NRT Technical Assistance Document: Managing Worker Fatigue during Disaster Operations

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OSHA Region V
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Overview:

1. Why create a Technical Assistance Document (TAD)?
2. What are our goals for the TAD?
3. What content is covered in Volume I and Volume II?
4. What recommendations were made?
5. What tools are included?
NRT Extended Work Shift Work Group: EPA, OSHA, NIOSH, FEMA, USACE, CPWR, AIHA EI-SIG, Lippy Group

• Jan Shubert (EPA)
• Tina Jones (OSHA)
• Jenn Hornsby-Myers (NIOSH)
• Joyce Brewer (FEMA)
• Jim Woodey (USACE)
• Chris Trahan (CPWR)
• Owen Douglass (AIHA EI-SIG)
• George Crawford (AIHA EI-SIG)
• Frances Walsh (SRA)
Why create a technical assistance document?

• Long work shifts/weeks and worker fatigue were recognized as critical issues during recent disasters
• Numerous studies show that accident rates increase when shifts exceed 12 hours or work weeks exceed 60 hours
• Guidance for recovery workers is limited; only a few NRT agencies have formal policies
What are our three goals for the document?

1. Recommend practices that:
   - protect workers
   - are based on current research
   - include lessons learned and best practices

2. Encourage NRT Agencies to evaluate and modify their current practices

3. Encourage adoption of the TAD recommendations by key stakeholders beyond the NRT
Volume II is a background document covers research highlights, existing regulations and work practices

- Covers disaster recovery *not* rescue
- Outlines disaster conditions and hazards that impact workers
The literature contained *many* studies showing increased accident rates when shifts exceed 12 hours or work weeks exceed 60 hours

- 12+ hrs/day = 37% increase
- 60+ hrs/week = 23% increase
- 8+ hrs/day = 57% increase for construction workers
- 40+ hours/week = reduced performance, decreased alertness and cognitive function, increased fatigue and injuries
Volume I outlines how to manage fatigue at two levels, with common elements.

- Assessment
- ID and evaluation of risk factors
- Controls
- Evaluation

Organizational Program

Incident-specific plan
Organizational Fatigue Management Program is the upper level document

- Reflects organization’s overall disaster recovery experience
  - nature and conditions of incidents
  - likely operations and challenges
  - lessons learned
- Broadly describes organization’s practices, procedures, and resources
  - criteria/threshold for use
  - assessment and management components
Incident-specific plan is created for each response based on the larger program

- Identifies incident risk factors
  - Risk Management Tool
  - Risk-based decision making
- Outlines incident controls
  - Work hours and rest periods, education, planning, etc.
  - Tied to risk factors present
  - Combined to offset operational needs - demands of the task and 12-hr shifts
Fatigue Risk Factors

- Work Hours and Rest Periods
  - Long work hours
  - Shift work/rotating shifts/night shifts
  - Lack of/limited rest breaks

- Site Conditions
  - Chemical, biological, and physical hazards

- Living Conditions
  - Temporary or communal living conditions

- Nature of Work
  - PPE use
  - Unfamiliar work environment/work task
  - Psychological stressors

- Management/Administrative Support
  - Access to nutritional meals & recreational or fitness equipment
Examples of Suggested Controls

Educational Topics
• Health Impacts, Signs, and Symptoms of Fatigue
• Common Fatigue Risk Factors during Disaster Recovery
• Strategies for Preventing Fatigue
• Recognizing Operational Fatigue and Stress in Employee (supervisors)

Advance Planning
• Approved list of hotels with fitness facilities and dining facilities;
• Contracts with transportation services for shuttling employees
• Helpful checklists for personal preparedness

Work Hours and Rest Periods
• Criteria for setting a maximum work shift duration or minimum amount of time off during a 24-hour period
• Time off between work rotations
• Rest breaks throughout a work shift to address fatigue, PPE limitations, and/or temperature extremes
• Limiting early morning shift start times
Examples of Suggested Controls

Transportation and Living Conditions
• Transportation service or an assigned staff member as the “designated driver” to shuttle personnel to/from the site
• Food service at staging areas and base camps; storage/cooking utilities for personnel with special diets
• Use of hotels/motels with access to recreational facilities and dining facilities

