Technical Support Document for ANSI/API RP 755, *Fatigue Risk Management Systems for Personnel in the Refining and Petrochemical Industries*

API TECHNICAL REPORT 755-1
APRIL 2010

AMERICAN PETROLEUM INSTITUTE

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Downstream Segment

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Foreword

Fatigue Risk Management Systems (FRMS) have emerged and been widely recognized as a more effective approach to managing and mitigating employee fatigue risk in the 24/7 workplace. The core feature of the FRMS is that it is a data-driven, risk-informed, safety performance-based system. The FRMS implementation process first identifies all sources of fatigue risk in the business operation, then introduces mitigating policies, technologies, and procedures to reduce the risk, and most importantly then maintains them in a proactively-managed continuous improvement system. The history of FRMS was recently summarized [1].

This method represents a significant step change from the traditional approaches of either relying on maximum limits to hours of work or minimum limits to hours of rest (variously called Hours of Service, Work-Rest Rules, Working Time Directives), or adopting intermittent or piece-meal solutions (e.g. a fatigue training program or a shift schedule redesign), depending on the interests and initiative of local site managers.

One essential feature of FRMS is that it is a system meant to be improved upon on a regular and continuous basis. It is not a set of guidelines designed for one-time compliance, but instead provides a framework that will evolve over time, driven by the collection of data on fatigue risk and fatigue outcomes (e.g. fatigue-related incidents).

This document identifies and explains the scientific and operational issues considered during the preparation of RP 755. By providing the reasoning behind the specific wording in the RP755 document, this document supports each key statement in RP 755 in sequence so that it can be used in parallel with the RP 755 text. To make this document accessible and manageable, key scientific sources and references are provided to help readers gain access to the scientific literature.

Suggested revisions are invited and should be submitted to the Director of Regulatory and Scientific Affairs, API, 1220 L Street, NW, Washington, DC 20005.

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1 Scope

Provides guidance to all stakeholders (e.g. employees, managers, supervisors, contractors)

The success of an FRMS depends on the willingness of diverse stakeholders to alter their behaviors and practices to help mitigate fatigue risk. It is important to bring employees, supervisors and managers early into the process of designing an FRMS. Doing so helps create a buy-in so that they will support and own the FRMS because of the benefits they see for themselves as well as for the overall safety of the workplace.

This recommended practice was developed for refineries, petrochemical and chemical operations, natural gas liquefaction plants, and other facilities such as those covered by the OSHA Process Safety Management Standard, 29 *CFR* 1910.119

RP 755 was specifically developed for US facilities operating under the OSHA Process Safety Management Standard. Companies voluntarily may also choose to take advantage of RP 755 to design and implement FRMS across their other operations, including upstream and international operations outside the US where fatigue risk can also significantly impact the operational safety. However, doing so is not required under RP 755.

Applies to a workforce that is commuting daily to a job location

RP 755 is specifically designed for employees who live and sleep at their homes during off-duty hours and have normal family-social interactions on a daily basis. These recommendations are not designed for employees who travel to remote locations (e.g. offshore platforms or onshore remote locations) where they live in company-provided accommodations and are isolated from their normal daily family and social interactions.

Research on sleep patterns in offshore platforms and other remote locations shows a greater capacity to adapt to longer sequences of consecutive workdays and maintain adequate sleep when the demands of family and social interactions are not competing with sleep and relaxation time. [2,3]

1.1 Overview

It has been documented that excess workplace fatigue is a risk to safe operations

Fatigue is not just feeling physically tired; it also is a state of impaired alertness, attentiveness, and mental and physical performance. Being fatigued also causes reduced motor coordination and slower reaction times. A working definition of fatigue for the purposes of this document is found under Terms and Definitions in Section 3.3 of RP 755.

Fatigue is a common issue among workers. A survey of US workers found a fatigue prevalence of 37.9% [4], which is consistent with other studies of working-age individuals [5,6]. When an individual is fatigued, the probability of poor, inefficient, and variable performance increases. Performance deficits include increased periods of delayed response or no-response (lapses) during attention-based tasks, slowed information processing, increase in reaction times, reduced accuracy of short-term memory, and accelerated decrements in performance with time on task [7]. Fatigue is also associated with a loss of environmental (“situational”) awareness, impairment of cognitive/logical reasoning skills, poor judgment, and diminished ability to communicate and/or process communications and information.