager

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Data Transmission System Manual
4. BART SCADA Preventative Maintenance Procedure
5. BART Book 42
6. BART Emergency Telephone Inspection Procedures

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Communications Equipment
Interview BART facilities and equipment inspectors, and review appropriate records, and perform the following:

1. Select at least two activities from the Communication Equipment Inspections and Maintenance table in the SSPP, Section 1501, and verify all activities were performed with the required frequency.
2. Perform visual inspections and review records to determine whether the Data Transmission System (DTS) has been maintained as required, and that all preventative and corrective maintenance practices comply with the applicable reference criteria.
3. Perform visual inspections and review records to determine whether the Supervisory Control and Data Acquisition (SCADA) System has been maintained as required, and that all preventative and corrective

maintenance practices comply with the applicable reference criteria.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff reviewed records for one year at 4 locations.

Comments:
BART Data Transmission System has been phased out and SCADA is now the primary communications system utilized by BART.

Findings:

1. Staff noted some inspection forms are not being filled out completely including signatures and dates. Staff noted that engineering has not updated forms after field changes have been made.
2. Staff noted an open work order for 2 years on damaged pole.

Recommendations:

1. Staff recommends BART retrain staff to properly fill out PM inspection forms.
2. Staff recommends BART engineering staff create new procedure changes as engineering changes are made.
3. Staff recommends BART make corrections to communications equipment with signs of damage within a timely manner.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**14-H**	**Element**	**Facilities and Equipment Inspections: Measurement and Testing Instrumentation**
Date of Audit	September 19, 2017 OKS and OHY	**Department(s)**	Maintenance and Engineering Department Rolling Stock and Shops: Oakland and Hayward
Auditors/ Inspectors	**Adam Freeman** James Matus	**Persons Contacted**	Luis Leon, Manager of Non-Revenue Maintenance Richard Severo, Group Manager Sandy Miniz, Manager of Quality

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. NTSB Safety Advisory R-13-1 and R13-2, Use of Jumpers

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Facilities and Equipment Inspections: Measurement and Testing Instrumentation
Interview responsible BART representatives from each department, review appropriate records, inspect equipment storage facilities, and inspect no fewer than eight measuring or testing instruments to determine whether:

1. The selected gauges, micrometers, calipers, torque wrenches, multi-meters, etc. are properly inventoried, stored, distributed for use, calibrated at prescribed intervals, and marked, tagged, or otherwise identified to show current calibration status.
2. The next scheduled testing/calibration due date is shown on each instrument.
3. Tools and instruments requiring calibration are addressed in departmental procedures.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff inspected tools for proper testing and calibration at the OKS & OHY facility. Tools selected were torque wrenches, multi meters, gauges, calipers, oscilloscope, capacitance

analyzer, micrometer and single car air test devices. All of the tools that were randomly selected were found to be within the calibration cycle, with the exception of the single car test devices that are used at the OKS facility.

Staff verified that there was an established master tool list for each shop. Tools that are being tested and calibrated are being completed yearly and are being documented. All tools that require calibration are properly identified with a tool number (asset #) and date of calibration with next due date. Staff verified that the company prescribed to do the testing is called On-Site Calibration, Staff verified tools were accounted for from the tool room, shop tool lockers, rolling tool boxes and the location of each tool is properly recorded on the master tool list. Staff selected a random variety of tools from the tool room, shop floor lockers and tool boxes and verified correct application of tool identification number and testing date. Staff also looked at both single car test devices, (see comments below), single car test devices must have current testing dates.
Staff found a variety of tools at the OKS facility including tape measures and other gauges that do not require testing or calibration but did have calibration stickers.

Comments:

BART must ensure that any single car test device that is being used is in compliance with the most up to date industry standards.

Findings:

1. Single car test devices that are being used are not being properly recorded and calibrated according to industry standards, APTA standards, 3. Calibration requirements, the device shall be tested not less frequently than every 92 days after being placed into service and not to exceed 120 days after calibration. 3.3 Record keeping, single car testing devices and ancillary gages shall be tagged or labeled with the date of its most recent calibration.

Recommendations:

1. Staff reviewed the BART, Rolling Stock and Shops Standard Operating Procedures Book 49 Volume 3 Chapter 2 Section 2, Control of test and measuring equipment (T&ME) - Calibration. Staff was informed that this procedure is being currently revised and not yet finalized. Once this procedure is finalized it must be distributed to all revenue shops so that each employee understands that they are responsible for ensuring that each tool is in good working condition before use and that it's been properly calibrated with a current calibration date. This procedure also requires an audit at each facility which must be conducted by supervisors and management to ensure accountability.

2. Single car test devices need to be properly calibrated according to the most recent industry standards, as well as documented records of each time the device is being used to ensure the device does not exceed the calibration date requirements. Single car test devices must have a documented daily test performed every time the device is used.

3. Remove all tools that do not require testing of the master tool calibration list to simplify tools that require calibration, refer to Book: 429 Vol.3, Chapter 2, Section 2, and Attachment 1- Calibration Exclusion list.

4. Have a sign out sheet for employees who take tools off property which need calibration for better documentation.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**15-A**	**Element**	**Maintenance Audits and Inspections: Rail Vehicles**
Date of Audit	September 20, 2017 OHY, ORY, OCY, ODY	**Department(s)**	Maintenance and Engineering Department Operations Hayward Yard Operations Richmond Yard Operations Concord Yard Oakland Shops Operations Daly City Yard
Auditors/ Inspectors	**Adam Freeman** James Matus John Madriaga Michael Warren	**Persons Contacted**	Gopolo Balusu, Superintendent (ODY) Harold Engle, Superintendent (OCY) Luis Leon, Manager of Non-Revenue Manager (OKS) Leo Pica, Superintendent (ORY) Richard Severo, Group Manager (OHY)

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Book 50, C Car Preventative Maintenance Manual
4. BART Book 86, A/B Car Preventative Maintenance Manual

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Maintenance Audits and Inspections: Rail Vehicles

1. Perform detailed inspections of BART's revenue and non-revenue rail vehicles to determine if the following components are properly and adequately maintained:
   a. Axle-mounted gearbox
   b. Truck, axle, and wheel assemblies
   c. Brake systems

d. Door assemblies

e. Lighting

f. Passenger doors

g. Passenger component and safety appliances

h. Public address and intercom systems

2. Determine whether the cars are in compliance with the applicable references based on record review and inspections.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff performed inspections at BART's revenue & non-revenue Rail Vehicles facilities; OCY, OHY, ORY, OKS and ODY. Staff reviewed Preventative Maintenance records and performed visual inspections to determine if vehicles are being properly maintained in compliance with BART's SSPP, preventative maintenance manuals, and CPUC General Orders.

Records at OKS shop for non-revenue vehicles were reviewed. Daily, monthly, 90-day bit, 6 month, and annual records were provided. Yearly diesel maintenance was provided as well. All documents are logged and filed in folders with vehicle numbers except daily inspections. Staff randomly reviewed records of vehicles. Staff found that supervisor's signatures need to be provided on some inspections. Vehicle # 3674 was without maintenance records for the period one year. Staff verified that this vehicle was in an accident and that was the reason for no maintenance records. Daily inspections are being performed on vehicles; however, the filing system for daily inspections is not acceptable to perform detailed random inspections. All daily inspections on vehicles are mixed together. Staff was made aware that they are working on this. Repairs made to vehicles are being logged with 6 months inspections. Staff performed vehicle inspections and on some found equipment not being maintained or documented prior to operation. For example, staff found hi-rail trucks without fire extinguishers and hi-rail vehicles with fire extinguishers that were not tagged for inspection. Speed swing inspected was just used the day before and upon inspection it should not have been operated until all bolts are changed on hi-rail equipment

Staff reviewed maintenance inspections at ODY maintenance shop. Staff performed visual inspections on LRV's. Staff reviewed PM inspections on all aspects of maintenance. Staff randomly picked cars and followed their progress of inspection throughout the year. All information was documented in the Maximo program. P.M.s are performed at approximately every 600 hrs. Six hundred hours is the target for maintenance. P.M.'s range from 1,2,3,4,5, and 6 at intervals of 600 hrs. For example, LRV #423 was followed 12/16-1/17-3/17-5/17-7/17-8/17. Doors inspections are provided on all PMs and heavier on PM 4. Time control asset tracking provided for all journal bearings, compressors, and couplers. All inspections performed are documenting repairs made and supervisors are signing on inspection sheets with employee numbers. All items of inspections doors, lighting ext.in 15-a are being covered in P.M.s 1-6.

