

**NEI 06-11 [Draft, Rev. 2f]**

# **Managing Personnel Fatigue at Nuclear Power Reactor Sites**

**November 2013**



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**Nuclear Energy Institute**

**Managing Personnel  
Fatigue at Nuclear Power  
Reactor Sites**

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## **EXECUTIVE SUMMARY**

This document provides guidance for managing fatigue in accordance with 10 CFR 26, Subpart I, *Managing Personnel Fatigue*. The goals of this guide are to provide the tools needed to meet regulatory requirements while:

- Maintaining reasonable assurance of industrial and nuclear safety
- Recognizing that a wide variety of work situations exist across the industry
- Supporting management flexibility and decision making when unplanned work is required
- Providing the records needed to allow the required performance evaluations to be performed efficiently
- Clarifying the rights and responsibilities of licensees and workers

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# **MANAGING PERSONNEL FATIGUE AT NUCLEAR POWER REACTOR SITES**

## **1 INTRODUCTION AND BACKGROUND**

### **1.1 INTRODUCTION AND BACKGROUND**

This guide provides an approach to meeting 10 CFR 26, Subpart I requirements related to managing personnel fatigue at power reactor sites. The management of fatigue is integrated into the industry's fitness-for-duty program and is addressed in NEI 06-11, Managing Personnel Fatigue at Nuclear Power Reactor Sites, NEI 03-01, Nuclear Power Plant Access Authorization Program, and NEI 03-04, Guideline for Plant Access Training.

These documents should be used by the licensee to develop policies, procedures and programs specific to their utility. Training, security and human resource policies as well as labor management and relations practices need to be considered as well in the development of the policies, procedures and programs.

This document is presented in a format that will be closely aligned in sequence to 10 CFR 26. Tables are provided in each section for ease of reference to the applicable rule in 10 CFR 26. These are for general information, and the actual rule should be referenced for explicit details.

This guide also addresses training and the comprehensive examination that is required by Part 26 for the following new knowledge and abilities (KAs):

- Knowledge of the contributors to worker fatigue, circadian variations in alertness and performance, indications and risk factors for common sleep disorders, shift work strategies for obtaining adequate rest, and the effective use of fatigue countermeasures.
- Ability to identify symptoms of worker fatigue and contributors to decreased alertness in the workplace.

The training for other KAs associated with Fitness-for-duty FFD is addressed in NEI 03-01 and NEI 03-04.

### **1.2 BACKGROUND**

An individual's ability to safely and competently perform his or her duties is not solely based on the individual's hours worked or that the individual has had adequate rest. Fatigue can be caused by numerous factors including long hours of work, inadequate rest between work periods, sleep disorders, sedentary lifestyles, work problems or dissatisfaction, home finances and relationships, inadequate nutrition, emotional stress, physical stress, prescription drugs, and mental or physical illness. Fatigue may lead to decreased alertness. When an individual is alert, he or she may be more focused and better able to pay attention. Fatigue and decreased alertness

can substantively degrade an individual's ability to safely and competently perform his or her duties.

Fatigue can be defined as:

Fatigue – The degradation in an individual's cognitive and motor functioning resulting from inadequate rest.

When considering fatigue, both the effects of acute fatigue (short term), chronic fatigue (long term), and an individual's susceptibility to circadian variations should be considered.

Fatigue may not be readily observable by a casual observer. Consistent with a station's Continuing Behavioral Observation program, individuals should be observed for signs of fatigue which can include, but are not limited to: difficulty staying on task, irritable behavior, disorientation, forgetfulness, and tardiness.

Fatigue management is vital to ensure that individuals are rested and capable of performing his/her daily tasks without error. An alert individual will be able to remain focused and engaged in his/her duties.

### 1.3 OVERVIEW OF FATIGUE MANAGEMENT

Fatigue management is part of the licensee's overall fitness-for-duty (FFD) program.

In 1982 the Nuclear Regulatory Commission issued Generic Letter 82-12, Nuclear Power Plant Staff Working Hours, providing guidelines for managing the hours worked for individuals performing safety related work. The current rule was driven, in part, by the variation in approaches used across the industry to meet these guidelines. To meet the requirements in Subpart I, a detailed process, as described in this guide, is needed for consistent application of fatigue management principles across the industry. As an integral part of the fitness-for-duty program, sound fatigue management for individuals should be viewed as a way of doing business as opposed to requirements imposed by the NRC.



**Table 1: Other Part 26 Sections Applicable to Fatigue Management**

[See rule for details - table provides only general summary of rule]

<b>Part 26 Section</b>	<b>Notes on Connection to Subpart I</b>
26.1 Purpose	States purpose of Part 26
26.3 Scope – entities	Referenced explicitly in several sections of Subpart I; provides definitions of entities subject to Subpart I requirements
26.4 Applicability – individuals	Referenced explicitly in several sections of Subpart I; provides definitions of individuals subject to specific Subpart I requirements
26.5 Definitions	Provides definitions for terms used in Subpart I
26.9 Specific exemptions	States that the Commission may allow exemptions
26.21 FFD program	States general licensee duty to establish, implement, and maintain FFD program
26.23 Performance objectives	Includes performance objectives related to managing the effects of fatigue and degraded alertness: 26.23(b) & (e)
26.27 Written policy and procedures	Referenced explicitly in Sec. 26.203(a) and (b); policy and procedures required under Subpart I are to be included as part of those specified in 26.27
26.29 Training	Referenced explicitly in Sec. 26.203(c); training and comprehensive examination required under Subpart I are to be included as part of those specified in 26.29
26.33 Behavioral observation	Impairment from fatigue is included as behavior to be detected
26.35 Employee assistance program	Provides for employee assistance program, which would include individuals subject to Subpart I
26.37 Protection of information	Provides protection of information, including information gathered under Subpart I
26.39 Review process for FFD policy violations	Provides process for policy violation review, including those under Subpart I
26.41 Audits and corrective action	Referenced explicitly in Sec. 26.203(f); licensees shall audit the management of worker fatigue as required by 26.41
26.77 Management actions regarding possible impairment	Specifically addresses observed behavior or physical condition resulting from fatigue
26.189 Determination of fitness	Provides process for determining fitness, including possible impairment from fatigue; requires that determination be performed by a physician and/or MRO with the necessary clinical expertise



The regulatory approach to managing fatigue relies on two elements – limiting work periods (days and hours), and ensuring adequate time is allotted for breaks and days off. There are two protocols for managing work hours MDO (minimum days off) and MAWH (maximum average work hours).



The work hours of covered individual's schedules shall be consistent with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.

When establishing schedules the performance objective is preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts:

Scheduling plays a vital role in fatigue management, as mentioned earlier and in further detail in Sections 6 and 7.

It is the responsibility of each individual to report to work in condition to perform his/her duties safely and effectively and to maintain that condition while at work.



Management and covered individuals should be equally responsible for properly managing work hours prior to the work being conducted.



## 2 SCOPE (26.201)

### 2.1 GENERAL APPLICATION



This guide applies to licensees who are authorized to operate a nuclear power reactor under Subpart 50.57 and holders of a combined license under 10 CFR 52 after the Commission has made the finding under 10 CFR 52.103(g). This guide also applies to new plant construction no later than upon receipt of special nuclear material in the form of fuel assemblies. This guide does not apply to decommissioned plants not authorized to operate.

### 2.2 FATIGUE MANAGEMENT

- All persons who are granted unescorted access to nuclear power reactor protected areas.
- All persons who are required to physically report to the Technical Support Center or Emergency Operations Facility, in accordance with the site Emergency Plan and procedures (whether they have unescorted access or not).

See Tables 1 & 2 for additional relevant information.

### 2.3 WORK HOUR CONTROLS

10 CFR 26.205, “Work hours”  apply to covered individuals (a subset of the individuals to which the Fatigue Management Program applies)  who are granted unescorted access to nuclear power reactor protected areas. Any individual who performs duties within any of the following job categories is a covered individual subject to work hour controls:


- Operating or on-site directing of the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety.
- Performing maintenance, on-site directing of the maintenance, or performing quality inspections during and following maintenance on systems, structures, and components (SSCs) that a risk-informed evaluation process has shown to be significant to public health and safety.
- Performing Health Physics or Chemistry duties required as a member of the on-site emergency response organization minimum shift complement.
- Performing the duties of a Fire Brigade member who is responsible for understanding the effects of fire and fire suppressants on safe shutdown capability. The person specifically designated for understanding the effects of fire and fire suppressants on safe shutdown capability is considered the person responsible for understanding the effects of fire and fire suppressants on safe shutdown capability. The remaining Fire Brigade members are not considered as the person(s) responsible for understanding the effects of fire and fire suppressants on safe shutdown capability.


- Performing security duties as an armed security force officer, alarm station operator, response team leader, or watchman, hereinafter referred to as security personnel.



**Table 2-A: Subpart I Requirements for Different Categories of Individuals \*\***

[See rule for details - table provides only general summary of the rule]

<b>Sub-section</b>	<b>Category of Individual</b>	<b>Subpart I Coverage</b>	<b>Note</b>
26.4(a)	<p>All persons granted unescorted access to nuclear power reactor protected areas (including contractors/vendors) by the licensees in Sec. 26.3(a) and, as applicable, (c), and who perform the following duties:</p> <p>(1) Operating or onsite directing the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety</p> <p>(2) Performing health physics or chemistry duties as part of onsite emergency response organization minimum shift complement</p> <p>(3) Performing duties of fire brigade member responsible for understanding effects of fire and fire suppressants on safe shutdown capability</p> <p>(4) Maintaining or onsite directing or performing quality inspections of the maintenance of SSCs that a risk-informed evaluation process has shown to be significant to public health and safety</p> <p>(5) Performing security duties as an armed security force officer, alarm station operator, response team leader, or watchperson (security personnel)</p>	<p>26.203 - General provisions</p> <p>26.205 - Work hours</p> <p>26.207 - Waivers and exceptions</p> <p>26.209 - Self-declarations </p> <p>26.211 - Fatigue assessments</p>	<p>This is the full fatigue management program, including work hour controls, waivers and exceptions, and self-declaration procedures when working under a waiver.</p>
26.4(b)	<p>Persons granted unescorted access to nuclear power reactor protected areas by the licensees in Sec. 26.3(a) and, as applicable, (c) and who do not perform the duties described in 26.4(a)</p>	<p>26.203 - General provisions</p> <p>26.211 - Fatigue assessments</p>	<p>Does not include work hour controls (26.205-209), but does include requirements for self-declaration procedures applicable to all individuals under Subpart I</p>
26.4(c)	<p>Persons who are required by a licensee in Sec. 26.3(a) and, as applicable, (c) to physically report to the licensee's Technical Support Center or Emergency Operations Facility by licensee emergency plans and procedures</p>	<p>26.203 - General provisions</p> <p>26.211 - Fatigue assessments</p>	<p>Does not include work hour controls (26.205-209), but does include requirements for self-declaration procedures applicable to all individuals under Subpart I</p>

**\*\*Note: These requirements apply only to operational Nuclear Power Plants (NPPs)** 

**Table 2-B: Individuals Subject to Work Hour Controls (26.205(a))**

[See rule for details - table provides only general summary of the rule]

<b>Sub-section</b>	<b>Individuals*</b>	<b>Duties</b>	<b>Note</b>
26.4(a)(1)	Operators	All persons with unescorted access operating or onsite directing the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety	
26.4(a)(2)	Health Physics or Chemistry Staff	All persons with unescorted access performing health physics or chemistry duties required as a member of onsite emergency response organization minimum shift complement	Not necessarily all health physics or chemistry staff – only those who are performing duties of onsite emergency minimum shift complement
26.4(a)(3)	Fire Brigade Members	All persons with unescorted access performing duties of fire brigade member responsible for understanding effects of fire and fire suppressants on safe shutdown capability	Not necessarily all fire brigade members – only those specifically responsible for understanding the effects of fire and fire suppressants on safe shutdown capability
26.4(a)(4)	Maintenance	All persons with unescorted access maintaining or onsite directing or performing quality inspections of the maintenance of SSCs that a risk-informed evaluation process has shown to be significant to public health and safety	See asterisk note below
26.4(a)(5)	Security Personnel	All persons with unescorted access performing security duties as an armed security force officer, alarm station operator, response team leader, or watchperson	Does not include security staff solely performing administrative duties

***\*Note: Contractors, if performing the listed duties, are also covered. This includes maintenance contractors.***

### 3 DEFINITIONS

#### Terms Relevant to Fatigue Management

**Acute fatigue** means fatigue from causes (e.g., restricted sleep, sustained wakefulness, task demands) occurring within the past 24 hours.

**Alertness** means the ability to remain awake and sustain attention.

**Averaging Period** means the 1- to 6-week period over which an individual's per week average work hours are to be calculated; this per week average is not to exceed 54 hours. The averaging period is set by the licensee and may range from 1 week to 6 weeks, with a specified beginning and ending time of day and day of week. The averaging period advances by 7 consecutive calendar days at the finish of every averaging period.

**Break** – The interval of time that falls between successive work periods, during which the individual does not perform any duties for the licensee other than one period of shift turnover at either the beginning or end of a shift, but not both. This means that one period of shift turnover can be considered as part of the break.

**Break Requirements** – Defined as the following:

- **Minimum Work Period Break:** A 10-hour break between the previous work period, or an 8-hour break between the previous work period when a break of less than 10 hours was necessary to accommodate a crew's scheduled transition between work schedules or shifts.
- **Minimum 9-Day Break Requirement:** A 34-hour break in the preceding 216-hour (9-day) period.

**Calculated work hours** – see **Work Hours**

**Calculation period** means the period of time used to calculate whether a particular work hour control requirement is met.

**Call-in** means coming to the site to perform unscheduled work.

**Ceiling Limits** – (also referred to as **Work Hour Limits**) are the specific limits placed on the number of hours an individual can work within certain periods of time (24-hour, 48-hour, and 7-day).

Defined as the following:

- 16 hours in a 24-hour period
- 26 hours in a 48-hour period
- 72 hours in a 7-day period or 168 hours

NOTE: The periods of “24 hours,” “48 hours,” and “7 days” are considered rolling time periods. Rolling means the period is not re-zeroed, or the “clock reset” following a day off or after obtaining authorization to exceed the limits. The “24-hours,” “48-hours,” and “7-days” periods do not restart after a day off, the periods continue to roll.

***Circadian variation in alertness and performance*** means the increases and decreases in alertness and cognitive/motor functioning caused by human physiological processes (e.g., body temperature, release of hormones) that vary on an approximately 24-hour cycle.

***Contractor/Vendor (C/V)*** – Any company, or any individual not employed by a licensee who is providing work or services to a licensee, either by contract, purchase order, oral agreement, or other arrangement.

***Corrective maintenance*** – Includes actions that restore by repair, overhaul, or replacement, the capability of a failed SSC to function within acceptance criteria.

***Covered individual*** means an individual subject to work hour controls. Any individual granted unescorted access to a nuclear power plant’s protected area that performs covered work.

***Covered SSC*** – Systems, structures, and components (SSCs) that a Risk-Informed Evaluation Process has shown to be significant to public health and safety. The operational condition of the SSC is not relevant to the SSC covered status. See Section 22 Examples 2 & 3

***Covered work*** means the following:

- Operating or on-site directing of the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety;
- Performing maintenance or on-site directing maintenance or performing quality inspections of the maintenance of structures, systems, and components (SSCs) that a risk-informed evaluation process has shown to be significant to public health and safety;
- Performing Health Physics or Chemistry duties required as a member of the on-site emergency response organization minimum shift complement;
- Performing the duties of a Fire Brigade member who is responsible for understanding the effects of fire and fire suppressants on safe shutdown capability; and
- Performing security duties as an armed security force officer, alarm station operator, response team leader, or watchperson, hereinafter referred to as security personnel.

See Sect 22 Example 4 a-e.

***Crew*** means a group of workers that are scheduled on the same shift and work together.

***Cumulative fatigue*** means the increase in fatigue over consecutive sleep-wake periods resulting from inadequate rest.

***Day-off*** – A calendar day in which an individual does not start a work shift.

**Deviation** – A departure from the requirements included in 10 CFR 26 Subpart I.

**Directing** means the exercise of control over a work activity by an individual who is directly involved in the execution of the work activity, and either makes technical decisions for that activity without subsequent technical review, or is ultimately responsible for the correct performance of that work activity. (See Sect 22 Example 4a-e)

**Fatigue** means the degradation in an individual's cognitive and motor functioning resulting from inadequate rest.

**Incidental duties** means unscheduled work activities, required by the licensee, performed off-site.

**Increased threat condition** means an increase in the protective measure level, relative to the lowest protective measure level applicable to the site during the previous 60 days, as promulgated by an NRC advisory.

**Maintenance** means, for the purposes of Sec. 26.4(a)(4), the following onsite maintenance activities: Modification, surveillance, post-maintenance testing, and corrective and preventive maintenance. Predictive maintenance activities that do not result in a change of condition or state of a risk-significant SSC may be excluded from covered maintenance activities. Examples include: nondestructive examination, thermography, vibration analysis, and data collection and analysis.

**Maximum Average Work Hours (MAWH)** is a method for managing cumulative fatigue that establishes a limit of 54 work hours per week that an individual may average over the licensee-defined averaging period of 1 to 6 weeks. This is sometimes referred to as “On Line Averaging”.


**Minimum Days Off (MDO)** is a method for managing cumulative fatigue that establishes the minimum number of days off that an individual is required to have during a given period of time. The required number of days off varies by plant operating status, shift schedule, and job duties.

**Nap or Restorative Sleep** – A brief opportunity and accommodations for restorative, uninterrupted sleep of at least one half hour in a designated area.

**Nominal** means the limited flexibility that is permitted in meeting a scheduled due date for completing a recurrent activity that is required under this part, such as the nominal 12-month frequency required for FFD refresher training in Sec. 26.29(c)(2) and the nominal 12-month frequency required for certain audits in Sec. 26.41(c)(1). Completing a recurrent activity at a nominal frequency means that the activity may be completed within a period that is 25 percent longer or shorter than the period required in this part. The next scheduled due date would be no later than the current scheduled due date plus the required frequency for completing the activity.

**Off-site** means any area not considered on-site.

**On-Line Averaging** – An industry term synonymous with the average 54 hour per week limitations referred to as MAWH (Maximum Average Work Hours).

**On-Line Day** – A day when the unit is not in an outage when the shift starts. 

**On-site** means within the owner controlled area of the nuclear power plant.

**Outage Day** – A day when the unit is in an outage when the shift starts

**Outage Worker** – A worker porting outage activities that are not part of a multi-unit minimum control room complement required by the operating unit on the same site.

**Predictive Maintenance** – To monitor, diagnose, or trend SSC functional or condition indicators by observation, driven by the condition of the SSC or at specified intervals. Results indicate current and future functional ability or the nature of and schedule for planned maintenance not real-time operations. Examples of activities that may be excluded from covered maintenance activities if they do not change the state or condition of these Covered SSCs include, but are not limited to, nondestructive examination (NDE), thermography, vibration analysis, and data collection and analysis.

**Preventive maintenance** – Includes actions that detect, preclude, or mitigate degradation of functional structures, systems, and components (SSC) to sustain or extend its useful life by controlling degradation and failures to an acceptable level.

**Protected area** has the same meaning as described in 10CFR 73.2(g): An area encompassed by physical barriers and to which access is controlled.

**Quality Inspections** – For the purpose of determining covered individuals, those inspection/verification activities performed during and following maintenance on covered SSCs. Excluded from covered quality inspection activities are material and fuel receipt inspections and the directing of quality inspections.

**Rest Break** means an interval of time that falls between successive work periods during which the individual does not perform any duties for the licensee. One period of shift turnover either at the beginning or the end of the shift can be considered as part of the break, but not both. Rest break requirements are one form of work hour controls.

**Risk-informed evaluation process** means an evaluation based on a probabilistic risk analysis approach such as the Maintenance Rule (50.65(a)(4)) or other similar process.

**Safety-related structures, systems, and components (SSCs)** mean, for the purposes of this part, those structures, systems, and components that are relied on to remain functional during and following design basis events to ensure the integrity of the reactor coolant pressure boundary, the capability to shut down the reactor and maintain it in a safe shutdown condition, or the capability to prevent or mitigate the consequences of accidents that could result in potential offsite exposure comparable to the guidelines in 10 CFR 50.34(a)(1).

**Security personnel** means armed security force officers, alarm station operators, response team leaders, and watchpersons.

**Shift cycle** means a series of consecutive work shifts and days off that is planned by the licensee or other entity to repeat regularly, thereby constituting a continuous shift schedule.

