



 **PHMSA**
U.S. Department of Transportation
Pipeline and Hazardous Materials
Safety Administration

CRM

Control Room Management

CONTACT INFORMATION

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CRM - BACKGROUND

- ❖ Pipeline Safety Improvement Act of 2002
 - ❖ Study control room operations to enhance pipeline safety (CCERT)
 - ❖ Provide report to Congress
- ❖ NTSB
 - ❖ Conducted study of hazardous liquid pipeline SCADA systems

CRM - BACKGROUND

- ❖ PIPES Act of 2006
 - ❖ Establish human factors management plan
 - ❖ Reduce risks associated with human factors
 - ❖ Program to assure safe operations of pipelines
 - ❖ Adopt NTSB Recommendations
 - ❖ Changes to reporting requirements to include Control Room and fatigue factors

CRM - BACKGROUND

- ❖ NPRM published September 12, 2008
 - ❖ Objectives were to introduce additional requirements with respect to control room management and human factors

- ❖ PHMSA received 144 comments on the NPRM

CRM – FINAL RULE

- ❖ CRM Final Rule issued on December 3, 2009
 - ❖ Amendment Nos. 192-112 and 195-93
 - ❖ Only Parts 192 and 195 changed
 - ❖ LNG excluded entirely from regulations

- ❖ Effective date is February 1, 2010

CRM – FINAL RULE EXCLUSIONS

Excludes gas distribution operators with less than 250,000 services and gas transmission operators without compressor stations from certain portions of the rule

CRM – FINAL RULE EXCLUSIONS

- ❖ Must Comply with:
 - ❖ provisions of fatigue mitigation (§192.631(d)),
 - ❖ compliance validation (§192.631(i)), and
 - ❖ compliance and deviation (§192.631(j))



CRM – FINAL RULE

- ❖ Addition of definitions
- ❖ Addition of new reference standards
- ❖ Provision for written CRM procedures as part of O&M Manual and Emergency Plan
- ❖ New section of code for Control Room Management

192.3 DEFINITIONS

ALARM

Means an audible or visible means of indicating to the controller that the equipment or processes are outside operator-defined, safety related parameters

192.3 DEFINITIONS

CONTROL ROOM

Means an operations center staffed by personnel charged with the responsibility for remotely monitoring and controlling a pipeline facility.

192.3 DEFINITIONS

CONTROLLER

Means a qualified individual who remotely monitors and controls the safety-related operations of an entire, multiple or single section(s) of a pipeline facility via a SCADA system from a control room, and who has operational authority and accountability for the remote operational functions of a pipeline facility

192.3 DEFINITIONS

Supervisory Control and Data Acquisition (SCADA) System

Means a computer-based system or systems used by a controller in a control room that collects and displays information about a pipeline facility and may have the ability to send commands back to the pipeline facility.

192.7 REFERENCES

Added to both Parts 192 and 195

- ❖ API RP 1165 “Recommended Practice for Pipeline SCADA Displays”, First Edition (January 2007)

Added only to Part 195

- ❖ API RP 1168 “Pipeline Control Room Management”, First Edition (September, 2008)

PROCEDURES

- ❖ O&M Manual - 192.605(b)(12)
Implementing the applicable control room management procedures required by §192.631
- ❖ Emergency Plan 192.615(a)(11)
Actions required to be taken by a controller during an emergency in accordance with §192.631

192.631 – CONTROL ROOM MANAGEMENT

New Section of code to address control room management

- ❖ Final requirements for CRM
- ❖ Applies to all operators that use SCADA systems and have at least one controller and control room

192.631 (a) GENERAL

The section applies to each operator of a pipeline facility with a controller working in a control room who monitors and controls all or part of a pipeline facility through a SCADA system.