Staff performed visual inspections on the following rail vehicles maintained at the OCY maintenance facility; 1844, 1819, 2509, 1614, 1810, 2566, 2525, 2512 & 1242, and Hi-rail vehicles 3613 & 3569. Staff did point out minor defects pertaining to both revenue and non-revenue vehicles, some of these defects included ground straps and headlights, these defects were also noted by BART staff for repair. Staff also reviewed some completed wheel reports and work order repairs related to PM: A, B, C & D and PM: 1,2,3,4,5 & 6.
Staff reviewed a random sampling of completed preventative maintenance inspection records recorded in the Maximo system at the OCY maintenance shop which included the following rail vehicles; A-Car 1251 & 1270. B-Car 1512, 1620 & 1772. C-Car 2503 & 2545.

Staff performed a visual inspection on the following rail vehicles maintained at the ORY maintenance facility; 394, 1740, 408, 1760, 371, 395 & 309 and Hi-rail vehicles 3570 & 3612. Staff did point out only minor defects pertaining to both revenue and non-revenue vehicles, these were also noted by BART staff for repair. Staff also reviewed completed work order repairs related to PM: A, B, C & D and PM: 1,2,3,4,5 & 6.
Staff reviewed a random sampling of completed preventative maintenance inspection records recorded in the Maximo system at the ORY maintenance shop which included the following rail vehicles; A-Car 1218. B-Car 1696 & 1865. C-Car 328 & 411.

Staff performed visual inspections on the following rail vehicles maintained at the OHY maintenance facility; 1758, 2506, 1557, 2568 & 2573 and Hi-rail vehicles 315 & 3642. Staff did point out defects pertaining to both revenue and non-revenue vehicles, some defects included torque stripe markings and air bag defects, these defects were also noted by BART staff for repair.

Staff also reviewed a random sampling of completed wheel reports and work order repairs related to PM: A, B, C & D and PM: 1,2,3,4,5 & 6. Car 1557 was shopped for PM-D and it was observed as having the BT-3 wheel profile and is being tracked for the component evaluation.

Staff reviewed completed preventative maintenance inspection records that had been recorded in the Maximo system at the OHY maintenance shop which included the following rail vehicles; B-Car 1722 &1618. C-Car 2538 & 2571.

Comments:

The completed PM records that were reviewed did include 2014, 2015, 2016 & 2017, each shop did meet the scheduled PM interval outlined in BART's SSPP, revenue vehicles, Car-A & B are being maintained at 800 hours and Car-C is being maintained at 600 with all inspection activities and methods outlined in accordance with BART book 50 & 86.

BART, Rolling Stock and Shops, Standard Operating Procedures, Book 429 Volume 4, Chapter 1, Section 4 does allow for a -50/+25 hour window at 800 hours for A2 & B2 Cars, any car that exceeds 825 hours must be held out of revenue service until the scheduled PM is completed. The C1 & C2 Cars does allow for a +50 hour window at 600 hours, any car that exceeds 650 hours must be held out of revenue service, none of the PM records reviewed had met the hold criteria; they had all been completed at the scheduled interval. All discrepancies are being properly noted on PM inspection records and each task is being signed off using the employee ID, work orders are being generated and noted on PM inspection records.

Findings:

1. OKS shop needs general clean up especially around fire extinguishers. Do not block fire extinguishers by gas station area. Hi-rail equipment needs better visual inspections. Fire extinguishers need tags of inspection on all hi-rail equipment. Speed swing needs bolts to replace on driver-side hi-rail wheel. Hi-rail vehicles need to be cleaned out due to trash accumulation.

Recommendations:

1. OKS shall organize all hi-rail vehicle daily inspections. Each vehicle should have its own folder for daily inspections. Conduct compliance checks on drivers and document the daily inspection process. If any vehicle is involved in an accident document it in vehicle folder. If vehicle is not in

service for any period of time document the reasons why it is non-operable. If it is not documented it represents a period on non-compliance of maintenance. Years in-service and out-of-service shall be documented. Supervisors shall sign off on all maintenance reports.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**15-B**	**Element**	**Maintenance Audits and Inspections: Traction Power System**
Date of Audit	September 22, 2017 OSA	**Department(s)**	Operations Department Maintenance and Engineering Department
Auditors/ Inspectors	**Steve Espinal** Sal Herrera Jimmy Xia Shane Roberson	**Persons Contacted**	John Carnes, Section Manager Gary Fleming, Group Manager Myat San, Manager of Traction Power Engineering Juan Ulloa, Manager of Electrical Engineering

REFERENCE CRITERIA

1. CPUC General Order 95
2. CPUC General Order 164-D
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Stray Current Program documentation
5. BART Book 4, TBT Cathodic Protection

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Maintenance Audits and Inspections: Traction Power System
Select at least one section of the third rail traction power system from each of the following areas:

1. A/L Lines
2. C/R Lines
3. M/K Lines
4. W/Y Lines

For each section, review the appropriate documentation to determine whether:

1. The third rail is inspected and maintained in compliance with applicable standards.
2. Substations and gap-breakers are inspected and maintained in compliance with applicable standards.

Perform a visual inspection of one substation for each of the four areas to determine whether they are in compliance with BART standards, and are in a state of good repair. Perform a detailed inspection of substation components including but not limited to:

1. 1 kV DC Breaker
2. 1 kV DC Bus

Review BART's stray current program to determine whether:

1. BART is active in mitigating the effects of stray current on its own and surrounding structures and utilities.
2. BART has procedures in place to identify and correct hazards caused by stray current.
3. Any hazards identified have been satisfactorily addressed.
4. Review all fires in the last three years. Discuss stray current from BART traction power system to PG&E pipes.
5. Review and discuss the infrared inspection program.

FINDINGS AND RECOMMENDATIONS

Activities:
No procedures to identify or minimize stray current in the traction power department.

Failing insulators have led to several fires. Traction power staff have attempted to clean the insulators with soap and water. They also attempted to clean the insulators with cold jetting using carbon dioxide. Staff advised BART staff utilities use deionized water, denatured alcohol and Electronic Cleaner LX-113 to clean their insulators.

BART is currently purchasing infrared gun to locate hot spots.

Reviewed the records for CGD powers North Concord Station
Cast Coil Transformer Inspection Report conducted 3/27/17
Reviewed the following Monthly Inspections:
Nov 4 , 2014 Sept 4, 2014 Dec 7, 2014
Feb 5, 2015, Mar 16, 2015 May 26, 2015, July 1, 2015 Aug 6, 2015 Sept 3, 2015,
Jan 11, 2016 Mar 14, 2016 Jun 2, 2016, Mar 10, 2017
Reviewed biannual circuit breaker testing records:
1000 Vdc Circuit Breaker tests conducted:

Apr 2, 2014 Mar 4, 2015 Sept 11, 2016 Jan 23, 2017

Traction power Rectifier Inspection Reviewed:
Sept 14, 2016, Sept 24, 2014

Cast Coil Transformer Inspection Report Reviewed:
Mar 24, 2017 Sept 24, 2017 Sept 11, 2015

BART Substation Battery Maintenance Record
Sept 16, 2016 Jun 19, 2015 Mar 26, 2015 May 4, 2015

Substation Fire Alarm PM
Mar 30, 2015, no more were found

Maintenance Procedures 35kv Circuit breaker
Mar 9, 2015

NGD G01A Inspection Record
March 3, 2015, last one stated need batteries, will not close
Oct 10, 2016 Maximo stated batteries were installed and the work order is closed

Substation Peninsula:
WXE Outside of Millbrae (Gap Breaker Station)
Monthly Substation Inspection reviewed:
Jan, 2015, February, Dec 2015, (Combination Maximo and worksheet)
Jan 2016, Mar 2016 Jun 2016, Aug 2016
Jan 2017, Apr 2017, Aug 2017

Biannual Inspections breaker inspection:
DC-1 Sept 14, 2015, DC-9 Sept 3, 2015
DC-1 Mar 5, 2016 DC-3 Mac 7, 2016
DC-10 Oct 3, 2016 DC-5, Sept 25, 2016
DC-2 Mar 19, 2017 DC-6 Mar 24, 2017 12 breakers were tested.
During the past 3 years all four breaker were tested each year for a total of 12 tests.

