

and the Federal Government have contributed to the development of the existing systems in varying degrees in an uncoordinated effort.

In spite of the fact that the signal systems have been well engineered, the maximum practical level of safety in train operation that can be obtained with signals has not been reached. Technology is available to provide at a reasonable cost the signal systems and appliances to overcome many of the conditions and circumstances which lead to costly collisions.

As long as the safety of train operation depends upon the variable judgments of employees under authority of vague operating rules, accidents will continue to occur. Supervisory pressure to increase production may contribute to defects in judgment on the unsafe side.

The railroad industry is economically unable to make large investments in signal improvements at this time; however, a program of future improvements for the industry should be contemplated.

Systems which allow the engineer to override the train control quickly without a prescribed positive action are unsafe.

At this time, there does not appear to be a system which can be installed economically that will justify the elimination of flagmen. Improvements to existing systems are needed to lessen the possibility of the collision of a following train when a preceding train has stopped near the entering-end of the block. These improvements are technically feasible now.

The absence of standard aspects and indications has led to the development of a variety of aspects composed of combinations of color-light, position-light, and color-position-lights. The large number of variations may contribute to difficulty by engineers in quickly determining what action to take. This also leads to misreading or misunderstanding of what is indicated.

Under the authority of the Safety Inspection Act and the Federal Railroad Safety Act of 1970, FRA has the necessary authority to

promulgate regulations requiring the optimum systems of signals and operating rules.

R-71-45-47

## VI. RECOMMENDATIONS

The Safety Board recommends that:

1. The Federal Railroad Administration develop a comprehensive program for future requirements in signal systems and operating rules that will require as a minimum:
  - a. that all mainline trains be equipped with continuous cab signals in conjunction with automatic-block signals;
  - b. that all passenger trains be equipped with continuous automatic speed control (train control);
  - c. that engineers, in order to nullify a train control device, be required to take a prescribed positive action which would be recorded for later reference;
  - d. that a system be devised to protect trains which stop within 1,000 feet after entering a block from being struck by following trains; and
  - e. that an optimum number of aspects be specified as standard, with deviations allowed only where cause is shown. R-71-45
2. The Federal Railroad Administration develop operating rules, complementary to the signal systems, which are free of vagueness and which specify definitely the circumstances and action to be taken. R-71-46
3. The Federal Railroad Administration, under the authority of the Railroad Safety Act of 1970, establish a program to review current training procedures for employees on the railroad, and on the basis of the results and in cooperation with the railroads and the Association of American Railroads, expand and develop a comprehensive

training program applicable to the various crafts, trades, and personnel employed in the several operational modes. The training program should be subject to periodic review by the

Federal Railroad Administration and should assure, by examination, that those who complete the training are qualified to perform their duties with safety. R-71-47

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ OSCAR M. LAUREL  
Member

/s/ FRANCIS H. McADAMS  
Member

/s/ LOUIS M. THAYER  
Member

REED, Chairman, and BURGESS, Member, were absent, not voting.