

be scientifically insufficient for further action (as well as an invalid test result) could not be a basis for a licensee or other entity to grant or deny authorization or impose sanctions because it would be neither a negative nor positive, adulterated, or substituted test result. Therefore, the change meets Goal 6 of this rulemaking to improve clarity in the language of the rule. The NRC has changed some of the terminology used in the former paragraph in the final rule for consistency with the terminology used throughout the final rule (e.g., "samples" is changed to "specimens"). The final rule also makes the following changes to this provision:

The final rule also adds a statement to the former paragraph to indicate that the MRO is neither expected nor required to request retesting of the specimen unless, in the sole opinion of the MRO, such retesting is warranted. The final rule includes this statement because, in the experience of other Federal agencies, some MROs have been pressured by the organization to whom they provide services to request retesting of specimens that the MRO has confirmed to be positive, adulterated, substituted, or invalid. Although the NRC is not aware of any such instances in Part 26 programs, the rule clarifies that the MRO alone is authorized to request retesting to further protect the independence of the MRO function.

In addition, the NRC has moved the last sentence of former Section 2.9(g), which contained records retention requirements, to § 26.215(b)(11) of Subpart N [Recordkeeping and Reporting Requirements] of the final rule. The NRC has moved this provision to group it with other records retention requirements in the rule for organizational clarity.

Section 26.185(n) [Evaluating results from a second laboratory] establishes new requirements for the MRO's determination of an FFD policy violation based on a retest of a single specimen or a test of the specimen in Bottle B of a split specimen. This provision specifies that the test result(s) from the second HHS-certified laboratory supersede the confirmatory test results provided by the HHS-certified laboratory that performed the original testing of the specimen. The final rule incorporates these requirements from the HHS Guidelines because the former rule did not address MRO actions in response to test results from a second laboratory. Therefore, the provision is consistent with the related provisions in the HHS Guidelines and meets Goal 1 of this rulemaking to update and enhance the consistency of

Part 26 with advances in other relevant Federal rules and guidelines.

The NRC has added § 26.185(o) [Re-authorization after a first violation] to the final rule. This provision addresses the MRO's review of drug test results following a first violation of the FFD policy based on a confirmed positive drug test result. The former rule did not require the MRO to evaluate whether drug test results in these instances indicated subsequent drug use after a first confirmed positive drug test result, and MROs from different FFD programs have implemented different policies. Specifically, the final rule requires the MRO to determine whether subsequent drug test results indicate further drug use since the first positive drug test result was obtained. For example, because marijuana metabolites are fat-soluble and may be released slowly over an extended period of time, a second positive test result for marijuana from a test that is performed within several weeks after a first confirmed positive test result for marijuana may not, in fact, indicate further marijuana use. Therefore, in this case, the provision prohibits the MRO from determining that a second FFD policy violation for marijuana had occurred if the quantitative results from confirmatory testing of the second specimen are positive for marijuana metabolites, but at a concentration that is inconsistent with additional marijuana use since the first positive, adulterated, substituted, or invalid test result was obtained. If the MRO concludes that the concentration of marijuana metabolites identified by confirmatory testing is inconsistent with further marijuana use since the first positive test result, the MRO would declare the test result as negative, even if the quantitative test result exceeds the 15 ng/mL confirmatory cutoff level specified in this part or a licensee's or other entity's more stringent cutoff level. The provision prevents individuals from being subject to a 5-year denial of authorization for a second confirmed positive drug test result under § 26.75(e), when the donor has not engaged in further drug use, consistent with Goal 7 of this rulemaking to protect the privacy and other rights (including due process rights) of individuals who are subject to Part 26.

Section 26.185(p) [Time to complete MRO review] of the final rule amends former § 26.24(e). This provision requires the MRO to complete his or her review of test results and notify management of the results of his or her review within 10 business days after an initial positive, adulterated or substituted test result. The rule replaces

the former phrase, "initial presumptive positive screening test result," with the phrase, "initial positive, adulterated or substituted test result," for consistency with the terminology used throughout the rule (see § 26.5). This provision also requires the MRO to report his or her determination that a test result is an FFD policy violation in writing to the licensee or other entity and in a manner that ensures the confidentiality of the information. The NRC has made these changes for consistency with the related provisions in the HHS Guidelines, consistent with Goal 1 of this rulemaking.