C/R-Line
Berkeley (RBE)
Monthly inspection conducted
The following Monthly inspection were reviewed:
Jan 2015, July 2015 , Dec 2015
Jan 13, 2016 Jun 12, 2016, Dec 6, 2016

Jan 8, 2017 Aug 19, 2017
All inspection were conducted in the previous 3 year period.

Breaker Inspection (1KV Breakers)
DC-1 Jun 8, 2017 Jun 6, 2016
DC-2, Jun 7, 2017 Jun 14, 2016
DC-3, Jun 19, 2017 Jun 6, 2016

Breakers (34.5 KV)
H-1 Jun 9, 2017, Jan 30, 2016, June 15, 2016
H-2 Jun 19, 2017 Jan 30, 2016 Dec 7, 2016
All inspections were conducted in the previous three years.

Cover boards
The C line crew works at night looking for missing cover boards. Usually inspections are conducted biannually however there is no inspection procedure has been instituted. For the Y-line on February 2, 2017 inspections found no cover missing near the San Francisco Airport.

In total eight work orders are in Maximo for repairing cover boards.

Inspection records read on May 8, 2017 cover board and brackets broken. Records indicate repaired the same day.

<u>Findings:</u>

1. A CPUC Engineer was measuring pipe to soil voltages in close proximity to the BART system. When a BART train moved by the voltage reading on the pipe to soil moved out of the proper range. After the BART train left sight the pipe to soil measurements returned to the proper range. Staff contacted PG&E to determine if stray current from the BART system was a system wide issue. PG&E informed staff BART DC stray current is occurring throughout the system.

2. Regarding North Concord Station (CGD):
   Biannual 1KV circuit breaker test were conduct yearly
   Rectifier test which is yearly was conducted alternate years
   Cast Coil Transformers biannual tests were not conducted in 2016 and only one in 2015.

Battery maintenance was not conducted in 2017 and only once in 2016. Substation Fire Alarm Preventative Maintenance was not conducted in 2017 or 2016. Only one test in 2015.
35 KV annual circuit breaker test was not conducted in 2017 or 2016. One test was conducted in 2015.

3. Review of open traction power work orders. BART staff stated the Maximo database is new. Initially BART traction power had approximately 650 open work orders. After review of the open work orders and properly closing work orders the traction power department had approximately 450 open work orders. Based on exercise it was determined that staff wasn't monitoring open and properly closing work orders.

Comments:

1. No work is currently being conducted to mitigate BART stray current. PG&E has requested a meeting with BART. As of today, October 24, 2017, BART has not agreed to meet with PG&E to discuss stray current issues though requests have been made. According to PG&E staff, PG&E has met with BART on the matter and BART stopped communicating with PG&E on the matter.

2. Maximo is incredibly slow and slows productivity. Maximo should be quicker to be useful. BART staff has estimated the Maximo requires 15% waiting time between instructions to complete instructions.

Recommendations:

1. BART, PG&E and CPUC shall meet to discuss stray current. PG&E is stating it is emanating from the BART system. BART shall work closely with PG&E to correct the stray current issue.

2. BART shall conduct inspections and preventative maintenance on substations on the prescribed time table dictated by the SOP's.

3. Document and repair destroyed insulators in a timely manner.

4. BART shall monitor and close open work orders as well as documenting said closures.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**15-C**	**Element**	**Maintenance Audits and Inspections: Train Control and Signal Systems Maintenance**
Date of Audit	September 14, 2017 MET-G	**Department(s)**	Operations Department Maintenance and Engineering Department
Auditors/ Inspectors	**Shane Roberson** Sal Herrera Michael Warren Steve Espinal	**Persons Contacted**	Mario Gutierrez, Superintendent

REFERENCE CRITERIA

1. CPUC General Order 127
2. CPUC General Order 164-D
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Book 20, Train Control Maintenance Procedures
5. BART Track Safety Standards (TSS)
6. BART Wayside Safety Program
7. BART Maintenance Management Information System (access onsite)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Maintenance Audits and Inspections: Train Control and Signal Systems Maintenance

1. Review and evaluate the compliance of BART's train control and signal inspection maintenance programs and standards
2. Perform detailed inspections of the signal system and Automatic Train Protection (ATP) system components to determine whether or not they are in compliance with applicable reference criteria. Select at least one track section at random from each of the following areas to inspect:

1. A- and L-Lines
2. C- and R-Lines
3. M- and K-Lines
4. W- and Y-Lines

FINDINGS AND RECOMMENDATIONS

Activities:
Staff conducted field inspections of the A,C,M,&Y lines stopping randomly during the field inspection to look at turnout, switches and interlocking.

Comments:
None.

Findings:

1. Staff noted at all locations the lack of permanent labels on wiring in switch machines and their junction boxes.

Recommendations:

1. BART shall install permanent labels on all wiring at all switch machines and junction boxes.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**15-D**	**Element**	**Maintenance Audits and Inspections: Tracks and Turnouts**
Date of Audit	September XX, 2017 Multiple Locations	**Department(s)**	Operations Department Maintenance and Engineering Department
Auditors/ Inspectors	John Madriaga Shane Roberson Sal Herrera Matt Ames	**Persons Contacted**	Tom Delaney, Superintendent

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Track Standards Manual
4. BART Track Safety Standards (TSS)
5. BART Annual Track and Train Control Joint-Switch, Turnout Interlocking Inspection Form
6. BART Maintenance Management Information System (access onsite)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Maintenance Audits and Inspections: Tracks and Turnouts
Review BART's records of PM, schedule and unscheduled maintenance activities for two separate 6 month periods in the past 3 years:

1. Track Inspection:
    a. Randomly select at least two separate track inspection reported areas to determine whether:
        i. Mainline tracks, yard leads, and transfer tracks were inspected at the proper frequency.

ii. Inspections were properly documented and noted defects were corrected in a timely manner and tracked through completion.

b. Randomly select at least two separate recorded geometry car inspection reports to determine whether:

i. Mainline tracks, yard leads, and transfer tracks were inspected at the proper frequency.

ii. Inspections were properly documented and noted defects were corrected in a timely manner and tracked until completion.

c. Review BART internal rail defect reports to determine whether:

i. Mainline tracks, yard leads, and transfer tracks were inspected at the proper frequency.

ii. Inspections were properly documented and noted defects were corrected in a timely manner and tracked until completion.

2. Turnout Inspection:

a. Randomly select at least two separate turnout inspection reports to determine whether:

i. Mainline tracks, yard leads, and transfer tracks were inspected at the proper frequency.

ii. Inspections were properly documented and noted defects were corrected in a timely manner and tracked until completion.

Perform detailed inspections of mainline tracks to determine whether or not they are in compliance with applicable reference criteria. Select at least one track section at random from each of the following areas to inspect, including at least one at-grade section, one underground section, and one aerial section:

1. A- and L-Lines
2. C/R-Lines
3. M/K Line
4. W/Y Lines

FINDINGS AND RECOMMENDATIONS

Activities:

Comments:
None.

Findings:

1. Track and Switch inspection reports do not reflect condition of the track inspected, such as:
   a) Non-standard bolts used for guard rail
   b) 90lb floating heel block used in place on a 115lb rail switch point
   c) Five washers used on long track bolt
   d) Bent #1 switch rod not replaced
   e) Housekeeping, scrap rail left between rails of track
   f) Covers on third rail missing
   g) Concrete ties replaced and not properly fastened
   h) Broken wire on frog

2. Inspection reports do not specify location and nature of any deviation from the requirements of BART Track Safety Standards (TSS) Book 425 and the remedial or corrective action taken by the person making the inspection. Inspection reports do not describe the defect, location, rank the defect priority and list any actions taken to correct the problem and/or to protect train traffic. Records of periodic track inspections do not show defects and deviations from the adopted standards along with the corrective action taken.

Recommendations:

1. Prepare Inspection Records on the 'current' form, have the inspector sign and specify locations, nature and remedial or corrective actions taken for any deviations; complete all entry fields.

