



U.S. Department  
of Transportation  
**Federal Railroad  
Administration**



**RR 16-03 | March 2016**

---

## **SHORT LINE SAFETY INSTITUTE PILOT SAFETY CULTURE ASSESSMENT PROJECT: DEVELOPMENT OF ASSESSMENT TOOLS**

### **SUMMARY**

The American Short Line and Regional Railroad Association (ASLRRA), with the support of the Federal Railroad Administration (FRA) Office of Research, Development, and Technology (RD&T), implementing a Short Line Safety Institute. The ASLRRA and FRA initiated the Institute with a Pilot Safety Culture Assessment Project (Pilot Project), which is focused on short line and regional railroads that transport crude oil.

This report provides more information on developing and pilot testing safety culture assessment tools for the Institute's use.

### **BACKGROUND**

The Institute's goals are: (1) conduct safety culture assessments, which are voluntary and non-punitive, to improve the safety culture on short line and regional railroads; (2) serve as a training and education resource for short line and regional railroads; and (3) serve as a research center that compiles and disseminates information on safety culture, how to improve it, and related issues.

In partnership with FRA RD&T, the ASLRRA implemented the Pilot Project. Then a Project Team, including representatives from the ASLRRA, FRA RT&D, the University of

Connecticut (UCONN), and Volpe National Transportation Systems Center (Volpe), was assembled to support the development of the Institute. UCONN is developing, testing and validating safety culture assessment protocols and procedures, while Volpe is evaluating the development and implementation of the Institute.

To assess safety culture, Institute Assessors visit railroads, review documents related to the railroad's safety procedures, and perform interviews, observations, and surveys with senior leadership, managers, and craft employees. Following the site visit, Assessors analyze the data and document their findings in a written report.

Initial safety culture assessments will be focused on carriers that transport crude oil. Over time, assessments will be extended to carriers transporting hazardous materials and eventually they will cover all short line and regional railroads.

### **OBJECTIVE**

This report describes UCONN's process for developing and pilot testing a web-based safety culture survey for the Institute's safety culture assessments.

## PILOT PROJECT

FRA RD&T worked with UCONN to develop a suite of safety culture assessment tools that included a web-based safety culture survey instrument, field conformance checklists, and interview protocols. The tools assess the degree to which a railroad's core values and behaviors emphasize safety over competing goals (e.g., timeliness), record railroad employees' characteristic patterns of thought and behavior as they relate to safety, and provide a basis for identifying discrepancies between stated values and observable behaviors.

Development and testing of the web-based safety culture survey was performed in three phases:

### **Phase I: Conducting a safety culture measurement literature review**

UCONN reviewed the scientific literature on safety culture, including published journal articles as well as technical reports and white papers. The literature reviewed included (a) theoretical and empirical studies of what constitutes safety culture, (b) factors that influence safety culture, and (c) tools for assessing safety culture.

For each document reviewed, UCONN noted the constructs (i.e., themes) that were used to define and tools that were used to assess safety

culture. UCONN also documented empirical evidence that the constructs were related to safety behaviors and key outcomes (e.g., accidents and injuries).

Then UCONN used the literature review to compile a list of seven constructs which define safety culture and are empirically related to transportation safety outcomes. Constructs were often broken down into distinct facets of a broader construct. When distinct facets of a larger construct were identified, they were listed and briefly defined. For example, Individual Safety Behaviors included several sub-factors, such as safety compliance and personal responsibility for safety.

### **Phase II: Developing the safety culture survey**

After UCONN identified seven safety culture constructs and their sub-factors, they began developing the survey. Where possible, UCONN used individual items and survey measures (i.e., a collection of survey items related to one construct) from previously validated and published safety culture assessments.

### **Phase III: Feedback from Institute partners**

UCONN met with FRA RD&T, ASLRRRA, and Volpe to obtain feedback on the safety culture survey. The language of some items needed to be adapted to be related specifically to the railroad industry. Additionally, an item that measured *concern for public safety* was added.

## RESULTS

The draft safety culture survey contains 7 safety culture constructs and 96 items. The constructs, their sub-factors (when applicable), and example items are listed below.