Section 26.187 Substance Abuse Expert

The NRC has added § 26.187 to the final rule. This section establishes minimum requirements for a new position within FFD programs, the "substance abuse expert" (SAE). These added provisions meet Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs.

The NRC has added § 26.187(a) [Implementation] to the final rule. This provision requires SAEs to meet the requirements of this section within 2 years of the date on which the final rule is published in the **Federal Register**. The NRC has imposed the 2-year period in order to ensure that professionals who may currently be performing determinations of fitness, but who do not meet these proposed requirements, have the time necessary to obtain the required credentials, knowledge, and qualification training. With respect to the proposed rule, the final rule adds a sentence that allows an MRO who meets the requirements of this section to serve as both an MRO and as an SAE. The NRC has made this change in response to a public comment suggesting that allowing the MRO, if qualified, the option to function as the SAE would avoid any unnecessary financial burden for licensees that have an MRO that can make SAE determinations.

The NRC has added § 26.187(b) [Credentials] to the final rule to establish the credentials required for an individual to serve as an SAE under this part. The rule requires that the SAE must possess the extensive education, training, and supervised clinical experience that are prerequisites for obtaining the professional credentials listed in § 26.187(b)(1) through (b)(5). Further, § 26.187(c) through (e) requires an SAE to possess additional knowledge and experience directly related to substance abuse disorders and the requirements of this part.

The NRC has added § 26.187(c) [Basic knowledge] and (d) [Qualification

training] to the final rule to establish the specific areas of expertise and training that are required for an individual to serve as an SAE under this part. The knowledge and training requirements in these two paragraphs are necessary to ensure that SAEs possess the knowledge and clinical experience required to perform the SAE function effectively in a Part 26 program.

Section 26.187(c) requires SAEs to possess the following types of knowledge: (1) Knowledge of and clinical experience in the diagnosis and treatment of alcohol and controlled-substance abuse disorders, in § 26.187(c)(1); (2) knowledge of the SAE function as it relates to individuals who perform the duties that require an individual to be subject to this part, in § 26.187(c)(2); and (3) knowledge of this part and any changes to its requirements, in § 26.187(c)(3).

Section 26.187(d) establishes the topical areas in which an SAE must be trained. The qualification training requirements include training in the following areas: (1) The background, rationale, and scope of this part, in § 26.187(d)(1); (2) key drug and alcohol testing requirements of this part, in § 26.187(d)(2) and (d)(3), respectively; (3) SAE qualifications and prohibitions, in § 26.187(d)(4); (4) the role of the SAE in making determinations of fitness, and developing treatment recommendations and followup testing plans, in § 26.187(d)(5); (5) procedures for consulting and communicating with licensee or other entity officials and the MRO, in § 26.187(d)(6); (6) reporting and recordkeeping requirements of this part as they related to the SAE function, in § 26.187(d)(7); and (7) appropriate methods for addressing issues that SAEs confront in carrying out their duties under this part, in § 26.187(d)(8).

The NRC has added § 26.187(e) [Continuing education] to the final rule to ensure that SAEs maintain the knowledge and skills required to perform the SAE function. The paragraph requires SAEs to complete at least 12 continuing professional education hours relevant to performing the SAE function during each 3-year period following completion of initial qualification training. Section 26.187(e)(1) describes the topics that must be covered in the continuing education training, to include, but not limited to, new drug and alcohol testing technologies, and any rule interpretations or new guidance, rule changes, or other developments in SAE practice under this part since the SAE completed the qualification training requirements in § 26.187(d). Section 26.187(e)(2) requires documented

assessment of the SAE's understanding of the material presented in the continuing education activities in order to ensure that the SAE learned the material. These continuing education requirements are necessary to ensure that SAEs maintain updated knowledge and skills to continue performing the SAE function effectively under this part.

