Federal Motor Carrier Safety Administration

CSA 2010

Comprehensive Safety Analysis

CSA 2010 Listening Session: Safety Measurement System and Safety Fitness Determination

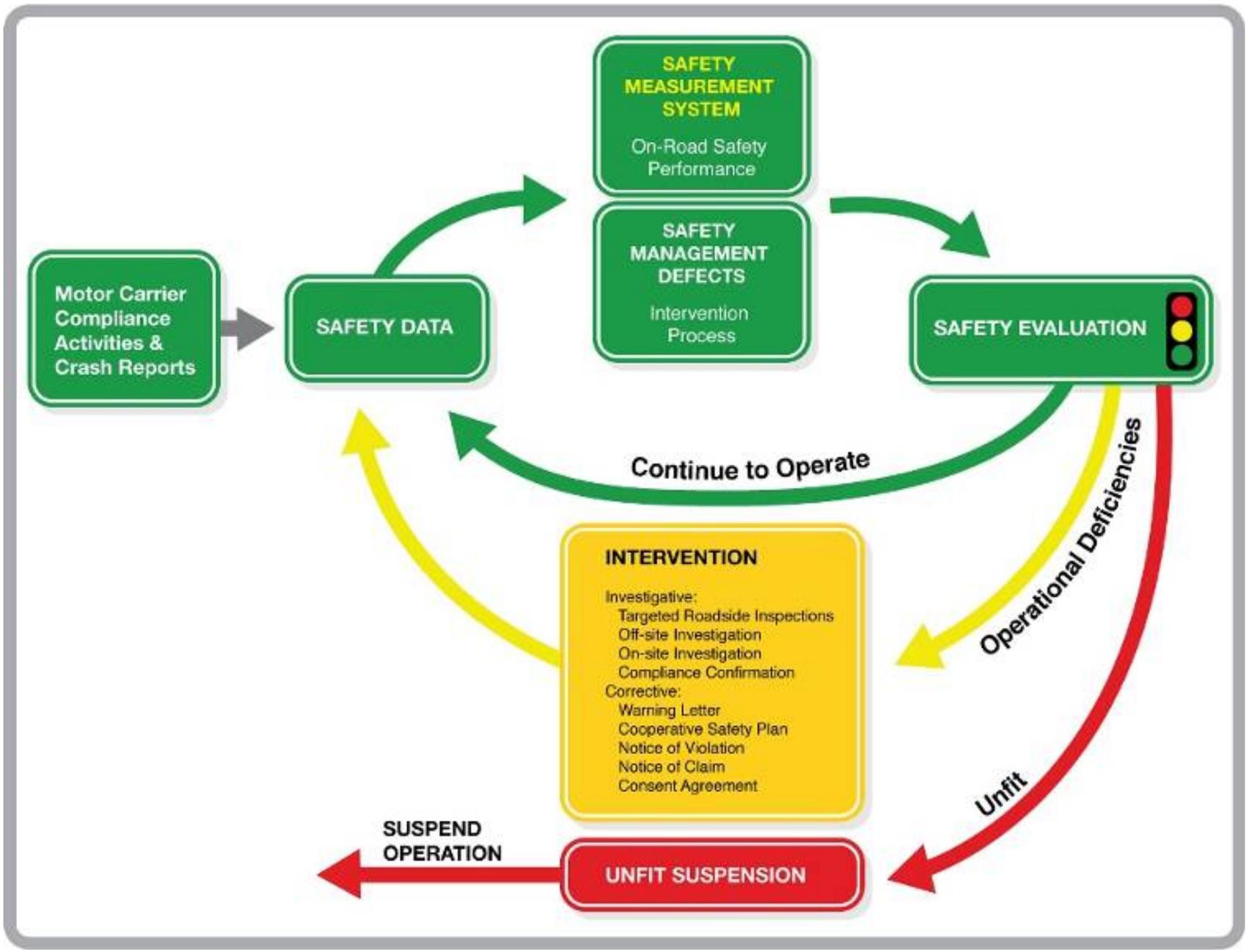
October 16, 2008

Today's Objective

Provide an overview of two CSA 2010 Operational Model components

- Carrier and Driver Safety Measurement System (SMS)
  - Uses in Operational Model
  - Concepts and Methodology
  - Examples
- Safety Fitness Determination (SFD) Process
  - Limitations of existing rating process
  - Approach to new SFD
  - Provide an overview of the supporting analysis and research used to develop SFD

CSA 2010 Operational Model



Measurement System Uses

Quantifies On-road Safety Performance Data to:

- Identify entities for interventions
- Determine what problems need to be addressed by the intervention process
- Monitor safety problems throughout the intervention process to determine if further action is warranted
- Support Safety Fitness Determination (SFD)
- Provide stakeholders with important information to make safety conscious decisions

Measurement System Concept

Measure performance of an entity in each Behavior Analysis & Safety Improvement Categories (BASICs)

