Transit Worker Fatigue and Developing Fatigue Risk Management Programs Webinar

July 22, 2026

U.S. Department of Transportation
Federal Transit Administration

Webinar Overview

During this webinar, participants will hear from:

- Federal Transit Administration (FTA) with a discussion about Safety Bulletin 26-01 on Transit Worker Fatigue;
- Center for Urban Transportation Research (CUTR) with in-depth view on the problem of fatigue and methods for addressing fatigue; and
- Washington Metropolitan Area Transit Authority (WMATA) with its perspective on how to address fatigue in rail and bus operations using its Fatigue Risk Management Program.

Speakers are:

- Ethan Novak, Program Analyst, Office of Safety Oversight, FTA
- Lisa Staes, Director of Transit Safety and Workforce Development Programs, CUTR
- Sofia Dellis, Human Factors Program Specialist, WMATA

Transit Worker Fatigue

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Office of Transit Safety Oversight

July 22, 2026

U.S. Department of Transportation
Federal Transit Administration

Agenda

- About Transit Worker Fatigue
- Fatigue-Related Incidents
- Federal Oversight of Transit Worker Fatigue
- Safety Bulletin 26-01- Transit Worker Fatigue
- Recommended Mitigations in Safety Bulletin 26-01
- Additional Resources

About Transit Worker Fatigue

Exhaustion and Transit Worker Performance

Research shows **fatigue harms transportation workers' performance, health, and safety**.

The symptoms of fatigue can appear in different ways:

- General Physical Signs
- Cognitive Symptoms
- Extreme Exhaustion

Fatigue In Safety Critical Industries: Impact, Risks and Recommendations, National Safety Council, 2017

The Impact of Fatigue on Safety

Studies and medical research indicate that fatigue can negatively affect transportation worker performance, as well as worker health and safety.

Percentage of employers in the transportation industry:

97%

Reported feeling the impact of fatigue.

66%

Reported decreases in productivity due to fatigue.

45%

Reported that they experienced safety incidents due to fatigue-related issues.

Fatigue In Safety Critical Industries: Impact, Risks and Recommendations, National Safety Council, 2017

Fatigue-Related Incidents

Select Fatigue-Related Transit Safety Events

September 2025: San Francisco Municipal Transportation Agency

A train overran its station at high speed, causing **several passenger falls** and requiring an evacuation. The operator was working a **double shift** and had received **less than five hours** of restorative sleep.

December 2024: Milwaukee County Transit System

A bus struck two pedestrians, resulting in **one fatality**. The operator had worked **four consecutive 14-hour shifts** and had **only six hours of sleep**.

Select Fatigue-Related Transit Safety Events

November 2004: Washington Metropolitan Area Transit Authority

Two trains collided at Woodley Park station, resulting in approx. **20 hospital transports** and **$3.45 million in property damage**. The train operator had only eight hours off between shifts and had **not had enough sleep**.

March 2014: Chicago Transit Authority

A train collision at O'Hare Station injured **33 passengers** and caused **$11.1M in damages**. The operator fell asleep **after 12 consecutive days/nights of work**.

Overall Transit Worker Fatigue Safety Data

Through analysis of NTD reports, follow-up investigations, and media coverage, the FTA has identified 137 safety events since 2014 where transit worker fatigue was a factor.

Federal Oversight of Transit Worker Fatigue

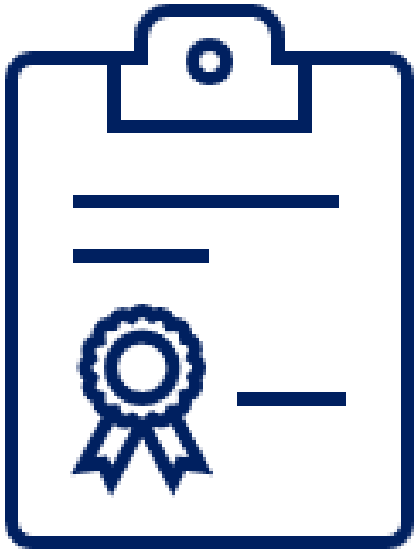
Fatigue Oversight Across USDOT Modes

MODE/AGENCY	PRIMARY FATIGUE REGULATIONS
Federal Motor Carrier Safety Administration	• Hours of Service • Electronic Logging Devices • Fitness for Duty
Federal Aviation Administration	• Hours of Service • Fitness for Duty • Fatigue Risk Management System with minimum required elements
Federal Railroad Administration	• Hours of Service • Fatigue Risk Management Program with minimum required elements

NTSB Recommendations

The National Transportation Safety Board (NTSB) has open fatigue-related recommendations to FTA dating back to 2014:

- R-15-018: Develop a scheduling program for rail transit agencies that incorporates fatigue science
- R-15-019: Develop hours of service regulations
- R-15-020: Identify and require necessary training and certification for work schedulers.
- R-15-021: Require transit agency training on science-based scheduling practices to mitigate fatigue risks



State of Transit Industry Fatigue Requirements

Transit remains the only major transportation mode without federal hours-of-service mandates.

Current Policies

In response to a 2024 RFI, 129 transit agencies reported having Hours of Service requirements, and 41 reported having a formal FRMP

Primary Safeguard

Agency-level programs serve as the **primary safeguard against fatigue-rated risks** in transit operations.

Timeline: FTA Actions on Transit Worker Fatigue

**FTA withdrew the ANPRM on July 1, 2025.*

Safety Bulletin 26-01

Transit Worker Fatigue

Publication of the Safety Bulletin

FTA published a Safety Bulletin 26-01 recommending that transit agencies subject to the Public Transportation Agency Safety Plan (PTASP) regulation consider assessing transit worker fatigue-related risks by applying data-driven strategies.

These strategies can help transit agencies **better identify, assess, and mitigate fatigue-related risks** to improve the safety of transit workers and the public.

View the Safety Bulletin.

Safety Bulletin 26-01 Recommendations

FTA recommends that transit agencies subject to PTASP regulation assess fatigue risks using:

Safety Management Systems (SMS) principles → Safety Risk Management (SRM) procedures

SMS and its SRM process, established in **Agency Safety Plans,** should be used to assess safety risk associated with transit worker fatigue

Applying Data-Driven Strategies to Fatigue-Related Risk

FTA recommends in Safety Bulletin 26-01 that transit agencies subject to the Public Transportation Agency Safety Plan regulation consider assessing transit worker fatigue-related risks by **applying data-driven strategies** from their Safety Management System

Hazard Identification

Risk Assessment

Risk Mitigation

Risk Assessments

When assessing fatigue-related risks, agencies are encouraged to consider:

Hazard Identification

Employee Groups Vulnerable to Fatigue Related Errors

- Safety-sensitive employees
- Dispatchers
- Supervisors
- Maintenance staff

Conditions Particularly Vulnerable to Fatigue

- Split-shift assignments
- Operations on long routes
- Operations during late-night or extended work shifts

Safety Risk Assessment

- The likelihood of fatigue contributing to operational errors or safety events.
- The severity of potential consequences using insights from the effectiveness of existing safety risk mitigations.