The NRC has added § 26.187(f) [Documentation] to the final rule to specify the records that the SAE must maintain in order to demonstrate that he or she meets the requirements of this section. The SAE is required to provide the documentation, as requested, to NRC representatives, and to licensees or other entities who rely on the SAE's services. Licensees and other entities who intend to rely upon a determination of fitness that is made by an SAE under another FFD program are also required to have access to this documentation. These requirements are necessary to ensure that licensees and other entities, and the NRC, have access to the documentation required to verify that the SAE's knowledge, training, and practice meet the requirements of this part. The final rule, with respect to the proposed rule, adds a cross-reference to ensure that this provision is consistent with the protection of information requirements in § 26.37 of this part.

The NRC has added § 26.187(g) [Responsibilities and prohibitions] to the final rule to specify the responsibilities of SAEs within a licensee's or other entity's FFD program and their limitations.

Section 26.187(g)(1) specifies at least three circumstances in which the SAE is responsible for making a determination of fitness under the rule. In § 26.187(g)(1)(i), an SAE may be called upon to make a determination of fitness regarding an applicant for authorization when the self-disclosure, the suitable inquiry, or other sources of information identify potentially disqualifying FFD information about the applicant. In § 26.187(g)(1)(ii), an SAE may be called upon to make a determination of fitness when an individual has violated the substance abuse provisions of a licensee's or other entity's FFD policy, including, but not limited to a first confirmed positive drug test result. Related provisions in § 26.69 require the licensee or other entity to rely upon the results of the SAE's determination of fitness when making a decision to grant or maintain an individual's authorization and implement any recommendations from the SAE for treatment and followup testing. In § 26.187(g)(1)(iii), an SAE may be called upon to make a determination of fitness when there is a concern that an

individual may be impaired as a result of the use of prescription or over-the-counter medications or alcohol. Related provisions in § 26.77 [Management actions regarding possible impairment] require the licensee or other entity to rely upon the results of the SAE's determination of fitness when determining whether an individual may perform duties that require the individual to be subject to this part. Therefore, the NRC has added the paragraph for consistency with other related provisions in the rule.

The NRC has added § 26.187(g)(2) to the final rule to require the SAE to act as a referral source to assist an individual's entry into an appropriate treatment or education program. The provision also prohibits the SAE from engaging in any activities that could create the appearance of a conflict of interest. Section 26.187(g)(2)(i) prohibits the SAE from referring an individual to any organization with whom the SAE has a financial relationship, including the SAE's private practice, to avoid creating the appearance of a conflict of interest. However, § 26.187(g)(2)(ii)(A) through (g)(2)(ii)(D) specifies circumstances in which the prohibition in § 26.187(g)(2)(i) does not apply. In general, the rule permits the SAE to refer an individual to an entity with whom the SAE has a financial relationship in situations where treatment and educational resources may be limited by cost considerations or geographical availability. These provisions are necessary to ensure that the SAE's determinations are not influenced by financial gain and that individuals who are subject to the rule and the public can have confidence in the integrity and independence of the SAE function in Part 26 programs.

Section 26.189 Determination of Fitness

The NRC has added § 26.189 to the final rule to present in one section and amend former requirements related to the determination that an individual is fit to safely and competently perform the duties that require individuals to be subject to this part.

The final rule replaces the terms "medical assurance" and "medical determination of fitness" used in various sections of the former rule (e.g., § 26.27(a)(3), (b)(2) and (b)(4)) with the term "determination of fitness" as defined in this section. The NRC has made this change in terminology because the rule permits healthcare professionals other than licensed physicians to conduct determinations of fitness, as discussed with respect to § 26.187 [Substance abuse expert].

Therefore, the change meets Goal 6 of this rulemaking to improve clarity in the organization and language of the rule.

The NRC has added § 26.189(a) to the final rule. The first sentence of the paragraph defines the term "determination of fitness." This term refers to the process entered when there are indications that an individual may be in violation of the licensee's or other entity's FFD policy or is otherwise unable to safely and competently perform his or her duties. The final rule amends this definition as it was proposed, due to public comment, to clarify the intent of the provision.

