

PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Rail Safety and Carriers Division
Rail Engineering Safety Branch
Rail Transit Safety Section

RESOLUTION ST-29
Date December 16, 1997

R E S O L U T I O N

RESOLUTION ST-29. GRANTING APPROVAL OF A REPORT,
PREPARED BY THE RAIL TRANSIT SAFETY SECTION, OF AN ON-
SITE SAFETY AUDIT OF THE SAN FRANCISCO BAY AREA RAPID
TRANSIT DISTRICT

SUMMARY

This resolution grants the request of the Rail Transit Safety Section (RTSS) for approval of its final audit report entitled "Triennial On-Site Safety Audit of the San Francisco Bay Area Rapid Transit District", dated December 16, 1997.

BACKGROUND

Both the Commission's General Order No. 164 (G.O. No. 164) and the Final Rule of the Federal Transit Administration's (the FTA's Rule), 49 CFR, Part 65, require the Commission, as the designated state safety oversight agency for California, to conduct an on-site safety review of each rail transit agency in the state at least once every three years. Following the completion of each review, the Commission is required to issue a report that contains findings and recommendations. At a minimum, this report must include an analysis of the efficacy of the rail transit agency's system safety program plan and a determination of whether or not the plan should be updated.

RTSS of the Commission's Rail Safety and Carriers Division is responsible for performing on-site safety audits and preparing appropriate audit reports for the Commission's approval to fulfill the requirements of the FTA's Rule and G.O. No. 164 for triennial, on-site, safety reviews of California's rail transit agencies. The first of these audits covering the San Francisco Bay Area Rapid Transit District (BARTD) was conducted by the RTSS during the period from September 22 to October 3, 1997. The audit was performed in accordance with the RTSS's procedure RTSS-4, Procedure for Performing Triennial Safety Audits of Rail Transit Systems.

DISCUSSION

Acting in compliance with Section 659.37 of the FTA's Rule and paragraphs 3.6 and 3.7 of G.O. No. 164, the RTSS conducted an on-site, safety audit of BARTD from September 22 to October 3, 1997. The audit was conducted by interviewing BARTD's management and staff, reviewing documentation, observing operations, and inspecting equipment and infrastructure. A full description of the audit is contained in the final audit report included as an appendix to this resolution.

The audit shows that BARTD is effectively implementing its system safety program plan. All exceptions noted during this audit are addressed under the headings "RECOMMENDATIONS" or "CORRECTIVE ACTION REQUIRED" on the checklists of the final audit report included in the appendix. The recommendations shown on Checklists Nos. 55 and 63 and the required corrective action shown on Checklists Nos. 22 and 23 indicate a need for minimal changes to update BARTD's system safety program plan.

Following the audit, BARTD's staff and RTSS staff were able to achieve full agreement on all aspects of the final audit report, including the recommendations and requirements for corrective action. The BARTD's System Safety Department will perform the necessary follow up to assure that the 24 recommendations in the final report are implemented. For each of the 14 items that require corrective action, BARTD will prepare a plan and schedule that identifies each step of the work to be done, when it will be done, and the person responsible for getting it done. This information will be provided to the RTSS for review by Monday, December 22, 1997. Beginning in 1998, BARTD will also provide the RTSS with a report in June and December each year until all required corrective actions are completed. The status reports will include updates that show the work completed and the work remaining for each item.

RTSS recommends that the Commission approve the final audit report entitled "Triennial, On-Site, Safety Audit of the San Francisco Bay Area Rapid Transit District", contained in the appendix to this resolution, and order BARTD to carry out the recommendations and requirements for corrective action contained in the final report.

PROTESTS

All interested parties, including BARTD, have been advised of the contents of this resolution, and no protest or objection has been received.

FINDINGS

1. The RTSS performed an on-site, safety audit of BARTD from September 22 to October 3, 1997.
2. This audit shows that BART is effectively implementing its system safety program plan.
3. Exceptions noted during the audit caused RTSS to make 24 recommendations and identify 14 items in need of corrective action. BARTD is in full agreement with all of the recommendations and requirements for corrective action, including those for updating the BARTD's system safety program plan.
4. BARTD's System Safety Department will perform the necessary follow up to assure that the 24 recommendations are implemented.
5. BARTD will prepare plans and schedules, for review by RTSS, to implement the 14 requirements for corrective action.
6. BARTD will prepare and submit to RTSS a semi-annual report of progress on implementing the 14 requirements for corrective action.
7. A description of the audit is contained in the final audit report entitled, "Triennial, On-Site, Safety Audit of the San Francisco Bay Area Rapid Transit District", and dated December 16, 1997.
8. RTSS recommends that the Commission approve the final audit report.
9. RTSS recommends that the Commission order BARTD to implement the audit's recommendations and requirements for corrective action.
10. RTSS recommends that the Commission order BARTD to submit its corrective action plans and schedules to RTSS for review.
11. RTSS recommends that the Commission order BARTD to provide the RTSS with semi-annual reports to track progress on implementation of the required corrective actions.

IT IS ORDERED that:

RTSS's request for approval of its final audit report entitled TRIENNIAL, ON-SITE, SAFETY AUDIT OF THE SAN FRANCISCO BAY AREA RAPID TRANSIT DISTRICT is granted. In addition, BARTD shall adopt the 24 recommendations and implement 14 requirements for corrective action contained in the report. BARTD shall also prepare the corrective action implementation plans and schedules and semi-annual reports, as described in the report. These plans and schedules shall be submitted to the RTSS for review by December 22, 1997.

I hereby certify that this resolution was adopted by the California Public Utilities Commission at its regular meeting on December 16, 1997.

Wesley M. Franklin
Executive Director

P. Gregory Conlon
President
Jessie J. Knight, Jr.
Henry M. Duque
Josiah L. Neeper
Richard A. Bilas
Commissioners

FINAL REPORT
12-16-97

CALIFORNIA PUBLIC UTILITIES COMMISSION

TRIENNIAL, ON-SITE, SAFETY AUDIT OF THE SAN FRANCISCO
BAY AREA RAPID TRANSIT DISTRICT

INTRODUCTION

The California Public Utilities Commission's General Order No. 164 and the Federal Transit Administration's Final Rule, 49 CFR Part 659, require the Commission staff to perform triennial, on-site, safety audits of each transit agency operating a rail fixed guideway system in California. The purpose of these audits is to verify compliance with, and evaluate the effectiveness of, each rail transit agency's system safety program plan.

The first triennial, on-site, safety audit of the San Francisco Bay Area Rapid Transit District (BART) was conducted by staff of the Commission's Rail Transit Safety Section during the two week period from September 22 to October 3, 1997. The on-site audit was preceded by a pre-audit conference with the BART General Manager and staff on September 19, 1997. A post-audit conference, also attended by the BART General Manager and staff, was held on October 7, 1997.

PROCEDURE

The audit was conducted in accordance with the Rail Transit Safety Section's procedure RTSS-4, Procedure for Performing Triennial Safety Audits of Rail Transit Systems. A set of 76 audit checklists covering Engineering (1 through 25), Operations (26 through 38), Maintenance (39 through 68), System Safety (69 through 75) and the BART Police Department (checklist no. 76) were prepared in advance of the on-site audit. Each checklist

identifies the safety related requirements that were audited, the BART reference documents that establish the acceptance criteria for the requirements, and the method that was used for evaluating compliance with the requirements. The methods used included:

- discussions with BART managers and rank and file employees
- reviews of procedures and records
- observations of operations and maintenance activities
- inspections and measurements of equipment and infrastructure

The audit checklists concentrated on requirements that affect the safety of train operations, and are known or believed to be important to reducing safety hazards and preventing accidents.

During the course of the on-site audit a number of the checklists turned out to be so similar to one another in scope and content that it became possible and prudent to combine them into single checklists. However, to minimize possible confusion from re-numbering them, the full sequence of numbers, 1 to 76, was retained. Consequently, some checklists have more than one number (e.g. checklist No. 9-10).

RESULTS

The audit results are recorded on each checklist in the Results/Comments section. Also recorded in this section are recommendations and requirements for corrective action. The "RECOMMENDATIONS" and "CORRECTIVE ACTION REQUIRED" statements

were discussed with BART management and staff both during the course of the on-site audit, and during a 30-day post audit review and comment period. As a result of these discussions, Commission staff and BART staff have reached full agreement on the recommendations and requirements for corrective action. BART accepts each of the recommendations and will take the indicated corrective action as shown on each of the individual checklists.

For each "CORRECTIVE ACTION REQUIRED" item, BART will prepare and implement a plan and schedule that identifies each step of the work to be done, when it will be done, and the person responsible for getting it done. This planning and scheduling information will be provided to the Commission staff for review and acceptance within 30 days, i.e. by Monday, December 22, 1997. Beginning in 1998, BART will also provide the Commission staff with a status report in June and December each year until all required corrective actions are completed. The status reports will include plan and schedule updates that show the work completed and the work remaining for each item.

For each "RECOMMENDATION", the BART System Safety Department is responsible for performing the required follow up. In addition, the Commission's designated RTSS representative for BART is responsible for monitoring BART's progress in implementing the recommendations as a part of his regularly assigned safety oversight duties performed in accordance with RTSS-1, Procedure for Safety Oversight of Design, Construction, Operation and Maintenance of Rail Fixed Guideway Systems.

There are 24 separate recommendations in all. Many of these recommendations involve activities that BART recognized needed attention and had begun to work on, but not completed, before the audit began. Examples of these are the recommendations for checklists 16-17, 36, 54, 61, 65, 71, 72, and 74. BART also

began to take action on many of the other recommendations as soon as they were identified during the course of the on-site audit, or while they were still in draft form during the post-audit 30-day review and comment period from October 20 to November 20, 1997.

There are 14 separate items that require corrective action. Similar to its treatment of the recommendations, BART also began responding to the requirements for corrective action while the on-site audit was still in progress and during the post-audit 30-day review and comment period.

SUMMARY AND CONCLUSIONS

This, the first on-site, triennial, safety audit conducted by the Commission's Rail Transit Safety Section concentrated on those elements of BART's System Safety Program Plan that affect the safety of train operations, and that are important to reducing safety hazards and preventing accidents. The audit was conducted by interviewing management and staff personnel, reviewing documentation, observing operations, and inspecting equipment and infrastructure to evaluate compliance with, and determine the effectiveness of BART's System Safety Program Plan. The scope of the audit included engineering, operations, maintenance, system safety and the police department.

The results of the audit clearly show that BART is effectively implementing its System Safety Program Plan. BART management demonstrated that they have a clear understanding of the policies and procedures important to safety. BART staff, by their actions as well as words, demonstrated that they understand their duties and responsibilities relative to carrying out the policies and procedures important to safety.

The vast majority of the thousands of documents reviewed, activities observed, and items inspected were found to be in compliance with the requirements of BART's System Safety Program Plan. However, there were exceptions noted. These are described under the Results/Comments section on each checklist. All of the noted exceptions are addressed under the headings RECOMMENDATION or CORRECTIVE ACTION REQUIRED which also appear on the checklists in the Results/Comments section.

The single most common noted exception involved "not following procedures." This was encountered in engineering, operations, maintenance, system safety and the police department.

The Commission staff's recommendations and requirements for corrective action as shown on the checklists are intended to mitigate potential problems associated with not following procedures. BART has agreed to accept all of the recommendations, and to take all of the designated corrective actions. BART has further agreed to develop appropriate plans and schedules to perform the corrective action and to keep the Commission staff advised of BART's progress through semi-annual progress reports. The BART System Safety Department, with Commission staff oversight, is responsible for assuring the recommendations are put into practice.

The Rail Transit Safety Section would like to express its appreciation to BART management and staff for their cooperation and support during every phase of this audit from development of the checklist requirements through the post-audit review and comment period. All of the information requested was made readily available, and BART personnel at every level were always responsive to the auditors requests for assistance. This kind of cooperation contributed greatly to the performance of the audit.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 1**

Rail Transit Agency BART	Persons Contacted Colin McDonald Rolph Sabye Don Howard	Date of Audit September 23, 1997
Department ENGINEERING - Civil, Electrical/Mech. and Maint.		Auditors Len Hardy and John Enschede

Reference Criteria

BART ENGINEERING CHANGE ORDER (BECO) INSTRUCTIONS, Rev.1-92

Element/Characteristics and Method of Verification

BECO PROCEDURE

For BART Civil/Structural, Electrical/Mechanical, and Maintenance Engineering Disciplines select a random sample of not less than 5 BECOs prepared during the past 12 months from each department and review them to determine whether or not:

- 1) Copies were sent to the Safety Department
- 2) Final close-out Approval was signed by an engineer in a timely manner
- 3) The BECO Coordinator appropriately assigned BECO tracking numbers to the completed BECOs
- 4) As-built drawings were appropriately updated with the changes

Results/Comments

A random sample of 5 BECOs was selected. The sample included both completed BECOs and BECOs in various stages of completion. All BECOs were signed off in the block indicating that copies had been forwarded to the BART Safety Department. For completed BECOs final close-out approval was signed by the appropriate engineer within a reasonable time. For all BECOs tracking numbers had been assigned. For all BECO's the status of affected as-built drawings were reviewed by visiting the BART Drafting and Configuration Control department. Inspection of drawings affected by completed BECOs indicated that they had been appropriately undated. Inspection of drawings affected by current, but uncompleted BECOs indicated that the appropriate drawings had been assigned to draftspersons and were in various levels of completion. On one BECO comments from the BART Safety Department were evident.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 2**

Rail Transit Agency BART	Persons Contacted Susan Presley Chuck Jenkins Steve Peery	Date of Audit September 23, 1997
Department TRANSIT SYSTEM DEVELOPMENT - A & B Car Rehab. Project		Auditor Len Hardy and John Enschede

Reference Criteria

1) SAFETY CERTIFICATION PROGRAM PLAN for REHABILITATION OF TRANSIT VEHICLES

Element/Characteristics and Method of Verification

SAFETY CERTIFICATION - CERTIFIABLE ELEMENT No. 1: DESIGN CRITERIA CONFORMANCE

Review the safety certification file to determine whether a Certificate of Compliance for design criteria conformance has been properly prepared and signed by the Project Director and Lead Supervising Engineer

Results/Comments

Review of the Safety Certification file showed that the subject certificate has been properly prepared and signed by the Project Director and the Lead Supervising Engineer.

Elements reviewed during the audit were found to be in compliance. No recommendations is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 3**

Rail Transit Agency BART	Persons Contacted Susan Presley Chuck Jenkins Steve Peery	Date of Audit September 23, 1997
Department TRANSIT SYSTEM DEVELOPMENT - A & B Car Rehab. Project		Auditor Len Hardy and John Ensich

Reference Criteria

1) SAFETY CERTIFICATION PROGRAM PLAN for REHABILITATION OF TRANSIT VEHICLES

Element/Characteristics and Method of Verification

SAFETY CERTIFICATION - CERTIFIABLE ELEMENT No. 2: SPECIFICATION CONFORMANCE

Review the safety certification file to determine whether or not:

- 1) The specification conformance checklist items have been identified
- 2) The method of verification (evidence of review activity) has been completed for each item
- 3) A Certificate of Compliance has been issued and signed by the Project Director and the BART System Safety Manager

Results/Comments

The project team needs to be commended for the quality of the Safety Certification Program Plan adopted for this project. The plan is clear, logical, comprehensive, and meets current standards for the transit industry. It was prepared by Booz-Allen & Hamilton, Inc. and has been approved by Albert Scala and Chuck Jenkins.

FINDINGS FOR SPECIFICATION CONFORMANCE PORTION OF THE PLAN

1. A total of 226 items have been identified on the Safety Certification Conformance Checklist
2. There is no evidence of review for any of the 226 items on the checklist. The project team indicated that this project has not been completed and that the checklist will be completed once the specifications are finalized. It was indicated that this would be done with the completion of the two prototype vehicles in Pittsburgh, Pa.
3. A Certificate of Compliance is yet to be completed.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 4**

Rail Transit Agency BART	Persons Contacted Susan Presley Chuck Jenkins Steve Peery	Date of Audit September 23, 1997
Department TRANSIT SYSTEM DEVELOPMENT - A & B Car Rehab. Project		Auditors Len Hardy John Enschede

Reference Criteria

1) SAFETY CERTIFICATION PROGRAM PLAN for REHABILITATION OF TRANSIT VEHICLES

Element/Characteristics and Method of Verification

SAFETY CERTIFICATION - CERTIFIABLE ELEMENT No. 8: MAINTENANCE PLAN AND MANUALS

Review the safety certification file to determine whether or not:

- 1) The Procedure Review Checklist has been created that includes evidence of review by relevant departments
- 2) Any exceptions listed in the review checklist have been satisfactorily resolved
- 3) A Certificate of Compliance has been issued and signed by the Project Supervisor and the Department Manager

Results/Comments

FINDINGS

The project team indicated that Adtranz is responsible for providing maintenance manuals for any new equipment installed on the vehicles. Additionally, the project team has identified a task force to review and integrate these manuals with the existing BART maintenance manuals. To date, Adtranz has submitted eighty percent of required maintenance manuals in draft form. These drafts are currently being reviewed by the task force. Adtranz is required to submit final maintenance manuals by the first quarter of next year.