192.631 (a) GENERAL

Each operator must have and follow written control room management procedures that implement the requirements of this section, except

192.631 (a) GENERAL
except where an operators activities
are limited to either or both of:

1. Distribution with less than 250,000 services, or
2. Transmission without a compressor station

192.631 (a) GENERAL

The operator must have and follow written procedures that implement only paragraphs (d) (regarding fatigue), (i) (regarding compliance validation), and (j) (regarding compliance and deviations)

192.631 (a) General

The procedures required by this section must be integrated, as appropriate, with operating and emergency procedures required by §§192.605 and 192.615.

192.631 (a) General

An operator must develop the procedures no later than August 1, 2011, and implement the procedures no later than February 1, 2012.

Implementation Dates

Procedures by **August 1, 2011**

Implementation by

February 1, 2013

Date of February 1, 2012 in code is incorrect, and provides only a 2 year implementation

192.631(b) ROLES AND RESPONSIBILITIES



Each operator must define roles and responsibilities of a controller during normal, abnormal, and emergency operating conditions.

192.631(b) ROLES AND RESPONSIBILITIES

To provide for a controller's prompt and appropriate response to operating conditions, and operator must define each of the following:

192.631(b) ROLES AND RESPONSIBILITIES

(1) Controller's authority/responsibility to make decisions and take action during normal operations;



192.631(b) ROLES AND RESPONSIBILITIES

(2) Controller's role when an abnormal operating condition is detected, including responsibility to take specific actions and communicate with others;

192.631(b) ROLES AND RESPONSIBILITIES

(3) Controller's role during an emergency, including responsibility to take specific actions and communicate with others;

192.631(b) ROLES AND RESPONSIBILITIES

- (4) Method of recording controller shift changes and handover of responsibility between controllers

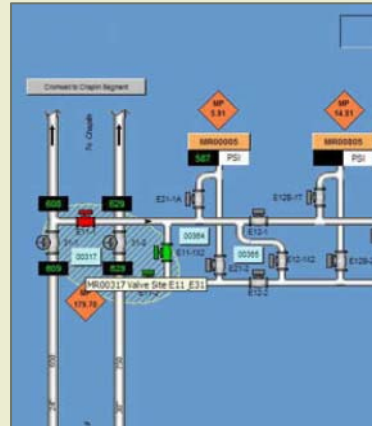


192.631(c) PROVIDE ADEQUATE INFORMATION

Each operator must provide its controllers with the information, tools, processes and procedures necessary for the controllers to carry out the roles and responsibilities the operator has defined by performing each of the following:

192.631(c) PROVIDE ADEQUATE INFORMATION

- (1) Implement sections 1, 4, 8, 9, 11.1, and 11.3 of API 1165 whenever a SCADA system is added, expanded or replaced;



192.631(c) PROVIDE ADEQUATE INFORMATION

- (2) Conduct point-to-point verification between SCADA displays and related field equipment when field equipment is added or moved and when other changes are made to field equipment or SCADA displays;

192.631(c) PROVIDE
ADEQUATE INFORMATION

- (3) Test and verify internal communication plan to provide adequate means for manual operation of the pipeline safely, at least once each calendar year not to exceed 15 months;

192.631(c) PROVIDE
ADEQUATE INFORMATION

- (4) Test any backup SCADA system at least once each calendar year not to exceed 15 months; and

192.631(c) PROVIDE

ADEQUATE INFORMATION

- (5) Establish/implement procedures for when a different controller assumes responsibility, including content of information to be exchanged.

192.631(d)

FATIGUE MITIGATION

Each operator must implement the following methods to reduce the risk associated with controller fatigue that could inhibit a controller's ability to carry out the roles and responsibilities the operator has defined:

192.631(d)

FATIGUE MITIGATION

- (1) Establish shift lengths and schedule rotations that provide controllers off-duty time sufficient to achieve eight hours of continuous sleep;

