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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

Reference: 10 CFR Part 26, Subpart I

This guide provides an approach to meeting 10 CFR Part 26, Subpart I requirements related to managing personnel fatigue at power reactor sites. Implementation of the drug and alcohol portion of the fitness-for-duty program are addressed in NEI 03-01, *Nuclear Power Plant Access Authorization Program* and NEI 03-04, *Guideline for Plant Access Training*.

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 things including such things as 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 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 is needed for managing and documenting hours worked.

This guide addresses a number of challenges on the level of detail needed in the program.

This guide addresses the 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 FFD is addressed in NEI 03-01 and NEI 03-04.

2 PURPOSE AND APPLICABILITY

Reference: 10 CFR Part 26.201, "Applicability"

2.1 PURPOSE

The purpose of this guide is to provide the guidance needed by licensees to have an effective program for meeting the requirements of 10 CFR Part 26 Subpart I related to managing personnel fatigue. The goal is to provide management processes, record keeping processes and monitoring tools that ensure compliance while providing guidance for flexibility for day-to-day operations.

2.2 APPLICABILITY

This guide applies to licensees who are authorized to operate a nuclear power reactor (under Sec. 50.57).

Applicability to licensees who are transitioning from new plant construction to operations will be addressed in a future revision.

This guide does not apply to decommissioned plants, not authorized to operate.

2.2.1 **Fatigue Management Program, With the Exception of Work Hour Controls**

In accordance with 10 CFR 26.4, fatigue management requirements, with exception of work hour controls, apply to:

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

Therefore, the Fatigue Management Program, with the exception of Work Hour Controls, shall be implemented by licensees who are authorized to operate a nuclear power reactor under 10 CFR 50.57, and holders of a combined license under 10 CFR part 52 after the Commission has made the finding under 10 CFR 52.103(g).

2.2.2 **Work Hour Controls for Covered Individuals**

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 on-site 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 or on-site directing 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. 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 watchperson, hereinafter referred to as security personnel.

Implementation of work hour controls for covered individuals for licensees transitioning from new construction to operations will be addressed in a future revision.

3 DEFINITIONS

Reference: 10 CFR Part 26.5

The following definitions are used in this guide.

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.

Break is defined as an 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.

Call-in means returning to the site when not normally scheduled for work.

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) means 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.

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 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 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.

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

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

Deviation means a departure from the requirements included in 10 CFR Part 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 or is ultimately responsible for the correct performance of that work activity.

Eight (8) -hour shift schedule means a schedule that averages not more than 9 hours per workday over the entire shift cycle.

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

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

Increased threat condition means an increase in 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.

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

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

Maintenance means, the following onsite maintenance activities: Modification, surveillance, post-maintenance testing, and corrective and preventive maintenance. of SSCs that a risk-informed evaluation process has shown to be significant to public health and safety

Nap or Restorative Sleep means 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 10 CFR 26, such as the nominal 12-month frequency required for FFD refresher training. 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 10 CFR 26. The next scheduled due date would be no later than the current scheduled due date plus the required frequency for completing the activity.

Protected area means an area encompassed by physical barriers and to which access is controlled.

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

Security personnel means armed security force officer, alarm station operator, response team leader, or watchperson.

Shift cycle means a series of consecutive work shifts and days off that is planned by the licensee to repeat regularly, thereby constituting a continuous shift schedule. A shift cycle cannot exceed 6 weeks for the purposes of calculating days off.

Shift turnover means only 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, and the status of ongoing activities, such as extended tests of safety systems and components.

Tactical exercise means 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.

Ten (10)-hour shift schedule means a schedule that averages more than 9 hours, but not more than 11 hours, per workday over the entire shift cycle.

Twelve (12)-hour shift schedule means a schedule that averages more than 11 hours, but not more than 12 hours, per workday over the entire shift cycle.

Unit outage means that the reactor unit is disconnected from the electrical grid.

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

- One period of shift turnover time, either at the end or beginning of the shift, but not both shall be excluded.
- 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.

NOTE: For the purposes of incidental duties, these times are cumulative. The cumulative 30 minutes is over any calendar day and impacts the break period where the 30 minute limit is exceeded.

- Incidental duties performed off-site provided the total duration of the work does not exceed a nominal 30 minutes during any single break period may be excluded.

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

- For security personnel, during periods defined in writing by the NRC when security personnel are required to work to ensure the common defense and security.

- Personal time in which an individual is on-site but is off duty (i.e., before or after his/her normally scheduled work period in which work activities are performed for the licensee) may be excluded. The individual may be reading the paper, in the on-site fitness center, eating breakfast, etc.

Work hour controls mean the regulatory requirements in 10 CFR 26.205.

4 IMPLEMENTATION

The guidance in this document shall be implemented no later than September 30, 2009.

5 POLICY AND PROCEDURES

Reference: 10 CFR Part 26.203 General Provisions

5.1 POLICY

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 § 26.27(b), FFD Policy. As related to fatigue management, the FFD policy should:

1. Address the affect of fatigue on FFD;
2. 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;
3. Describe the consequences of violating the policy;
4. Describe the responsibilities of managers, supervisors, and escorts to report FFD concerns; and
5. Describe the individual's responsibility to report FFD concerns.
6. Describes the individual's responsibility to maintain their FFD and make self-declaration if they are not fit for duty.