In response to the question regarding how revenue service vehicles will be maintained until the manuals are completed and available, the project team indicated that the services of Adtranz will be used during this interim period.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 5**

Rail Transit Agency BART	Persons Contacted Susan Presley Chuck Jenkins Steve Peery	Date of Audit September 23, 1997
Department TRANSIT SYSTEM DEVELOPMENT - A & B Car Rehab. Project		Auditors Len Hardy John EnsCh

Reference Criteria

- 1) **SAFETY CERTIFICATION PROGRAM PLAN for REHABILITATION OF TRANSIT VEHICLES**

Element/Characteristics and Method of Verification

SAFETY CERTIFICATION - CERTIFIABLE ELEMENT No. 10: MAINTENANCE PERSONNEL TRAINING

Review the safety certification file to determine whether or not:

- 1) An approved training curriculum has been developed
- 2) Training attendance reports have been completed
- 3) A Certificate of Compliance has been issued and signed by the Training Supervisor and the Operations Manager

Results/Comments

A comprehensive Training Program Plan has been developed by Adtranz. BART has developed a task force to review training materials as they become available to expedite the training process. Individual Lesson Plans in draft form have been submitted by Adtranz and these are currently under review by the task force.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 6**

Rail Transit Agency BART	Persons Contacted Susan Presley Chuck Jenkins Steve Peery	Date of Audit September 23, 1997
Department TRANSIT SYSTEM DEVELOPMENT - A & B Car Rehab. Project		Auditors Len Hardy John Enschede

Reference Criteria

1) SAFETY CERTIFICATION PROGRAM PLAN for REHABILITATION OF TRANSIT VEHICLES

Element/Characteristics and Method of Verification

SAFETY CERTIFICATION - CERTIFIABLE ELEMENT No. 13: SAFETY RELATED TESTING

Review the safety certification file and other pertinent documentation to determine whether or not:

- 1) A test plan that defines requirements for verifying the safety of the car design has been developed (Specification Checklist Item 58)
- 2) Testing and verification procedures have been developed (SC Item 59)
- 3) A report has been written detailing the results of the safety tests, method used to verify the safety of items in the Safety-Critical Items List, and any Category I or II hazards identified during testing. (SC Item 60)
- 4) A Certificate of Compliance has been issued and signed by the Lead Supervising Engineer and the Project Director

Results/Comments

A log listing all the test that need to be performed has been developed, and a comprehensive test plan has been completed by Adtranz. The test plan includes testing and verification procedures.

The report detailing the results of the safety related tests has not been produced to date since the testing has not been completed.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 7**

Rail Transit Agency BART	Persons Contacted Susan Presley Chuck Jenkins Steve Peery	Date of Audit September 23, 1997
Department TRANSIT SYSTEM DEVELOPMENT - A & B Car Rehab. Project		Auditors Len Hardy John Ensich

Reference Criteria

1) SAFETY CERTIFICATION PROGRAM PLAN for REHABILITATION OF TRANSIT VEHICLES

Element/Characteristics and Method of Verification

SAFETY CERTIFICATION - CERTIFIABLE ELEMENT No. 14: HAZARD IDENTIFICATION AND RESOLUTION

Review the safety certification file and other pertinent documentation to determine whether or not:

- 1) A tractability matrix document has been developed that documents the successful resolution of identified hazards.
- 2) A Certificate of Compliance has been issued and signed by the Lead Supervising Engineer, the Project Director, and the System Safety Manager

Results/Comments

FINDINGS

The traceability matrix document identifies 75 safety considerations. Of these safety considerations, roughly 20% have been addressed by Adtranz. No BART action appears on any of the forms to date, and no verification activity has taken place. None of the safety considerations have been completely resolved.

In response to the question regarding whether all these safety concerns will be resolved prior to revenue service some reservations were expressed by the project team. However, assurances were given that prior to revenue service, exceptions to full certification of this portion of the Safety Certification Plan will be listed and measures taken to ensure that safety will not be compromised.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 8**

Rail Transit Agency BART	Persons Contacted Lee Cohen Susan Presley	Date of Audit 9-26-97
Department TRANSIT SYSTEM DEV. A & B Car Rehab. Project	Chuck Jenkins John Garnham	Auditor Len Hardy John Ensich

Reference Criteria

1. Section 16, Contract No. 41 MF - 110A, BART Contract Book for Rehabilitation of Transit Vehicles, Conformed Copy, Feb. 1995

Element/Characteristics and Method of Verification

BART A & B VEHICLE REHABILITATION QUALITY ASSURANCE INSPECTIONS

Randomly select one A-Car and one B-car that have substantially made it through the rehabilitation process. Review the quality assurance records associated with the selected vehicles to determine whether or not:

1. The records are available to the BART Project Director upon the request at all times during the performance of the contract.
2. The records are maintained complete and in orderly, easily accessible arrangement.
3. The records include the results of:
 - a) examinations
 - b) inspections
 - c) tests
 - d) process controls
 - e) disposition of discrepancies

Results/Comments

The quality control records of several cars on the shop floor were inspected. In each case the "BART Car Record Book" was attached to the vehicle and appropriately filled in for the zone that the car was in. As a car moves to the next phase, the Q.A. records are archived in master books in the central document control room. One car was randomly selected and the records in the master book were reviewed and found to be in order. Discrepancies are tracked until corrected or resolved.

The quality control of parts was reviewed. We requested that the brake resistors and air compressors be tracked through the quality control process. These parts were entered into the Parts Management System (PMS) database. The records in the database showed that these parts are inspected and either accepted or rejected. There were examples of parts rejected. These parts are given a Material Rejection Notice and are either repaired in house or returned to the manufacturer. The inspection area was reviewed and examples of rejected parts were appropriately labeled.

The parts inspection area was reviewed. Tools were stocked in cabinets with appropriate calibration stickers attached. Additionally, the calibration tracking system listing the re-calibration schedule was reviewed and found to be in order.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 9 & 10**

Rail Transit Agency BART	Persons Contacted Colin McDonald Barbara Doyle Rolph Sabye Galip Sukaya	Date of Audit September 25, 1997
Department ENGINEERING AND TRANSIT SYSTEM DEVEOP.		Auditor Len Hardy

Reference Criteria

- 1) STANDARD OPERATING PROCEDURE FOR TRACK USAGE - (Feb. 1992)
- 2) RESIDENT ENGINEER'S MANUAL, PF-34 AND APPENDIX B (June 1997)

Element/Characteristics and Method of Verification

SITE SPECIFIC WORK PLAN (SSWP)

Randomly select a sample of not less than 3 recently completed SSWPs and review to determine whether or not they contain the following:

- 1) Signature of the Contractor, Resident Engineer, and the BART Project Manager
- 2) Detailed description of work including an hourly work plan
- 3) Contingency plan for restoration of the system in case of an emergency, or if contractor fails to adhere to the approved schedule
- 4) Completion time for each SSWP activity
- 5) Duty sheet listing name and phone number of contractor's site representative

Results/Comments

A random sample of 5 SSWPs were reviewed. All items in this checklist were successfully completed on all SSWPs, except the requirement that an hourly work plan be included. Of the 5 SSWPs reviewed only two included an hourly work plan.

BART Engineering explained that an hourly work plan is not required for many of the projects due to the simplicity of the work involved and the fact that the work does not critically affect the system operation. Engineering presented the example of installing wet standpipes. This project consists of repetitive work each shift that does not involve multiple disciplines or critical cut-over operations requiring go/no go decisions to be made.

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CHECKLIST ITEM No's. 9 & 10
CONTINUED FROM PAGE 1.

Although Engineering presented good logic regarding the omission of hourly work plans, the procedure specifically states that an hourly work plan will be included. The practice of using discretion in deviating from this procedure may lead employees to the mistaken belief that they may exercise discretion in deviating from other rules and procedures.

RECOMMENDATION:

Review the "Standard Operating Procedure For Track Usage", Appendix B in the Resident Engineer's Manual and determine whether all SSWPs should require hourly work plans. If yes, then ensure all SSWPs are consistent in including an hourly work plan. If no, change the wording in the procedure to qualify this requirement.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 11 & 12**

Rail Transit Agency BART	Persons Contacted Colin McDonald Rolph Sabye Barbara Doyle Galip Sukaya	Date of Audit September 25, 1997
Department ENGINEERING AND TRANSIT SYSTEM DEVELOPMENT		Auditor Len Hardy

Reference Criteria

- 1) STANDARD OPERATING PROCEDURE FOR TRACK USAGE - (Feb. 1992)
- 2) RESIDENT ENGINEER'S MANUAL, APPENDIX B (June 1997)

Element/Characteristics and Method of Verification

INTERIM OPERATING PLAN (IOP)

Randomly select a sample of not less than 3 recently completed IOPs and review to determine whether or not they contain the following:

- 1) BART's Track Allocation Form
- 2) Description of the work including its location, and start and completion times
- 3) Duty sheet listing names of persons who shall be present or on call
- 4) Checklist of milestone events of the work, including the recording and initializing of each activity's completion time
- 5) Checklist of activities required to restore the track to normal service, including the recording and initializing of each activity's completion time
- 6) Contingency plan for emergency operation of the transit service
- 7) Evidence that a test train was operated over the subject track prior to return to revenue service

Results/Comments

A random sample of 5 IOPs were reviewed. All checklist items were successfully satisfied except the following:

Only two of the five projects included the "Worksite Preparation Checklist" and the "Service Restoration Checklist". These checklists contain a list of milestones. Each milestone has a slot for the recording of the actual time that the milestone is reached along with a slot for the initials of the person responsible for the milestone.

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**CHECKLIST ITEM No's 11 & 12
CONTINUED FROM PAGE 1.**

2. A requirement in the procedure ("Standard Operating Procedure For Track Usage", Appendix B in the Resident Engineer's Manual) states, "Any section of revenue track that has been out of service will be restored to revenue service only after a "test" train has been operated over it." None of the five projects included this requirement.

BART Engineering explained that these requirements are not warranted for all projects. Additionally, there is the general requirement that a "Sweep" train be run over every line before revenue service and some individuals felt that this is equivalent to a "test" train.

RECOMMENDATION:

For the reasons cited in Checklist Nos 9 & 10 the following recommendation is made: The subject procedure should be reviewed and the decision made to either require all parties to consistently follow the procedure as is, or to modify the procedure to accurately reflect how it is currently being implemented.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 13**

Rail Transit Agency BART	Persons Contacted Lee Cohen John Slama Ken Nakashima	Date of Audit October 3, 1997
Department ENGINEERING - Train Control		Auditor Len Hardy

Reference Criteria

- 1) TRAFFIC CONTROL PROJECT PLAN dated June 25, 1997
- 2) SYSTEM SAFETY PROGRAM PLAN, SECTION 404.7 - 404.10
- 3) BART SAFETY STANDARDS FOR AUTOMATIC TRAIN CONTROL

Element/Characteristics and Method of Verification

TRAFFIC CONTROL PROJECT

Conduct interviews and review documentation to determine whether or not the process that has been / will be followed in order to ensure that safety prevails throughout the design, installation, and cut over phases of the project, includes:

1. Hazard analyses to ensure that all combinations of plausible events are evaluated to determine if a hazard could arise due to the design modification
2. Appropriate checks and balances, sign-offs, documentation, etc. to validate the safety of the proposed design change
3. Interdepartmental review requirements to ensure input from each of the various departments affected
4. A comprehensive pre-operational safety certification testing program with appropriate sign-off requirements

Results/Comments

An interview with the responsible engineers and a review of the file for this project showed that: (1) A hazard analysis was performed which evaluated the safety impact of the proposed design changes; (2) there has been adequate review by other departments including BART Safety; (3) marked-up drawings indicating the changes will be left at each location for maintenance reference until the BECO process produces updated drawings; and (4) appropriate testing (200 series, 400 series, and interlocking) with required signoffs will be performed as part of the project plan. Prior to the cutover of the project, the Train Control department will issue a memorandum to the appropriate BART department managers stating that all testing has been successfully completed and that the system is ready for operations.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 14**

Rail Transit Agency BART	Persons Contacted John Donahue, BART Albert Bast, BATC Ben Cheek, BATC Bob Clemons, BATC	Date of Audit October 3, 1997
Department WEST BAY EXTENSION		Auditor Len Hardy

Reference Criteria

SECTION 11.3, BART SAN FRANCISCO AIRPORT EXTENSION PROJECT MANAGEMENT PLAN, REV. 3, DATED 7/26/96

Element/Characteristics and Method of Verification

DOCUMENT AND CHANGE CONTROL

Randomly select 3 drawings, and 3 specifications that have been subject to multiple revisions and determine whether or not:

- 1) The Design Document Register (DDR) interactive database tracks all changes, amendments, and attachments to the selected documents.
- 2) A standard document distribution list has been established, and the recipients of the documents within the BART organization are in receipt of the documents with the same revisions as entered in the DDR

Results/Comments

An in-depth presentation on the project configuration control was given by BATC. After the presentation, a review of pertinent BATC documentation was performed. Main information/findings from these exercises were:

- * For the most part the project is still in the Design Phase and the Bid Phase. BATC explained how input was solicited at different levels of the design phase by holding design reviews, distributing documentation to interested parties, and collecting comments. Examples of how comments and updated drawings and specifications are tracked were shown. The BATC database for tracking all correspondence was demonstrated. The database lists all items distributed (documents, letters, memorandums, etc.), lists the recipients of the items, and indicates the final storage location of each item.

The Design Document Register (DDR) interactive database has not been developed to date. The DDR was originally intended to track contract document changes, and amendments once the contracts have been awarded. At the current phase of the project this function is being adequately performed manually with the

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use of tables produced with a standard word processing computer program. Examples of this manual process, along with how changes and amendments are recorded and distributed, were shown. According to BATC it is questionable whether the DDR will eventually be developed as additional contracts are awarded, or whether the current manual method would better serve their purposes.

- * A distribution list has been established indicating the parties that need to get updated copies when changes to the contract documents are made. BART engineers verified that this list is working well, and that appropriate individuals are receiving updated revisions as they occur.

RECOMMENDATION:

BATC should evaluate whether it intends to establish a Design Document Register (DDR) interactive database. If an alternative means other than an interactive database is engaged, the "Tracking Tools" section in the Project Management Plan should be revised accordingly.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 15**

Rail Transit Agency BART	Persons Contacted Colin McDonald	Date of Audit September 23, 1997
Department ENGINEERING - Civil	Mark Chiu Rolf Sabye	Auditors Len Hardy and John Ensch
Reference Criteria 1) BART CONSTRUCTION LIAISON - Memo from Chris Koukis dated July 19, 1996		
Element/Characteristics and Method of Verification <u>BART ENGINEERS' REVIEW OF THE LIFT PLAN AND LOAD CALCULATIONS FOR CRANES AND DERRICKS EXCEEDING 3 TONS CAPACITY AND WITH BOOM EXTENSIONS THAT COULD FALL ON BART TRACKS</u> Randomly select two site locations where cranes/derricks that meet the above criteria are currently operating, or where they have recently been operating. Review the contractor submitted lift plans and load calculation for the cranes/derricks to determine whether or not BART engineering reviewed and provided comments.		
Results/Comments Review of the SSWPs and subsequent correspondence for the Cypress Freeway Project and the 16th Street Overcrossing Project indicated that BART engineering did evaluate the contractors submittals regarding cranes and derricks plans for operation, design of lifting jigs, and load calculations where necessary. Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 16 & 17**

Rail Transit Agency BART	Persons Contacted Rick Rattray Mark Dana	Date of Audit September 29, 1997
Department ENGINEERING AND TRANSIT SYSTEM DEVELOPMENT	Chuck Marin Barney Smits	Auditor Len Hardy

Reference Criteria

- 1) **RESIDENT ENGINEER'S MANUAL** (June 1997), Section 1.16 Safety Program and procedure PF-26
- 2) **SYSTEM SAFETY PROGRAM PLAN, SECTION 303**, Rev. 4, Dec 2, 1996

Element/Characteristics and Method of Verification

RESIDENT ENGINEER'S RESPONSIBILITIES REGARDING CONTRACTOR SAFETY PROGRAMS

Randomly select 2 current or recently completed projects that involve or involved work on or about operating trackways. Review the contractor's Safety Program submittal and pertinent resident engineer's records to determine whether or not:

1. The safety program was reviewed by the resident engineer to ensure compliance with contract terms, and BART's OR & P requirements
2. The resident engineer or a member of his staff attended the contractor's weekly "tool box" meetings, conducted daily jobsite safety inspections, and completed Construction Safety Survey Forms to memorialize these events, including corrective action recommendations where necessary
3. The resident engineer ensured that contractor personnel have received not less than the minimum safety training required as detailed in section 4.16.4 of the Resident Engineers Manual
4. The resident engineer received, reviewed and filed contractor reports as detailed in procedure PF-26, including monthly and annual crane inspection reports

Results/Comments

Three separate projects were reviewed. For each project the responsible resident engineer presented documentation and answered questions regarding the checklist items.