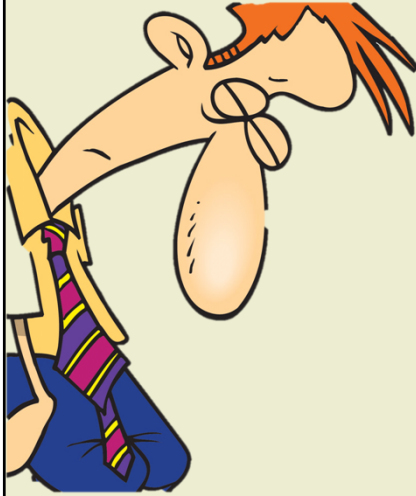
192.631(d)

FATIGUE MITIGATION

- (2) Educate controllers & supervisors in fatigue mitigation strategies and how off-duty activities contribute to fatigue;

192.631(d)

FATIGUE MITIGATION



- (3) Train controllers and supervisors to recognize the effects of fatigue; and

192.631(d)

FATIGUE MITIGATION

- (4) Establish maximum limit on controller hours-of-service, providing from emergency deviation from the maximum limit if necessary for the safe operation of a pipeline facility

192.631(e) ALARM MANAGEMENT

Each operator using a SCADA system must have a written alarm management plan to provide for effective controller response to alarms. An operator's plan must include provisions to:

192.631(e) ALARM MANAGEMENT

(1) Review SCADA safety-related alarm operations by a process that ensures alarms are accurate and support safe operations;

192.631(e) ALARM MANAGEMENT

- (2) At least once a month identify points affecting safety that have been taken off the SCADA scan, had alarms inhibited, generated false alarms or that have had forced or manual values for periods of time exceeding those required for O&M activities;

192.631(e) ALARM MANAGEMENT

- (3) Verify correct safety-related alarm set-point values and alarm descriptions at least once each calendar year, not to exceed 15 months;

192.631(e) ALARM MANAGEMENT

- (4) Review required alarm management plan at least once each calendar year, not to exceed 15 months;

DateTime	Type	Name	Tag Name
2009-06-02 09:23:02	Limit	SULPHURIC	Channel_0_User_Def_0
2009-06-02 09:23:02	Test	TEST	Channel_0_User_Def_0
2009-06-02 09:23:02	Limit	TEST	Channel_0_User_Def_44
2009-06-02 09:22:58	Limit	MIXTURE	Channel_0_User_Def_0
2009-06-02 09:22:58	Limit	MIXTURE	Channel_0_User_Def_20
2009-06-02 09:22:58	Limit	SULPHURIC	Channel_0_User_Def_0
2009-06-02 09:22:57	Test	TEST	Channel_0_User_Def_0
2009-06-02 09:22:57	Limit	TEST	Channel_0_User_Def_44
2009-06-02 09:22:53	Limit	MIXTURE	Channel_0_User_Def_0
2009-06-02 09:22:53	Limit	SULPHURIC	Channel_0_User_Def_0
2009-06-02 09:22:52	Limit	TEST	Channel_0_User_Def_44
2009-06-02 09:22:48	Limit	MIXTURE	Channel_0_User_Def_0
2009-06-02 09:22:48	Limit	MIXTURE	Channel_0_User_Def_2
2009-06-02 09:22:48	Limit	SULPHURIC	Channel_0_User_Def_0
2009-06-02 09:22:48	Test	TEST	Channel_0_User_Def_0
2009-06-02 09:22:48	Limit	TEST	Channel_0_User_Def_35
2009-06-02 09:22:43	Limit	MIXTURE	Channel_0_User_Def_0
2009-06-02 09:22:43	Limit	MIXTURE	Channel_0_User_Def_0

192.631(e) ALARM MANAGEMENT

- (5) Monitor content and volume of general activity being directed to and required of each controller at least once each calendar year, not to exceed 15 months to assure controllers have sufficient time to analyze and react to incoming alarms; and

192.631(e) ALARM MANAGEMENT

(6) Address deficiencies identified through implementation of (e)(1) through (e)(5)

192.631(f) CHANGE MANAGEMENT

Each operator must assure that changes that could affect control room operations are coordinated with the control room personnel by performing each of the following:

192.631(f) CHANGE MANAGEMENT

- (1) Establish communications between control room representatives, operator's management, and associated field personnel when planning and implementing physical changes to pipeline equipment or configuration;

192.631(f) CHANGE MANAGEMENT

- (2) Require field personnel to contact the control room when emergency conditions exist and when making field changes that affect control room operations; and

192.631(f) CHANGE MANAGEMENT

- (3) Seek control room or control room management participation in planning prior to implementation of significant pipeline hydraulic or configuration changes.

