



# DRAFT REGULATORY GUIDE

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## DRAFT REGULATORY GUIDE DG-5026 (Proposed new Regulatory Guide)

### FATIGUE MANAGEMENT FOR NUCLEAR POWER PLANT PERSONNEL

#### A. INTRODUCTION

This guide describes a method that the staff of the U.S. Nuclear Regulatory Commission (NRC) considers acceptable for complying with the Commission's regulations for managing personnel fatigue at nuclear power plants.

The regulations established by the NRC in Title 10, Part 26, "Fitness for Duty Programs," of the *Code of Federal Regulations* (10 CFR Part 26) (Ref. 1) establish requirements for ensuring that personnel are fit to safely and competently perform their duties. Subpart I, "Managing Fatigue," of 10 CFR Part 26 establishes requirements for managing personnel fatigue at nuclear power plants. The regulations in Subpart I provide a comprehensive and integrated approach to fatigue management, taking into account the multiple causes and effects of worker fatigue. The Commission recognizes that the potential for excessive fatigue is not solely based on extensive work hours but also on other causal factors, such as stressful working conditions, sleep disorders, accumulation of sleep debt, and the disruptions of circadian rhythms associated with shift work. The requirements of the rule reflect these considerations to ensure that licensees effectively manage worker fatigue and provide reasonable assurance that workers are able to safely and competently perform their duties.

The requirements of Subpart I of 10 CFR Part 26 are organized in six sections as follows:

- (1) 10 CFR 26.201, "Applicability," specifies that the requirements of Subpart I apply to licensees authorized to operate a nuclear power reactor under 10 CFR 50.57, "Issuance of Operating License," and holders of a combined license after the Commission has made the finding under 10 CFR 52.103(g), before the receipt of special nuclear material in the form of fuel assemblies. In addition, Subpart I would apply to certain combined license holders and applicants, as well as,

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This regulatory guide is being issued in draft form to involve the public in the early stages of the development of a regulatory position in this area. It has not received final staff review or approval and does not represent an official NRC final staff position.

Public comments are being solicited on this draft guide (including any implementation schedule) and its associated regulatory analysis or value/impact statement. Comments should be accompanied by appropriate supporting data. Written comments may be submitted to the Rulemaking, Directives, and Editing Branch, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001; emailed to [nrcprep@resource.nrc.gov](mailto:nrcprep@resource.nrc.gov); submitted through the NRC's interactive rulemaking Web page at <http://www.nrc.gov>; faxed to (301) 415-5144; or hand-delivered to Rulemaking, Directives, and Editing Branch, Office of Administration, US NRC, 11555 Rockville Pike, Rockville, MD 20852, between 7:30 a.m. and 4:15 p.m. on Federal workdays. Copies of comments received may be examined at the NRC's Public Document Room, 11555 Rockville Pike, Rockville, MD. Comments will be most helpful if received by October 31, 2008.

Electronic copies of this draft regulatory guide are available through the NRC's interactive rulemaking Web page (see above); the NRC's public Web site under Draft Regulatory Guides in the Regulatory Guides document collection of the NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/doc-collections/>; and the NRC's Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>, under Accession No. ML081960515.

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construction permit applicants and holders, and certain early site permit holders, no later than the receipt of special nuclear material in the form of fuel assemblies as described in 10 CFR 26.3. Further, Subpart I would apply to Contractor/Vendors (C/V) who implement fitness for duty (FFD) programs or program elements to the extent that the licensees rely on those C/Vs to meet the requirements of Part 26.

- (2) 10 CFR 26.203, “General Provisions,” establishes fatigue management requirements for licensees’ fitness-for-duty programs. This section includes requirements for a fatigue management policy, procedures, training, recordkeeping, reporting, and auditing of the program.
- (3) 10 CFR 26.205, “Work Hours,” establishes controls on the work hours and rest-break periods of select categories of workers (referred to in this draft regulatory guide as “covered groups”) who perform duties that directly affect safety and security. The provisions in this section address maximum work hours and minimum rest breaks for both normal operations and for outage periods. This section incorporates with limited modifications work-hour guidelines in Generic Letter 82-12, “Nuclear Power Plant Staff Working Hours,” dated June 15, 1982 (Ref. 2), and includes additional requirements regarding minimum days off (MDO) and the calculation and review of work hours and rest-break periods.
- (4) 10 CFR 26.207, “Waivers and Exceptions,” specifies the conditions under which licensees are permitted to waive the work-hour and rest-break requirements in 10 CFR 26.205. The rule also permits exceptions from the requirements of 10 CFR 26.205 under specified circumstances, such as force-on-force tactical exercises evaluated by the NRC and work hours necessary to protect the common defense and security or address plant emergencies.
- (5) 10 CFR 26.209, “Self-declarations,” establishes the requirements for licensee actions in response to self-declarations of fatigue. All individuals who are subject to 10 CFR Part 26 may self-declare if they believe they are not fit for duty because of fatigue.
- (6) 10 CFR 26.211, “Fatigue Assessments,” specifies the conditions under which licensees shall conduct fatigue assessments. It also includes specific provisions regarding the scope of the assessments and the associated documentation requirements placed on licensees.