Recommended Mitigations in Safety Bulletin 26-01 Transit Worker Fatigue

Managing Fatigue

FTA recommends PTASP-covered agencies improve safety by considering the following industry practices:

- Developing or enhancing **Fatigue Risk Management Programs**
- Using scheduling practices that **ensure adequate rest** between shifts
- Providing specialized training:
  - **Scheduling training** that ensures schedule policies and mitigations are implemented
  - **Fatigue awareness training** for schedulers, workers, and supervisors
- Establishing **Fatigue Reporting Programs** that are confidential/non-reprisal

Denver RTD, fatigue-related collision, 2023
Photo from 9NEWS (KUSA-TV) Denver

Fatigue Risk Management Program (FRMP)

Transit agencies may consider developing or enhancing FRMPs to:	
✓	Clearly define agency roles and responsibilities.
✓	Provide training on fatigue risks, mitigation strategies, and agency policies.
✓	Implement hours-of-service limitations and scientifically informed work scheduling practices.
✓	Enhance Safety Assurance processes through program auditing, data analysis and mitigation monitoring.

Work Scheduling Practices

To ensure adequate rest between shifts, consider implementing effective work scheduling practices that:	
✓	Set predictable work and rest schedules when possible.
✓	Adhere to limits on total hours-of-service and consecutive days worked.
✓	Regularly review scheduling data to ensure actual work hours align with policies.
✓	Adjust scheduling practices for fatigue intensive assignments.

Work Schedule Training

Work schedule training may include initial and recurrent instruction for schedulers. Curriculum may include:	
✓	Identifying scheduling patterns that elevate fatigue risks.
✓	Understanding fatigue science and the impacts of circadian rhythm disruptions and sleep debt.
✓	Addressing unavoidable operational constraints, including mandatory overtime, while maintaining safety.
✓	Documenting and reporting fatigue-related scheduling issues.

Worker Fatigue Awareness Training

Fatigue awareness training may include:	
✓	Recognizing signs of fatigue and how to report fatigue-related concerns.
✓	Understanding proper sleep hygiene, circadian rhythm awareness, and the health impacts of chronic sleep loss.
✓	How a supervisor should respond when an employee reports fatigue.

Fatigue Reporting Programs

Consider establishing fatigue reporting programs that are confidential/non-reprisal, including industry practices such as:	
✓	Allowing frontline personnel to confidentially report fatigue concerns or insufficient rest.
✓	Feeding information directly into SRM and Safety Assurance processes for hazard identification, risk assessment, and mitigation monitoring.
✓	Including mechanisms to analyze reports for trends.
✓	Providing feedback to employees to reinforce trust and demonstrate the value of reporting.

Performance Measures

Once mitigations are identified and implemented, an agency should use its Safety Assurance process (49 CFR § 673.27) to monitor their effectiveness.

FTA recommends the transit agency develop performance measures to evaluate the effectiveness of any implemented fatigue-related mitigations, using data such as safety events and near misses.

View the PTASP Safety Assurance requirements.

Conclusion

Fatigue Management & Communication

Establishing a Culture of Safety

- Foster **free and open communication** between the agency and its employees (ROW workers, operators, mechanics, etc).

- Prioritize **fitness for duty** by giving space for real conversations about physical and mental readiness.

Additional Resources

Fatigue Resources for Transit Operations

All humans need sleep and a lack of sleep leads to fatigue. FTA has gathered resources to support the transit community in understanding and addressing fatigue in the workplace:

- **Understanding Sleep**
- **Causes of Fatigue**
- **Symptoms & Warning Signs**
- **Effects of Fatigue**

Fatigue Resources

Thank you!

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U.S. Department of Transportation
Federal Transit Administration

Fatigue in the Public Transportation Industry

Challenges, Evidence, and Best Practices for Transit Agencies

Center for Urban Transportation Research (CUTR) // July 2026

CUTR
Center for Urban Transportation Research

UNIVERSITY of SOUTH FLORIDA

Outline

- Understanding Fatigue
- Case Study
- Best Practices/Recommendations for U.S. Transit Agencies
- Conclusion

Understanding Fatigue – a Systemic and Prolific Occupational Health Issue

Fatigue: Definitions, Types & Mechanisms

Two Primary Types[1]

- **Sleep-related fatigue:** insufficient or poor-quality sleep; circadian disruption from shift work
  - The circadian trough (2–6 a.m.) represents the highest-risk operating window for transit operators
  - Obstructive sleep apnea (OSA)
  - Secondary employment
  - Work and non-work-related stressors
- **Task-related fatigue:** sustained cognitive effort during extended duty periods

Both impair performance, are prevalent in transit environments, and bring HIGH SAFETY RISK

Fatigue: Definitions, Types & Mechanisms

Physiological Consequences[2]

- Impaired attention and reduced vigilance
- Slowed reaction times
- Degraded decision-making under time pressure
- Microsleeps

35mph/2 sec microsleep = 100+ ft of uncontrolled vehicle travel

Operational & Financial Consequences of Fatigue

Injuries and fatalities

Impaired Decision-making[3]

Anxiety and depression[4]

Lost productivity[5]

Absenteeism and turnover

Operational & Financial Consequences of Fatigue

Service disruptions

Increased equipment wear

Insurance and disability claim costs

Legal exposure

Contributors to Transit Operator Fatigue

Workforce & Scheduling Factors

- 90%+ of small/rural agencies reported driver shortages in 2023 (Transit Workforce Center)[6]
- Overtime and on-call assignments deny operators adequate recovery time
- 72.6% of transit bus drivers are aged 50+ — more vulnerable to cumulative sleep debt[7]
- Split shifts fragment sleep: operators may have fewer than 6 hours available between duty periods
- Lengthy commutes
- Optibus (2024): 2 in 3 drivers say they would stay if scheduling and communication improved[8]
- Predictable schedules are a workforce retention and safety imperative