5.2 PROCEDURES

The licensee shall develop, implement, and maintain procedures that:

1. Describe the process to be followed when any individual covered by the FFD program makes a self-declaration that he or she is not fit to safely and competently perform his or her duties for any part of a working tour as a result of fatigue.
2. Describe the individual's and licensee's rights and responsibilities related to self-declaration.
3. Describe 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.

4. Describe the process to be followed if the individual disagrees with the results of a fatigue assessment that is required.
5. Describe the process for implementing the work hour controls required for covered individuals.
6. Describe the process to be followed in conducting fatigue assessments.
7. Describe the disciplinary actions that the licensee may impose on an individual following a fatigue assessment, and the conditions and considerations for taking those disciplinary actions.

The procedure(s) shall include the following responsibilities: [Bracketed text is filled in on a site specific basis]:

1. The [Operations Shift Manager] or a site senior level manager with requisite signature authority is responsible for:
   - Determining that a work hour waiver is necessary to mitigate or prevent a condition adverse to safety.
   - As applicable, evaluating 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 succesive shifts.

2. The [Security Shift Manager] or a site senior level manager with requisite signature authority is responsible for:
   - Determining that a waiver is necessary to maintain site security.
   - As applicable, evaluating 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 succesive shifts.

3. The [General Manager, Plant Operations] is responsible for:
   - Ensuring a review is performed at least once per year, such that the entire year is reviewed, to evaluate the effectiveness of the control of work hours, to include:
     - Evaluating 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.
     - Evaluating the performance of individuals to ensure individual work schedules prevent impairment from fatigue. This includes evaluating the duration, frequency and sequencing of the hours that are worked by each individual relative to worker performance.
     - Reviewing 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.
     - Ensuring that problems identified in the annual review are address in the corrective action program.

4. The [Supervisor or Manager] of the individual who will be issued a waiver to exceed the work hour limits or who is being assessed for fatigue is responsible for:
   - 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.
   - 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.

5. Each [Department Head] is responsible for:
   - Providing guidelines for overtime selection process, including those required by the union contract, and the fitness-for-duty 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 succesive shifts.

6. Each Requesting Supervisor is responsible for ensuring a waiver to exceed working hour limits is authorized prior to allowing an individual to exceed these limits.

7. Each Employee (licensee or contractor) is responsible for (this is inclusive of the above listed positions):
   - 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 he/she 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.

6 INDIVIDUALS SUBJECT TO FATIGUE MANAGEMENT AND WORK HOUR CONTROLS

Reference: 10 CFR Part 26.4 "FFD Program Applicability to Categories of Individuals"

6.1 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, and
- 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.

6.2 WORK HOUR CONTROLS FOR COVERED INDIVIDUALS

Work hour controls apply to only covered individuals who are granted unescorted access to nuclear power reactor protected areas. Any individual on-site 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 or on-site directing 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. 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 watchperson, hereinafter referred to as security personnel

Work hour controls do not apply to the following individuals and activities:

- Maintenance activities on systems, structure and components that are off-site.
- Quality control and quality assurance activities.
- Predictive maintenance activities that do not result in a change of condition or state of a structure, system, or component (SSC) are excluded from covered maintenance activities such as, non-destructive analysis (NDE), thermography, vibration analysis, data collection and analysis.

  Note: At times a predictive maintenance activity requires starting or stopping a piece of equipment. The worker starting or stopping the equipment would be performing covered work under the operating category; however, the predictive maintenance activity would not be considered a covered work activity.

- Contractor/vendors, who are not granted unescorted access (i.e, the individual is escorted), conducting work on a risk-significant system, structure, or component on-site
- Emergency Response Personnel who are not part of the on-site minimum shift complement.

The licensee program shall clearly define when an individual is subject to work hour controls. The Maintenance Rule, Requirements for monitoring the effectiveness of maintenance at nuclear power plants, § 50.65 (a) (4), can be considered a risk-informed evaluation process to identify SSC's that are significant to public health and safety. The licensee has the option of using risk-informed evaluation processes other than those used for compliance with the Maintenance Rule.

Example 1:

If an unbadged 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., unbadged individuals) are not subject to work hour limitations.

Example 2:

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.