For convenience, Appendix A to this draft regulatory guide contains selected text of the final rule, including the entire text of Subpart I. The glossary provides selected definitions of terms used in this draft regulatory guide.

The NRC issues regulatory guides to describe to the public methods that the staff considers acceptable for use in implementing specific parts of the agency’s regulations, to explain techniques that the staff uses in evaluating specific problems or postulated accidents, and to provide guidance to applicants. Regulatory guides are not substitutes for regulations and compliance with them is not required.

This regulatory guide contains information collection requirements covered by 10 CFR Part 26 and that the Office of Management and Budget (OMB) approved under OMB control number 3150-0146. The NRC may neither conduct nor sponsor, and a person is not required to respond to, an information collection request or requirement unless the requesting document displays a currently valid OMB control number.

## B. DISCUSSION

### Background

The Nuclear Energy Institute (NEI) developed a guidance document, NEI 06-11, Revision E, “Managing Personnel Fatigue at Nuclear Power Reactor Sites” dated June 2008 (Ref. 3), which provides information and describes methods applicable to implementing the requirements of Subpart I of 10 CFR Part 26. The guidance document describes the processes and procedures that licensees may use to manage personnel fatigue with an emphasis on procedures for implementing the work hour and rest break requirements of 10 CFR 26.205. The guidance presented in Revision E of NEI 06-11 is also intended to ensure the establishment of uniform fatigue management practices across the nuclear industry.

The NRC staff is endorsing, with certain clarifications, additions, and exceptions, Revision E of NEI 06-11 through this regulatory guide. The staff identified three substantive issues related to the guidance in NEI 06-11 for implementing the work-hour controls established in Subpart I of 10 CFR Part 26. Specifically, these issues concern the rule’s minimum days off (MDO) requirements in 10 CFR 26.205(d)(3) through (d)(6). These provisions establish specific MDO requirements that differ based on the given category of personnel (e.g., operations or security personnel), shift schedule (i.e., 8-, 10- or 12-hour shift schedules), and plant condition (e.g., outages or non-outage). The NRC staff takes exception to the portions of the MDO guidance in NEI 06-11 that address:

- (1) how the MDO requirements are applied to occasional periods of increased work hours, including transitions into and out of an outage (i.e., the NEI concept of “periodic overtime”),
- (2) methods for implementing the MDO requirements for individuals who transition into or between covered groups, and
- (3) methods for implementing the MDO requirements described in 10 CFR 26.205(d)(4) during unit outages at multi-unit facilities.

Specific exceptions to NEI 06-11 associated with these issues are discussed below and provided in Section C of this regulatory guide. This regulatory guide also includes clarifications to NEI 06-11, as listed in Section C.

An important aspect of fatigue management is mitigating cumulative fatigue. The concept of cumulative fatigue refers to the increase in an individual’s level of fatigue resulting from inadequate rest over consecutive sleep-wake periods. Cumulative fatigue occurs when an individual accumulates a sleep debt from the long periods of limited sleep associated with working multiple days of long shifts. The NRC has established the MDO requirements to limit the number of consecutive work days individuals in the covered groups may work and to ensure sufficient days off to mitigate the effects of cumulative fatigue. Without these provisions, licensees could require individuals to work several sequential 72-hour weeks, allowing only 1 day off in every 7 days. The MDO requirements in the rule provide licensees with considerable flexibility in scheduling work and days off for the covered groups while complying with the rule. All of the NRC’s exceptions to the guidance in NEI 06-11 relate to this MDO concept.

## **1. Periodic Overtime**

The implementation guidance in Section 7.1, “Periodic Overtime,” of NEI 06-11 introduces the concepts of “periodic” and “incidental” overtime. These concepts are not included in the rule nor are they necessary. The MDO requirements in the rule provide substantial scheduling flexibility to accommodate periods of increased work hours for emergent work (i.e., “incidental” overtime) and planned periods of increased work (i.e., “periodic” overtime).

The implementation guidance in Section 7.1 of NEI 06-11 would permit licensees to establish a schedule for a shift duration (e.g., 8-hour shifts) that includes sufficient days off to meet the MDO requirements for that shift duration, but would allow licensees to assign or permit unscheduled work hours that could result in individuals working shift lengths (e.g., 10- or 12-hour shifts) that would require a greater number of days off under 10 CFR 26.205(d)(3). Section 7.1 also provides guidance to distinguish between periodic overtime and an actual change of shift schedule.

The NRC staff disagrees with this distinction between periodic overtime and an actual change in shift schedule and considers the section on periodic overtime in NEI 06-11 to be unnecessary. As noted in the Statement of Considerations for the 10 CFR Part 26 final rule published in the Federal Register on March 31, 2008, the MDO requirements provide substantial scheduling flexibility by permitting licensees to distribute the MDO over a period of up to 6 weeks while permitting an average work week of up to 60 hours. Therefore, the MDO requirements of 10 CFR Part 26 accommodate periods of increased work hours for emergent work and planned periods of increased work (e.g., pre- and post-outage), while ensuring that individuals receive adequate days off to maintain their fitness for duty.

