UNION PACIFIC FATIGUE RISK MANAGEMENT SYSTEM (FRMS)

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Managing Fatigue in the Real World

If we are to develop effective fatigue management systems that improve safety and operational flexibility we must expand our purview beyond the biological determinants of fatigue and acknowledge the profound influences of psychological, socio-cultural and political factors.
Managing fatigue in the real world

For every complex problem there is a simple solution...

... and it is usually wrong

H.L. Mencken
DEFINITION OF FATIGUE

• Multiple & Complex

• Mental Fatigue: Impairment in cognitive functioning, concentration & thinking with a loss of desire or ability to continue performing.

• Sleep Deprivation = Homeostasis + Circadian Rhythm

• Amount of Sleep
  – Time of Day Sleep Occurs

• Amount of time since last sleep period
  – Time of Day Awake
UNION PACIFIC’S FRMS

- 1990 Initial research/education
- 1997 AMP/DAM
- Broad comprehensive plan to manage the human resource.
- Integrated and Interdisciplinary approach to managing manpower, fatigue and quality of life issues.
- Safety & Health Priorities.
- Evidence-based
FRMS

- Risk Management Model (2005)
  - Identify, measure and prioritize risk
  - develop and implement controls

- Addresses Critical Challenges
  - 24/7 Operations
  - Unsupervised TE&Y workforce
  - Aging/new workforce
  - Unhealthy workforce
  - Implications of a 24/7 society

- Scientifically based “toolbox” approach
  - Theory and research
KEY ELEMENTS OF FRMS

- Policy
  - Corporate & Local Policies
- Training and Education
- Ensuring adequate **average sleep opportunity**
  - Company responsibility
  - Software analysis (FAID)
  - Regional/CMS action plans
  - Ongoing measurement system (FAID analysis)
KEY ELEMENTS OF FRMS

• Ensuring employee preparedness: ensure that individuals who received an adequate average sleep opportunity have achieved sufficient sleep to ensure safe level of alertness [SLA]
  – Education on signs & symptoms
  – Education & policy regarding minimal sleep and reporting
  – Shared Responsibility partnerships with employee, labor organizations and government
KEY ELEMENTS OF FRMS

• Research - ongoing process of pertinent research projects to ensure that FRMS is scientific based.

• Current and proposed research projects (in partnership with DOT and Labor)
  – Actigraphs: Epidemiological & behavioral modification studies
  – Sleep disorders (OSA)
  – Other related human factors research
KEY ELEMENTS OF FRMS

• Additional Countermeasures
  – Planned Nap Program
  – Lodging
  – Families
  – Alternative to Discipline (Peer program to eliminate unauthorized sleeping on duty)
  – Sleep Disorder Screening
  – Toolbox approach (multiple strategies)
  – Measurements (Utilization of software packages)
  – Technology Review Process
IMPLEMENTING FRMS

UNDERSTANDING THE FRMS LEVELS OF CONTROL

BUILDING AMERICA®

UNION PACIFIC®
Fatigue Risk Management System Model

**Figure 1.** Fatigue risk trajectory. There are multiple layers that precede a fatigue-related incident, for which there are identifiable hazards and controls. An effective FRMS should attempt to manage each layer of risk.
CONTROLS

• Level One: Organizational Responsibility

• Level Two: Ensuring individuals achieve adequate sleep to ensure safe level of alertness (SLA).

• Level Three: Monitoring, assessment, screening, etc.