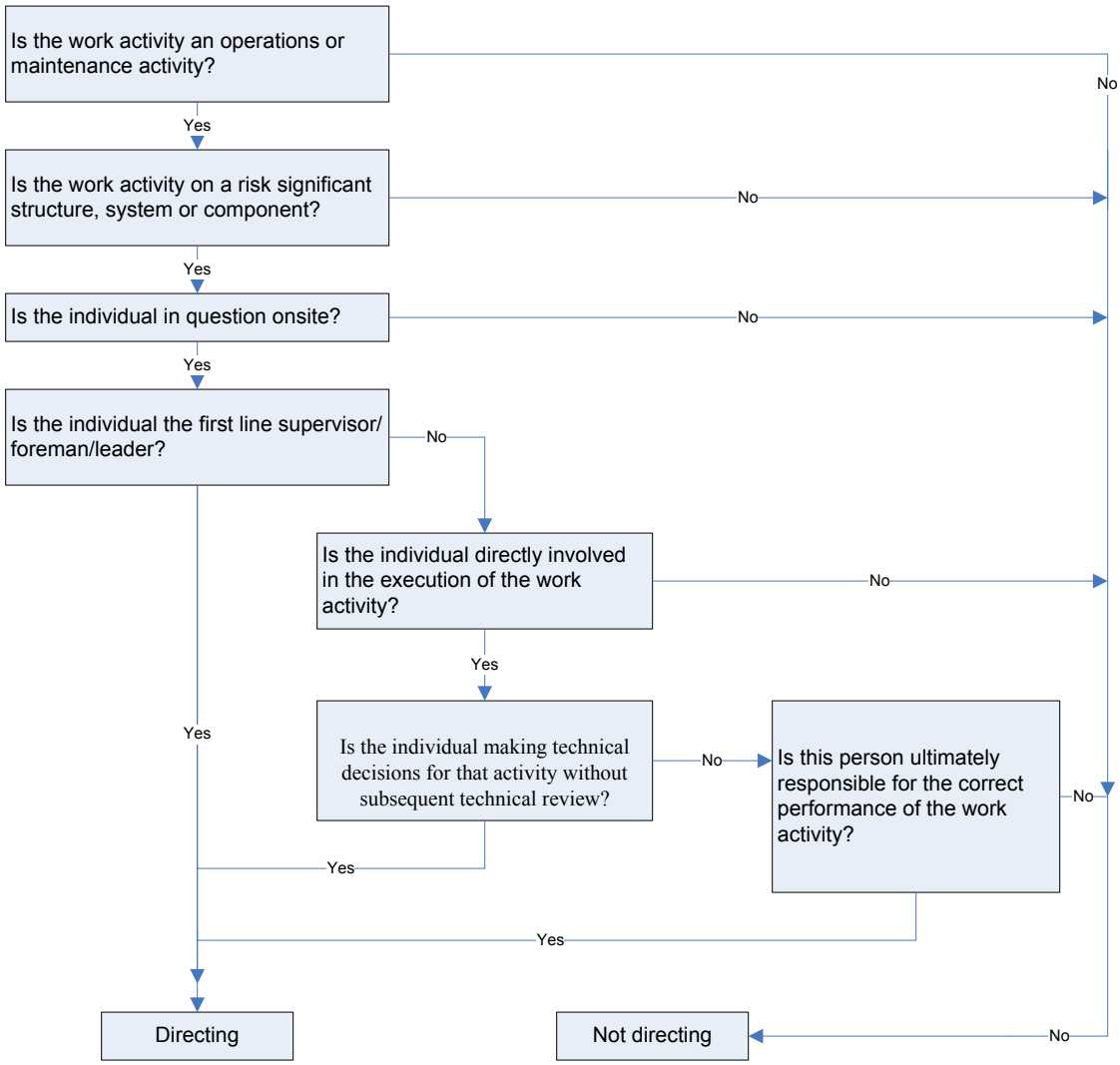
6.3 DIRECTING

For the purposes of compliance with the rule, directing only applies to operations and maintenance activities. Directing means the exercise of control over a work activity by an individual who is directly involved in the execution of the work activity or is ultimately responsible for the correct performance of that work activity.

The licensee program shall clearly define when an individual is directing and subject to work hour controls. Considerations should include all of the following when determining if an individual is directing an operation or maintenance activity:

- Is the individual on-site?
- Is the individual the first line supervisor/foreman/leader?
- Is the individual directly involved in the execution of the work activity?
- Is the individual making technical decisions for that activity without subsequent technical review?
- Is the individual ultimately responsible for the correct performance of that work activity? (For the purpose of this guide, ultimately refers to first level of leadership accountability for the performance of the task.)

(See the following flow chart.)


Is the work activity an operations or maintenance activity?
No
Yes
Is the work activity on a risk significant structure, system or component?
No
Yes
Is the individual in question onsite?
No
Yes
Is the individual the first line supervisor/ foreman/leader?
No
Is the individual directly involved in the execution of the work activity?
No
Yes
Yes
Is the individual making technical decisions for that activity without subsequent technical review?
No
Is this person ultimately responsible for the correct performance of the work activity?
No
Yes
Yes
Directing
Not directing
No

The following tasks are examples generally considered NOT directing:

- Engineering tasks
- Supervision in the plant of the maintenance on a non-covered 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, 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 1:

On Sunday morning at 0400, while running the # 1 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 2:

A diesel generator (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 3:

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 4:

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 conrol room suprvisor would be directing and is a covered individual.

7 WORK HOURS SCHEDULING

Work Hour Scheduling
Reference: 10 CFR Part 26.205(c)

This section covers the normal long range schedule used for covered individuals. 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. Licensees should have a procedure on establishing schedules.

The licensee may elect to use a rolling (maximum) 6 week period for the purposes of determining the average days off.

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 that are 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)
- 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).
- 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

Staffing levels should be sufficient so that schedules (over non-outage periods) for the covered individuals can be maintained based on vacation and emergent training demand without relying on excessive work hours. It is expected and allowed that normal variation in the vacation demand and training demand may occasionally require additional work hours to be used. Management is responsible for understanding the total vacation, training, and work loads, and for maintaining sufficient staff to get the work done. Normal variation in the vacation demand, training demand, and emergent or extraordinary work demands may occasionally require additional work hours to be used. Section 15, Reviews, addresses an annual performance based assessment of the work schedule.