**Shift (work shift)** – a regular occurring work period which is normally of a consistent length (e.g., 8, 10 or 12 hours) and scheduled by the licensee or other entity as part of a shift schedule.

**Shift Schedule** – A schedule that averages the hours described below over a shift cycle:

- **Eight (8)-hour shift schedule** a schedule that averages not more than 9 hours per workday over the entire shift cycle. [Used for MDO calculations]
- **Ten (10)-hour shift schedule** – a schedule that averages more than 9 hours, but not more than 11 hours, per workday over the entire shift cycle. [Used for MDO calculations]
- **Twelve (12)-hour shift schedule** – a schedule that averages more than 11 hours, but not more than 13 hours, per workday over the entire shift cycle. [Used for MDO calculations]

**Shift Turnover** - Shift turnover - those activities that are necessary to safely transfer information and responsibilities between two or more individuals between shifts. Shift turnover activities may include, but are not limited to, discussions of the status of plant equipment, arming and disarming of armed security officers, transit to and from turnover stations including compliance with radiological and personal safety requirements, and the status of ongoing activities such as extended tests of safety systems and components.

**Tactical exercise** – A force-on-force simulation used to evaluate and demonstrate the capability to defend target sets against selected attributes and characteristics of an adversary. A force-on-force tactical exercise includes all key program elements of a station's protective strategy.

**Unit outage** – Unit outage means, for purposes of this part, the period from when the reactor unit is disconnected from the electrical grid until the reactor unit achieves 75% reactor power or until seven calendar days have elapsed since reconnecting the reactor unit to the electrical grid whichever is shorter.

**Work day** means a calendar day during which an individual starts a work shift.

**Work hours** means the amount of time an individual works performing duties for the licensee.

**Work hour controls** are the work hour limits and rest break requirements in 10 CFR 26.205.

**Work hour limits** – (also referred to as **Ceiling Limits**) are the specific limits placed on the number of hours an individual can work within certain periods of time (24-hour, 48-hour, and 7-day).

Defined as the following:



- 16 hours in a 24-hour period
- 26 hours in a 48-hour period
- 72 hours in a 7-day period or 168 hours

NOTE: The periods of “24 hours,” “48 hours,” and “7 days” are considered rolling time periods. Rolling means the period is not re-zeroed, or the “clock reset” following a day off or after obtaining authorization to exceed the limits. The “24-hours,” “48-hours,” and “7-days” periods do not restart after a day off, the periods continue to roll.





## 4 POLICY AND PROCEDURES (26.203)

### 4.1 POLICY


- a) The licensee shall establish a policy for the management of fatigue for all individuals who are subject to the licensee's Fitness-For-Duty (FFD) program and incorporate the guidance into the site or corporate written FFD policy as required in 10 CFR 26.27(b). As related to fatigue management, the FFD policy should:
- Address the effect of fatigue on FFD.
  - Provide a description of any program that is available to individuals who are seeking assistance in dealing with fatigue or other problems that could adversely affect an individual's ability to safely and competently perform the duties that require an individual to be subject to this subpart.
  - State which method of on-line work hour controls is being used, on-line  Minimum Days Off (MDO) or Maximum Average Work Hours (MAWH).
  - When complying with the on-line averaging method, state which work-hour counting system is being used relative to the start and end of the work day. See 10 CFR 26.205(d)(7)(ii).
  - Describe the consequences of violating the policy. 
  - Describe the responsibilities of managers, supervisors, and escorts to report FFD concerns.
  - Describe the individual's responsibility to report FFD concerns.
  - Describe the individual's responsibility to maintain his/her FFD and make self-declaration if not fit for duty.

### 4.2 PROCEDURES



- a) The licensee shall develop, implement, and maintain procedures that describe the .
- Method of on-line work hour controls that is being used, MDO (minimum days off) or MAWH (maximum average hours worked).
  - Work hour counting system that is being used relative to the start and end of the work day, when complying with maximum average work hours. See 10 CFR 26.205(d)(7)(ii).
  - Individuals and licensees rights and responsibilities related to self-declaration.
  - Process to be followed when any individual covered by the FFD program makes a self-declaration that he or she is not fit  safely and competently perform his or her duties for any part of a working tour as a result of fatigue.

- Requirements for establishing controls and conditions under which an individual may be permitted or required to perform work after that individual declares that he or she is not fit due to fatigue.
  - Process to be followed if the individual disagrees with the results of a fatigue assessment that is required.
  - Process for implementing the work hour controls required for covered individuals.
  - Process to be followed in conducting fatigue assessments.
  - Disciplinary actions that the licensee may impose on an individual following a fatigue assessment, and the conditions and considerations for taking those disciplinary actions.
- b) The procedures, at a minimum, delineate the following responsibilities:
- Operations Shift Manager or a site senior level manager with requisite signature authority:
    - Determining the necessity of a waiver of work hour controls for an individual.
    - Staffing levels are adequate ensure work hours are managed with the objective of preventing impairment from fatigue.
  - Security Shift Manager or a site senior manager with requisite signature authority:
    - Determining the necessity of a waiver of work hour controls to maintain site security.
    - Security staffing levels are adequate ensure work hours are managed with the objective of preventing impairment from fatigue.
  - Plant Manager (generic title for top senior level site manager responsible for plant operations)
    - Responsible for ensuring a review is performed at least once per year to evaluate a full year of data evaluating the effectiveness of work hour controls. This review includes evaluation and review of:
      - Staffing levels to ensure individual work hours are managed with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.
      - The performance of individuals to ensure individual work schedules prevents impairment from fatigue. This includes evaluating the duration, frequency and sequencing of the hours that are worked by each individual relative to worker performance.
      - The performance of the station in adhering to work schedules for covered work groups: evaluate the number of schedule changes and reasons for the changes and assess whether or not the schedule is effectively being implemented.

NOTE: Issues identified in the annual review are addressed in the corrective action program.

- Supervisor [or Manager] of the individual who will be issued a waiver: 
  - Evaluating the employee's fitness by performing a face-to-face fatigue assessment.
  - Evaluating the employee's performance and continued fitness-for-duty while working under a waiver.
  - Ensuring the waiver is authorized prior to allowing an individual to exceed work hour limit(s) being waived.

NOTE: If evaluating for the issuance of a waiver and the individual's Supervisor or Manager is not on-site, this responsibility may be performed by any manager or supervisor who is qualified to oversee the work to be performed by the individual.

- Department Head for departments with Covered Workers:
  - Providing guidelines for overtime selection process, including those required by the union contract, , and the FFD requirements outlined in this guide and in the licensee's FFD Program.
  - Communicating the requirements to appropriate personnel within his/her department.
  - Maintaining a record of the shift schedules and shift cycles used for at least the past 3 years for those individuals who are subject to work hour controls. Records may be required longer than 3 years, if legal proceedings are ongoing. 
  - Evaluating staffing levels are adequate to ensure individual work hours are managed with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.
- Employee (licensee or contractor):
  - Evaluating his/her personal fitness to work based on impairment from fatigue.
  - Managing his/her work hours consistent with the objective of preventing impairment from fatigue.
  - Making a self-declaration of fatigue and discussing his/her concerns with supervision or management in cases when the individual feels his/her performance may be impaired.
  - Verifying his/her working hours are correctly documented regardless of whether he/she is paid for the hours worked.
  - Monitoring and reporting concerns related to individuals' fitness to work based on impairment from fatigue (i.e., behavioral observation program).
  - Being aware of the total hours worked in the previous 14 days and notifying management if work hour limits will be exceeded if asked to work additional hours.

## **5 MANAGING FATIGUE (26.203,**



### **5.1 INDIVIDUALS SUBJECT TO FATIGUE MANAGEMENT**

Fatigue management requirements, with exception of work hour controls, apply to the following individuals:

All persons who are granted unescorted access to nuclear power reactor protected areas.

All persons who are required to physically report to the Technical Support Center or Emergency Operations Facility, in accordance with the site Emergency Plan and procedures.

NOTE: Not all personnel that are subject to Fatigue Management will be subject to work hour controls. Individuals subject to work hour controls are specified in Section 6.

### **5.2 REQUIREMENTS**

Personnel subject to fatigue management will be trained and examined as part of the fitness-for-duty training requirements for the following KAs:

- Knowledge of the contributors to worker fatigue, circadian variations in alertness and performance, indications and risk factors for common sleep disorders, shift work strategies for obtaining adequate rest, and the effective use of fatigue counter measures.
- Ability to identify symptoms of worker fatigue and contributors to decreased alertness in the workplace.

## 6 WORK HOUR CONTROLS (26.205)

### 6.1 INDIVIDUALS SUBJECT TO WORK HOUR CONTROLS

- a) Any individual granted unescorted access to a nuclear power plant's protected area that performs covered work. These individuals shall be subject to a FFD program that meets the requirements of 10CFR 26.4(a). (see Table 2A & 2B).



- b) In addition to either the MDO or MAWH on-line averaging methods of work hour limits, work hours must comply with Ceiling Limits and Break Requirements at all times unless specifically exempted.

- c) If a Covered Individual begins or resumes performing Covered Work during the calculation period, the licensee shall include in the calculation of the individual's work hours all work hours worked for the licensee, including hours worked performing duties that are not considered Covered Work. These work hours apply to Break Requirements, Ceiling Limits, as well as total hours worked for either the MDO or MAWH on-line averaging methods below.

- d) At a multi-unit site when one or more units is in an outage, only those licensed operators composing the minimum shift complement of operators required in the table below derived from 10 CFR 50.54(m) are required to work under the on-line hours rules.

Minimum Number of Individuals Per Shift Working Nonoutage Schedules for Onsite Staffing of Operating Nuclear Power Units during Outages								
Number of operating nuclear power units <sup>1</sup>	Position	Two-unit Site		Three-unit Site				
		One Control Room	Two Control Room	Two control rooms				Three Control Rooms
				Single Control Room Unit In Outage	Single Control Room Unit and One Unit Served by Dual Control Room In Outage	One of the Units Served by Dual Control Room in Outage	Two Units Served by Dual Control Room in Outage	
One	Senior Operator	2	2		2		2	2
	Operator	2	2		2		2	2
Two	Senior Operator			2		3		3
	Operator			2		4		4

<sup>1</sup> For the purpose of this table, a nuclear power unit is considered to be operating when it is connected to the grid.



- e) If a worker (any classification) is dedicated to and solely working the operating unit, that worker is not eligible for outage work hour rules.
- f) In Fuel Handling operations, the operators making and approving reactivity changes are required to be on Operations work hours rules if using the MDO method.
  - o At a minimum, this includes the operator on the manipulating bridge over the Reactor Vessel the Fuel Handling SRO in Containment, and the Control Room Reactor Operator on the Tag Board (or equivalent).
  - o All others involved with Fuel Handling operations may be considered under the Maintenance work hour rules.
- g) Predictive Maintenance on a covered system is not a covered activity. If a change in operational state of the equipment is necessary, the actual operation or maintenance activity to prepare for the predictive maintenance activity may be covered.
- h) Emergency Response Personnel who do not perform health physics or chemistry duties required as a member of the onsite emergency response organization minimum shift complement are not covered workers.



For the purposes of determining the performing or directing of covered work, the following guidance should be applied.

- o Operating or on-site directing of the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety.
- o Performing maintenance or on-site directing of the maintenance or performing quality inspections during and following maintenance on systems, structures and components (SSC's) that a risk-informed evaluation process has shown to be significant to public health and safety.
- o Maintenance - the following on-site maintenance activities: modification, surveillance, post-maintenance testing, and corrective and preventive maintenance of SSCs. Only maintenance activities that change the operational condition of the SSCs are included.
- o Directing - the exercise of control over a maintenance or operations covered work activity by an individual who is directly involved in the execution of the work activity, and either makes technical decisions for that activity without subsequent technical review, or is ultimately responsible for the correct performance of that work activity.

Note: Predictive maintenance activities that do not result in a change of condition or state of a risk-significant SSC may be excluded from covered maintenance activities. Examples include: nondestructive examination, thermography, vibration analysis, and data collection and analysis.

## 6.2 WORK HOUR SCHEDULING REQUIREMENTS AND PRINCIPLES (26.205 (C))

Licensees shall schedule the work hours of covered individuals consistent with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.

When establishing schedules the following should be applied consistent with the performance objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.

- Duration of scheduled work period (not to exceed 12 hours).
- Duration of break period.
- Consistent start times for work periods (e.g., 6 or 7 a.m.).
- Considerations of start times consistent with circadian factors.
- Consistent stop times for work periods.
- Consistent rotation (e.g., if working a 5-week shift rotation, the scheduled work days and days off are repeated every five weeks).
- Rotating schedules provide suitable transition between shifts (days/nights, days/swings/nights), 8-hour shift rotations rotate forward or provide more than 24 hours between work periods to adjust circadian rhythm; 12-hour shift rotations provide 34 hours off during day/night transitions.
- Long range predictability is a key aspect of fatigue mitigation.
- Circadian factors - fixed vs. rotating shifts.
- Training requirements.
- Vacation scheduling.
- Consideration of the impact of unscheduled overtime.
- Stable 24-hour shift rotation (e.g., 3 X 8's, 2 X 12's, 2 X 10's with four hours un-staffed).
- The impact of backward shift rotation (rotation of the start of the shift from days to night to swings).

Staffing levels should be sufficient so that schedules for the covered individuals can be maintained based on vacation and training demand without relying on waivers. It is expected and allowed that normal variation in vacation and training demands may occasionally require additional work hours to be used. Management is responsible for understanding the total vacation, training, and workload demands, and for maintaining sufficient staff to do the work.

This guidance covers the normal long range schedule used for covered individuals.

## 6.3 WORK HOUR CONTROLS

### 6.3.1 Introduction

Fatigue is managed by two basic strategies, limiting hours worked and mandating required break periods (also referred to as “rest breaks”). This is accomplished via scheduling protocols to limit both acute and cumulative impact. The use of MDO and/or MAWH programs provide the method to maintain compliance with work hour controls at all times.

### 6.3.2 Specific Requirements

#### 6.3.2.1 Work hour limits are prescribed by either Minimum Days Off (MDO) or Maximum Average Work Hour (MAWH) protocols.

The MDO method requires that in a Shift Cycle, the worker will receive an average number of Days Off equal to or greater than the MDO requirement for the shift duration that applies.

The alternative approach to on-line MDO is a weekly maximum average of 54 hours worked, based on a rolling averaging period of up to 6 weeks. This alternative is applicable to all covered workers, regardless of classification.

#### 6.3.2.2 Ceiling Limits (Work Hour Limits) and Break Requirements – (Rest Break)

- **Ceiling Limits (Work Hour Limits)**

Defined as the following:

- 16 hours in a 24-hour period
- 26 hours in a 48-hour period
- 72 hours in a 7-day period or 168 hours

The periods of “24-hours,” “48-hours,” and “7-days” are considered rolling time periods. Rolling means the period is not re-zeroed, or the “clock reset” following a day off or after obtaining authorization to exceed the limits.

- The “24-hours,” “48-hours,” and “7-days” periods do not restart after a day off, the periods continue to roll.
- **Break Requirements**

Minimum Work Period Break: A 10-hour break between the previous work period, or an 8-hour break between the previous work period when a break of less than 10 hours is necessary to accommodate a crew’s scheduled transition between work schedules or shifts.

- When calculating the duration of a break between work periods, either the off-going turnover duration or the subsequent on-coming duration of turnover may be included as part of the break duration, but not both.



- Minimum 9-Day Break Requirement: A 34-hour break in the preceding 216-hour (9-day) period.
  - When determining the 34-hour break in 9 days, a rolling 216-hour (9-day) period should be used.
  - The licensee should continuously look forward from the start of the first period of work, immediately following a 34-hour break, to ensure there is a 34-hour break in the subsequent 9 days or 216-hour period.
  - Conversely, to ensure that the actual hours worked by the individual are in compliance, the licensee must verify that the individual has had a 34-hour break in the previous 9 days or 216-hour period at the end of the work period.

## Minimum Days OFF (MDO)

The Method requires that in a Shift Cycle, the worker will receive an average number of Days Off equal to or greater than the MDO requirement for the shift duration that applies.

Covered Individual	8-hour shift	10-hour shift	12-hour shift
<b>Actual Average Shift Hours</b>	8 to less than or equal to 9 hours	Greater than 9 to less than or equal to 11 hours	Greater than 11 and less than or equal to 13 hours
<b>Maintenance</b>	1 day off per week	2 days off per week	2 days off per week
<b>Operations, HP, Chemistry, Fire Brigade</b>	1 day off per week	2 days off per week	2.5 days off per week
<b>Security</b>	1 day off per week	2 days off per week	3 days off per week

- a) The planned shift schedule is used to establish the beginning minimum days off (MDO) requirement. If the actual hours worked do not deviate from the planned shift schedule then the required MDO will not change.
- Periodically, workers and supervisors may need to work unscheduled hours to meet station needs. An accumulation of unscheduled work hours over a shift cycle may affect the MDO requirement that applies to individuals or crews.
  - The above table is shift schedule is averaged over a shift cycle of 42 days or less as applicable. If the worker averages more hours than previously scheduled the licensee must recalculate the average hours worked per shift to ensure the proper MDO (8, 10 or 12) is met prior to the end of the shift cycle. For actual shift rotation cycles greater than 42 days, the averages must be calculated over a period of 42 days or less.

The licensee may elect to use a rolling or fixed (maximum) 6-week period for the purposes of determining the minimum days off. The actual repeatability of the rotation may exceed 6 weeks; however, the shift cycle used for calculating the minimum days off cannot exceed 6 weeks.

Generally a rolling evaluation period for MDO evaluations takes into account the current day and looks back at the previous days in the evaluation period for compliance. For example, an individual on a 42-day (6 week) rolling evaluation period – for the purpose of compliance with the MDO requirement – the current day and the last 41 days of actual time are used to determine if the individual has had the required days off. When tomorrow is reached, it is that day and the previous 41 days, etc. For the purposes of predicting compliance, the current day and the next 41 days of scheduled time are used.

For a 42-day (6 weeks) fixed evaluation period, an individual must meet the MDO requirement for their job function and average shift length for days 1 to 42. The day following day 42 is a new day 1 and a new 42 day evaluation period begins. These evaluation periods go in blocks from 1-42 and then start over. Once the schedule goes beyond day 42, the evaluation period looks ahead another 42 days and does not look back as does the rolling evaluation method.

### **Maximum Average Work Hours (MAWH) aka On Line Averaging Method**

The alternative approach to on-line MDO is a weekly maximum average of 54 hours worked, based on a rolling averaging period of up to 6 weeks. This alternative is applicable to all covered workers, regardless of classification.

#### **6.3.3 Details on Work Hour Controls**

##### **6.3.3.1 MDO Administration**

- a) Licensees shall ensure that individuals have, at a minimum, the number of days off specified for their shift duration.
  - The duration of the shift cycle may not exceed 6 weeks for the purposes of calculating the average.
  - If individuals work for a licensee for a period of less than one week, the minimum day off requirements are not applicable.
- b) Work hours are calculated as the amount of time an individual performs any duties for the licensee including but not limited to the following:
  - All within-shift break times and rest periods during which there is no reasonable opportunity or accommodations appropriate for restorative sleep (e.g., a nap)
  - Shift holdovers to cover for late arrivals of incoming shift members.
  - Early arrivals of individuals for licensee required meetings, training, or pre-shift briefings for special evolutions (these activities are not considered shift turnover activities).
  - Holdovers for interviews needed for event investigations.
- c) Within-Shift Breaks and Rest Periods
  - Time spent at lunch, although non-productive work may not be excluded from the work hour calculations.
  - Break time allowed during the scheduled work day is included in the work hour calculation.
  - That portion of a break or rest period during which there is a reasonable opportunity and accommodation for restorative sleep on site (e.g., a nap of at least 30 minutes) may be excluded.
- d) Shift Turnover - Licensees may exclude Shift Turnover from the calculation of an individual's work hours.



e) Resets from Deviations must additionally ensure that actions are in place to comply with MDO requirements by the end of the Shift Cycle if using the fixed-cycle method in work hour calculations.

f) Transitions between on-line schedules:

Licensees may transition individuals or crews between shift schedules by ending a shift cycle and starting a new shift cycle with a different shift schedule. The following guidance applies:

- Terminating the shift cycles: Ensure that the individuals meet the MDO requirement applicable to the shift schedule that the individuals were working before it was terminated.
  - In these instances, for the purpose of determining compliance with the MDO requirements, the licensee may average the individuals' work hours over a period immediately preceding the transition that is equal in length to the shift cycle the individuals were working before the transition (e.g., 6 weeks, if the shift cycle was 6 weeks in length). The licensee should then ensure that the individual meets the applicable MDO requirement for the new shift schedule going forward from the beginning of the new shift cycle. A shift cycle may be as short as 1 week. There are no MDO requirements for shift cycles less than one week.
  - Transitions between on-line and outage schedules.
  - The Ceiling Limits and Break Requirements apply during the transitions. The outage MDOs only apply while in an unit outage. The online MDO rules take effect when a unit outage is complete. For purposes of this part, a unit outage is the period from when the reactor unit is disconnected from the electrical grid until the reactor unit achieves 75% reactor power or until seven calendar days have elapsed since reconnecting the reactor unit to the electrical grid whichever is shorter. For the first 42 days after an outage, (for 6 week cycles) the employee must be evaluated using the fixed shift cycle method.
- Transitions between covered groups or onto a covered shift:
  - If an individual begins or resumes performing for the licensee any covered work during the calculation period, the licensee shall include in the calculation of the individual's work hours all work hours worked for the licensee, including hours worked performing duties that are not covered work and control the individual's work hours.
  - Ceiling and Break Requirements always apply.
  - A minimum of 1 day off in the preceding 7-day period is acceptable for individuals to begin or resume covered duties and for individuals who have been working an 8-hour shift schedule, as either day or shift workers, and are transitioning (1) from a non-covered group to a covered group or (2) from a covered group to another covered group that has more stringent MDO requirements.

