

Managing the Risks of Fatigue at Disaster Sites

NIEHS Spring Conference, 4-30-09



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My wife's comment on my credibility really stung

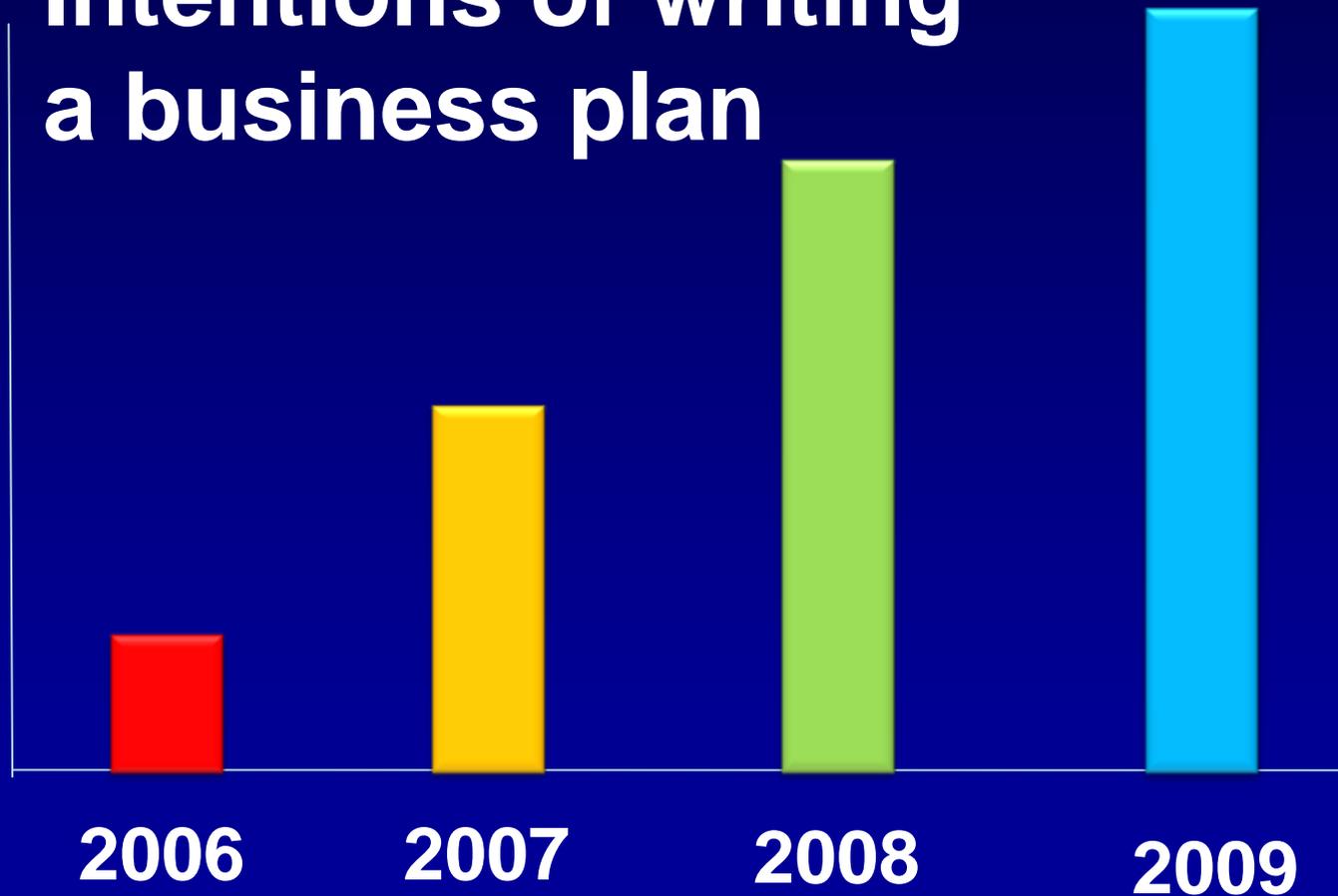


**Fatigue
Management**

Parenting

Lippy Group declassified business data

Intentions of writing
a business plan





Lippy Group green initiatives are blazing ahead



“Where *greening* is a slogan, not just a gerund”