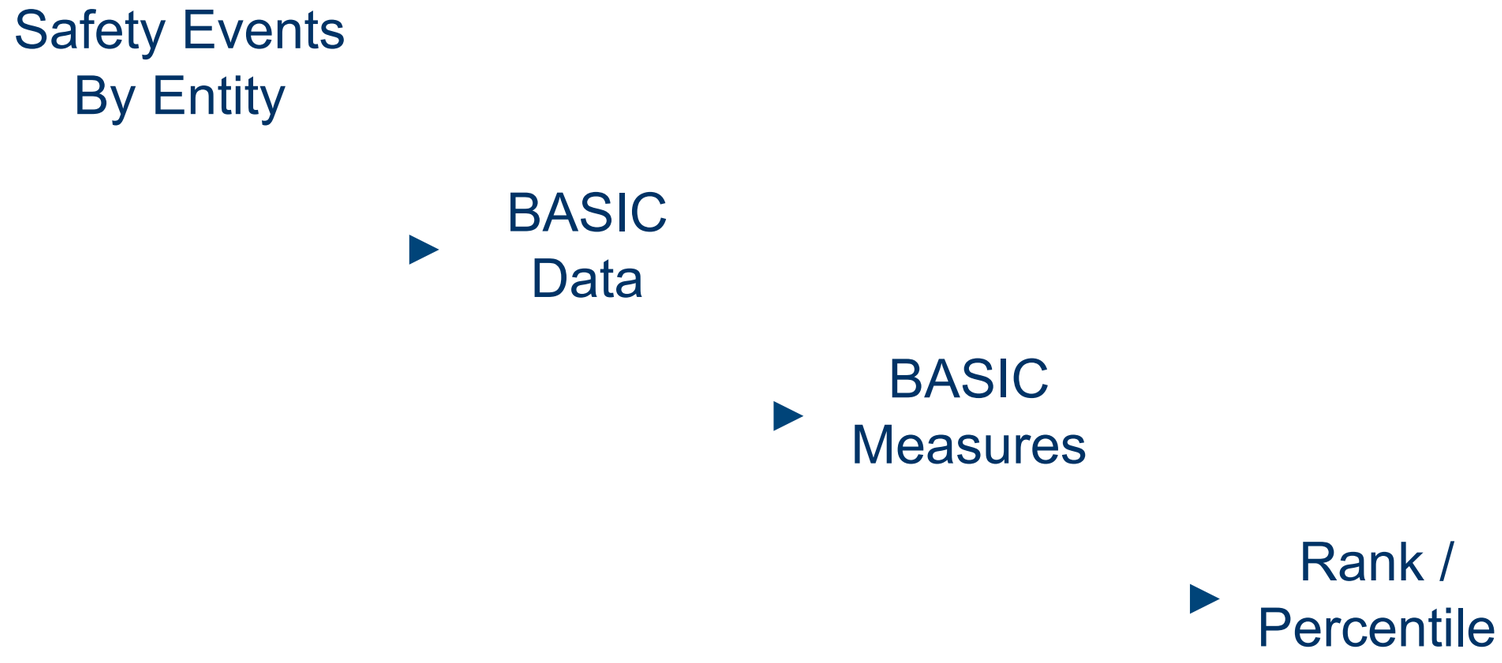
- Methodology designed to weight on-road safety data based on its relationship to crash risk
- Focuses on safety behaviors that lead to crashes

Entities

- Two measurement systems for CSA 2010:
  - Carrier Safety Measurement System (**CSMS**)
  - Driver Safety Measurement System (**DSMS**)
  - Potential to add additional measurement systems in the future
    - HM Shipper

Methodology Overview

1) Obtain on-road safety event data (e.g., inspections, crashes) and attribute to entity to create a safety event history
2) Place each entity's violations/crashes into a BASIC
3) Convert BASIC data to quantifiable measure/rate
   (Safety Fitness Determination will be based on absolute performance)
4) Based on each entity's BASIC measure, develop rank and percentile for each entity's BASIC performance



Safety Events

Safety Event Data Attributed to Entity

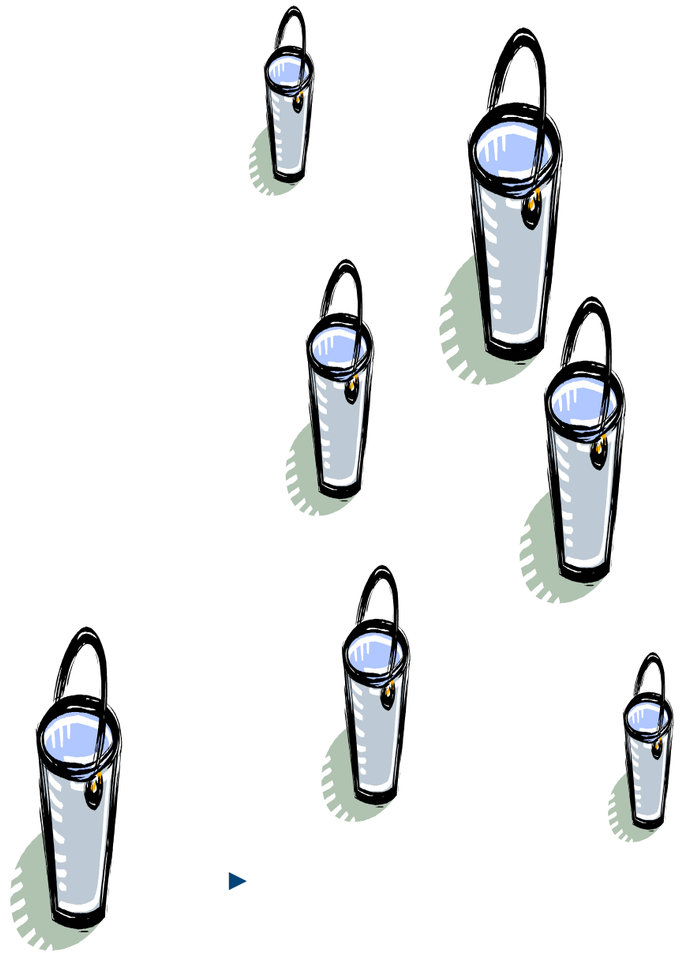
- Carrier Safety Measurement System (CSMS)
  - Includes 24 months of carrier on road safety performance
    - ~6.6 Million inspections
    - ~290 K crashes
    - ~690 K carriers
- Driver Safety Measurement System (DSMS)
  - Includes 36 months of driver on road performance
    - ~9.6 Million inspection records
    - ~440 K crash records
    - ~3.6 Million drivers

SAFETY EVENTS ▸ BASIC DATA ▸ BASIC MEASURES ▸ RANK/ PERCENTILE

BASIC Data

Safety Event Data Sorted by BASIC

- Unsafe Driving (Parts 392 & 397)
- Fatigued Driving (HOS) (Parts 392 & 395)
- Driver Fitness (Parts 383 & 391)
- Controlled Substances /Alcohol (Part 392)
- Vehicle Maintenance (Parts 393 & 396)
- Improper Loading/Cargo Securement (Parts 392, 393, 397 & HM)
- Crash Indicator



SAFETY EVENTS ▸ **BASIC DATA** ▸ BASIC MEASURES ▸ RANK/ PERCENTILE

BASIC Measures

Convert BASIC Data into Quantifiable Measure

Considerations

- **Time Weighting / Time Frame** - More recent events more relevant
- **Severity Weightings** - Increase weighting of violations that have been shown to create a greater risk of crash involvement
- **Normalizing** - Based on exposure: use of number of inspections and power units
- **Single Inspection Cap** – limit violation weight of single poor inspection

SAFETY EVENTS ▸ BASIC DATA ▸ **BASIC MEASURES** ▸ RANK/ PERCENTILE

Unsafe Driving Measure

- Operation of CMVs in a dangerous or careless manner.
  - Examples: speeding, reckless driving, improper lane change
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Violation Severity Weight**
    - based on crash risk: Range from 1-10, where 10 is the most severe
  - **Normalized by Average Power Units**

$$\text{BASIC Measure} = \frac{\text{Sum of Time \& Severity Weighted Violations}}{\text{Average Number of Power Units (PUs)}}$$