- A minimum of 2 days off in the preceding 7-day period is acceptable for individuals who have been working a 10- or 12-hour shift schedule, as either day or shift workers, and transition (1) from a non-covered group to a covered group or (2) from a covered group to another covered group with more stringent MDO requirements.
- A minimum of 2 days off in the preceding 7-day period is acceptable for operators at a multiunit site with one or more units in an outage, if the operators have been working outage hours on 10- or 12-hour shifts before they transition to an operating unit as members of the minimum shift complement described in Section 6.1.
- There is no minimum day off requirement for transitioning from a non-covered to covered work if the previous schedule was less than 7 days in length.

See Sect 22 Example 7.

### 6.3.3.2 MAWH Administration

#### a) Rolling Period

- The averaging period starts “rolling” after a work history for a covered worker has been established equal to the length of the averaging period.
- The averaging period rolls by one full week at a time. The week does not have to start on any specific day but must be consistent through the calculation period and documented in the controlling procedure.
- Shifts that bridge the point in time during the week when the averaging period rolls forward one week may be counted in one of two ways and must be documented in the controlling procedure:
  - The hours for that shift may be included in the week the shift starts.
  - The hours may be included in the weeks the hours are worked.

#### b) Calculating the Average

- While the calculation of the average work hours worked occurs at the end of the averaging period, there is a need to be continually calculating the average looking forward to identify work hours that may potentially exceed the limit so that work hours can be adjusted or, as appropriate, waivers can be prepared in advance of exceeding the limit.
- One simple method is to add up the work hours from the previous five weeks and subtract from 324 giving the worker the maximum amount of hours that can be worked the upcoming week, assuming a 6 week averaging period.

#### c) Beginning a Rolling Averaging Period

- In the case of a worker who has not been performing on-line covered work and will be transitioning to on-line covered work, there are two options for setting up the schedule to start the averaging period:

- The schedule established for the worker for the initial averaging period (e.g., initial 6 weeks) can be set up as a fixed period which averages 54 hours or less. The first week after this (e.g., 7th week worked) is the start of the rolling schedule.
- The number of weeks in the averaging period for the worker is determined and the hours for the past number of work weeks that is equal to the averaging period are calculated to establish the history needed to begin rolling.

d) Partial Averaging Periods


- Partial averaging periods occur when a worker will not be working a full averaging period.
  - Less than a full week, then only Ceiling Limits and Break Requirements apply.
  - If greater than one full week but less than a full averaging period, then the worker must limit the average work hours to 54-hour per week or less averaged over the partial averaging period.
- e) If the fixed schedule is truncated due to unforeseeable events outside the control of the licensee, the worker will be considered to be in compliance with the rule if the schedule for the averaging period would have met the on-line averaging limit should the truncation not have occurred.
- Examples of unforeseeable events:
    - Unexpected unit outage.
    - A declared emergency as defined by the licensee's emergency plan.
    - Duties of the worker are terminated.
    - An unplanned security system outage (security only).
    - An increased threat condition (security only).
  - Following such an event, the Covered Worker may start a new averaging period or choose not to truncate the averaging period.
- f) Extended Absences
- An extended absence is not considered an interruption or truncation of an averaging period but is considered part of the averaging period.
- g) Resets from Deviations must additionally ensure that actions are in place to comply with the 54-hour averaging limit by the end of the averaging period.

## 6.4 DEVIATIONS AND COMPLIANCE

A Covered Worker must be in compliance with all the specific work hour rules or be under an approved waiver prior to performing covered work.

- a) Whenever a Covered Worker finds that a violation of limits exists, then in order to reset from that deviation to permit further Covered Work, the worker must come into compliance with all:
  - break requirements
  - ceiling limits
  - the specific rules for the method of work hour calculation below prior to performing any further Covered Work.
- b) Each deviation must be documented in the licensee corrective action program.
- c) Resets from Deviations must additionally ensure that actions are in place to comply with MDO requirements by the end of the Shift Cycle if using the fixed-cycle method in work hour calculations.
- d) Resets from Deviations must additionally ensure that actions are in place to comply with the 54-hour averaging limit by the end of the averaging period.

## 6.5 UNEXPECTED OUTAGES


- a) Unexpected outages can impact the licensee's ability to demonstrate compliance with the normal operations day off requirements. During an outage, days off are required on a day basis every rolling 7 day period for personnel performing maintenance activities and every non-rolling 15-day period for all other covered workers for the duration of the outage and not on an average basis as when on-line. 
- b) When entering an unexpected outage, the licensee shall be considered to be in compliance with the rule if the schedule for the shift cycle would have provided for the required minimum days off.

See Section 22 Example 15

## 7 COUNTING WORK HOURS AND BREAK TIME (26.205)

### 7.1 PROCESS FOR EVALUATING A SCHEDULE

This section orients the reader to how schedules are structured and gives some general strategies for reading them.

Schedules are typically ed or rotating, where Operations, RP and Chemistry will usually follow the same schedule, while Maintenance and Security will typically follow a fixed schedule.

Examples of on-line schedules:

Operations (5 section typical)

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
1		T	T	T	T			N	N	N					D	D	D								N	N	N	N				D	D	D	D
2	N	N	N	N				D	D	D								N	N	N	N				D	D	D	D		T	T	T	T		
3	D	D	D								N	N	N	N				D	D	D	D			T	T	T	T		N	N	N	N			
4				N	N	N	N				D	D	D	D		T	T	T	T				N	N	N			D	D	D					
5				D	D	D	D		T	T	T	T			N	N	N						D	D	D							N	N	N	N

D = Day 12 hour N = Night 12 hour T = Training 10 hour

Security (4 section typical)

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	31	33	34	35
Day	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
A		D	D	D	D					D	D	D	D				D	D	D	D					D	D	D	D				D	D	D	
B					D	D	D	D				D	D	D	D			D	D	D	D					D	D	D	D						
C		N	N	N	N				N	N	N	N				N	N	N	N					N	N	N	N				N	N	N	N	
D					N	N	N	N				N	N	N	N					N	N	N	N				N	N	N	N					

Maintenance may follow a standardized day or night protocol or work to a schedule similar to those illustrated.

When a schedule is created or schedule change is proposed, the following items need to be considered prior to implementation:

Begin by evaluating the existing and proposed schedule for continued compliance with restrictions of the rule (required breaks, consecutive days worked, transitioning, current work schedules, etc.)

- Items to be considered during schedule development
  - Self-relieving shifts – absorb unexpected absences
  - Minimizing changes – make schedules compliant with minimal changes
  - 8-hour shifts vs. 10- or 12-hour shifts
  - Union contracts



- Cumulative fatigue impacts
- Ability to fill an unexpected vacancy on any shift assuming the maximum allowable personnel are on vacation

## 7.2 ACCOUNTING OF WORK HOURS

**Work hours** mean the amount of time an individual performs duties for the licensee. This includes all work hours, with the following exceptions:

- Shift turnover time.
- Within-shift break and rest periods in which there is reasonable opportunity and accommodations for restorative sleep (e.g., a nap) may be excluded.
- Unscheduled work hours for the purpose of participating in unannounced emergency preparedness exercises and drills may be excluded.

Resuming or beginning covered work – the act of performing covered work, whether considered part of an earlier work day, or resumption of covered work activities. If an individual begins or resumes performing for the licensee any covered work during the calculation period, the licensee shall include in the calculation of the individual's work hours all work hours worked for the licensee, including hours worked performing duties that are not covered work.

Exclusion and inclusion guidance for work hour calculations:

### a) Paid Time Not Included in the Work Hour Calculations

- Only the actual hours worked are included in the work hour calculations. Examples of paid hours not worked are as follows:
  - Vacation time – this is time away from work and is not included in the work hour calculation.
  - Sick leave – this is time away from work and is not included in the work hour calculation.
  - Personal leave – this is time away from work and is not included in the work hour calculation.
  - Holiday pay – this may be either time away from work or at work. If the time is at work, then only the actual hours worked are included in the work hour calculation.

### b) Declared Plant Emergencies as defined in the licensee's emergency plan.

- The hours worked during a declared plant emergency may be excluded from the total number of hours worked. This includes the period of time the plant is in the declared emergency and any recovery time necessary to deactivate the emergency facilities.

- When the plant exits the emergency classification to a non-emergency state, this exclusion becomes not applicable. This exclusion applies for ceiling limits, break requirements, MDOs and MAWH limits.
- c) Unannounced emergency preparedness exercises and drills.
  - Licensees may exclude the time an individual works unscheduled work hours for the purpose of participating in the actual conduct of an unannounced emergency preparedness exercise or drill. If an individual is on a day off, it is still considered a day off.
- d) Force-on-force tactical exercises
  - For those licensee's using MDO: Licensees may exclude shifts worked by security personnel during the actual conduct of force-on-force tactical exercises evaluated by the NRC when calculating the individual's number of days off. This includes support personnel who may not be actual drill participants.
  - For those licensee's using MAWH: May exclude shifts worked by security personnel during the actual conduct of NRC-evaluated force-on-force tactical exercises when calculating average hours worked. This includes support personnel who may not be actual drill participants. See Table 7 for additional guidance.
- e) Common defense and security
  - Licensees need not meet the work hour requirements when informed in writing by the NRC that these requirements, or any subset thereof, are waived for security personnel in order to assure the common defense and security, for the duration of the period defined by the NRC.
- f) Daylight Saving Time
  - When working during the change from standard time to daylight savings time, the shift being worked during the time change may be counted as a 7-hour, 9-hour, or 11-hour shift.
  - When working during the change from daylight savings time back to standard time, the shift being worked during the time change may be counted as an 8-hour, 10-hour, or 12-hour shift (i.e., the additional hour does not have to be included in the work hour calculations).
  - In addition to not counting the extra hour, the evaluation period (i.e., 24 hours, 48 hours, 168 hours or 7 calendar days) should not be impacted by the decrease or increase in actual time versus apparent time.
- g) Call-in work period
  - A call-in is considered an addition to the normal work schedule. The work hours can be accounted for using three different methods depending on timing and circumstances of the call-in work period.
    - The call-in hours can be considered a separate work period. Using this method, only the hours worked for the licensee will be counted. The

method requires a 10-hour break before the call in period and after the call-in period.

- The call-in hours can be considered an extension to the preceding or succeeding work period. Using this method, the intervening hours of the extended work period must be counted.
- A waiver can be processed for the required 10-hour break between successive work periods. The requirements of Section 9, Waivers, apply to this method.

See Section 22 Examples 8 & 9.

h) Incidental duties performed off-site

- Licensees may exclude from the calculation of an individual's work hours unscheduled work performed off-site (e.g., technical assistance provided by telephone from an individual's home or an unscheduled teleconference, calls between the licensee and a vendor or between parties on behalf of the licensee) provided the total cumulative duration of the work, which is required by the licensee, does not exceed a nominal 30 minutes during any single break period.
- For the purposes of compliance with the minimum break requirements and the minimum day off requirements, such duties, (work periods less than 30 minutes), do not constitute work periods or work shifts.
- Professional time is not discouraged, for example after-hours study time that is not required by the licensee may be excluded from work-hour calculations. As with any academic setting and curriculum, after hours study time varies from individual to individual. Appropriate after hours study time complements the utility provided training to ensure the learning process occurs and optimal information retention is achieved.
- This does not include short duration, infrequent, or irregular telephone calls that do not interrupt a sleep period to verify or discuss plant and equipment status.

See Section 22 Examples 10, 11, 12, and 17.


i) Shift Duration Extensions (holdovers)

- When considering shift extensions for individuals performing covered work, all hours worked by the individual shall be included. For example, if an individual has performed 15 hours of non-covered work, and the individual is needed to perform additional covered work that extends beyond 16 hours in a 24-hour period, then a waiver to exceed the work hour limits shall be approved prior to the individual exceeding the 16-hour limit.
- On the other hand, if the individual has performed 14 hours of covered work, and is needed to perform additional non-covered work, then the programmatic approvals of this document do not apply. However, the additional work hours are included in consideration of any other limits if the individual subsequently performs covered work.

j) Official Union Time

- Unpaid Union business is considered personal time and not counted in work hour calculations (including no impact to breaks and ceiling limits).
- Grievance meetings held pursuant to a contract between the Union and the licensee where personnel are required to be in attendance are considered time that must be considered in work hour calculations.

k) Travel Time

- Should the worker be required to travel to another work location within the same licensee organization, the licensee has the option to either count the travel time in the work hour calculation or apply the following 
  - If the worker is required to extend his/her shift duration by traveling (either at the end or beginning), then extend the shift hours by the nominal travel time and apply the minimum break and ceiling rules accordingly.
  - If the worker is required to travel on his/her own time, then increase the minimum break time (either the minimum work period break or minimum 9-day break requirement as appropriate) by the nominal travel time to ensure adequate opportunity for a full rest period. There is no impact on the ceiling limits since no additional work hours have been incurred.
  - Nominal travel time is determined using an established web-based mapping application.



See Section 22 Examples 5 & 6.

### 7.3 DAYS OFF

**Day-off** – A calendar day in which an individual does not start a work shift.

Day Off requirement determinations:

Individuals may change shift schedules during the shift cycle. The following guidance applies:

For shift schedule transitions, licensees should calculate the average duration of the shift   
worked and to be worked during a period of not more than six weeks that encompasses the schedule transition to determine the applicable day off requirement. If the average shift duration is not more than 9 hours, then the minimum day off requirements for 8-hour shift schedules would apply. If the average shift duration is more than 9 hours but not more than 11 hours then the requirements for a 10-hour shift would apply.  If the average shift duration is more than 11 hours then the requirements for a 12-hour shift apply.

The following guidance should be applied in determining if a day off has been provided.

For security personnel during the actual conduct of force-on-force tactical exercises evaluated by the NRC, if security personnel work on his/her day off, this work day may be counted as a day off in the calculation of minimum days off.

Unannounced emergency preparedness exercises and drills – Licensees may exclude from the calculation of an individual’s work hours the time the individual works unscheduled work hours, above the normal scheduled work hours, for the purpose of participating in the actual conduct of an unannounced emergency preparedness exercise or drill. If an individual is on a day off, it is still considered a day off.

Incidental duties performed off-site – Licensees may exclude from the calculation of an individual’s work hours unscheduled work performed off-site (e.g., technical assistance provided by telephone from an individual’s home) provided the total duration of the work, which is required by the licensee, does not exceed a nominal 30 minutes during any single break period. For the purposes of compliance with the minimum break requirements and the minimum day off requirements, such duties do not constitute work periods or work shifts.


After hours study time during training weeks shall be excluded from work hour calculations. As with any academic setting and curriculum, after hours study time varies from individual to individual. Appropriate after hours study time complements the utility provided training to ensure the learning process occurs and optimal information retention is achieved.

Activities initiated by the individual (not required by the licensee) may be performed at home on a day off and not be considered “work,” e.g., studying, reading work-related material, reading email. These activities would not violate the 30 minute incidental duties requirement and would, therefore, not be counted toward the work hour total.

**Table 7: What to Include/Exclude When Calculating Work Hours**

[See rule for details - table provides only general summary of the rule]

<b>Sub-section</b>	<b>Item</b>	<b>Must Include</b>	<b>May Exclude</b>
26.205(b)	Performing duties for licensee	Must include amount of time individual performs duties for the licensee, including from off-site locations in some circumstances (see below 26.205(b)(5))	May exclude off-hours voluntary study time, as long as it is not required or performed for the licensee ( <i>from Reg Guide 5.73</i> )
26.205(b)(1)	Shift Turnover	<p>Must include (examples; not exhaustive list):</p> <ul style="list-style-type: none"> <li>• Hours worked during turnovers between individuals within a shift period due to rotations or relief within a shift</li> <li>• Shift holdovers to cover for late arrivals of incoming shift members</li> <li>• Early arrivals for meetings, training, or pre-shift briefings for special evolutions</li> <li>• Holdovers for interviews needed for event investigations</li> </ul>	<p>May exclude:</p> <ul style="list-style-type: none"> <li>• Those activities necessary to safely transfer information and responsibilities between shifts</li> <li>• Arming and disarming for security personnel (<i>from Reg Guide 5.73</i>)</li> <li>• Personnel donning/doffing radiation protective gear and transiting to and from a job site where continuous monitoring is required. This criterion also limits this exclusion to turnover activities between contiguous shifts.</li> </ul>
26.205(b)(2)	Within-shift break and rest periods	Must include break or rest periods during which there is no reasonable opportunity & accommodation for restorative sleep, such as most lunch breaks	May exclude that portion of a break or rest period during which there is reasonable opportunity and accommodation for restorative sleep
26.205(b)(3)	Beginning or resuming duties subject to work hour controls	Must include (count) all hours performing duties for the licensee, including hours worked on duties that are not subject to work hour controls if the individual performs any covered duties during the calculation period	The hours worked before the beginning or resumption of covered work are not subject to work hour controls themselves, even though they must be included in the count once covered work is begun or resumed

<b>Sub-section</b>	<b>Item</b>	<b>Must Include</b>	<b>May Exclude</b>
26.205(b)(4)	Unannounced emergency preparedness exercises and drills	Must include hours spent preparing for the exercises and drills, but only if the individual also performs covered duties during the calculation period 	May exclude from calculation the unscheduled work hours to participate in the actual conduct of such exercises or drills
26.205(b)(5)	Incidental duties performed off site	Separate unscheduled phone calls that together exceed the nominal  30 minutes (e.g., 2 phone calls of  20 min. each, 2 hours apart) must be included as a separate work period or as part of a previous or upcoming work shift.	May exclude unscheduled work performed off site if total duration does not exceed nominal 30 min. during any single break period  This work also does not constitute "work periods" or "work shifts" when calculating rest breaks or MDOs
(From NRC Guidance)	Travel time	Must include travel time in cases where:  <ul style="list-style-type: none"> <li>• The individual is performing work for the licensee</li> <li>• The travel is not the individual's regular commute</li> </ul>	May exclude travel time if: <ul style="list-style-type: none"> <li>• The individual is not performing work for the licensee</li> <li>• The travel is part of the individual's regular commute</li> <li>• Individual has initially reported to the site to begin work and has not yet been granted unescorted access</li> <li>• Travel time that is not directed by the licensee may likewise be excluded</li> </ul>
26.207(b)	Force-on-force tactical exercises exception	Must include hours spent preparing for the exercises and drills, but only if the individual also performs covered duties during the calculation period	May exclude shifts worked by security personnel during the actual conduct of NRC-evaluated force-on-force tactical exercises when calculating individual's number of days off (as per MDO requirements, or when calculating weekly average hours worked (as per the MAWH requirements)**

\*\* In practice, licensees should exclude from the calculation of hours worked during the actual conduct of NRC-evaluated force-on-force tactical exercises only those hours worked in excess of 54 hours during the week of the exercise.

## **8 WORK HOUR LIMITS (CEILING LIMITS) AND BREAK REQUIREMENTS (26.205)**

### **8.1 APPLYING WORK HOUR (CEILING) LIMITS**


Ceiling Limits and Break Requirements always apply when a worker is a Covered Individual except when specifically exempted in Section 12 (EXCEPTIONS).

