

Decision No. 86393

ORIGINAL

BEFORE THE PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA

Investigation on the Commission's
own motion into the safety
appliances and procedures of the
SAN FRANCISCO BAY AREA RAPID
TRANSIT DISTRICT.

Case No. 9867
(Filed February 4, 1975)

FIFTH INTERIM OPINION

During the hearings on July 28 and 30, 1976, the staff presented a proposed order for BART consisting of six items. Of these six items, two are urgent. Changes and modifications of the system are being made with inadequate analysis to verify the safety aspects of the changes, and unproven test modifications have been made. Also, a large number of door openings have been encountered on BART trains since the beginning of this year. These openings have not been satisfactorily explained. The staff recommends that steps be taken to insure that adequate safety and reliability analyses are made and that a full safety analysis of the door sub-system and its interaction with other sub-systems is made.

Two additional safety problems presented by BART in testimony require immediate action. Erroneous speed codes can be presented to trains in three of the four terminal zones. An erroneous speed code was presented to a train at A-90 (Fremont Station), which caused the train to accelerate towards the end of the track. BART's investigation appears to have disclosed the reasons for these erroneous speed codes, but BART has not found the cure to date. Since an erroneous speed code can be generated at any time, trains can go off the end of the track if operators are not constantly alert. To preclude such an accident, the Commission staff recommends, and BART concurs, that speed codes be removed from the three terminal zones at Fremont, Concord, and Daly City. The removal of these speed

codes will cause the trains to stop before being positioned manually by the train operator alongside the platform.

The final item of this emergency order deals with the staffing of the train control console at BART Central. During the February 1976 hearings, Mr. Gallaway, BART's assistant general manager in charge of operations, stated that the Central Control staff would be increased to five people to fully staff the operation. A survey of the operation of Central Control from July 1 to August 20, 1976 indicates that for greater than half the time this function has been staffed by a supervisor and one train controller. During the July 1976 hearings, Mr. Gallaway again stated that BART was going to increase staffing for this function. There has been a 50-percent increase in bad-order trains from the beginning of 1976 to the present. Less than two train controllers on duty on the main console could present a hazardous situation. The rate of failure of BART trains at present is averaging approximately one an hour. When several concurrent bad-order trains occur, which has happened during the peak hours, one person cannot handle the bad-order trains and normal traffic at the same time. To alleviate this situation, the staff recommends that no less than two train controllers and a supervisor be on duty from 6:00 a.m. until 8:00 p.m.

We find the staff recommendations reasonable and required to insure the safety of the public and BART's employees.

We conclude that the staff recommendations should be implemented as hereafter ordered. The effective date of this order should be the date hereof to expedite the inauguration of these safety requirements.

FIFTH INTERIM ORDER

IT IS ORDERED that:

1. BART shall modify its procedures to insure the following:
 - a. No equipment or components of equipment that affect the safety of the passengers or employees shall be

installed, nor shall any modifications be made to existing equipment unless two copies of the following plans and specifications for such construction and/or modifications have been filed with the Commission not less than twenty days prior to the date of installation or modification of the equipment:

- (1) Function description and functional block diagram.
 - (2) Summary and conclusions of the results of a safety and reliability analysis that shall be on file in BART's safety department consisting of, as a minimum, a failure modes and effects analysis and a worst case analysis, taking into account all environmental conditions; a component stress analysis; and a computed failure rate. The District may request the Commission to waive the requirements of this subparagraph if alternate analyses that are better suited to a particular situation are presented in detail.
- b. A test shall be performed to verify that each modification or installation performs according to the analyses and accomplishes the original intent of the modification or installation. The Commission shall be notified of the time and location of these verification tests.
 - c. The provisions of paragraph 1.a and b of this order shall not apply to equipment installations and modifications made for the purposes of test and evaluation provided that the installation or modification is excluded from revenue service.
 - d. Under emergency conditions, BART may make immediate changes or modifications, providing that prior to the start of the work the Commission is notified by telephone or telegraph as ordered for property damage or deaths of the reason for the change or modification and the detail of the modification or change. The District shall file the analyses required by paragraph 1.a of this order within fifteen calendar days from the start of the work on the emergency change or modification.

- e. Not less than twenty days prior to the start of each safety and reliability analysis, BART shall file with the Commission:
 - (1) An outline of the proposed format and scope for each safety and reliability analysis that the District has been ordered to file by paragraph 1.a above together with a schedule for the progress and completion of each analysis.
 - (2) The name of the person responsible for the performance of each analysis.
- f. BART shall submit to the Commission monthly progress reports of the safety and reliability analyses in progress by the 15th of each month until the analyses are completed and submitted.
- g. BART shall comply with the above for any modifications now in progress but not completed by the effective date of this order, except that the filings required by paragraph 1.a of this order do not apply as stated. For such modifications, the filing required by paragraph 1.a shall be met within thirty days from the effective date of this order. The Commission staff may, for appropriate cause, exclude this requirement from specific open modifications now in progress.

2. In order to determine the reason for and to eliminate inadvertent and unexplained door openings together with reported failures of the trains to stop after such openings, BART shall:

- a. Perform a safety analysis upon the door sub-system in conformance with paragraphs 1.a, e, and f of this order. This analysis shall use as an input interface the output of the ATO and shall include the electrical-electronic circuitry, the mechanical aspects of the sub-system, wiring, connectors, components, and any other area within the sub-system that could cause the noted effects.
- b. Perform a safety analysis in conformance with paragraphs 1.a, e, and f. above upon the interrelationship of the door sub-system and other sub-systems within the BART system.
- c. Begin the safety analyses required in this paragraph no later than thirty days from the effective date of this order.

3. Until such time as BART designs and installs a permanent solution to the end-of-line speed code problem BART shall remove the transmitters that generate the speed codes for the entire length of the three platforms at M90 (Daly City Station), the two platforms at A90 (Fremont Station), and the two platforms at C60 (Concord Station). The train operator shall position the train into these platforms in road manual at a speed no greater than 15 miles per hour.

4. During the time of revenue service between 0600 to 2000, or any other time when there are more than twenty trains operating in revenue service, there should be a minimum of two fully qualified train controllers and one central supervisor on duty in the central control room for the train control console. BART shall notify the Commission within ten days of the effective date of this order when the additional positions hereby required will be manned.

The effective date of this order is the date hereof.

Dated at San Francisco, California, this 14th
day of SEPTEMBER, 1976.

William J. Quinn President
William J. Quinn
Verion L. Livingston
Leonard Ross
Robert Bateman Commissioners