



Continued Improvements at One C³RS Site

SUMMARY

Human-factors-based solutions, along with process and technology innovations, can make significant contributions to improving safety in the railroad industry. As part of ongoing efforts to address human-factors, FRA implemented the Confidential Close Call Reporting System (C³RS), which includes:

- Confidential reporting of close call or “near miss” events.
- Root-cause-analysis problem solving by a Peer Review Team (PRT), which includes representatives from labor, management, and FRA.
- Implementing and reviewing corrective actions developed in response to close call events —some locally and others with the help of a Support Team made up of senior managers.
- Tracking the effects of each change.
- Reporting the results of changes to employees.

Demonstration pilot project sites included Union Pacific Railroad (UP); Canadian Pacific Railway (CP); New Jersey Transit (NJT); and Amtrak.

FRA has sponsored a rigorous evaluation of C³RS that was designed to answer three questions:

1. What conditions are necessary to implement C³RS successfully?
2. What is the impact of C³RS on safety and safety culture?
3. What factors help to sustain C³RS over time?

This evaluation was organized into baseline, midterm, and final time periods. To protect company confidentiality, specific sites are not identified in this report.

This document is part of a series of *Research Results Reports* that provide the public with the evaluation’s findings [1-4]. This paper discusses the findings from one demonstration site (Site A),

using these data sources: (1) Site A’s decertification and derailment/incident data; (2) the Railroad Safety Culture Survey; (3) interviews with workers, managers, and other stakeholders; and (4) redacted C³RS program data.

Findings at Site A

The evaluation’s results indicated that C³RS has had a positive impact on Site A’s safety performance and its safety culture. Decertifications decreased 31 percent and human factor-caused derailments decreased 41 percent (Figure 1). Safety culture and employee engagement improved, and increased tracking of run-through switches reduced human factors-related incident costs by 53 percent. Figure 2 is an example of a corrective action.

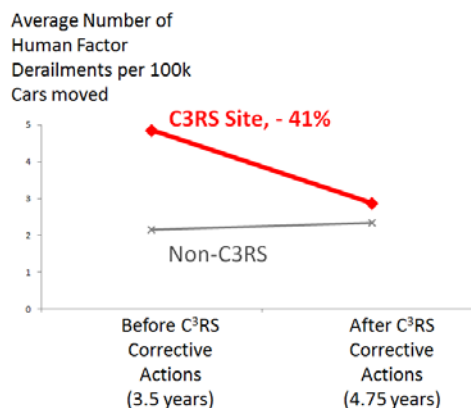


Figure 1: 41% Decrease in Human Factor Derailments



Figure 2: Corrective Action – Job Aid Hang Tags



BACKGROUND

C³RS contains two critical elements:

1) When an employee reports a close call, the report is routed through a neutral third party, either the U.S. Bureau of Transportation Statistics (BTS) or the National Aeronautics and Space Administration (NASA), who anonymizes the reports; and 2) the sanitized information is sent to a joint-labor/management/FRA PRT, which is trained in collaborative Multiple Cause Incident Analysis (MCIA). The PRT conveys recommendations for corrective action to local and corporate management for review and possible implementation [5].

OBJECTIVES

The evaluation's goals were to learn lessons about: 1) implementing C³RS successfully; 2) the system's impact on safety and safety culture, and 3) the conditions necessary for the long-term viability of C³RS (for previous findings see [1-4]).

METHODS

Railroad Safety Culture Survey

The Railroad Safety Culture Survey was administered over five years at baseline (499 respondents), midterm (1,028 respondents), and final (941 respondents). This survey included validated safety culture measures drawn from research literature [6], specific questions concerning beliefs about C³RS, and an open-ended comment section. BTS designed the layout and administered the survey.

Stakeholder Interviews

Phased interviews at Site A were conducted at the beginning of the baseline, midterm, and final phases, and these interviews involved railroad employees and managers both inside and outside of the C³RS program. The interviewees were asked about the impact of C³RS in terms of safety, safety culture, and C³RS program operations. Implementation interviews, which took place throughout the evaluation, involved key stakeholders such as PRT members, senior managers, labor officials, FRA, the Volpe

Implementation Team, BTS, or NASA. Interviewees were asked about key events in C³RS, the program's impact, and its sustainability.

Decertifications and Human Factors

Derailments

The impact of C³RS was measured with corporate statistics on engineering decertifications and human factors-caused derailments.

Decertifications: Under 49 CFR Part 240, FRA's Operating Crew Review Board (OCRB), which was formerly called the Locomotive Engineer Review Board or LERB, arbitrates disputes related to a railroad's decertification of a locomotive engineer's authorization to operate trains (be decertified) if he or she engages in certain types of rule violations. Thus, the number of decertifications is one indicator that shows whether trains are being operated safely by crews or not in compliance with codified railroad operating rules. The violations that apply to C³RS are: Stop, Main Track Authority, Speed, and Brake. The data was normalized by worker hours.