- Individual Safety Behaviors
  - Sub-factors: Safety Compliance; Safety Participation; Risk Taking Behaviors; and Personal Responsibility for Safety
  - Example: *I ensure the highest level of safety when I carry out my job*
- Training Quality
  - Example: *Employees receive adequate, ongoing training to work safely*
- Safety Communications
  - Example: *Safety communications to employees are timely, frequent, and accurate*
- Organizational Commitment to Safety
  - Sub-factors: Safety Values; Safety Fundamentals; Going beyond Compliance; Respectful Work environment; and Continuous Improvement
  - Example: *Management goes above and beyond regulatory minimums when it comes to issues of rail safety*
- Formal Safety Indicators
  - Sub-factors: Reporting System; Safety Programs; and Reinforcement and Incentives
  - Example: *Employees can report safety discrepancies without fear of negative*

## effects

- Management Commitment to Safety
  - Sub-factors: Procedure Communications; Presence; Resources; Accountability; and Coaching
  - Example: *Managers act promptly when a safety issue is raised to ensure it is understood and appropriately addressed*
- Coworker Behaviors/Helping Behaviors
  - Sub-factors: Coworker Behaviors and Concern for Public Safety
  - Example: *Employees in my group expect others to behave safely*

The survey also includes demographic items (e.g. age, education, marital status) and items related to job satisfaction and turnover intentions.

After developing the survey, UCONN mapped each safety culture survey construct and its sub-factors to the U.S. DOT Safety Council's (DOT SC) *10 Core Elements of a Strong Safety Culture*, which were taught to the Institute assessors during training.<sup>1</sup> For example, the survey sub-factor "safety compliance" relates to DOT SC Core Element #6: Employees Feel Personally Responsible for Safety. An upcoming FRA report will detail UCONN's mapping of the safety culture constructs to the DOT SC's classification of core safety culture elements. The 10 core elements, adapted for railroading, included in the DOT SC's classification of safety culture are:

- Leadership is Committed to Safety
- The Railroad Practices Continuous Learning

- Decisions Demonstrate that Safety is Prioritized Over Competing Demands
- Reporting Systems and Accountability are Clearly Defined
- There is a Safety Conscious Work Environment
- Employees Feel Personally Responsible for Safety
- There is Open and Effective Communication Across the Railroad
- Mutual Trust is Fostered between Employees and the Railroad
- The Railroad is Fair and Consistent in Responding to Safety Concerns
- Training and Resources are Available to Support Safety

#### NEXT STEPS

Pilot testing of the web-based safety culture survey began in Spring 2015. After the survey is administered to the pilot railroad sites, UCONN will assess the survey's performance (length, ease of directions, etc.), and revise it as needed. UCONN will also develop a user guide for the survey and assess the survey's reliability and validity beginning in late 2015.

<sup>1</sup> Morrow, S. (2011). *Safety Culture: A Significant Driver Affecting Safety in Transportation*. A research paper prepared for the DOT Safety Council, Washington, DC. Funding provided by FRA's Office of RT&D to Volpe. May, 2011.

#### ACKNOWLEDGEMENTS

This report would not have been possible without the collaboration and cooperation of many individuals. The authors would especially like to thank UCONN's Janet Barnes-Farrell and Katrina Burch and Volpe's Nicole Boyko and Juna Snow for their review and input into this document. Furthermore, the authors would like to thank the ASLRRA leadership and the Safety and Training Committee for sharing valuable insight on the short line rail industry.

#### CONTACT

##### **Starr Kidda**

Human Factors Program Manager  
Federal Railroad Administration  
Office of Research and Development  
1200 New Jersey Avenue, SE  
Washington, DC 20590  
(202) 493-1300  
[Starr.Kidda@dot.gov](mailto:Starr.Kidda@dot.gov)

##### **Michael Coplen**

Human Factors Program Manager  
Federal Railroad Administration  
Office of Research and Development  
1200 New Jersey Avenue, SE  
Washington, DC 20590  
(202) 493-6346  
[Michael.Coplen@dot.gov](mailto:Michael.Coplen@dot.gov)

#### KEYWORDS

Safety culture, safety culture measurement, training, education, evaluation, short line railroads, crude oil

*Notice and Disclaimer: This document is disseminated under the sponsorship of the United States Department of Transportation in the interest of information exchange. Any opinions, findings and conclusions, or recommendations expressed in this material do not necessarily reflect the views or policies of the United States Government, nor does mention of trade names, commercial products, or organizations imply endorsement by the United States Government. The United States Government assumes no liability for the content or use of the material contained in this document.*