- The periods of “24-hours,” “48-hours,” and “7-days” are considered rolling time periods. Rolling means the period is not re-zeroed, or the “clock reset” following a day off or after obtaining authorization to exceed the limits.
- The “24-hours,” “48-hours,” and “7-days” periods do not restart after a day off, the periods continue to roll.

See Section 22 Example 7.

### **8.2 APPLYING BREAK REQUIREMENTS**

Break times may be required to be extended based on the travel time provisions in Section 12 (EXCEPTIONS).

- a) When calculating the duration of a break between work periods, either the off-going turnover duration or the subsequent on-coming duration of turnover may be included as part of the break duration, but not both.
- b) When rotating shift periods are transitioning to a new time of day (e.g., day shift to night shift) or work schedules (e.g., 10-hour shifts to 12-hour shifts) then a break period of 8 hours is acceptable for the transition.
- c) When determining the 34-hour break in 9 days, a rolling 216-hour period  should be used.
  - The licensee should continuously look forward from the start of the first period of work, immediately following a 34-hour break, to ensure there is a 34-hour break in the subsequent 9 days or 216-hour period.
  - Conversely, to ensure that the actual hours worked by the individual are in compliance, the licensee must verify that the individual has had a 34-hour break in the previous 9 days or 216-hour period at the end of the work period.



## **9 APPLICATION OF MINIMUM DAYS OFF (MDO) AND/OR MAXIMUM AVERAGE (MAWH) WORK HOURS ALTERNATIVE (26.205 (D)(3),(D)(7))**

**NOTE:** Ceiling Limits and Break Requirements apply under all circumstances when determining work hours to be worked unless waived or specifically exempted in Section 12, Exceptions.

### **9.1 GENERAL INFORMATION**

In order to prevent workers from experiencing the effects of cumulative fatigue, a licensee may implement the Minimum Days Off (MDO) or Maximum Average Work Hours (MAWH) protocol. A licensee may not utilize a combination of the 2 protocols simultaneously e.g., Operations on MDO and Maintenance on MAWH.

During unit outages, a licensee may implement either method of fatigue management. This may differ from the on-line protocol e.g., on line may be using MAWH, where in an outage the MDO method would normally be employed.

Station policies should delineate the chosen method for applying work hour controls to manage fatigue.

### **9.2 MINIMUM DAYS OFF (MDO) METHOD**

#### **9.2.1 Minimum Day Off (MDO)**

A method for managing cumulative fatigue that establishes the minimum number of days off that must be taken in order to comply with the appropriate on-line or outage work hour controls. The required number of days off varies by plant operating status, shift schedule, and job duties.

#### **9.2.2 Applying MDO Method**

The licensee may elect to use a rolling or fixed (maximum of) 6-week period for the purposes of determining the minimum days off. The actual repeatability of the rotation may exceed 6 weeks; however, the shift cycle used for calculating the minimum days off cannot exceed 6 weeks.

Generally a rolling evaluation period for MDO evaluations takes into account the current day and looks back at the previous days in the evaluation period for compliance. For example, an individual on a 42-day (6 week) rolling evaluation period – for the purpose of compliance with the MDO requirement – the current day and the last 41 days of actual time are used to determine if the individual has had the required days off. When tomorrow is reached, it is that day and the previous 41 days, etc. For the purposes of predicting compliance, the current day and the next 41 days of scheduled time are used.

For a 42-day (6 weeks) fixed evaluation period, an individual must meet the MDO requirement for their job function and average shift length for days 1 to 42. The day following day 42 is a new day 1 and a new 42 day evaluation period begins. These evaluation periods go in blocks

from 1-42 and then start over. Once the schedule goes beyond day 42, the evaluation period looks ahead another 42 days and does not look back like the rolling evaluation method does.

- a) The MDO method requires that in a Shift Cycle, the worker will receive an average number of Days Off equal to or greater than the MDO requirement for the shift duration that applies.

<b>Covered Individual</b>	<b>8-hour shift</b>	<b>10-hour shift</b>	<b>12-hour shift</b>
<b>Actual Average Shift Hours</b>	8 to less than or equal to 9 hours	Greater than 9 to less than or equal to 11 hours	Greater than 11 and less than or equal to 13 hours
<b>Maintenance</b>	1 day off per week	2 days off per week	2 days off per week
<b>Operations, HP, Chemistry, Fire Brigade</b>	1 day off per week	2 days off per week	2.5 days off per week
<b>Security</b>	1 day off per week	2 days off per week	3 days off per week

- b) The planned shift schedule is used to establish the beginning minimum day off (MDO) requirement. If the actual hours worked do not deviate from the planned shift schedule then the required MDO will not change.
- Periodically, workers and supervisors may need to work unscheduled hours to meet station needs. An accumulation of unscheduled work hours over a shift cycle may affect the MDO requirement that applies to individuals or crews.
  - The above table is shift schedule is averaged over a shift cycle of 42 days or less as applicable. If the worker averages more hours than previously scheduled the licensee must recalculate the average hours worked per shift to ensure the proper MDO (8, 10 or 12) is met prior to the end of the shift cycle. For actual shift rotation cycles greater than 42 days, the averages must be calculated over a period of 42 days or less.
- c) If the individual works for a licensee for a period less than one week, the MDO requirement is not applicable.

### 9.2.3 Calculating Work Hours using the MDO Method

- a) Licensees shall ensure that individuals have, at a minimum, the number of days off specified for their shift duration.
- b) Work hours are calculated as the amount of time an individual performs any duties for the licensee including but not limited to the following:
- All within-shift break times and rest periods during which there is no reasonable opportunity or accommodations appropriate for restorative sleep (e.g., a nap).
  - Shift holdovers to cover for late arrivals of incoming shift members.

- Early arrivals of individuals for licensee required meetings, training, or pre-shift briefings for special evolutions (these activities are not considered shift turnover activities).
  - Holdovers for interviews needed for event investigations.
- c) Within-Shift Breaks and Rest Periods
- Time spent at lunch, although non-productive work may not be excluded from the work hour calculations.
  - Break time allowed during the scheduled work day is included in the work hour calculation.
  - That portion of a break or rest period during which there is a reasonable opportunity and accommodation for restorative sleep on site (e.g., a nap of at least 30 minutes) may be excluded.
- d) Shift Turnover - Licensees may exclude Shift Turnover from the calculation of an individual's work hours.
- e) Resets from Deviations must additionally ensure that actions are in place to comply with MDO requirements by the end of the Shift Cycle if using the fixed-cycle method in work hour calculations.
- f) Transitions between on-line schedules

Licensees may transition individuals or crews between shift schedules by ending a shift cycle and starting a new shift cycle with a different shift schedule. The following guidance applies:

- Terminating the shift cycles: Ensure that the individuals meet the MDO requirement applicable to the shift schedule that the individuals were working before it was terminated.
  - In these instances, for the purpose of determining compliance with the MDO requirements, the licensee may average the individuals' work hours over a period immediately preceding the transition that is equal in length to the shift cycle the individuals were working before the transition (e.g., 6 weeks, if the shift cycle was 6 weeks in length). The licensee should then ensure that the individual meets the applicable MDO requirement for the new shift schedule going forward from the beginning of the new shift cycle. A shift cycle may be as short as 1 week. There are no MDO requirements for shift cycles less than 7 days.

g) Transitions between on-line and outage schedules

The Ceiling and Break Requirements apply during the transitions. The outage MDOs only apply while in a unit outage. On line MDO rules take effect the first shift after the reactor unit achieves 75% reactor power or until seven calendar days have elapsed since reconnecting the reactor unit to the electrical grid, whichever is shorter. For the first 42 days after an outage, (for 6 week cycles) the employee must be evaluated using the fixed shift cycle method.

h) Transitions between covered groups or onto a covered shift:

If an individual begins or resumes performing for the licensee any covered work during the calculation period, the licensee shall include in the calculation of the individual's work hours all work hours worked for the licensee, including hours worked performing duties that are not covered work and control the individual's work hours.

- Ceiling Limits and Break Requirements always apply.
- A minimum of 1 day off in the preceding 7-day period is acceptable for individuals to begin or resume covered duties and for individuals who have been working an 8-hour shift schedule, as either day or shift workers, and are transitioning (1) from a non-covered group to a covered group or (2) from a covered group to another covered group that has more stringent MDO requirements.
- A minimum of 2 days off in the preceding 7-day period is acceptable for individuals who have been working a 10- or 12-hour shift schedule, as either day or shift workers, and transition (1) from a non-covered group to a covered group or (2) from a covered group to another covered group with more stringent MDO requirements.
- A minimum of 2 days off in the preceding 7-day period is acceptable for operators at a multiunit site with one or more units in an outage, if the operators have been working outage hours on 10- or 12-hour shifts before they transition to an operating unit as members of the minimum shift complement described in Section 6.1.
- There is no minimum day off requirement for transitioning from a non-covered to covered work if the previous schedule was less than 7 days in length.

See Section 22 Example 7.

#### 9.2.4 Unit Outage, Security System Outage or Increased Threat Condition Work Hour Controls – MDO Methodology

**Note:** During a unit outage, the options for control of work hours for covered workers are outage MDOs or staying with on-line MDOs.

**Note:** If an individual is performing work under multiple categories, the most restrictive work hour controls apply.

- a) During the first 60-day period of a unit outage, the Covered Worker under outage rules will receive an average number of Days Off equal to or greater than the MDO requirement for the shift duration that applies.

<b>Covered Individual**</b>	<b>8- hour shift Days off</b>	<b>10- hour shift Days off</b>	<b>12- hour shift Days off</b>
<b>Actual Average Shift Hours</b>	8 to less than or equal to 9 hours	Greater than 9 to less than or equal to 11 hours	Greater than 11 and less than or equal to 13 hours
<b>Maintenance</b>	1 day off per week	1 day off per week	1 day off per week
<b>Operations, HP, Chemistry, Fire Brigade</b>	3 days off in each successive (i.e., non-rolling) 15-day period	3 days off in each successive (i.e., non-rolling) 15-day period	3 days off in each successive (i.e., non-rolling) 15-day period
<b>Security</b>	4 days off in each successive (i.e., non-rolling) 15-day period	4 days off in each successive (i.e., non-rolling) 15-day period	4 days off in each successive (i.e., non-rolling) 15-day period

\*\*If the worker averages more hours than previously scheduled the licensee must recalculate the average hours worked per shift to ensure the proper MDO (8, 10 or 12) is met prior to the end of the listed period.

- b) During the first 60-day period of an unplanned security system outage or increased threat condition, the requirements for MDOs for Security personnel do not apply.
- c) Extensions of 60-day period may be provided to individuals in 7-day increments for each non-overlapping 7-day period in which the individual has worked not more than 48 hours during the unit or security system outage or increased threat condition.
- This extension can be made any time in the outage period after the less than 48-hour work week.
  - This extension is calculated by a week defined as 7 days.
  - If every week of the initial 60 days is used for the extension only 56 days (8 weeks) are available for the extension.
  - The 48-hour allowance can only be banked during the first 60 days of the outage and used no later than day 116 of the outage.

See Section 22 Examples 13 & 14.

### **9.3 MAXIMUM AVERAGE WORK HOURS (MAWH)**

#### **9.3.1 Maximum Average Work Hours (MAWH)**

An alternative method for managing cumulative fatigue that establishes a limit of 54 work hours per week that an individual may average over the licensee defined averaging period of 1 to 6 weeks. A weekly maximum average of 54 hours worked, is calculated based on a rolling averaging period of up to 6 weeks.

#### **9.3.2 Maximum Average Work Hours (MAWH) Method**

The alternative approach to on-line MDO is a weekly maximum average of 54 hours worked, based on a rolling averaging period of up to 6 weeks. This alternative is applicable to all covered workers, regardless of classification.

The rolling periods used in the MAWH calculations, roll by one full week at a time. The week may start on any specific day, and must be consistent through the calculation period, and documented in the controlling procedure.

#### **9.3.3 Calculating Maximum Average Work Hours**

##### **9.3.3.1 Rolling Period**

The averaging period starts “rolling” after a work history for a covered worker has been established equal to the length of the averaging period.

The averaging period rolls by one full week at a time. The week does not have to start on any specific day but must be consistent through the calculation period and documented in the controlling procedure.

Shifts that bridge the point in time during the week when the averaging period rolls forward one week may be counted in one of two ways and must be documented in the controlling procedure:

- The hours for that shift may be included in the week the shift starts.
- The hours may be included in the weeks the hours are worked.

##### **9.3.3.2 Calculating the Average**

- While the calculation of the average work hours worked occurs at the end of the averaging period, there is a need to be continually calculating the average looking forward to identify work hours that will potentially exceed the limit so that work hours can be adjusted or, as appropriate, waivers can be prepared in advance of exceeding the limit.
- One simple method is to add up the work hours from the previous five weeks and subtract from 324 giving the worker the maximum amount of hours that can be worked the upcoming week.

### **9.3.3.3 Beginning a Rolling Averaging Period**

- In the case of a worker who has not been performing on-line covered work and will be transitioning to on-line covered work, there are two options for setting up the schedule to start the averaging period.
- The schedule established for the worker for the initial averaging period (e.g., initial 6 weeks) can be set up as a fixed period which averages 54 hours or less. The first week after this (e.g., 7th week worked) is the start of the rolling schedule.
- The number of weeks in the averaging period for the worker is determined and the hours for the past number of work weeks that is equal to the averaging period are calculated to establish the history needed to begin rolling.

### **9.3.3.4 Partial Averaging Periods**

- Partial averaging periods occur when a worker will not be working a full averaging period.
- If less than a full week, then only Ceiling Limits and Break Requirements apply.
- If greater than one full week but less than a full averaging period, then the worker must limit the average work hours to 54-hour per week or less averaged over the partial averaging period.

### **9.3.3.5 Truncated Schedules**

If the fixed schedule is truncated due to unforeseeable events outside the control of the licensee, the worker will be considered to be in compliance with the rule if the schedule for the averaging period would have met the on-line averaging limit should the truncation not have occurred.

Examples of unforeseeable events:

- Unexpected unit outage.
- A declared emergency as defined by the licensee's emergency plan.
- Duties of the worker are terminated.
- An unplanned security system outage (security only).
- An increased threat condition (security only).

Following such an event, the Covered Worker may start a new averaging period or choose not to truncate the averaging period.

### 9.3.4 Unit Outage, Security System Outage or Increased Threat Condition Work Hour Controls – MAWH Methodology

During a unit outage, the options for control of work hours for covered workers are outage MDOs or staying with MAWH work hour controls.

In cases where a licensee utilizing MDO for on line work hour controls, and desires to use MAWH for an outage, the guidance in 9.3.3.4 Partial Averaging would apply.

In cases of an unexpected outage, which is anticipated to last only a short time, remaining on MAWH may be administratively beneficial.

## 9.4 OUTAGE SPECIFIC GUIDANCE – WORK HOUR CALCULATIONS

- a) Licensees shall ensure that individuals have, at a minimum, the number of days off specified for their shift duration.
- b) Transitioning to a planned outage using the MDO method:
  - Rolling shift cycles - Since the rolling evaluation method is a backwards look at days worked, online MDO's are in compliance when entering a planned outage.
  - Fixed shift cycles – The working hours must be carefully managed working towards the beginning of an outage. In the last week prior to the outage, the number of days off must meet the averaged shift length on-line MDO requirement. These individual may either need additional days off or have their working hours adjusted to meet the required MDO's for a fixed evaluation period prior to entering the planned outage.
  - Schedules can also be abbreviated to cause a fraction number of weeks in the online schedule. In these cases the required number of MDO's is prorated over the abbreviated schedule. For example 30 days is 4.3 weeks. A 12-hour shift operator shift would require  $4.3 \times 2.5$  MDO/week or 11 days off to be in compliance with the rule.
- c) Transitioning to a planned outage using MAWH (on-line averaging method):
  - Outage MDO's may begin when the reactor unit is disconnected from the electrical grid.
- d) Transitioning from a Planned Outage to On-Line using the MDO method:
  - Return to on-line work hour limitations starts a new shift cycle. As long as the worker has not exceeded the maximum number of allowed work days for the period (7-day rolling or 15 day fixed), the licensee shall be considered to be in compliance with the rule.
- e) Transitioning from a Planned Outage to On-Line using the on-line averaging method:
  - See section 11 Table 11






- f) Work hours are calculated as the amount of time an individual performs any duties for the licensee including but not limited to the following:
- All within-shift break times and rest periods during which there is no reasonable opportunity or accommodations appropriate for restorative sleep (e.g., a nap).
  - Shift holdovers to cover for late arrivals of incoming shift members.
  - Early arrivals of individuals for licensee required meetings, training, or pre-shift briefings for special evolutions (these activities are not considered shift turnover activities).
  - Holdovers for interviews needed for event investigations.
- g) Within-Shift Breaks and Rest Periods
- Time spent at lunch, although non-productive work may not be excluded from the work hour calculations.
  - Break time allowed during the scheduled work day is included in the work hour calculation.
  - That portion of a break or rest period during which there is a reasonable opportunity and accommodation for restorative sleep on site (e.g., a nap of at least 30 minutes) may be excluded.
- h) Shift Turnover
- Licensees may exclude Shift Turnover from the calculation of an individual's total work hours.
  - Licensees may exclude one shift turnover, either on-coming or off-going, from the calculation of the minimum work period break.
  - The level of precision in determining the time duration for turnover should not be greater than 15 minutes.
- i) Resets from Deviations must additionally ensure that actions are in place to comply with MDO requirements by the end of the specified period.
- j) Contract and Licensee Outage Workers
- Licensee employees and contractor/vendor personnel may go from an outage at one site to an outage at another site.
  - When a licensee employee or contractor/vendor performs covered work for a licensee during two or more unit outages or security system outages (or a combination thereof), and the interval(s) between successive outages is less than 9 days, the receiving licensee should make a reasonable judgment as to the individual's fitness-for-duty relative to fatigue.
  - Licensees are not responsible for tracking individual's hours between outages for different licensees.
  - If the Contractor does not have unescorted access, then the work performed is not covered. See Section 22 Example 1.

k) Operator Relief at Multi-Unit Sites

- An operator who has been working outage work hours and has had 2 days off in the previous 7-day period may provide relief to the operator at the controls or the senior operator in the control room, if an appropriately qualified operator who has been working non-outage work hours is not immediately available to provide relief.
- If an operator who has been working outage work hours and has had 2 days off in the previous 7-day period is not immediately available, an operator who has been working outage hours may provide:
  - Short-term relief (up to 2 hours) for the operator at the controls or the senior operator in the control room without a waiver.
  - Longer term relief (more than 2 hours) under a waiver of the MDO or MAWH requirement that is applicable to the shift schedule (i.e., 8-, 10-, or 12-hour shifts) for personnel assigned to the operating unit.

## **10 EXAMPLES OF APPLYING ALL WORK HOUR CONTROLS (26.205)**

### **10.1 GENERAL WORK HOUR REQUIREMENTS**

- a) If a work hour limit will be exceeded, it shall be identified before the hours are worked. To determine if the minimum days off requirements will be met (before working the additional hours) a licensee may use one of the following methods: Calculate the minimum days off based on a backwards look of the previous five weeks and determine if the extra hours worked in the sixth week would still meet the requirement (rolling 6-week cycle method); or ensure that sufficient days off still exist (within the shift cycle) to meet the minimum days off requirements (fixed shift cycle method).
- b) Hours worked should be evaluated to determine if any limit will be exceeded based on the work schedule by picking a future time (T) on the work schedule and asking, “how many hours will have been worked during the T-24 hours, T-48 hours, or T-168 hours (T-7 days).”
- c) The limit for 72 hours in a 7-day period may be calculated using a rolling 168-hour window or based on 7 calendar days (i.e., a backwards look at the number of hours which have or will have been worked based on a time in the future).
- d) The period is not re-zeroed, or the “clock reset” following a day off or after obtaining authorization to exceed the limits.
- e)  Licensees shall establish the accounting practices to be used in monitoring hours worked. In many cases this will parallel the established system for compensation. However, the accounting practices may be different from record keeping for payroll purposes. Work periods should be rounded consistently.
- f) Work hour records should show the number of hours worked each calendar day. Work period start and stop should be documented in a consistent manner.

See Section 22 Examples 5-7 for clarifications.