7.1 PERIODIC OVERTIME

Periodically, workers and supervisors will need to work overtime to meet station needs. Periodic Overtime is considered to be when overtime is scheduled for more then two days in a work week for more than a few weeks. Incidental overtime is overtime required on a non-periodic basis to meet emergent station needs. Periodic overtime should be evaluated for a shift duration change. Incidental overtime does not to be evaluated for a shift duration change since it is required on a non-periodic basis to meet emergent station needs. This differentiation is drawn to reduce the burden on licensees to track each hour worked to determine if a shift duration change has occurred.

When scheduling periodic overtime, a determination of average hours worked during the shift over the current shift cycle will need to be performed to detect a change in shift schedule. A change in schedule will be deemed to have occurred if the average hours worked by an individual differs from the definition of the shift duration to which the individual is assigned. The applicable minimum days off requirement will be determined by comparing the average shift duration to the shift duration definitions.

7.2 TRANSITIONS BETWEEN SCHEDULES

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 shifts 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, and so forth.

7.3 TRANSITIONING ONTO A SHIFT

Individuals may be non-shift workers, but will occasionally be assigned shift duties. One example is non-shift SROs that will stand proficiency watches. Another situation where the individual joins the shift after the shift cycle has started. These individuals may not have been doing covered work prior to joining the 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 in accordance with the following requirements:

> Except as permitted by waivers and exceptions, licensees shall ensure that any individual's work hours do not exceed the following limits:
>
> 16 work hours in any 24-hour period
>
> 26 work hours in any 48-hour period
>
> 72 work hours in any 7-day period

Except as permitted by waivers and exceptions, licensees shall ensure that individuals have the following breaks and minimum days off:

> A 10-hour break between successive work periods, or an 8-hour break between successive work periods when a break of less than 10 hours is necessary to accommodate a crew's scheduled transition between work schedules or shifts.
>
> A 34-hour break in any 9-calendar day period.
>
> If the individual joins a shift after the start of a shift cycle, they shall meet the minimum days off requirement going forward and they shall meet the minimum days off requirement for the shift they have transitioned from.

Example 1:

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 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 9-calendar day period.

Example 2:

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 an SRO watch. Can she stand the watch?

Answer: Yes, Jane has had a 34 hour break in the last 9 days. 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.

7.4 TRANSITIONING BETWEEN COVERED GROUPS OR INTO A COVERED GROUP

If an 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 covered and control the individual's work hours under the requirements of their covered work group. The individual shall have had a minimum of 1 day off in the last 7 days prior to beginning or resuming covered work.

A covered individual that is in one covered group may transition to another covered group. The individual shall meet the work hours requirement for the group they are in at that time. When the individual transitions to another covered group, they shall meet the Minimum days off requirements for the group from the time they enter the new group going forward and a look back for the new group is not required

Example: An individual is qualified as both a maintenance worker and a security officer. During the first two weeks of the outage, the individual conducts covered maintenance work. At the beginning of the third week, the individual conducts covered work as a security officer. What are the days off requirements for this individual?

Answer: The individual must have one day off per week for the first 2 weeks. The individual changes work groups at the beginning of the third week, at this point forward the individual must have 4 days off in the next 15 days.

7.5 UNEXPECTED OUTAGES

Unexpected outages can impact the licensee's ability to demonstrate compliance with the normal operations day off requirements. Average days off are applicable during non-outage periods. During an outage, days off are required on a day (e.g., 1 day off per week for maintenance workers and 3 or 4 days off every non-rolling 15 day period for the remainder of the covered individuals) basis and not on an average basis. 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 average days off.

Example: 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	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			
E		N	N	N					D	D	D	D			T	T	T	T		D	D	D				N	N	N	N						

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

The above schedule show that the licensee was currently in compliance and would have been in compliance with the average days off over the remainder of the shift cycle and thus is considered in compliance with the rule when transitioning to the outage work hours. The licensee shall meet the outage work hour requirements during the outage.

7.6 RESET FROM DEVIATIONS

Deviations from the requirements from the rule may occur as the result of administrative errors or unforeseen circumstances and may constitute violations of rule requirements. A person is considered "reset" from a deviation, whether under a waiver or otherwise, when they are less than the minimum hour requirements16/24, 26/48, 72/7, have had at least 10 hours off since last at work, and actions are in place to ensure they will meet the minimum days off requirement for their current shift cycle or outage window (7 days or 15 days). The corrective action program shall be utilized to document deviations from the rule requirements

8 MANAGING HOURS WORKED

Reference: 10 CFR Part 26.205(b)

This section addresses what the expectations are relative to the work hour limits and what records are needed to document compliance. Management and covered individuals should be equally responsible for properly managing work hours.

8.1 CALCULATING HOURS WORKED

The concepts for this section are:

- Work hour limits and the associated calculation and tracking of work hours apply to the individuals who perform covered work.
- 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.
- Work hour records should show the number of hours worked each calendar day. Work period start and stop times should be recorded and documented in a consistent manner.