My presentation is in 3 sections

**Background on
the initiative**



**Overview of the
literature**



**Overview of the
NRT guidance**





My thanks to the National Response Team's Extended Work Shift Work 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)
- Bruce Lippy



This effort came out of concerns from Ground Zero



9/20/01 Photo courtesy
Andrea Booher/ FEMA

There are 2 NRT volumes...in draft

NRT



Volume I

Guidance for Managing Worker Fatigue
During Disaster Recovery Operations

Technical Assistance Document

**Volume 1:
Technical
Assistance
Document**

*5/14/11
01-16-08*

NRT



Volume II

Guidance for Managing Worker Fatigue
During Disaster Recovery Operations:
Background Operations

**Volume 2:
Background**

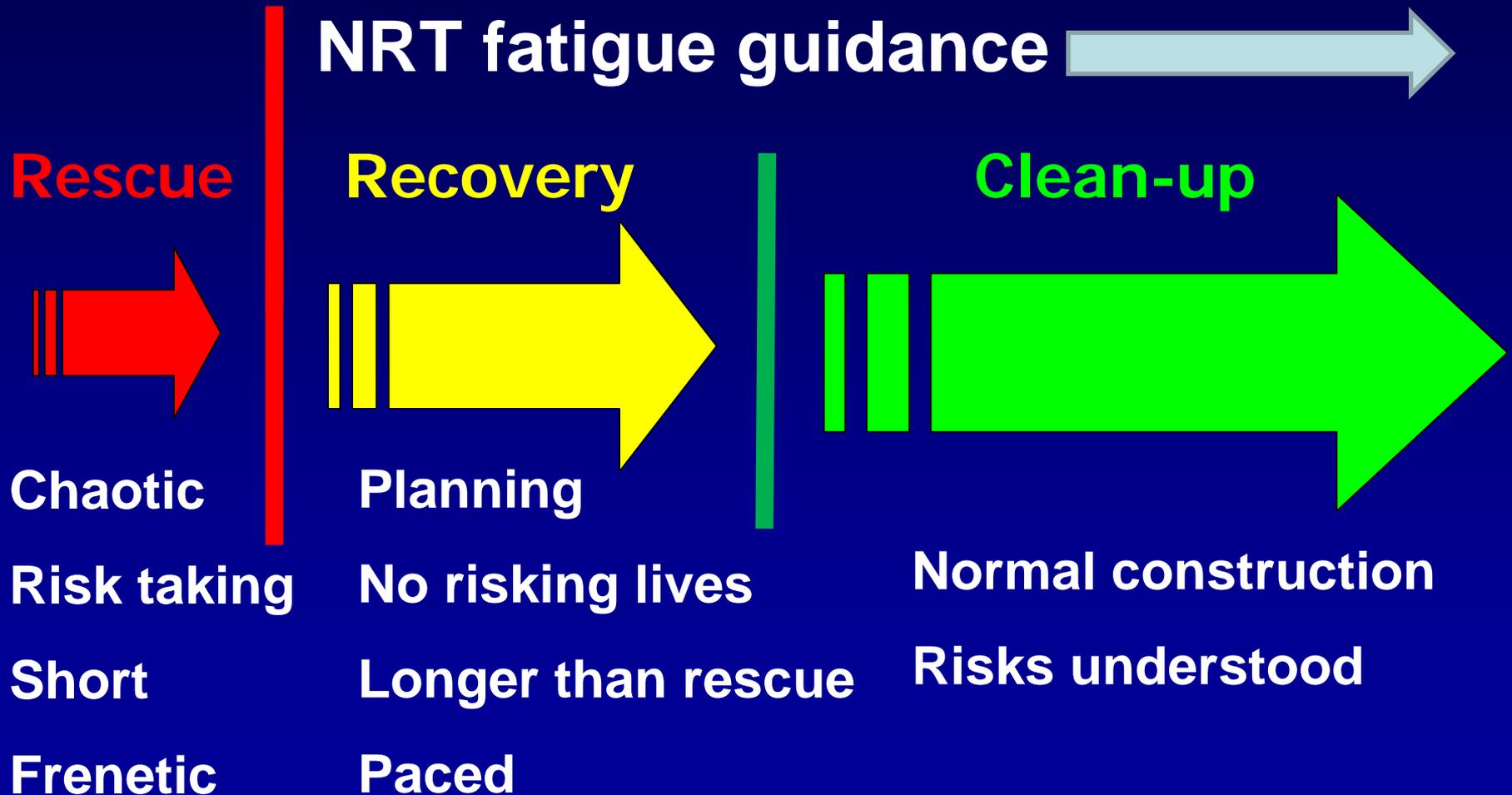
**DRAFT
04-04-08**

3 Goals for the Technical Assistance 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 by key stakeholders beyond the NRT



