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Decision No. 87376 May 24, 1977

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)

SEVENTH INTERIM OPINION

During the hearings on July 28 and 30, 1976, the staff presented testimony and a proposed order for BART consisting of several items. Decision No. 86393 in Case No. 9867 dated September 14, 1976 required BART to implement four of those items which were considered urgent.

Exhibit 69, paragraph III and Attachment A, submitted by the staff, contained a list of 67 safety-related items which needed corrections, and which were assigned priorities according to the staff's view of their importance. The 67 items were taken from Exhibit 66, entitled "Systems Inadequacies List", submitted by BART during hearings in April 1976. The staff recommended that BART be required to correct the 67 safety-related items on Attachment A of Exhibit 69 and to submit a proposed schedule for completion of the work. Subsequent information has revealed a need for further assessment and definition of many of these items to determine their actual safety impact.

Exhibit 69, paragraph IV, also proposed that BART should prepare a Quality Control Manual which shall include, but not be limited to, procedures for the inspection and verification of maintenance work performed and approved modifications made to revenue vehicles prior to release for revenue service.

Subsequent to the submission of this exhibit, the Commission staff met with BART and recommended that BART's Quality Inspection function and organization be upgraded to a Quality Assurance capability which extends Quality Control to all phases of the BART operation. BART is currently in the process of upgrading its Quality organization and capability. The Commission staff determined and BART agreed that the implementation of this Quality Control should be documented in a comprehensive plan, which would be submitted to the Commission. The staff therefore recommends that BART submit a Quality Assurance plan which describes the implementation of the Quality Program throughout all facets of the BART operation.

The staff's Exhibit 75 contained a list of proposed requirements covering the establishment of programs for the training, retraining, and certification of employees to assure that employees whose duties may affect the safety of passengers, employees, and/or equipment are thoroughly qualified. BART's Exhibit 79 contained the District's comments on Exhibit 75 and proposed amendments thereto. The staff, by letter of September 1, 1976 to Examiner Coffey in Case No. 9867, stated that, in general, it would accept the wording of Exhibit 79 if three recommended changes were made.

A BART witness testified that the functions of the Reliability Task Forces created pursuant to Decision No. 84582 are being included within the responsibilities of the newly organized Systems Development Staff, a permanent BART organization. The witness submitted Exhibit 81 and proposed that the language therein be adopted in amending paragraphs 8, 9, and 11 of Decision No. 84582 to accurately reflect the new organization and its functions. Subsequent to the hearings in July 1976, BART transferred these responsibilities from the Systems Development Staff to another permanent BART organization that can perform the work more effectively. The tasks formerly performed by the Reliability Task Forces will be continued by the

permanent BART organization. The need for monthly reporting heretofore required is superseded by the 5th and 6th Interim Order requirements. Commission staff and consultants will have access to all information available to members of the permanent BART organizations. The staff does not object to BART's latest proposal.

Another BART witness testified that the District was experiencing operational problems with paragraph 2 of Decision No. 86013 dated June 29, 1976. The paragraph and subsections thereof required BART to comply with certain safety procedures to provide protection between maintenance vehicles and revenue trains pending the installation of detection devices on all maintenance vehicles. The witness introduced Exhibit 83 which he explained was meant to clarify the definition of revenue service to insure that revenue trains and on-rail maintenance vehicles are not allowed to mix. Also, the witness advised that the proposed rules in Decision No. 86013 were drafted prior to BART's filing of its Operations Rules and Procedures, which were subsequently analyzed by the Commission staff and its consultant who found them adequate to insure protection of the maintenance vehicles on the main line. The witness proposed that the language in Exhibit 83 be adopted to amend paragraph 2 of Decision No. 86013. The Commission staff agreed.

Conclusion

We find the staff's recommendations and those of BART, with which the staff concurred, reasonable and necessary to insure the safety of the public and BART's employees. We conclude that those recommendations should be implemented as hereafter ordered.

SEVENTH INTERIM ORDER

IT IS ORDERED that:

1. BART shall submit within one hundred and twenty days of the effective date of this order a safety evaluation of each of the 67 safety-related items listed in Attachment A. The submittal shall contain BART's conclusions based on each evaluation and new schedules where appropriate.

2. BART shall:

   a. Submit a plan for a complete Quality Assurance Program which shall detail the authority, responsibilities, plans, and procedures for the implementation of a Quality Program throughout all phases of BART operation including design, construction, modification, operation, test, maintenance, and storage. The plan shall include, but not be limited to:

      1. The organization, authority, and responsibilities required to implement the plan.

      2. The determination and control of inspections, test plans, and procedures for the inspection and verification of maintenance work performed and modifications made to BART equipment.