2. Track and Switch Inspection Records shall identify the location and nature of any deviation or defective condition and the remedial/corrective action taken. Comply with BART Track Safety and Maintenance Standards, Book 425, Section S7.5 B and Section M 7.1 B-D.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**16-A**	**Element**	**Training and Certification Programs: Operators, Controllers, and Foreworkers**
Date of Audit	September 14, 2017 LKS-2 and LMA	**Department(s)**	Operations Central Control Operations Department Training Department
Auditors/ Inspectors	**Mike Rose** Richard Fernandez Debbie Dziadzio Matthew Ames	**Persons Contacted**	Fred Edwards, Assistant Chief Transportation Officer of OCC Kimberly Johnson, Training Supervisor OCC Shanon Matthews, Sr Ops Safety Specialist Chris Byrne, Operations Training Supervisor

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. Cal/OSHA Safety Orders
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Employee Certification Plan

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Training and Certification Programs: Operators, Controllers, and Foreworkers
Select at least six (6) employees at random in each of the following classifications:

- Train Operator
- Train Controller
- Foreworker

Review training, certification, and recertification records of the selected employees to determine whether:

1. All personnel successfully completed initial training programs, and any discrepancies were addressed and resolved.

2. All personnel have been retrained and recertified at the correct frequency and are currently certified to perform their duties according to the Employee Certification Plan.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART Personnel for training, certification, and recertification records. Staff selected 6 employees from each of the following rosters; Train Controller, Train Operator, and Foreworker. Staff discussed the initial certification requirements outlined in Employee Certification Plan and personnel presented Staff with documents from the selected employees as outlined in the Plan. Testing requirements include; Roadway Worker Protection (RWP), Personal Electronic Device (PED), written and/or performance-based examination. Personnel presented Staff with all documents requested including a spreadsheet matrix and all training packets for Train Operator and Foreworker.

Comments:
BART OCC presented Staff documents without a document control number, date, header and/or revision number. Staff found Train Controller document filing system inadequate and did not coincide with Train Operator and Foreworker filing system. The departments should be under the same document control system so training records are uniform and conform to BART Employee Certification Plan Section III Transportation. At the very least, Operations Training Department (LKS-2) needs to work in conjunction with OCC Training Department to bring OCC Training Department deficiencies up to BART standards and procedures.

Staff found Operations Training Department (LKS-2) using all tools and resources to accurately track employee training and recertification records allowing easy access for review.

Findings:

1. When Staff reviewed Train Controller records they found initial certification did not include a written and/or performance test of PED for any employee selected. Further discussion found BART not properly training Train Controllers per BART Transportation Certification Policy: 3.2.1 regarding PED.

2. Staff inspected records of selected Train Controllers and found no test scores per

rule 3.2.7 Transportation Department Testing Requirements. Employees must receive a minimum passing grade as outlined; BART personnel could not provide Staff with Train Controller test scores.

Recommendations:

1. BART must adhere to their training policy and requirements as outlined in Transportation Department Initial Certification Requirements, Section 3.2.1 regarding PED Training.

2. BART must clearly note all test scores on written and/or performance-based examinations as per BART Employee Certification Plan (Aug, 2016) 3.2.7.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**16-B**	**Element**	**Training and Certification Programs: Employees and Contractors**
Date of Audit	September 13, 21, and 22, 2017 LKSD-2	**Department(s)**	Operations Department Training Department
Auditors/ Inspectors	**Mike Rose** Richard Fernandez Debbie Dziadzio Matt Ames	**Persons Contacted**	Celine Schafer, Manager of M&E Technical Training Michael Smith, Operations Training Supervisor Carlina Leong, Principle Engineer System Safety

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. Cal/OSHA Safety Orders
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Employee Certification Plan

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Training and Certification Programs: Employees and Contractors
Interview BART representative(s) responsible for Maintenance Personnel and Signal Maintenance Personnel training and certification programs, and review records for at least 6 active employees and 6 active contractors to determine whether:

1. Employees and contractors have completed the initial training program, refresher, and remedial training as necessary.
2. Employees and contractors have been certified, and recertified at the required frequency, and currently meets all criteria for proper performance of his or her duties according to the Employee Certification Plan.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART Personnel regarding training and certification programs for employees and contractors. Staff chose at random from each roster, 6 Maintenance and Engineering, 7 Train Control and 6 Contractor training records to review for compliance as per BART Employee Compliance Plan. The records review included each individual's initial certification, rules and procedures, General Orders 172 and 175, safety regulations pertinent to the particular skill, and training classes. Staff found BART personnel and contractors to be in compliance with the training and certification programs for Maintenance and Engineering, Train Control and Contractor, as outlined.

Comments:
Staff found BART Training Personnel prepared for this audit. The records inspected were readily available, current, and concise.

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**17**	**Element**	**Configuration Management and Control**
Date of Audit	September 14, 2017 LKS-2	**Department(s)**	System Safety Department
Auditors/ Inspectors	**Rupa Shitole** Michael Warren	**Persons Contacted**	Kirk Marshall, Manager Documentation Niko Wilson, Administrative Support Officer Mark Chan, Manager of Engineering Safety Steward Restill, Administrative Support Officer

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Engineering Change Order (BECO) Form

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Configuration Management and Control

1. Randomly select two recent BART system modifications or changes during the last year to ensure configuration management documentation was properly updated to include at minimum:
   a. Engineering design peer review;
   b. Design and Analysis Review by the System Safety Department;
   c. Design and Analysis Review by CPUC if required;
2. Randomly select a Project Concept submitted to the System Safety Department and verify that:
   a. BECO Forms were used;

b. BECO Forms were circulated to the Project Engineer;

c. The System Safety Department performed a review, analysis, and approval of the Modification and Change Request Forms for the project;

d. The modification or change was reviewed and approved by BART's Director or Deputy Director of Operations and Maintenance;

e. The modification or change was circulated to the proper departments prior to implementation;

f. All necessary parties or contract employees within or outside the agency were properly notified of the modification or change.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed representatives from Document Control and System Safety and reviewed applicable documentations and determined the following:

Staff reviewed the following documents related to Configuration Management:

- BECO No.V0009510 (Modify existing, and create new drawings to facilitate new BART tapered wheel profile. Archived signed copy dated 10/19/2016.

- BECO No. TC001535 (M15 interlocking turnout speed reduction. A and B MUX modification.) Archived signed copy dated 12/2/2016. (BECO Form used was Rev 10/14)

- BECO No. PS000299 Update Book 4, Chapter 10 received date 4/28/17 Archived signed copy dated 6/5/2017.

- BECO No. V0009633 dated received 7/7/17 and Archived signed copy dated 8/8/2017.

- Reviewed the binder documents for Vehicle Wheel Profile Change. It went through engineering and safety department review & approval, signed and dated around 6/6/2016. CPUC attended a meeting on May 9, 2017 related to this configuration change.
- A78 interlocking (HMC) did not have a BECO no. since it is still open. The received date was 9/1/16 and it in progress. Location LKS-15.

Staff audited Documentation Control department, who only plays a role in the final BECO Form process, making sure all fields are accurately filled up and signed. The BECO is submitted to Document Control, who will make the updates according to the BECO directions. Then, the BECO originator will check revisions for final close-out approval. The originator of the BECO form is responsible for notifications to other departments who may have a stake. The System Safety Department will get a copy of the BECO form once created and then completed.

There were 2 changes done to the BECO Form in 2017, once in April (added the S line), and in July (added the System Safety Comment). The current book 38 shared during the audit was a current revision and the form has been revised and is in draft version currently.

Final approved and signed BECO is published on BART Intranet (Technical Information System) and everyone has access to the documents published. Document Control will flag BECO drawings/documents as "changes in progress" for BECOs currently in process so anyone that accesses the drawing/document is aware that it may change versions. Old drawing/document versions are then removed from system and replaced with the new versions. Old versions are then only obtainable directly through request to Document Control.

1. Staff reviewed multiple BART system modifications (listed above) and verified that the following occurred: engineering design peer review, design and analysis review by the System Safety department, and design and analysis review by CPUC when applicable.
2. Staff reviewed the Vehicle Wheel Profile Change project concept and verified the following: BECO Forms were used, BECO Forms were circulated to the Project Engineer, System Safety performed a review of the BECO, project was reviewed and approved by BART Operations and Maintenance, modification was circulated to the proper departments prior to implementation, and all necessary parties were properly notified of the modification.

Comments:
None.