Checklist items 1 and 3 were successfully satisfied for each of the three projects.

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Checklist items 2 and 4 were not being followed as outlined in the Resident Engineers manual by any of the three engineers. Each engineer, however, was not totally ignoring his responsibilities for the elements in the subject checklists. Each engineer had developed his own methodology and had used his discretion regarding the scope and frequency that certain elements were being performed.

RECOMMENDATION:

Discussions with individuals at the audited activity revealed that they themselves recognized that the Resident Engineer's Manual needs some revision in order to be a helpful guide in outlining consistent responsibilities for safety inspections and documentation. It is thus recommended that the BART Safety Department work with Engineering to identify relevant safety inspection and reporting requirements (forms used, etc.) for different classes of projects and to update the Resident Engineer's Manual accordingly.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 18 and 19**

Rail Transit Agency BART	Persons Contacted Mark Chan Chuck Rae	Date of Audit 9-30-97
Department ENGINEERING & TRANSIT SYSTEM DEVELOPMENT		Auditor Len Hardy
Reference Criteria 1. Section 304 - Contractor and Supplier Control, BART System Safety Program Plan, Rev.4, Dec.2, 1996 2. Operation Rules and Procedures Manual, Rev.3, March 1, 1980 3. Section 404.9 - Review and Monitor Engineering Designs, Construction and Testing, BART System Safety Program Plan, Rev.4, Dec.2, 1996		
Element/Characteristics and Method of Verification Contractor Performance 1. Observe Contractor activities along the BART Right of Way for not less than two hours at two locations to determine whether or not they are in compliance with the BART Rules and Procedures, the Site Specific Work Plan and the Interim Operating Plan 2. Interview at least two contractor supervisors at each work site to determine whether or not they have sufficient knowledge and understanding of the BART Rules and Procedures, the SSWP and the IOP.		
Results/Comments <p>Contract work was observed at three locations: trackway between Balboa Park and Glen Park, trackway at 12th Street Station, and trackway between 12th Street Station and West Oakland Stations.</p> <p>At each location, work was being performed in accordance with the BART OR & P Manual, the SSWP, and IOP requirements. Supervisors were conversant with safety requirements applicable to their scope and location of work.</p> <p>Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.</p>		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 20 and 21**

Rail Transit Agency BART	Persons Contacted Mark Chan Chuck Rae	Date of Audit 9-30-97
Department ENGINEERING & TRANSIT SYSTEM DEVELOPMENT		Auditor Len Hardy
Reference Criteria <ol style="list-style-type: none"> 1. Section 302 - District Safety Observation, BART System Safety Program Plan, Rev.4, Dec.2, 1996 2. Operation Rules and Procedures Manual, Rev.3, March 1, 1980 3. Guidelines For Use by BART Safety Monitor - Memo dated July 19, 1996 4. BART Safety Monitor Certification Training Program Plan 		
Element/Characteristics and Method of Verification <p>Safety Monitor Performance</p> <p>Interview two Safety Monitors on site to determine whether or not:</p> <ol style="list-style-type: none"> 1. They are assigned a train radio, a cellular phone, and a paging device that are all operating properly. 2. They conducted a radio check with OCC at the beginning of their shift. 3. They are familiar with the Interim Operating Plan, Site Specific Work Plan, and the limits of their observation area. 4. They are familiar with their duty regarding who to notify if the train operating envelope clearance is violated. 5. They are knowledgeable in at least the following areas: <ul style="list-style-type: none"> • O R & P (e.g. Clearance Rules ,sec 401, Track & Milepost designation/reference points, Access & Egress location). • Electrical equipment (e.g. Third Rail, Third Rail Trips, Third Rail Probing Procedure) & Electrical Safe Clearance Procedure. 		
Results/Comments <p>Contract work was observed at three locations: trackway between Balboa Park and Glen Park, trackway at 12th Street Station, and trackway between 12th Street Station and West Oakland Stations.</p> <p align="center">CONTINUED NEXT PAGE</p>		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 20 and 21
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At each location the safety monitor was equipped with a copy of the OR & P and the communications equipment listed in Checklist item 1. Each safety monitor conducted a radio check with OCC prior to beginning the shift. Each safety monitor was familiar with the appropriate SSWP, IOP, and the limits of his observation area. Each safety monitor was conversant with the process in obtaining a clearance to control a section of trackway, and the procedures and responsibilities related to Electrical Safety Clearances.

Lastly, each safety monitor's certification was current.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 22 and 23**

Rail Transit Agency BART	Persons Contacted Rebecca McCord Randy McCluny Mike Flanigon	Date of Audit 9-22-97
Department ENGINEERING & TRANSIT SYSTEM DEVELOPMENT		Auditors Len Hardy John Ensch

Reference Criteria

1. Extensions Construction Safety Program Manual
2. Extensions Program Standard Operating Procedure for Track Use
3. BART Contractor Certification Training Plan

Element/Characteristics and Method of Verification

Contractor Training and Certification

1. Review the current contractor training program lesson plan to determine whether or not appropriate rules, procedures and supplemental directives are included in the training plan.
2. Select a random sample of at least four contractors and review their training and certification records to determine whether or not they meet the requirements of the BART Contractor Certification Training Plan.
3. Select one or more sites where contracted persons are working on or about BART tracks and determine whether or not they are on the roster of qualified contracted persons.

Results/Comments

1. The Instructor's Guide for "Outside Contractor OR & P Training" was reviewed, and found to adequately cover appropriate rules and procedures.
2. A random sample of eight contractor superintendents was selected and their test results were reviewed. The test results demonstrated that (1) the training department's records are being adequately maintained, (2) passing grades were satisfactory – above the minimum requirement of 75%, and (3) the certification status of selected contractor superintendents matched the Training Center's – "Certification Status Report".
3. A roster of certified contractor superintendents was acquired from the training department. On Sept. 30, 1997 three construction sites were visited. At these sites, two supervisors said that they had recently completed training at the BART Training Center and that they were certified. These individuals, however, were not on the Training Center's Certification List.

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CPUC SYSTEM SAFETY AUDIT
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FINDINGS:

At two of three construction sites the contractors' supervisors were not on the Training Center's roster of certified contract superintendents. The subject two supervisors said that they had taken the required 16 hour course at the training center and were certified recently (one said two weeks ago, and the other said last week). An updated list was requested through BART Safety and one was faxed to the CPUC on October 3rd. This list was the same as the list acquired on September 22nd and thus did not contain the names of the subject supervisors.

CORRECTIVE ACTION REQUIRED:

1. The discrepancy between the information regarding certification given in the field to that indicated on the Training Center's certification list needs to be resolved.
2. The requirement for contract supervisor certification in contract documents should be consistent with those in the System Safety Program Plan.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 24 and 25**

Rail Transit Agency BART	Persons Contacted Rebecca McCord Randy McCluny Mike Flanigon	Date of Audit 9-22-97
Department ENGINEERING & TRANSIT SYSTEM DEVELOPMENT		Auditor Len Hardy John Ensich
Reference Criteria 1. Section 404.5 - Hazard Identification (Safety Audit Program), BART SSPP, Rev.4, Dec.2, 1996 2. Section 404.9 - Review and Monitor Engineering Designs, Construction, and Testing, BART SSPP Rev.4, Dec.2, 1996 3. Extension Program Standard Operating Procedure for Track Use 4. Extensions Construction Safety Program Manual 5. Operating Rules and Procedures Manual, Rev.3, March 1, 1980 6. BART Safety Monitor Certification Training Program Plan		
Element/Characteristics and Method of Verification Safety Monitor Training and Certification 1. Select a random sample of at least four Safety Monitors and review training and certification records. 2. Review current training program to verify all required Rules, Procedures and Supplemental Safety Directives are included in the training plan.		
Results/Comments 1. The "BART Safety Monitor Instructor Guide" (November 1996) was reviewed against the requirements of the "BART Monitor Training Program". The guide adequately covered the requirement in the program. 2. A random sample of eight non-BART safety monitors was chosen and the test results of the selected individuals were examined. The test results demonstrated that (1) the training department's records are being adequately maintained, (2) passing grades were satisfactory – above the minimum requirement of 75%, and (3) the certification status of selected safety monitors matched the Training Center's – "Certification Status Report". 3. In addition to the Training Center's portion of the certification there is the Resident Engineer's portion which consists of a report validating 35 hours of Field Evaluation, Assessment and Verification. Review of the Resident Engineer's records indicated that two of the eight individuals randomly selected were unaccounted for (i.e. no record of these individuals found). These individuals may simply have "dropped out" of the program. Engineering, however, recognized the need to better track safety monitor status and location. They suggested coordinating with the Training Center to improve the tracking of safety monitor status and to pursue the idea of keeping records for both portions of the certification at one central location.		

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RECOMMENDATIONS:

1. All certification documentation should be maintained in one, central location. Specifically, the Resident Engineer's portion of the certification (a report addressing each safety monitor's Field Evaluation, Assessment and Verification) should be maintained with the Training Center's portion of the certification.
2. Although the lesson plan contains extensive broad background information on the system, it lacks definition of, and focus on, the safety monitor's direct duties and responsibilities. It is thus recommended that the BART Engineering Department discuss with the BART Training Department the value of adding a section in the lesson plan that summarizes the direct duties and responsibilities of the safety monitor. For example, some elements in the Engineering Department's "Guidelines for Use by BART Safety Monitors" are of such safety importance that inclusion in the lesson plan as well as the Engineering Manual may be warranted.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 26, 27, 29 & 31**

Rail Transit Agency BART	Persons Contacted Ed Snell Ken Cook	Date of Audit 10-1-97
Department OPERATIONS – Training and Development	Steve Chong Johanna Ackerman Michael Smith	Auditors Gary Rosenthal Roger Nguyen
Reference Criteria 1) Section 207 - Employee Certification, BART System Safety Program Plan, Rev. 4, Dec. 2, 1996 2) CPUC Decision 87376 (Seventh Interim Decision)		
Element/Characteristics and Method of Verification Training and Certification of Train Operators, Station Agents, Tower Foreworkers and On-Rail Equipment Operators 1. Select a random sample of each employee classification and review their training, certification and re-certification records to determine whether or not they are in compliance with the Reference Criteria. 2. Review the current training, certification and re-certification programs for each classification to determine whether or not they are complete, current and have been filed with the Commission as required by reference criteria (2).		
Results/Comments Reviewed samples of the training, certification and recertification records for all four employee classifications. From this review it appears that the Train Operators and Station Agents have received the necessary training and been certified and recertified as required by the System Safety Plan. The five person sample of Tower Foreworkers showed that three were OK, and two were approximately ten months past the maximum three year interval between recertifications. A review of the Certification Status Report for On-Rail Vehicle Operators showed that the required recertification (every two years) for 35 out of a total of 62 employees is overdue from between a matter of days to as long as 24 months. The training, certification and recertification programs for all four employee classifications were found to be complete and up to date. However, the most recent revisions have not been filed with the CPUC.		
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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 26, 27, 29 & 31
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CORRECTIVE ACTION REQUIRED:

1. Review the current training and recertification status of all Tower Foreworkers and On-Rail Equipment Operators to identify all employees who are past due recertification. Develop a plan and schedule to get current, and then implement the plan with System Safety Department oversight to make certain it is carried out.
2. Institute the necessary management controls to make certain that when the Operations Training and Development Department identifies a person is due for training and recertification, the affected Department Manager responds by making certain that person actually receives the required training and is recertified on time.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 28**

Rail Transit Agency BART	Persons Contacted Mike Flanigon Jim Stevens Stephan Brigham	Date of Audit 9/23/97
Department OPERATIONS -Transportation		Auditor Roger Nguyen Gary Rosenthal

Reference Criteria

- 1) Section 205 - Train Operations, BART System Safety Program Plan, Rev. 4, Dec. 2, 1996
- 2) Operations Rules & Procedures Manual, Rev. 3, March 1, 1980
- 3) Tower Procedures Manual (no date)

Element/Characteristics and Method of Verification

Train Operator Performance

1. Observe operations of not less than two trains on each of two different lines between not less than four stations aboard each train to determine whether or not each train operator is in compliance with the Rules and Procedures addressed in the Reference Criteria (Consider Extensions a part of the connecting line).
2. Observe train operations for a least one hour in each of two yards to determine whether or not the train operator is in compliance with the Rules and Procedures addressed in the Reference Criteria.
3. Interview not less than ten randomly selected Train Operators from the current roster regarding Rules, Procedures and policies listed in the Reference Criteria.
4. Review Performance Evaluations, Discipline and Accident/Incident Records for each of the Train Operators selected in Item 3.

Results/Comments

Observed six different Train Operators on the R-Line, the A-Line, and the M-Line. Three operators had their cab door window completely covered with double curtains, newspaper, or jackets. Four operators did not have their OR & P and Train Operator Manual with them. When asked if they could recall what was the last "Sign-For" they had received, two said it was the 311 Rule change and the rest could not remember. One operator said that he didn't know because he was on vacation for a week. The most recent "Sign For" at the time was the "Operating Bulletins in Effect" which was issued in August 1997. Also, noticed the Train Operator Sign-For sheets are incomplete. Some bulletins dating back two months have not yet been signed for by all T/O's. Additionally, T/O's are not required to keep a personal file of the active bulletins even though they are addendums to the OR & P and TOM which all employees are required to have in their possession.

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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 28
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Also observed Train Operators performing manual yard movement operations at the Hayward and Richmond yards. The most obvious rule violation was the required Friction Brake Test which was not performed by some of the operators.

Four T/O's, two at each yard were interviewed. The T/O's were asked to give their interpretation of the meaning and application of several specific rules taken from the OR & P and TOM. Generally, all of the T/O's gave consistent and correct interpretations of the rules.

RECOMMENDATION:

The Transportation Department should complete by December 1997 the development and implementation of its program of operational evaluations (Ride Checks) that it is already committed to.

CORRECTIVE ACTION REQUIRED:

A plan and schedule should be developed and implemented to overcome the apparent shortcomings in the "sign-for" program covering Operations Bulletins and Transportation Notices described above. Specifically, a way needs to be found to be certain that each affected employee "signs-for" the bulletin or notice before he goes on duty once the bulletin or notice become effective. Existing rules and procedures, such as OR & P Rule 102 and 103, shall be enforced and adhered to.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 30**

Rail Transit Agency BART	Persons Contacted Mike Flanigon Roy Sipp Jim McHenry	Date of Audit 9/25/97
Department OPERATIONS - Transportation		Auditor Gary Rosenthal Roger Nguyen

Reference Criteria.

- 1) Section 205 - Train Operations, BART System Safety Program Plan, Rev. 4, Dec. 2, 1996
- 2) Operations Rules & Procedures Manual, Rev. 3, March 1, 1980
- 3) Tower Procedures Manual (no date)

Element/Characteristics and Method of Verification

Tower Foreworker Performance

1. Observe Tower Operations not less than one hour at each of two different yards in connection with the Reference Criteria Policy, Rules and Procedures.
2. Interview not less than one randomly selected Tower Foreworker from each of the selected in 1. above BART yards regarding Rules and Procedures listed under the Reference Criteria.
3. Review a randomly selected sample of Tower Operations Reports, Logs, and Files specified by the Reference Criteria Documents and prepared during the six months prior to the Audit from each of the BART yards selected in 1. above to determine whether or not they are being properly prepared and maintained according to criteria..