      3. The determination of the adequacy of tools and test equipment required to evaluate equipment inspected and tested.

      4. The definition of the documentation needed to determine the degree of conformance of equipment inspected and tested.

      5. The method of control of the quality of purchased items.

      6. The control of nonconforming materials.

      7. The identification of the procedures to assure that tools and equipment are calibrated at scheduled intervals.

      8. The description of the data system for collection, analyses, and corrective action of the discrepancies and failures.

      9. The audits employed to check the adequacy of the Quality Assurance Program described herein.

   b. BART shall complete and submit the plan to the Commission within thirty days of the effective date of this order.

c. BART shall implement the procedures and plans to assure the inspection and certification of required safety and reliability-related characteristics resulting from maintenance or modifications of cars or equipment prior to use in revenue service within ninety days of the effective date of this order.

d. BART shall implement all other procedures and plans of action described in the plan within one hundred and twenty days of the effective date of this order.

3. BART shall establish training, testing, and certification programs for personnel whose duties may affect the safety of passengers, employees, or equipment. The training and testing programs and certification requirements shall be submitted to the Commission for review within three months of the effective date of this order along with a proposed schedule for implementation of the programs.

a. The basic training program shall include, but not be limited to, general rules and procedures, special instructions pertaining to the specific craft, simulator training where applicable, and on-the-job training under supervision.

b. Personnel to be trained shall include, but not be limited to, station agents, Central Control personnel, train operators, tower operators, and maintenance employees engaged on and adjacent to main and yard tracks. Technicians involved in the maintenance or modification of wayside train control, on-board train control, communications, and Central Control shall also be included.

Engineering personnel whose work is covered under paragraph 1 of the Fifth Interim Order of this case and police services employees whose training is governed by the California State Commission of Peace Officers Standards and Training shall be exempted from these certification requirements.

Training shall include new employees and those promoted to positions of increased responsibility as defined within the plan. Upon successful completion of training and testing, a certification of competency shall be issued to the employee by the District prior to assuming his duties.

c. The program shall include refresher courses and periodic recertification for employees, as defined within the plan, whose duties may affect the safety of personnel, passengers, or equipment. The program shall also provide training for employees who have been absent from duty for at least three months, or less if important changes in rules or procedures have been made.

d. The testing program shall include written examinations designed to determine the employee's knowledge and understanding of job functions as well as the ability to perform job functions. Examinations also should determine the employee's understanding of rules and regulations and the impact of the employee's actions on safety.

e. The District shall develop several examination forms for each area of examination. In this way, trainees will be unable to become overly familiar with examinations, either through word of mouth or memorization of questions. Tests and examinations shall be replaced periodically.

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

g. Any modification to the training program submitted to the Commission in compliance with this order shall be forwarded to the Commission for review and comment prior to implementation. In instances requiring immediate training program modification, such modification shall be submitted to the Commission within three days after being put into effect.

h. Any employee who does not complete the training and testing program, or who fails to qualify for subsequent re-certification, shall not be granted certification by the District and may not perform in the craft in question until this certification is acquired.

4. Ordering Paragraphs 8, 9, and 11 of Decision No. 84582 in Case No. 9867 are modified to read as follows:

8.a. The functions of the Reliability Task Forces created pursuant to Decision No. 84582 shall be included within the responsibilities of a permanent BART organization.

b. BART shall, within ten days of the effective date of this order, file with the Commission a complete description of the permanent BART organization noted in a. The description shall include:

1. Organization chart.
2. Names of section managers.
3. Functions and responsibilities of each section.

c. The tasks currently underway by the Reliability Task Forces named in paragraph 8 of the Interim Order in Decision No. 84582 shall be explicitly itemized and continued by the permanent BART organization until completion.

9. BART shall continue to file with the Commission, until further order, monthly progress reports on the tasks identified in paragraph c above. Such reports shall be filed by the fifteenth of each month.

11. The Commission staff and designated consultants shall have access to all information pertaining to safety and reliability available to BART staff and shall be informed of BART staff activities in order to monitor their progress and report to the Commission as necessary.

5. Ordering Paragraph 2 of Decision No. 86013 in Case No. 9867 is modified to read as follows:

2. The following requirements shall be adhered to, pending the installation of detection devices on maintenance vehicles as required by paragraph 1 of Decision No. 86013:

a. Routine maintenance requiring on-rail maintenance equipment shall not be performed during revenue service.

(1) On-rail maintenance equipment shall not occupy main line track until the last passenger-carrying train has departed the terminal zone and progressed beyond the on-rail maintenance equipment's access point on its final run.