Recuperation Provisions and Health Care Services
• Subsidized health club memberships at local facilities
• Encourage visits by family members during off-duty hours and time-off.
• EAP and other health services at base camps and staging areas; access to these services during off-hours (in-person or via telephone)
## Appendix B: Federal Agency Operating Practices and Other Standards Addressing Work Hours and Work Rotations

<table>
<thead>
<tr>
<th>Agency</th>
<th>Background &amp; Applicability</th>
<th>Hour Limitations</th>
<th>Rest Periods &amp; Rotation Length</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. Army Corps of Engineers (USACE)</td>
<td>USACE Employees During Emergency Response Operations</td>
<td>Should not work in excess of 84 hours per week (usually 12 hours per day, 7 days a week, during emergency response)</td>
<td>Employees provided opportunity for 24 hours rest after working 14 days and 48 hours of rest after working 21 days. Employees required to take 10 hours rest after every 10 hours of duty.</td>
<td>Duty Schedule defined in EM 365-1-1, App B, Par 8</td>
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<td>Department of Interior (DOI)</td>
<td>National Interstate Fire Fighters</td>
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<td>Federal Aviation Administration (FAA)</td>
<td>Commercial Motor Vehicle Drivers</td>
<td>11-hour limit on the length of time a long-haul truck driver can drive after 10 consecutive hours off.</td>
<td>May not drive beyond the 14th hour after coming on duty, following 10 consecutive hours off duty.</td>
<td>Department of Transportation Website, <a href="http://www.fmcsa.dot.gov/Home_Files/revised_hos.asp">www.fmcsa.dot.gov/Home_Files/revised_hos.asp</a></td>
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<tr>
<td></td>
<td>DOT</td>
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<td>May not drive after 60/70 hours on duty in 7/8 consecutive days.</td>
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<td>A driver may restart a 7/8 consecutive day period after taking 34 or more consecutive hours off duty.</td>
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<td>Specific rest requirements between flights range from 8-11 hours (based on total flight time during a 24-hour period). Exceptions made to these rules require that flight crew members receive the proper amount of compensatory rest time during the next rest period. Rules do not address the amount of time flight crew members can be on duty (standby time). Airline rules may be even stricter than FAA regulations if the issue is part of a collective bargaining agreement.</td>
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### Standards and Guidelines that address Work Shift and Work Week Durations for a Regulated/Covered Population of Workers

- Department of Transportation Website: [www.fmcsa.dot.gov/Home_Files/revised_hos.asp](http://www.fmcsa.dot.gov/Home_Files/revised_hos.asp)
### Appendix C: References

**Table 1: Association between Working Extended Work Shifts/Work Weeks and Workplace Injury: Summary of Reviewed Literature**

This table highlights studies that evaluated the association between hours worked and occupational injury. It presents data from several recent studies where the risk of injury has been quantified and/or modeled. None of the studies highlighted here or in Table 2 evaluate how the implementation of a well-designed and well-managed fatigue management program, such as the one recommended in Section 2.1, would impact the risk of injury. However, it is clear from the studies included in Table 2 that when aspects of such a program, e.g., including breaks throughout a work shift, are implemented, fatigue is reduced and performance is enhanced; the risk of injury may be similarly reduced. These data should be used collectively when designing a work schedule for an incident-specific fatigue management plan. It is “necessary to consider the various features of the schedule in combination with one another, rather than in isolation from one another” (Johnson & Lipscomb, 2006).

<table>
<thead>
<tr>
<th>Reference</th>
<th>Risk of Injury</th>
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<tr>
<td></td>
<td>(as compared with working 8-hr work day, working during the day shift, and working a 40 hr work week)</td>
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<td></td>
<td>10-hr work shift</td>
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<tr>
<td>S. Vegso, et al, 2007</td>
<td>↑ by 13%</td>
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<td>Folkard &amp; Lombardi, 2006</td>
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<td>(model using results from numerous studies)</td>
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Varies based on length of shift and time of day. For any given work week duration, a long span of short shifts is likely to be safer than a short span of long shifts. 60 hour week – as
Table 2: Summary of Literature and Bibliography