## **2. Transitions**

Section 7.3, “Transitioning onto a Shift,” of NEI 06-11 provides guidance for applying the MDO requirements to individuals who transition from a non-shift work schedule to a shift work schedule at the time they begin or resume covered duties. Section 7.4, “Transitioning between Covered Groups or into a Covered Group,” of NEI 06-11 provides guidance for applying the MDO requirements to individuals who are transitioning from (1) performing job duties that are not subject to the MDO requirements to performing duties that are subject to MDO requirements (i.e., from a non-covered group to a covered group), and (2) performing job duties that are subject to one set of MDO requirements to performing job duties that may require additional days off (i.e., from one covered group to another).

The NRC staff disagrees with how the guidance in Sections 7.3 and 7.4 of NEI 06-11 applies the MDO requirements to new duties going forward only. The NRC staff’s position is that meeting the MDO requirements for the new duties is a precondition for the individual to assume the new duties.

## **3. Outages**

The implementation guidance in Section 8.3, “Work Hour Controls During Outages,” of NEI 06-11 would permit individuals whose planned work activities include at least a nominal 25-percent “outage activities” to be eligible to work in accordance with the relaxed work-hour limits applicable to individuals “while working on outage activities,” as described in 10 CFR 26.205(d)(4). The NRC staff believes that, at a minimum, those individuals who comprise the operator minimum shift complement, including the operator at the controls, as specified in 10 CFR 50.54, “Conditions of Licenses,” (Ref. 4) for the operating unit at a multi-unit site should not work the longer work hours the rule permits for individuals working on outage duties because these individuals’ primary duties are to ensure the safe operation of operating unit(s).

The NRC staff's position is based on the rules and guidance associated with the minimum crew complement, including the operator at the controls (i.e., 10 CFR 50.54(m) and (k)). The primary responsibility of these individuals is to ensure that the unit is operating safely, and they must be prepared to prevent and mitigate any operational problems. As described in the NRC's Policy Statement on the Conduct of Nuclear Power Plant Operations (Volume 54, page 3424, of the Federal Register, dated January 29, 1989), (Ref. 5) "the operator at the controls and the immediate supervisor must be continuously alert to plant conditions and ongoing activities affecting plant operations..." and "licensed operators must be alert and attentive to instruments and controls...using all their senses, ...to prevent or mitigate any operational problems." Furthermore, Regulatory Guide 1.114, Revision 2, "Guidance to Operators at the Controls and to Senior Operators in the Control Room of a Nuclear Power Unit," issued May 1989 (Ref. 6), states, "The operator must be alert to ensure that the unit is operating safely and must be capable of taking action to prevent any progress toward a condition that may be unsafe."

## C. REGULATORY POSITION

The NRC staff considers conformance with the guidance in Revision E of NEI 06-11 to be an acceptable approach to meeting the requirements of 10 CFR Part 26 related to managing fatigue at nuclear power plants, subject to the following clarifications, additions, and exceptions:

1. In Section 6.2, “Work Hour Controls for Covered Individuals,” replace the bullet that begins with “Predictive maintenance activities that do not result....” with the following:

Predictive maintenance activities that are not required by technical specifications or do not result in a change of condition or state of a structure, system, or component (SSC) are excluded from covered maintenance activities. These predictive maintenance activities include nondestructive analyses (NDE), thermography, vibration analysis, and data collection and analysis.

2. Disregard Section 7.1 in its entirety.
3. In Section 7.2 add the following to the end of the second paragraph:

If the average shift duration is more than 11 hours then the requirements for a 12-hour shift apply.

4. Replace Sections 7.3 and 7.4 with the following:

### 7.3 Transitioning onto a Shift or Between Covered Groups or into a Covered Group

A minimum of 1 day off in the preceding 7-day period is acceptable for individuals to begin or resume covered duties and for individuals who have been working an 8-hour shift schedule, as either day or shift workers, and are transitioning (1) from a non-covered group to a covered group or (2) from a covered group to another covered group that has more stringent MDO requirements.

A minimum of 2 days off in the preceding 7-day period is acceptable for individuals who have been working a 10- or 12-hour shift schedule, as either day or shift workers, and transition (1) from a non-covered group to a covered group or (2) from a covered group to another covered group with more stringent MDO requirements.

A minimum of 2 days off in the preceding 7-day period is acceptable for operators who have been working outage hours on 10- or 12-hour shifts before they transition to serving as a member of the minimum shift complement on the non-outage unit as described in Regulatory Position 6 below.

5. Replace the first sentence of the subsection in Section 8.3 titled, “Transitioning into/out of an Outage, Security System Outages, or Increased Threat Conditions,” with the following:

When entering an unplanned outage, unplanned 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.