Fatigued (HOS) Driving Measure

- Operation of CMVs by drivers ill, fatigued, or in non-compliance with the hours-of-service (HOS) regulations.
  - Examples: HOS, logbook, and operating CMV while ill or fatigued
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Violation Severity Weight**
    - based on crash risk: Range from 1-10, where 10 is the most severe
    - OOS (+2)
  - **Normalized by Relevant Inspections:** Levels 1, 2, 3 and any other inspections resulting in related violations

$$\text{BASIC Measure} = \frac{\text{Sum of Time \& Severity Weighted Violations}}{\text{Number of Time Weighted Relevant Inspections}}$$

Driver Fitness Measure

- Operation of CMVs by drivers who are unfit to operate a CMV due to lack of training, experience, or medical qualifications.
  - Examples: failure to have valid and appropriate CDL, being medically unqualified to operate a CMV
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Violation Severity Weight**
    - based on crash risk: Range from 1-10, where 10 is the most severe
    - OOS (+2)
  - **Normalized by Relevant Inspections:** Levels 1, 2, 3 and any other inspections resulting in related violations

$$\text{BASIC Measure} = \frac{\text{Sum of Time \& Severity Weighted Violations}}{\text{Number of Time Weighted Relevant Inspections}}$$

Controlled Substances and Alcohol Measure

- Operation of CMVs by drivers who are impaired due to alcohol, illegal drugs, and misuse of prescription or over-the-counter medications.
  - Examples: use or possession of controlled substances or alcohol
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Violation Severity Weight**
    - based on crash risk: Range from 1-10, where 10 is the most severe
  - **Normalized by Average Power Units**

$$\text{BASIC Measure} = \frac{\text{Sum of Time \& Severity Weighted Violations}}{\text{Average Number of Power Units (PUs)}}$$

Vehicle Maintenance Measure

- Operation of CMVs having improper or inadequate maintenance.
  - Examples: brakes, lights, and other mechanical defects, and failure to make required repairs
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Violation Severity Weight**
    - based on crash risk: Range from 1-10, where 10 is the most severe
    - OOS (+2)
  - **Normalized by Relevant Inspections:** Levels 1, 2 & 5 and any other inspections resulting in related violations

$$\text{BASIC Measure} = \frac{\text{Sum of Time \& Severity Weighted Violations}}{\text{Number of Time Weighted Relevant Inspections}}$$

Improper Loading/Cargo Securement Measure

- Operation of CMV with potential of shifting loads, spilled or dropped cargo, or unsafe handling of hazardous materials.
  - Examples: improper load securement, cargo retention, and hazardous material handling
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Violation Severity Weight**
    - based on crash risk: Range from 1-10, where 10 is the most severe
    - OOS (+2),
  - **Normalized by Relevant Inspections:** Levels 1, 2 & 5 and any other inspections resulting in related violations

$$\text{BASIC Measure} = \frac{\text{Sum of Time \& Severity Weighted Violations}}{\text{Number of Time Weighted Relevant Inspections}}$$

Crash Measure

- Histories or patterns of high crash involvement, including frequency and severity.
  - Based on state-reported crash records
- Considerations:
  - **Time weight:** 0-12 Months (x2), 12-24 Months (x1)
  - **Crash Severity Weight**
    - Range from 1-3: crashes involving injury/fatality or HM release have more weight
  - **Normalized by Average Power Units**

$$\text{Crash BASIC Measure} = \frac{\text{Sum of Time / Severity Weighted Crashes}}{\text{Average Number of Power Units (PUs)}}$$

FMC-CSA-09-001

Rank/Percentile

Based on each BASIC measure, develop rank and percentile indicating entity's BASIC performance

- Provides a relative assessment of performance
- Allows for prioritizing intervention resources by behavior

- Considerations:
  - **Peer Grouping** - compare measures of entities with similar levels of exposure
  - **Data Sufficiency standards** – define events/exposure necessary to generate a robust measure
  - **SFD/Intervention standards** – define “critical mass” of poor performance necessary for inclusion of entity in intervention process or detrimental SFD
  - **Recency of Inspection Data** – assignment of percentile dependent on age and result of most recent inspection (12 months)

SAFETY EVENTS ▸ BASIC DATA ▸ BASIC MEASURES ▸ RANK/ PERCENTILE

Peer Grouping

- Create percentile based on measure for carrier with similar exposure (same peer group)

Peer Group	BASICs	
	-Unsafe Driving -Controlled Substances/Alcohol -Crash	-Fatigued Driving -Driver Fitness -Vehicle Maintenance -Improper Loading/Cargo Securement
1	0 < PU<= 5	5 – 10 Inspections; (3-10 Fatigued)
2	5 < PU <= 15	11 – 20 Inspections
3	15 < PU <= 50	21 – 100 Inspections
4	50 < PU <= 500	101 – 500 Inspections
5	500 < PU	501+ Inspections

Data Sufficiency

- Minimum number of inspections with applicable violations required for percentile to be assigned

BASIC	Number of Inspections
Unsafe Driving	3
Fatigued Driving	3
Driver Fitness	5
Controlled Substances / Alcohol	1
Vehicle Maintenance	5
Improper Loading/Cargo Securement	5
Crash	2 Crashes

Safety Measurement System vs. SafeStat

Today's Model SafeStat	CSA 2010's SMS
Organized in 4 broad categories --- Safety Evaluation Areas	Organized by Behavior Analysis Safety Improvement Categories (7 BASICs)
Identifies carriers for a compliance review (CR)	Identifies safety performance problems to determine intervention level
Uses only out-of-service (OOS) and moving violations from inspections	Emphasizes on-road safety performance, using all safety-based inspection violations
No impact on safety rating	Used to propose adverse safety fitness determination based on carriers' own data
No risk based violation weightings	Risk based violation weightings
Assesses carriers only	Two distinct safety measurement systems – carriers and drivers

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Example

Carriers Under the Radar with Existing SafeStat System:

Address https://ai.fmcsa.dot.gov/smsweb/carrier_search.asp Go

Google Go Bookmarks 37 blocked Check AutoLink AutoFill Send to Settings

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Comprehensive Safety Information (CSI)

Federal Motor Carrier Safety Administration

Overview | Carrier Measurement | Driver Measurement | Intervention Management | Guidance

SEARCH | REPORT

Performance Search

BASIC: Driver Fitness >=99%

Recommendation: Select recommendation

NARROW SEARCH BY:

Carrier State: New Jersey

Carrier Type: Select carrier type

search

Tip: Use * (an asterisk) for a wildcard search.

