

***Report on ANSI/API RP 755 –
Fatigue Risk Management Systems
For Personnel in the Refining &
Petrochemical Industries***

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Fatigue Risk Management System: RP 755

Finding:

“It has not been possible for the Investigation Team to directly attribute actions or inactions of the operators and supervisors to fatigue. However, this extended working period clearly has the potential to contribute to a lack of attentiveness, and slowness to identify and respond to process upsets.”

Recommendation:

“...API and the United Steel Workers union work together to develop fatigue prevention guidelines that would, at a minimum, limit hours and days of work and address shift work ... developed in conformance with ANSI principles and the composition of the working group developing the guidelines should be diverse”

RP 755 – Committee Membership

- **Owner/Operators – Refiners (8)**

- Steve Lerman, ExxonMobil
- Lamar Stokes, Shell
- Gerald Naliborski, Marathon
- Huma Abbasi, Chevron
- David Flower, BP
- Mike Mayo, Valero
- Ralph Bocian, Ergon
- Cully Farhar, ConocoPhillips
- Citgo, Tesoro, Pasadena Refining

- **Engineering & Construction (2)**

- Scott Wozniak, UOP
- Mike Morris, Austin Industrial

- **General Interest (2)**

- Martin Moore-Ede, Circadian
- Benjamin Gerson, University Services
- Alertness Solutions

- **Labor (2) – Withdrew 8/09**

- Glenn Erwin, USW International
- Tim Webster, USW Local (EM)
- BP, USW

- **Owner/Operator – Chemicals (4)**

- Richard Griffin, CP Chemicals
- Jeffrey Bonorden, Lyondell Basell
- Gary Whaley, Invista
- Shakeel Kadri, Air Products

- **Academia (1)**

- Sam Mannan, MKO Process Safety Center

- **Associations (3)**

- Laurie Miller, ACC
- Scott Madar, ORC
- Mark Scanlon, Energy Institute
- CCPS, NPRA

- **Government (0)**

- CSB
- UK HSE

- Observer

RP 755 – General Information

- Committee formed in Spring – Summer 2008
- Committee recognized that addressing fatigue goes well beyond hours of service and days of work
 - Comprehensive Fatigue Risk Management System approach adopted
- Scope of committee work excluded matters subject to collective bargaining like “overtime”
- Standards development schedule
 - Committee met about once a month
 - Balloted for approval in October 2009
 - Final publication by end of March 2010

Overview of Key Concepts

- Fatigue mitigation addressed through a comprehensive fatigue risk management system (FRMS) that is integrated with other safety management systems
- FRMS should be informed by sound science and recognize operational issues
- Key stakeholders shall be consulted in developing and implementing the local application of the FRMS
- Culture of fatigue risk management should be created in which the shared responsibility of mitigating risk is recognized

Scope & Positions Covered

- Refineries, petrochemical and chemical operations, natural gas liquids extraction plants, and other facilities such as those covered by the OSHA Process Safety Management Standard, 29 CFR 1910.119
 - Applies to locations where employees commute to work
 - Does not apply to locations where employees are housed on-site
 - On-site contractors expected to have equivalent programs
- Employees working night shifts, rotating shifts, extended hours/days or call outs involved in process safety sensitive actions

RP 755 - FRMS Framework

- Staff-Workload Balance
- Safety Promotion: Training, Education & Communication
- Work Environment
- Individual Risk Assessment & Mitigation
- Incident/Near Miss Investigation
- Hours of Service Guidelines
 - 8, 10 & 12 hour shifts
 - Normal Operations, Outages & Extended Shifts
- Periodic Review of FRMS to Achieve Continuous Improvement

Staff – Workload Balance & Work Environment

- Assess staffing levels and workload balance initially and periodically, including consideration of:
 - Workload variability incl. start-ups, shutdowns, unplanned events and emergency management situations
 - Turnover, absenteeism & workforce demographics
- FRMS should consider type of work being performed
- Where possible, the work environment should be designed to enhance alertness
 - Brightly lit utilizing indirect lighting to avoid glare and eye strain
 - Indoor temperature and humidity should be in a comfortable range
 - Workstations should be designed utilizing ergonomic principles

Training, Education & Communication

- Employees & Family Members: Initial and recurring training that includes:
 - Basic sleep, circadian & fatigue physiology
 - Strategies for achieving good quality, restorative sleep
 - Recognizing symptoms of sleep disorders and how to obtain appropriate medical advice and treatment
 - Healthy lifestyle choices in 24/7 operations
 - Risks & signs of fatigue impairment in their work environment and work duties and effective ways of mitigating them
 - Recognizing when fatigue mitigation is no longer possible under existing circumstances

Training, Education & Communication (cont.)