NRT guidance does not cover the rescue phase, which is often the most exhausting



Natural disasters keep coming: 324 FEMA declarations in last 6 years



Photo courtesy of FEMA,/George Armstrong, Biloxi, MS, 2006

Rail disasters involving chemicals keep coming (CDC, MMWR 1-28-05)

- 4300 daily shipments of hazmat by rail
- 75% of releases were < 70 gallons
- 10% of releases were > 2,200 gallons



Claire Caruso, Ph.D. from NIOSH provided this overview

The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy



Overview
of the
literature



Overview of
the NRT
guidance



Shift work leads to shorter sleep patterns with more disturbances

- long-term insomnia and excessive sleepiness
 - 32% night workers
 - 26% rotating workers
- (Drake et al. 2005)

12 hour shift, USAR
Team members, Kansas
grain elevator explosion
1998, FEMA





17 hours awake impairs performance similar to being drunk

- 17 hr awake = BAC 0.05%
- 24 hr awake = BAC 0.10%

(Dawson & Reid, 1997; Williamson & Feyer, 2000; Arendt et al. 2005)

After 12 hour shift,
Dennis Clark, Kansas
grain elevator explosion
1998, FEMA



Shift work negatively impacts neuro-cognitive functioning

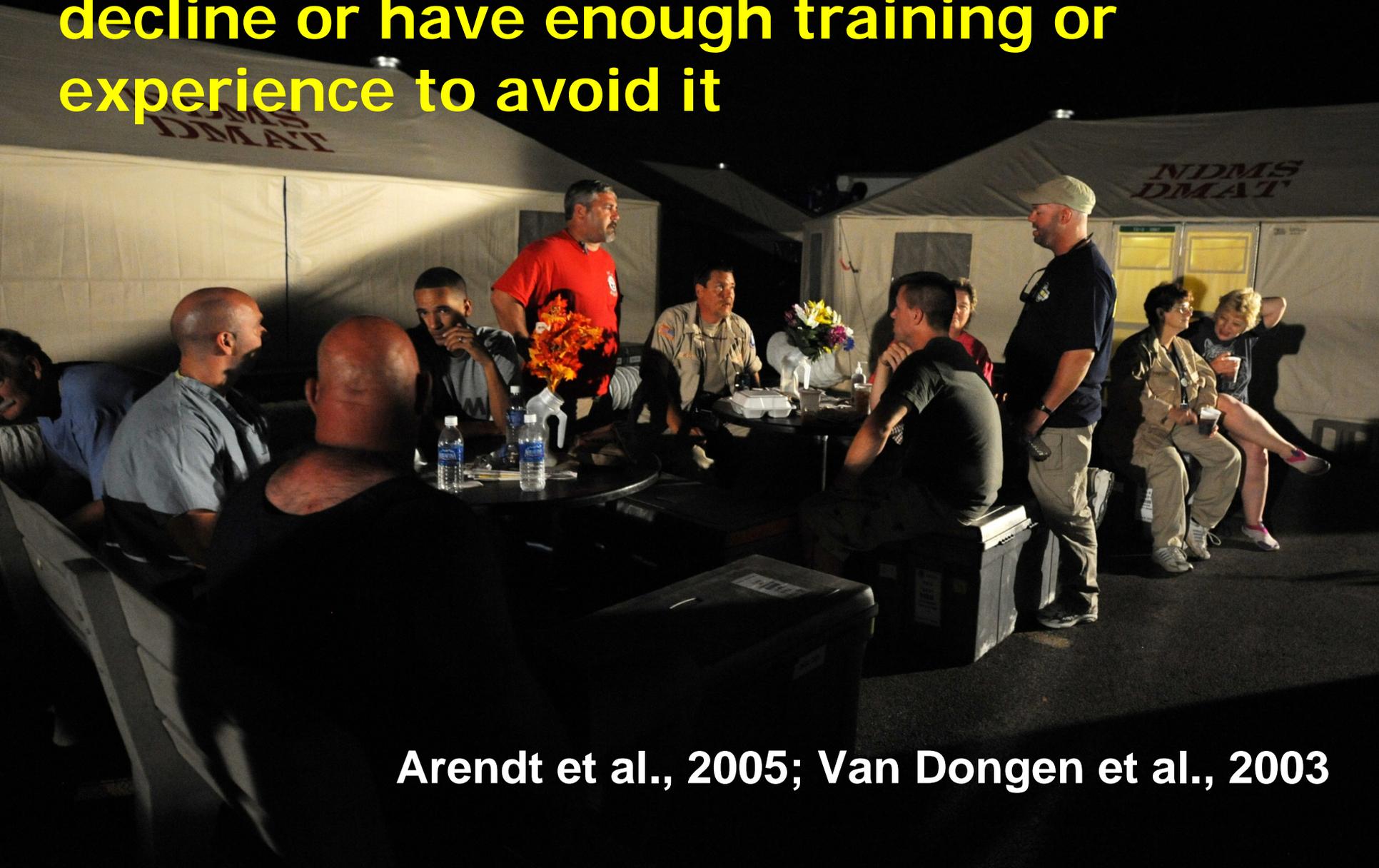
- Alertness
- Short term memory
- Learning
- Reaction times
- Risk assessment
- Performance