(2) On-rail maintenance equipment shall not cause the reverse running of passenger-carrying trains.

b. Routine maintenance requiring on-rail maintenance equipment shall be performed within Blanket Work Areas whenever possible. All rules and procedures governing Blanket Work Areas currently on file with the Commission shall remain in effect.

All on-rail maintenance equipment movement conducted on main line track and outside

of Blanket Work Areas shall be governed by rules and procedures currently on file with the Commission.

The effective date of this order shall be twenty days after the date hereof.

Dated at Los Angeles, California, this 24th day of MAY 1, 1977.

President

Commissioners

Commissioner Robert Batinovich, being necessarily absent, did not participate in the disposition of this proceeding.

Prioritized List of Safety Related Items Taken From BART System Inadequacies List, Exhibit 66

Correction shall be instituted as follows:

Priority 1 - By June 30, 1977
Priority 2 - By June 30, 1978
Priority 3 - By June 30, 1979
Priority 4 - By June 30, 1980
Priority 5 - By June 30, 1980

WAYSIDE TRAIN CONTROL

PUC #	Priority #	BART #	Description
1	1	12	Maintenance vehicle detector - provides detection by jamming the wayside system to indicate the presence of a vehicle on the track.
2	1	13	Wayside occupancy activator - provides enforced occupancy for detection by train control system while maintenance vehicle is being set on/off track.
3	1	7	Earthquake sensing devices - to be installed at each of 26 control stations to shut off speed codes at those locations in event of earthquake of such magnitude that it might cause track or structure damage. (Also required by GO 127)
4	2	8	Modification of speed profiles - involves determination and implementation of speed profiles that correspond to the "worst case brake rate" for close headways project.
5	2	55	Berkeley Hills tunnel doors - used to intake air or exhaust smoke away from passengers during fire. Restraining mechanism (to prevent it from closing on a train) is defective.
6	2	55	Fremont - Correct dispatch control - Relay race condition has allowed dispatch of wrong train on wrong track.

PUC #	Priority #	BART #	Description
7	2	55	Hayward Yard - Correct auto route - Realignment after dispatch - route does not drop out after dispatch.
8	2	27	Yard departure test - are not made due to faulty hardware resulting in other than zero speed codes transmitted to trains entering yard. Without it no departure tests are made and trains enter revenue service with defects that show up under the stress of main line operations.
9	3	2	P2.10 test - a general performance test. Will be safety related with advent of SORS. No impact at this time.
11	3	21	Crystal filters and flat packs - source of supply is running out and new source must be found. Integrity of replacement being tested by Hewlett Packard Co.
12	3	25	Auto routing - failure would result in interlocking malfunction and require more manual intervention.
13	3	55	Hayward Yard - correct gate cancel D, F, R, S, L, H, TF7, TF8 - inability of Central to cancel gate.

COMPUTER SYSTEMS

PUC #	Priority #	BART #	Description
14	2	7	Computer primary power - train control computer system has reliability problems associated with its primary power system.
15	2	13	Inadequate DTS back-up panel - relocate and redesign panel to make adequate and useful to train controllers in case of "big board" failure.
16	2	25	On-line diagnostics - improves our ability to monitor and investigate incidents without 24-hour delay awaiting mag tape availability.
17	2	28	SOR false latches - create susceptibility to false occupancies at SOR interface boundaries. (Home relay solution being implemented.)

PUC #	Priority #	BART #	Description
18	2	29	SOR alarm latch - will provide ability to monitor and protect for power fail or RAM reset of SOR computers.
19	2	30	SOR Central reset - will provide ability to clear false SOR latches at Central.
20	2	31	SOR alternate strategies - need procedures and hardware required to provide fail-safe operation in event of dual SOR failure.
21	2	32	SOR maintenance procedures - evaluation of required PM's to maximize SOR reliability.
22	2	34	Yard departure test - need to redesign sequence and test to correct present malfunction.
23	3	2	Sigma II disc reliability - disc has read transmission errors that cause software failures or create invalid data.
24	3	35	Yard local control areas - propose to change control of switches in Hayward Yard. Present method results in switches being lined under cars - safety problem. Federal money requested.
25	3	36	Hayward Yard switch controls - remove capability of tower controller to override interlocking protection of switches.
26	3	51	Noise level measurements - have been made in entire control center complex to avoid or diminish distracting noises. This could be a hazard to train controllers under stress situations.
27	4	15	Central train control enhancement - will provide Central with capability to impose zero speed code to a train anywhere on the system. Related to R60 incident. (No BART priority.)
28	5	26	Monitor and control resolution - improve track circuit display and control resolution in conjunction with replacement of control system. (Five years.)