**Table 10-A: Work Hour Controls – Normal Operations**

[See rule for details - table provides only a general summary of the rule]


<b>Sub-section</b>	<b>Item</b>	<b>Controls for Individuals Performing Duties Subject to Work Hour Controls</b>	<b>Note</b>
26.205(d)(1)	Work hour limits	<p>Ensure that the individual's work hours do not exceed:</p> <ul style="list-style-type: none"> <li>• 16 hours in any 24-hour period</li> <li>• 26 hours in any 48-hour period</li> <li>• 72 hours in any 7-day period</li> </ul>	<ul style="list-style-type: none"> <li>• Rolling limits</li> </ul> <p>7-day period can be calculated as 168 hours or 7 calendar days</p>
26.205(d)(2)	Rest break requirements	<p>Ensure that the individual has at minimum:</p> <ul style="list-style-type: none"> <li>• 10-hour break between successive work periods <ul style="list-style-type: none"> <li>o May use 8-hour break when needed to accommodate scheduled crew shift transition and transition between work schedules</li> </ul> </li> <li>• 34-hour break in any 9-day period</li> </ul>	<p>Rest break is the interval of time between successive work periods during which individual does not perform any duties for licensee</p> <p>Break time may include one period of shift turnover (at either the beginning or end of a shift), but not both</p> <p>9-day period can be calculated as 216 hours or 9 calendar days</p>
26.205(d)(3)	Minimum days off	<p>If using the MDO method, ensure that the individual has at minimum the following days off per week averaged over shift cycle:</p> <ul style="list-style-type: none"> <li>• 8-hr shift schedule: 1 day off/week avg.</li> <li>• 10-hr shift schedule: 2 days off/week avg.</li> <li>• 12-hr shift schedule: per week: <ul style="list-style-type: none"> <li>o 2.5 days off avg. for those performing duties listed in 26.4(a)(1)-(3) [ops/HP-chem/fire brigade]</li> <li>o 2 days off avg. for those performing duties listed in 26.4(a)(4) [maintenance and quality inspections of maintenance]</li> <li>o 3 days off avg. for those performing duties listed in 26.4(a)(5) [security]</li> </ul> </li> </ul>	<p>Day off defined as: a calendar day during which individual does not start work shift</p> <p>Duration of shift cycle may not exceed 6 weeks for purpose of calculating days off</p> <ul style="list-style-type: none"> <li>• Shift cycle may not be less than 1 week [RG 5.73]</li> </ul> <p>Days off per week average is calculated as: (# days off in shift cycle) divided by (# weeks in shift cycle)</p>
26.205(d)(7)	Maximum Average Work Hours (MAWH) Alternative to MDOs	<p>If using the maximum average work hours (MAWH) method, ensure that individuals work no more than a weekly average of 54 hours</p> <ul style="list-style-type: none"> <li>• Averaged over period up to 6 weeks</li> <li>• Averaging period advances by 7 consecutive calendar days at finish of every averaging period</li> </ul>	<p>For shifts that span 2 calendar days, either:</p> <p>Count all hours worked as if they were worked on the day the shift started, or</p> <p>Count hours on calendar days they were actually worked</p>

26.205(d)(8)	State Alternative Used	Clearly state in the FFD policy and procedures which requirements are being applied during both operations and outages: MDO or MAWH requirements	
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**Table 10-B: Work Hour Controls – Outages**

[See rule for details - table provides only a general summary of the rule]

<b>Sub-section</b>	<b>Item</b>	<b>Controls for Individuals Performing Duties Subject to Work Hour Controls</b>	<b>Note</b>
26.205(d)(1)	Individual work hours	Ensure that the individual's work hours do not exceed: <ul style="list-style-type: none"> <li>• 16 hours in any 24-hour period</li> <li>• 26 hours in any 48-hour period</li> <li>• 72 hours in any 7-day period</li> </ul>	Rolling limits 7-day period can be calculated as 168 hours or 7 calendar days
26.205(d)(2)	Rest break requirements	Ensure that the individual has at minimum: <ul style="list-style-type: none"> <li>• 10-hour break between successive work periods <ul style="list-style-type: none"> <li>○ May use 8-hour break between work periods when break of less than 10 hours is needed to accommodate scheduled crew shift transition and transition between work schedules</li> </ul> </li> <li>• 34-hour break in any 9-day period</li> </ul>	A rest break is the interval of time between successive work periods during which the individual does not perform any duties for licensee Break time may include one period of shift turnover (at either the beginning or end of a shift), but not both 9-day period may be calculated as 216 hrs or 9 calendar days
26.205(d)(4)	Unit outage – minimum days off – Operations, HP/Chem, fire brigade	If using the MDO method, ensure that the individuals working on outage activities and performing duties listed in 26.4(a)(1)-(3) [operations, HP/chem., fire brigade] have at minimum the following days off: <ul style="list-style-type: none"> <li>• 3 days off each successive 15-day period</li> </ul>	Requirement applies for the <u>first 60 days</u> of a unit outage Requirement applies to successive 15-day periods (i.e., non-rolling) Applies only to individuals working on outage activities
26.205(d)(4)	Unit outage – minimum days off – maintenance and quality inspections of maintenance	If using the MDO method, ensure that the individuals working on outage activities and performing duties listed in 26.4(a)(4) [maintenance and quality inspections of maintenance] have at minimum the following days off: <ul style="list-style-type: none"> <li>• 1 day off in any 7-day period</li> </ul>	Requirement applies for the <u>first 60 days</u> of a unit outage Requirement applies to rolling 7-day periods Applies only to individuals working on outage activities
26.205(d)(5)	Unit outage, security system outage, or increased threat condition – minimum days off – security	If using the MDO method, ensure that the individuals performing duties listed in 26.4(a)(5) [security] have at minimum the following days off: <ul style="list-style-type: none"> <li>• For unit outage (planned or unplanned) or for planned security system outage: 4 days off each successive 15-day period</li> <li>• For unplanned security system outage or increased threat condition: no minimum days off are required</li> </ul>	Requirement applies for the <u>first 60 days</u> of a unit outage, security system outage, or increased threat condition Requirement applies to successive 15-day periods (i.e., non-rolling) Applies only to individuals working on outage activities

26.205(d)(6)	 Extension of outage/threat condition requirements	If using the MDO method, the outage/increased threat MDO requirements may be extended on an individual basis in 7-day increments beyond the 60-day limit	For each non-overlapping 7-day period during an outage or increased threat condition in which the individual did not work more than 48 hrs  Applies only to individuals working on outage activities
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**Table 10-C: Applying Each Control – Work Hour Limits and Rest Break Requirements**

<b>Topic</b>	<b>16 hrs in 24</b>	<b>26 hrs in 48</b>	<b>72 hrs in 7-day/168-hr</b>	<b>10 hr rest break</b>	<b>34-hr rest break in 9-day/216-hr</b>
Limit applies to:	All covered workers	All covered workers	All covered workers	All covered workers	All covered workers
When limits apply:	At all times individual is performing covered work for the licensee	At all times individual is performing covered work for the licensee	At all times individual is performing covered work for the licensee	Before the start of a work period in which the individual is performing covered work for the	At all times an individual is performing covered work for the licensee
Work hour limits and break requirements	16 work hours	26 work hours	72 work hours	10 hour rest break (continuous 10 hour	34 hour rest break (continuous 34 hour break)
Allowed deviations	None	None	None	An 8 hour rest break is allowed when needed to accommodate scheduled crew shift transitions	None
Apply hours worked to:	24 hours	48 hours	7 days or 168 hours	The time between the end of one work period and the start of the next work period.	9 days or 216 hours
Calculation period	Rolling	Rolling	Rolling	Sequential	Rolling



<b>Topic</b>	<b>16 hrs in 24</b>	<b>26 hrs in 48</b>	<b>72 hrs in 7-day/168-hr</b>	<b>10 hr rest break</b>	<b>34-hr rest break in 9-day/216-hr</b>
Calculation Period	<p>The calculation period has no designated starting or ending time relative to the calendar or clock. It continues through work hours and breaks and ends 24 hours after it starts.</p> <p>For individuals starting or resuming covered work, the 24-hr calculation period begins 24 hours before the start of covered work.</p>	<p>The calculation period has no designated starting or ending time relative to the calendar or clock. It continues through work hours and breaks and ends 48 hours after it starts.</p> <p>For individuals starting or resuming covered work, the calculation period begins 48 hours before the start of covered work.</p>	<p>If using a 7-day period, the calculation period starts at 12 am of a calendar day , and ends at 11:59 pm 7 calendar days later.</p> <p>If using 168 hour period, the calculation period has no designated starting or ending time relative to the calendar or clock. It continues through work hours and breaks and ends 168 hours after it starts.</p> <p>For individuals starting or resuming covered work, the calculation period begins 7 days or 168 hours before the start of covered work.</p>	<p>The calculation period begins at the end of one work period and ends at the start of the next (subsequent) work period. For individuals starting or resuming work the calculation period begins at the end of the previous work period.</p>	<p>If using a 9-day period, the calculation period starts at 12am of a calendar day, and ends at 11:59 pm 9 days later.</p> <p>If using a 216 hour period the calculation has no designated starting or ending time relative to the calendar or clock. It continues through work hours and breaks and ends 216 hours after it starts.</p> <p>For individuals starting or resuming covered work, the calculation period begins 9 days or 216 hours before the start of covered work.</p>
By what increments does the calculation period move?	It rolls in hour-by-hour increments*	It rolls in hour-by-hour increments*	<p>- If using 7-day period, it rolls in day-by-day increments</p> <p>- If using 168-hour period, it rolls in hour-by-hour increments</p>	It moves sequentially from break period to break period.	<p>- If using 9-day period, it rolls in day-by-day increments</p> <p>- If using 216-hour period, it rolls in hour-by-hour increments</p>


\*Vendor software may calculate in 15 minute increments



**Table 10-D: Applying Each Control – MDO and MAWH Requirements**

Information needed to apply either MDO or the Maximum Average Work Hours requirements

<b>Topic</b>	<b>MDO – Normal Operations</b>	<b>MDO – Outage Conditions – Ops, HP/Chem, Fire Brigade</b>	<b>MDO – Outage Conditions – Maintenance and Quality Inspections</b>	<b>MDO – Outage Conditions – Security</b>	<b>MAWH 54-hr Alternative</b>
To whom does it apply?	All covered workers. To determine specific number days off required, determine both individual's duties as well as applicable shift schedule (based on average hours worked per day over shift cycle)	All covered workers performing duties listed in 26.4(a)(1)-(3)	All covered workers performing duties listed in 26.4(a)(4)	All covered workers performing duties listed in 26.4(a)(5)	All covered workers, irrespective of duties or shift schedule
When does it apply?	At all times the individual is performing covered work for the licensee during normal operations	At all times the individual is performing covered work for the licensee under outage conditions; some exceptions for operators at multi-unit sites	At all times the individual is performing covered work for the licensee under outage conditions	At all times the individual is performing covered work for the licensee under outage conditions	At all times the individual is performing covered work for the licensee
What is the limit or value to track?	Days off (defined as a calendar day during which individual does not start a work shift), as follows: <ul style="list-style-type: none"> <li>• 8-hr shift schedule: 1 day off/week avg.</li> <li>• 10-hr shift schedule: 2 days off/week avg.</li> <li>• 12-hr shift schedule: per week: <ul style="list-style-type: none"> <li>○ 2.5 days off avg. for those performing duties listed in 26.4(a)(1)- (3) [OPS/HP-</li> </ul> </li> </ul>	3 days off (defined as a calendar day during which individual does not start a work shift) in each successive 15-day period	1 day off (defined as a calendar day during which individual does not start a work shift) in any 7-day period	4 days off (defined as a calendar day during which individual does not start a work shift) in each successive 15-day period for unit outages (planned or unplanned) or for planned security system outages.	Average may not exceed 54 work hours per week over the rolling averaging period.

<b>Topic</b>	<b>MDO – Normal Operations</b>	<b>MDO – Outage Conditions – Ops, HP/Chem, Fire Brigade</b>	<b>MDO – Outage Conditions – Maintenance and Quality Inspections</b>	<b>MDO – Outage Conditions – Security</b>	<b>MAWH 54-hr Alternative</b>
	Chem/Fire brigade] <ul style="list-style-type: none"> <li>○ 2 days off avg. for those performing duties listed in 26.4(a)(4) [maintenance]</li> </ul> 3 days off avg. for those performing duties listed in 26.4(a)(5) [security]				
Specific exceptions to the limit or value of this requirement [Note-this is an exception to the limit or value of the control, not the exceptions to the calculation of work hours specified in 26.205(b) and 26.20(d)(7)II)]	<p>No MDOs are required for individuals working for the licensee for a period of less than one week.</p> <p>If a shift cycle during normal operations is cut short due to the unit transitioning into an outage or increased threat condition, MDO requirements are considered met if an individual's scheduled days off during the truncated period would have provided the required days off for the shift cycle.</p> <p>To accommodate a change in shift schedules, the licensee may end a shift cycle and start a new one. MDO requirements and compliance of individuals working the shortened shift</p>	<p>No MDOs are required for individuals working for the licensee for a period of less than one week </p> <p>Some exceptions for operators at multi-unit sites.</p> <p>The 60-dayperiod during which these MDO requirements apply may be extended for each individual in 7-day increments for each non-overlapping 7-day period the individual has worked not more than 48 hours during the outage.</p>	<p>No MDOs are required for individuals working for the licensee for a period of less than one week.</p> <p>The 60-dayperiod during which these MDO requirements apply may be extended for each individual in 7-day increments for each non-overlapping 7-day period the individual has worked not more than 48 hours during the outage.</p>	<p>No MDOs are required for individuals working for the licensee for a period of less than one week.</p> <p>During the first 60 days of an unplanned security system outage or increased threat condition: no minimum days off are required</p> <p>The 60-dayperiod during which these MDO requirements apply may be extended for each individual in 7-day increments for each non-overlapping 7-day period the individual has worked not more than 48 hours during the outage.</p>	<p>During the first 60 days of an unplanned security system outage or increased threat condition: the maximum average work hour limits need not be met.</p>

<b>Topic</b>	<b><i>MDO – Normal Operations</i></b>	<b><i>MDO – Outage Conditions – Ops, HP/Chem, Fire Brigade</i></b>	<b><i>MDO – Outage Conditions – Maintenance and Quality Inspections</i></b>	<b><i>MDO – Outage Conditions – Security</i></b>	<b><i>MAWH 54-hr Alternative</i></b>
	cycle maybe determined by looking back a period that is equal in length to the shift cycle the individual was working before the change (e.g., the past 6 weeks).				
What is its calculation period?	Shift cycle, which is set by the licensee, cannot be less than one week nor exceed 6 weeks, but can vary within these limits.	15-day period	7-day period	15-day period	Averaging period, which cannot exceed 6 weeks, and is defined in days
How does the calculation period move?	Sequential	Sequential	Rolling	Sequential	Rolling
What/when is the beginning and end of the calculation period?	The calculation period starts at the beginning of the shift cycle and ends at the end of the shift cycle; days off per week average is calculated as: (# days off in shift cycle) divided by (# weeks in shift cycle).	The calculation period starts at the beginning of each 15-day period and ends at the end of the 15- day period.	The calculation period starts at the beginning of each 7- day period and ends at the end of the 7-day period.	The calculation period starts at the beginning of each 15-day period and ends at the end of the 15-day period.	The calculation period starts on the first day of averaging period and ends on the last day of the averaging period. Licensee must specify the time of day the averaging period starts and stops. Note that for shifts that span 2 calendar days, licensee can either: <ul style="list-style-type: none"> <li>○ Count all hours worked as if they were worked on the day the shift started, or</li> <li>○ Count hours on calendar days they were actually worked</li> </ul>

<b>Topic</b>	<b><i>MDO – Normal Operations</i></b>	<b><i>MDO – Outage Conditions – Ops, HP/Chem, Fire Brigade</i></b>	<b><i>MDO – Outage Conditions – Maintenance and Quality Inspections</i></b>	<b><i>MDO – Outage Conditions – Security</i></b>	<b><i>MAWH 54-hr Alternative</i></b>
By what increments does the calculation period move?	By shift cycle	By 15-day period	Day-by-day	By 15-day period	By 7 consecutive calendar days (i.e., rolling weeks)

## 11 TRANSITIONS

### 11.1 TYPES OF TRANSITIONS

#### Note: Maintain Compliance through Transitions

#### 11.1.1 Transitions between on-line schedules

Licensees may transition individuals or crews between shift schedules by ending a shift cycle and starting a new shift cycle with a different shift schedule. The following guidance applies:



Terminating the shift cycles: Ensure that the individuals meet the MDO requirement applicable to the shift schedule that the individuals were working before it was terminated.

- In these instances, for the purpose of determining compliance with the MDO requirements, the licensee may average the individuals' work hours over a period immediately preceding the transition that is equal in length to the shift cycle the individuals were working before the transition (e.g., 6 weeks, if the shift cycle was 6 weeks in length). The licensee should then ensure that the individual meets the applicable MDO requirement for the new shift schedule going forward from the beginning of the new shift cycle. A shift cycle may be as short as 1 week. There are no MDO requirements for shift cycles less than 7 days.

#### 11.1.2 Transitions between on-line and outage schedules

The Ceiling and Break Requirements apply during the transitions. The outage MDO's only apply while in an unit outage. On line work hour controls (MDO or MAWH) take effect the first shift after the reactor unit achieves 75% reactor power or until seven calendar days have elapsed since reconnecting the reactor unit to the electrical grid whichever is shorter. For the first 42 days after an outage, (for 6 week cycles) the employee must be evaluated using the fixed shift cycle method.

#### 11.1.3 Transitions between covered groups or onto a covered shift

If an individual begins or resumes performing for the licensee any covered work during the calculation period, the licensee shall include in the calculation of the individual's work hours all work hours worked for the licensee, including hours worked performing duties that are not covered work and control the individual's work hours.

- Ceiling Limits and Break Requirements always apply.
- A minimum of 1 day off in the preceding 7-day period is acceptable for individuals to begin or resume covered duties and for individuals who have been working an 8-hour shift schedule, as either day or shift workers, and are transitioning (1) from a non-covered group to a covered group or (2) from a

covered group to another covered group that has more stringent MDO requirements.

- A minimum of 2 days off in the preceding 7-day period is acceptable for individuals who have been working a 10- or 12-hour shift schedule, as either day or shift workers, and transition (1) from a non-covered group to a covered group or (2) from a covered group to another covered group with more stringent MDO requirements.
- A minimum of 2 days off in the preceding 7-day period is acceptable for operators at a multiunit site with one or more units in an outage, if the operators have been working outage hours on 10- or 12-hour shifts before they transition to an operating unit as members of the minimum shift complement described in Section 6.1.
- There is no minimum day off requirement for transitioning from a non-covered to covered work if the previous schedule was less than 7 days in length.

See Section 22 Example 7.

NOTE: Ceiling Limits and Break Requirements apply under all circumstances when determining work hours to be worked unless waived or specifically exempted in Section 12.

NOTE: During a unit outage, the options for control of work hours for covered workers are outage MDOs or staying with on line work hours controls.

NOTE: If an individual is performing work under multiple categories, the most restrictive work hour controls apply.

#### 11.1.4 Transitioning to a planned outage using the MDO method

- Rolling shift cycles - Since the rolling evaluation method is a backwards look at days worked, online MDOs are in compliance when entering a planned outage.
- Fixed shift cycles – The working hours must be carefully managed working towards the beginning of an outage. In the last week prior to the outage, the number of days off must meet the averaged shift length on-line MDO requirement. These individuals may either need additional days off or have their working hours adjusted to meet the required MDOs for a fixed evaluation period prior to entering the planned outage.
- Schedules can also be abbreviated to cause a fraction number of weeks in the online schedule. In these cases the required number of MDOs is prorated over the abbreviated schedule. For example 30 days is 4.3 weeks. A 12-hour shift operator shift would require  $4.3 \times 2.5$  MDO/week or 11 days off to be in compliance with the rule.

#### 11.1.5 Transitioning to a planned outage using the MAWH method

No additional guidance needed.

#### **11.1.6 Transitioning from a Planned Outage to On-Line using the MDO method**

- Return to on-line work hour limitations starts a new shift cycle. As long as a worker has not exceeded the maximum number of allowed work days for the period (7-day rolling or 15 day fixed), the licensee shall be considered to be in compliance with the rule.