Also add the following to the same subsection:

For security personnel during the first 60 days of an unplanned security system outage or increased threat condition, licensees need not meet the MDO requirements of 10 CFR 26.205(d)(3) nor the requirement for 4 days off in every non-rolling 15-day period in 10 CFR 26.205(d)(5)(i).

6. In Section 8.3, following the subsection titled “**Workers Eligible to Work Outage Hours**” add the following subsection:

**Workers Not Eligible to Work Outage Hours**

- Covered workers working only on the operating unit(s)
- The minimum shift complement of reactor operators, as specified in 10 CFR 50.54(m), including the operator at the controls, as specified in 10 CFR 50.54(k), who are assigned to the operating unit(s) are not eligible to work the outage work hours as described in 10 CFR 26.205(d)(4).

The following table details the number of reactor operators and senior operators that should be excluded from working outage hours given the plant design and operating status. The numbers in this table are based on having at least (1) one reactor operator at the controls of each operating unit, (2) one backup operator, (3) one senior operator, and (4) one backup operator for each control room with a unit operating.

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

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

7. In Section 15, “Reviews,” replace the paragraph numbered “5” with the following:

Review documented worker job performance data from sources, including, but not limited to, 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 work hours on performance.

8. The examples included throughout NEI 06-11 to supplement the guidance may not apply to all circumstances for all licensees or other entities subject to Subpart I of 10 CFR Part 26. A licensee or other entity should ensure that an example is applicable to its particular circumstances before implementing the guidance as described in an example.

### Use of Other Methods

Licensees and other entities subject to Subpart I of 10 CFR Part 26 may use methods other than those proposed in NEI 06-11, as clarified by this regulatory guide, to meet the requirements of the regulations in 10 CFR Part 26. The NRC will determine the acceptability of other methods on a case-by-case basis. Methods and solutions that differ from those set forth in this regulatory guide may be deemed acceptable if they provide a sufficient basis for the findings required for issuance or continuance of a permit or license by the Commission.

## D. IMPLEMENTATION

The purpose of this section is to provide information to applicants and licensees regarding the NRC’s plans for using this draft regulatory guide. The NRC does not intend or approve any imposition or backfit in connection with its issuance.

The NRC has issued this draft guide to encourage public participation in its development. The NRC will consider all public comments received in development of the final guidance document. In some cases, applicants or licensees may propose an alternative or use a previously established acceptable

alternative method for complying with specified portions of the NRC's regulations. Otherwise, the methods described in this guide will be used in evaluating compliance with the applicable regulations for license applications, license amendment applications, and amendment requests.

## **REGULATORY ANALYSIS**

### **1. Statement of Problem**

The NRC revised the fitness-for-duty regulations in 10 CFR Part 26 to update them and to improve their effectiveness, efficiency, and clarity. Part of the rulemaking effort included standardizing and strengthening the regulations for the control of work hours. This was done to eliminate existing ambiguities and improve the effectiveness of fatigue management programs by establishing clear and understandable requirements for managing fatigue of nuclear power plant personnel. A new regulatory guide is required to expand and clarify the regulations in 10 CFR Part 26.

### **2. Objective**

The NRC's analysis of changes to the regulations in 10 CFR Part 26 has led to the conclusion that the implementation of fatigue management provisions added to 10 CFR Part 26 can be enhanced through the issuance of this regulatory guide. This regulatory guide supports the NRC's research and experience which shows that fatigue can substantially degrade an individual's ability to safely and competently perform a wide range of work-related duties. The degradation in an individual's cognitive functioning resulting from inadequate rest includes; reduced attention span, lack of situational awareness, and slower response times. Such degradations in performance, if exhibited by individuals performing risk-significant functions, can adversely affect the safety and security of a nuclear power plant, and can cause levels of worker impairment comparable to those prohibited by 10 CFR Part 26 for alcohol. Although the NRC has established regulations limiting work hours for personnel performing safety-related functions at nuclear power reactors, the NRC considers additional regulatory guidance to be beneficial.

### **3. Alternative Approaches**

The NRC staff considered the following alternative approaches:

- Do not issue a new regulatory guide
- Issue a new regulatory guide

#### **3.1 Alternative 1: Do Not Issue a Regulatory Guide**

Under this alternative, the NRC would not issue additional guidance, and the NRC staff would continue to address specific fatigue issues on a case-by-case basis. Taking no action would allow licensees continued flexibility in determining the course of action when they are not constrained by other agencies, legal requirements, or labor negotiations. This would also disregard the staff and industry recommendations regarding areas for clarification in 10 CFR Part 26 and could continue to impose avoidable costs on licensees. Moreover, taking no action at this time would not yield any positive impact on the effectiveness of the new 10 CFR Part 26 rule. This alternative provides a baseline condition from which the other alternatives will be assessed.

### **3.2 Alternative 2: Issue a Regulatory Guide**

Under this alternative, the NRC would issue a regulatory guide on fatigue management of nuclear power plant personnel, taking into consideration the guidance in NEI 06-11 and NRC research and experience. The development of a regulatory guide will enhance consistency across licensee programs and provide opportunities for savings that may not be available with a case-by-case approach. The new regulatory guide will provide clear inspection and implementation guidance which will result in more efficient inspections and document reviews.