In general, the final rule requires that professionals who perform determinations of fitness must be qualified and possess the requisite clinical experience, as verified by the licensee or other entity, to assess the specific fitness issues presented by an individual whose fitness may be questionable. The approach to designating the healthcare professionals who may conduct a determination of fitness focuses on the appropriateness of the professional's expertise for addressing the subject individual's fitness issue, rather than on the professional's organizational affiliation [see the discussion of § 26.69(b)(4)] or whether the individual is a licensed physician. Therefore, § 26.189(a)(1) through (a)(5) provides examples of the healthcare professionals who are qualified to address various fitness issues that may arise in a FFD program. When a decision must be made to determine whether an individual may be granted or maintain authorization and a substance abuse disorder is involved, only professionals who meet the requirements to serve as an SAE are permitted to make determinations of fitness under § 26.189(a)(1). The final rule permits other healthcare professionals to perform determinations of fitness that involve assessing and diagnosing impairment from causes other than substance abuse, such as clinical psychologists in § 26.189(a)(2), psychiatrists in § 26.189(a)(3), physicians in § 26.189(a)(4), or an MRO in § 26.189(a)(5), consistent with their professional qualifications. The final rule also permits other licensed and certified professionals who are not listed in the paragraph, such as registered nurses or physicians' assistants who have the appropriate training and qualifications, to perform a determination of fitness regarding specific fitness issues that are within their areas of expertise. However, the critical tasks of assessing the presence of a substance abuse disorder, providing input to authorization decisions, and

developing treatment plans are reserved for healthcare professionals who have met the specific training, clinical experience, and knowledge requirements for an SAE under § 26.187 for the reasons discussed with respect to that section.

The final rule also prohibits healthcare professionals who may conduct a determination of fitness for a Part 26 program from addressing fitness issues that are outside of their specific areas of expertise, consistent with the ethical standards of healthcare professionals' disciplines as well as State laws. The rule adds this prohibition to clarify that the ethical standards and State laws also apply to making determinations of fitness under Part 26 because a determination of fitness conducted by a professional who is not qualified to address the specific fitness issue would be of questionable validity. Therefore, the prohibition is necessary to meet Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs, as well as Goal 7 to protect the privacy and other rights (including due process rights) of individuals who are subject to Part 26.

Section 26.189(b)(1) through (b)(4) of the final rule lists and presents together the circumstances in which a determination of fitness must be performed, as required in other sections of the rule. Although this paragraph is redundant with other sections of the rule, these circumstances are listed in one paragraph to meet Goal 6 of this rulemaking to improve clarity in the organization and language of the rule, by grouping related requirements together in the order in which they would apply to licensees' and other entities' FFD processes.

Section 26.189(b)(1) reiterates the requirement in former Section 2.9(f) in Appendix A to Part 26 and § 26.185(k) of the final rule that a determination of fitness must be performed when there is a medical explanation for a positive, adulterated, substituted, or invalid test result, but a potential for impairment exists. For example, legitimate use of some psychotropic medications or medications for pain relief may cause impairment in some individuals and it may be necessary to limit the types of tasks the individual performs until the medication is no longer necessary or the person adjusts to its effects.

Section 26.189(b)(2) reiterates requirements in former § 26.27(b)(1) and (b)(4) and § 26.69(b) [Authorization after a first confirmed positive drug or alcohol test result or a 5-year denial of authorization] of the final rule that a determination of fitness must be

performed before an individual is granted authorization following an unfavorable termination or denial of authorization for a violation of a licensee's or other entity's FFD policy.

Section 26.189(b)(3) reiterates the requirement in § 26.69(c) [Granting authorization with other potentially disqualifying FFD information] that a determination of fitness must be performed before an individual is granted authorization when potentially disqualifying FFD information is identified that has not been previously addressed and resolved under the requirements of this subpart.

Section 26.189(b)(4) addresses other circumstances in which a determination of fitness may be required. For example, a determination of fitness may be necessary if an FFD concern has been raised regarding another individual, as required in § 26.27(c)(4), and if a licensee's or other entity's reviewing official requires one, under § 26.69(c)(3) and (d)(2).