• Levels Four & Five: Analysis
Scientific Panel Report: Union Pacific’s Fatigue Risk Management System

November 17, 2005

Drs. Greg Belenky, Drew Dawson, Steve Hursh, Steve Popkin, and Pat Sherry
Panel’s Overall Assessment

- Practical, innovative, evidence-based approach to fatigue risk management
  - Supports organizational goals of safety and productivity

- Potential to be responsive to concerns of all stakeholders

- Broad applicability beyond UP to other railroads and the transportation industry as a whole (Should set industry standard)

- Important to future Scientific Research Agenda
  - Supports the scientific goals of better understanding of sleep and performance
FRMS IMPLEMENTATION

- Integrate into Safety Quality Assurance Process
- Initiate Industry Synergies
- Interdisciplinary Implementation Team
- Develop/Implement Research Agenda
- Alternative to Discipline
- Communication & Awareness
- Improve/Enhance Software
- CMS Implementation Process
CONCLUSION

- Need for a systematic, measurable and evidence-based plan (FRMS) and implementation strategies that address safety risk management
- Software (FAID) documents, measures and assists in overall manpower management
- Education and communication are critical
- Partnerships are invaluable (industry, labor, government)
UNION PACIFIC FATIGUE RISK MANAGEMENT SYSTEM (FRMS)
Eliminating Fatigue Related Incidents

Fatigue Mitigation

- Manpower Planning
  - Low mile strategy
    - Regulation by CMS
    - Cut-back Engineer strategy

- 10 Hours Undisturbed
  - Auto-Mark-up
  - Pro-Active notification
  - SACP Predictability

- 8 Hrs Disturbed
  - Pools at High-Miles
  - Regulation by Local Chairman

Train Line-up Improvement
FAID Analysis
Fatigue Risk Management Plan

Overall Fatigue Management - Tool Box Approach

2002 2004 2005 2006 Future

Train Line-up Improvement
FAID Analysis
Fatigue Risk Management Plan

Overall Fatigue Management - Tool Box Approach

2002 2004 2005 2006 Future

Train Line-up Improvement
FAID Analysis
Fatigue Risk Management Plan

Overall Fatigue Management - Tool Box Approach
FAID Quarterly Process

- Run Yearly report
- Report on Top 20 for system to system team
- Run Monthly report
- CMS develop top ten for each region
  - Analyze causes (prepare detail score card)
  - Propose solutions
  - Simulate solutions with FAID Board Game
  - Implement-Evaluate-Adjust
Sept 03 - Manpower Planning Process Initiated

May 16th Auto-Mark up for UTU/LET
10 Hours UDR UTU - CNW, UPED BLET

July 16th - 10 Hour UDR BLET - Southern, SLC, Portland Hubs
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Top Twenty List for 2006

February, Northern region affected by major winter weather and service interruptions
Create Work Schedule Game Area

Based on the work periods loaded (historically by default), the number of turns available, the work rest cycles and the rules of work scheduling, turns are allocated to work periods as they appear. The turn that obtains the ‘work period’ is selected by attempting to provide a balance of mileage, total work periods, fatigue and quality of life preferences during the Work Scheduling process. All the while respecting the rules of the work scheduling.

It should be noted that although the decisions are valid and would work in an operational environment, the goal of this game area is to prove that the number of turns on this work rest cycle will provide adequate capacity to supply the demand of work periods.
Potential Corrective Actions

- Evaluate Recrew rates and solutions
- Evaluate long pool-short pool opportunities
- Keep pool regulated to low miles
- Target pool/family for education blitz
- Extend undisturbed hours to 12 for 24 hours
- Focus absenteeism hearings on part timers
- Encourage use of free days and LM days
- Negotiate scheduled off time
Current Rest Opportunities

- 10 and 8 hours undisturbed
- Work 7 consecutive days-24 hours off LM
- Extra Board Free Day
  - Monday thru Thursday
  - All engineers-50% trainmen
- Extra Rest Provisions:
- AM mark up after 72+ hours off
- Boards that roll the first out after 24 hours or at noon.
Fatigue Mitigation – Next Steps

- Incorporate Fatigue Management into daily process
- Work with FRA/Scientific Community into developing models
- Ability to demonstrate that Union Pacific has a plan and strategies to address fatigue
- Be able to differentiate between fatigue and quality of life issues
- Develop fatigue software to incorporate into crew calling systems to show risk at time of calls