The impact to the NRC will be the costs associated with preparing and issuing the regulatory guide. Licensees will incur costs related to revising and implementing their fatigue policies and procedures, developing systems to track work hours in the manner specified in 10 CFR Part 26, paying a scheduler to plan work schedules, and training staff on the fatigue provisions based on implementation of the requirements of 10 CFR Part 26. The estimated cost to the licensees are detailed in the NRC document titled “Regulatory Analysis of the Final Rulemaking to Amend the Fitness-for-Duty Rule (10 CFR Part 26)” (Ref. 7). The impact to the public will be the voluntary costs associated with reviewing and providing comments to the NRC during the public comment period.

## **4. Conclusion**

Based on this regulatory analysis, the NRC staff recommends issuing a regulatory guide. The staff concludes that a new regulatory guide will strengthen the fitness for duty programs by helping to establish clear guidelines concerning the management of fatigue of nuclear power plant personnel that will reduce the potential for worker fatigue to adversely affect public health and safety and the common defense and security. The new regulatory guide will also help assure that individuals who are subject to the fatigue management regulations in 10 CFR Part 26 are not impaired from acute or cumulative fatigue that will adversely affect their ability to safely and competently perform their duties.

## GLOSSARY

- Circadian Rhythm -** The human physiological processes that vary on an approximate 24-hour cycle.
- Cumulative Fatigue -** The increase in fatigue over consecutive sleep-wake periods resulting from inadequate rest.
- Fatigue -** The degradation in an individual's cognitive and motor functioning resulting from inadequate rest.
- Maintenance -** For the purposes of 10 CFR 26.4(a)(4), maintenance includes the following onsite activities: modification, surveillance, post-maintenance testing, and corrective and preventive maintenance.
- Sleep Debt -** The difference between the amount of sleep an individual needs and the amount of sleep that the individual actually obtains.

## REFERENCES

1. 10 CFR Part 26, "Fitness for Duty Programs," U.S. Nuclear Regulatory Commission, Washington, DC.<sup>1</sup>
2. GL 82-12, "Nuclear Power Plant Staff Working Hours," U.S. Nuclear Regulatory Commission, Washington, DC, June 15, 1982.<sup>2</sup>
3. NEI 06-11, Revision E, "Managing Personnel Fatigue at Nuclear Power Reactor Sites," Nuclear Energy Institute, Washington, DC, June 2008.<sup>3</sup> (ADAMS Accession No. ML081820656)
4. 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," U.S. Nuclear Regulatory Commission, Washington, DC.<sup>1</sup>
5. Federal Register Notice (54 FR 3424) titled "NRC's Policy Statement on the Conduct of Nuclear Power Plant Operations," dated January 29, 1989.<sup>4</sup>
6. Regulatory Guide 1.114, "Guidance to Operators at the Controls and to Senior Operators in the Control Room of a Nuclear Power Unit," U.S. Nuclear Regulatory Commission, Washington, DC.<sup>5</sup>
7. "Regulatory Analysis of the Final Rulemaking to Amend the Fitness-for-Duty Rule (10 CFR Part 26)" U.S. Nuclear Regulatory Commission, Washington, DC.<sup>3</sup> (ADAMS Accession No. ML080580135).

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<sup>1</sup> NRC regulations listed herein are available electronically through the Electronic Reading Room on the NRC's public Web site, at <http://www.nrc.gov/reading-rm/doc-collections/cfr/>. Copies are also available for inspection or copying for a fee from the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555; telephone (301) 415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail [PDR@nrc.gov](mailto:PDR@nrc.gov).

<sup>2</sup> Generic Letters (GLs) listed herein were published by the U.S. Nuclear Regulatory Commission and are available electronically through the Electronic Reading Room on the NRC's public Web site, at <http://www.nrc.gov/reading-rm/doc-collections/gen-comm/gen-letters/>. Copies are also available for inspection or copying for a fee from the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555-0001; telephone (301) 415-4737 or (800) 397-4209; fax (301) 415-3548; and e-mail [PDR@nrc.gov](mailto:PDR@nrc.gov).

<sup>3</sup> Copies of publicly available documents are available electronically through the NRC's Agencywide Documents Access and Management System (ADAMS) at <http://www.nrc.gov/reading-rm/adams.html>.

<sup>4</sup> NRC policy statements are available electronically through the Electronic Reading Room on the NRC's public Web site at <http://www.nrc.gov/reading-rm/doc-collections/commission/policy/54fr3424.pdf>.

<sup>5</sup> Regulatory Guides published by the NRC are available electronically through the Electronic Reading Room on the NRC's public Web site, at <http://www.nrc.gov/reading-rm/doc-collections/reg-guides/>. Copies are also available for inspection or copying for a fee from the NRC's Public Document Room (PDR) at 11555 Rockville Pike, Rockville, MD; the mailing address is USNRC PDR, Washington, DC 20555-0001; telephone (301) 415-4737 or (800) 397-4209; fax (301) 415-3548, and e-mail [PDR@nrc.gov](mailto:PDR@nrc.gov).