Done Internet

Carrier A

Overview | Carrier Measurement | Driver Measurement | Intervention Management | Guidance

SEARCH | SUMMARY | UNSAFE | FATIGUE | FITNESS | DRUG/ALCOHOL | VEHICLE | CARGO | CRASH | HISTORY

Home > Carrier Measurement > Summary

price | Logout

Using January 25, 2008 snapshot

How do I correct my data? Measurement Profile Methodology

Print

Carrier Measurement: Summary

OPERATIONAL MODEL TEST CARRIER TYPE: CONTROL GROUP (edit)

ASSIGNED SI/MGR: N/A

CARRIER INFORMATION			
DOT #:	1111	Carrier Operation:	Interstate
Carrier Legal Name:	Carrier A	Carrier DBA Name:	

Last CR Date:	8/16/2005	Safety Rating:	S
Date of Last MCS-150 Update:	02/27/2007	SafeStat Category:	
Accident SEA:	15.61	Vehicle SEA:	36.76
Driver SEA:	72.25	Safety Management SEA:	

Carrier A: Safety Measurement Results

CRASH ACTIVITY (within 2 years)			
# of Crashes:	10	# of Crashes with Injuries or Fatalities:	5
# of Towaways:	10	# of HM Releases:	0

INSPECTION ACTIVITY (within 2 years)					
Driver Inspections:	329	VH Inspections:	274	HM Inspections:	0

CARRIER SAFETY MEASUREMENT

	BASIC	Measure	Percentile *	# inspections resulting in violation of BASIC
3	Driver Fitness	0.65	99.2	66
5	Vehicle Maintenance	6.00	70.7	191
6	Improper Loading/Cargo Securement	0.73	32.7	16
	INDICATOR			# crashes
7	Crash Indicator	0.11	43.0	10

* The percentile is shaded in yellow when the intervention threshold is exceeded, red when the percentile is greater than or equal to 97% (except for Controlled Substances and Alcohol and Crash Indicator), otherwise there is no shading.

Carrier A: Driver Fitness Violations

INSPECTION SUMMARY (View Detail Report)			
Relevant Inspections:	327	**Peer Group Size:**	101-500 Inspections
Inspections resulting in Driver Fitness Violation:	63	**Number of Driver Fitness Violations:**	84

VIOLATION HISTORY: DRIVER FITNESS

Description	Violation	# Violations	# OOS Violations	Violation Severity Weight
Operating a CMV without a CDL	383.23A2	3	3	3
Driver qualification	391.11	6	1	6
Interstate driver under 21 years of age	391.11B1	1	1	6
Non-english speaking driver	391.11B2	7	4	6
No medical certificate on driver's possession	391.41A	39	0	
Improper medical examiners certificate form	391.43H	1	0	
Expired medical examiner's certificate	391.45B	11	0	

View Detail Data

Select Focus: None | Relevant Inspections | Inspections with Driver Fitness Violations | Generate

Carrier A: Inspections w/ Driver Fitness Violations

DRIVER FITNESS INSPECTION RESULTS (63 records)

	Date		Viol OOS?	Time Weight	Viol Sev. Weight	OOS Weight	Insp Value	Viol Value
1	1/15/2008						2	
	Driver Fitness Violation:	391.11 Driver qualification	N	2	6	0		12
		383.23A2 Operating a CMV without a CDL	Y	2	3	2		10
2	1/12/2008						2	
	Driver Fitness Violation:		N	2	1	0		2
3	12/20/200	391.41A No medical certificate on driver's possession					2	
	Driver Fitness Violation:		Y	2	6	2		16
4	12/7/2007						2	
	Driver Fitness Violation:		N	2	1	0		2
5	12/4/2007	391.15A Driving a CMV while disqualified					2	
	Driver Fitness Violation:		N	2	6	0		12
			N	2	1	0		2
			Y	2	3	2		10
6	11/27/200						2	
	Driver Fitness Violation:	391.41A No medical certificate on driver's possession	N	2	1	0		2
7	11/18/200						2	
	Driver Fitness Violation:		N	2	1	0		2
8	10/29/200						2	

Driver 1

Driver 2

Driver 3

Driver 4

Driver 5

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Individual Driver Example

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SEARCH

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Using Jar

Methodology

Driver

Performance Search

BASIC: Unsafe Driving >=90%

NARROW SEARCH BY:

License State: New Jersey

Search Results

SEARCH CRITERIA: Unsafe Driving: >=90%; State: NJ

Search resulted in 268 driver(s)

Download Data

	DRIVER INFO							BASIC PERCENTILES				
	Last Name	First Name	License #	State	Driver DOB	# Insp	# Crash	Unsafe Driving	Fa... Dr...			
1	Driver 1			NJ		9	1	99.7%				
2	Driver 2			NJ		19	0	99.6%				
7	Driver 7		NJ		8	0	99.2%	94.7%	N/A	N/A	11.9%	N/A	N/A
8	Driver 8		NJ		19	0	99.2%	68.6%	91.7%	N/A	61.6%	N/A	N/A
9	Driver 9		NJ		4	0	99.2%	54.0%	44.6%	N/A	14.1%	N/A	N/A
10	Driver 10		NJ		4	0	99.2%	27.5%	N/A	N/A	81.1%	N/A	N/A
11	Driver 11		NJ		15	0	99.2%	67.1%	N/A	53.7%	45.7%	54.7%	N/A
12	Driver 12		NJ		6	0	99.1%	93.3%	N/A	N/A	61.9%	N/A	N/A

Driver Measurement: Summary

Print

DRIVER INFORMATION			
Last Name:	Driver 2	First Name:	
License Number:	123456	License State:	NJ

OPERATION HISTORY

Date of Most Recent Activities	DOT#
12/1/2007	Carrier A
12/13/2006	Carrier B
3/29/2006	Carrier C
6/15/2005	Carrier D

INSPECTION ACTIVITY (within 3 years)					
Driver Inspections:	19	VH Inspections:	7	HM Inspections:	0

Driver 2: Unsafe Driving Measure and Violations

Driver Name: Driver 2 License 123456 License State: NJ Driver DOB:

DRIVER SAFETY MEASUREMENT: UNSAFE DRIVING	
Measure	Percentile *
65.00	99.6

* The percentile is shaded in yellow when the percentile is greater than 90% except for Unsafe Driving, Fatigued Driving, and Crash Indicator where the percentile is shaded when it is greater than or equal to 85%.