Results/Comments

Observed tower operations at the Daly City and Concord yards. The Tower Foreworkers are apparently responsible for evaluating each T/O's fitness prior to going on duty as they check out the portable radios. The effectiveness of this evaluation is questionable due to the very brief time it takes and the limited contact that takes place.

Reviewed the Tower Foreworkers' Read File and noticed that it was missing the bulletin for "Operating Bulletins In Effect", which was issued in August, 1997.

The T/O portable radio check out process has been modified. The T/O radio check out is recorded on the Tower Crew sheet rather than the radio card as required by the Tower Foreworkers Manual.

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**CPUC SYSTEM SAFETY AUDIT
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The Tower Foreworker at one yard was not able to locate an O R & P manual.

The results of a review of various logs and other records including the Tower Turnover Log, Supervisor's Daily Read File, Crew Sheets, BART Medical Treatment Facilities List, AMBOTOM Reports, and Ten Channel Tape Storage/Checkout Log were all satisfactory.

The Tower Foreworker Manual has no effective date, revision number, or authorizing signature.

Review of the Yard Control Center Tape Recorder Log showed that at least three times the tape recorder was not operating or was out of recording tape. This was apparently because the tape recorded was not checked daily. In one instance, the recorder went unchecked for 52 hours.

CORRECTIVE ACTION REQUIRED:

The Transportation and Systems Services Department in collaboration with the System Safety Department should conduct a more in depth review/audit of the tower operations at all four yards to determine the full depth and true nature of the discrepancies described above. Corrective action should then be taken to correct the discrepancies described in this checklist and others that may be revealed by BART System Safety and the Transportation and Systems Services Department.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 32**

Rail Transit Agency BART	Persons Contacted Kathy Roth Nick Lujan	Date of Audit 9-29-97
Department OPERATIONS - Engineering & Maintenance		Auditors Gary Rosenthal Roger Nguyen
Reference Criteria 1. Section 204.3 - Facility Management, BART System Safety Program Plan, Rev. 4, Dec. 2, 1996 2. Section 207 - Employee Certification, BART System Safety Program Plan, Rev. 4, Dec. 2, 1996 3. Operation Rules and Procedures Manual, Rev.3, March 1, 1980		
Element/Characteristics and Method of Verification On-Rail Equipment Operator Performance 1. Observe On-Rail Equipment Operators for at least one hour at two locations on the system to determine whether or not they are in compliance with the Reference Criteria, policy, rules and procedures. 2. Interview not less than one certified On-Rail Equipment Operator at each location regarding rules and procedures in the Reference Criteria to determine whether or not they are knowledgeable about them. 3. Check the On-Rail Equipment Operators at each location to determine whether or not they are listed on the current roster as required by the Reference Criteria.		
Results/Comments <p>Reviewed on rail equipment operation rules and procedures with a Track and Structures supervisor. Also met with a Track Inspection Crew to discuss on-rail equipment operations rules and procedures, and to observe a hi-rail "set-on" operation.</p> <p>The track and Structures supervisor and the track inspection crew demonstrated that they both were very familiar with the applicable rules, and they were consistent in their interpretation of the meaning and application of those rules.</p> <p>Observation of the on-rail equipment operation revealed compliance with the required rules and procedures, including Simple Approval, Blanket Work Area, Work Orders, required equipment and manuals, and "set-on" procedures.</p> <p>The track inspection crew was confirmed to be certified for on rail equipment operation by review of their records at the Hayward Training Center.</p> <p>Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.</p>		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 33**

Rail Transit Agency BART	Persons Contacted Ed Snell Eric Vogel	Date of Audit 9-22-97
Department OPERATIONS - Rolling Stock and Shops		Auditors Roger Nguyen Gary Rosenthal
Reference Criteria 1. Section 207 - Employee Certification, BART System Safety Program Plan, Rev.4, Dec.2, 1996 2. CPUC Decision 87376 (Seventh Interim Opinion) 3. Operations Rules & Procedures Manual, Rev.3, March 1, 1980		
Element/Characteristics and Method of Verification Employee Training for Local Control Train Operation 1. Select a random sample of at least five shop employees from a roster of those qualified to operate trains in Local Control and review records for initial and subsequent training, certification and re-certification. 2. Review current training, certification and re-certification programs for Shop employees who operate trains in Local Control.		
Results/Comments Reviewed training materials and certification/recertification records for the local control move crews at the Hayward and Concord shops. Also interviewed the Employee Development Specialist responsible for training and certification at each shop. All except one of the employees shown on the rosters of local control operators at the two shops are up to date with the requirements for certification/recertification. Although the training material at each shop appeared to be comprehensive, it was not the same at each shop. <u>RECOMMENDATIONS:</u> 1. Make certain that the local control move crews at all four shops are certified/recertified as required. 2. The Rolling Stock and Shops local control move crew training programs at all four shops should be standardized and coordinated with the Hayward training center to ensure compatibility with similar operations training given to other BART departments.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 34**

Rail Transit Agency BART	Persons Contacted Ed Snell Erich Vogel	Date of Audit 9-22-97
Department OPERATIONS - Rolling Stock & Shops	Fred Stephens Ray Crist	Auditor Gary Rosenthal Roger Nguyen
Reference Criteria 1. Section 204.6 - Car Repair and Storage Facilities, BART System Safety Program Plan, Rev.4, Dec.2, 1996 2. Operations Rules and Procedures Manual, Rev.3, March 1980		
Element/Characteristics and Method of Verification Shop / Local Control Operation Performance 1. Observe Local Control operations for at least one hour at each of two randomly selected shop facilities to determine if they are in compliance with the Reference Criteria, policy, rules and procedures. 2. Interview not less than one randomly selected Local Control Foreperson regarding Rules and Procedures listed under the Reference Criteria at each shop facility selected for 1 above determine if they are in compliance with the Reference Criteria. 3. Review a randomly selected sample of reports, logs, and files prepared during the six months prior to the audit at each shop facility selected for 1 above to determine if they are being properly prepared and maintained as required by the Reference Criteria.		
Results/Comments Observed move crews perform local control operations at the Hayward and Concord yards. All of the observed operations were performed satisfactorily except as noted below: 1. Personnel at the Hayward shop did not have a copy of the OR & P immediately available as required by Rule 103. 2. At the Concord shop two different movements in the local control area were made without first performing the required friction brake test. 3. Move crews at both Concord and Hayward were observed working in the yard local control area without wearing safety vests.		

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Also interviewed two shop/local control foreworkers (one each at Hayward and Concord) concerning their understanding and interpretation of rules 100, 107 and 136 from the OR & P. Although the two foreworkers had some what different interpretation of rules 100 and 107, both replies were reasonable and reflected safe courses of action. Their replies concerning rule 136 were remarkably similar.

Finally, from a review of the various documents on file at the two shops it was determined that the copy of Book No. 16, Shop or Local Control Car Movement Procedures at Concord was out of date. Also the "read and sign" file at Concord did not contain all of the active Operating Bulletins, and the last time any of the bulletins were signed for was over one year ago.

CORRECTIVE ACTION REQUIRED:

The System Safety Department should perform a more in depth review and analysis of shop/local control operations to determine the full extent and true nature of the discrepancies identified above. Corrective action should then be taken as determined to be needed based upon the results of the in depth review and analysis.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 35**

Rail Transit Agency BART	Persons Contacted Kathy Roth Paul Oversier	Date of Audit 10-2-97
Department OPERATIONS - Transportation	Rudy Crespo Henry Miranda Martha Taylor Jim McHenry	Auditors Gary Rosenthal Roger Nguyen
Reference Criteria <ol style="list-style-type: none"> 1. Section 302, District Safety Organization, BART System Safety Program Plan, Rev.4, Dec.2, 1996 2. Section 303, Change Control Safety Management, BART SSPP, Rev.4, Dec.2, 1996 3. BART Management Procedure No.34, Operations Manual and Bulletins, Rev.2, March 11, 1985 4. Commission Decision 95-12-034 		
Element/Characteristics and Method of Verification <p>Transportation Safety Management</p> <p>Within the Operations Organization, interview the Chief Transportation Officer and a randomly selected sample of Assistant Chief Transportation Officers, Transportation Supervisors and Tower Supervisors to determine whether or not they know and understand BART's safety:</p> <ol style="list-style-type: none"> 1. Policies and procedures regarding operations and their roles according to the Reference Criteria. 2. Their specific responsibilities regarding Operations Rules, Procedures and Manuals, Operating Bulletins, Operating Equipment and Systems Modifications, and Training as required by the Reference Criteria. 		
Results/Comments <p>Interviewed the Chief Transportation Officer and several members of the Operation Support and Review staff. The results of this interview showed that management and staff at this level have an excellent understanding of the safety related policies and procedures governing train operations, and of their duties and responsibilities relative to carrying out those policies and procedures.</p> <p>Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.</p>		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 36**

Rail Transit Agency BART	Persons Contacted Mike Flanigon Rockne Green	Date of Audit 9-24-97
Department OPERATIONS CONTROL CENTER	Betty Soo Hoo Margaret Pierce Kim Lowe	Auditors Gary Rosenthal Roger Nguyen

Reference Criteria

SECTION 207, EMPLOYEE CERTIFICATION, OF BART'S SYSTEM SAFETY PROGRAM PLAN, REV. 4, DEC. 2, 1996

Element/Characteristics and Method of Verification

TRAINING AND CERTIFICATION OF TRAIN CONTROLLERS AND POWER/SUPPORT CONTROLLERS

Obtain a current roster of all train controllers and power/support controllers. Select a random sample of at least five persons from each category. Review each selected person's training and certification file to verify that it is complete and up to date (recertification required every 2 years). Confirm that the training and testing required for certification and recertification includes such topics as BART operating rules, policies and procedures; emergency procedures; emergency preparedness and notification (including the minimum information to be provided to emergency dispatchers); BART signal and control systems; and the physical characteristics of the BART System, including the recent system extensions for which each controller is responsible.

Results/Comments

Five Train Controllers from a roster of twenty and three power/support controllers from a roster of eight were randomly selected and their training records reviewed. All five train controllers and all three power/support controllers were recertified within the previous two years.

A review of the training programs for certification and recertification showed that all of the topics listed above under Element/Characteristics and Method of Verification are included in the respective lesson plans for train controllers and power/support controllers.

In reviewing the training plans, it was noted that OCC managers and supervisors may be required to perform as train controllers or power/support controllers in unusual or emergency circumstances. As such, they should maintain a current certification status as train controllers and/or power/support controllers. OCC personnel are in the process of developing a training and recertification program for supervisors and managers that is scheduled to completed within the next six months.

RECOMMENDATION:

The training and certification program that is being developed for supervisors and managers should be expedited and put in place as soon as possible.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 37**

Rail Transit Agency BART	Persons Contacted Mike Flanigon Rockne Green Betty Soo Hoo	Date of Audit 9-26-97
Department OPERATIONS CONTROL CENTER		Auditors Roger Nguyen Gary Rosenthal

Reference Criteria

1. SECTION 205, TRAIN OPERATIONS, OF BART'S SYSTEM SAFETY PROGRAM PLAN, REV. 4, DEC. 2, 1996.
2. OPERATIONS CONTROL CENTER, RULES AND PROCEDURES MANUAL, REV. 5, DATED JULY 31, 1996
3. OPERATIONS RULES AND PROCEDURES MANUAL, REV. 3, MARCH 1, 1980
4. COMMISSION DECISIONS 84582 AND 86393
5. COMMISSION RESOLUTION RTS-9

Element/Characteristics and Method of Verification

OPERATIONS CONTROL CENTER (OCC) ACTIVITIES

By a combination of first hand observations for a minimum of 4-hours, one on one interviews with randomly selected OCC employees, and a review of a random sample of the forms, cards, recorded voice tapes, computer files and other documentation prepared during the past six months, audit the safety related duties and responsibilities of BART personnel assigned to the operations control center to determine whether or not they are being properly performed. A list of specific items to be included in the audit follows:

1. The OCC Rules and Procedures Manual is republished in January and July of each year (OCC-RPM-102)
2. No unauthorized reading material is permitted at OCC work stations (OCC-RPM-110)
3. Unusual Occurrence Reports (Form No. 0348), Operations Incident Reports (NF #) and Supervisors Reports of Injury/Illness are prepared and processed correctly; including review and investigation by the System Safety Department and a description of the action taken by the OCC. Complete reports and documentation are faxed to the System Safety Department within 24 hours of the incident (OCC-RPM-204)
4. Six hour reports for all collisions, derailments, switch run throughs, and gate and run order violations prepared and submitted to the Assistant Chief Transportation Officer, OCC. (OCC-RPM-205)
5. Hours of service restrictions for train controllers and power/support controllers established and adhered to during the past six month period.

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6. The "sign for" clipboard and each OCC employee's assigned Directives and Bulletin binder is complete and up to date. (OCC-RPM-209)
7. All phone and radio communications are recorded, and all voice tape recordings and computer tapes are controlled as per BART Management procedure # 19 (OCC-RPM-210)
8. A minimum of two certified train controllers and one certified train controller supervisor shall be on duty at all times between 0600 and 2000 hours (Decision 86393)
9. Emergency plan checklists are present at the OCC Manager, train controller, power/support controller and communication specialist work stations. (OCC-RPM-284)
10. An up to date Management Notification List for reporting accidents/incidents is available on the OCC Manager's clipboard at the OCC desk. (OCC-RPM-285 and Management Procedure 15)
11. Passenger carrying trains are prohibited from operating in underground areas when communications or ventilation equipment is non operative. (OCC-RPM-291)
12. Clearance cards, blanket work area logs, outstanding facility/ equipment status cards, control cards, simple approval logs, prohibit logs and personnel logs all prepared and filed as required by OCC procedures and instructions (OCC-RPM-301)
13. Non BART personnel access to restricted facilities controlled in accordance with OCC procedures (OCC-RPM-305)
14. Tagging and clearance cards correctly used to protect work areas from automatic train operations (OCC-RPM-306)
15. Once each month the transbay tube fans and dampers and the Berkeley Hills tunnel fans (both modes) checked by the graveyard shift controller (OCC-RPM-307)
16. Controls and restrictions placed on power/support trainee's duties strictly enforced. (OCC-RPM-309)
17. Controls and restrictions placed on train controller trainee's duties strictly enforced (OCC-RPM-401)
18. Emergency communications telephone numbers are verified weekly and completed checklists are on file at the console (OCC-RPM-364)

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19. Maintenance Vehicle set on and set off verification checklists are available at the train controller work stations. Completed checklists are signed off by both the train controller and OCC manager and attached to and filed with the corresponding work order card (OCC-RPM-423)

20. Train control procedures for track inspections, debris on trackway, loss of third rail power, on rail maintenance vehicle operations, train reversals and tumbucks, road manual orders, unscheduled and wrong side door openings, zero speed codes and manual movements, special rules for underground operations, mainline storage of cars with inoperative motor alternators or inverters, hold instructions, SORS operation, route prohibit checks, route diversions, and manual movements through mainline interlockings, are all correctly followed. (OCC-RPM-421 to 452)

21. Weekly voice tape reviews are performed correctly and documented in the voice tape review log at the OCC manager's work station (OCC-RPM-437)

22. Simple approvals issued by train controllers are recorded in the simple approval log at the power/support controller's work station (OCC-RPM-451)

Results/Comments

Reviewed random samples of Unusual Occurrence Reports, Operations Incident Reports, Supervisors', Reports, Six Hour Reports, Clearance Cards, Hours of Service records, "Sign-For" Clipboards and Binders as well as the Management Notification List. Also reviewed Emergency Plan Checklists, Tagging Cards, Emergency Communications Telephone numbers (weekly updates) and Maintenance Vehicle Set-On/ Set-Off checklists. The documents reviewed were properly prepared.

The meaning and application of the rules and procedures relating to these documents were discussed with OCC Management, Train Controllers and Power/Support Controllers. There was a consistent understanding and interpretation of the rules and procedures among those working in the OCC.

The one discrepancy noted concerned the requirement for monthly testing of fans and dampers in the Transbay Tube and Berkeley Hills Tunnel. The OCC records for these tests showed that the Transbay Tube was not tested during February, July and August of 1997. The Berkeley Hills Tunnel was apparently tested in September, 1997 but not during the other previous eight months of 1997.