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**18**	**Element**	**Local, State, and Federal Requirements: Employee Safety Program**
Date of Audit	September 18, 2017 LKS-18	**Department(s)**	Operations Department System Safety Department
Auditors/ Inspectors	Michael Warren Daniel Kwok	**Persons Contacted**	Jonathan Rossen, Manager of Employee and Patron Safety Reginald Lewis, Senior Safety Specialist

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. Cal/OSHA Safety Orders
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART District Management Procedure – Injury and Illness Prevention Program

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Local, State, and Federal Requirements: Employee Safety Program
Interview personnel and review appropriate records to determine whether:

1. BART has had any problems complying with local, state, or federal requirements. Review documentation of any such problems and assess how the issue was handled and resolved.
2. BART regularly holds Joint Union/Management Safety Committee (JUMSC) Meetings, and the Chief Safety Officer serves as the committee chair.
3. The JUMSC appropriately responds to employees' complaints regarding safety problems.
4. The JUMSC appoints subcommittees for special task assignments.
5. BART Management forms other Safety Committees when appropriate to address safety in specific work areas, special operation problems, or

employee behavior and morale.

6. An appropriate procedure and reporting form is being implemented, and is distributed to all employees to effectively report safety hazards in the work place.

7. Employees are aware of the Employee Safety Program and comfortable utilizing it.

8. Appropriate corrective actions regarding employee safety have either been satisfactorily completed or are being actively tracked and documented.

Randomly select at least two employees from each of the following departments, and review each employee's safety program records to determine whether they have received appropriate safety training with respect to their classification:

1. Maintenance and Engineering: Way and Facilities;
2. Maintenance and Engineering: Systems Maintenance;
3. Maintenance and Engineering; Traction Power
4. Non-Revenue Vehicle Maintenance;
5. System Safety;
6. Rolling Stock and Shops.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff interviewed System Safety, Transportation, and Rolling Stock and Shops personnel and reviewed and determined the following:

Staff reviewed meeting agenda/minutes for the following BART's Joint Union/Management Safety Committee (JUMSC) meetings:

- 6/3/2015
- 11/4/2015
- 1/6/2016
- 5/4/2016
- 8/2/2017
- 9/6/2017

Staff reviewed safety training records for the following employees:

- Maintenance and Engineering: Way and Facilities
  - 060602 – no defects noted
  - 060226 – no defects noted
- Maintenance and Engineering: System Maintenance
  - 062940 – no defects noted
  - 057607 – no defects noted
- Maintenance and Engineering: Traction Power
  - 057356
    - Employee never took training code WTPME008S FPE/GE Traction Power & PM Procedures
    - Employee never took training code WTTS002 Commercial Driver's License Class B
  - 055217 – no defects noted
- Non-Revenue Vehicle Maintenance
  - 062094 – no defects noted
  - 062468
    - Employee never took training code WTTS00xCVP CDL Proficiency Check
- System Safety
  - 061969
    - Employee is 6 months overdue for training code SSOSHA04A Electrical Safety – High Voltage
  - 062394 – no defects noted
- Rolling Stock and Shops
  - 060753 – no defects noted
  - 056704
    - Employee never took training code PL908 2-Day Supervisor Mandatory Orientation

BART personnel receive approximately 18 classes of training, with 11 of the core classes for new hires being administered by System Safety. BART personnel are given 90-days to complete classes. BART uses a training tracking software called Pathlore.

BART regularly holds JUMSC meetings the first Wednesday of every month. These meeting usually consist of issues brought to BART management by the Union representatives. The JUMSC is also where System Safety tracks the progress of concerns reported through their BART Safety Notice program. The

individual shops hold their own monthly Union safety meetings to resolve localized issues.

BART utilizes BART Safety Notices and BART Unusual Occurrence Reports (UOR) as part of their safety program. The UORs are a more immediate means to handle unsafe conditions since it goes straight from the employee to their supervisor for correction. BART Safety Notices are used if the employee does not feel their concerns are being adequately addressed by their supervisor. A copy of the Safety Notice is sent to the employee's immediate supervisor, one to the Shop Safety Committee, and one to Safety. Safety monitors the department supervisors to ensure they adequately address these issues. BART Safety Notices and UORs have recently been made available electronically via MAXIMO on all BART workstations. Interviews with employees has revealed that little to no instruction has been provided on how to fill out an electronic UOR or Safety Notice. System Safety also states that they have a Safety Hotline number available for employees to report concerns, but that no employee has yet to use this method. During Staff interviews with employees, no employee had and recollection of being told there was a Safety Hotline number.

1. BART has 5 open Cal/OSHA events. These events are tracked in a spreadsheet maintained by the Manager of Employee and Patron Safety.
2. BART regularly holds JUMSC meetings, which is chaired by the Chief Safety Officer's designee.
3. JUMSC tracks and appropriately responds to employees' complaints regarding safety problems.
4. JUMSC has not had to appoint subcommittees for special task assignments. It was stated that they are aware of the ability to form additional committees but has not felt the need to utilize the process.
5. BART Management has not had to form other safety committees.
6. Appropriate procedures and reporting forms are being implemented in the form of BART Safety Notices and UORs. Forms are made readily available to all employees.
7. Employees are aware of BART Safety Notices and UORs hardcopy forms and comfortable using them. The online forms on MAXIMO while mostly straight-forward, have led to some trial and error finding to the employees due to lack of instruction on its use. No employee interviewed outside of System Safety was aware of the Safety Hotline.
8. See #3.

Comments:

None.

Findings:

1. Employee training defects:
   Employee 057356 training defects
   a. Employee never took training code WTPME008S FPE/GE Traction Power & PM Procedures
   b. Employee never took training code WTTS002 Commercial Driver's License Class B

   Employee 062468 training defect
   c. Employee never took training code WTTS00xCVP CDL Proficiency Check

   Employee 061969 training defect
   d. Employee is 6 months overdue for training code SSOSHA04A Electrical Safety – High Voltage

   Employee 056704 training defect
   e. Employee never took training code PL908 2-Day Supervisor Mandatory Orientation
2. There was either little or no instruction given to employees on how to use online Safety Notices and UORs in MAXIMO.
3. No employee interviewed outside of System Safety was aware of the Safety Hotline.

Recommendations:

1. BART must ensure all employees receive their required training.
2. BART must ensure all employees are properly instructed and informed in all aspects of BART's safety programs.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**19**	**Element**	**Hazardous Materials Program**
Date of Audit	September 18, 2017 LKS-18	**Department(s)**	Operations Department Environmental Department
Auditors/ Inspectors	Jimmy Xia Steven Espinal	**Persons Contacted**	Gary Jensen, Principal Engineer Aaron Meeks, Safety Specialist

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. Cal/OSHA General Order Title 8
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Hazardous Communications Program documentation
5. BART District Management Procedure – Injury and Illness Prevention Program
6. BART Material Safety Data Sheets (MSDSs)

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Hazardous Materials Program

1. Select at random at least six BART employees responsible for handling hazardous materials, verify that they have received specific training for reporting requirements, product release or spill, and spill incident response and clean-up.
2. Verify that hazardous materials discharge/spill reports for incidents in the past 12 months have been prepared and filed properly.
3. Verify that all MSDSs are available to all personnel who handle hazardous materials.

FINDINGS AND RECOMMENDATIONS

Activities:

Staff interviewed BART representatives and reviewed BART's Hazardous Materials Program documentation, including the following:

1. BART issues two types of training related to hazardous material handling for BART employees who work with hazardous materials every year, which are described below:
    a. All BART employees who work with hazardous materials are required to complete the two courses entitled 'Hazardous Waste/Hazardous Materials' and 'Non-Emergency HazMat Spill Response', respectively, every year. All of BART's hazardous materials are in the shops. BART shops' management has the responsibility to see that shop personnel are adequately trained in the handling and use of hazardous materials by completing these two courses every year. Each of these two courses is comprised of a video, which is about 20 to 30 minutes in length, presented online via BART's Pathlore database. The Non-Emergency HazMat Spill Response video training course covers reporting requirements, product release or spill, and spill incident response and clean-up.
    The status of employees' training in regard to these two courses is documented on the Pathlore database, which allows the section managers to see when training will be due for each employee. Each section manager is sent a Pathlore report via email periodically so he/she can see who are due for training in the near future.