The NRC has added § 26.189(c) to the final rule to establish requirements for a determination of fitness that is conducted "for cause." Specifically, § 26.189(c) requires that a determination of fitness that is conducted for cause must be conducted through face-to-face interaction. With respect to the proposed rule, the final rule clarifies that a face-to-face interaction is required only when there is observed behavior or a physical condition. This provision ensures that the professional who is performing the determination has available all of the sensory information that may be required for the assessment, such as the smell of alcohol or the individual's physical appearance. The NRC does not require a for-cause determination of fitness to be conducted under this section if there is an absence of physical or sensory information (*i.e.*, based solely on receiving information that an individual is engaging in substance abuse). The immediacy of the decision limits the amount of information that can be gathered and made available to the professional by others. The provision does not require that determinations of fitness for other purposes be conducted face-to-face. These other purposes may include, but are not limited to, the determination of fitness that is required when an applicant for authorization has self-disclosed potentially disqualifying FFD information. Determinations of fitness in these other circumstances would focus primarily on historical, rather than immediate, information. In these cases, the professional would have access to information that could be gathered by others about the individual,

and no time urgency would be involved in the evaluation. Therefore, NRC has added the paragraph to meet Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs. This provision also requires a face-to-face assessment in some circumstances where electronic means of communication could not provide the requisite information for the evaluation. It also permits other means of conducting the assessment when those means provide increased flexibility to licensees and other entities while continuing to achieve the goal of the evaluation.

Section 26.189(c)(1) through (c)(2) specifies the required outcomes of a for cause determination of fitness. The final rule provides an increased level of detail in these requirements to increase consistency in implementing the for cause determination of fitness process among FFD programs for the reasons discussed with respect to § 26.187.

Section 26.189(c)(1) requires that, if there is neither conclusive evidence of an FFD policy violation nor a significant basis for concern that the individual may be impaired while on duty, then the individual must be determined to be fit for duty. The licensee or other entity shall permit the individual to perform the duties that require the individual to be subject to this part.

Section 26.189(c)(2) requires that, if there is no conclusive evidence of an FFD policy violation, but there is a significant basis for concern that the individual may be impaired while on duty, then the individual must be determined to be unfit for duty. Such a determination does not constitute a violation of Part 26 or the licensee's or other entity's FFD policy. Therefore, no sanctions shall be applied. Examples of circumstances in which an individual may be determined to be unfit under this paragraph could include a temporary illness, such as a severe migraine headache, or transitory but severe stress in a personal relationship. These circumstances may impact an individual's ability to work safely for a short period, but would have no implications for the individual's overall fitness to perform the duties that require the individual to be subject to this part. In addition, the final rule requires the professional who conducts the determination of fitness to consult with the licensee's or other entity's management personnel to identify and implement any necessary limitations on the impaired individual's activities to ensure that the individual's condition would not affect workplace or public health and safety. If appropriate, the

individual may be referred to the EAP for assistance.

The NRC has added § 26.189(d) to the final rule to prohibit licensees and other entities from seeking a second determination of fitness if a determination of fitness under Part 26 has already been performed by a qualified professional who is employed by or under contract to the licensee or other entity. The paragraph also requires that the professional who made the initial determination must be responsible for modifications to the initial determination based on new or additional information. However, if the initial professional is no longer available, then the licensee or other entity is required to assist in arranging for consultation between a new professional and the professional who is no longer employed by or under contract to the licensee or other entity. The paragraph is necessary to ensure consistency and continuity in the treatment of an individual who may be undergoing treatment, aftercare, and followup testing. Therefore, this addition meets Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs.