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CORRECTIVE ACTION REQUIRED:

BART needs to clarify who is responsible for testing fans and dampers in the TBT and BHT. In addition, frequency, specific procedures and coordination between departments, if any, must be clearly established. BART System Safety Department should audit this item to ensure testing is performed as required. From the records reviewed, the OCC is not in compliance with OCC-RPM-307.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 38**

Rail Transit Agency BART	Persons Contacted Kathy Roth Barbara George	Date of Audit 9-24-97
Department HUMAN RESOURCES DEPT. EMPLOYEE SERVICES DIV.		Auditors Gary Rosenthal Roger Nguyen
Reference Criteria 1. 49 CFR Parts 653 and 654 2. American Public Transit Association (APTA) System Safety Guidelines, Item No. 21 3. BART System Safety Program Plan, Paragraph 303.7 4. BART Substance Abuse Program, Policies and Procedures Manual, Effective 1/1/95		
Element/Characteristics and Method of Verification <u>DRUG AND ALCOHOL TESTING PROGRAM</u> Ask BART to review their records for BART's pre duty, reasonable cause, post accident, random, return to work, and follow up drug and alcohol testing of safety sensitive employees conducted during the past three (3) years. From this review ask BART to identify those individuals, if any, who either tested positive (i.e. failed one or more of the tests) or refused to take a test. Perform a further review of the employment records of the above identified individuals to confirm that they were subsequently prohibited from performing safety sensitive duties unless and until they successfully completed the required rehabilitation program, passed the required return to work testing and signed a return to work agreement. Finally, perform a further review of the records of any identified individuals who were returned to work in safety sensitive positions to confirm that they have been subjected to and successfully passed the required follow up drug and alcohol testing as specified in the reference criteria.		
Results/Comments All BART drug and alcohol testing program records, including all positive tests, were available for review. The program appears to be well managed by conscientious people. The records were thorough, well organized, and cross referenced. Reviewed the files for safety sensitive employees who tested positive. No employees tested positive for post accident, reasonable cause, or return to duty testing. In one random test, an employee tested positive, attended a counseling program, and passed the return to duty test, but was only given an eight months follow up test rather than the required twelve months follow up test. The Substance Abuse Manual has recently been revised, but does not contain a revision number and date. <u>RECOMMENDATIONS:</u> The Substance Abuse Manual should be given a revision number and effective date. The Employee Services Division should strengthen its procedures to assure the FTA requirements for drug and alcohol follow up testing are strictly enforced.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 39**

Rail Transit Agency BART	Persons Contacted Jess Perez Carlina Leong	Date of Audit 9-22-97
Department FACILITIES MAINTENANCE		Auditors Joey Bigomia Kartik Shah

Reference Criteria

PLANT FACILITIES MAINTENANCE PROCEDURES MANUAL, SECTION (4) PLANT CONTROL AND SECTION (8) TREE INSPECTION

Element/Characteristics and Method of Verification

PLANT CONTROL AND TREE INSPECTION

Randomly select one of the system mainline A, M, C, or R and visually inspect the right of way by end of train observation to determine whether or not weeds, grass and trees are being properly controlled as required by the above referenced criteria.

Results/Comments

Performed a round trip inspection of the A-Line (Lake Merritt Station to Fremont Station) and visually observed the right-of-way by the end of train inspection to determine if vegetation growth and trees are being properly controlled. Staff noted that the right-of-way on the Northbound tracks just south of the Hayward Station, had some vegetation and palm tree overgrowth with the possibility of striking the train. BART representatives stated that this area was currently in the process of being cleared. It was also stated that the work crew would start at the right-of-way just north of the Hayward Station Platform, and would continue towards the Fremont Station. Staff confirmed that the work crew was currently clearing the area by observing that the vegetation and tree growth just north of the Hayward Station had been trimmed.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 40**

Rail Transit Agency BART	Persons Contacted Jess Perez Joe Torrisi Al Welchert	Date of Audit 10-2-97
Department FACILITIES MAINTENANCE		Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

**PLANT FACILITIES MAINTENANCE PROCEDURES MANUAL,
WORK ACTIVITY GUIDE NO. 17 – DISTRICT FENCE INSPECTION and
6.01 – MONTHLY FENCE REPORT**

Element/Characteristics and Method of Verification

MONTHLY FENCE INSPECTION

Review BART's file of completed fence inspection reports prepared during the past nine months to determine whether or not:

- 1) all mainline fencing was visually inspected at least once each month by end of train or drive by observation
- 2) the required inspections were properly documented
- 3) noted defects were corrected in a timely manner

Results/Comments

Reviewed the fence repair log from January 1, 1997 to September 1997. The records indicate that the required inspections were performed as required. No defects were noted. The BART representatives stated that the completed reports are sent to the System Safety Department for forwarding to the CPUC.

No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 41**

Rail Transit Agency BART	Persons Contacted Randy Clark Al Richey Al Welchert Kathy Roth	Date of Audit 9-24-97 and 9-30-97
Department POWER & MECHANICAL MAINTENANCE		Auditors Joey Bigornia Kartik Shah
Reference Criteria POWER & WAY ELECTRICAL MAINTENANCE PROCEDURES, BOOK 31, CHAPTER 1, SECTION 17, DATED 11-18-82		
Element/Characteristics and Method of Verification <u>THIRD RAIL COVERBOARD MAINTENANCE</u> Randomly select three separate sections of third rail and review the corresponding maintenance inspection records to determine whether or not: 1) the required monthly and annual inspections were performed during the past twelve months as required by the referenced procedure 2) the inspections were properly documented 3) noted discrepancies were corrected in a timely manner		
Results/Comments Reviewed the file of the third rail coverboard PM's for the A-Line and R-Line. The inspection records for 1997 were incomplete. The BART representatives stated that they depend upon the train operator's trouble tickets to inform them of coverboard defects which when reported they then repair. It was also stated that due to manpower limitations, power and mechanical maintenance does not perform the monthly and annual inspections on a regular basis as specified in the PM procedure. <u>RECOMMENDATION:</u> Schedule and perform required inspection at the specified frequency, or direct engineering to review the third rail coverboard maintenance program and depending upon the results of the review revise the PM procedures accordingly.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 42**

Rail Transit Agency BART	Persons Contacted Al Richey Al Welchert Kathy Roth Randy Clark	Date of Audit 9-24-97 and 9-30-97
Department POWER & MECHANICAL MAINTENANCE		Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

NOT AVAILABLE WHEN THIS CHECKLIST WAS PREPARED

Element/Characteristics and Method of Verification

UNDERCAR EMERGENCY SPRINKLER SYSTEM

Randomly select two underground stations. Through a combination of procedure and record reviews determine whether or not:

- 1) appropriate procedure for inspection, testing and maintenance of the undercar emergency sprinkler systems have been established
- 2) the procedures have been properly implemented and substantiating documentation is on file
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

Discussed the undercar emergency sprinkler system item with the BART representatives. From this discussion it was determined that a specific BART maintenance procedure for periodic inspection and testing of the undercar emergency sprinkler system has not been established to date. However, the BART representatives indicated during the discussion that based upon their experience with having to periodically repair damage to the undercar sprinkler system caused by non revenue vehicles, a preventive maintenance program probably should be established.

RECOMMENDATION:

It is recommended that the question of what preventive maintenance, inspection and testing requirements, if any, should be established for the undercar sprinkling systems be referred to Engineering for resolution.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 43**

Rail Transit Agency BART	Persons Contacted Al Welchert Randy Clark	Date of Audit 9-24-97 and 9-30-97
Department POWER & MECHANICAL MAINTENANCE	Al Richey Kathy Roth	Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

SERVICE TEST PROCEDURE FOR HORIZONTAL CLASS I STANDPIPES IN THE WALNUT CREEK, BERKELEY HILLS AND TRANSBAY TUNNELS – S 4395, DATED 4-30-87

Element/Characteristics and Method of Verification

STANDPIPES AND ASSOCIATED PUMPS

Review BART's maintenance records for the standpipes and associated pumps in the Walnut Creek, Berkeley Hills and Transbay Tube tunnels to determine whether or not:

- 1) the standpipes and pumps were tested at least once in the past five years in accordance with the referenced criteria
- 2) the required tests were properly documented
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

Reviewed test data for standpipes and associated pumps in the Walnut Creek, Berkeley Hills and Transbay Tube Tunnels with the following results:

1. Walnut Creek – There is no test data available to show that the Walnut Creek tunnel has been tested at any time since the wet standpipes were installed in 1984.
2. Berkeley Hills – The Berkeley Hills tunnel wet standpipes were placed in service on 9-28-93. Testing is not required until 9-28-98, five years after commissioning.
3. Transbay Tube – The test data shows that the Transbay Tube standpipes and associated pumps were properly tested on 2-6-96.

CORRECTIVE ACTION REQUIRED:

BART's Service Test Procedure for Horizontal Class 1 Standpipes and associated pumps in the Walnut Creek, Berkeley Hills and Transbay Tube Tunnels requires inspection and testing of the standpipes and associated pumps every five years per the California Administrative Code, Title 19.

- 1) Schedule and perform the required testing of the Walnut Creek Tunnel wet standpipes as soon as possible.
- 2) Establish a positive scheduling program similar to MARIS that will alert management when the time has come to perform the required testing.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 44**

Rail Transit Agency BART	Persons Contacted Randy Clark Al Richey	Date of Audit 9-24-97 and 9-30-97
Department POWER & MECHANICAL MAINTENANCE	Al Welchert Kathy Roth	Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

PERIODIC MAINTENANCE REQUIREMENTS FOR FIRE ALARM AND FIRE SPRINKLER SYSTEMS (PASSENGER STATIONS), DATED 6-2-72

Element/Characteristics and Method of Verification

STATION FIRE ALARMS AND SPRINKLER SYSTEMS

Randomly select one aerial, one at grade, and one subway station. Review the fire alarm and fire sprinkler system inspection, testing and maintenance records for the past two years for the three selected stations to determine whether or not:

- 1) the required four week, 26 week and 52 week inspections, tests and maintenance activities were performed as required by the referenced criteria
- 2) the required documentation was properly prepared
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

Reviewed Power and Mechanical Maintenance Departments inspection, testing and maintenance records for the R50 (El Cerrito Del Norte), R60 (Richmond) and M-50 (16th Street) Stations. Results of this review showed all records were satisfactory except that the annual meggering tests of fire alarm initiating loop conductors has not been performed during the last two years.

RECOMMENDATION:

The BART representatives stated that based upon many years of experience, they have determined that the specified meggering test is not necessary, and may in fact damage the wiring. It is recommended that engineering review the meggering requirements to determine if they should be changed, eliminated or maintained as they are. Power and Mechanical Maintenance should then take action as directed by engineering to bring the actual practices being followed in the field in conformance with the written instructions.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 45**

Rail Transit Agency BART	Persons Contacted Al Richey Randy Clerk	Date of Audit 9-24-97 and 9-30-97
Department POWER & MECHANICAL MAINTENANCE	Al Welchert Kathy Roth	Auditors Kartik Shah Joey Bigomia Don Johnson
Reference Criteria POWER & WAY ELECTRICAL MAINTENANCE PROCEDURES BOOK 31, CHAPTER 2, SECTIONS 1 and 2, DATED 11-18-82		
Element/Characteristics and Method of Verification <u>EMERGENCY VENTILLATION FANS</u> Review BART's file of Preventive Maintenance Cards (Form 0430) for three randomly selected ventilation fans and associated dampers for the past three years to determine whether or not: 1) each fan was inspected on a monthly and yearly basis as required by the reference criteria 2 the required inspections were properly documented 3) noted discrepancies were corrected in a timely manner		
Results/Comments Reviewed BART's monthly and yearly preventive maintenance cards for three emergency ventilation fans (MV51, RV12 and RV23) and associated dampers for the past three years. The required inspections were performed at the specified frequency and noted defects were properly taken care of. No recommendation is listed and no corrective action is required.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 46**

Rail Transit Agency BART	Persons Contacted Michael O. Brown Richard J. Leonard	Date of Audit 9-23-97 and 9-30-97
Department TRACK & STRUCTURES	Al Welchert Kathy Roth	Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

BART'S MANAGEMENT PROCEDURE NO. 34 – OPERATIONS MANUALS AND BULLETINS AND BART'S TRACK STANDARDS MANUAL, DATED 6-1-95

Element/Characteristics and Method of Verification

UPDATING OF TRACK STANDARDS MANUAL TO COVER THE EXTENSIONS TO PITTSBURG, PLEASANTON AND COLMA

Review the appropriate track maintenance bulletins or other documents prepared by BART to, determine whether or not the Track and Structures Department has updated information in Appendices F through K of the Track Standards manual to cover the new extensions.

Results/Comments

This item was discussed with the BART representatives. They stated that they have not yet received all of the necessary "as-built" information to update appendices F through K, but the Track Standards Manual will be revised as soon as this information is made available. In the interim period the Track and Structures Department has all of the essential information they need to make certain that the track for the new extensions is subjected to exactly the same preventive maintenance program as the track for the existing system.

Elements reviewed during the audit were found to be in compliance. No recommendations is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 47**

Rail Transit Agency BART	Persons Contacted Michael O. Brown Richard Leonard Al Welchert	Date of Audit 9-23-97
Department TRACK & STRUCTURES		Auditors Kartik Shah Joey Bigornia
Reference Criteria SECTION 1.4 – DESIGNATION OF QUALIFIED PERSONS TO RENEW AND INSPECT TRACK, BART'S TRACK STANDARDS MANUAL, DATED 6-1-95		
Element/Characteristics and Method of Verification <u>TRACK INSPECTOR QUALIFICATIONS</u> Obtain a copy of BART's list of persons qualified to renew and inspect track. Randomly select not more than 10% but not less than four individual names, and then review the qualification records for those selected to determine whether or not they meet the requirements of the above referenced criteria. Also, use the list of qualified persons when performing the inspection record reviews.		
Results/Comments Reviewed the Track and Structures Department Designation of Qualified Persons file. Results of this review showed that there are eight people qualified to renew and inspect track (track foreworkers). All eight persons are qualified as required by Section 1.4 of BART's Track Standards Manual. Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 48**

Rail Transit Agency BART	Persons Contacted Michael O. Brown Richard J. Leonard	Date of Audit 9-23-97 and 9-30-97
Department TRACK & STRUCTURES	Al Welchert Kathy Roth	Auditors Joey Bigornia Kartik Shah Don Johnson
Reference Criteria APPENDIX D – REQUIRED MEASUREMENT EQUIPMENT, BART’S TRACK STANDARDS MANUAL, DATED 6-1-95		
Element/Characteristics and Method of Verification <u>CALIBRATION OF MEASURING & TEST EQUIPMENT</u> Randomly select two each of BART’s track gauges, railwear calipers, rail temperature thermometers and switch point gauges. From a combination of procedure and records reviews as well as visual inspection, determine whether or not the selected items are properly controlled, calibrated against certified standards at prescribed intervals, and marked, tagged or otherwise identified to show their calibration status.		
Results/Comments From discussions with the Track and Structures Department representatives it was learned that a formal calibration program for measuring and test equipment used for preventive maintenance does not exist. The nature of the tools and equipment used and the tolerances allowed make such a program unnecessary. Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 49**

Rail Transit Agency BART	Persons Contacted Ed Snell Nick Lujan	Date of Audit 9-25-97
Department TRACK & STRUCTURES		Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

SECTION 7.0 – INSPECTION, OF BART’S TRACK STANDARDS MANUAL, DATED 6-1-95

Element/Characteristics and Method of Verification

WEEKLY TRACK INSPECTION

Review BART’s file of completed track inspection reports (T001) for three randomly selected separate one month periods during 1995, 1996 and 1997 to determine whether or not:

- 1) all mainline track (including turnouts) was visually inspected at least once each week by hi-rail vehicle
- 2) the required inspections were properly documented
- 3) noted defects were corrected in a timely manner

Results/Comments

BART completely revised their track inspection and record keeping system in 1996. Because of this change the selected samples were limited to 1996 and 1997. The selected samples were the A Line from Milepost 11.10 to 23.70 and the M Line from Milepost 0.24 to 15.30. The weekly inspection records for the months of July 1996 and August 1997 were reviewed for the two track samples. With one minor exception, all the required records were on file. The required inspections were performed at the required frequency, they were properly documented, and the noted defects, if any, were corrected immediately.

The one exception was for a short section (less than ¼ mile) of one track that was not documented for one weekly inspection. However, because of the way the inspections are scheduled and the rail vehicle set on points, it would have been impossible to have covered the track that was documented as being inspected without also covering the undocumented portion. It is apparent this was a paperwork error and not an inspection error.