- Supervisors: Initial and recurring training that includes:
 - The scientific basis, structure and management of the corporate FRMS
 - + Integration within the corporate safety management system
 - Influence of staffing levels on employee fatigue
 - Effects of work and rest scheduling on employee fatigue
 - + Scheduling work to minimize the risk
 - Managing a team of employees to minimize fatigue risk
 - Assessing fitness for duty potentially due to fatigue

Individual Risk Assessment & Mitigation

- Individuals encouraged to be continuously aware of their level of fatigue
- Supervisors shall be:
 - Alert to signs of excess fatigue in the workplace
 - Given the responsibility and authority to take appropriate steps to ensure fitness for duty per the FRMS
- Consideration should be given to implementing “wellness programs” and “employee assistance programs” to promote:
 - Prevention and management of medical conditions
 - Promote psychological and physical fitness
- Programs designed to identify and address sleep disorders should be offered

Incident/Near Miss Investigation

- Investigations of incidents should consider role of fatigue
- Fatigue-related information collected should include:
 - time of incident
 - shift pattern incl. number of consecutive shifts worked
 - number of hours awake
 - number of hours slept in last 24 hours for individuals involved
- For some incidents, concluding a definitive role of fatigue may not be possible
- Aggregate analysis of incidents may reveal patterns suggestive of the role of fatigue that may not be apparent when evaluating individual incidents

Hours of Service Guidelines

- Hours of Service Guidelines have been developed:
 - In the context of the existence of a comprehensive FRMS
 - Recommendations for 8, 10 & 12 hour shifts
 - Will address normal operations, outages and extended shifts
 - Guidelines will identify the upper limits for hours of service
 - Consistently working at the upper limits is not sustainable and may lead to chronic sleep debt
 - In addition to the upper limits, the FRMS should provide target hours of service for normal operations
 - Objective of limits is to establish triggers at which additional fatigue risk evaluations need to be performed

12 Hour Shifts

- Normal Operations

- Work sets shall not exceed 7 consecutive day or night shifts
- To permit 2 consecutive nights sleep after a work set:
 - + There shall be 36 hours off after a work set or
 - + Minimum of 48 hours off after a work set containing 4 or more night shifts or
 - + Minimum of 48 hours off after a total of 84 hours worked regardless of day or night shift

- Outages

- Work sets shall not exceed 14 consecutive day or night shifts
- There shall be a minimum of 36 hours off after a work set
- Time off beyond 36 hours shall be addressed at the plant level

- Extended Shifts (i.e., shifts greater than 14 hours)

- Shall occur only when necessary to avoid an unplanned open safety critical position or accomplish an unplanned safety critical task
- Shall be managed by an established management process
- After shifts of 14 -16 hours, a minimum of 8 hours off shall be provided before returning for next shift
- After shifts greater than 16 hours, a minimum of 10 hours off shall be provided before returning for next shift
- Extended shifts shall not exceed 18 hours
- No more than 1 extended shift longer than 14 hours should occur in a work set

Hours of Service Guidelines

Operational Situation	12-Hour Shift	10-Hour Shift	8-Hour Shift
Maximum Consecutive Shifts (Day or Night) In a Workset			
a) Normal Operations	7 shifts	9 shifts	10 shifts
b) Outages	14 shifts	14 shifts	19 shifts
Minimum time off after a workset			
a) Normal Operations	36 hours	36 hours	36 hours
▪ Workset of 4 or more night shifts	48 hours	48 hours	48 hours
▪ After 84 hours or more regardless of day or night	48 hours	48 hours	48 hours
b) Outages	36 hours	36 hours	36 hours
Extended Shifts			
a) Unscheduled maximum shift	18 hours	16 hours	16 hours
b) Time off after shift			
▪ 10 – 16 hour shift	N/A	N/A	8 hours
▪ 12 – 16 hour shift	N/A	8 hours	N/A
▪ 14 – 16 hour shift	8 hours	8 hours	N/A
▪ >16– 18 hour shift	10 hours	N/A	N/A
Maximum Number of Extended Shifts per Workset	1	1 – 14 hour shift or 2 – 12 hour shifts or for 3 or more 12 hour shifts, follow 12 hour normal operations guidelines above	2 – if greater than 12 hours in duration; extended shifts must be non-consecutive If >2, follow 12 hour normal operations above

Periodic Review of FRMS – Continuous Improvement

- FRMS should undergo periodic assessments of its effectiveness and identify opportunities for continuous improvement
- Targets should be set for key parameters of FRMS such as:
 - Percentage overtime
 - Number of open shifts
 - Number of extended shifts
 - Number of exceptions
- Metrics gathered to determine if targets are being met
- Plans should be developed to close gaps between targets and actual FRMS performance

Implementation Strategies

- Option 1: Consultant-led implementation
 - Good consults exist who can walk a company through all aspects of an FRMS
 - Pros:
 - + Limited in-house expertise needed
 - + Access to current science and experience of others
 - Cons:
 - + Cost
 - + potential for less organizational ownership
 - + Potential for less integration with other management systems
- Option 2: Management-led, multidisciplinary team
 - May include: Operations, Safety, HR, Medical, Law, PA, Training, IT, Engineering, others
 - Retain consultants as needed for skill gaps or to leverage resources
 - Develop sub-teams to address key components of RP-755
 - Pros:
 - + Well integrated with other management systems
 - + compatible with company culture
 - + potentially less expensive
 - Cons: Requires significant time commitment and diverse areas of expertise