    Staff reviewed Pathlore printouts of matrices showing the current statuses of various safety related training courses for six randomly selected BART employees. The matrix covers the Hazardous Waste/Hazardous Materials and Non-Emergency HazMat Spill Response video training courses. The matrices show the dates for the training courses specific to each employee that are one year from the dates each employee previously completed the training courses. The Pathlore printouts show the following dates for when the six randomly selected BART employees will complete the two video training courses mentioned above next.
        i. Employee A
        Hazardous Waste/Hazardous Materials due date: 4/19/2018
        Non-Emergency HazMat Spill Response due date: 1/1/2018
        ii. Employee B
        Hazardous Waste/Hazardous Materials due date: 12/1/2017
        Non-Emergency HazMat Spill Response due date: 12/1/2017
        iii. Employee C
        Hazardous Waste/Hazardous Materials due date: 4/19/2018

Non-Emergency HazMat Spill Response due date: 5/17/2018

iv. Employee D
Hazardous Waste/Hazardous Materials due date: 2/16/2018
Non-Emergency HazMat Spill Response due date: 2/16/2018

v. Employee E
Hazardous Waste/Hazardous Materials due date: 11/17/2017
Non-Emergency HazMat Spill Response due date: 12/13/2017

vi. Employee F
Hazardous Waste/Hazardous Materials due date: 7/1/2018
Non-Emergency HazMat Spill Response due date: 3/30/2018

b. A class entitled 'Hazardous Waste Management/Shipping' conducted by a consultant, the Industrial Safety & Hazmat Training Group, LLC. This is an 8-hour long (one day) training class specifically for BART employees responsible for handling hazardous materials as designated by each facility that is conducted every year. This training includes all the information from the two video training courses mentioned above. BART selects several employees each year to receive this training, usually around three per shop. The selected employees may vary by year. Employees are issued a certificate upon successful completion of the class.

The Certificates of Completion for the Hazardous Waste Management/Shipping training class conducted by the Industrial Safety & Hazmat Training Group for six randomly selected BART employees for training they completed during the last three years with the following training and expiration dates.

i. Employee A
Completed training: 6/28/2017; Expiration date: 6/28/2018
This is the first time he took this class.

ii. Employee B
Completed training: 6/28/2017; Expiration date: 6/28/2018
This is the first time he took this class.

iii. Employee C
Completed training: 6/26/2017; Expiration date: 6/26/2018
This is the first time he took this class.

iv. Employee D
Completed training: 6/15/2016; Expiration date: 6/15/2017
Completed training: 6/26/2017; Expiration date: 6/26/2018

The BART Principal Engineer said that he is fairly new and thinks he came onboard in 2016.

v. Employee E
Completed training: 6/24/2015; Expiration date: 6/24/2016
Completed training: 6/14/2016; Expiration date: 6/14/2017
Completed training: 6/26/2017; Expiration date: 6/26/2018

vi. Employee F
Completed training: 6/23/2015; Expiration date: 6/23/2016
Completed training: 6/15/2016; Expiration date: 6/15/2017
Completed training: 6/28/2017; Expiration date: 6/28/2018

All six BART employees that staff randomly selected are current with the Hazardous Waste/Hazardous Materials and Non-Emergency HazMat Spill Response video training courses as could be seen from the dates for them to take these courses next on the Pathlore training matrix. All six BART employees will be scheduled to take these courses on various dates in the future as indicated on the Pathlore printouts as shown above.

Also, all six BART employees have received the annual Hazardous Waste Management/Shipping training as required, as could be seen from their issued certificates. All six selected employees are current with the annual Hazardous Waste Management/Shipping training, because their current training certificates are valid through latter June of 2018. Staff pointed out that Employees D, E, and F received retraining in 2017 approximately 12 days later than the 2016 training expiration dates on average, and that there was a similar finding and associated recommendation from the 2014 BART Triennial Audit. According to BART Principal Engineer, BART's response to the recommendation from the previous Triennial Audit is summarized as follows. BART usually provides the training annually in June, which may vary from the training expiration dates from the previous training by a week or two, either one to two weeks earlier or later than the previous training expiration dates. Despite this time variance, BART's hazardous materials handlers do receive the training once a year as required. BART views this as a minor administrative issue.

2. BART did not have any hazardous materials discharge/spill incidents that were reportable within the past 12 months. As such, no reports of such incidents have been prepared and filed during the past 12 months. If BART ever encounters such an incident, they will proceed in reporting and resolving the issue accordingly. BART's Unusual Occurrence Report form, which is a

standard report form for any unusual occurrence or any occurrence out of the ordinary, would be utilized in these cases.

3. MSDS for Hydroxybrite B-50 Heavy Duty Transit Cleaner printed out from Sitehawk
    a. All MSDSs are available to all personnel who work with hazardous materials online on a website called Sitehawk on any computers in BART facilities. MSDSs can readily be found through searching various parameters on Sitehawk. In November 2016, BART inventoried every facility and what was there. The MSDSs for all chemicals BART uses are currently stored on Sitehawk system. As such, Sitehawk provides all personnel who work with hazardous materials access to the MSDSs for all chemicals BART uses. The MSDSs stored on Sitehawk are kept current at all times. Sitehawk automatically tracks updates to MSDSs from manufacturers and updates MSDSs to the most recent version. BART Principle Engineer stated that BART doesn't use hardcopies of MSDSs anymore and he doesn't believe BART currently have CD-ROMs containing MSDSs as mentioned on Checklist #19 from the previous Triennial Audit, since these have been replaced by the online method of accessing/viewing MSDSs.
    b. Staff inquired about BART's process for adding new chemicals to be used by BART. BART personnel described the process as follows. Before a new chemical is purchased, system safety has to review and approve the MSDS for that chemical. If system safety approves the MSDS, the purchase of the new chemical will be permitted and they will add the new MSDS into the electronic inventory of MSDSs on Sitehawk.

Comments:
None

Findings:
None

Recommendations:
None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**20**	**Element**	**Drug and Alcohol Program**
Date of Audit	September 19, 2017 LKS-20	**Department(s)**	Operations Department System Safety Department
Auditors/ Inspectors	**Debbie Dziadzio** Mike Warren	**Persons Contacted**	Laura Clark, Principal Personnel Analyst Susan Marie Silburn, Drug Testing Coordinator Andrea Eneidi, Industrial Hygienist Demond Blanton, HR Division Manager-Leave Management

REFERENCE CRITERIA

1. Code of Federal Regulations, Title 49 Part 655 – Prevention of Alcohol Misuse and Prohibited Use in Transit Operations
2. CPUC General Order 164-D
3. BART System Safety Program Plan (SSPP) Rev. 9
4. BART Operations Rules and Procedures (OR&P) Manual
5. BART Corporate Drug and Alcohol Policy
6. BART Book 349, Substance Abuse Program

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Drug and Alcohol Program
Interview BART representatives and review appropriate records prepared in the past 12 months to:

1. Verify that the number of employees in safety-sensitive positions who tested non-negative or refused to take the test was reported accurately.
2. Verify that the Substance Abuse Program meets current FTA requirements.
3. Verify that BART has a policy for managing the use of over-the-counter drugs.

4. Select at random at least two safety-sensitive employees who tested non-negative for drugs or alcohol in the past year. Determine whether:

    a. The employee was evaluated and released to duty by a Substance Abuse Professional;

    b. The employee was administered a return-to-duty test with verified negative results;

    c. Follow-up testing was performed as directed by the Substance Abuse Professional according to required follow-up testing frequencies in the reference documents after the employee returned to duty.

5. Verify that consequences for repeat offenders were carried out as required in the reference.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART representatives and was advised that (3) three current BART employees tested non-negative in the past 12 months. Staff reviewed 2 randomly selected employee files. Upon review, Staff determined the tests were reported accurately. One employee was evaluated and released to duty by the Substance Abuse Professional (SAP), the employee was re-tested prior to return-to-work, and follow-up testing occurred as directed by the SAP. The second reviewed employee tested non-negative on August 29, 2017 and is currently in a substance abuse rehabilitation program, to be reviewed further by the SAP upon completion.

Staff then reviewed the Substance Abuse Program and determined that the program met current FTA requirements.

Staff determined BART's policy covers over-the-counter drugs.

Of the 3 employee that tested non-negative in the past 12 months, one was a repeat offender and consequences were carried out as required per BART Substance Abuse Policy.

Comments:

Staff found the BART representatives for this checklist to be prepared and knowledgeable in their duties and responsibilities.