No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 50**

Rail Transit Agency BART	Persons Contacted Ed Snell Nick Lujan	Date of Audit 9-25-97
Department TRACK & STRUCTURES		Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

SECTION 7.0 – INSPECTION, OF BART’S TRACK STANDARDS MANUAL, DATED 6-1-95

Element/Characteristics and Method of Verification

MONTHLY TURNOUT INSPECTIONS

Review BART’s file of completed turnout inspection reports (T002) for randomly selected separate three month periods during each of the years 1996 and 1997 to determine whether or not:

- 1) every mainline and yard turnout was visually inspected on foot at least once each month
- 2) the required inspections were properly documented
- 3) noted defects were corrected in a timely manner

Results/Comments

Reviewed the monthly turnout inspection records for the A25 interlocking, switches 123, 127, 223 and 227 and the R45 interlocking, switches 123, 127, 223 and 227 for all 1996 and to date for 1997. The records were complete and showed that each switch had been inspected on foot at least once each month. Noted defects were corrected in a timely manner.

No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 51**

Rail Transit Agency BART	Persons Contacted Ed Snell Nick Lujan	Date of Audit 9-25-97
Department TRACK & STRUCTURES		Auditors Joey Bigornia Kartik Shah Don Johnson
Reference Criteria SECTION 7.0 – INSPECTION, OF BART’S TRACK STANDARDS MANUAL, DATED 6-1-95		
Element/Characteristics and Method of Verification <u>QUARTERLY TURNOUT MEASUREMENTS</u> Review BART’s file of completed turnout measurement reports (T101 through T141) for the years 1996 and 1997 to determine whether or not: 1) every mainline turnout and crossing diamond was dimensionally inspected at least once each quarter 2) the required measurements were properly documented 3) noted defects were corrected in a timely manner		
Results/Comments Reviewed the quarterly turnout measurement reports for the A25 interlocking, switches No. 123, 127, 223 and 227 for the year 1996. The records were complete and show that each switch was inspected and dimensionally checked at the required frequency. Noted defects were corrected in a timely manner. No recommendation is listed and no corrective action is required.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 52**

Rail Transit Agency BART	Persons Contacted Ed Snell Nick Lujan	Date of Audit 9-25-97
Department TRACK & STRUCTURES	Al Welchert Ray Cole	Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

SECTION 7.10 – SPECIAL INSPECTIONS AND SECTION 7.11 DERAILMENTS AND RUN-THROUGH SWITCHES, BART’S TRACK STANDARDS MANUAL, DATED 6-1-95

Element/Characteristics and Method of Verification

SPECIAL INSPECTION REQUIREMENTS FOLLOWING DERAILMENTS AND SWITCH RUN THROUGH

Compare BART’s file of special inspection records with BART’s accident and unusual occurrence reports for the years 1996 and 1997 to determine whether or not all of the conditional requirements in Section 7.11, including sign off by a track supervisor and BART Safety before repairs were made and the track was returned to service, were complied with following each reported incident of a derailment or switch run through.

Results/Comments

Randomly selected three switches that were reported on UOR’s as split switches during 1997. They were:

UOR	DATE	SWITCH	LOCATION
97-2.002	1-11-97	# 579	OCY
97-2.007	4-1-97	# 97	OCY
97-2.009	4-13-97	# 53	ORY

The track maintenance department had no records to indicate that the selected switches had received the special inspection required by Section 7.11 of BART’s Track Safety Standards before repairs were made and before the track was placed back in service. It is not apparent that the required special inspections were made by a Track and Structures Dept. inspector and that a Track and Structures Dept. Supervisor authorized repairs and return of the switch to service. UOR 97-2.007 shows that the BART Safety Department did authorize jacking over the switch point and returning switch # 97 to service. A similar record for the other two switches could not be found.

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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 52
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CORRECTIVE ACTION REQUIRED:

1. Perform a further investigation of a larger sample to determine the full scope and cause of the problem, including whether it is a lack of proper preparation and filing of documentation or a failure to actually perform the required special inspections.
2. Take appropriate corrective action as determined by the results from step 1 above.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 53**

Rail Transit Agency BART	Persons Contacted Al Welchert Louis Espinoza Mike Brown	Date of Audit 9-26-97
Department TRACK & STRUCTURES		Auditors Joey Bigornia Len Hardy Joe Farley
Reference Criteria SECTION 6.0 – TURNOUTS AND TRACK CROSSING DIAMONDS OF BART’S TRACK STANDARDS MANUAL		
Element/Characteristics and Method of Verification <u>TURNOUT INSPECTION</u> Randomly select three mainline turnouts and utilizing the services of a FRA certified track inspector from the Commission’s Railroad Operations Safety Section, perform a detailed visual inspection and dimensional measurement inspection to determine whether or not the selected items are in compliance with BART’s track maintenance standards.		
Results/Comments Mr. Joe Farley , FRA certified track inspector from the Commission’s Railroad Operations Safety Section performed the required inspection on A05 interlocking, switches no. 153, 189 and 251. All three switches were in complete conformance with BART’s track maintenance standards. No recommendation is listed and no corrective action is required.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 54**

Rail Transit Agency BART	Persons Contacted Michael O. Brown Richard J. Leonard	Date of Audit 9-23-97 and 9-30-97
Department TRACK & STRUCTURES	Al Welchert Kathy Roth	Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

SECTION 7.0 – INSPECTION, OF BART’S TRACK STANDARDS MANUAL, DATED 6-1-95

Element/Characteristics and Method of Verification

GEOMETRY CAR INSPECTIONS

Review BART’s file of completed geometry car inspection reports (T001) for the years 1996 and 1997 to determine whether or not:

- 1) all mainline track (including turnouts) was automatically inspected by geometry car at least once each quarter
- 2) the results were properly documented
- 3) noted defects were corrected in a timely manner

Results/Comments

Reviewed BART’s geometry car inspection reports for the 4th quarter of 1996 and the first three quarters of 1997. All of the inspections were completed on time at the required frequency and the results were documented on geometry car test run print outs, but not the specified T001 report forms.

RECOMMENDATION:

It is recommended that in the future the T001 report forms be used to make certain that 100% coverage of all track is obtained.

CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 55

Rail Transit Agency BART	Persons Contacted Rebecca McCord Martha Halliwell	Date of Audit 9-29-97
Department SYSTEMS MAINTENANCE	Des Patten Ken Cook Mike Flanigon	Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

BART'S SYSTEM SAFETY PROGRAM PLAN SECTION 207 – EMPLOYEE CERTIFICATION

Element/Characteristics and Method of Verification

TRAINING AND RECERTIFICATION OF TRAIN CONTROL TECHNICIANS

Obtain a current roster of all train control technicians. Select a 10% minimum random sample, but not less than five persons. Review each selected persons training and certification file to determine if it is complete and up to date (recertification required every two years). Confirm that the training and testing required for recertification includes the equipment changes introduced with the beginning of operations on the PAX, DPX and CSX extensions.

Results/Comments

Reviewed the certification status report and certification test records for three randomly selected train control technicians. Results of this review showed that:

1. Recertification is done every three years rather than every two years. The three years frequency is correct and in accordance with the CPUC's requirements.
2. There are 60 technicians subject to training and certification. Forty one of the 60 have not yet completed training and certification for the GRS equipment on the extensions.
3. The BART representative noted that some reference material important to training has not yet been received from GRS.
4. The certification test records for the three randomly selected technicians were all in proper order.

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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 55
CONTINUED FROM PAGE 1**

RECOMMENDATIONS:

- 1. The Certification and Recertification Plan should be revised to show that recertification is done every three years.**
- 2. Adopt an aggressive schedule to expedite the training and certification of the 41 technicians who are not yet qualified to work on the GRS equipment.**
- 3. Increase the priority status and aggressively pursue obtaining the missing GRS information which is needed to upgrade the technician training program.**

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 56**

Rail Transit Agency BART	Persons Contacted Lee Cohen Charles Eng Tom Lechuga	Date of Audit 9-26-97
Department SYSTEMS MAINTENANCE		Auditors Kartik Shah Don Johnson

Reference Criteria

BART PERIODIC MAINTENANCE INSPECTION PROCEDURE FOR STATION EMERGENCY PHONES

Element/Characteristics and Method of Verification

STATION EMERGENCY TELEPHONES

Randomly select one station and review the inspection records for the emergency telephones associated with that station to determine whether or not:

- 1) the quarterly and annual inspections required by the referenced procedure were performed during past three year period
- 2) the required documentation was properly prepared
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

Reviewed the inspection records for station emergency telephones A10 (Lake Merritt), K10 (12th Street) and K20 (19th Street) for 1997. This review showed that:

1. The annual inspection which requires an on and off the hook voltage check was not performed. The BART representatives explained that this test has been replaced by an operational check every 60 days to verify that the phones work.
2. The A10 quarterly inspection records were OK.
3. The K10 quarterly inspection records indicate that the 2nd quarter 1997 inspection was not performed.
4. The K20 quarterly inspection records were incomplete in that they did not show the voltage and resistance test results for the 3-5-97 and 6-1-97 inspections.

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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 56
CONTINUED FROM PAGE 1**

CORRECTIVE ACTION REQUIRED:

Perform a general review and analysis of the Systems Maintenance Department's practices, procedures and record keeping requirements for the inspection, testing and maintenance of station emergency telephones. Take whatever corrective action is determined to be necessary as a result of the general review and analysis.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 57**

Rail Transit Agency BART	Persons Contacted Nick Lujan Ed Snell	Date of Audit 9-25-97
Department TRACK & STRUCTURES		Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

SECTION 7.0 – INSPECTION, OF BART’S TRACK STANDARDS MANUAL, DATED 6-1-95

Element/Characteristics and Method of Verification

INTERNAL RAIL DEFECTS INSPECTIONS

Review BART’s file of completed internal rail defect inspection reports for the years 1996 and 1997 to determine whether or not:

- 1) all mainline track (including turnouts) was automatically inspected by ultrasonic examination or other nondestructive test method capable of revealing internal defects at least twice each year
- 2) the results of the tests were properly documented
- 3) noted defects were corrected in a timely manner

Results/Comments

Reviewed the Herzog Services, Inc. Report for Testing Services performed on March 1997. Results of the Ultrasonic Rail Test Car Movement Reports for all mainline track (including turnouts) were complete and properly documented.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 58**

Rail Transit Agency BART	Persons Contacted Ray Crist Lee Cohen	Date of Audit 9-26-97 and 10-1 and 2 - 97
Department SYSTEMS MAINTENANCE	Mike Lighty Al Welchert Charles Ng	Auditors Joey Bigornia Don Johnson Kartik Shah

Reference Criteria

POWER AND WAY MAINTENANCE DEPARTMENT TRAIN CONTROL DIVISION MANUAL, DATED 7-1-76, SECTION IV TRAIN CONTROL MAINTENANCE, PARAGRAPHS 406, 407, 408 AND 410

Element/Characteristics and Method of Verification

VITAL RELAYS

Randomly select three vital relays. From a combination of procedure and records reviews as well as visual inspection of the selected items, determine whether or not the relays are properly controlled, calibrated against certified standards at prescribed intervals, tested as required by the referenced paragraphs and marked, tagged or otherwise identified to show their calibration status.

Results/Comments

Randomly selected three vital relays designated PD 1 – 500 OHM (S/N P2675), PD 1 – 250 OHMS (S/N P6116) and VR 1 – B- 360 OHMS (S/N A7326). Reviewed the calibration test records on file at the Hayward Electronic Repair Shop for the three relays. Aside from one minor discrepancy involving a recorded date, the reviewed records were satisfactory.

No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 59**

Rail Transit Agency BART	Persons Contacted Charles Ng Lee Cohen	Date of Audit 9-26-97 and 10-2-97
Department SYSTEMS MAINTENANCE	Mike Lighty Al Welchert	Auditors Kartik Shah Don Johnson

Reference Criteria

POWER AND WAY MAINTENANCE DEPARTMENT TRAIN CONTROL DIVISION MANUAL DATED 7-1-76, SECTION IV – TRAIN CONTROL MAINTENANCE, PARAGRAPHS 401, 402 409, 410, 411, 412, 414, 415, 419. 420. 421

Element/Characteristics and Method of Verification

TRAIN CONTROL INSPECTION AND TESTS

Randomly select three different station control zones with interlockings on three different lines. Review the inspection and test records for the selected train control zones to determine whether or not:

- 1) the tests and inspections required by the referenced Section IV paragraphs were performed on time and as scheduled
- 2) the required documentation were properly prepared
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

Discussed this audit activity with the Section Manager, Special Projects of Systems Maintenance and the Manager of Systems Maintenance. They explained that the above referenced criteria taken from BART's Book 30, Section IV, Train Control Maintenance is out of date and not truly reflective of current practices for all train control equipment (See Checklist No. 62). A revised manual with updated procedures to reflect the actual train control maintenance, inspection and testing practices being used by BART technicians is being prepared, but is not available at this time.

CORRECTIVE ACTION REQUIRED:

Perform a general review and analysis of the Systems Maintenance Department's practices, procedures and record keeping requirements for scheduling and performing the required inspection, testing and maintenance of train control equipment. Train Control Engineering as well as Systems Maintenance should participate in this review and analysis. Appropriate corrective action should then be taken as determined by the results of the review and analysis.

The corrective action required by this checklist should be combined with that required for checklist no. 62.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 60**

Rail Transit Agency BART	Persons Contacted Mike Lighty Al Wlechert	Date of Audit 10-2-97
Department SYSTEMS MAINTENANCE		Auditors Joey Bigomia Kartik Shah Don Johnson

Reference Criteria

**POWER AND WAY MAINTENANCE DEPARTMENT TRAIN CONTROL DIVISION
MANUAL, DATED 7-1-76**
1) SECTION III – SWITCH MAINTENANCE, PARAGRAPHS 318, 319, 320 AND 321
2) SECTION V – MAINTENANCE PROCEDURES, NUMBERS 521, 524, 536 AND 538

Element/Characteristics and Method of Verification

SWITCH MACHINE INSPECTION AND MAINTENANCE

Randomly select a sample of five different mainline switch machines. Review the preventive maintenance cards and inspection and test records for the selected machines to determine whether or not:

- 1) the daily, monthly, quarterly, semi-annually and once every eight years tests, inspections and maintenance activities required by the referenced criteria were performed
- 2) the required documentation was properly prepared
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

Reviewed the Switch and Lock Movements Cards prepared during 1997 for the nine switches that make up the M87 interlocking. The results of this review showed that:

1. The Oakland Wye daily inspections are no longer performed.
2. The eight-year meggering tests were deleted by 12-19-90 IOM from Dean Ehmert to the train control foreworkers and technicians.
3. Cards were prepared in advance to schedule the required monthly inspections by a given due date. However, the date completed entry and check points, were not filled in for the months of February, March and April.

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CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 60
CONTINUED FROM PAGE 1

4. The quarterly inspection report for 2-16-97 had no recorded date to show that the operating voltage tests were performed. Also the required check points were not checked off, and the date completed entry was not filled in.
5. The second quarterly inspection report, which is also the semi-annual report, was dated 6-8-97 and showed that the operating voltage data was recorded for only five of the nine switches.

CORRECTIVE ACTION REQUIRED:

Perform a further more in depth audit/investigation of the switch machine inspection and maintenance program to determine the full extent of the problems outlined above, and to establish if this is limited to a documentation problem or if it is an actual failure to perform the required maintenance activities at the required frequency. Take appropriate corrective action as determined by the results of the in depth audit/investigation.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 61**

Rail Transit Agency BART	Persons Contacted Charles Ng Lee Cohen	Date of Audit 9-26-97 and 10-2-97
Department SYSTEMS MAINTENANCE	Mike Lighty Al Welchert	Auditors Kartik Shah Don Johnson Joey Bigornia

Reference Criteria

SECTION 102, 7, OF THE POWER AND WAY MAINTENANCE DEPARTMENT TRAIN CONTROL DIVISION MANUAL, DATED 7-1-76

Element/Characteristics and Method of Verification

JOINT INSPECTION OF SWITCHES

Review the Train Control Supervisor's file of joint switch inspection reports for the years 1996 and 1997 to determine whether or not:

- 1) all switch were jointly inspected at least once every 60 days by a track supervisor and a train control supervisor or foreman
- 2) the required inspections were properly documented
- 3) noted defects were corrected in a timely manner

Results/Comments

The Section Manager, Special Projects of Systems Maintenance explained that the joint inspection of switches has not been done at least since 1981. Systems Maintenance and Track Maintenance independently do their own inspections because for the most part they have different interests and areas of responsibility. Systems Maintenance does a management inspection (foreworker or manager accompanied by a technician) of high use switches every 60 days and low use switches every 90 days. However, there are no joint inspections performed with the track maintenance department. After further discussion with the Manager of Systems Maintenance it was learned that BART intends to reinstitute a joint inspection program, but probably at a different frequency and possibly in a different manner than is described in Section 102.7 of the manual.