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PLANT/FACILITIES

PUC #	Priority #	BART #	Description
29	2	10	Car retarders on Hayward Test Track - needed at both ends of track as a back-up should brakes fail to stop train.
30	2	3	Maintenance access crossings - plan to install three more at stategic locations to shorten on-rail mileage and traveling time. This should alleviate the probability of human error in moving such equipment.
31	5	7	Spurs and pocket tracks - new tracks at strategic locations for storing "BO" trains. Present shortage of such tracks creates undue stress on Central personnel and equipment when trains "bomb out" and there is no set out track nearby.

VEHICLE SYSTEM

PUC #	Priority #	BART #	Sub-System	Description
32	1	12	Door Sub-system	Failure mode analysis, reliability improvements and improved maintainability - to identify causes of inadvertent door openings while car is in motion or outside of platform.
33	1	13	Vehicle ATO	Speed decoding - to identify causes of failure to properly decode speed commands from wayside (Fremont, Oakland Wye), which causes overspeed.
34	2	1	Propulsion	T/M Flashover Minimization
35	2	2	Propulsion	Dead Car Minimization
36	2	4	Propulsion	Reverser flashover and wheel reversal elimination - condition causes wheel and track damage - a hazard.
37	2	6	Friction Brake	Friction brake logic analysis - early brake application access, unnecessary wear, heat, and failure of discs.

PUC #	Priority #	BART #	Sub-System	Description
38	2	18	Auxiliaries	M/A set - failure on "A" cars results in no headlights while moving to nearest yard and no air conditioning on any car - could cause sickness and fainting.
39	2	30	Truck and Suspension	Training - expansion of technical training and certification.
40	3	10	Annunciation	Annunciation display and information - present display does not provide sufficient or adequate details to indicate malfunctions.
41	3	22	Truck and Suspension	Derail bar - redesigning brackets to prevent undesired breakage and falling off. Also, plan to remove two from "B" cars - on opposite corners only. Loose or broken bars can cause stress to the entire system and Central Control.
42	4	20	Truck and Suspension	Wheels - combination aluminum/steel wheels are migrating laterally. BART looking at all steel wheels.

ELECTRIFICATION

PUC #	Priority #	BART #	Description
43	1	2	Eliminate shock hazards at platforms - testing three types of car body coatings to protect metal and eliminate shock.
44	2	7	Better personnel protection - need to improve equipment and procedures.
45	2	11	Improve fence grounding at Hayward Yard - now a shock hazard.
46	2	26	Improved fire resistance for equipment adjacent to d.c. equipment in Transbay Tube.

PUC #	Priority #	BART #	Description
47	3	3	Eliminate 1000 volt d.c. switchgear flashovers - provide separate feeder breakers with higher insulation.
48	3	4	Better control circuit protection - circuit breaker closing coil has excess voltage problem and needs better insulation.
49	3	5	Inadvertent breaker operation - corrective action, same as #3.
50	3	6	Better fault protection - installation of additional protection equipment for circuit breakers.
51	3	8	Improve main breaker insulation.
52	3	9	Cathodic protection for bay tube - to reduce corrosion of steel shell, rebar, etc., where failure could result in leaks.
53	3	12	Minimize corrosion of San Francisco approach tunnels - same problem as #9.
54	3	16	Improve testing program for protective devices.
55	3	19	Review protective device coordination.
56	3	24	Improve shutter operating mechanism on 34.5 kv breakers.
57	4	1	Reduction of stray currents - can cause corrosion of pipelines and steel work in structures.
58	4	15	Investigate need for fire alarming equipment at sub-stations.
59	4	27	Improve annunciation of 34.5 kv cable low gas pressure alarm.
60	4	28	Improve annunciation of subway trips - need better resolution to identify location.

COMMUNICATIONS

PUC #	Priority #	BART #	Description
61	2	18	On-Board Intercom - mod to be made to correct malfunctions.
62	2	19	On-Board P.A. - mod to be made to correct malfunctions.
63	3	10	Station public address system - equipment at above ground stations could be a safety item if platform is crowded.
64	3	11	Station Intercom - white courtesy phones are silent when handset is picked up. Plan to install dial tone so patrons will know phone is not dead.
65	5	1	Train Radio coverage - may lose this frequency in 1980 and want help to keep it. Also, has 2-100' long gaps on R and C lines. Signs to be posted.
66	5	13	Closed circuit TV - needed to observe overcrowding on platforms.
67	5	17	Yard radio system - need another frequency - overcrowding.