Contributors to Transit Operator Fatigue

Medical & Regulatory Gaps

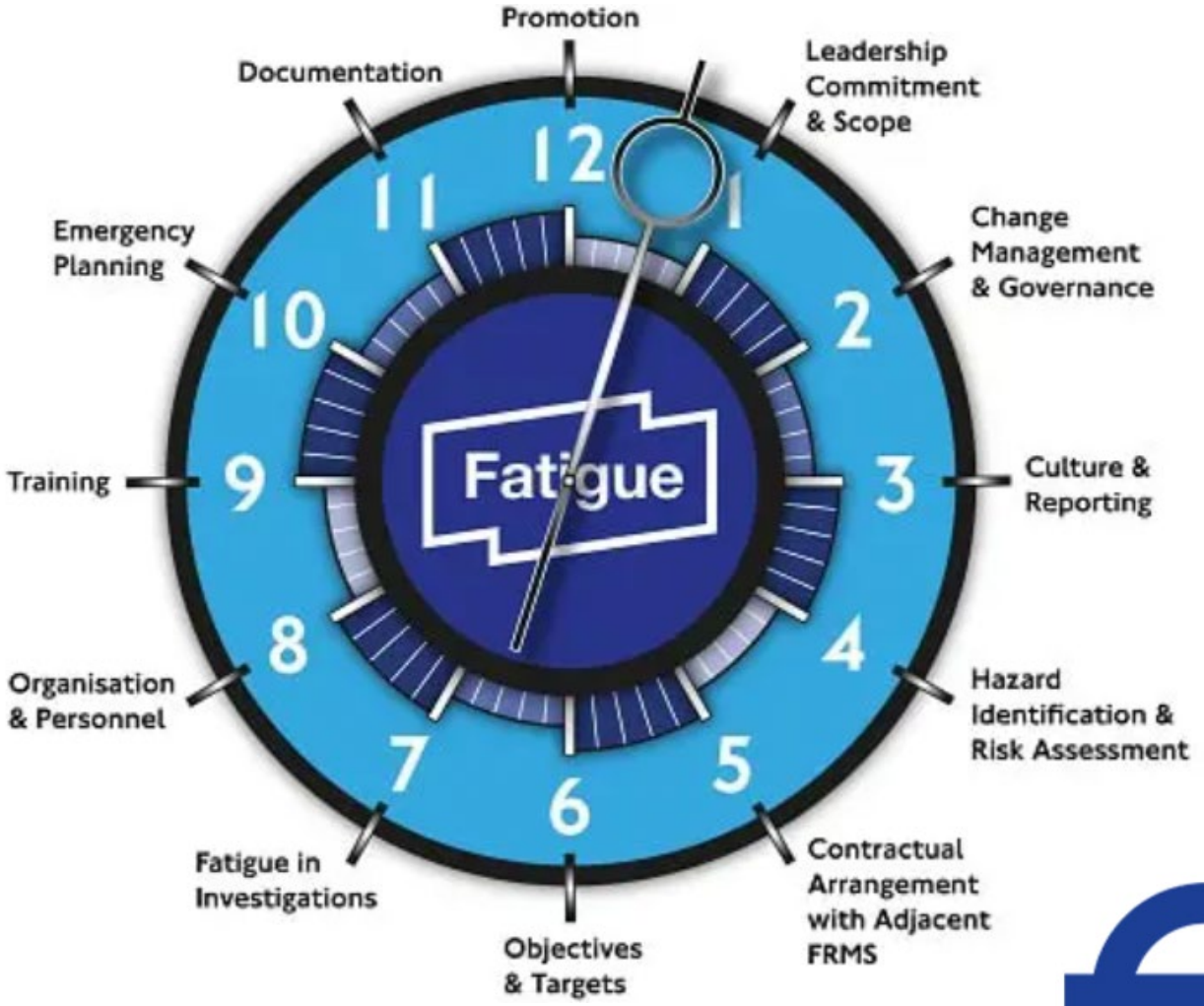
- Night and rotating or split shifts conflict with human circadian biology — peak sleepiness at 2:00 – 6:00 AM
- OSA[9] (frequently undiagnosed in transit operators — absent proactive screening programs)
- Unlike trucking (FMCSA) and aviation (FAA), transit has no federal HOS minimums / individual agencies and/or states variable
- 77% of SSO agencies have no HOS requirements[10]
- 78% of rail agencies have fatigue policies, but fewer than half allow on-property napping[11]

Persistent Gaps & Challenges

- Inconsistent data
- Workforce shortage cycle
- Technology adoption gaps
- Contractor blind spots
- Limited resources and technical capacity
- Labor-management gaps
- Employee external stressors

Case Study - Transport for London Fatigue Management Plan (Pan-TFL)

Pan-TfL Fatigue Management Plan – 12 Activity Areas



Source: Transport for London

TfL Targeted Fatigue Training[12]

- Fatigue Awareness at TfL – **targeted at all employees**
- Managing Fatigue at TfL – **targeted at managers**
- Fatigue and Shiftwork Awareness – **targeted at those who work shifts**
- Fatigue Awareness for Schedulers – **targeted at colleagues who manage, update or otherwise interface with schedules and rosters**

TfL Fatigue Management Plan

- ***Managing Fatigue*** handbook supplemented by a family & friends guide – Fatigue and Shift Work Awareness
- Business intelligence app developed to aggregate fatigue-related incident trends across the organization
- Fatigue embedded as a formal inquiry requirement in all incident investigations
- Face-to-face briefings with night workers – called the “Night Club” and other hard-to-access employees
- Noted as among the most advanced transit fatigue management programs

Best Practices/ Recommendations for U.S. Transit Agencies

Best Practices: Scheduling Reform & Work Design

- Minimum off duty hours: 10 hours between shifts[13] (measured from actual shift end) – common in the research
- Limit split shifts - tripper runs, extraboard (dedicated peak crews reduce sleep fragmentation)
- Schedule predictability and self-rostering improve sleep quality and retention
- Voluntary napping (10–20 min): 43% of rail agencies already permit; quiet rooms provided
- APTA recommended practice: no more than 6 consecutive days for safety-sensitive operators

Best Practices: Medical & Training

- OSA screening (STOP-BANG) at all physicals for safety-sensitive roles
- Facilitate CPAP access and monitor treatment compliance
- Employee assistance
- Fitness for duty screenings, evaluations, or warning signs
- Incident investigator training – use of FTA's Fatigue Risk Assessment Worksheet
- Role-differentiated training
- Face-to-face briefings

Best Practices: Technology Solutions

- Fatigue modeling software
- Driver Drowsiness and Attention Warning (DDAW) systems on new buses EU mandate by July 2024[14]
- Business intelligence dashboards to aggregate and trend fatigue incident data agency-wide
- Non-punitive self-reporting systems

Best Practices: Technology Solutions

- Fatigue detection, including real-time monitoring[15, 16, 17]
- Wearable actigraphy: objective sleep data — Edinburgh Trams and Debrecen transit piloting[18]

Best Practices: Technology Solutions

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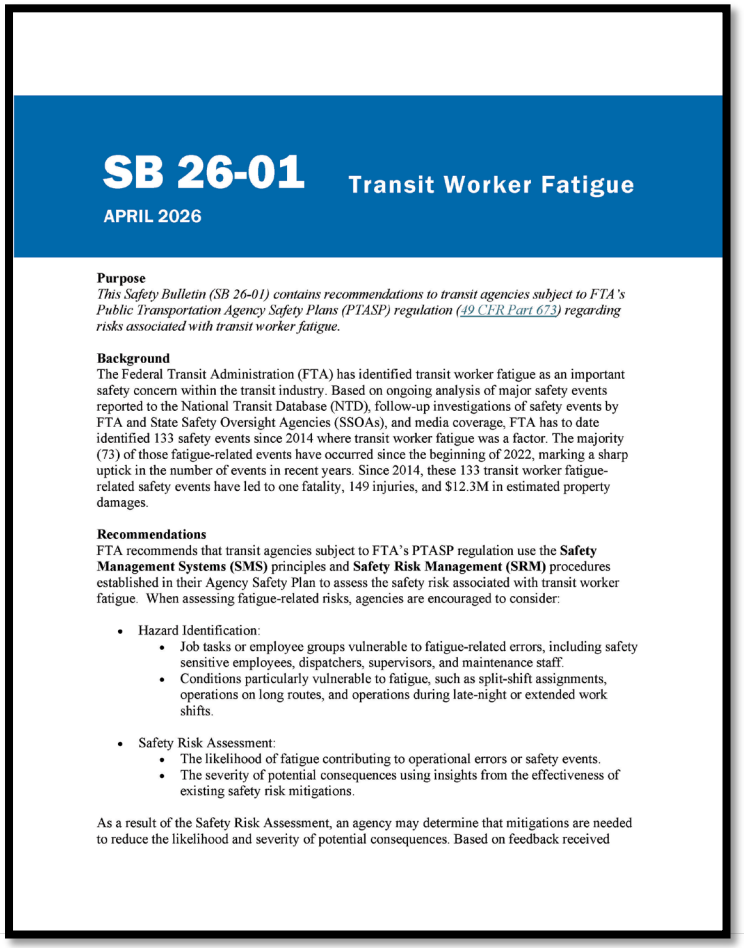
Recommendations for Transit Agencies

