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Remote Control Locomotive Operations: Results of Focus Groups with Remote Control Operators in the U.S. and Canada

SUMMARY

The Federal Railroad Administration (FRA) Office of Research and Development sponsored a research project to learn more about remote control locomotive (RCL) operations safety-related issues, lessons learned, and best practices from those most familiar with the equipment and operations. The findings from focus groups with remote control operators (RCOs – see figure 1) in the U.S. and Canada are presented. Seventy-eight RCOs participated in 12 focus groups conducted in four cities from March to May 2003. Focus groups addressed five themes: RCL implementation, training, current RCL operations, prior operating experience, and future RCL operations. RCOs identified and discussed a number of issues related to each theme, and suggested changes for the future. Key themes based on RCO perceptions and experiences include the following: adequacy of RCO training, reliability of RCL equipment, and RCO situation awareness. RCO suggestions addressed these key themes. RCOs also noted three primary areas of improvement before RCL operations are considered for service outside yards: improve training, more reliable equipment, and greater control over the RCL and consist.



Figure 1. Remote control operator



BACKGROUND

Focus groups were conducted with remote control operators (RCOs) in the U.S. and Canada between March – May, 2003. Focus groups with RCOs provided a forum to gather information about operator experiences with remote control locomotive (RCL) operations, to identify potential safety issues, and lessons learned and best practices from those who are most familiar with RCL operations and equipment. Focus groups also provided a means to solicit suggestions on how to improve RCL operations.

In an effort to reduce operating costs and increase efficiency, Class I freight railroads in the U.S. have begun to implement RCL operations in and around railroad yards. U.S. railroads are permitted to use RCL operations as long as they follow all relevant FRA safety regulations. RCL operations consist of three components:

- 1) The locomotive (the RCL),
- 2) An onboard control computer (OCC) that interfaces with the locomotive's controls (and usually mounted somewhere inside or on the RCL), and
- 3) A portable remote control device (RCD; also frequently referred to as a "belt pack," "operator control unit," or simply "the box."). An RCO wears the RCD, usually by means of a vest, and controls the RCL through inputs to the RCD.

Although the technology has been around for decades, the safety implications of using these devices in the U.S. railroad industry, and of reducing crew size in switching operations, have not been clearly discerned and are not fully known. To better understand the safety implications of RCL operations, the FRA Office of Research and Development Human Factors Program and FRA Office of Safety initiated a multi-study RCL operations research program in early 2002. The FRA sponsored three separate studies: a comparative risk assessment of RCL and conventional yard switching operations, a root cause analysis (RCA) of RCL-involved train accidents/incidents, and focus groups with RCOs to identify safety issues and best practices. This report describes the results of the focus groups.

OBJECTIVES

The specific objectives of this research project were to:

- Gather information on operator experiences with RCL operations.
- Discern RCL operations safety-related issues.
- Identify RCL operations "lessons learned" and "best practices."
- Solicit suggestions for how to improve RCL operations.

METHODS

Criteria were first established to help tap into a range of RCO experiences across the U.S. and Canada. These criteria included:

- Identify focus group locations (cities) where RCL operations had been implemented by at least two railroads.
- Identify at least one focus group city east of the Mississippi River and one west of the Mississippi River.
- Conduct focus groups with both switchmen and engineers. Switchmen include all train service employees. Depending on the particular railroad, these employees are variously referred to as switchmen, groundmen, trainmen, conductors, brakemen, yard foremen, or helpers. The title depends on the railroad and the particular function of the position. For example, on some railroads, a switchman responsible for a road train is called a conductor, while the same switchman in charge of a job in a yard is called a yard foreman.
- Conduct at least one set of focus groups in Canada, where RCL operations have been used in some locations for over a decade.

Three focus groups each were conducted in four different locations across the U.S. and Canada. Each focus group used the same set of questions, which concentrated around five major topics:

1. Implementation of RCL operations
2. RCO training
3. Current RCL operations and safety
4. Switchman/engineer experience
5. Other-than-yard RCL operations



Questions asked RCOs to relate their experiences to these five topics. No attempt was made to validate any statements made by RCOs, however.