Some responders carry guns

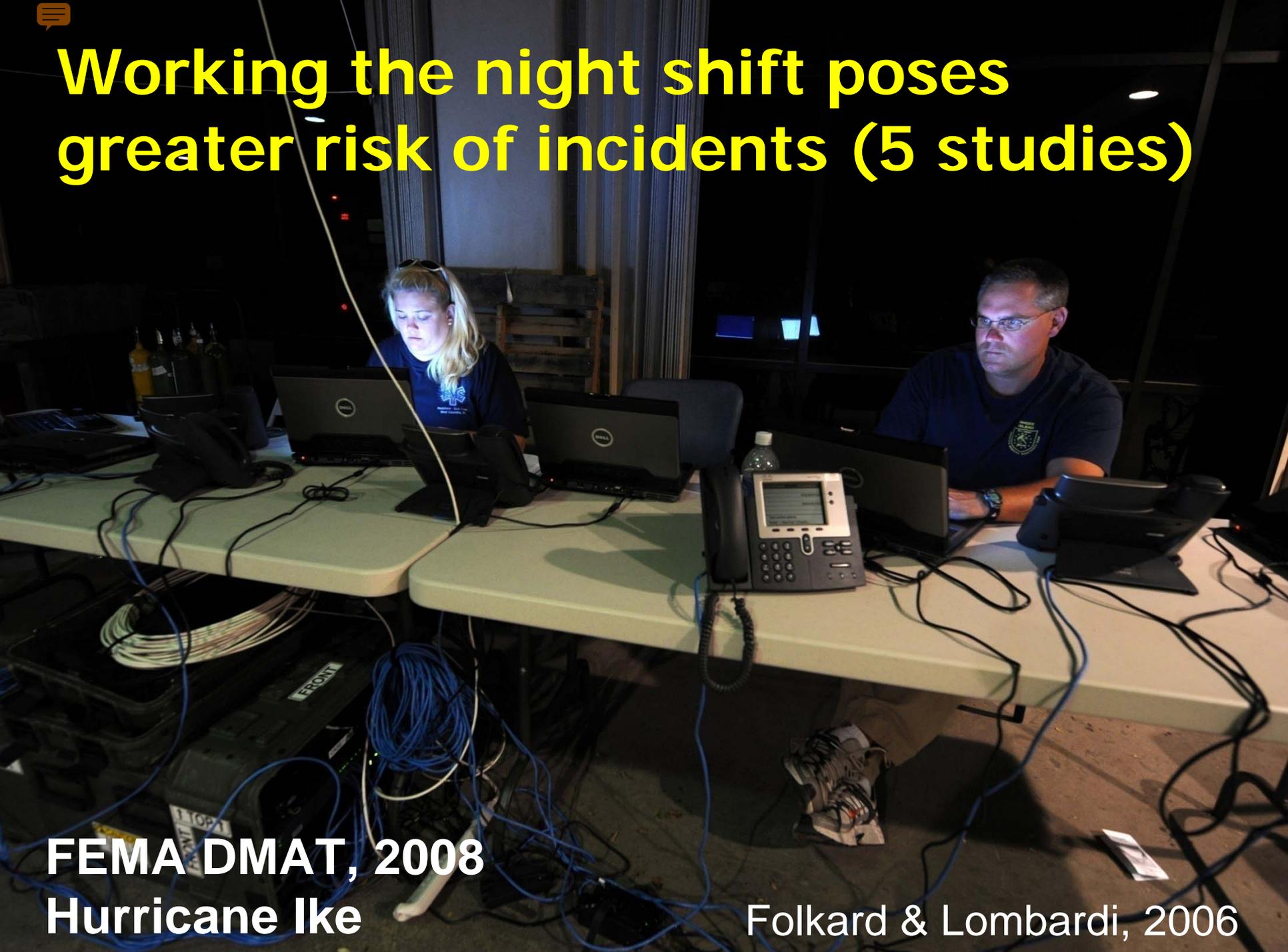


Curfew, Hurricane Ike,
2008 FEMA

Responders can not recognize their own decline or have enough training or experience to avoid it