Priority Actions

- Develop and implement a formal, written FRMP using APTA recommended practices, FTA Bulletin 26-01 and fatigue guidance and research
- Standardize minimum rest intervals (≥10 hrs) through CBA and workforce management systems
- Mandate and track physical examinations/fitness for duty for all safety-sensitive employees — including contractors
- Incorporate validated OSA screening (STOP-BANG) at every periodic physical



SB 26-01 Transit Worker Fatigue

APRIL 2026

Purpose

This Safety Bulletin (SB 26-01) contains recommendations to transit agencies subject to FTA's Public Transportation Agency Safety Plans (PTASP) regulation (49 CFR Part 673) regarding risks associated with transit worker fatigue.

Background

The Federal Transit Administration (FTA) has identified transit worker fatigue as an important safety concern within the transit industry. Based on ongoing analysis of major safety events reported to the National Transit Database (NTD), follow-up investigations of safety events by FTA and State Safety Oversight Agencies (SSOAs), and media coverage, FTA has to date identified 133 safety events since 2014 where transit worker fatigue was a factor. The majority (73) of those fatigue-related events have occurred since the beginning of 2022, marking a sharp uptick in the number of events in recent years. Since 2014, these 133 transit worker fatigue-related safety events have led to one fatality, 149 injuries, and $12.3M in estimated property damages.

Recommendations

FTA recommends that transit agencies subject to FTA's PTASP regulation use the **Safety Management Systems (SMS)** principles and **Safety Risk Management (SRM)** procedures established in their Agency Safety Plan to assess the safety risk associated with transit worker fatigue. When assessing fatigue-related risks, agencies are encouraged to consider:

- Hazard Identification:
  - Job tasks or employee groups vulnerable to fatigue-related errors, including safety sensitive employees, dispatchers, supervisors, and maintenance staff.
  - Conditions particularly vulnerable to fatigue, such as split-shift assignments, operations on long routes, and operations during late-night or extended work shifts.
- Safety Risk Assessment:
  - The likelihood of fatigue contributing to operational errors or safety events.
  - The severity of potential consequences using insights from the effectiveness of existing safety risk mitigations.

As a result of the Safety Risk Assessment, an agency may determine that mitigations are needed to reduce the likelihood and severity of potential consequences. Based on feedback received

Recommendations for Transit Agencies

Technology & Policy Actions

- Pilot in-cab AI alertness monitoring and wearable fatigue devices
- Establish confidential non-punitive fatigue self-reporting programs
- Engage unions as co-owners
- Address the challenge across transit disciplines
- Deploy biomathematical fatigue modeling software

Conclusion

- Effective, evidence-based solutions exist but are unevenly implemented across FTA regulated agencies
- Fatigue risk management requires a multi-layered response with a cross section of players[19]
- Labor-management collaboration is not optional
- Hours of service and minimum time between shifts should be incorporated into agency policies and CBAs
- There are valuable resources available[20,21,22]
- The cost of inaction far exceeds the investment required to act decisively.

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Thank you

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Implementing a Fatigue Risk Management Program

Strengthening Operational Safety – Presentation to the FTA

Washington Metropolitan Area Transit Authority

July 2026

Introduction and Context

WMATA's Fatigue Risk Management Program

Implementing a Data-Driven, Proactive Safety Approach

WMATA has implemented a comprehensive Fatigue Risk Management Program (FRMP) to systematically identify, assess, and mitigate fatigue related safety risk across bus and rail operations.

This program integrates hours-of-service compliance, fatigue science, operational data, and workforce engagement into WMATA's Safety Management System framework.

This presentation outlines the phased implementation of WMATA's FRMP.

Strategic Goal and Implementation Framework

WMATA's Strategic Objective

WMATA Moved from Reactive Incident Investigation to Proactive , Data - Driven Fatigue Risk Identification

Problem

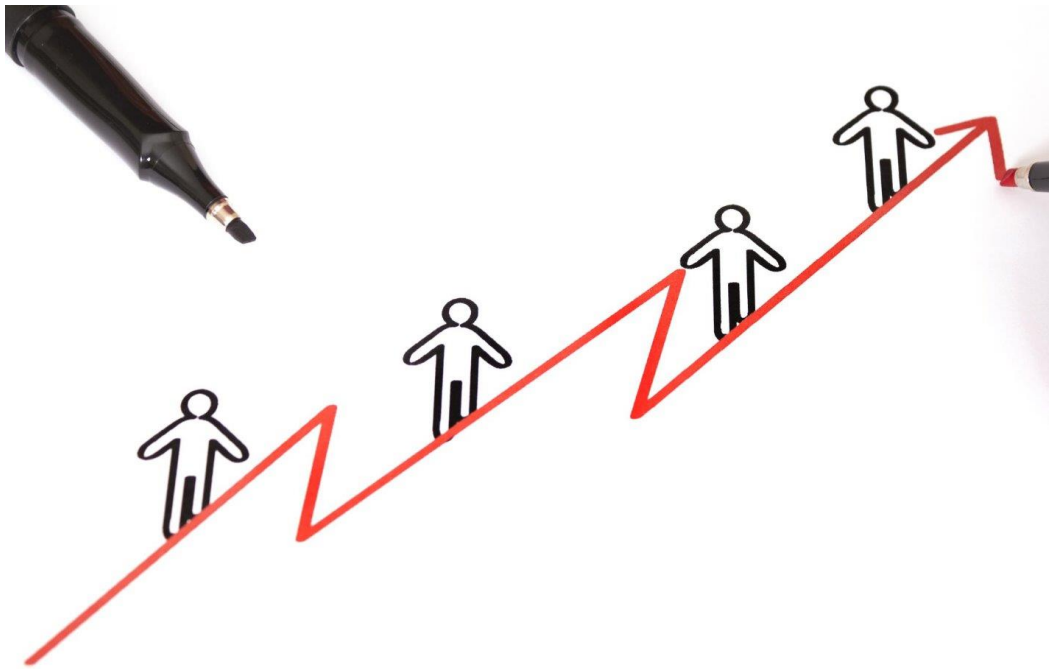
Transit agencies' operational conditions inherently increase fatigue risk, including split shits, extended duty periods, early morning starts and overnight operations. These factors disrupt circadian rhythms and create predictable periods of reduced alertness. As a result, fatigue must be managed as an operational system risk.