The licensee shall calculate the work hours of covered individuals subject to this section as the amount of time the individuals perform duties for the licensee. The calculated work hours shall include all time performing duties for the licensee, including all within-shift break times and rest periods during which there are no reasonable opportunities or accommodations appropriate for restorative sleep.

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); and
- Holdovers for interviews needed for event investigations.

For the purposes of calculating the average number of days off, the duration of the shift cycle shall not exceed 6 weeks and may be of a shorter duration.

To ensure an individual's work hour limits are not exceeded, the following guidance should be used:

(a) 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.

(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-7days)" (i.e., a backwards look at the number of hours that have or will have been worked based on a time in the future.)

(c) 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 5 weeks and determine if the extra hours worked in the next 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).

(d) The period is not re-zeroed, or the "clock reset" following a day off or after obtaining authorization to exceed the limits.

For example, if an individual who normally works a 12-hour shift schedule is requested to work additional hours from 0700 to 1900 on Friday, the following should be considered prior to working the additional hours.

- To determine if more than 16 hours in any 24-hour period will be exceeded, review all hours worked during the 24-hour period prior to the stop time on Friday as reflected in the request to work additional hours. .

- To determine if more than 26 hours in any 48-hour period will be exceeded, review all hours worked during the 48-hour period prior to the stop time on Friday as reflected in the request to work additional hours. .

- To determine if more than 72 hours in any 7-day period will be exceeded, review all hours worked during the 7-day period prior to the stop time on Friday (i.e., T-168 hours) as reflected in the request to work additional hours.

- To determine if a 10-hour break has been taken, review the break period(s) between the last day of work before Friday and 0700 on Friday. .

- To determine if a break of at least 34 consecutive hours has been taken, review the break period(s) during the last 9 days prior to the stop time on Friday. .

- To determine if the minimum days off requirement for the current shift cycle is impacted.

Within-Shift Breaks and Rest Periods

(a) Only that portion of a break or rest period during which there is a reasonable opportunity and accommodation for restorative sleep (e.g., a nap of at least 30 minutes) may be excluded.

(b) Time spent at lunch, although non-productive work may not be excluded from the work hour calculations.

(c) Any other break time allowed during the scheduled work day that does not allow opportunity or accommodations for restorative sleep (e.g., a nap) is included in the work hour calculation.

Paid Time Not Included in the Work Hour Calculations

(a) Pay for hours not worked – Only actual hours worked are included in the work hour calculations. Examples of paid hours not worked follow:

- 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.

(c) 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.

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.

(a) 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.

(b) 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.

(c) 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.

Example 1:

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 as a 10 hour break is not available prior to the call-in period.

(b) The call-in is consider 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 2:

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 consider 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.

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 an 7-hour, 9-hour, or 11 hour day.

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 day (i.e., the additional hour does not have to be included in the work hour calculations).

Non-Outage and Outage Days

(a) A non-outage day for a shift is a day when the unit is not in an outage when the shift starts.

(b) An outage day for a shift is a day when the unit is in an outage when the shift starts.

For example if Crew "A" works from 0700 to 1900 on Friday and the outage starts at 1800 on Friday, Crew "A" is working a non-outage day. When Crew "B" comes in at 1900 on Friday, Crew "B" is working an outage day.

The licensee may exclude in the calculation of work hours the following as discussed below:

- Shift Turnover

- Within-shift break and rest periods during which there is a reasonable opportunity and accommodations for restorative sleep (e.g. a nap)
- Unannounced emergency preparedness exercises and drills
- Incidental duties performed off-site.

Shift turnover

Licensees may exclude either oncoming or off going shift turnover, but not both, from the calculation of an individual's work hours. Shift turnover includes only 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, and the status of ongoing activities, such as extended tests of safety systems and components. Turnovers for supervisors may be more extensive than for workers and will therefore may be longer. Licensees may not exclude work hours worked during turnovers between individuals within a shift period due to rotations or relief within a shift. Activities that licensees may not exclude from work hours calculations also include, but are not limited to, shift holdovers to cover for late arrivals of incoming shift members; early arrivals of individuals for meetings, training, or pre-shift briefings for special evolutions; and holdovers for interviews needed for event investigations.

Within-shift break and rest periods

Licensees may exclude from the calculation of an individual's work hours only that portion of a break or rest period during which there is a reasonable opportunity and accommodations for restorative sleep (e.g., a nap).

Unannounced emergency preparedness exercises and drills

Licensees may exclude from the calculation of an individual's work hours, including days off, the time the individual works unscheduled work hours for the purpose of participating in the actual conduct of an unannounced emergency preparedness exercise or drill.

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 hours calculations. As with any academic setting and curriculum, after hours study time varies from individual to individual. Appropriate after hours study time compliments the utility provided training to ensure the learning process occurs and optimal information retention is achieved.

When considering work hour 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.

Example 1:

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 receving the 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 2:

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 that 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. The day is considered a work day.

Example 3:

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.