Findings:

None

Recommendations:

None

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**21**	**Element**	**Procurement Process**
Date of Audit	September 15 & 20, 2017 OHY	**Department(s)**	Operations Department System Safety Department Rolling Stock and Shops
Auditors/ Inspectors	Michael Warren Daniel Kwok	**Persons Contacted**	Sandy Miniz, SR. Quality Assurance Engineer, RS&S Roland Fowlks, Manager of Inventory management, Procurement Ted Mutch, Manager of Logistics, Procurement Detra Dillon, Purchasing Manager, Procurement Anita McReynolds-Lidbury, Quality Assurance Program Manager, M&E Gary Fleming, Group Manager, M&E Gordon Wong, Sr. Electrical Engineer, Traction Power Engineering

REFERENCE CRITERIA

1. CPUC General Order 164-D
2. BART System Safety Program Plan (SSPP) Rev. 9
3. Book 429, RS&S Material Inspection, dated 1/30/15
4. Book 429, RS&S First Article Inspection Requirements, dated 3/17/14
5. Book 429, RS&S Receiving Inspection Procedure, dated 3/10/14
6. Book 429, RS&S Material Review Board of Handling Rejected Material, dated 4/4/17
7. Book 125, M&E Quality Management Plan, dated 10/2016
8. Item Master Inventory Addition/Change Procedure, dated 5/1/15
9. Procurement Manual, dated 10/2013

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION
Procurement Process Interview BART representatives and review appropriate documentation to: 1. Verify that BART personnel are following the Procurement Quality Assurance Procedures, and ensure safety issues and concerns are addressed in the procurement process. 2. Determine that adequate procedures and controls are in place to preclude the introduction of defective or deficient equipment into the BART System. 3. Determine that adequate procedures are in place to deal safely with defective or deficient equipment in the event such equipment is introduced into the BART System.
FINDINGS AND RECOMMENDATIONS

<u>Activities:</u>
Staff interviewed Rolling Stock & Shops(RS&S), Maintenance & Engineering(M&E), and Procurement personnel and reviewed documentation and determined the following:
 	
• RS&S
  o QA will get received materials from Stores and verify that materials received are appropriate to what was ordered.
  o All necessary supporting documentation needed to verify is attached to the Purchase Order(PO).
  o QA will label all received materials as accepted and return to Stores for stocking, or reject and segregate until an engineer inspects the material who will then either label as accept, accept with modification, or reject.
  o First Article Inspections are first approved by QA, and then must receive final approval from an engineer.
  o Any BART employee can fill out an MRB report to notify QA of issues with existing stock or parts. QA will assign a QA Officer to track and quarantine parts, and investigates the merit of the MRB report. Vendor usually replaces defective parts, or may issue a refund.

Report Reviewed	Comment
QR-17-3262	Example of First Article Receiving Inspection Report, engineering signed off on acceptance of part
QR-17-3447	Example of Receiving Inspection Report, item was found to be acceptable by QA
QR-17-3306	Example of Receiving Inspection Report, item pending rejection
17-125	Example of MRB Report, Quality Report generated, existing stock checked, and items rejected/returned as appropriate
17-097	Example of MRB Report, items found acceptable and returned to stock for use

- Procurement
    - Inventory parts:
        - For under $150,000: system(MAXIMO) auto makes part orders when levels drop below a specified amount. Requisition is auto generated and reviewed by an analyst. Buyers(via PeopleSoft used for financial tracking) will look at the particular item, and based off type will decide how to go about deciding who to buy from.
        - For over $150,000: Informal bid process is followed. The bid is advertised for specified amount of time. The bid is awarded to the lowest responsive bidder.
    - Non Inventory:
        - Sponsor will solicit quotes and the contract is offered to lowest supplied quote/bid.
    - Engineering will request an Item Master Update to have new items added to inventory.
    - MSDS items need prior approval from System Safety.
    - Technical specs to be attached to advertisement bid are pulled from Fusion(document management system).
    - Rejected items by QA/QC are sent to engineering for secondary inspection. If engineer rejects, then goes to Procurement for discussions with supplier on how to handle return/replacement.
- M&E:

- For purchase contracts:
  - Before full production, submittals are supplied by contract owner and reviewed by engineer. Can be approved as noted if minor changes are needed for submittal, limited approval needs to be resubmitted with changes noted to ensure changes are what's needed, not approved with resubmission required, and rejected with why and needs resubmittal.
  - An engineer is sent for Factory Acceptance Test. Then the item is shipped and Field Acceptance Tested at BART.
  - No payments are made until item is installed and verified that operates to contract requirements.
  - Office Engineer will make sure appropriate parties review submittal and that it meets all needs.

Comments:

- Book 125, M&E Quality Management Plan, Section 8.7.9 needs a typo correction. It references QMP Section 8.3 for nonconformance and it should be Section 9.3.
- Staff understands that M&E's QA program is relatively young and still developing, but Staff would expect to see development of task procedures as time goes on. SOPs detailed akin to those supplied by RS&S QA(listed above).

Findings:
None.

Recommendations:
None.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**22**	**Element**	**Personal Electronic Devices**
Date of Audit	September 13, 2017 LKSD-1856	**Department(s)**	Safety Department
Auditors/ Inspectors	**Debbie Dziadzio** Mike Rose Richard Fernandez John Madriaga Matt Ames Steve Espinal	**Persons Contacted**	Jeff Lau, Chief Safety Officer Denis Ring, Acting Manager Ops Safety Tony Onisko, E-BART Safety & Training

REFERENCE CRITERIA

1. CPUC General Order 172-
2. BART System Safety Program Plan (SSPP) Rev. 9
3. BART Use of Personal Electronic Devices Policy

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Personal Electronic Devices (PED)
Interview BART representatives and review appropriate documentation to:

1. What is the failure rate of in-cab cameras? How many cameras failed in the last three years? Verify that BART's recording retention complies with General Order 172?
2. Determine if the BART PED procedures adheres to General Order 172?
3. Is BART's zero tolerance being enforced?
4. Verify that BART has conducted random evaluations regarding PED use as
required by General Order 172, Sections 4.3.e, 4.5, and 6.2.

5. Determine whether BART has developed and implemented a zero-tolerance policy and program regarding PED usage, as required by General Order 172, Section 5.

6. Determine if BART is following their PED policy and General Order 172.

FINDINGS AND RECOMMENDATIONS

Activities:
Staff interviewed BART representatives regarding in-cab camera maintenance and in-cab camera failures for the past three years. Staff was given BART RTA In-Cab Camera System Inspection and Maintenance procedures and learned that the in-cab camera failure rate for the past three years is 3% of a fleet of 669 cars. Staff determined the PM for the in-cab cameras was thorough. Currently, BART has two types of revenue vehicles; A/B and C1/C2. They go through PM visits every 800 hours (10-12 weeks) for A/B cars and 600 hours (6-8 weeks) on C1/C2 cars. A complete check of the in-cab camera system occurs at that time. Staff then requested records to determine recording retention compliance to GO 172, Section 6.3. BART maintains records for at least 3 years.

Staff reviewed BART PED policy, ATU PED policy and SEIU PED policy and determined that they comply with GO172.

Staff reviewed Interoffice Memo dated 7/14/16 to Transportation Supervisors, ACTO's regarding Procedure for Cab Video Review, which is a procedure for the Supervisors responsible for performing random in-cab video review.

Staff reviewed PED violations that occurred on BART property for the past 3 years.

Staff verified that BART is performing random evaluations regarding PED as per GO 172.

Comments:
Regarding interoffice memo titled Procedure for Cab Video Review, Staff noted that there is no minimum time for random observation. Some reports showed as little as 8 minutes of video review. Staff suggests verbiage be put into the procedure that instruct the time limit to be at a minimum, 15 minutes.

Staff noted that the PED policy for BART v.s. ATU v.s. SEIU were inconsistent with regards to the zero tolerance discipline.

Staff pointed out to BART personnel that per BART policy, in the event of an accident or incident, BART may request PED records from the employee 15 minutes prior to the accident and/or incident, however, per ATU contract agreement, PED records request is 10 minutes prior to an accident and/or incident.

While reviewing in-cab camera random observations, Staff noted on 9/24/15 corrections were made on the random observation report by the reviewing officers and there was no clear indication whether the Operator being observed passed or failed during the random inspection. Furthermore, there were no initials next to the corrections to denote an error had occurred. Staff inquired into the Operations Manager's responsibilities regarding review of the paperwork.

Findings:

1. Staff reviewed two incidents of PED violations that occurred by two different Track Section Managers who were utilizing their personal cell phones. The Track Managers are under AFSCME contract which does not have a PED policy and therefore, fall under BART PED policy. The two Track Managers were given one day suspension v.s. BART PED policy which calls for first time offense to be 10 days suspension.