#### **11.1.7 Transitioning from a Planned Outage to On-Line using the MAWH method**

**See Table 11 for guidance on transitioning out of an outage**




**Table 11: Transitions Out of an Outage**

<b>Control</b>	<b>Outage</b>	<b>On Line Operations</b>
No more than 16 hrs worked in 24 hrs	Must remain in compliance through outage	Look back and roll forward without interruption—no difference across transition
No more than 26 hrs worked in 48 hrs	Must remain in compliance through outage	Look back and roll forward without interruption— no difference across transition
No more than 72 hrs worked in 7-days/168 hours	Must remain in compliance through outage	Look back and roll forward without interruption— no difference across transition
10 hour break between successive work periods	Must remain in compliance through outage	Look back and then move forward to next break without interruption— no difference across transition
34 hours break in any 9- day period	Must remain in compliance through outage	Look back and roll forward without interruption— no difference across transition
Minimum Days Off (MDO) to MDO	Must be in compliance with outage requirements throughout and at time of transition out of outage	New shift cycle starts at point of transition; no look back.
MDO during outage to Maximum Average Work Hour (MAWH) requirements during normal operations	Must be in compliance with outage requirements throughout and at time of transition out of outage	Establish fixed initial averaging period after the transition, then roll forward in 7-day increments. Continue to roll forward by 7- day increments.  If a partial week occurs, the hours worked during the partial week are not included in the MAWH calculation averaging period.
MAWH during outage to MAWH during normal operations	Must remain in compliance through outage	No difference across transition, continue to roll forward by 7-day increments, maintaining compliance throughout.

<b><i>Control</i></b>	<b><i>Outage</i></b>	<b><i>On Line Operations</i></b>
MAWH during outage to MDO during normal operations [Note: this is an unlikely sequence; it is included for completeness.]	Must be in compliance with MAWH requirements throughout and at time of transition out of outage, adjusting the last averaging period as a partial period, if necessary.	Continue to roll forward by 7- day periods to evaluate MAWH compliance until final 7-day period prior to transition is evaluated. This means for purpose of MAWH, the hours worked after transition out of outage will be evaluated until the full averaging period has been evaluated. New shift cycle for MDOs starts at point of transition; no look back.

## 12 EXCEPTIONS

IMPACTING CALCULATIONS  See Section 7 and Table 7 for specific guidance on exclusions and inclusions impacting work hour calculations

### MISCELLANEOUS INTERPRETATIONS

- Scaffolding – Erecting scaffolding is not considered a covered activity.
- Crane operations are often covered activities if part of covered work or operations dealing with safe load lifts as defined by NUREG 0612.
- Insulation – Removal of insulation is not a covered activity. However, restoration of insulation material that brings a covered SSC back into compliance with its design is covered work.

## 13 WAIVERS (26.207)

### 13.1 INTRODUCTION

There will be unforeseen circumstances that may require issuance of a waiver. The issuance of a Waiver is expected to meet a high threshold and be infrequent. Waivers are only applicable to covered workers and should not be considered a routine methodology to circumvent work hour controls.

The annual assessment evaluates the use of waivers and requires a determination of adequate staffing if multiple waivers are issued through the year.

Tables 13A and 13B are provided for reference.

### 13.2 APPLICABILITY

- a) A waiver is only permitted when necessary to mitigate or prevent a condition adverse to safety, or to maintain site security.
- b) Waivers can be issued for the work hour rules of Break Requirements, Ceiling Limits, Minimum Days Off, and the Maximum Average Work Hours limit as applicable.
- c) Each rule requires a distinct and separate Waiver although they can be processed together on one form at the discretion of the licensee's program.
- d) To the extent practicable, licensees shall rely upon the granting of waivers only to address circumstances that could not have been reasonably controlled.
- e) If the covered work authorized under a waiver is completed prior to the expected time, the specific worker under the waiver should be sent home.

### 13.3 WAIVER PROCESS

- a) The process for granting waivers includes the following distinct steps:
  1. Identification by the job supervisor that a waiver is needed.
    - Name of the individual for which a waiver is to be requested.
    - Date and time the request is initiated.
    - Limits for which a waiver is required.
    - Date and time waiver would start.
    - Duration of the waiver requested. For example, how many hours beyond 16?
    - Description of the work to be performed. This should be in adequate detail to support the supervisory (operations or security shift manager) fatigue assessment.

- Circumstances that caused the job extension.
- Identify that the waiver is required to address conditions that are adverse to security or safety. State the basis for the waiver.

NOTE: A senior site manager with requisite signature authority may substitute for the shift manager or security shift manager as applicable to the need for a waiver.

2. Review and approval by the operations shift manager or security shift manager.
  - basis for approval
  - name, signature, date, and time
3. Supervisory Fatigue Assessment

NOTE: The Fatigue Assessment shall be completed before start of waiver period and no more than 4 hours prior to the beginning of work under a waiver.

- Work history for the past 14 days as reported by the individual for whom the waiver is requested and, if the individual has worked for a licensee who is subject to Subpart I of Part 26 over the past 14 days, as documented by that licensee.
  - A statement of how the following were considered:
    - Potential for acute fatigue—time since last 10-hour break.
    - Potential for cumulative fatigue—review work history above.
    - Circadian factors-time of day and recent work cycle.
    - Observation and statements of the individual.
    - How fatigue could affect the work quality, if at all.
    - Nature of work to be performed.
  - Are controls and conditions on work required? If yes describe.
  - Name, signature, date, and time review completed.
4. Closeout. In many cases waivers are generated as a contingency for a job and not used. The information in this section is to support the periodic reviews that are required.
    - Hours actually worked, beyond limits, under this waiver.
    - Did the individual perform satisfactorily?
    - Name, signature and date of job supervisor or individual for whom waiver was granted.

#### b) Granting Waivers


- In order to grant a waiver, the licensee shall meet the following requirements:
  - Shift Manager or Security Shift Manager Approval:

- An operations shift manager determines that the waiver is necessary to mitigate or prevent a condition adverse to safety, or a security shift manager determines that the waiver is necessary to maintain site security, or a site senior-level manager with requisite signature authority makes either determination.
- Supervisory Fatigue Assessment for Waivers:
  - A supervisor assesses the individual face to face and determines that there is reasonable assurance that the individual will be able to safely and competently perform his or her duties during the additional work period for which the waiver will be granted.
  - The supervisor performing the assessment shall be trained in accordance with the requirements of §§ 26.29 and 26.203(c) and shall be qualified to direct the work to be performed by the individual.
  - If there is no supervisor on site who is qualified to direct the work, the assessment may be performed by a supervisor who is qualified to provide oversight of the work to be performed by the individual. The supervisor, if knowledgeable of the work activity, can be a second level supervisor or a manager in the chain of command.
  - See FATIGUE ASSESSEMENTS for the process to perform an assessment required for waivers.

Note: Supervisory Assessments of Fitness for Waivers differ from Fatigue Assessments Refer to Table 15-B in Section 15 Fatigue Assessment 

**Table 13-A: Waiver Process**

[See rule for details - table provides only a general summary of the rule]

<b>Sub-section</b>	<b>Waiver Requirement</b>	<b>Note</b>
26.207(a)	Licensee may grant a waiver to any work hour controls listed in Sec. 26.205(d)(1) through (d)(5) 	In cases where more than one work hour control is affected, each control must be waived explicitly
26.207(a)(1)(i)	To grant waiver, a determination must be made that the waiver is necessary to mitigate or prevent a condition adverse to safety, or necessary to maintain site security	The determination must be made by: <ul style="list-style-type: none"> <li>- an operations shift manager, for conditions adverse to safety,</li> <li>- a security shift manager, for conditions necessary to maintain site security,</li> <li>- or a site senior-level manager with requisite signature authority, for either condition</li> </ul>
26.207(a)(1)(ii)	To grant waiver, a determination must be made that there is reasonable assurance the individual <u>will be</u> able to safely and competently perform his/her duties during the additional work period under waiver	The determination must be made by a supervisor assessing the individual face to face.  The supervisor must be: <ul style="list-style-type: none"> <li>- trained under Sec. 26.29 and Sec. 26.203(c), and</li> <li>- qualified to direct the work, or if none available on site, then one qualified to provide oversight of the work</li> </ul> The assessment must address at minimum: <ul style="list-style-type: none"> <li>- potential for acute and cumulative fatigue, considering work history for at least past 14 days</li> <li>- potential for circadian degradations in alertness and performance considering time of day</li> <li>- potential for fatigue to affect risk-significant functions</li> <li>- whether controls or conditions must be established</li> </ul>
26.207(a)(2)	To extent practicable, waivers should be used only to address circumstances that could not have been reasonably controlled	Waiver is not intended for use to address inadequate staffing or work planning, or other circumstances a licensee could reasonably foresee (see FRN, March 31, 2008, p.17147)
26.207(a)(3)	Timing of face-to-face supervisory assessment must support a valid assessment of potential for worker fatigue during period of time covered by waiver	In all cases, the face-to-face assessment may not be performed more than 4 hours before beginning work under the waiver
26.203(d)(3) & 26.207(a)(4)	Licensees must document individual waivers granted	Each work hour control that is waived must be documented  The documentation must describe the basis for the waiver, including: <ul style="list-style-type: none"> <li>- a description of circumstances requiring the waiver</li> <li>- a statement of the scope of work and time period for which waiver approved</li> <li>- the bases for the determinations in 26.207(a)(1)(i) and (ii)</li> </ul>

26.203(e)(1) & 26.203(e)(2)	Include summaries of waivers granted and corrective actions taken in the Annual FFD Program Performance Report (26.717)	Provide a summary report of waivers from the previous calendar year for each nuclear power plant, as well as a summary report of corrective actions, if any, resulting from the analyses of waiver data
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**Table 13-B: Waivers and Exceptions to Work Hour Controls**

[See rule for details - table provides only a general summary of the rule]

<b>Sub-section</b>	<b>Type of Waiver or Exception</b>	<b>Relevant to Which Individuals</b>	<b>Requirements Affected</b>	<b>Implementation Details</b>
26.207(a)	Licensee waiver of work hour controls	All individuals subject to work hour controls	26.205(d)(1) through (d)(5)(i) – work hour control requirements	Waiver of requirements: Continue to count/calculate work hours; requirements are waived for specific limits as detailed in waiver
26.207(b)	NRC-evaluated force-on-force tactical exercises exception	All security personnel (not just those taking part in exercise)	26.205(d)(3) – Minimum days off  26.207(d)(7) Maximum Average Work Hours	Affects work hour calculation: May exclude shifts worked during the actual conduct of these exercises when calculating individual's number days off (as per MDO requirements, or when calculating weekly average hours worked (as per the MAWH requirements)
26.207(c)	Common defense and security exception	All security personnel	26.205, or any specified subset thereof – i.e., work hour scheduling and control requirements	Exception to work hour controls: When informed in writing by NRC, specified requirements need not be met for the duration of the period defined by NRC**
26.207(d)	Plant emergency exception	All individuals subject to work hour controls	26.205(c) and (d) – work hour scheduling and work hour controls	Exception to work hour controls: These requirements do not need to be met during declared emergencies, as defined in licensee's emergency plan**

26.205(b)(4)	Unannounced emergency preparedness exercises or drills	Individuals participating in actual conduct of exercises or drill	26.205(d) – work hour control requirements	Affects work hour calculation: Unscheduled work hours performed while participating in the actual conduct of exercises or drills may be excluded from work hour counts/calculations
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\*\*All hours worked are still accounted for and entered into the software but treated as non-covered work.

Future Text for Sequestration guidance per 207(e)

## **14 SELF DECLARATIONS (26.209)**

### **14.1 APPLICABILITY AND GENERAL PROVISIONS**

- a) It is the individual's responsibility to make a clear self-declaration of fatigue.
- b) Site procedures should clearly identify how a self-declaration is to be made and leave no room for confusion.
  - A casual statement to a supervisor or fellow employee that an individual is tired is not a self-declaration.
  - The process shall leave no confusion that a declaration was made and when it was made.
  - It should also be clear that an assessment is not needed if the supervisor agrees with the individual and provides a rest break of at least 10 hours.
- c) Any on-site individual covered by the FFD program can self-declare whether or not they are performing covered work.
- d) See Section 15.4 (b) for Self-Declaration follow-up requirements.

### **14.2 SELF-DECLARATIONS DURING EXTENDED WORK HOURS UNDER WAIVER**

- a) If an individual is performing, or being assessed for, work under a waiver of the requirements and declares that, due to fatigue, he or she is unable to safely and competently perform his or her duties, the licensee shall immediately stop the individual from performing any covered work.
  - The exception to this is if the individual is required to continue performing those duties under other requirements of the regulations, e.g., meet minimum licensed operator staffing.
  - If the subject individual must continue performing the covered work until relieved, the licensee shall immediately take action to relieve the individual.
- b) Following the self-declaration or relief from performing covered work, as applicable, the licensee:
  - May reassign the individual to duties other than covered work, but only if the results of a fatigue assessment indicate that the individual is fit to safely and competently perform those other duties.
  - Shall permit or require the individual to take a break of at least 10 hours before the individual returns to performing any covered work.

**Table 14: Self-declaration Process**

[See rule for details - table provides only a general summary of the rule]

<b>Sub-section</b>	<b>Self-declaration Requirement</b>	<b>Note</b>
26.203(b)(1)	<p>Establish written procedure to follow when an individual makes a self-declaration that he/she is not fit to safely and competently perform duties for any part of a working tour as a result of fatigue, including:</p> <ul style="list-style-type: none"> <li>• Individual's rights and responsibilities</li> </ul> <p>Requirements for controls and conditions</p> <p>Process to follow if individual disagrees with results of fatigue assessment</p>	<p>Applies to all individuals who have unescorted access to nuclear power plant protected areas -- not just the categories of workers who are subject to work hour controls</p> <p>Self-declaration must be formalized, not a simple statement of being "tired"</p>
26.209(a)	<p>Take immediate action in case of a self-declaration while the individual is performing or being assessed for work under a waiver:</p> <p>Immediately stop individual from performing duties listed in Sec. 26.4(a)</p> <p>Exception: if individual is required to perform covered duties, based on other requirements of Title 10 CFR, then immediately take action to relieve individual</p>	<p>Applies only to self-declaration by individuals performing covered work under a waiver, or being considered for work under a waiver</p>
26.211(a)(2)	<p>Conduct a fatigue assessment</p> <p>Exception: if the individual is required or permitted to take a rest break of at least 10 hours, then a fatigue assessment is not required</p>	<p>Required in response to self-declaration to supervisor that individual is not fit to safely and competently perform duties for any part of a working tour because of fatigue</p>
26.209(b)	<p>Subsequent to self-declaration:</p> <p>Individual may be reassigned to duties other than those listed in Sec. 26.4(a) if results of fatigue assessment indicate individual can safely and competently perform those other duties</p> <p>Individual must be permitted or required to take a break of at least 10 hours prior to returning to covered work</p>	<p>Applies only to self-declaration by individuals performing covered work under a waiver, or being considered for work under a waiver</p>
26.211(a)(4)	<p>Conduct follow-up fatigue assessment in cases when individual is returned to performing any duties following a break of less than 10 hours</p>	<p>Individual must be reassessed for fatigue and the need for controls and conditions must be determined before the individual can resume duties</p>

## 15 FATIGUE ASSESSMENTS (26.211)

### 15.1 INTRODUCTION

A Fatigue Assessment is an evaluation of an individual by an authorized Fatigue Assessor to make a determination regarding that individual's ability to perform any assigned duties within the scope of the fitness-for-duty program with respect to fatigue. Fatigue Assessments while similar to Supervisory Assessments of Fitness for waivers, have distinct attributes including when they will be performed, what qualifications are needed to perform a Fatigue Assessment and the requirements to not have a conflict of interest. Additional information is provided in Tables 15-A & B.

### 15.2 FATIGUE ASSESSMENT ATTRIBUTES

a) The evaluation consists of two components:

1. A review of data pertaining to fatigue contributors.
  2. A face-to-face interview.
- Employer policies typically describe the obligation on the part of the employee to be fit for duty. In the same way that drug and alcohol testing protocols provide a mechanism for measuring FFD with respect to substance abuse, the fatigue assessment protocol provides a mechanism for measuring FFD with respect to fatigue.
  - The fatigue assessment may, in some circumstances, provide the basis for subsequent actions or sanctions under the licensee's Fatigue Management or Disciplinary policies.
  - The fatigue assessment may also be a factor in determining whether or not time off for fatigue recovery is paid by the employer.
  - The fatigue assessment is often used to determine whether the individual is capable of safely and competently performing their assigned duties without degraded alertness due to fatigue.
  - There are certain restrictions on who may perform fatigue assessments.
    - The fatigue assessments must be performed by a staff member of the FFD organization or by a supervisor.
    - If the individual being assessed is a contractor/vendor, the Fatigue Assessor may be a supervisor in the affected contractor/vendor organization.

b) Fatigue Assessors

- The minimum training and examination requirements for a Fatigue Assessor are the same requirements as those described in Section 12 for all individuals who are in the FFD population. Among other FFD program topics this training addresses:

- Contributors to worker fatigue and decreased alertness in the workplace.
- Symptoms of worker fatigue.
- Indications and risk factors for common sleep disorders.
- Effective use of fatigue countermeasures.
- Licensees and contractor/vendors may require additional optional training for their Fatigue Assessors, such as that available through the National Academy for Nuclear Training electronic learning portal (NANTeL).
- See Post-Event conditions below for further restrictions on Fatigue Assessors.
- c) The licensee may not conclude that fatigue has not or will not degrade the individual's ability to safely and competently perform his or her duties solely on the basis that the individual's work hours have not exceeded any of the work hour limits or that the individual has had the minimum breaks or minimum days off, as applicable.
- d) Following a fatigue assessment, the licensee shall determine and implement the controls and conditions, if any, which are necessary to permit the individual to resume performing duties for the licensee, including the need for a break.

### **15.3 CIRCUMSTANCES REQUIRING FATIGUE ASSESSMENT**

- a) There are four circumstances or conditions under which a Fatigue Assessment is required for all personnel under general requirements of the Fitness-for-duty Program:
  - for-cause
  - self-declaration
  - post-event
  - follow-up.
- b) There is one condition that only applies for individuals who are being evaluated to perform covered work under a waiver (See Section 13 Waivers).
  - Waiver of regulatory work hour limits.

### **15.4 CONDITIONS FOR CONDUCTING FATIGUE ASSESSMENTS**

- a) For-Cause
  - A For-Cause fatigue assessment is initiated by a supervisor based on direct behavioral observation or based on credible information provided by others.
  - Observation for fatigue should not be applicable during an individual's break period.
  - The Fatigue Assessor may not be the individual who observed the condition of impaired alertness.

- The drug and alcohol testing requirements of the FFD Program may also apply in a For-Cause situation.
- If the observed condition is impaired alertness with no other behaviors or physical conditions creating a reasonable suspicion of possible substance abuse, then the drug / alcohol testing is not required.
- In this case, a fatigue assessment only may be performed or other fatigue counter measures may be taken. For example, the individual may be provided with a ten-hour break period in lieu of a fatigue assessment.
- If the affected individual is performing covered work and a break period is not provided, then a fatigue assessment is required to evaluate the individual's ability to safely and competently continue with covered work duties.
- If a break period is provided, that is less than ten hours, a follow-up fatigue assessment is required before the individual can resume covered work duties.

b) Self-Declaration


- Self-Declaration of fatigue is a provision of the Fatigue Management Program which allows individuals to formally notify supervision that they are not or may not be able to safely and competently perform their duties due to fatigue.
- This provision is not unlike similar notifications that an individual may make regarding the need to use medication and the possible resultant impact on fitness-for-duty.
- Licensee procedures must make a clear distinction between formal declarations of fatigue under the Fatigue Management Program and casual comments such as being up late, being tired, etc.
- A fatigue assessment must be conducted in response to an individual's self-declaration to his or her supervisor that he or she is not fit to safely and competently perform his or her duties for any part of a working tour because of fatigue, except if, following the self-declaration, the licensee permits or requires the individual to take a break of at least 10 hours before the individual returns to duty.

Note: Additional information regarding Self-Declaration is provided in Chapter 14.

c) Post-Event

- A Post-Event fatigue assessment is required in conjunction with drug / alcohol testing which is invoked in response to events or circumstances as described in the licensee's FFD Program (refer also to 10 CFR 26.31(c)(3)(i) through (iii)).
- The primary purpose of the fatigue assessment is to determine if worker fatigue contributed to the event.
- If the event entails an injury to the affected individual then necessary medical treatment must not be delayed in order to perform the fatigue assessment.