RECOMMENDATION:

Revise the existing procedure on an expedited basis to describe the new method for performing the joint inspections.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 62**

Rail Transit Agency BART	Persons Contacted Charles Ng Kathy Roth	Date of Audit 9-22-97 and 10-2-97
Department SYSTEMS MAINTENANCE	Mike Lighty Al Welchert	Auditors Joey Bigornia Kartik Shah

Reference Criteria

POWER AND WAY MAINTENANCE DEPARTMENT TRAIN CONTROL DIVISION MANUAL, DATED 7-1-76, SECTION V – PROCEDURE NUMBER INDEX

Element/Characteristics and Method of Verification

PREVENTIVE MAINTENANCE OF TRAIN CONTROL EQUIPMENT

Review the schedule of planned preventive maintenance (P.M.) activities to be performed by BART during the time the CPUC audit takes place. Randomly select two or more of these P.M. activities for one or more of the new DPX, PAX and CSX extensions. Witness the performance of the P.M. activities to determine whether or not:

- 1) the P.M. activity is performed in accordance with the applicable P.M. procedures in Section V of the train control maintenance manual
- 2) the required documentation was properly prepared
- 3) noted discrepancies were corrected in a timely manner
- 4) the procedures in Section V of the manual adequately cover the new equipment installed on the extensions.

Results/Comments

Observed two technicians perform TCI preventive maintenance activities on the Lake Merritt train control room. Inspection and test data generated during the P.M. was recorded on Form No. 0472 (Rev. 3 – 7/86) Train Control Room Inspection card and Form No. 0505 (Rev. 2 – 2/85) Automatic Train Control Cabinets card. A written procedure describing the tasks to be performed and the data to be recorded for this station was not available. The BART Manager of System Maintenance explained that the procedures in Book 30, Section IV, Train Control Maintenance are in the process of being revised for this station and three other station control rooms that have been modified in a similar way. Based upon further discussions with the Manager of Systems Maintenance, it was learned that six other station control rooms are also in the process of being modified in the same way as Lake Merritt. When this modification work is completed, there will be ten station control rooms that will be maintained in accordance with instructions in a revised procedure covering the modified Westinghouse train control system, six station control rooms that will be maintained in accordance with instructions provided by GRS, and the balance of the stations will be covered by the instructions in the existing Book 30, Section IV, Train Control Maintenance procedure.

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CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 62
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CORRECTIVE ACTION REQUIRED:

Train Control Engineering should review the whole matter of the different maintenance requirements for different train control rooms with both Systems Maintenance and Training and Development. Then as necessary and as determined by the results of the review, , an appropriate set of maintenance instructions for each different type of train control room should be prepared. At the same time, appropriate lesson plans should also be prepared to match the different sets of maintenance instructions.

In the short term, an interim engineering directive advising the responsible technicians of the exceptions to Book 30, Section IV that apply at each location should be prepared and issued.

The corrective action required by this checklist should be combined with that required for checklist no. 59.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 63**

Rail Transit Agency BART	Persons Contacted Rebecca McCord Martha Halliwell	Date of Audit 9-29-97
Department ROLLING STOCK AND SIIOPS	Des Patten Ken Cook Mike Flanigan	Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

BART'S SYSTEM SAFETY PROGRAM PLAN, PARAGRAPH 207 - EMPLOYEE CERTIFICATION, DATED 12-2-96

Element/Characteristics and Method of Verification

TRAINING AND CERTIFICATION OF TRANSIT VEHICLE MECHANICS, INSPECTORS AND ELECTRONIC TECHNICIANS

Obtain a current roster of all transit vehicle mechanics, inspectors and electronic technicians. Select a random sample of two persons from each of the three categories. Review each selected person's training and certification file to determine whether or not it is complete and up to date (recertification required every two years). Also check to see if the required training and testing for certification/recertification reflects the persons assigned duties.

Results/Comments

Reviewed the certification status report and certification test records for three randomly selected transit vehicle mechanics and three electronic technicians. Results of this review showed that:

1. Recertification is done every three years rather than every two years as shown in BART's System Safety Program Plan. The three years frequency is correct and in accordance with CPUC's requirements.
2. The BART representatives explained that inspectors, unlike the mechanics and technicians, do not require training and certification.
3. The certification test records for the three randomly selected mechanics and three randomly selected technicians were all in proper order.

RECOMMENDATIONS:

1. The Certification and Recertification Plan should be changed to show that recertification is done every three years.
2. BART Safety should address the question of training and certification of inspectors to determine whether it is needed or not.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 64**

Rail Transit Agency BART	Persons Contacted Ray Crist Lee Cohen Mike Kincaid	Date of Audit 10-1-97
Department ROLLING STOCK AND SHOPS		Auditors Joey Bigornia Kartik Shah Don Johnson

Reference Criteria

- 1. BART QUALITY ASSURANCE MANUAL, BOOK 15, CHAPTER 17, SECTIONS 1 & 2 DATED 3-1-82**
- 2. BART IOM, CALIBRATION OF DISTRICT TOOLS AND TEST EQUIPMENT, F. L. STEPHENS TO DISTRIBUTION, DATED 5-15-95**

Element/Characteristics and Method of Verification

CALIBRATION OF MEASURING AND TESTING EQUIPMENT

Obtain a copy of the Inventory/Recall list of items subject to calibration control. Randomly select three different items from this list. From a combination of records review and visual inspection of the equipment items, determine whether or not they are properly controlled, calibrated against certified standards at the prescribed intervals and marked, tagged or otherwise identified to show their calibration status.

Results/Comments

Selected several items in the Hayward shop toolroom subject to calibration control. Most of these items had the required calibration labels showing they were calibrated at the prescribed interval. However, at least two items were past the December 1996 calibration due date, and one item, apparently newly purchased, was not labeled and not yet entered on the inventory/recall list. Also checked several measuring tools on the shop floor at the wheel press. All of the tools were properly calibrated and labeled except one torque wrench which was apparently still being used even though it had an "out of calibration - rejected" label on it. When this was discovered, one of the BART representatives immediately scraped the torque wrench by putting it in the trash barrel.

RECOMMENDATION:

It is recommended that newly purchased equipment subject to calibration control be entered on the Inventory/Recall list and labeled before it is released for shop use. It is also recommended that a regular audit program be implemented to make certain that only properly calibrated tools are used in the shops.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 65**

Rail Transit Agency BART	Persons Contacted Mike Flanigan Ray Crist	Date of Audit 9-29-97
Department ROLLING STOCK AND SHOPS		Auditors Joey Bigomia Don Johnson Kartik Shah
Reference Criteria ROLLING STOCK AND SHOPS DEPARTMENT PROCEDURE NO. 27, SECTION 1, DATED 5-2-94		
Element/Characteristics and Method of Verification <u>ANNUAL TURNING OF TRANSIT VEHICLES</u> Randomly select two transit vehicles from each of the four shops and review each one's MARIS history to determine whether or not the cars were turned between September 1 and October 15 during 1994, 1995 and 1996.		
Results/Comments The BART representative explained that the entire fleet was turned in 1994 and 1995, however, it was not turned in the fall of 1996 and has not been turned this year (by procedure it should have been started on September 1, 1997 and completed by October 15, 1997). Vehicle maintenance believes this is more of an economic issue than a safety issue and based upon experience over the past four years it is questionable whether or not this practice should be continued. <u>RECOMMENDATION:</u> It is recommended that the practice of turning cars on a fleet basis be reviewed and re analyzed by engineering to determine whether or not it should be continued as originally required, modified or eliminated entirely. The governing procedure should then be either implemented as written or revised as directed by engineering.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 66**

Rail Transit Agency BART	Persons Contacted Mike Flanigon Ray Crist	Date of Audit 9-29-97
Department ROLLING STOCK AND SHOPS		Auditors Kartik Shah Joey Bigornia Don Johnson

Reference Criteria

CPUC INTERIM ORDER DATED 1-24-95 FOR CASE NO. 9867

Element/Characteristics and Method of Verification

WHEEL FLANGE THICKNESS

The referenced Interim Order required BART to adopt a wheel flange thickness limit of No. 6 or less as measured by AAR wheel gauge, by July 1, 1995. Review BART's applicable transit vehicle maintenance procedures to determine whether or not the No. 6 criteria was adopted. Also, randomly select three wheel sets in one or more of the shops and measure the wheel flange thickness with an AAR wheel gauge to determine whether or not they meet the No. 6 or less criteria.

Results/Comments

Reviewed Vehicle Maintenance Bulletin # 33, Ch. 3, "Change in Wheel Flange Wear Removal and Cutting", and determined that BART has adopted a flange thickness limit of No. 6 as measured by AAR wheel gauge. Also observed measurements of 16 wheel flanges on car numbers 573 and 208 at the Hayward Maintenance Facility. All 16 wheels had a flange thickness of 4.75 or less

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 67**

Rail Transit Agency BART	Persons Contacted Ray Crist Lee Cohen Ed Snell James Plaisance	Date of Audit 10-1-97 and 10-3-97
Department ROLLING STOCK AND SHOPS		Auditors Joey Bigornia Don Johnson

Reference Criteria

1) BOOK 7: A/B – CAR PREVENTIVE MAINTENANCE REQUIREMENTS, SECTION 15-1, DATED 3-16-94

2) BOOK 50:C – CAR PREVENTIVE MAINTENANCE MATRIX, SECTION 15-1, DATED 3-16-94

Element/Characteristics and Method of Verification

PREVENTIVE MAINTENANCE PROGRAM FOR TRANSIT VEHICLES

Randomly select 4A-cars, 4B-cars and 4C-cars (two each assigned to two different yards shops). For each car selected, review the completed P.M. check sheets, D & C sheets and Vehicle Workbooks to determine whether or not the required PM's were performed during the required time limits, and if the required inspection and maintenance activities were signed off by the responsible maintenance workers, inspection workers, and foreworkers.

Results/Comments

Selected car no. 261 (A-car), 615 (B-car) and 351 (C-car) assigned to the Hayward shop, and car no's. 170 (A-car), 719 (B-car) and 430 (C-car) assigned to the Concord shop. Reviewed the PM checksheets and D & C sheets for all six cars for all of 1997. All of the records were found to be in accordance with the specified requirements. Also reviewed the car history computer print out reports dating back to June 1991 for all six cars. The maximum allowable time interval between PM's for five of the six cars was exceeded as shown in the table below:

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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 67
CONTINUED FROM PAGE 1**

<u>SHOP</u>	<u>CAR NO.</u>	<u>TYPE</u>	<u>NO. OF HOURS ABOVE THE MAX. ALLOWABLE LIMIT</u>	<u>DATE</u>
HAYWARD	261	A	12	3-25-93
HAYWARD	261	A	9	2-7-95
HAYWARD	261	A	4	9-27-95
HAYWARD	261	A	15	1-2-97
HAYWARD	615	B	9	2-3-93
HAYWARD	615	B	18	4-17-93
HAYWARD	615	B	22	6-7-94
HAYWARD	615	B	3	1-7-97
CONCORD	170	A	2	7-26-94
CONCORD	170	A	17	2-1-95
CONCORD	170	A	31	7-22-95
CONCORD	170	A	13	2-15-96
CONCORD	170	A	11	9-10-96
CONCORD	719	B	6	10-14-94
CONCORD	719	B	36	1-31-97
CONCORD	430	C	10	1-23-96
CONCORD	430	C	20	9-5-97

RECOMMENDATION:

A management directive should be issued by the General Manager instructing Transportation Department personnel that all revenue vehicles must be taken out of service before the maximum allowable time between PM's is exceeded, and the only exceptions permitted are as approved by the Assistant General Manager of Operations.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 68**

Rail Transit Agency BART	Persons Contacted Bob Parker Ray Crist Lee Cohen	Date of Audit 10-1-97
Department ROLLING STOCK AND SHOPS		Auditor Kartik Shah

Reference Criteria

1. **A/B – CAR, BOOK 7, VOLUME 14, PM PROCEDURES FOR USE WITH CHECKLISTS, DATED (VARIOUS)**
2. **C – CAR, BOOK 50, VOLUME 14, PM PROCEDURES FOR USE WITH CHECKLISTS, DATED (VARIOUS)**

Element/Characteristics and Method of Verification

PREVENTIVE MAINTENANCE PROGRAM FOR TRANSIT VEHICLES

Review the schedule of planned preventive maintenance (P.M.) activities to be performed by BART during the time the CPUC audit takes place. Randomly select two or more of these activities for two or more of the yard shops. Witness the performance of the P.M. activities to determine whether or not:

- 1) the P.M. activity is performed in accordance with the applicable P.M. procedures from Books 7 and 50.
- 2) the required documentation is properly prepared
- 3) noted discrepancies are corrected in a timely manner

Results/Comments

Witnessed the performance of PM-4, Procedure 4-1, Part B maintenance activities (hydraulic power unit check) on B car # 684 at the Hayward shops. The central hydraulic power accumulator pre charged pressure was found to be less than 700 psig and the unit was replaced with a refurbished accumulator in full compliance with the specified procedure. Also reviewed the Maintenance Discrepancy/Correction Sheet and found it to be prepared satisfactorily.

No discrepancies noted in the performance of the observed PM activities.

Also witnessed the performance of PM-3 Procedure 3-5, part 2 maintenance activities (compressor oil change) on C-Car # 2525 at the Concord shop with the same results as for the Hayward shop. The work observed was done in full conformance with the governing procedure.

Elements reviewed during the audit were found to be in compliance. No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 69**

Rail Transit Agency BART	Persons Contacted Dale Wensler Ray Cole	Date of Audit 9-23-97
Department SYSTEM SAFETY	Ed Snell Zoyd Luce	Auditor Don Johnson

Reference Criteria

1) BART'S SYSTEM SAFETY PROGRAM PLAN, CHAPTER 4 - SYSTEM SAFETY DEPARTMENT, SECTION 402- RESPONSIBILITIES 4, 6, 9, 10, 11, 12, 13, 15, 16, 19 AND 21

Element/Characteristics and Method of Verification

SAFETY DEPARTMENT RESPONSIBILITIES

Through a combination of interviews with Safety Department personnel, procedure reviews, and documentation checks, determine whether or not BART has successfully implemented the referenced system safety program criteria covering the following listed activities during the past 12 months:

- 1) Participation in design reviews
- 2) Collect historical information on hazards, failures, accidents and injuries
- 3) Audit safety related modifications and additions
- 4) Review and approve modifications and new systems
- 5) Direct a hazardous materials management program
- 6) Ensure that BART maintains an up to date disaster preparedness plan
- 7) Audit detection and warning devices, protective equipment, and emergency and rescue equipment
- 8) Investigate failures, injuries and accidents and ensure that unsafe conditions are corrected
- 9) Audit operations for rules and procedures compliance

Results/Comments

1. Participation in design reviews
2. Audit Safety related modifications and additions
4. Review and approve modifications and new systems

Reviewed the System Safety Department's Audit Log of all Open Projects. This log identifies safety related projects which require input, monitoring, review and approval by a member of the System Safety Department. The log is developed from BART Engineering Change Orders, Project Services Requests and Contracts. At the present time there are 267 open projects listed on the log. Each project is assigned to a member of the System Safety Department to provide safety input during design, to monitor the progress of the in process work, and to review the completed work to assure that safety related elements and objectives are satisfied. In addition, one or more members of the System Safety Department are assigned full time to each extension project to provide the same type of safety input to these major projects.

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CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 69
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2. Collect historical information on hazards, failures accidents and injuries

Reviewed the System Safety Department's accident investigation procedures, Quarterly Report of Safety Statistics, file of Unusual Occurrence Reports, MARIS reports and Patron Accident/Injury reports. These procedures, records and reports show that the System Safety Department maintains a comprehensive file of historical information on hazards, failures, accidents and injuries.

5. Direct a hazardous materials management program

Reviewed BART's Management Procedure 59-Materials Safety Data Sheet Acquisition and Hazardous Materials Control Procedure Manual, Hazardous Waste Management Procedure, and MSDS Program Manual. These documents clearly show that the System Safety Department is actively directing BART's hazardous materials management program.