<table>
<thead>
<tr>
<th>Author(s)</th>
<th>Title</th>
<th>Publication</th>
<th>Findings/Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Conference of Governmental Industrial Hygienists (ACGIH)</td>
<td>Threshold Limit Values (TLVs®) for Chemical Substances and Physical Agents and Biological Exposure Indices BEIs® (2008)</td>
<td>Published by the ACGIH, available at <a href="http://www.acgih.org">www.acgih.org</a></td>
<td>Threshold Limit Value (TLV®) occupational exposure guidelines are recommended for more than 700 chemical substances and physical agents. There are more than 50 Biological Exposure Indices (BEIs®) that cover more than 80 chemical substances. Chemical Abstract Service (CAS) registry numbers are listed for each chemical. Introductions to each section and appendix provide philosophical bases and practical recommendations for using TLVs® and BEIs®.</td>
</tr>
<tr>
<td>International Agency for Research on Cancer (IARC) Monograph Working Group (A. Blair, et al)</td>
<td>Carcinogenicity of shift work, painting, and firefighting</td>
<td>Lancet Oncology; 8 (12), December 2007</td>
<td>A meeting of 24 international scientists at the IARC in October 2007 to review numerous epidemiological studies concluded that shift work that involves circadian disruption, occupational exposure as a painter, and occupational exposure as a firefighter are possibly carcinogenic to humans.</td>
</tr>
</tbody>
</table>
Resources

Educational Topics
- Health Impacts, Signs, and Symptoms of Fatigue
- Strategies for Preventing Fatigue during Disaster Operations
- Recognizing Operational Fatigue and Stress in Employees (training for supervisors)
- Common Fatigue Risk Factors During Disaster Recovery
- Information on Organization’s Employee Assistance Program
- Tips/Checklist on Preparing for Deployment to a Disaster Site – Personnel and Supervisors
- Information for Recovery Workers and their Families on what to expect during deployments
(http://www.osha.gov/SLTC/emergencypreparedness/)
- Work Zone Safety and Defensive Driving Techniques
- Sleeping Strategies for Night-shift Workers
- Critical Incident Stress Management Team and Employee Assistance Program
- Information on organizations’ policies and procedures
- Job Aid providing clearly defined job tasks and duties
- Pre-deployment training, resources, and other tools
- Site orientations, daily briefings, and safety meetings (symptoms, prevention) and reinforce reporting of symptoms

Advance Planning
- Approved list of hotels that have fitness facilities, conference facilities, and balconies
- Contracts with transportation services for shuttles and hotel picks up
- Helpful checklists of personal preparedness tasks for individuals
- Preassembled “go-kits” with PPE and other equipment
- Mobile trailer outfitted as office space for deployment
- Reasonable estimate of resource needs (equipment, personnel, etc.) for duration and breadth anticipated
- Information for responders and their families on what to expect

Work Hours and Rest Periods
- Criteria for setting a maximum work shift duration or minimum amount of time off during a 24-hour period (e.g., 10 hours rest time in a 24-hour time period, with as much of that in consecutive hours as possible)
- Consideration for how work shift duration may change based on the use of controls to mitigate fatigue (e.g., use of transportation, etc.)
- Time off between work rotations (e.g., 48 hours off after 14 consecutive days of work)
- Rest breaks throughout a work shift to address fatigue, PPE limitations, and/or temperature extremes (heat and cold-related illnesses)
- Rotation of personnel during longer shifts requiring strenuous and/or detailed tasks
- Scheduling day/night shift rotations to reduce fatigue (e.g., clockwise rotation with several days off before new shift assigned)
- Limiting early morning shift start times (e.g., before 6:00am)
- Procedures for monitoring personnel for fatigue signs/symptoms
- Procedures for enforcing work/rest and rotation schedules for employees and supervisors
- Provisions (e.g., job rotation, extended lunch/breaks, additional time off) for personnel and crews exhibiting signs/symptoms of fatigue
- Mechanism for employees to request additional time off and encouragement to do so when experiencing signs/symptoms of fatigue

Transportation and Living Conditions
- Transportation service or an assigned staff member as the “designated driver” to shuttle personnel to/from the site
- Food service at staging areas and base camps, storage/cooking utilities for personnel with special diets
- Use of hotels/motels with access to recreational facilities and dining facilities
- Separation of day and night shift sleeping areas and provision of areas for socializing in base camps
- Reimbursement for personal calls home during deployment
- Scheduling complex/hazardous tasks for periods of higher alertness
- Lighting for night-shift operations
- Provision of security for base camp and night-time operations
- Encourage family visits during rest periods/off-hours once the affected area is stabilized