8.2 WORK HOUR CONTROLS DURING NON-OUTAGE PERIODS

During non-outage periods, licensees shall control the work hours of covered individuals as follows:

1. Except as permitted by waivers and exceptions, licensees shall ensure that any individual's work hours do not exceed the following limits:

    a. 16 work hours in any 24-hour period

    b. 26 work hours in any 48-hour period

    c. 72 work hours in any 7-day period

2. Licensees shall ensure that individuals have, at a minimum, the rest breaks specified below. A break is defined as an 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. Except as permitted by waivers and exceptions, licensees shall ensure that individuals have, at a minimum:

a. A 10-hour break between successive work periods, or an 8-hour break between successive work periods when a break of less than 10 hours is necessary to accommodate a crew's scheduled transition between work schedules or shifts.

b. A 34-hour break in any 9-calendar day period.

3. Licensees shall ensure that individuals have, at a minimum, the number of days off specified below. For the purposes of breaks, a day off is defined as a calendar day in which an individual does not start a work shift. For the purposes of calculating the average number of days off, the duration of the shift cycle may not exceed 6 weeks.

Covered Individual	**8- hour shift Days off***	**10- hour shift Days off***	**12- hour shift Days off***
Maintenance	1 day off per week	2 days off per week	2 days off per week
Operations, HP, Chemistry, Fire Brigade	1 day off per week	2 days off per week	2.5 days off per week
Security	1 day off per week	2 days off per week	3 days off per week

***Averaged over a shift cycle**

8.3 WORK HOUR CONTROLS DURING OUTAGES, SECURITY SYSTEM OUTAGES, OR INCREASED THREAT CONDITIONS

Transitioning Into/Out of an Outage, Security System Outages, or Increased Threat Conditions

When entering an outage, security system outage, or increased threat condition, 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 average days off.

The following options for managing the transition into or out of an outage can be used:

- Using shift cycles of less than six weeks in length;
- Changing shift duration;
- Using a rolling 6-week average.
- A new shift cycle can be used at the completion of an outage.

Licensee employees may go from an outage at one site to an outage at another site. When a licensee employee works for one 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, licensees should determine that the individual has had a 34 hour break period and that the individual has not exceed the following limits:

1. 16 work hours in any 24-hour period

2. 26 work hours in any 48-hour period

3. 72 work hours in any 7-day period.

Workers Eligible to Work Outage Hours

10 CFR 26 Subpart I defines outages as the reactor unit is disconnected from the electrical grid. Also, 10 CFR 26 Subpart I uses the term "working on outage activities." However, 10 CFR 26 Subpart I does not define the term "working on outage activities." Thus, this section provides a description for outage activities.

10 CFR 26 Subpart I has different days off requirements during outage periods than during normal (online) operations. The differing requirements acknowledge the unique and temporary nature of outage activities while requiring hour limitations and work day breaks. While there are many considerations that need to be evaluated when determining who the outage work hour restrictions apply, the determination must takes into consideration the safety of the operating unit and the unit in the outage.

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

Workers that are eligible to work outage hours shall meet the following criteria:

- covered workers at single sites working on outage activities are eligible
- covered workers at multi unit sites with one unit in an outage that are working on outage activities are eligible
- covered workers at multi unit sites that work on both outage activities and operating unit activities are eligible, if they work a nominal 25% or more on outage activities
- covered workers, due to Emergency Response Organization, Fire Brigade, or Security duties, at a multi unit sites with a unit in an outage are eligible

Covered workers working only on the operating unit are not eligible for outage work hour restrictions.

Eligibility should be established on an individual or defined group basis. Eligibility should be evaluated each 15 days for each individual or defined group during the outage.

Return to normal work hour limitations starts a new shift cycle. 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 average days off.

Following are examples of Covered Workers that may be affected by outage work hour limitations:

Example 1 – A maintenance or operations worker at a multi-unit site that has responsibilities for outage activities. These workers are eligible for outage work hour limitations.

Example 2 – A Maintenance worker at a multi-unit site that performs tasks exclusive to the operating unit not including common systems. This maintenance worker is not eligible for outage work hour limitations.

Example 3 – A Maintenance worker at a multi-unit site with responsibilities for activities on the operating unit, outage unit and common systems. This maintenance worker is eligible for outage work hour limitations if they are assigned outage unit and common system activies for a nominal 25% or more of their time.

Example 4 – An operator at a multi-unit site with responsibilities for activities on the operating unit, outage unit, and common systems. This operator is eligible for outage work hour limitations if they are assigned outage unit and common system activies for a nominal 25% or more of their time.

Example 5 – A system engineer reassigned as a temporary maintenance supervisor providing direct oversight and decision making to a maintenance crew. This engineer is eligible for outage work hour limitations.

Example 6 - A Chemistry or Radiation Protection worker at a multi-unit site with ERO responsibilities assigned activities for the site. This chemistry worker is eligible for outage work hour limitations.

Example 7 – The fire brigade leader assigned activities for the site is eligible for outage work hour limitations.

Example 8 – Security personnel assigned activities for the site is eligible for outage work hour limitations.

Example 9 – An operator at a multi-unit site that alternates between the outage unit and the operating unit. This operator is eligible for outage work hour limitations if they are assigned to the outage unit for a nominal 25% or more of their time...

