



Federal Motor Carrier Safety Administration

# **Fostering a Safety Culture** **In Small Motor Carriers**

**David Goettee**

**Office of Analysis, Research and Technology  
for the Transportation Research Board**

**Truck and Bus Safety Committee (ANB70)**

**January 11, 2010**



Federal Motor Carrier Safety Administration

## **Participants in the Research**

### **Federal Motor Carrier Safety Administration**

Research Division – David Goettee

Analysis Division – Scott Valentine

### **The SAGE Corporation**

Carmella Campanian, Lew Grill

### **DecisionPath Consulting**

Walter Spiegel

## Structure of Presentation

- Overview of Research Project to give perspective on how we're going to foster adoption of safety culture in small motor carriers.
- Highlights of analysis results from a similar previous training project with New Entrant motor carriers from which lessons learned.
- Next Steps

## Perspective

- Existing approaches to Crash Reduction, e.g., physical roadway design, enforcement, and identification of problem carriers to target, worked effectively. FMCSA is improving on targeting problem carriers with its CSA 2010 initiative.
- These approaches remain effective, but there are opportunities for other approaches to improve safety.

## **Safety Culture**

- The culture of the motor carrier is part of daily processes for making operational decisions
  - TRB Synthesis Report 14 provides suggestions for best practices delivered through the motor carrier's safety department
- That Synthesis Report concludes with a fundamental question – Can a Safety Culture be effectively fostered in a motor carrier too small to have a Safety Officer or Safety Dept?



# Federal Motor Carrier Safety Administration

## **Research with Small Motor Carriers**

- FMCSA can research intervention strategies with small motor carriers using the New Entrant program created by Congress as part of the Motor Carrier Safety Improvement Act (MCSIA) of 1999.
- One of the reasons Congress created this program is because New Entrant Motor Carriers are less safe than established motor carriers. As a group, new entrant motor carriers typically significantly underperform average safety measures.

## **New Entrant Motor Carriers**

- Most New Entrant motor carriers are too small to have a safety officer or program. 94% - 95% of new entrants report 5 or fewer power units.
- We can filter out 'Chameleon Carriers' and those new entrants that really are being set up as new 'branches' of other carriers or corporations that likely provide safety department functionality.



## **General Opportunity**

- NHTSA's alcohol program found that the combination of the "Carrot & the Stick" approach, they called it education and enforcement, actually has a larger impact than either approach alone.
- There is a multiplier effect when both are used in combination.
- Essentially this is the approach being used by CSA 2010 for carriers identified.





## Federal Motor Carrier Safety Administration

### **General Opportunity (cont)**

- Thus was borne this research idea. The New Entrant program already has enforcement components in the form of Safety Audits, roadside inspections, compliance reviews, etc.
- So what would be the result of adding early education for new entrants? Would it effectively foster a safety culture that changes their safety performance?

## Available Data

- There is data available to preliminarily answer the question of whether early training has any significant impact on adoption of a safety culture by new entrants, and its impact on their safety performance.
- Namely, a similar, narrower effort dealing with just regulatory training was carried out in Montana in 2005-6.

## 2005-6 Training

- A Montana contract with The SAGE Corp. provided limited regulations training to all New Entrants in Montana for approximately 15 months.
- It was funded by a New Entrant grant to Montana. FMCSA terminated the grant funding, and thus the contract, because it made a determination that New Entrant grant funds could not be used for training.
- A consequence of the early termination is no analysis of that training was performed.

## **Current Project – Approach**

- Build on lessons learned from the Montana 2005-6 New Entrant training and develop data to support future directions.
- An important step is to analyze data from the 2005-6 project to identify issues needing focus.
- The rest of this presentation and the paper available here, provide initial, preliminary analysis of that data.

## **Safety Performance Measures**

- Direct Measure of Safety – Crash Rate
- Indirect Measures of Safety
  - Inspection Performance,
  - New Entrant Safety Audit Results
  - Driver License Convictions (not yet available),
  - Success in business (not yet available),
- **These are preliminary, initial results subject to Agency review and revision.**

## Statistical Approach

- The Montana Trained Carriers are the intervention group.
- We defined a Control Group of New Entrants.
  - They are from the same time period,
  - From surrounding States with similar population densities,
  - Carriers with more than 15 power units were excluded from the analysis.

## Statistical Approach (Cont)

- Montana 2005-6 trained carriers self-selected into two roughly equal groups:
  - Carriers that both completed the training, AND completed the suggested ‘homework’ (including telephone help available from SAGE if the carrier desired it.) These are called Homework Carriers.
  - Carriers that completed the training, but did NOT complete the suggested homework. These are called No-homework carriers.