VIOLATION HISTORY: UNSAFE DRIVING

Description	Violation	# Violations
Failure to obey traffic control device	392.2C	1
Following too close	392.2FC	1
Improper lane change	392.2LC	1
Speeding	392.2S	5

View Detail Data

Select Focus: None Inspections with Unsafe Driving Violations Generate

Driver 2: Inspections w/ Unsafe Driving Violations

UNSAFE DRIVING INSPECTION RESULTS (8 records)

	Date	DOT #	Carrier Name	Rpt #	Rpt State	Time Weight	Viol Sev. Weight	Insp Value	Viol Value
1	5/17/2007		Carrier A	44274	IN			3	
Unsafe Driving Violation:			392.2S Speeding			3	5		15
2	12/13/2006			00095	IN			2	
Unsafe Driving Violation:						2	5		10
3	7/5/2006		Carrier B	61683	IL			2	
Unsafe Driving Violation:			392.2S Speeding			2	5		10
4	3/29/2006			79701	NM			2	
Unsafe Driving Violation:						2	5		10
5	1/9/2006		Carrier B	01983	OH			1	
Unsafe Driving Violation:			392.2LC Improper lane change			1	5		5
6	12/22/2005			03103	OH			1	
Unsafe Driving Violation:						1	5		5
7	4/25/2005		Carrier C	00326	AZ			1	
Unsafe Driving Violation:			392.2FC Following too close			1	5		5
8	4/5/2005			04686	MD			1	
Unsafe Driving						1	5		5

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An example of why we are moving to change the formal safety rating process that is currently tied to the on-site compliance review

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CSA2010 Comprehensive Safety Analysis

Carrier B

Overview | Carrier Measurement | Driver Measurement | Intervention Management | Guidance

SEARCH | SUMMARY | UNSAFE | FATIGUE | FITNESS | DRUG/ALCOHOL | VEHICLE | CARGO | CRASH | HISTORY

Home > Carrier Measurement > Summary

price | Logout

Using January 25, 2008 snapshot

How do I correct my data? Measurement Profile Methodology

Print

Carrier Measurement: Summary

OPERATIONAL MODEL TEST CARRIER TYPE: NON-PARTICIPANT (edit)

ASSIGNED SI/MGR: N/A

CARRIER INFORMATION							
DOT #:	33333			Carrier Operation:		Interstate	
Carrier Legal Name:	Carrier B			Carrier DBA Name:			
Carrier Address:	333 B St.			Mailing Address:		333 B St.	
Telephone/Fax:	333-333-3333			Email:			
Number of Power Units:	271			Number of Drivers:		279	
HM Carrier:	No	Passenger Carrier:	No	HHG Carrier:	No	New Entrant Carrier:	No

Last CR Date:	4/12/2007	Safety Rating:	S

CSA 2010 INTERVENTION ACTIVITY
No intervention activity

Carrier B: Safety Measurement Results

CRASH ACTIVITY (within 2 years)

CARRIER SAFETY MEASUREMENT

	BASIC	Measure	Percentile *
1	Unsafe Driving	3.07	81.9
2	Fatigued Driving	3.41	98.4
3	Driver Fitness	0.22	97.7
4	Controlled Substances and Alcohol	0.26	89.0
5	Vehicle Maintenance	10.86	98.8
6	Improper Loading/Cargo Securement	1.07	55.2
	INDICATOR		
7	Crash Indicator	0.23	79.7

Limitations of Current Rating Process

Current Ratings:

- Can only be issued or downgraded with an on-site review – resource intensive
- Represent a snapshot of carrier compliance at the moment of the most recent compliance review
- Do not consider roadside driver inspection performance
- Are based only on violations deemed “critical” or “acute” and vehicle out-of-service violations
- Generally require multiple areas of deficiency for adverse rating
- Only issued to small portion of carrier population

Objectives of proposed SFD Process

- Make carriers accountable for sustained unsafe operations and performance
- Assess larger portion of carrier population
- Move away from agency “seal of approval”
  - Carrier can continue to operate until deficiency identified, focus is on removing high risk carriers from road vs. identifying “good” carriers
- Maximize use of data collected by inspection program
  - ~3 million inspections performed annually

CSA 2010 Safety Fitness Determination Process

Two major components considered in determining SFD for a carrier:

1. On Road Performance - Violations identified during roadside inspections and crash data

AND

2. Intervention Results – Violations identified and data collected during investigations

SFD – Roadside Data

Role of On Road Performance

- 24 months of violation data used to evaluate a carrier in the following BASICs:
  - Unsafe Driving
  - Fatigued Driving
  - Driver Fitness
  - Vehicle Maintenance
  - Cargo Securement
    - Crash and Controlled Substances and Alcohol BASICs cannot fail based on roadside data alone
- Measure exceeding established “absolute” thresholds – results in failed BASIC

SFD – Intervention Data

Role of Intervention Results

- Essential Safety Management Violations
  - Tied to BASICs
  - Discovery of at least 10% of the records checked results in failed BASIC
  - Analogous to “critical” violations of current rating process
- Fundamental Violations
  - Discovery of a single instance during an intervention results in proposed Unfit
  - Largely in line with New Entrant Rule
- Accountable Crashes and VMT
  - Determined onsite during Crash investigation by SI
  - Rate may result in failed BASIC