Recommendations:

1. Ensure all PED violations are disciplined consistently per BART PED zero tolerance policy.

2017 CPUC SYSTEM SAFETY REVIEW CHECKLIST FOR SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT

Checklist No.	**23**	**Element**	**Roadway Worker Protection**
Date of Audit	September 12, 2017 OHY	**Department(s)**	System Safety Department Maintenance and Engineering Department
Auditors/ Inspectors	**Matt Ames** John Madriaga Mike Borer	**Persons Contacted**	Denis Ring, Acting Manager of Operations Safety Celine Schafer, Manager of M&E Technical Training Michael Smith, Operations Training Supervisor Jeff Lau, Chief Safety Officer

REFERENCE CRITERIA

1) CPUC General Order 175-A.
2) BART System Safety Program Plan (SSPP) Rev. 9
3) BART Roadway Worker Program Plan

ELEMENT/CHARACTERISTICS AND METHOD OF VERIFICATION

Roadway Worker Protection
Interview BART representatives and review appropriate documentation to:

1) Determine whether BART's Roadway Worker Protection procedure adheres to the General Order 175-A.
2) Determine if BART is following their procedure and adhering to General Order 175-A.
3) Review near miss program records (including in the SSPP and BARTs review (section 10.6)), unsafe acts and right to challenge history and training as well as 24 month retraining. Request a BART roadway worker rule book.
4) Witness a job safety briefing if possible and work site for verification.

5) Ask roadway workers if they have a roadway worker rule book.

6) What is the status of on rail movement into the work zone controlled by early warning alarm device (General Order 6.3 d.i.(d))?

7) Have early warning alarm technology been acquired by BART as stated in Section 6.3 (f) in General Order 175-A.

8) Review RWP training records and compliance testing (Sections 9.3 and 9.4).

9) Review classroom training material and field training.

Activities:

Staff interviewed BART Safety and Training personnel, reviewed policy and procedures, and determined that the BART Roadway Worker Protection (RWP) program is in compliance with General Order 175-A requirements.

Staff conducted field inspections and determined that BART personnel do not consistently comply with RWP procedures and job safety briefings; See Checklist 13-B and 15-D for findings.

Staff reviewed all available records from the past 3 years, which included: 3 near miss records, 1 unusual occurrence report, 3 safety notices and Zero right to challenge notices. Staff received a BART RWP Manual.

Staff determined the status of BART adopting an Early Warning Alarm Technology (EWAT). BART has conducted testing with 4 EWAT vendors with no adopted system. BART has formally requested an extension in order to continue testing.

Staff reviewed the BART RWP training program for Rolling Stock and Shops, Maintenance and Engineering, and Operating Employees. This review also included training records, testing compliance, classroom material and field training material. BART Training utilizes database software to track all employees training compliance. The software provides various levels of warning in order to reduce the number of employees removed from service for failing to complete required training. Staff learned that, depending on the department, employees receive up to an initial RWP

certification training of 40 hours, which includes an 8 hour field training exercise; and a Twenty-four Month RWP recertification, which includes an 8 hour class with a 30 minute field training exercise.

Comments:

Staff discovered that BART does not provide additional RWP Training for personnel who fulfill Employee In Charge (EIC) positions. Staff considers the EIC to be the primary provider of RWP compliance for a safe work environment. Therefore, the EIC should receive additional training in order to perform these duties successfully.

Findings:

None.

Recommendations:

None.

APPENDIX D.

CPUC STAFF RECORDED NOISE ON BART CARS

BART Noise Level

Investigation conducted by Steve Espinal and Adam Freeman

7/18/2017 Random cars and train were selected.

South Bound (MacArthur to Millbrae)			
Leaving Station	**Arriving Station**	**Length of time over 85 db**	**Highest db recorded**
MacArthur	19th	25 seconds	
19th	12th	24 seconds	
12th	West Oakland	1 minute 4 seconds	
West Oakland	Embarcadero	3 minutes 48 seconds	101 dB (briefly)
Embarcadero	Montegomery	20 seconds	
Montgomery	Powell	15 seconds	
Powell	Civic Center	30 seconds	
Civic Center	16th	1 minute 5 seconds	
16th	24th	55 seconds	
24th	Glen Park	1 minute 40 seconds	105 db
Glen Park	Balboa	40 seconds	102.6 db
Balboa	Daly City	20 seconds	
Daly City	Colma	15 seconds	
Colma	South San Francisco	1 minute	
South San Francisco	San Bruno	1 minute 55 seconds	105 db
San Bruno	Millbrae	1 minute 5 seconds	
MacArthur	**Millbrae**	**15 minutes 54 seconds**	

North Bound (Millbrae to Del Norte)			
Leaving Station	**Arriving Station**	**Length of time over 85 db**	**Highest db recorded**
Millbrae	San Bruno	19 seconds	
San Bruno	South San Francisco	1 minute 20 seconds	Bart Operator asked
South San Francisco	Colma	1 minute	if we wanted ear plugs
Colma	Daly City	8 seconds	
Daly City	Balboa Park	7 seconds	
Balboa park	Glen Park	29 seconds	
Glen Park	24th	1 minute 20 seconds	
24th	16th	53 seconds	

16th	Civic Center	1 minute
Civic Center	Powell	No time
Powell	Montgomery	No Time
Montgomery	Embarcadero	No time
Embacadero	West Oakland	2 minutes 30 seconds
West Oakland	12th	14 seconds
12th street	19th	4 seconds
19th	MacArthur	19 seconds
MacArthur	Ashby	3 seconds
Ashby	Downtown Berkeley	25 seconds
Downtown Berkeley	North Berkeley	No Time
North Berkeley	El Cerrito	11 seconds
El Cerrito	Del Norte	No time
Millbrae	**Del Norte**	**10.4 minutes**

North Bound (MacArthur to Pittsburgh)			
Leaving Station	**Arriving Station**	**Length of time over 85 db**	**Highest db recorded**
MacArthur	Rockridge	20 seconds	
Rockridge	Orinda	3 minutes 10 seconds	101 db
Orinda	Lafayette	10 seconds	
Lafayette	Walnut Creek	10 seconds	
Walnut Creek	Pleasant Hill	12 seconds	
Pleasant Hill	Concord	9 seconds	
Concord	North Concord	37 seconds	
North Concord	Pittsburgh	17 seconds	
MacArthur	**Pittsburgh**	**5.1 minutes**	

South Bound (Pittsburgh to MacArthur)			
Leaving Station	**Arriving Station**	**Length of time over 85 db**	**Highest db recorded**
Pittsburgh	North Concord	No time	
North Concord	Concord	58 seconds	
Concord	Pleasant Hill	13 seconds	
Pleasant Hill	Walnut Creek	No time	
Walnut Creek	Lafayette	No Time	
Lafayette	Orinda	3 seconds	
Orinda	Rockridge	3 minutes	
Rockridge	MacArthur	11 seconds	
Pittsburgh	**MacArthur**	**4.4 minutes**	

South Bound (Del Norte to MacArthur)			
Leaving Station	**Arriving Station**	**Length of time over 85 db**	**Highest db recorded**
Del Norte	El Cerrito	No time	
El Cerrito	North Berkeley	3 seconds	
North Berkeley	Berkeley	3 seconds	
Berkeley	Ashby	21 seconds	
Ashby	MacArthur	17 seconds	
Del Norte	**MacArthur**	**0.7 minutes**	

AMERICAN HEARING RESEARCH FOUNDATION

Occupational Noise

Habitual exposure to noise above 85 dB will cause a gradual hearing loss in a significant number of individuals, and louder noises will accelerate this damage. For unprotected ears, the allowed exposure time decreases by one half for each 5 dB increase in the average noise level. For instance, exposure is limited to 8 hours per day at 90 dB, 4 hours per day at 95 dB, and 2 hours per day at 100 dB. The highest permissible noise exposure for the unprotected ear is 115 dB for 15 minutes per day. Any noise above 140 dB is not permitted.

The Occupational Safety and Health Administration, in its Hearing Conservation Amendment of 1983, requires hearing conservation programs in noisy work places. This includes a yearly hearing test for the approximately five million workers exposed to an average of 85 dB or more of noise during an 8-hour work day.

American Speech Language Hearing Association

Sound is measured in units called decibels. Sounds of less than 75 decibels, even after long exposure, are unlikely to **cause hearing loss**. However, long or repeated exposure to sounds at or above 85 decibels can **cause hearing loss**. The louder the sound, the shorter the amount of time it takes for NIHL to happen