## Direct Measures – Crash Performance

Two measures were calculated:

- Crashes per reported power unit - Because of data quality problems with number of power units there was no statistically significant finding.
- Carriers' Drivers' Crash Rates (see preliminary paper for explanation.)
  - Homework Carriers had **statistically significant** (at the **95%** level) lower crash rate than control group.
  - No-homework Carriers had a slightly lower crash rate, but not statistically significant.



# Crashes per Carrier's Drivers

Measure	Control group	Montana Homework Carriers	Montana No-home-work Carriers
Average Number of Crashes per Driver	0.144	<b>0.086</b>	<b>0.124</b>

**Blue** shows significance at the 95% confidence level, **Red** shows significance at the 99.9% confidence level.



# Federal Motor Carrier Safety Administration

## **Indirect Measures – Inspection Results**

- Comparisons included:
  - Inspections with Violations
  - Inspections with Out-of-Service Orders,
  - Inspections with Vehicle Violations,
  - Inspections with Vehicle Out-of-Service Orders,
  - Inspections with Driver Violations,
  - Inspections with Driver Out-of-Service Orders.
- Technical adjustments were made to the expected values for these to make them statistically comparable to deal with differences in patterns of inspection results between States.



## Federal Motor Carrier Safety Administration

### **Indirect Measures – Inspection Results**

- In all measures, Homework carriers' safety performance was substantially better than the calculated expected value from Control Group Carriers and statistically significant at **99.9%**.
- The only measure for No-homework carriers that is statistically significant at the **95%** level was for driver out-of-service orders; in 4 measures, No-homework carriers were slightly better; and in inspections with violations, No-homework carriers were slightly worse.



# Inspections

Measure	Control group	Expected Montana Value	Montana Homework Carriers	No-home-work Carriers
Percent of Inspections with Driver Out-of-Service Orders	10.55%	11.51%	<b>7.63%</b>	<b>8.09%</b>
Percent of Inspections with Vehicle Out-of-Service Orders	22.03%	18.58%	<b>11.49%</b>	18.47%

## **Indirect Measure – Safety Audit Results**

- The Final Rule for New Entrants has 16 automatic failures, and is expected to result in many more failures of the SA.
- That will require remediation, and can result in revocation of the carrier's registration.
- This can create a potential staffing and cost element for both the carrier and FMCSA.
- Based on SA data, we projected the number of carriers that would have failed the Safety Audit under the final rule.

## Indirect Measure – Safety Audit Results

- Homework Carriers performed significantly better than the control group carriers and the difference is statistically significant at the **99.9%** level.
- No-homework carriers scored slightly better than the Control Group, but the difference is not statistically significant.





# Projected SA Failures

New Entrant Group	Total Safety Audits	# of Carriers That Would Have Failed with New Criteria	% That Would Have Failed with New Criteria
Montana Homework Carriers	96	29	<b>30%</b>
Montana No-homework Carriers	87	47	53%
Control Group Carriers	5,303	2,993	56%



# Federal Motor Carrier Safety Administration

## Summary

- The Safety Culture of Homework new entrants produced measurably better safety performance.
- Across a wide range of tests, Homework Carriers' safety performance was significantly better than the Control Group.
- In fact, Homework Carriers' safety performance was so much better they are not significantly different from (and in some case, better than) expected values for the entire population of established carriers.

## Summary (Cont)

- Safety performance of No-homework carriers was, in general, better than the performance of the Control group.
- However, in most tests, the difference was smaller and not statistically significant.
- It is unknown what role the self-selection to not do the homework is the culture determinant of outcome. Namely, was it preconceived culture and attitude, or would performing the homework have made a difference.



# Federal Motor Carrier Safety Administration

## Summary (Cont)

- The difference in Homework carriers safety performance is consistent with training theory. Namely, reinforcement is required to make learning become imprinted.
- The new demonstration will test several things to achieve more reinforcement. These include:
  - Recruit motor carrier mentors to work with SCORE;
  - Require all new entrants to perform the homework.
- The implication of reinforcement may be significant for training considerations if FMCSA should consider proposing training as part of the new entrant program.

## Next Steps

- We have completed a draft detailed work plan for the research demonstration.
- We held a peer review meeting of the research, which included some Committee members.
- Report from that Peer Review will make further recommendations to FMCSA.
- We plan to hold a working meeting next month with a number of partners local to Montana, including the FMCSA Division office and the Montana Department of Transportation.

## Next Steps (cont)

- We project we will begin training by March.
- We might have preliminary findings from that training by the next committee meeting.
- Based on the substantial insights identified by the preliminary analysis, it seems worthwhile to consider expanding support for analysis.
- If additional support is granted, we could have more information to report to the committee next year.