Derailments: All derailments which had monetary damage below and above the FRA incident reporting threshold were analyzed [7]. Data from the baseline period consisted of incidents from 3.5 years prior to C³RS to the time of the first corrective action, while data from the final period began after the first corrective action to the end of the evaluation period (about 4.75 years). Derailments were normalized by the numbers of cars moved.

C³RS Program Data

The evaluation team studied multiple types of C³RS program-related data: (1) MCIA results de-identified by the third party; (2) corrective action documents and databases; and (3) "lessons learned" field notes from the team. This data was used to assess the program's implementation and its outcomes.

RESULTS AT SITE "A"

Improvements in Safety Culture

The Railroad Safety Culture Survey revealed many



significant improvements (see Figure 3). Labor reported improvement in relationships with supervisors, and they also reported an improved view of the organization and its managers. Their views of coworkers did not improve, possibly because the baseline scores were already very high. Also, labor’s willingness to report to C³RS increased.

Managers saw improvements in survey scales related to the organization, management, and coworkers. Managers were more aware of improvements in safety than was labor.

Survey Scale	Manager	Labor
Labor-Management Relations	X	X
Organizational Fairness During Change	X	X
Supervisor Fairness	X	X
Supervisor-Employee Relationships		X
Management Safety	X	X
Raising Concerns with Supervisors	X	X
Work Safety Priorities		X
Respectful Workplace	X	
Coworker Safety	X	

Figure 3: Railroad Safety Culture Scales that Improved from Baseline to Final at Site A

Interviewees See Improvements in Safety Culture and Employee Engagement

Interviews showed improvements in:

- 1) awareness of safety issues and safe behavior (“Filling out a C³RS form makes you think about what happened, so you are less likely to do it again”);
 - 2) the ability to discover switch problems, which reduced derailments and any related costs;
 - 3) labor-management relationships;
 - 4) labor-to-labor communication; and
 - 5) time spent in disciplinary activities.
- Furthermore, senior management valued employee engagement, (“Site A is furthest along in employee engagement of whole railroad.”)

Site A Implemented Many Corrective Actions

Corrective action data indicated that employees submitted close call reports over the entire demonstration period. Corrective actions

addressed derailments, run-through switches, and excess speed. For example, Figure 2 consists of highly visible tags, which are displayed in cabs to remind people of operating procedures in particular circumstances, such as slow orders (Form A) and work around the track (Form B). Others provide a pre-departure checklist. The tags were distributed throughout the system.

Improving C³RS

The evaluation indicated that the C³RS could be improved by: increasing the amount of communication with employees, providing corrective action tracking, and continuing to improve the efficiency of the entire C³RS process.

Reduced Decertifications and Derailments

Decertifications at Site A per worker hour decreased by 31 percent when the first two years of C³RS were compared to the later three years (p-value=0.04). A comparison site did not show any significant change.

A significant reduction in derailments at Site A was measured by two independent methods. First, the analysis compared the C³RS site to a similar site from the same railroad that had not implemented C³RS, and the C³RS site had a statistically significant 41 percent reduction in human factors derailments per 100K cars moved after C³RS corrective actions began (Figure 1). There was no change over time at the comparison site. Significance was tested with a Cox regression on cars moved between, and a Poisson rate occurrence comparison was conducted (both p =0.00) [6]. Next, the team looked at C³RS reports to the third party over time. As expected, when derailments decreased, the reports of derailments decreased 36 percent (comparing derailment and derail reports per 200k worker hours from year 1 to year 5).

Improvements in Tracking Run-through Switches Led to Decreased Incident Costs

Knowledge of close calls and precursor incidents appears to help prevent expensive incidents. For example, knowledge of a run-through switch enables the railroad to fix it quickly and prevent



more costly derailments. Interviewees said that C³RS contributed to better tracking of run-through switches. The data show that this started about 1.75 years into C³RS. Analysis showed that afterward there was a 53 percent decrease in the cost of human factors incidents per cars moved (p-value-0.1). (The 4 years before C³RS plus first 1.75 years of C³RS were compared to the next 3.3 years of C³RS.)

CONCLUSIONS

C³RS contributed to improvements in safety and safety culture at Site A as shown in the interviews, survey, safety data, and C³RS data.

FUTURE ACTION

The evaluation team will collect final data at all C³RS sites and publish their findings.

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CONTACT

Dr. Joyce Ranney

Surface Transportation Human Factors Division
Research and Innovative Technology
Administration
Volpe National Transportation Systems Center
55 Broadway, RVT-81
Cambridge, MA 02142
(617) 494-2095
Joyce.ranney@dot.gov

Dr. Thomas G. Raslear

Chief, Human Factors Research Division
Federal Railroad Administration
Office of Research and Development
1200 New Jersey Avenue, SE – Mail Stop 20
Washington, DC 20590
(202) 493-6346
Thomas.raslear@dot.gov

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