Metro's Solution

- WMATA transitioned from a reactive approach focused on post- incident to a proactive risk management model. The goal is to use data to identify fatigue exposure, detect risk patterns and implement controls before incidents occur.
- This shift integrates fatigue into hazard identification, risk assessment, and mitigation processes within the Safety Management System.

Fatigue Risk Management Program Implementation: 2022 - Present

Progressive Maturation of Metro's Fatigue Risk Management Program



Foundational Program Development
In 2022, Fatigue Risk Management Program Version 1 established governance, roles, and introduced biomathematical fatigue modeling into investigations.

Workforce Readiness Expansion
The 2024 Fit for Duty Program enhanced employee awareness and supervisory oversight, reinforcing operational fatigue controls.

Analytics Maturation
In 2025, Version 2 expanded analytics, embedded Hours-of-Service compliance, and integrated fatigue risk into safety culture.

Continuous Improvement Focus
From 2026 onward, emphasis is on ongoing monitoring, refining controls, validating effectiveness, and adopting best practices.

Fatigue Risk Management System Implementation Framework

Four – Phase Program Development

Fatigue Risk Management System Through Four Structured Phases

Phase 1: Foundation

Established Hours-of-Service limits aligned with best practice and collective bargaining agreements, including **maximum 14 hours duty time** and **minimum 10 consecutive hours off duty**. Compliance is monitored through a dashboard, which tracks violations by division, employee, assignment type and the day of the week. This phase also included baseline fatigue data collection and initial dashboard development.

Phase 2: Operational Monitoring and Analytics

Operational data was integrated to correlate incidents with fatigue indicators including shift timing, time-on-duty, and circadian risk zones. Biomathematical modeling was introduced into safety investigations, and operator-facing camera technology enhanced fatigue detection analysis.

Phase 3: Safety Culture Integration

Implemented fatigue awareness training, supervisor engagement, non-punitive reporting, and Fit-for-Duty program.

Phase 4: Continuous Improvement

Focus on dashboard refinement, monthly risk reviews, and predictive analytics exploration.

Data, Analytics and Monitoring Capabilities

Hours of Service Limit Analysis (10-14 Rule)

Updated at: 07/08/2026 09:37:46 AM

RTRA 2.64%

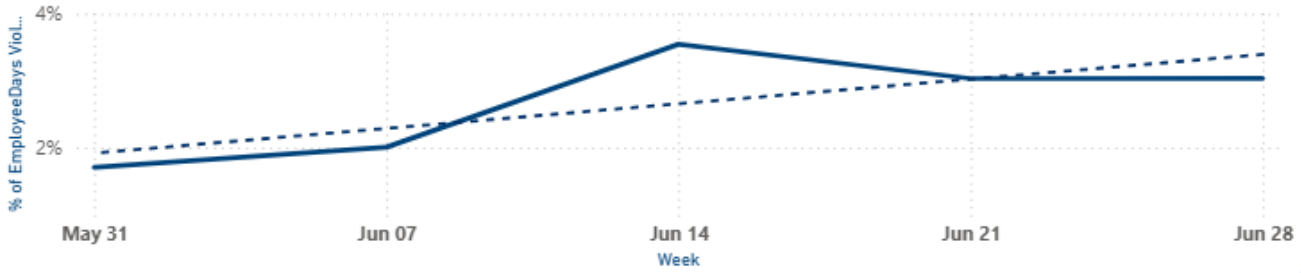
Select Mode: Bus Transportation | Rail Transportation

Select Division: All

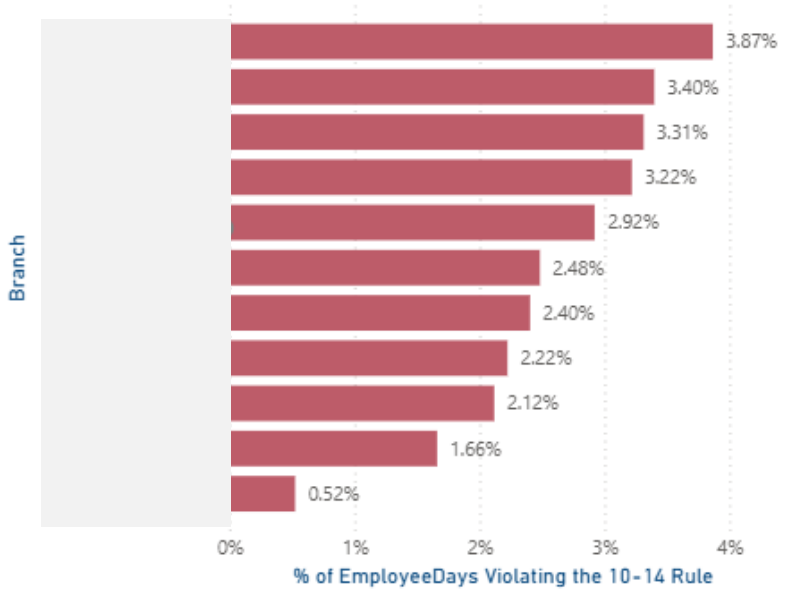
Filter by Date: 6/1/2026 – 6/30/2026

Total Violations %	Total Violations
2.64%	649

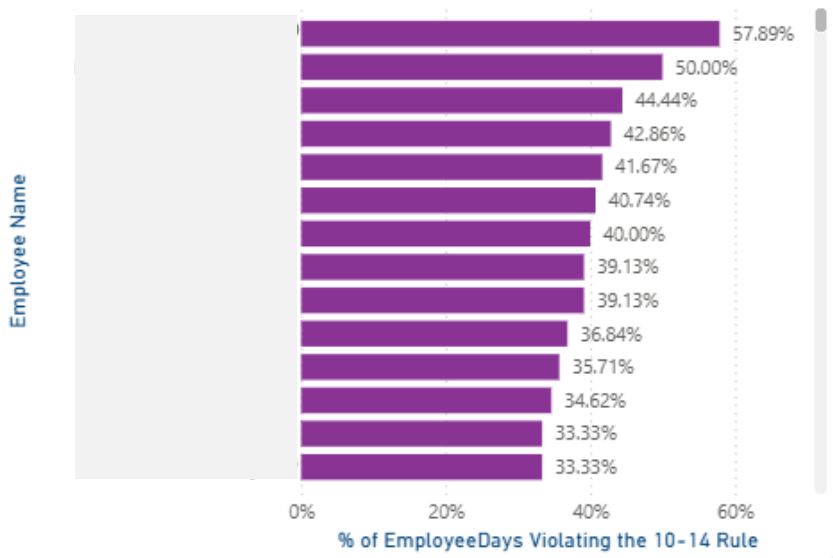
% of EmployeeDays Violating the 10-14 Rule by Week