- In cases where the fatigue assessment is delayed by 10 or more hours, a fatigue assessment may not be useful in determining if worker fatigue contributed to the event.
- If medical treatment is not an issue and the affected individual is to remain in a work capacity without a ten-hour break period, then the fatigue assessment is needed to determine if that individual can safely and competently perform the assigned work duties without impairment due to fatigue.
- The Fatigue Assessor for a Post-Event fatigue assessment may not have:

(i) Performed or directed (on-site) the work activities during which the event occurred, 


(ii) Performed, within 24 hours before the event occurred, a fatigue assessment of the individuals who were performing or directing (on-site) the work activities during which the event occurred; and

(iii) Evaluated or approved a waiver of the limits for any of the individuals who were performing or directing (on-site) the work activities during which the event occurred, if the event occurred while such individuals were performing work under that waiver.

d) Follow-Up

- The purpose of the Follow-Up Fatigue Assessment is to determine if the individual is capable of safely and competently performing the assigned work duties without impairment due to fatigue.
- A Follow-up fatigue assessment is required in circumstances where a break period of less than ten hours is provided to an individual following a For-Cause or Self-Declaration situation.
- A Follow-up fatigue assessment is also required if a break period of less than ten hours is provided to an individual involved in an event, as described in item c, in which fatigue was confirmed or was reasonably believed to be a contributor.

e) Waiver (of regulatory work hour limits)

- A Waiver fatigue assessment  is required to evaluate the capability of an individual to safely and competently perform covered work during any work period or shift when a waiver is being used to allow the work hour limits (10 CFR 26.205) to be exceeded.
- Although a waiver applies to a plant condition (operational or security) and may involve multiple individuals over a duration multiple shifts, the fatigue assessment applies to an individual and is valid for one work period or shift for that individual.
- A separate fatigue assessment must be conducted for each individual working under the waiver.
- The face-to-face portion of the fatigue assessment must be performed within a four-hour window prior to commencing work under the waiver and must



support a reasonable conclusion regarding the potential for worker fatigue during the work period or shift covered by the fatigue assessment.

- At a minimum, the assessment must address the potential for acute and cumulative fatigue considering the individual's work history for at least the past 14 days, the potential for circadian degradations in alertness and performance considering the time of day for which the waiver will be granted, the potential for fatigue-related degradations in alertness and performance to affect risk-significant functions, and whether any controls and conditions must be established under which the individual will be permitted to perform work. This is both a real time assessment and predictive assessment of fatigue.
- The licensee should consider and establish additional fatigue counter-measures to further mitigate the potential for fatigue during the work period or shift.
- A new fatigue assessment is required for each subsequent work period or shift that the affected individual performs covered work in excess of the work hour limits as allowed by an approved waiver.
- The individual's obligation and rights to self-declare fatigue remain in effect while working under a waiver fatigue assessment.
- The Fatigue Assessor for a waiver fatigue assessment must be a supervisor who is qualified to direct the work being performed under the waiver.
  - If that supervisor is not on site, the Fatigue Assessor must be a supervisor who is at least qualified to perform oversight of the work being performed.

## 15.5 REQUIRED INFORMATION

- a) At a minimum, the fatigue assessment must address the following factors:
  - acute fatigue
  - cumulative fatigue
  - circadian variations in alertness and performance.
- b) Individuals shall provide complete and accurate information that may be required by the licensee to address the required factors.
- c) Licensees shall limit any inquiries to only the personal information from the subject individual that may be necessary to assess the required factors.
- d) Review of individual performance as applicable.

## 15.6 DOCUMENTATION

- a) Licensees shall document the results of any fatigue assessments conducted, the circumstances that necessitated the fatigue assessment, and any controls and conditions that were implemented.
- b) The licensee shall maintain on-site a summary for each nuclear power plant site of instances of fatigue assessments that were conducted during the previous calendar year for any individual identified in § 26.4(a) through (c). The summary shall include:
  - The fatigue assessment type (i.e., For-cause, Self-declaration, Post-event, Follow-up, or Waiver).
  - A statement of whether or not the individual was working on outage activities at the time of the self-declaration or condition resulting in the fatigue assessment.
  - The category of duties the individual was performing, if the individual was performing the duties described in § 26.4(a)(1) through (a)(5) at the time of the self-declaration or condition resulting in the fatigue assessment.
  - The management actions, if any, resulting from each fatigue assessment.
- c) Fatigue Assessments must be documented and an annual summary of fatigue assessments must be prepared by January 30 for all fatigue assessments performed in the prior calendar year.
- d) The Fatigue Assessment documentation and the Annual Summaries must be retained for a minimum of three years.

See Sect 17 Records Table 17 and Sect 18 Reviews Table 18 for additional information.

## 15.7 PROCESS FOR CONDUCTING FATIGUE ASSESSMENT

**NOTE:** See specific requirements in the applicable sections of this guidance to ensure all attributes of the assessment are met for the circumstance.

- a) The process for conducting a fatigue assessment includes the following steps:
  1. Identification of condition requiring a fatigue assessment:
    - Name of the individual.
    - Date and time.
    - Type of fatigue assessment
    - Narrative supporting the type of evaluation:
      - For Cause—Description of observed behavior.
      - Self-declaration—Description of current job duties, time in a duty status, and scheduled end of tour.

- Post-event—Description of the event and the individual's involvement.
  - Follow-up—Length of rest period, reason for early return, and expected duties.
  - Waiver—Description of covered work to be performed by the individual.
  - Name, date, time, signature of individual completing this section.
2. Assessment
- Work history for past 14 days as reported by the individual.
  - Work history for the past 14 days as documented by the licensee.
  - Statement that the following were considered.
    - Potential for acute fatigue—time since last 10-hour break.
    - Potential for cumulative fatigue—review work history above.
    - Determine if the individual has had the opportunity for two restorative rest periods, 34 hours off in the last 7 days.
    - Circadian factors—time of day and recent work cycle.
    - Observation and statements of the individual.
    - Nature of work to be performed.
  - Results of evaluation.
    - Individual is fit for duty—return to full work status.
    - Individual is not fit for duty due to fatigue—provide a 10-hour break.
    - Individual is returned to duties with the following restrictions (Describe the restrictions. Restrictions can include assignment to non-covered work, a nap before continuing covered work, etc.).
  - Name, date, signature of supervisor.

**Table 15-A: Fatigue Assessment Process**

[See rule for details – table provides only a general summary of the rule]

<b>Sub-section</b>	<b>Fatigue Assessment Requirement</b>	<b>Note</b>
26.203(b)(3)	Develop procedure for Fatigue Assessments	Applies to individuals performing duties listed in Sec. 26.4(a)-(c), i.e., all individuals subject to Subpart I
26.203(b)(4)	Develop procedure for disciplinary actions following a Fatigue Assessment	Must include conditions & considerations for taking those disciplinary actions
26.211(a)	Conduct Fatigue Assessment under the following conditions: - for cause - self-declaration - post-event - follow-up	For cause: in cases of an observed condition of impaired alertness, creating a reasonable suspicion, except during a break period  Self-declaration: in cases of self-declaration unless the individual is permitted or required a rest break of at least 10 hours  Post-event: in cases where post-event drug and alcohol testing is required  Follow-up: if a previous Fatigue Assessment was conducted for cause or due to a self-declaration, and if the individual is being returned to duty after a rest break of less than 10 hours; the need for controls and conditions must be assessed before permitting the individual to resume any duties
26.211(b)	Ensure persons conducting the Fatigue Assessment are trained and not subject to conflicts of interest	Fatigue Assessment must be conducted face to face  Supervisors and FFD program personnel conducting Fatigue Assessments must be trained under Sec. 26.29 and 26.203(c)  For cause and post-event: the person conducting the assessment must be free of conflicts of interest, such as having approved a waiver prior to the event; see 26.211(b)(1) & (2) for details
26.211(c)	Ensure Fatigue Assessment provides information necessary for management decisions and actions	The assessment must address: - acute and cumulative fatigue - circadian variations in alertness and performance  The inquiry must be limited to relevant information; the Individual must provide complete and accurate information
26.211(d)	Licensee may not conclude that fatigue has not or will not degrade individual's performance solely on the basis that the individual did not exceed work hour control requirements	

<b><i>Sub-section</i></b>	<b><i>Fatigue Assessment Requirement</i></b>	<b><i>Note</i></b>
26.211(e)	Determine and implement controls and conditions necessary to resume duties	Controls and conditions may include such things as: a rest break; peer-review and approval of job tasks; or assignment to job tasks that are non-repetitive (see SOC p.17153)
26.203(d)(5) & 26.211(f)	Document Fatigue Assessment results	Must document the reasons for and results of any Fatigue Assessment conducted, the circumstances, and the controls and conditions implemented
26.203(d)(5) & 26.211(g)	Prepare annual summary report	Prepare the annual summary report of Fatigue Assessments conducted for covered individuals during the previous calendar year at each NPP site; see 26.211(g)(1)-(4) for details

**Table 15-B: “Supervisory Assessment of Fitness” for Waivers vs “Fatigue Assessment”**

[See rule for details - table provides only a general summary of the rule]

Item	Supervisory Assessment of Fitness for Waivers – 26.207(a)(1)(ii)	Fatigue Assessment – 26.211
Purpose	<ul style="list-style-type: none"> <li>Assess individual for a waiver</li> </ul>	<ul style="list-style-type: none"> <li>Following these conditions: <ul style="list-style-type: none"> <li>For cause</li> <li>self-declaration</li> <li>post-event</li> <li>follow-up (before return to duty in certain specified cases)</li> </ul> </li> <li>See 26.211(a)(1)-(4) for specific details</li> </ul>
Who can perform	<ul style="list-style-type: none"> <li>Supervisor trained and qualified to direct or oversee work</li> </ul>	<ul style="list-style-type: none"> <li>Trained supervisor or trained FFD program personnel with <i>no conflict of interest</i></li> </ul>
How	<ul style="list-style-type: none"> <li>Face-to-face</li> </ul>	<ul style="list-style-type: none"> <li>Face-to-face</li> <li>Requires accurate info from worker and constrains licensee to ask only pertinent questions</li> </ul>
Timing	<ul style="list-style-type: none"> <li>Not more than 4 hours before the individual begins performing any work under the waiver</li> </ul>	<ul style="list-style-type: none"> <li>Depends on the triggering condition</li> <li>Post-event fatigue assessment must occur as soon as practical after event</li> </ul>
Scope	<ul style="list-style-type: none"> <li>Acute &amp; cumulative fatigue, circadian variations</li> <li>Whether already fatigued</li> <li>Whether <u>will be</u> fatigued by end of period waiver covers</li> </ul>	<ul style="list-style-type: none"> <li>Acute &amp; cumulative fatigue, circadian variations</li> <li>Not to be determined solely by compliance status with work hour controls</li> </ul>

## 16 TRAINING AND EXAMINATIONS

- a) Licensees shall add the following KA's to the content of the training that is required in § 26.29(a) and the comprehensive examination required in § 26.29(b):
  - Knowledge of the contributors to worker fatigue, circadian variations in alertness and performance, indications and risk factors for common sleep disorders, shift work strategies for obtaining adequate rest, and the effective use of fatigue countermeasures.
  - Ability to identify symptoms of worker fatigue and contributors to decreased alertness in the workplace.
- b) Employees and contractors of the licensee should be aware of the trustworthiness and reliability requirements for unescorted access to the protected area, the importance of being fit for duty, understand the potential consequences of working while fatigued, and work in compliance with the station FFD policy.
- c) Workers should be able to:
  - Demonstrate knowledge of the basic fatigue management requirements for workers.
  - Recognize the personal, public health, and safety hazards associated with fatigue.
  - Discuss the company fatigue management policy.
  - Discuss individual roles and responsibilities under the company fatigue management policy.
  - Demonstrate knowledge of the contributors to worker fatigue, circadian variations in alertness and performance, indications and risk factors for common sleep disorders, shift work strategies for obtaining adequate rest, and the effective use of fatigue countermeasures.
  - Demonstrate understanding of identifying symptoms of worker fatigue and contributors to decreased alertness in the workplace.
  - Demonstrate understanding of fatigue management techniques.
  - Discuss the methods used to implement the company fatigue management policy.
  - Discuss the consequences of not following the company fatigue management policy.
  - Discuss individual and company rights regarding the company fatigue management policy.
- d) Each test is to include at least one question from each KA. The rest of the test should be a random sample of questions from all the remaining KA's.

## **17 RECORDS**

- a) Licensees shall retain the following records for at least three years or until the completion of all related legal proceedings, whichever is later:
- Records of work hours for individuals who are subject to the work hour controls.
  - Records of shift schedules and shift cycles of individuals who are subject to the work hour controls.
  - The documentation of waivers including the bases for granting the waivers.
  - The documentation of work hour reviews.
  - The documentation of fatigue assessments.

Table 17 is provided for reference.



**Table 17: Documents, Reports, and Reviews Required under Subpart I**

[See rule for details - table provides only a general summary of rule]

<b>Item</b>	<b>Sub-section</b>	<b>Type of Document, Report, Review</b>	<b>Description</b>
1	26.203(a)	Policy on Fatigue Management	Written policy for the management of fatigue for all persons subject to FFD Program  Include as part of the written FFD policy required under 26.27
2	26.203(b)(1)	Procedure for Self-declaration	Written procedure describing the process to follow when an individual makes a self-declaration that he/she is not fit to safely and competently perform duties as a result of fatigue; see details in 26.203(b)(1)(ii)-(iii)
3	26.203(b)(2)	Procedure on Work Hour Controls	Written procedure describing the process for implementing work hour controls under Sec. 26.205
4	26.203(b)(3)	Procedure for Fatigue Assessments	Written procedure describing the process for conducting fatigue assessments under Sec. 26.211
5	26.203(b)(4)&26.77(b)(2)	Procedure for Disciplinary Actions	Written description of the disciplinary actions and the conditions and considerations that may be imposed following a fatigue assessment
6	26.203(c)	Additions to FFD Training Program	Addition of specific knowledge and abilities (KAs) on fatigue management to the FFD training requirements under Sec. 26.29(a); see details of KAs to be included in 26.203(c)(1)-(2)
7	26.203(c)	Additions to Comprehensive FFD Examination	Addition of specific KAs on fatigue management to the FFD comprehensive examination requirements under Sec. 26.29(b); see details of KAs in 26.203(c)(1)-(2)
8	26.203(d)(1)	Records of work hours	Records of work hours of individuals subject to Sec. 26.205 must be created and retained for 3 years or until completion of all legal proceedings
9	26.203(d)(2)	Records of shift schedules & shift cycles	Records of shift schedules & shift cycles of individuals subject to Sec. 26.205 must be created and retained for 3 years or until completion of all legal proceedings

<b>Item</b>	<b>Sub-section</b>	<b>Type of Document, Report, Review</b>	<b>Description</b>
10	26.203(d)(3) & 26.207(a)(4)	Documentation of waivers	Documentation of waivers granted under Sec. 26.207, including bases for granting the waiver, must be created
11	26.203(d)(4) & 26.205(e)(3)-(4)	Documentation of work hour reviews (effectiveness reviews)	Documentation of work hour reviews required under Section 26.205(e), including methods used, results, problems, and trends and corrective actions
12	26.203(d)(5) & 26.211(f)	Documentation of fatigue assessments	Documentation of the results of any fatigue assessment conducted, including circumstances and controls and conditions implemented
13	26.203(d)(5) & 26.211(g)	Annual Summary of Fatigue Assessments	Annual summary report of fatigue assessments conducted during the previous calendar year for any individual identified in Sec. 26.4(a)-(c); required for each NPP site; see 26.211(g)(1)-(4) for details
14	26.203(e)(1) & 26.717	Addition to Annual FFD Program Performance Report: Summary of Waivers of Work Hour Controls	A summary of waivers from the previous calendar year for each NPP site; see 26.203(e)(1)(i)-(iii) for details, included in the Annual FFD Program Performance Report
15	26.203(e)(2) & 26.717	Addition to Annual FFD Program Performance Report: Corrective Actions Summary	A summary of the corrective actions, if any, resulting from the analyses of waiver data, included in the Annual FFD Program Performance Report
16	26.203(f)	Addition to Audit process	An audit of the management of worker fatigue is part of the FFD audit requirements in Sec. 26.41
17	26.205(d)(8)	Policy and Procedure Regarding Use of MDOs and/or 54-hr Alternative	The FFD policy and procedures should state which alternative the licensee is complying with: MDO or maximum average work hour (MAWH) requirements

<b><i>Item</i></b>	<b><i>Sub-section</i></b>	<b><i>Type of Document, Report, Review</i></b>	<b><i>Description</i></b>
18	26.719	Significant FFD policy violations or programmatic failures	Violations of Subpart I or failures of a licensee's Fatigue Management Program are reported according to the procedures in 26.719 (Note that this requirement is not specifically referenced in Subpart I)

## 18 REVIEWS

Licensees shall evaluate the effectiveness of their control of work hours of individuals who are subject to this section.

### 18.1 ANNUAL WORK HOUR CONTROL EFFECTIVENESS REVIEW

- Licensees shall conduct the reviews once per calendar year.
- If any plant or security system outages or increased threat conditions occurred since the licensee completed the most recent review, the licensee shall include in the subsequent review an evaluation of the control of work hours during the outages or increased threat conditions.
- Licensees shall complete the review within 30 days of the end of the review period. The review period should be defined by the licensee.

#### 18.1.1 Content of Annual Review

- a) Review the actual work hours and performance of covered individuals during the entire review period, including any plant or security system outages or increased threat conditions, for consistency with the work hours scheduling requirement objective of preventing impairment from fatigue due to the duration, frequency, and sequencing of hours worked.
  - The review should be based on information in, but not limited to, the corrective action program.
  - At a minimum, this review should address the following:
    - When using the on-line MDO method, individuals whose actual hours worked during the review period exceeded an average of 54 hours per week in any shift cycle.
    - When using the on-line averaging method, individuals whose actual hours worked exceeded an average of 54 hours per week in any averaging period of up to 6 weeks.
    - Individuals whose actual hours worked during the review period exceeded an average of 54 hours per week in any shift cycle while the individuals' work hours were subject to the non-outage day-off requirements.
    - Individuals who were granted more than one waiver during the review period.
    - Individuals who were assessed for fatigue during the review period.
- b) If work under a waiver occurred, review the individuals' hours worked and the waivers under which work was performed to evaluate staffing adequacy for all jobs subject to the work hour controls.
- c) Review performance of the station in adhering to work schedules for covered work groups: evaluate whether or not the schedule is effectively being implemented.

- Is the schedule being adhered to?
- Are the changes understood and reasonably consistent with a properly managed schedule?
- Does the overtime utilized support efficient utilization of resources?
- Are the available resources properly aligned with the scheduled work load?
- Is unplanned work or outages indicative that other corrective actions are necessary?
- Does the level and pattern of overtime support a determination that staff size is appropriate for the schedule and work?

#### **18.1.2 Documentation and Follow-up**

- a) Document the methods used to conduct these reviews and the results of the reviews.
- b) Record, trend, and correct, under the licensee's corrective action program, any problems identified in maintaining control of work hours consistent with the specific requirements and performance objectives of the rule.

### **18.2 ANNUAL SUMMARY OF FATIGUE ASSESSMENTS**

Licensees shall prepare an annual summary for each nuclear power plant site of instances of fatigue assessments that were conducted during the previous calendar year for any individual identified in § 26.4(a) through (c). Each summary must include:

- (1) The conditions under which each fatigue assessment was conducted (i.e., self-declaration, for cause, post-event, follow-up);
- (2) A statement of whether or not the individual was working on outage activities at the time of the self-declaration or condition resulting in the fatigue assessment;
- (3) The category of duties the individual was performing, if the individual was performing the duties described in § 26.4(a)(1) through (a)(5) at the time of the self-declaration or condition resulting in the fatigue assessment; and
- (4) The management actions, if any, resulting from each fatigue assessment.