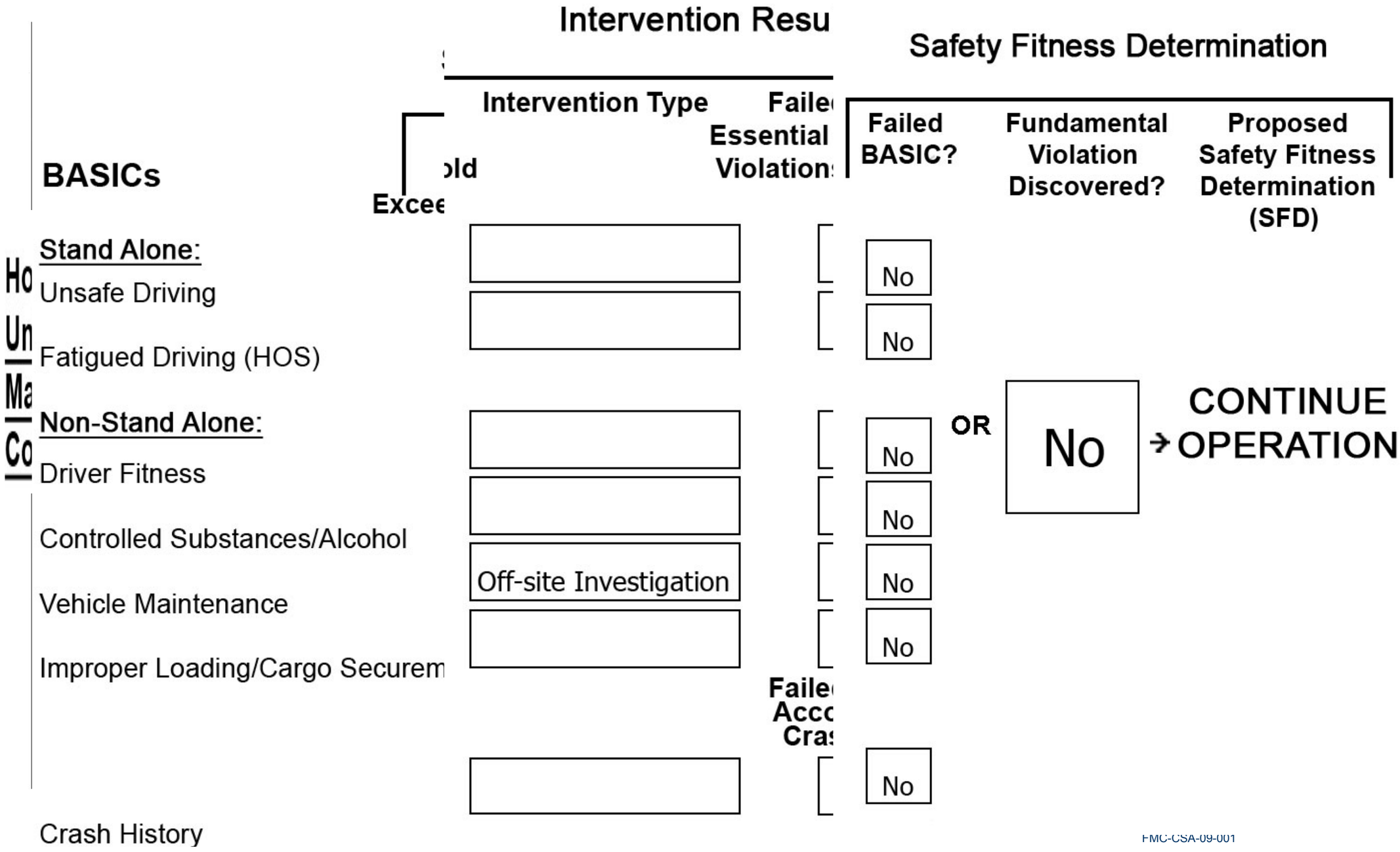
CSA 2010 Safety Fitness Determination Process

- Results of on road performance and interventions are used to determine failed BASICs for a carrier and applied to SFD methodology
- SFD methodology
  - Classifies BASICs as "***Stand Alone***" or "***Non Stand Alone***" according to their demonstrated relationship with carrier crash risk
  - Driven by the carrier's failed BASICs
    - Have any BASICs failed? How Many? Which One(s)?
  - Results in three potential SFDs
    - Continue to Operate
    - Marginal
    - Unfit

Safety Fitness Determination

SFD Methodology			
Number of BASICs: Measure equals or exceeds BASIC Failure Threshold *or* Essential Safety Mgmt Violations Discovered		Discovery of Fundamental Violation?	**Resulting Proposed SFD**
Stand Alone BASICs: Unsafe Driving Fatigued Driving	*Non Stand Alone BASICs:* Driver Fitness Improper Loading/Cargo Securement Crash Indicator Vehicle maintenance Controlled Substances/Alcohol		
1			Unfit
0	>1		Unfit
0	0	1	Unfit
0	1	0	Marginal
0	0	0	Continue to Operate