Control of Work Hour during an Outage, Security System Outages, or Increased Threat Conditions

During an outage, licensees shall control the work hours of covered individuals who are considered outage workers as follows:

1. Except as permitted by waivers and exceptions, licensees shall ensure that any individual's work hours do not exceed the following limits:

    a. 16 work hours in any 24-hour period

    b. 26 work hours in any 48-hour period

    c. 72 work hours in any 7-day period

2. Licensees shall ensure that individuals have, at a minimum, the rest breaks specified below. A break is defined as an 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. Except as permitted by waivers and exceptions, licensees shall ensure that individuals have, at a minimum,

    a. A 10-hour break between successive work periods, or an 8-hour break between successive work periods when a break of less than 10 hours is necessary to accommodate a crew's scheduled transition between work schedules or shifts.

    b. A 34-hour break in any 9-calendar day period.

3. During the first 60 days of a unit outage licensees shall ensure that individuals have, at a minimum, the number of days off specified below. For the purposes of breaks, a day off is defined as a calendar day in which an individual does not start a work shift.

Covered Individual	**8- hour shift Days off***	**10- hour shift Days off**	**12- hour shift Days off**
Maintenance	1 day off per week	1 day off per week	1 day off per week
Operations, HP, Chemistry, Fire Brigade	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
Security	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

*The Licensee has the alternative of leaving workers on normal work hour restrictions during outage periods.

For an 8-hour shift, the non-outage minimum days off requirements are less restrictive than the outage minimum days off requirements. The following table shows the minimum days off requirements allowable during an outage using the operating hours for the 8-hour shift:

Covered Individual	**8- hour shift Days off**	**10- hour shift Days off**	**12- hour shift Days off**
Maintenance	1 day off per week	1 day off per week	1 day off per week
Operations, HP, Chemistry, Fire Brigade	1 day off per week	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
Security	1 day off per week	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. The 60-day periods may be extended for each individual 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, as applicable.

5. Contractor/vendors are responsible for tracking and reporting their hours between outages.

Example:

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 anytime in the outage period after the less than 48 hour work week.

Example:

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.

9 WAIVERS

Reference: 10 CFR Part 26.207

Waivers" are only applicable to covered workers.

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
2. Review and approval by the operations shift manager or security shift manager.
    - Basis for approval
    - Name, signature, date, and time
3. Supervisory assessment (Note: Shall be completed before start of waiver period.)
    - Work history for past 14 days as reported by the individual for whom the waiver is requested.
    - 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.

Granting Waivers
Licensees may grant a waiver of the work hour controls as follows:

In order to grant a waiver, the licensee shall meet the following requirements:

1. 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.
2. 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 oversee the work to be performed by the individual.
3. If there is no supervisor on site who is qualified to oversee 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 can be a second level supervisor or a manager in the chain of command.
4. 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.

To the extent practicable, licensees shall rely upon the granting of waivers only to address circumstances that could not have been reasonably controlled.

Licensees shall ensure that the timing of the required face-to-face supervisory assessment supports a valid assessment of the potential for worker fatigue during the time the individual will be performing work under the waiver. Licensees may not perform the face-to-face assessment more than four hours before the individual begins performing any work under the waiver.

Licensees shall document the bases for individual waivers. The documented basis for a waiver must include a description of the circumstances that necessitate the waiver, a statement of the scope of work and time period for which the waiver is approved, and the bases for the required determinations.

10 PERSONNEL ACTIONS

Reference: 10 CFR Part 26.203(b)(4)

Procedures describing disciplinary actions related to fatigue shall address the employee's right to self-declaration that they are not fit for duty as a result of fatigue.

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.

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.

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.

Facts to be considered in assessing disciplinary action shall include the employee's job assignment , past work record., and work schedule.

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.

11 EXCEPTIONS

Reference: 10 CFR Part 26.207

The licensee may use the following exceptions to work hour controls:

Force-on-force tactical exercises

For the purposes of compliance with the minimum day off requirements, 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.

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.

Plant emergencies

Licensees need not meet work hour scheduling and work hour controls requirements during declared emergencies, as defined in the licensee's emergency plan.

12 FATIGUE ASSESSMENTS

Reference: 10 CFR Part 26.211

12.1 CONDITIONS FOR CONDUCTING FATIGUE ASSESSMENTS

Licensees shall ensure that fatigue assessments are conducted for all individuals in the FFD Program under the following conditions:

a. For-cause. In addition to any other test or determination of fitness that may be required, a fatigue assessment must be conducted in response to an observed condition of impaired individual alertness creating a reasonable suspicion that an individual is not fit to safely and competently perform his or her duties, except if the condition is observed during an individual's break period. If the observed condition is impaired alertness with no other behaviors or physical conditions creating a reasonable suspicion of possible substance abuse, then the licensee need only conduct a fatigue assessment. If the licensee has reason to believe that the observed condition is not due to fatigue, the licensee need not conduct a fatigue assessment.

b. Self-declaration. 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;

c. Post-event. A fatigue assessment must be conducted in response to events requiring post-event drug and alcohol testing. Licensees may not delay necessary medical treatment in order to conduct a fatigue assessment; and

d. Follow-up. If a fatigue assessment was conducted for cause or in response to a self-declaration, and the licensee returns the individual to duty following a break of less than 10 hours in duration, the licensee shall reassess the individual for fatigue as well as the need to implement controls and conditions before permitting the individual to resume performing any duties. If no break occurs, only one assessment is required.