**Note:** Refer to Table 17 in Sect 17 Records for a general summary of Documents, Reports and Reviews Required under 10FCFR26 Subpart I

**Table 18: Work Hour Control Effectiveness Review Process**

[See rule for details - table provides only a general summary of the rule]

<b>Sub- section</b>	<b>Review Requirement</b>	<b>Purpose</b>	<b>Note</b>
26.205(e)	Conduct work hour control effectiveness reviews once per calendar year	Evaluate the effectiveness of control of work hours of individuals subject to the work hour control requirements	Include in the review any plant or security system outages or increased threat conditions that occurred since the last review  Review must be completed within 30 days of the end of the review period
26.205(e)(1)	Review actual work hours and performance of certain covered individuals for consistency with scheduling requirements of 26.205(c)	Review actual hours worked and worker performance to examine if licensee scheduling practices meet objective of preventing impairment from fatigue due to duration, frequency, or sequencing of shifts (26.205(c))	At minimum, review must include individuals:  (i) whose actual hours worked exceeded an average of 54 hours per week: • in any shift cycle with covered work subject to 26.205(d)(3) MDOs, or • in any averaging period up to 6 weeks (as per licensee averaging period) for covered work subject to 26.205(d)(7)  (ii) who were granted more than one waiver  (iii) who were assessed for fatigue while being considered for a waiver under 26.211 [Fatigue assessment]
26.205(e)(2)	Review individuals' hours worked and waivers under which work was performed	Evaluate staffing adequacy for all jobs subject to work hour controls	Only waivers under which work was performed must be reviewed; if waiver was granted but not utilized, it does not need to be included in the review
26.205(e)(3)	Document the methods used to conduct the review and the results of the review	Provide basis for evaluation and corrective action	
26.205(e)(4)	Record, trend, and correct, under the corrective action program, any problems identified	Address problems identified in maintaining control of work hours consistent with specific requirements as well as performance objectives of Part 26	

## **19 REPORTING**

### **19.1 ANNUAL REPORTING REQUIREMENTS**

1. Licensees shall report Fatigue Rule information in a standard format in the annual FFD program performance report required under § 26.717.
  - Reports related to fatigue management can be integrated into the overall FFD report and can be submitted electronically.
2. A summary for each nuclear power plant site of all instances during the previous calendar year in which the licensee waived the work hour controls for individuals described in section 5, Managing Fatigue and Section 6, Work Hour Controls.
  - If a waiver(s) was involved, include only those waivers under which work was performed.
  - If it was necessary to waive more than one work hour control during any single extended work period, the summary of instances shall include each of the work hour controls that were waived during the period.
  - For each category of individuals specified in § 26.4(a), the licensee shall report:
    - The number of instances in which each work hour control was waived for individuals not working on outage activities.
    - The number of instances in which each work hour control was waived for individuals working on outage activities.
    - A summary that shows the distribution of waiver use among the individuals within each category (e.g., a table that shows the number of individuals that received only one waiver during the reporting period, the number of individuals that received a total of two waivers during the reporting period, etc.).
3. A summary of corrective actions, if any, resulting from the analyses of these data, including fatigue assessments.

### **19.2 INCIDENT REPORTING REQUIREMENTS**

- a) Within a 24-hour limit, licensees are required to report significant FFD policy violations or programmatic failures under § 26.719(b).

NOTE: The requirements in § 26.719(b)(1) and (b)(2) originated in the previous FFD rule and refer to drug and alcohol issues.

The requirement at § 26.719(b)(3) addresses any intentional act that casts doubt on the integrity of the FFD program.

- b) Since no reporting requirements were specifically identified for Fatigue Management incidents, an equivalency judgment will need to be made when an incident occurs. A few examples are as follows:
- A conflict of interest when performing a fatigue assessment may reach the threshold of a significant FFD policy violation.
  - Events or a series of events which, in the judgment of management, indicate a significant systemic failure of the Fatigue Management Program, Procedures, or Policies or failure to meet key objectives related to safety.
  - A significant attempt by a supervisor to subversively violate the Fatigue Management Program.

**Note:** Refer to Table 17 in Sect 17 RECORDS for a general summary of Documents, Reports and Reviews Required under 10FCFR26 Subpart I.



## **20 AUDITS**

Licensees shall audit the management of worker fatigue as required by § 26.41.

### **20.1 CONDUCT OF AUDITS**

- a) Audits shall focus on the effectiveness of the FFD program element, Fatigue Management, and shall be conducted by individuals who are qualified in the subject(s) being audited.
- b) The individuals performing the audit of the program shall be independent from both the subject FFD program's management and from personnel who are directly responsible for implementing the FFD program.
- c) Audits shall be conducted each twenty four months in accordance with the license's audit program.

### **20.2 AUDIT RESULTS**

- a) The result of the audits, along with any recommendations, shall be documented and reported to senior corporate and site management.
- b) Each audit report shall identify conditions that are adverse to the proper performance of the FFD program, the cause of the condition(s), and, when appropriate, recommended corrective actions.
- c) The licensee or other entity shall review the audit findings and take corrective actions, including re-auditing of the deficient areas where indicated, to preclude, within reason, repetition of the condition.
- d) The resolution of the audit findings and corrective actions shall be documented.

**Note:** Refer to Table 17 in Sect 17 RECORDS for a general summary of Documents, Reports and Reviews Required under 10FCFR26 Subpart I.

## 21 PERSONNEL ACTIONS

- a) Individuals that exhibit chronic self-declaration that they are not fit for duty as a result of fatigue should be considered for referral to the employee assistance program.
- b) Individuals that exhibit chronic self-declaration that they are not fit for duty as a result of fatigue, absent a sound medical reason, may be subject to disciplinary action.
  - Personnel are required to be fit for duty and getting sufficient rest is required to ensure a person is not subject to fatigue.
  - Persons who make choices that result in less than the sleep necessary for that person to remain alert and avoid fatigue are not meeting their obligation per this rule.
- c) The refusal on the part of an individual to submit to a fatigue assessment shall subject the individual to disciplinary action and possible removal from unescorted access.
- d) Facts to be considered in assessing disciplinary action shall include the employee's job assignment, past work record, and work schedule.
- e) Personnel subject to the fatigue assessments who refuse to be assessed will be considered fatigued and unable to perform their duties. Time away from work for fatigue management recovery shall be classified as vacation, personal time (if available), or non-paid time.

## 22 EXAMPLES

### Example 1: Unescorted Access

If a non-badged contractor is brought on-site to do emergent critical specialty work on a risk-significant component, (such as a contractor who is sealing a risk-significant valve), is that contractor subject to the work hour limitations? Note that the contractor would be escorted.

**Answer:** Personnel under escort (i.e., non-badged individuals) are not subject to work hour limitations.

### Example 2: Removal of Risk-Significant Component from System

A risk significant component is removed from on-site to be refurbished or repaired. Is the work off-site on this component considered covered work?

**Answer:** No, work on a component that is off-site is not covered work. The work for removal, installation and testing the component is covered work.

### Example 3: Risk Significance Status When in Outage


Part 26 states to use 10 CFR 50.65(a)(4) for determining safety significance of systems but many items in a(4) are not safety-significant during outages. For example, auxiliary feedwater is not risk-significant during an outage. Must the work be covered during an outage?

**Answer:** The auxiliary feed water system is safety significant when the unit is operating. If an individual works on the auxiliary feed water system either during an outage or operations, the individual would be considered to be subject to the work hour controls.

### Example 4: Directing

#### Example 4A:

On Sunday morning at 0400, while running the # 1 Diesel Generator (DG), a problem develops that requires the System Engineer to return to site to provide technical assistance. The maintenance crew performing work on the #1 DG is being supervised by a first line maintenance supervisor. The system engineer provides technical information and makes recommendations to the maintenance supervisor. Is the System Engineer a covered individual?

**Answer:** The System Engineer is providing information to the supervisor of a maintenance crew. The maintenance supervisor in this case would be responsible for deciding what information is to be acted on and for directing the maintenance activities associated with the job. The system engineer is not directing and therefore not performing covered work 

**Example 4B:**

A DG system engineer is supporting a diesel generator system window by providing technical decisions in the field directly to workers who are acting on the input without subsequent review or challenge by the job supervisor. Is the system engineer directing?

**Answer:** Yes, the system engineer is directing as defined by the rule as the covered workers are taking and acting on the input provided by the engineer without subsequent review, challenge, or decision-making processing by a supervisor.

**Example 4C:**

The Reactor Engineer is required by station procedures to be present during fuel movement. The Reactor Engineer's function is to observe the fuel movement activity and provide technical recommendations to the fuel handling SRO. Is the Reactor Engineer a covered individual?

**Answer:** The Reactor Engineer is not directing, they are providing technical information and observing and therefore not conducting covered work. The fuel handling SRO would be directing and is a covered individual.

**Example 4D:**

The Reactor Engineer is required by station procedures to be present during reactor startup. The Reactor Engineer's function is to provide information to the control room supervisor on the reactivity of the reactor during the approach to criticality. Is the Reactor Engineer a covered individual?

**Answer:** The Reactor Engineer is not directing, they are providing technical information and therefore not conducting covered work. The control room supervisor would be directing and is a covered individual.

**Example 4E:**

Give clarification of what activities the supervisor is a covered employee due to directing.

**Answer:** The following tasks are examples generally considered NOT directing:

- Engineering tasks
- Supervision in the plant of the maintenance on a non-risk significant SSC
- Supervision at the second level supervision
- NOTE: Position alone should not be the deciding factor. For example a Shift Manager is a second level supervisor but, in practice and as defined in 10CFR 26.4, has the authority to direct covered activities. Careful analysis, evaluating all the criteria, should occur prior to determining applicability or exclusion.
- Conducting Work Control Center documentation activities
- Writing a work procedure

- Preparing a work or modification package
- Review by senior management of work plans
- Training of personnel during which time the trainee is not operating or performing maintenance activities
- Providing recommendations from vendors and engineers on test performance, component and system operation, or other similar technical inputs
- Review and approval of documents
- Any work that is not operations or maintenance on risk significant SSCs
- Technical Staff providing only recommendation to control room staff

### **Example 5: 34-Hour Break**

Assume that John Doe is a staff engineer in the Operations department who holds an active license. John works a nominal 8-hour day. John's normal work duties are NOT within the scope of the work hours rule. Over the last 6 weeks John has had weekends off except for the 6th week; i.e., during the 6th week (i.e., last week) John worked Monday through Friday, came in on Saturday for 4 hours to catch up on work; and also came in Sunday for 4 hours. John resumed his normal duties on Monday this week. Today, (Tuesday), John is asked to stand an 8-hour shift schedule SRO watch. Can he stand the watch since Tuesday is the 9th day in a row that John will be working?

**Answer:** No, John has not had a 34-hour break in the last 216-hour (9-day) period nor has John had a day off in the last 7 days.

### **Example 6: 34-Hour Break and MDO**

Assume that Jane Doe is a staff engineer in the Operations department who holds an active license. Jane works a nominal 8-hour day. Jane's normal work duties are NOT within the scope of the work hours rule. Over the last 6 weeks Jane has had weekends off except that Jane as a normal routine works 4 hours every Saturday morning. Jane resumed her normal duties on Monday this week. Today, (Tuesday), Jane is asked to stand a 12-hour shift schedule SRO watch. Can she stand the watch?

**Answer:** Yes, Jane has had a 34-hour break in the last 216 hours (9 days). Jane also has worked less than 72 hours in the last 168-hour (7-day) period. Jane works an 8-hour shift and a look back over the last 7 days shows that she does meet the minimum 1 day off requirement to transition to covered work.

### **Example 7: Average Shift Length MDO Requirement and Other Limits**

Assume that John Smith works in the energy delivery part of his company and sometimes is needed to perform covered work in the switchyard of the nuclear plant. He has unescorted access to the plant, but only works here occasionally when needed. The rest of the time, he works

out on the distribution system. What are the requirements for John to start performing covered work in the switchyard?

**Answer:** If John's average shift length in the preceding 7 days is 9 hours or less, he requires 1 day off in the preceding 7 days. If his average shift length is greater than 9 hours, he requires 2 days off in the preceding 7 days. In addition the following maximum work hours and minimum breaks apply prior to performing covered work:

16 work hours in the preceding 24-hour period.

26 work hours in the preceding 48-hour period.

72 work hours in the preceding 168-hour (7-day) period.

A 10-hour break between the previous work period or an 8-hour break between the previous work period when a break of less than 10 hours was necessary to accommodate a crew's scheduled transition between work schedules or shifts.

A 34-hour break in the preceding 216-hour (9-day) period.

#### **Example 8: Call-In Work Period**

An individual's normal schedule is from 0700 to 1530 (8-hour day) and the individual is called back to work at 1900 and he/she works until 2100.

- a) The separate work period method cannot be used since a 10-hour break is not available prior to the call-in period.
- b) The call-in is considered an extension of the previous work period, 0700 to 1530. The hours counted for this work period would be 14. A ten-hour break is required prior to the individual starting an additional work period; therefore, the individual could return at the normal start of their work period at 0700 the next day.
- c) A waiver to the 10-hour break between successive work periods could be performed. The hours counted for the work day would be 10.5. The individual could return at the normal start of their work period at 0700 the next day.

#### **Example 9: Call-In Work Period**

An individual's normal schedule is from 0700 to 1530 (8-hour day), and the individual is called back to work from 0200 to 0400 the next day.

- a) The call in period is considered a separate work period. The 2 hours worked for the licensee is counted. The individual had a 10-hour break prior to the start of the work period and must be given a 10-hour break following the end of the work period.
- b) The call-in is considered an extension of the succeeding work period, 0700 to 1530. The hours counted for this work period would be 13.5.
- c) A waiver should not be necessary in this example.

### **Example 10: Phone Call at Home – Incidental Duties**

An individual performs risk-significant work for 10 hours (0700 - 1700) and goes home. At 2200 he/she receives a call from work and talks for 1 hour until 2300 pm. Can he/she return to work at 0700 the next day?

**Answer:** The individual did not have a 10 hour break prior to receiving a call. The hours from 1700 through 2200 do not count with respect to calculating hours worked. The individual worked a total of 11 hours with the work period ending at 2300. However, the individual cannot return to work at 0700 the next day; he/she would not meet the 10-hour break requirement. The individual could begin work at 0900 the next day.

### **Example 11: Phone Call at Home – Incidental Duties**

If an individual is on a day off and is required to talk with licensee personnel at the plant on 3 occasions, with each call lasting 20 minutes, totaling 1 hour, can the day still be considered a day off since that one hour shall be included in the work hour total.

**Answer:** The total time spent on the phone shall be counted since it exceeds a nominal 30 minutes during a single break period; therefore, the total time spent on the telephone call must be documented as an hour worked for MAWH. The day is considered a work day for MDO purposes.

### **Example 12: Day-Off and Work at Home**

What "work-related" activities may be done at home on a day off without violating the "day off" intent? For example, may an individual read procedures, catch up on administrative tasks, or study for a license requalification exam for a number of hours and still count that day as a "day off"?

**Answer:** Activities initiated by the individual (not required by the licensee) may be performed at home on a day off and not be considered "work," e.g., studying, reading work-related material, reading email. These activities would not violate the 30 minute incidental duties requirement and would, therefore, not be counted toward the work hour total.

### **Example 13: Outage Minimum Day Off Extension**

If during the 1st 60 days, a covered worker gets a 7-day block where he works not more than 48 hours, you can extend the 60-day period by 7 days. If the worker gets 2 7-day blocks where he does not work more than 48 hours and the 2 periods do not overlap, can you extend the 60-day period by 14 days?

**Answer:** Yes, you can extend the 60-day period by 14 days. This extension can be made any time in the outage period after the less than 48-hour work week. Since this extension is calculated by a week defined as 7 days and if every week of the initial 60 days is used for the extension only 56 days (8 weeks) are available for the extension. The 48-hour allowance can

only be banked during the first 60 days of the outage and used no later than day 116 of the outage.

#### Example 14: Outage Minimum Day Off Extension

An individual has not worked for a licensee on a nuclear unit outage with work hour controls for 14 days. The individual starts work on outage day 15. Can the worker be placed under the outage work hour controls only for a period of 45 days?

**Answer:** The 60-day period is defined by the start of the outage. The worker can be placed under the outage work hour controls only for a period of 45 days. The worker may also be available for a 14-day extension if the worker did not work more than 48 hours during each of the prior weeks. A worker that was on vacation during the 14-day period would be eligible for a 14-day extension. This extension for outage work hour controls cannot be extended into non-outage periods.

#### Example 15: Forced Outage Truncating On-Line Shift Cycle

What does it look like to be in compliance if the schedule would have been in compliance should the forced outage not have occurred?

Conditions: Plant Online Week 1 (Days 1-7), Forced Outage Weeks 2-5 (Days 8-35). After Week 1, Crews adopt outage schedule, adhering to outage work hour restrictions.

# Work schedule

Plant status = Normal Operations

Typcal Schedule - Operations Crews

D = 12 hour day shift from 07:00 am to 07:00 pm

N = 12 hour night shift from 07:00 pm to 07:00 am

T = 10 hour training shift from 07:30 am to 5:30 pm

Total cycle is for a 5 crew, 35 day rotation.

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	
A		N							N	N	N						D	D	D	D			T	T	T		D	D	D			N	N	N		
B		D				N	N	N	N								N	N	N					D	D	D	D		T	T	T	T		D	D	
C		T	T	T	T		D	D	D				N	N	N	N							N	N	N					D	D	D	D			
D			D	D	D	D			T	T	T	T		D	D	D				N	N	N	N						N	N	N	N				
E			N	N	N					D	D	D	D				T	T	T	T		D	D	D	D			N	N	N	N					

Legend

Day Shift

Night Shift


Training

Legend  
Day Shift      Night Shift      Training

Days Off Per Week, Averaged Over Shift Cycle during Periods of Normal Operations (i.e., during Week 1)

- Crew A: 6
- Crew B: 3
- Crew C: 1
- Crew D: 3
- Crew E: 4



 **Answer:** The above schedule shows that the licensee was currently in compliance and would have been in compliance with the minimum days off over the remainder of the shift cycle and thus is considered in compliance with the rule when transitioning to the unplanned outage work hours. Each crew has an average of 3.4 days off per week over the 5 weeks (17 days off/5 weeks). The licensee then must meet the outage work hour requirements during the outage.

### **Example 16: Outage Activities**

Provide some actual activities that are considered outage activities.

**Answer:** Outage activities are activities associated with the outage unit and common systems including covered and non-covered tasks performed while the unit is disconnected from the electrical grid.

Examples of unit outage activities include but are not limited to the following:

- Activities included in the outage schedule
- Planning and scheduling activities
- Emergent work that impacts the outage unit
- Review and impact of activities included in the outage schedule
- Switchyard activities
- Corrective maintenance
- Elective maintenance
- Preventive maintenance
- Calibrations
- Safety tagging
- Staging of equipment and tools
- Valve lineups and verifications
- System readiness inspections
- Post maintenance testing
- Surveillance testing
- System walkdowns
- Containment mobilization and demobilization
- Refueling
- Fuel movement in the spent fuel pool
- Housekeeping walkdowns and inspections

- FME activities
- Management observations
- Operation, monitoring and alarm response of outage systems and common systems
- Operation, monitoring and alarm response of stand-alone systems required to support the outage unit such as auxiliary boiler
- Construction activities
- Scaffold installation and removal
- Temporary power installation and removal
- Decontamination activities
- Radiation protection activities
- Processing of waste water
- Outage work control and communication
- Participation in pre and post job briefs for outage tasks and common systems
- Outage unit project coordination
- Testing of component on the outage unit or common systems
- Pre and post shift turnover briefing of outage unit and common systems
- Sampling of outage unit and common systems
- Chemical addition to outage unit and common systems
- Post event investigation for outage unit and common systems
- Receipt of materials in support of the outage
- Just in time training of outage activities

#### **Example 17: Infrequent Status Checks**

After leaving site, a reactor operator who was relieved “at the controls” receives a telephone call about a component switch on the control board with a red tag that became unattached. The telephone call lasts less than 10 minutes and was before the relieved operator entered his traditional sleep period. Does this count as incidental time?

**Answer:** No, if the call was one time only of short duration and did not interrupt his sleep, then there is no impact to fatigue and can be excluded from consideration of incidental time. If the telephone call interrupted the operator’s sleep period, then the supervisor authorizing the call should consider the impact of fatigue if the operator is required to be at work the next work shift.

## 23 REFERENCES AND RESOURCES

- 10 CFR 26 Fitness For Duty Programs
- Regulatory Guide 5.73 Fatigue Management For Nuclear Power Plant Personnel
- Federal Register Notice Vol 73 Page 16966 dated March 31, 2008
- SECY 06-0244 Final Rulemaking – Part 26 Fitness for Duty Programs
- SECY 09-0183 Inclusion of QC/QV Personnel within Scope of Subpart I
- SECY 11-0028 Alternative to MDO provisions of 10CFR26 Subpart I
- NUREG CR-4248 Recommendations on Scheduling and Overtime for NPP
- NUREG-1912 Summary and Analysis of Public Comments for 10CFR Part 26 FFD Programs
- ML11189A177 Managing Personnel Fatigue at Nuclear Power Reactor Sites
- ML12320A581 Summary of Public Meeting Oct 18 2012 for Part 26 Subpart I
- EGM-09-008 Enforcement Manual Change Notice – Dispositioning Violations of NRC Requirements for Work Hour Controls Before and Immediately After a Hurricane Emergency Declaration,” dated September 24, 2009

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### **Reference Aids – Tables & Graphics**

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