## APPENDIX A

### SELECTED TEXT OF 10 CFR PART 26

#### § 26.3 Scope.

- (a) 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) shall comply with the requirements of this part, except for subpart K of this part. Licensees ... shall implement the fitness for duty (FFD) program before the receipt of special nuclear material in the form of fuel assemblies.
- (d) Contractor/vendors (C/Vs) who implement FFD programs or program elements, to the extent that the licensees and other entities specified in paragraphs (a) through (c) of this section rely on those C/V FFD programs or program elements to meet the requirements of this part, shall comply with the requirements of this part.

#### § 26.4 FFD Program Applicability to Categories of Individuals.

- (a) All persons who are granted unescorted access to nuclear power reactor protected areas by the licensees in § 26.3(a) and, as applicable, (c) perform the following duties shall be subject to an FFD program that meets all of the requirements of this part, except subpart K of this part:
  - (1) Operating or onsite directing of the operation of systems and components that a risk-informed evaluation process has shown to be significant to public health and safety;
  - (2) Performing health physics or chemistry duties required as a member of the onsite emergency response organization minimum shift complement;
  - (3) Performing the duties of a fire brigade member who is responsible for understanding the effects of fire and fire suppressants on safe shutdown capability;
  - (4) Performing maintenance or onsite directing of the maintenance of SSCs that a risk-informed evaluation process has shown to be significant to public health and safety; and
  - (5) Performing security duties as an armed security force officer, alarm station operator, response team leader, or watchperson, hereinafter referred to as security personnel.
- (b) All persons who are granted unescorted access to nuclear power reactor protected areas by the licensees in § 26.3(a) and, as applicable, (c) and who do not perform the duties described in paragraph (a) of this section shall be subject to an FFD program that meets all of the requirements of this part, except §§ 26.205 through 26.209 and subpart K of this part.
- (c) All persons who are required by a licensee in § 26.3(a) and, as applicable (c) to physically report to the licensee's Technical Support Center or Emergency Operations Facility by licensee emergency plans and procedures shall be subject to an FFD program that meets all of the requirement of this part, except §§ 26.205 through 26.209 and subpart K of this part.

## § 26.5 Definitions.

### Subpart I – Managing Fatigue.

#### § 26.201 Applicability.

The requirements in this subpart apply to the licensees and other entities identified in § 26.3(a), and, if applicable, (c) and (d). The requirements in §§ 26.203 and 26.211 apply to the individuals identified in § 26.4(a) through (c). In addition, the requirements in § 26.205 through § 26.209 apply to the individuals identified in § 26.4(a).

#### § 26.203 General Provisions.

- (a) *Policy.* Licensees shall establish a policy for the management of fatigue for all individuals who are subject to the licensee’s FFD program and incorporate it into the written policy required in § 26.27(b).
- (b) *Procedures.* In addition to the procedures required in § 26.27(c), licensees shall develop, implement, and maintain procedures that—
  - (1) Describe the process to be followed when any individual identified in § 26.4(a) through (c) 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. The procedure must—
    - (i) Describe the individual’s and licensee’s rights and responsibilities related to self-declaration;
    - (ii) 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; and
    - (iii) Describe the process to be followed if the individual disagrees with the results of a fatigue assessment that is required under § 26.211(a)(2);
  - (2) Describe the process for implementing the controls required under § 26.205 for the individuals who are performing the duties listed in § 26.4(a);
  - (3) Describe the process to be followed in conducting fatigue assessments under § 26.211; and
  - (4) 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.
- (c) *Training and examinations.* 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):
  - (1) 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; and

- (2) Ability to identify symptoms of worker fatigue and contributors to decreased alertness in the workplace.
- (d) *Recordkeeping.* Licensees shall retain the following records for at least 3 years or until the completion of all related legal proceedings, whichever is later:
- (1) Records of work hours for individuals who are subject to the work-hour controls in § 26.205;
  - (2) Records of shift schedules and shift cycles of individuals who are subject to the work-hour controls in § 26.205;
  - (3) The documentation of waivers that is required in § 26.207(a)(4), including the bases for granting the waivers;
  - (4) The documentation of work-hour reviews that is required in § 26.205(e)(3) and (e)(4); and
  - (5) The documentation of fatigue assessments that is required in § 26.211(g).
- (e) *Reporting.* Licensees shall include the following information in a standard format in the annual FFD program performance report required under § 26.717:
- (1) A summary for each nuclear power plant site of all instances during the previous calendar year when the licensee waived the work-hour controls specified in § 26.205(d)(1) through (d)(5)(i) for individuals described in § 26.4(a). The summary must 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 must 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—
    - (i) The number of instances when each applicable 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;
    - (ii) The number of instances when each applicable 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; and
    - (iii) 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 who received only one waiver during the reporting period, the number of individuals who received a total of two waivers during the reporting period).
  - (2) A summary of corrective actions, if any, resulting from the analyses of these data, including fatigue assessments.
- (f) *Audits.* Licensees shall audit the management of worker fatigue as required by § 26.41.