6. Ensure that BART maintains an up to date disaster preparedness plan

Reviewed BART's Emergency Plan dated April, 1994. This document combined with the Commission staff's first hand involvement as members of BART's Fire Liaison Committee, which meets regularly with all the fire services with jurisdiction in BART's service territory, and attendance at BART's regularly scheduled emergency drills, provides satisfactory evidence of compliance with this requirement.

7. Audit detection and warning devices, protective equipment, and emergency rescue equipment

Reviewed BART's inspection checklists for both stations and shop facilities. These checklists include requirements for inspecting detection and warning devices, protective equipment, and emergency rescue equipment. These same types of items are also checked during BART's regularly scheduled emergency drills.

8. Investigate failures, injuries and accidents and ensure that unsafe conditions are corrected

Reviewed BART's Management Procedure No. 48 and the System Safety Department's Accident Investigation Procedures dated 1-1-97. Management Procedure No. 48 assigns the responsibility for conducting investigations to the System Safety Department. This information combined with the Commission staff's first hand knowledge from monitoring numerous BART accident investigations shows that the System Safety Department has a comprehensive program in place.

9. Audit operations for rules and procedures compliance

The System Safety Department performed this function in the past, but the program of performance checks for operations rules and procedures compliance has been allowed to lapse during the past several years. The System Safety Department plans to reactivate this activity as a part of the internal safety audit program that is currently in the development stage. See checklist No. 74 for a more detailed discussion and recommendations regarding BART's internal safety audit program.

No recommendation is listed and no corrective action is required.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 70**

Rail Transit Agency BART	Persons Contacted Dale Wensler Lee Cohen	Date of Audit 9/22 & 9/23/97
Department SYSTEM SAFETY		Auditor Don Johnson
Reference Criteria BART'S SYSTEM SAFETY PROGRAM PLAN, SECTION 404.14 – HAZARD CONTROL		
Element/Characteristics and Method of Verification <u>HAZARD CONTROL</u> Review BART's implementing procedures for hazard identification, hazard categorization and hazard resolution to determine whether or not the following minimum requirements taken from the APTA guidelines are being complied with: 1) the hazard analysis process is documented in a written procedure available to all BART departments, and includes requirements for appropriate sign offs, checks and balances. 2) the procedure allows for hazard categorization based upon severity and probability 3) hazards identified on an ongoing basis are entered into the formal hazard analysis process 4) there is a companion procedure to support the hazard resolution matrix by describing exactly how hazards defined as unacceptable and undesirable are reduced to an acceptable level		
Results/Comments The ADTRANZ Hazard Mitigation Traceability Matrix and Safety Critical Items List for the A & B Car Vehicle Rehabilitation project were presented as examples of BART's application of a hazard control procedure that incorporates the essential elements contained in the APTA System Safety Program Plan Guidelines. Review of these two ADTRANZ documents shows that the four elements for controlling hazards listed above under Element/Characteristic and Method of Verification are being applied to the A & B Car Vehicle Rehabilitation project. According to the BART representatives, similar hazard control requirements are also made a part of the formal safety certification program that BART applies to major projects and selected system modifications (see Section 303.6 of BART's System Safety Program Plan). However, the same degree of formal hazard categorization, analysis, resolution and documentation is not applied to hazards that are identified during system operation and maintenance by means of such things as accident reports, unusual occurrence reports, emergency drills, and safety notices. <u>RECOMMENDATION:</u> It is recommended that BART give consideration to applying some of the formal hazard categorization, analysis, resolution and documentation requirements contained in the APTA System Safety Program Plan Guidelines to hazards identified during system operation and maintenance in a manner similar to that used for hazards identified during design, fabrication and construction.		

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 71**

Rail Transit Agency BART	Persons Contacted Ray Cole Dave Wensler Mike Flanigon	Date of Audit 9-23-97
Department SYSTEM SAFETY		Auditor Don Johnson

Reference Criteria

**BART MANAGEMENT PROCEDURE NO. 34, SECTION E – OPERATING BULLETINS,
DATED 3-11-85**

Element/Characteristics and Method of Verification

OPERATING BULLETINS

Review the Safety Department's log of Operating Bulletins to determine whether or not:

- 1) the log is being properly maintained and all active bulletins are on file
- 2) all bulletins were reviewed by the Safety Department prior to issue by the responsible department
- 3) all bulletins were reviewed in January, 1997, and those that were still active were renumbered and reissued.

Results/Comments

Management Procedure No. 34 states in part:

“The Safety Department will provides bulletin numbers and maintain a log of all Operating Bulletins. Each January, all Operating Bulletins will be reviewed by Safety, renumbered and reissued, if still in effect.”

A review of the System Safety Department's Operating Bulletin Log revealed:

1. Eight Operating Bulletins (97-01 through 97-08) are listed in the log for 1997. However, copies of 97-02 (blanket work area) and 97-08 (handling switches) have not actually been issued and are not contained in the log book file because they are still being developed as drafts subject to review and comment prior to approval. All other active bulletins extending back to 86-02 are on file.
2. All interdepartmental Operating Bulletins have been approved by the System Safety Department.

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CPUC SYSTEM SAFETY AUDIT

CHECKLIST NO. 71

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3. All Operating Bulletins were not reviewed, renumbered and reissued if still in effect in January 1997. However, all Operating Bulletins were reviewed in August 1997, and those that were still in effect (22 bulletins) were reissued (but not renumbered) at that time.

RECOMMENDATION:

It is recommended that in January 1998 the requirement in Management Procedure No. 34 to review, renumber and reissue all active Operating Bulletins be implemented as written. It is also recommended that Bulletin numbers not be assigned until a Bulletin is approved and issued for use.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 72**

Rail Transit Agency BART	Persons Contacted Dale Wensler	Date of Audit 9-22-97
Department SYSTEM SAFETY		Auditor Don Johnson

Reference Criteria

- 1) BART SYSTEM SAFETY PROGRAM PLAN, CHAPTER 4, SECTION 404.13 – INVESTIGATIONS, PARAGRAPH 4, DATED 12-2-96
- 2) INSTRUCTIONS FOR PROCESSING BART SAFETY NOTICES ATTACHED TO FORM NO. 0836, REV. 2, DATED 1-93

Element/Characteristics and Method of Verification

BART SAFETY NOTICES

Review the Safety Department's file of Safety Notices received during 1996 and 1997 to determine whether or not the reported potentially unsafe acts or conditions were properly addressed.

Results/Comments

Reviewed BART's computer log of open and closed safety notices. This log lists all notices received by the System Safety Department and simply indicates whether they are open or closed. In addition, the System Safety Department also maintains a separate file folder for each notice they receive. This folder normally contains a copy of the notice itself and any other related correspondence.

Aside from the very brief instructions attached to the safety notice form itself, there are no detailed instructions on exactly how the assigned System Safety Department person is supposed to process a safety notice. This lack of instructions has been addressed in a draft procedure that is currently in the review and comment stage. This draft procedure requires the assigned System Safety person to contact the author of the safety notice to make certain there is no misunderstanding as to what the real problem is before taking any action to correct the problem. The draft procedure also requires the System Safety Department person to notify the person who initiated the notice when the problem has been corrected. These two requirements should improve the effectiveness of the safety notice program.

RECOMMENDATION:

It is recommended that every effort be made to complete the draft procedure as soon as possible and issue it for use.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 73**

Rail Transit Agency BART	Persons Contacted Dale Wensler Ray Cole	Date of Audit 9-22-97
Department SYSTEM SAFETY		Auditor Don Johnson

Reference Criteria

- 1) CPUC DECISION NO. 95-12-034, DATED 12-18-95
- 2) BART MANAGEMENT PROCEDURE 34, OPERATIONS MANUALS AND BULLETINS, DATED 3-11-85

Element/Characteristics and Method of Verification

REVISION OF THE OPERATIONS RULES AND PROCEDURES MANUAL

Reference Criteria (1) directed BART to develop and implement management procedures requiring BART to periodically review and revise the OR & P Manual. Review BART's management procedures to determine whether or not CPUC Decision No. 95-12-034 has been acted upon.

Results/Comments

CPUC Decision No. 95-12-034 ordered BART to:

"establish a plan and schedule by 12-31-95 to develop and implement management procedures that require periodic review of the BART OR&P Manual, supplementary operations manuals, and operating bulletins to guarantee identification and timely correction of conflicting, obsolete and improperly issued operating directives"

BART has responded to this Commission order by initiating two major tasks, both of which are still being worked on. The first of these tasks is to revise MANAGEMENT PROCEDURE NO. 34 to require the periodic review of BART's manuals and bulletins as ordered in CPUC Decision No. 95-12-034. The System Safety Department issued a draft revision of M.P. No. 34 for internal BART review, comment and approval on 4/24/97. This draft was reissued by System Safety with changes made to accommodate comments from the Transportation and System Service Department on 8/18/97. However, it appears that the present draft will require further changes to comply with the intent of the Commission's order. The draft states the OR&P and other manuals shall be revised annually as operational requirements dictate. What it should state is that the manuals will be subjected to a documented review by the issuer on an annual basis to make certain the manuals are up to date in all respects, and that appropriate revisions will be prepared and issued as dictated by the results of the required annual reviews.

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CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 73
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The second task undertaken by the System Safety Department in response to CPUC Decision No. 95-12-034 is to prepare a general revision of the OR&P Manual. This task is well underway but still has a considerable way to go to reach completion. It is a major undertaking.

RECOMMENDATIONS:

1. It is recommended that the System Safety Department issue a 3rd draft of M.P. No. 34 incorporating an additional change as outlined above. This 3rd draft should be issued in parallel instead of series to all BART departments and managers with review, comment and approval responsibilities. Also, to help expedite the entire process, a reasonable time limit needs to be established for responding to the System Safety Department's request for review, comment and approval.

As of November 14, 1997, M.P. No. 34 has been signed by the General Manager.

2. It is recommended that to expedite the process of revising the OR & P Manual and make certain this task is completed in a reasonable time period, a master schedule or flow diagram with appropriate milestone dates be created to govern the entire project. This plan and schedule should be monitored by the Executive Manager Budget & Business Management to make certain acceptable progress on this important task is maintained.

A draft OR & P Manual Revision Schedule dated November 5, 1997 has been created.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 74**

Rail Transit Agency BART	Persons Contacted Mike Flanigon Veronica Alencar	Date of Audit 9-23-97
Department SYSTEM SAFETY		Auditor Don Johnson

Reference Criteria

- 1) BART'S SYSTEM SAFETY PROGRAM PLAN, PARAGRAPH 404.12, DATED 12-2-96
- 2) CPUC GENERAL ORDER NO. 164, SECTION 4, REQUIREMENTS FOR INTERNAL SAFETY AUDITS

**Element/Characteristics and Method of Verification
INTERNAL SAFETY AUDITS**

Review BART's implementing procedures for performing internal audits and any reports of audits completed during 1997 to determine whether or not the procedures and completed audit reports provide for each of the following requirements:

- 1) Preparation of an internal audit plan and schedule showing what system safety program elements are to be included in each audit, and when each audit will be conducted;
- 2) Including in the internal audit plan and schedule at some time during the three year period between CPUC on-site safety program reviews (i.e. CPUC Triennial Audit) each of the following system safety program elements:
 - Facilities Inspections
 - Maintenance Audits/ Inspections
 - Rules/ Procedures Review
 - Training and Certification Review/ Audit
 - Emergency Response Planning, Coordination, Training
 - System Modification Review and Approval Process
 - Safety Data Acquisition/ Analysis
 - Interdepartmental/ Interagency Coordination
 - Configuration Management
 - Employee Safety Program
 - Hazardous Materials Programs
 - Drug and Alcohol Abuse Programs
 - Contractor Safety Coordination
 - Procurement
 - Security;
- 3) Submittal of the internal audit plan and schedule to the CPUC staff in advance of the performance of each individual audit;

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**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 74
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- 4) Preparation of written checklists for conducting each individual audit;
- 5) Establishment of technical qualification requirements for persons who perform the audits (including independence from the first line of supervision responsible for the activity being audited);
- 6) Preparation of a report following the completion of each individual audit that describes any discrepancies that are identified, and the required follow up action that must be taken to prevent the discrepancy from recurring;
- 7) Preparation of an annual internal audit summary report that states the results of the audits performed during the previous twelve months in terms of the adequacy and effectiveness of the transit agency's system safety program plan;
- 8) Submittal of the annual internal audit summary report to the CPUC staff prior to the 15th of February 1998 and every year thereafter.

Results/Comments

The System Safety Department is still in the process of developing a procedure to meet the internal safety audit requirements contained in CPUC General Order No. 164 and BART's System Safety Program Plan. Rough drafts of a proposed procedure and some accompanying checklists and report forms have been prepared to meet the requirements outlined above under Elements/Characteristic and Method of Verification. Although a detailed plan and schedule for completing the development of the procedure has not been prepared, System Safety Department staff expect to complete the task some time next year.

RECOMMENDATION:

The scope and complexity of this task is similar to that required for revising the OR&P Manual as discussed in Checklist No. 73. Consequently, the recommendation for the preparation of a detailed plan and schedule in the form of a flow chart with appropriate milestone dates to control the project and permit monitoring by the Executive Manager, Budget and Business Management applies equally to the Internal Safety Audit program.

**CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 75**

Rail Transit Agency BART	Persons Contacted Dale Wensler Ray Cole	Date of Audit 9-23-97
Department SYSTEM SAFETY		Auditor Don Johnson

Reference Criteria

**BART'S SYSTEM SAFETY PROGRAM PLAN
SECTION 502 - FACILITIES INSPECTION**

Element/Characteristics and Method of Verification

STATION SAFETY INSPECTIONS

Review BART's file of completed station safety inspection check sheets for the years 1995, 1996 and 1997 to determine whether or not:

- 1) all passenger stations were inspected at least once every six months by a system safety department inspector
- 2) the required inspections were properly documented
- 3) noted safety hazards were corrected in a timely manner

Results/Comments

BART's file of completed station safety inspection check sheets for 1995, 1996 and 1997 were reviewed. The results of this review revealed that:

1. It could not be verified from the documentation reviewed that all stations are being regularly inspected at six months intervals. For example, the latest recorded inspection of M90 (Daly City) and M80 (Balboa Park) was in December 1994, M40 (Civic Center) was in May 1996 and R-50 (El Cerrito Del Norte) was in December 1996.
2. The required inspections are properly recorded on a detailed checklist
3. The completed checklists are transmitted to the responsible ACTO with a request for a reply on the status of required corrective action. However, there is no evidence that such replies are ever made. According to System Safety Department staff, follow up is limited to the observations made at the next regularly scheduled inspection at six months intervals.

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CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 75
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CORRECTIVE ACTION REQUIRED:

1. Review the inspection records for all stations and inspect those that have not been done in the past six months.

2. Review the process of station inspections to determine whether or not to retain this activity as a System Safety responsibility, or if it should be assigned to another department with System Safety monitoring and oversight. In any case, an annual schedule covering all stations should be prepared to control the inspection process and permit management monitoring. A maximum time limit for correcting each discrepancy should be established and the person who performed the original inspection should be required to take follow up action at the end of the established time limit.

CPUC SYSTEM SAFETY AUDIT
CHECKLIST NO. 76

Rail Transit Agency BART	Persons Contacted Gary Gee	Date of Audit 9/23/97
Department POLICE DEPARTMENT		Auditor Don Johnson

Reference Criteria

BART POLICE DIVISION ORDER NO. 93-18

Element/Characteristics and Method of Verification

SUBWAY EMERGENCY EXITS

Review the Police Department inspection records for a randomly selected one week period during the past 12 months to determine whether or not:

- 1) the required daily inspections to ensure emergency exits are free of obstructions were performed
- 2) the required inspections were properly documented
- 3) noted discrepancies were corrected in a timely manner

Results/Comments

This item was discussed with BART Police Department Commander Gary Gee. He indicated that BART Police Division Order No. 93-18 was not a permanent or standing directive and that it is no longer in effect. However, as a matter of course many, but not all, of the emergency exits are routinely inspected by BART Officers on regular patrol duty. Some officers report these inspections to the police dispatcher and others do not. There is no consistent documentation of emergency exit checks by BART Police Officers.

CORRECTIVE ACTION REQUIRED:

The BART Police Department should collaborate with the System Safety Department in the development of a permanent procedure to cover the periodic inspection and testing of all 16 emergency exits in the BART System. This procedure should recognize and take into account the differences between the various types and locations of each exit. For example, daily inspections probably are required for EE1 and EE2 but probably not for EE16.