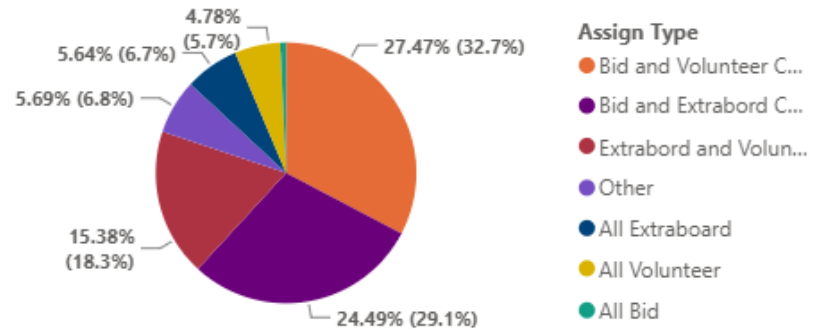
% of EmployeeDays Violating the 10-14 Rule by Branch



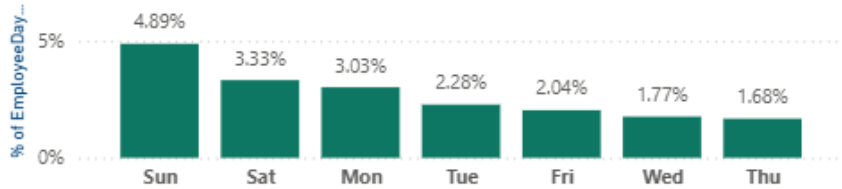
% of EmployeeDays Violating the 10-14 Rule by Employee Name



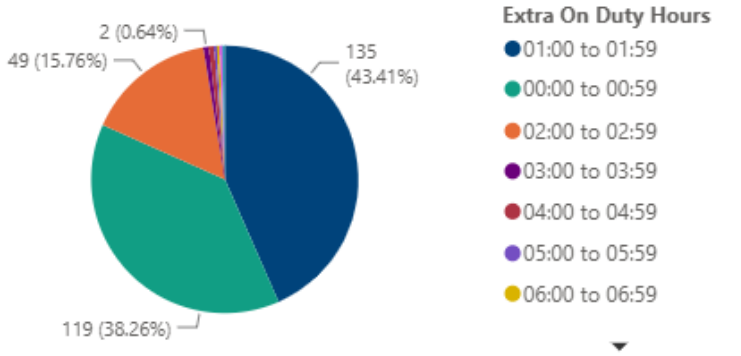
% of EmployeeDays Violating the 10-14 Rule by Assign Type



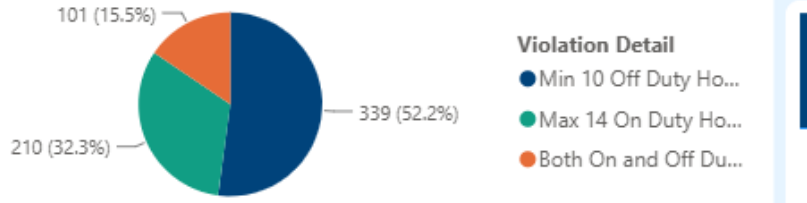
% of EmployeeDays Violating the 10-14 Rule by Weekday Name



Total EmployeeDays Violating the Rule by Extra On Duty Hours



Violations by Detail



Avg of Extra On Duty	Min of Extra On Duty	Max of Extra On Duty	Median of Extra On Duty	Standard deviation of Extra On Duty	Variance of Extra On Duty
1.29	0.02	13.33	1.17	1.19	1.41

Dashboard Capabilities

Understanding Risk Through Data Integration

The **Incident and Fatigue Overview Dashboard** integrates data from Hours-of Service and Safety Unified Data System (SUDS) to analyze the relationship between fatigue indicators and safety events. This centralized view allows incidents to be trended by circadian risk zone, shift type, and hours-of-service to determine whether fatigue was a likely contributing factor.

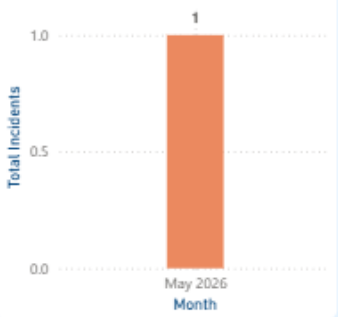
Key Capabilities include:

- Hours-Of-Service tracking and violation trends
- Incident correlation analysis
- Circadian risk alignment based on time of incident
- Shift type and division – level analysis
- Employee release periods and recovery time
- Split shift identification and analysis

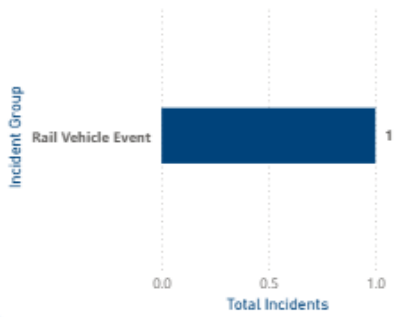
Incidents and Fatigue Overview

Updated at: 07/01/2026 08:10:01 AM

Total Incidents by Month



Total Incidents by Incident Group



Fatigue-Related Incidents by Incident Group

Incident Group

Total Incidents by Employee

Employee ID	Employee Name	OFFICE	Department	Incidents Matched with a WorkDay	Incidents Matched with a Violation	% of Incidents Matched With a Violation
056100		RTRA	Rail Station Dulles ...	1		
002107		RTRA	Rail Station Alexan...	1		
063106		BTRA	Bus 4 Mile Run Tra...	1		
064969		BTRA	Bus Andrews Feder...	1		
016233		BTRA	Bus Bladensburg Tr...	1		
023419		BTRA	Bus Western Trans...	1		
Total				521		

List of Incidents and their On Duty and Off Duty Hours From Last Time Worked

Employee ID	Employee Name	Incident ID	Transit Mode	Division Name	Incident Datetime	Circadian Rhythm	Incident Type	Employee Sign On Time for the day	Employee Sign Off Time for the day	On Duty Hours	Off Duty Hours	Violation Details	Shif
056100		139493	RAIL	Alexandria - Rail	5/15/2026 7:10:00 PM	Transition	Station Overrun	5/15/2026 1:08:00 PM	5/16/2026 3:08:00 AM	14.00	15.12	None	5/1

Select Mode

RAIL

Select Division

All

Filter by Date

5/1/2026 5/31/2026

Filter by Incident Type

All

Filter by Incident Group

All

Filter by Circadian Rhythm

All

Filter by Employee ID

All

Fatigue Violation Workshift?