RESULTS

A total of 78 RCOs participated in 12 focus groups. Participating RCOs came from seven different railroads: six Class I railroads and one regional railroad. Of the 78 RCOs, four were women. The average age of participating RCOs was 40 (range 23-58). See Table 1.

Table 1. Participating RCO railroad experience

	Average (mo)	Range (mo)	Median (mo)
Railroad experience	174	14 - 425	143
Yard experience	144	14 - 425	107.5
Engineer experience	36	0 - 300	0
RCO experience	34	4 - 156	13

Some of the key themes that emerged from the focus groups include:

- *Adequacy of RCO training.* RCOs felt that 2 weeks (wk) of training may be inadequate to fully prepare RCOs, given the added responsibilities and qualitative change to the nature of the job from a switchman or engineer to an RCO.
- *Knowledge of RCL operations.* RCOs felt that other operating employees and management have a limited understanding of RCL operations, resulting in few rules, little guidance on what to do in unusual circumstances, changing and sometimes problematic procedures, cuts of cars that are as long as the remote control zone (RCZ), poor communications between RCOs and management, and inadequate maintenance of equipment. Separately, RCOs said that they have encountered employees who work in the vicinity of, or

with, RCOs who are not familiar with RCL operations and procedures.

- *Perceived reliability of RCL equipment.* RCOs described several types of reliability problems associated with the RCL equipment, including communication failures between the RCD and OCC, frequent error messages, delays in RCL response, and RCL overspeed.
- *Inadvertent activation of the RCD.* RCOs reported frequent problems with inadvertent activation of the RCD. Causes of inadvertent activation include the location of switches, bumping into rail equipment as a result of mounting or dismounting equipment, and use of thick gloves in cold weather.
- *RCO situation awareness.* RCOs report that operating the RCL on the ground away from the locomotive has reduced some of the critical feedback cues (visual and kinesthetic) available to cab-based operators, and consequently reduces their situation awareness.
- *Other-than-yard operations.* A few RCOs were comfortable with the prospect of taking an RCL out onto the main track. However, a majority of RCOs were not comfortable, citing among their reasons that the equipment is currently unreliable, and that they lack the required knowledge and skills to operate on the main track.

RCOs also recommended a number of improvements to RCL operations. Some of these RCO-based suggestions include:

- *Improve RCO training.* Some suggestions were that railroads should employ instructors who have as much experience and knowledge of RCL operations as possible; OJT should cover the entire range of locations, operations and configurations of cuts of cars (one or more cars of any type, with or without the locomotive or RCL) that RCOs will encounter on the job; and training should cover train handling methods and familiarity and knowledge of basic locomotive systems. For the purposes of this report, train handling refers to handling both trains and cuts of cars.
- *Improve RCL equipment.* The most frequently cited suggested improvements include prevention of inadvertent activation of RCD controls; more responsive equipment; and additional control over, and feedback from, the RCL.



- *Improve RCL procedures.* Suggestions include requiring RCOs to protect the point at all times; familiarity training for those who work around RCL operations; and more frequent maintenance of RCL equipment.
- *Standardize operating practices.* There appears to be a need for more standardization of practices and more education to ensure railroad employees are familiar with safe operating practices around RCL equipment.
- *Improve railroad facilities in support of RCL operations.* Suggested improvements include the provision of additional information to an RCO about a cut of cars' proximity to a derail; increased maintenance of switches and switch leads, smaller ballast (crushed rock) to walk on, and more yard lighting.
- *Make adjustments for other-than-yard operations.* RCOs identified three core areas where RCL operations should be improved before any railroad considers taking RCL operations out beyond a railroad yard or surrounding area. The three areas of improvement are: more extensive training (to cover train handling, air brakes, locomotive systems and troubleshooting, communications protocols, and territory familiarization), more reliable and responsive RCL equipment (e.g., the locomotive's brakes must respond immediately to an RCD input), and more information on, and control over, the RCL and consist (e.g., information on air pressure status and access to dynamic brakes). RCOs wanted as much knowledge and control over the locomotive and consist as locomotive engineers have when operating a locomotive conventionally.

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