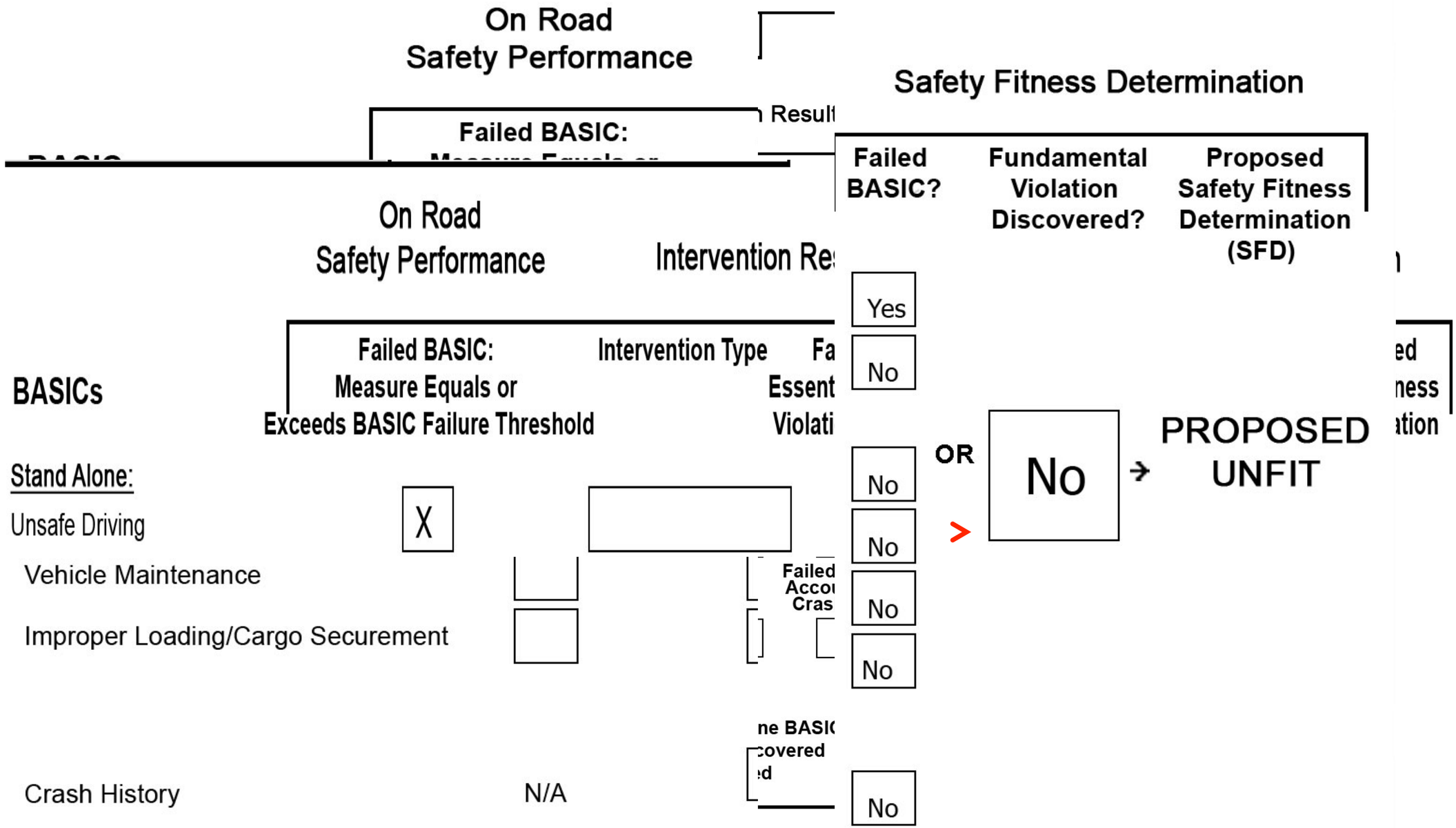
Example: Continue Operation SFD



Example: Proposed Marginal SFD

BASICs	On Road Safety Performance: Failed BASIC: Measure Equals or Exceeds BASIC Failure Threshold	ion Results: e Failed BASIC: Essential Safety Mgmt Violations Discovered	ion	s Determination: ental on ered? Proposed Safety Fitness Determination (SFD)
Stand Alone:				
Unsafe Driving	☐	☐	☐	
Fatigued Driving (HOS)	☐	☐	☐	
Non-Stand Alone:				
Driver Fitness	☐	☐	☐	→ PROPOSED MARGINAL
Controlled Substances/Alcohol	N/A	☐	☐ >	
Vehicle Maintenance	☐	☐	☐	
Improper Loading/Cargo Securement	X	☐	☐	
		Failed BASIC: Accountable Crash Rate		
Crash History	N/A	☐	☐	

Example: Proposed Unfit SFD (Roadside data-driven)



Example: Proposed Unfit SFD (Investigation-driven)

Carrier Name:	Carrier E

On Road

Intervention Results

Intervention Type	Failed BASIC: Essential Safety Mgmt Violations Discovered
On-site Investigation	X

Safety Fitness Determination

Failed BASIC?	Fundamental Violation Discovered?	Proposed Safety Fitness Determination (SFD)
No		
Yes		
No	OR No →	PROPOSED UNFIT
No		

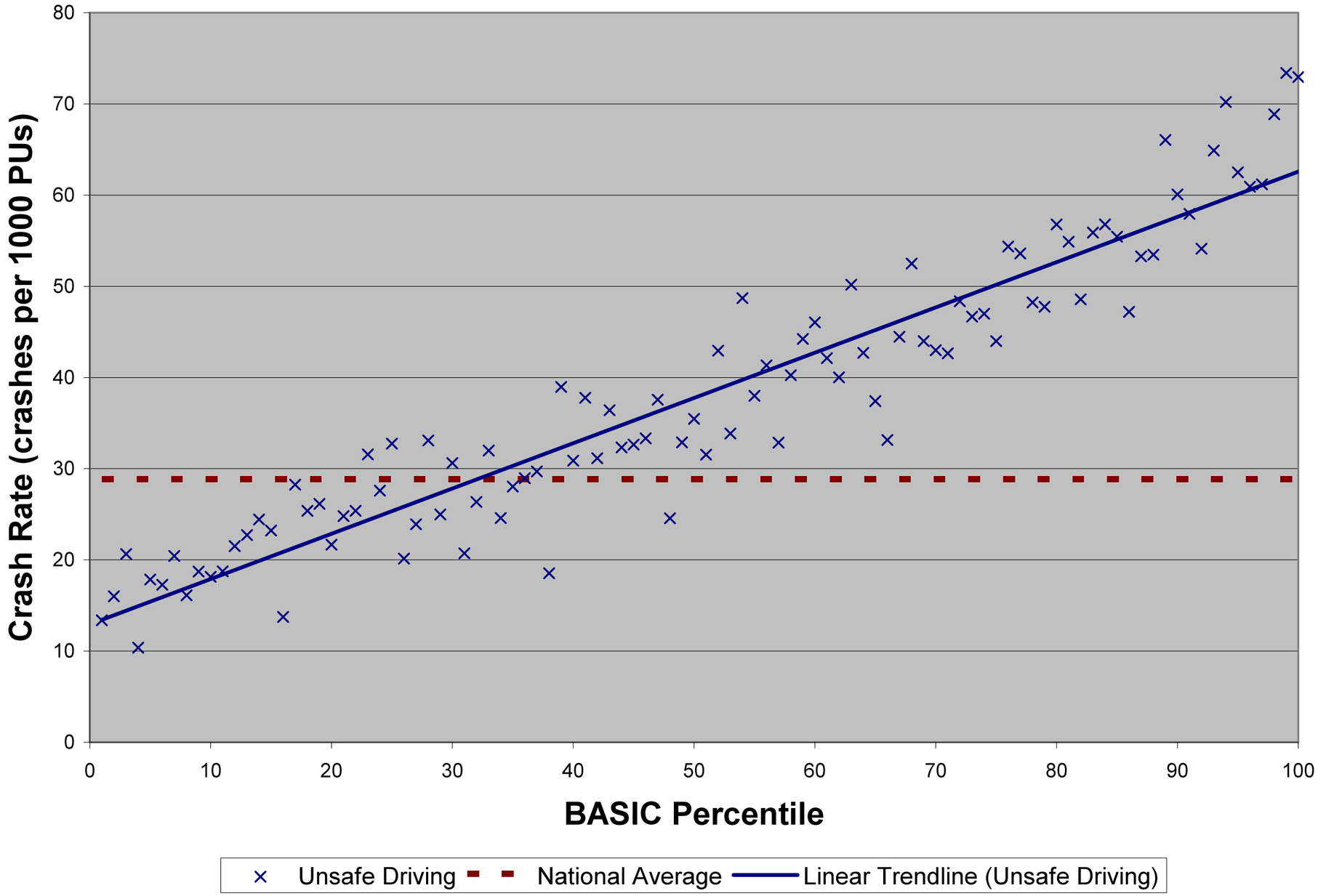
Data and Analysis used in developing SFD process

- Data driven empirical evaluation used to
  - Identify BASICs most closely related to future crash risk
  - Identify absolute BASIC failure thresholds
- Empirical evaluation modeled after SafeStat effectiveness test
  1. Performed a simulated CSMS run that calculates carrier measure and percentile ranks for each BASIC using historical data
  2. Observed each carrier's crash involvement over the immediate 18 months after the simulated CSMS timeframe
  3. Observed the relationship between the measures and percentile ranks in each BASIC and the subsequent post-CSMS carrier crash rates

How were Stand Alone vs. Non-Stand Alone BASICs identified?