No

Filter by Fatigue Behavior

All

Works Details (Previous Assignment)

LDate	Employee ID	Bid Employee ID	Work Name	Piece Num	Assign Type	Piece Sign On Time	Piece Sign Off Time	Duration	Rest Time Before Piece (Hrs)
20260514	056100	0	STNNBX/02	2	Planned Extra...	5/14/2026 3:00:00 PM	5/14/2026 4:29:00 PM	1.48	
20260514	056100	27431	530501~2	3	Daily Extrabo...	5/14/2026 4:29:00 PM	5/14/2026 6:52:00 PM	2.38	0.00
20260514	056100	27431	530501	4	Daily Extrabo...	5/14/2026 7:40:00 PM	5/14/2026 10:01:00 PM	2.35	0.80

Off Duty Hours Between two Shifts

15.12

(15:07 -hh:mm)

Works Details (Selected Assignment)

LDate	Employee ID	Bid Employee ID	Work Name	Piece Num	Assign Type	Piece Sign On Time	Piece Sign Off Time	Duration	Rest Time Before Piece (Hrs)
20260515	056100	71548	530508	4	Daily Extraboa...	5/16/2026 12:32:00 AM	5/16/2026 3:08:00 AM	2.60	0.50
20260515	056100	71548	530508	3	Daily Extraboa...	5/15/2026 8:40:00 PM	5/16/2026 12:02:00 AM	3.37	0.40
20260515	056100	71548	530508	2	Daily Extraboa...	5/15/2026 5:42:00 PM	5/15/2026 8:16:00 PM	2.57	0.62
20260515	056100	71548	530508	1	Daily Extraboa...	5/15/2026 3:21:00 PM	5/15/2026 5:05:00 PM	1.73	0.00

Causal Factor Group Desc	Causal Factor Desc

Incident	Inv Root Causes
RVO[redacted] reported overran the station by a leaf. Went straingt to B5 to slow train down. (Should have gradually slowed train by master controller). Train 610 picked up customers Reston Town Center track two at 1916 hours.CMNT Velasco reported minor flats on railcars 7501 and 7187. Supervisor [redacted] reported operator fit for duty.	

Biomathematical Modeling and Technology Integration

Biomathematical Modeling Integrated into Incident Investigations

WMATA incorporated biomathematical fatigue modeling into its safety investigations to provide an objective assessment of fatigue likelihood at the time of an incident. This approach enhances investigations by adding science-based estimates of alertness and fatigue to traditional observations and assessments.

As part of the investigation process, employees work schedules, sleep history, and rest opportunities are collected and validated. The information is then analyzed using the biomathematical model to determine whether fatigue related risk factors may have been present at the time of the event.

AI Systems

Deployed AI enabled bus operator camera systems with inward and outward facing lenses. These systems use artificial intelligence and machine vision to detect and flag behaviors associated with distraction, drowsiness and fatigue. Recorded events are uploaded to a secure dashboard supporting post event analysis.

Together, modeling and technology provide complementary insights into fatigue risk both predictive and observational perspectives.