Recovery Provisions and Health Care Services
- Subsidized health club memberships at local facilities
- Encourage visits by family members during off-duty hours and time-off.
Templates and Tools

- Risk Assessment Tool, Instructions, and completed example
Templates and Tools

Template for an Incident-Specific Fatigue Management Plan

<table>
<thead>
<tr>
<th>Name of Incident</th>
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<tbody>
<tr>
<td>Location:</td>
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<tr>
<td>IC/UC Personnel:</td>
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<tr>
<td>Description of Event &amp; Site Conditions:</td>
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<tr>
<td>Fatigue Risk Factors Present:</td>
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<tr>
<td>• Work Hours &amp; Rest Periods –</td>
</tr>
<tr>
<td>• Living Conditions –</td>
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<tr>
<td>• Nature of Work –</td>
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<tr>
<td>• Management &amp; Administrative Support –</td>
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<tr>
<td>• Emotional Stress –</td>
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<td>Controls to Be Implemented:</td>
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<td>Evaluation Schedule:</td>
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</tbody>
</table>
### Appendix C: Sample Incident Specific Fatigue Management Plan

**Incident Name:** New Madrid Earthquake  
**Location:** New Madrid, MO  

**IC/UC Personnel:**  
- Incident Commander – Mary Jones  
- Deputy Incident Commander – Bob Smith  
- Safety Officer – Joe Johnson  
- Public Information Officer – Peggy Greene  
- Liaison Officer – Larry Brown  
- Operations – Ken Jackson  
- Planning – Betty Baxter  
- Logistics – Joan Black  
- Finance – Brian Clark

**Description of Event & Site Conditions:**  
- The incident is a massive earthquake that occurred two weeks ago and affected a 3,000 square mile area in three states, resulting in major destruction to the infrastructure.  
- Lifesaving operations have ended, and there is an urgent need to begin rebuilding the destroyed infrastructure.  
- Airports and railroad facilities are still inoperable and major highways as well as many smaller roads are still impassable. Recovery work groups will be transported via helicopter wherever roads are inadequate.  
- There is major structural damage of buildings, and those that are habitable are being used to care for the injured and homeless. Recovery workers will have to carry in their own shelters.  
- There is no potable drinking water, and public waste disposal systems are still inoperable. Drinking water supplies will be carried in, and sanitation needs will likely initially be port-a-jons.  
- Communications in the area have all been disrupted.  
- Work groups will deploy for 3-week periods.  
- Although the response has moved to the recovery phase, workers can expect to see scenes of extreme destruction that may be emotionally disturbing to many.

**Fatigue Risk Factors Present:**  
- **Work Hours & Rest Periods** –  
  - Long work hours – possibility of 12 hour days initially.
How to Access the Worker Fatigue Technical Assistance Document
www.nrt.org
How to Access the Worker Fatigue Technical Assistance Document
How to Access the Worker Fatigue Technical Assistance Document
How to Access the Worker Fatigue Technical Assistance Document

Scroll to the bottom of the page.
During a radiological emergency, the FRERP and the NCP apply simultaneously. Consequently, it is necessary to reconcile the overlaps and perceived conflicts that potentially exist between these two plans. This report recommends a mechanism that addresses: (1) the perceived or potential conflicts between these two plans; (2) the solutions to these perceived or potential conflicts; and (3) the methods for implementing these solutions.

Supplements NRT-1; Recommends criteria to RRTs for reviewing their emergency plans. Criteria is also useful for SERCs and LEPCs during plan revision.

Federal Natural Resource Trustees and the ICS/UC
This fact sheet facilitates the integration of federal resource trustees into the ICS/UC command structure, describes resources and assistance that federal trustees can provide; and where the coordination link occurs between Federal trustee response and natural resource damage assessment (NRDA) activities.

Describes how to form a local emergency planning committee (LEPC), select a leader, identify and analyze hazards, identify response equipment and personnel, write a hazardous materials emergency response plan and update that plan. Aims to help local authorities in their efforts to comply with Title III of SARA, the Emergency Planning and Community Right to Know Act of 1986, which mandates creating local plans.

Effective Coordination in Local Emergency Planning

Guidance for Managing Worker Fatigue During Disaster Operations
Questions/ Comments?

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