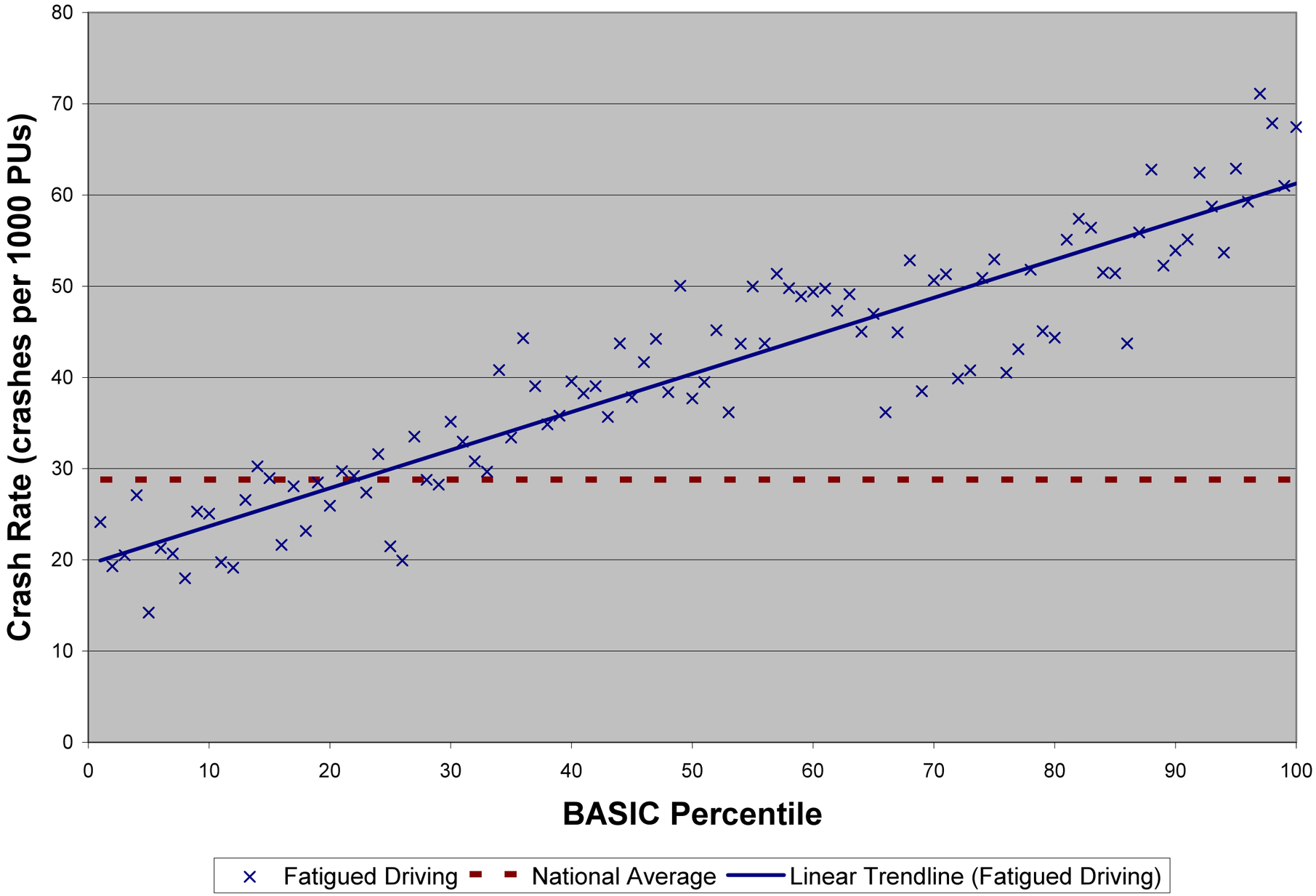
- Utilized effectiveness test results
- Mapped trendlines of BASIC percentile and future crash rates for each BASIC
- Unsafe Driving and Fatigue BASICs had strongest relationship with future crash risk
  - Identified as Stand Alone BASICs where single failure would result in proposed Unfit

Unsafe Driving BASIC Effectiveness Results



FMC-CSA-09-001

Fatigued Driving BASIC Effectiveness Results



FMC-CSA-09-001

How would absolute BASIC failure thresholds be established?

- Utilize effectiveness test results
- Identify absolute measures corresponding to proposed failure percentiles for each BASIC
- Effectiveness:
  - Test results indicate carriers deemed unfit based on roadside data alone have more than twice the average crash risk
    - 1 failed stand alone BASIC; or
    - More than one failed non stand alone BASICs

Safety Fitness Determination Today vs. Proposed CSA 2010 Process

Existing Safety Fitness Rating Process	CSA 2010 Safety Fitness Determination (SFD) Process in Development
Rating only issued or changed with on-site review	SFD can change based on roadside data alone
Rating is a snapshot of compliance on date of compliance review	Safety fitness evaluated on a monthly basis
Rating does not consider roadside driver inspection performance	Adverse SFD can be made based on roadside driver inspection performance alone
Rating based on violations deemed “critical and acute” and vehicle out-of-service violations from inspections	SFD based on violations of all safety-based regulations and evaluation in 7 BASICs ● NTSB Recommendation: H-07-3
Adverse rating generally only issued with multiple areas of deficiency	Adverse SFD will be issued with a single area of deficiency ● NTSB Recommendation: H-99-006
3 rating labels: Unsatisfactory, Conditional, Satisfactory	3 SFD “labels”: Unfit, Marginal, Continue to Operate