Biomathematical Model Example

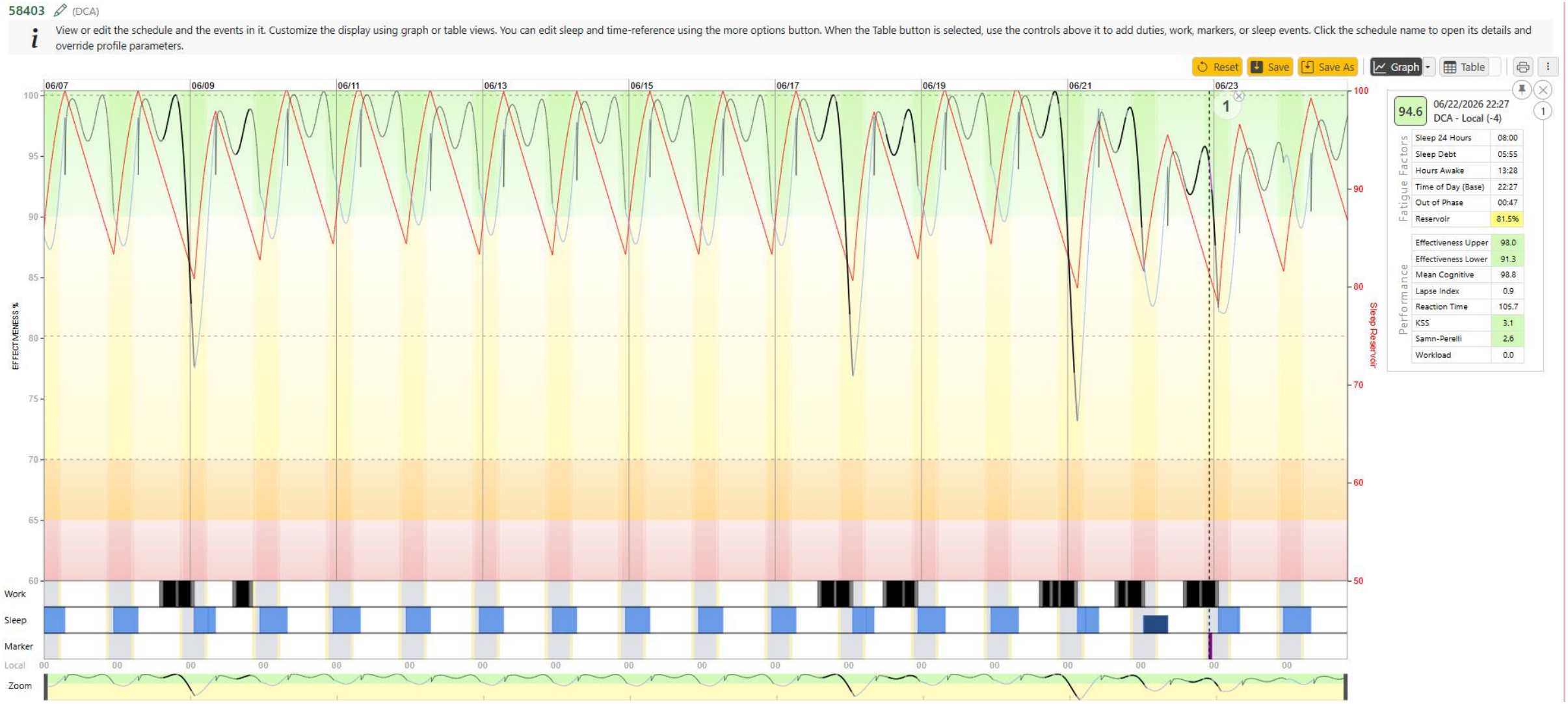


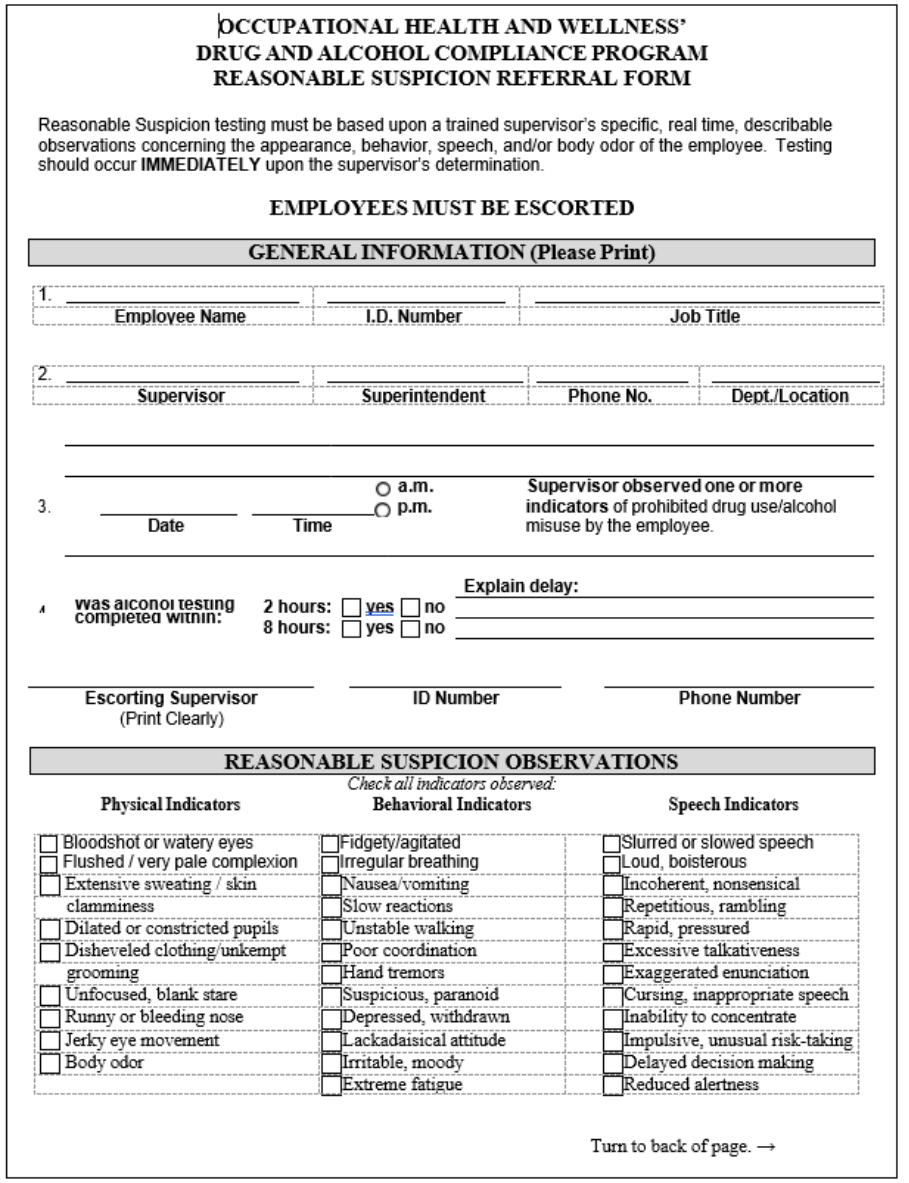
Figure 1: Snapshot of biomathematical output

Operational Implementation

Reasonable Suspicion Assessment

The program supports employees in assessing their readiness for work. As part of the program, Operations supervisors conduct a pre-shift Reasonable Suspicion Assessment before operators begin service.

This assessment uses a structure set of observations focused on physical appearance, behavior and speech indicators to identify signs that an employee may not be prepared to safely perform safety- sensitive duties due to fatigue or other potential impairments.



OCCUPATIONAL HEALTH AND WELLNESS'
DRUG AND ALCOHOL COMPLIANCE PROGRAM
REASONABLE SUSPICION REFERRAL FORM

Reasonable Suspicion testing must be based upon a trained supervisor's specific, real time, describable observations concerning the appearance, behavior, speech, and/or body odor of the employee. Testing should occur **IMMEDIATELY** upon the supervisor's determination.

EMPLOYEES MUST BE ESCORTED

GENERAL INFORMATION (Please Print)

1. Employee Name | I.D. Number | Job Title

2. Supervisor | Superintendent | Phone No. | Dept./Location

3. Date | Time ○ a.m. ○ p.m. | Supervisor observed one or more **indicators** of prohibited drug use/alcohol misuse by the employee.

4. Was alcohol testing completed within: 2 hours: ☐ yes ☐ no 8 hours: ☐ yes ☐ no | Explain delay:

Escorting Supervisor (Print Clearly) | ID Number | Phone Number

REASONABLE SUSPICION OBSERVATIONS

Check all indicators observed:

Physical Indicators	Behavioral Indicators	Speech Indicators
☐ Bloodshot or watery eyes	☐ Fidgety/agitated	☐ Slurred or slowed speech
☐ Flushed / very pale complexion	☐ Irregular breathing	☐ Loud, boisterous
☐ Extensive sweating / skin clamminess	☐ Nausea/vomiting	☐ Incoherent, nonsensical
	☐ Slow reactions	☐ Repetitious, rambling
☐ Dilated or constricted pupils	☐ Unstable walking	☐ Rapid, pressured
☐ Disheveled clothing/unkempt grooming	☐ Poor coordination	☐ Excessive talkativeness
	☐ Hand tremors	☐ Exaggerated enunciation
☐ Unfocused, blank stare	☐ Suspicious, paranoid	☐ Cursing, inappropriate speech
☐ Runny or bleeding nose	☐ Depressed, withdrawn	☐ Inability to concentrate
☐ Jerky eye movement	☐ Lackadaisical attitude	☐ Impulsive, unusual risk-taking
☐ Body odor	☐ Irritable, moody	☐ Delayed decision making
	☐ Extreme fatigue	☐ Reduced alertness

Turn to back of page. →

Figure 2: Reasonable Suspicion form

Safety Culture Integration

Safety Culture Integration

Workforce Engagement and Reporting

WMATA integrated fatigue management into its safety culture through training, engagement and reporting systems.

Initiatives included:

- **Fatigue Awareness Training**

To support fatigue risk management, employees are required to complete fatigue awareness training every three years. The training focuses on recognizing fatigue indicators, understanding the safety impacts of fatigue and applying effective mitigation strategies to manage personal fatigue risk and maintain safe operational performance.

- **Fit-for-Duty Program**

As part of the Fit-for-Duty Program, WMATA regularly conducts Fatigue Awareness and Fit-for-Duty Fairs to promote employee education and engagement around fatigue risk management. These events provide employees with opportunities to meet directly with fatigue and human factors specialists, ask questions, receive educational materials, and discuss strategies for managing fatigue both on and off the job.

- **Supervisor Engagement**

Supervisors receive fatigue awareness training to recognize signs and symptoms of employee fatigue and support ongoing fatigue related safety discussions with their teams. These discussions emphasize the importance of adequate sleep, recovery time, and effective fatigue mitigation strategies. Supervisors also foster an environment that encourages employees to report fatigue related concerns without fear of reprisal, supporting a proactive and just safety culture.

- **Non-Punitive Reporting Culture**

A Just Culture encourages employees to self report fatigue risks without fear of discipline using confidential channels, such as the Safety Hotline.

Outcomes, Benefits and Future Direction

Outcomes, Benefits and Future Direction

Strengthening Safety Through Data-Driven FRMP

WMATA's Fatigue Risk Management Program has resulted in:

- Improved visibility into fatigue related risk
- Enhanced understanding of incident timing
- Stronger Hours-of-Service oversight
- Increased data-driven decision making

These efforts support a more proactive safety management approach aligned with SMS principals

Ongoing efforts focus on refining dashboards, advancing predictive analytics to anticipate fatigue risk and continue to fatigue promotional outreach.

Industry Collaboration and Knowledge Sharing

Advancing Fatigue Risk Management Across Public Transportation

We welcome opportunities to:

- Exchange fatigue risk management practices and lessons learned
- Share approached to Hours-of Service monitoring and oversight
- Discuss fatigue related analytics, technology and emerging tools
- Collaborate on industry wide fatigue mitigation strategies

For continued discussions or information sharing:

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Thank you

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Post-Webinar Participant Survey

U.S. Department of Transportation
Federal Transit Administration