192.631(g) OPERATING EXPERIENCE

Each operator must assure that lessons learned from its operating experience are incorporated, as appropriate, into its control room management procedures by performing each of the following:

MW2

192.631(g) OPERATING EXPERIENCE

- (1) Review incidents that must be reported pursuant to 49 CFR Part 191 to determine if control room actions contributed to the event, and, if so, correct, where necessary, deficiencies related to:

MW4

192.631(g) OPERATING EXPERIENCE

- i. Controller fatigue;
- ii. Field equipment;
- iii. Operation of any relief device;
- iv. Procedures;
- v. SCADA system configuration; and
- vi. SCADA system performance.

Slide 53

MW2 Too much on one slide. try and stay with the 5 x 5 or at the most 7 x 7 rule for slide development
McGaughey, Wallace, 12/4/2009

Slide 54

MW4 Too much on one slide. try and stay with the 5 x 5 or at the most 7 x 7 rule for slide development
McGaughey, Wallace, 12/4/2009

192.631(g) OPERATING EXPERIENCE

(2) Include lessons learned from the operator's experience in the training program required by this section.

192.631(h) TRAINING

Each operator must establish a controller training program and review the training program content to identify potential improvements at least once each calendar year, but at intervals not to exceed 15 months.

192.631(h) TRAINING

An operator's program must provide for training each controller to carry out the roles and responsibilities defined by the operator. In addition, the training program must include the following elements:

192.631(h) TRAINING

- (1) Responding to abnormal operating conditions likely to occur simultaneously or in sequence;

192.631(h) TRAINING

- (2) Use a computerized or non-computerized (tabletop) method for training controllers to recognize abnormal operating conditions;

192.631(h) TRAINING

- (3) Training controllers on their responsibilities for communication under the operator's emergency response procedures;

192.631(h) TRAINING

- (4) Training that will provide a controller a working knowledge of the pipeline system, especially during the development of abnormal operating conditions; and

192.631(h) TRAINING

- (5) For pipeline operating setups that are periodically, but infrequently used, providing an opportunity for controllers to review relevant procedures in advance of their application.

192.631 (i) COMPLIANCE VALIDATION

Upon request, operators must submit their procedures to PHMSA or, in the case of an intrastate pipeline facility regulated by a State, to the appropriate State agency.

192.631 (j) COMPLIANCE AND DEVIATIONS

An operator must maintain for review during inspection:

192.631 (j) COMPLIANCE AND DEVIATIONS

- (1) Records that demonstrate compliance with the requirements of this section; and

192.631 (j) COMPLIANCE AND DEVIATIONS

- (2) Documentation to demonstrate that any deviation from the procedures required by this section was necessary for the safe operation of a pipeline facility.

ADDITIONAL INFORMATION

PHMSA Training and Qualification

<http://www.phmsa.dot.gov/pipeline/TQ>

PHMSA Pipeline Safety Regulations

<http://www.phmsa.dot.gov/pipeline/TQ/Regulations>

ADDITIONAL INFORMATION

ADB 05-06, *Countermeasures to Prevent Human Fatigue in the Control Room*, August 11, 2005 (70 FR 46917)

API RP 1113 *Developing a Pipeline Supervisory Control Center*

API RP 1161 *Guidance Document for the Qualification of Liquid Pipeline Personnel*

API RP 1167 *Alarm Management* (still under development)