**§ 26.205 Work Hours.**

- (a) *Individuals subject to work-hour controls.* Any individual who performs duties identified in § 26.4(a)(1) through (a)(5) shall be subject to the requirements of this section.
- (b) *Calculating work hours.* For the purposes of this section, a licensee shall calculate the work hours of individuals who are subject to this section as the amount of time the individuals perform duties for the licensee. Except as permitted by paragraphs (b)(1) through (b)(5) of this section, the calculated work hours must 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.
- (1) *Shift turnover.* Licensees may exclude shift turnover 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. 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.
  - (2) *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).
  - (3) *Beginning or resuming duties subject to work-hour controls.* If an individual begins or resumes performing for the licensee any of the duties listed in § 26.4(a) 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 listed in § 26.4(a), and control the individual's work hours under the requirements of paragraph (d) of this section.
  - (4) *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 for the purpose of participating in the actual conduct of an unannounced emergency preparedness exercise or drill.
  - (5) *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 does not exceed a nominal 30 minutes during any single break period. For the purposes of compliance with the minimum break requirements of paragraph (d)(2) of this section and the minimum day off requirements of paragraph (d)(3) through (d)(5) of this section, such duties do not constitute work periods or work shifts.
- (c) *Work-hours scheduling.* Licensees shall schedule the work hours of individuals who are subject to this section consistent with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.

- (d) *Work-hour controls.* Licensees shall control the work hours of individuals who are subject to this section.
- (1) Except as permitted in § 26.207, licensees shall ensure that any individual's work hours do not exceed the following limits:
    - (i) 16 work hours in any 24-hour period;
    - (ii) 26 work hours in any 48-hour period; and
    - (iii) 72 work hours in any 7-day period.
  - (2) Licensees shall ensure that individuals have, at a minimum, the rest breaks specified in this paragraph. For the purposes of this subpart, 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 in § 26.207, licensees shall ensure that individuals have, at a minimum—
    - (i) 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; and
    - (ii) A 34-hour break in any 9-day period.
  - (3) Licensees shall ensure that individuals have, at a minimum, the number of days off specified in this paragraph. For the purposes of this subpart, a day off is defined as a calendar day during which an individual does not start a work shift. For the purposes of calculating the average number of days off required in this paragraph, the duration of the shift cycle may not exceed 6 weeks.
    - (i) Individuals who are working 8-hour shift schedules shall have at least 1 day off per week, averaged over the shift cycle;
    - (ii) Individuals who are working 10-hour shift schedules shall have at least 2 days off per week, averaged over the shift cycle;
    - (iii) Individuals who are working 12-hour shift schedules while performing the duties described in § 26.4(a)(1) through (a)(3) shall have at least 2.5 days off per week, averaged over the shift cycle;
    - (iv) Individuals who are working 12-hour shift schedules while performing the duties described in § 26.4(a)(4) shall have at least 2 days off per week, averaged over the shift cycle; and
    - (v) Individuals who are working 12-hour shift schedules while performing the duties described in § 26.4(a)(5) shall have at least 3 days off per week, averaged over the shift cycle.

- (4) During the first 60 days of a unit outage, licensees need not meet the requirements of paragraph (d)(3) of this section for individuals specified in § 26.4(a)(1) through (a)(4), while those individuals are working on outage activities. However, the licensee shall ensure that the individuals specified in § 26.4(a)(1) through (a)(3) have at least 3 days off in each successive (i.e., non-rolling) 15-day period and that the individuals specified in § 26.4(a)(4) have at least 1 day off in any 7-day period;
- (5) During the first 60 days of a unit outage, security system outage, or increased threat condition, licensees shall control the hours worked by individuals specified in § 26.4(a)(5) as follows:
  - (i) During the first 60 days of a unit outage or a planned security system outage, licensees need not meet the requirements of paragraph (d)(3) of this section. However, licensees shall ensure that these individuals have at least 4 days off in each successive (i.e., non-rolling) 15-day period; and
  - (ii) During the first 60 days of an unplanned security system outage or increased threat condition, licensees need not meet the requirements of either paragraph (d)(3) or (d)(5)(i) of this section.
- (6) The 60-day periods in paragraphs (d)(4) and (d)(5) of this section may be extended for each individual in 7-day increments for each non-overlapping 7-day period the individual has worked not more than 48 hours during the unit or security system outage or increased threat condition, as applicable.
- (e) *Reviews.* Licensees shall evaluate the effectiveness of their control of work hours of individuals who are subject to this section. 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 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. Licensees shall—
  - (1) Review the actual work hours and performance of individuals who are subject to this section for consistency with the requirements of § 26.205(c). At a minimum, this review must address—
    - (i) 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 requirements of § 26.205(d)(3);
    - (ii) Individuals who were granted more than one waiver during the review period; and
    - (iii) Individuals who were assessed for fatigue under § 26.211 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 of this section;
  - (3) Document the methods used to conduct the review and the results of the review; and

- (4) 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 this part.