Arendt et al., 2005; Van Dongen et al., 2003

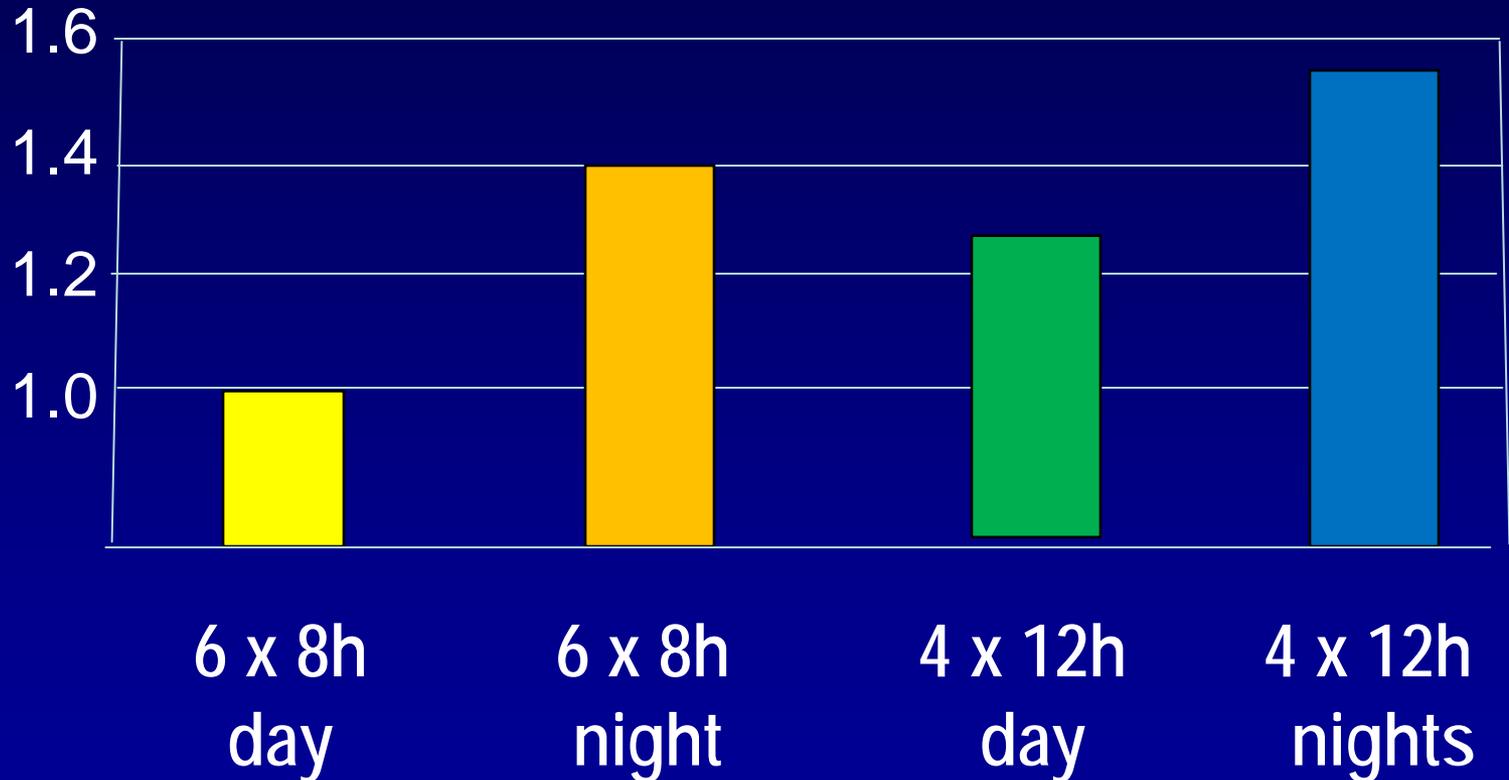


**Working the night shift poses
greater risk of incidents (5 studies)**

FEMA DMAT, 2008
Hurricane Ike

Folkard & Lombardi, 2006

Risks of incidents for 48-hr shifts depend on length and time of day



(adapted from Folkard & Lombardi, 2006)

Diseases have been linked to shift work

- **Gastro-intestinal complaints & disorders**
(Caruso et al. 2004; Knutsson 2003)
- **Cardiovascular disease**
 - Risk increased 40% (Bøggild & Knutsson, 1999)
- **Cancer**
 - Shift work with circadian disruption is a “probable carcinogen”
 - 2007 - Agency for Research on Cancer, WHO

There are fewer studies on long hours, but the number is growing



**FEMA, Winfield,
MO 6-08**



Long work hours result in higher injury rates

Dembe et al. Occup Environ Med 2005

- 110,236 job records for nationally representative sample of U.S. workers over 13-year period
- *61% higher injury rate* for workers in jobs with overtime schedules