12.2 INDIVIDUALS CONDUCTING FATIGUE ASSESSMENTS

EITHER A SUPERVISOR OR A STAFF MEMBER OF THE FFD PROGRAM, WHO IS TRAINED, SHALL CONDUCT THE FATIGUE ASSESSMENT FACE TO FACE WITH THE INDIVIDUAL WHOSE ALERTNESS MAY BE IMPAIRED.

a. In the case of a fatigue assessment conducted for cause, the individual who observed the condition of impaired alertness may not conduct the fatigue assessment.

b. In the case of a post-event fatigue assessment, the individual who conducts the 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.

12.3 REQUIRED INFORMATION

A fatigue assessment must provide the information necessary for management decisions and actions in response to the circumstance that initiated the assessment.

a. At a minimum, the fatigue assessment must address the following factors:

   (i) Acute fatigue;

   (ii) Cumulative fatigue; and

   (iii) 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. Licensees shall limit any inquiries to only the personal information from the subject individual that may be necessary to assess the required factors

c. Review of individual performance as applicable.

12.4 ASSESSMENT AND ACTIONS

a. 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.

b. 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.

12.5 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 conditions under which each fatigue assessment was conducted (i.e., self-declaration, for cause, post-event, followup).

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.

12.6 ASSESSMENT PROCESS

A fatigue assessment is evaluating an individual's ability to perform any assigned duties within the scope of the fitness-for-duty rule. It is not limited to covered individuals.

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 evaluation: For-Cause, Self-declaration, Post-event, Follow-up
    - 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—describe the event and the individuals involvement.
    - Follow-up—length of rest period, reason for early return, and expected duties
    - 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.

13 SELF-DECLARATIONS

Reference: 10 CFR Part 26.209

It is the individual's responsibility to make a clear self-declaration of fatigue. 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.

Any individual covered by the FFD program can self declare.

Self-declarations during extended work hours.

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, except 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. 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.

14 TRAINING AND EXAMINATION

Reference: 10 CFR Part 26.203(c)

Licensees shall add the following KAs 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, shiftwork 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.

This section defines the level of training to meet the requirements of 10 CFR 26 Subpart I.

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.

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, shiftwork 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.

15 REVIEWS

Reference: 10 CFR Part 26.205(e)

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

Licensees shall:

1. Review the actual work hours and worker performance of covered individuals for consistency with work hours scheduling requirement objective of preventing impairment from fatigue due to duration, frequency, and sequencing of hours worked. The review should be based on information associated with fatigue including but not limited to the corrective action program. At a minimum, this review should address:

    a. 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 are subject to the non-outage days off requirements.

    b. Individuals who were granted more than one waiver during the review period.

    c. Individuals who were assessed for fatigue during the review period.

2. Review individuals' hours worked and the waivers under which work was performed to evaluate staffing adequacy for all jobs subject to the work hour controls.

3. Review performance of the station in adhering to work schedules for covered work groups: evaluate whether or not the schedule is effectively being implemented.

    a. Is the schedule being adhered to?

    b. Are the changes understood and reasonably consistent with a properly managed schedule?

    c. Does the overtime utilized support efficient utilization of resources?

    d. Are the available resources properly aligned with the scheduled work load?

    e. Is unplanned work or outages indicative that other corrective actions are necessary?

f. Does the level and pattern of overtime support a determination that staff size is appropriate for the schedule and work

4. Document the methods used to conduct these reviews and the results of the reviews.

5. Review worker job performance documented in the Corrective Action Program (e.g. error rates or other human performance measures) with regard to the effects of the duration, frequency and sequencing of the work hours.

6. 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.

16 RECORDS

Reference: 10 CFR Part 26.203(d)

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

17 REPORTING

Reference: 10 CFR Part 26.203(e)

Licensees shall include the following information in a standard format in the annual FFD program performance report required under § 26.717:

> 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 specified in § 26.205(d)(1) through (d)(4) for individuals described in § 26.4(a). The summary shall 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:
>
> a. The number of instances in which each work hour control specified in § 26.205(d)(1)(i) through (d)(1)(iii), (d)(2)(i) and (d)(2)(ii), and (d)(3)(i) through (d)(3)(v) was waived for individuals not working on outage activities.
>
> b. The number of instances in which each work hour control specified in § 26.205(d)(1)(i) through (d)(1)(iii), (d)(2)(i) and (d)(2)(ii), (d)(3)(i) through (d)(3)(v), and (d)(4) and (d)(5)(i) was waived for individuals working on outage activities.
>
> c. A summary that shows the distribution of waiver use among the individuals within each category of individuals identified in § 26.4(a) (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.).
>
> d. A summary of corrective actions, if any, resulting from the analyses of these data, including fatigue assessments.

Reports related to fatigue management can be integrated into the overall FFD report and can be submitted electronically.

18 AUDITS

Reference: 10 CFR Part 26.203(f)

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

Conduct of audits. 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. 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.

Audit results. The result of the audits, along with any recommendations, shall be documented and reported to senior corporate and site management. 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. 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. The resolution of the audit findings and corrective actions shall be documented.

Timing of Audits. Audits shall be conducted each twenty four months in accordance with the license's audit program.