**§ 26.207 Waivers and exceptions.**

- (a) *Waivers.* Licensees may grant a waiver of the work-hour controls in § 26.205(d)(1) through (d)(5)(i), as follows:
  - (1) To grant a waiver, the licensee shall meet both of the following requirements:
    - (i) 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; and
    - (ii) 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 as required by §§ 26.29 and 26.203(c) and shall be qualified to direct the work to be performed by the individual. If there is no supervisor on site who is qualified to direct the work, the assessment may be performed by a supervisor who is qualified to provide oversight of the work to be performed by the individual. 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;
  - (2) To the extent practicable, licensees shall rely on the granting of waivers only to address circumstances that could not have been reasonably controlled;
  - (3) Licensees shall ensure that the timing of the face-to-face supervisory assessment that is required by paragraph (a)(1)(ii) of this section 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 4 hours before the individual begins performing any work under the waiver; and
  - (4) 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 determinations required in paragraphs (a)(1)(i) and (ii) of this section.
- (b) *Force-on-force tactical exercises.* For the purposes of compliance with the minimum days off requirements of § 26.205(d)(3), licensees may exclude shifts worked by security personnel during the actual conduct of NRC-evaluated force-on-force tactical exercises when calculating the individual's number of days off.

- (c) *Common defense and security.* When informed in writing by the NRC that the requirements of § 26.205, or any subset thereof, are waived for security personnel to ensure the common defense and security, licensees need not meet the specified requirements of § 26.205 for the duration of the period defined by the NRC.
- (d) *Plant emergencies.* Licensees need not meet the requirements of § 26.205(c) and (d) during declared emergencies, as defined in the licensee's emergency plan.

**§ 26.209 Self-declarations.**

- (a) If an individual is performing, or being assessed for, work under a waiver of the requirements contained in § 26.205(d)(1) through (d)(5)(i) 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 duties listed in § 26.4(a), except if the individual is required to continue performing those duties under other requirements of this chapter. If the subject individual must continue performing the duties listed in § 26.4(a) until relieved, the licensee shall immediately take action to relieve the individual.
- (b) Following a self-declaration, as described in paragraph (a) of this section, the licensee—
  - (1) May reassign the individual to duties other than those listed in § 26.4(a), but only if the results of a fatigue assessment, conducted under the requirements of § 26.211, indicate that the individual is fit to safely and competently perform those other duties; and
  - (2) Shall permit or require the individual to take a break of at least 10 hours before the individual returns to performing any duties listed in § 26.4(a).

**§ 26.211 Fatigue Assessments.**

- (a) Licensees shall ensure that fatigue assessments are conducted under the following conditions:
  - (1) For cause. In addition to any other test or determination of fitness that may be required under §§ 26.31(c) and 26.77, 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;
  - (2) 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 rest break of at least 10 hours before the individual returns to duty;
  - (3) Post-event. A fatigue assessment must be conducted in response to events requiring post-event drug and alcohol testing as specified in § 26.31(c). Licensees may not delay necessary medical treatment in order to conduct a fatigue assessment; and
  - (4) Followup. 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.

- (b) Only supervisors and FFD program personnel who are trained under §§ 26.29 and 26.203(c) may conduct a fatigue assessment. The fatigue assessment must be conducted face to face with the individual whose alertness may be impaired.
  - (1) 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.
  - (2) 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 specified in § 26.205(d)(1) through (d)(5)(i) 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.
- (c) A fatigue assessment must provide the information necessary for management decisions and actions in response to the circumstance that initiated the assessment.
  - (1) 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.
  - (2) Individuals shall provide complete and accurate information that may be required by the licensee to address the factors listed in paragraph (c)(1) of this section. Licensees shall limit any inquiries to obtaining from the subject individual only the personal information that may be necessary to assess the factors listed in paragraph (c)(1) of this section.
- (d) 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 limits specified in § 26.205(d)(1) or that the individual has had the minimum breaks required in § 26.205(d)(2) or minimum days off required in § 26.205(d)(3) through (d)(5), as applicable.
- (e) Following a fatigue assessment, the licensee shall determine and implement the controls and conditions, if any, that are necessary to permit the individual to resume performing duties for the licensee, including the need for a break.

- (f) 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.
- (g) Licensees shall also prepare an annual summary for each nuclear power plant site of instances of fatigue assessments that were conducted during the previous calendar year for any individual identified in § 26.4(a) through (c). Each summary must include—
  - (1) The conditions under which each fatigue assessment was conducted (i.e., self-declaration, for cause, post-event, followup);
  - (2) A statement of whether or not the individual was working on outage activities at the time of the self-declaration or condition resulting in the fatigue assessment;
  - (3) The category of duties the individual was performing, if the individual was performing the duties described in § 26.4(a)(1) through (a)(5) at the time of the self-declaration or condition resulting in the fatigue assessment; and
  - (4) The management actions, if any, resulting from each fatigue assessment.