- 37% increased rate for ≥ 12 hrs/day
- 23% increased rate for ≥ 60 hrs/week

Studies have shown that working long hours increases risks for diseases

- **myocardial infarction**
 - (Liu et al. 2002; Sokejima & Kagamimori 1998)
- **high blood pressure**
 - Hayashi et al. 1996
 - Iwasaki et al. 1998
 - Yang et al. 2006
 - No - Nakanishi et al. 2001; Park et al. 2001
- **Diabetes mellitus** 1 of 2 studies (yes - Kawakami et al. 1999; no – Nakanishi et al. 2001)
- **Musculo-skeletal disorders** Caruso & Waters, 2008

Shift work and long hours impact families

- **Delay of marriage, childbearing (Jacobs, 2004)**
- **Divorce: men 6 fold increase; women 3 fold increase (Presser, 2000)**
- **Increased risk for work/family conflict (Carlson & Perrewe 1999; Greenhaus et al. 1987)**

The final section

**Overview of the
NRT guidance**

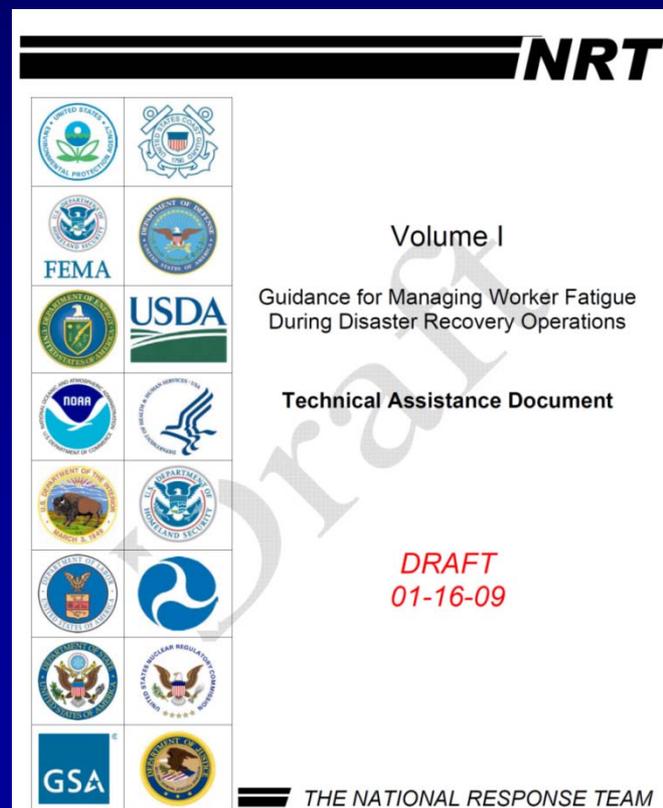
Volume I, the Technical Assistance Document, manages fatigue at two levels:

1. Organizational Program
2. Incident-Specific Plan



The agency program and site plan have common elements

1. Assessment
2. Identification of Fatigue Risk Factors
3. Controls
4. Evaluation



Volume II is the background document

Excellent literature search by Jan Shubert, EPA and Claire Caruso, NIOSH

NRT

Volume II

Guidance for Managing Worker Fatigue During Disaster Recovery Operations: Background Operations

Volume 2: Background

DRAFT
04-04-08

THE NATIONAL RESPONSE TEAM

The guidance contains a risk assessment tool

- Evaluates added risk due to fatigue
- Considers exposure and severity weight factors



The NRT guidance focuses on five key risk factors and stressors

1. Time
2. Living conditions
3. Nature of work
4. Site conditions
5. Emotional issues



Factor 1: "Chief among risk factors is the length of work shifts."

- Long hours
- Extended time per day and per week
- Extended weeks without a full day off
- Night shift

Safety Officer directing bus
with firefighters, Granite
Creek, MT 8-03
Courtesy FEMA



Factor 2: Living conditions have a major affect on responder fatigue

- Quarters
- Food
- Sanitation
- Recreation
- Leisure opportunities

Hurricane Rita
disaster workers,
9-05 FEMA

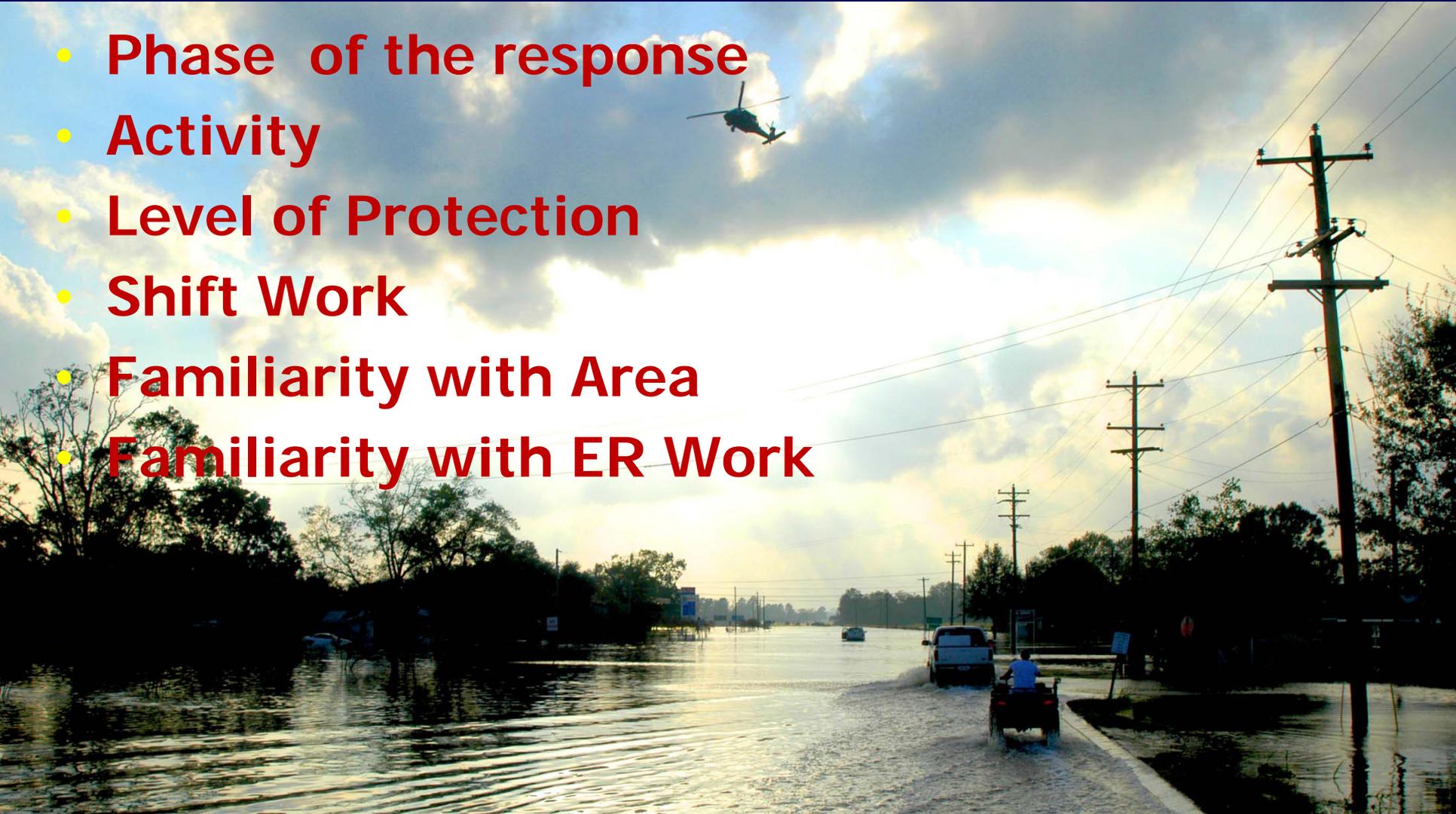


Responses pose capacity issues including sanitation, non-traditional lodging and stress



Factor 3: The nature of the work has an obvious impact on fatigue

- Phase of the response
- Activity
- Level of Protection
- Shift Work
- Familiarity with Area
- Familiarity with ER Work



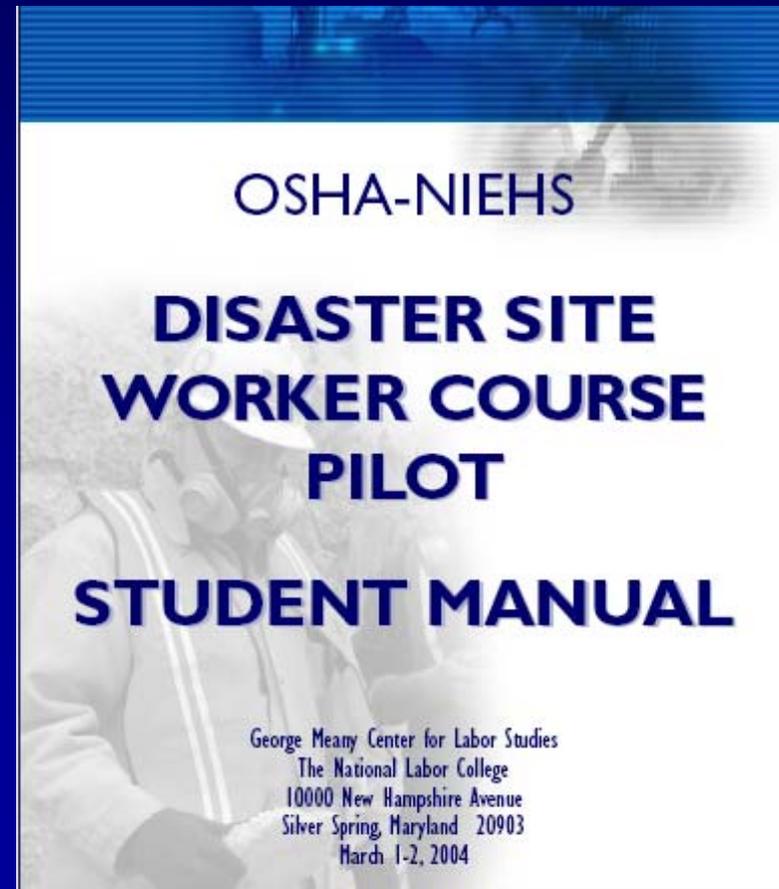
Factor 5: Emotional stressors add significantly to fatigue

Counselor in the
Astrodome, 9/05
Courtesy FEMA





**The OSHA-NIEHS
Disaster Site
Worker course
does not currently
address fatigue
management, but
it will**



**To receive copies of the draft
NRT guidance, when released:**

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**Join us in Toronto, May
30th, AIHA Full-day PDC 414**

**Thank you.
Any questions?**

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