Subpart I—Managing Fatigue

Section 26.201 Applicability

Section 26.201 specifies the licensees and other entities to whom the requirements in Subpart I apply. This section replaces, with limited editorial changes, § 26.195 of the proposed rule. Subpart I applies to licensees who are authorized to operate a nuclear power reactor (under § 50.57 [Issuance of operating license] of this chapter) and holders of a combined license after the Commission has made the finding under § 52.103(g) [Operation under a combined license] of this chapter, as specified in § 26.3(a), and licensees and other entities specified in § 26.3(c) at the time the licensee or other entity receives special nuclear material in the form of fuel assemblies. Also, Subpart I applies to Contractors/Vendors (C/Vs) who implement FFD programs or program elements upon which these licensees rely, as specified in § 26.3(d). As discussed in Section IV.D, the final rule requires nuclear power plant licensees to implement the requirements in Subpart I for the following reasons:

- (1) Fatigue and decreased alertness can substantively degrade an individual's ability to safely and competently perform his or her duties.
- (2) Conditions that contribute to worker fatigue are prevalent in the U.S. nuclear power industry.

(3) With the exception of NRC orders limiting the work hours of security personnel, the former NRC regulatory framework did not include consistent requirements to prevent worker fatigue from adversely impacting safe operations and the former requirements are difficult to readily and efficiently enforce.

(4) Reviews of nuclear power plant licensees' controls on work hours have repeatedly identified practices that are inconsistent with the NRC Policy on Worker Fatigue, including excessive work hours and the overuse of work hour limit deviations.

(5) The former regulatory framework was comprised of requirements that were inadequate and incomplete for effective fatigue management.

(6) Ensuring effective management of worker fatigue through rulemaking substantially enhances the effectiveness of FFD programs (i.e., the new requirements are cost-justified safety enhancements) and,

(7) Preventing the fatigue of workers in safety-critical positions through regulation is consistent with practices in foreign countries and other industries in the United States.

The requirements in the final rule also apply to C/Vs who implement FFD programs or program elements, to the extent that nuclear power plant licensees rely upon those C/V FFD programs or program elements to meet the requirements of this part. This final rule provision permits a licensee to rely on the fatigue management program of a C/V, which is consistent with former § 26.23(a), so long as the C/V relies on licensee-approved FFD programs and program elements, as retained in § 26.3 [Scope].

Subpart I does not apply to the materials licensees who are otherwise subject to Part 26 (see § 26.3) for two reasons. First, NRC analyses indicate that significant offsite radiological exposure is not a realistic accident consequence at a materials facility that is subject to Part 26 regulations because of the nature of the radioactive materials that are involved and the multiple layers of controls that NRC regulations require. Second, no analysis has been done to date to determine if there is evidence of excessive overtime use by the materials licensees. Therefore, at this time, the final rule does not impose the requirements of Subpart I on materials licensees. However, requirements to prevent fatigue from adversely affecting the job performance of security personnel at materials facilities provide a substantial enhancement to the security of these facilities. In SRM-COMSECY-04-0037,

“Staff Requirements: Fitness-For-Duty Orders to Address Fatigue of Nuclear Facility Security Force Personnel,” dated September 1, 2004, the Commission determined that FFD program enhancements related to the fatigue of security force personnel at independent spent fuel storage installations, decommissioning reactors, Category I fuel cycle facilities, gaseous diffusion plants, and the natural uranium conversion facility should be pursued as a separate rulemaking activity with additional stakeholder interactions.

Section 26.203 General Provisions

Section 26.203 establishes fatigue management requirements for licensees' FFD programs. This section replaces § 26.197 of the proposed rule with limited editorial changes. These editorial changes include the addition of recordkeeping requirements under § 26.197(d) and the removal of collective work hour requirements from § 26.197(e)(2) of the proposed rule. The general provisions in this section establish requirements for licensees' fatigue management policies, procedures, training, examinations, recordkeeping, and reporting. The NRC's objective in establishing these general provisions is to facilitate integrating fatigue management into licensees' FFD programs, as discussed in Section IV.D.

Section 26.203(a) [Policy] requires each licensee to have a written policy statement that describes its management's expectations and methods for managing fatigue to ensure that fatigue does not adversely affect any individual's ability to safely and competently perform his or her duties. This section replaces § 26.197(a) of the proposed rule with limited editorial changes. The policy required in this section will apply to all individuals subject to the licensee's FFD program and not just those individuals subject to the work hour requirements presented in § 26.205 [Work hours], which contains the revised work hour requirements presented in proposed § 26.199. The NRC considers the responsibility for ensuring that each individual is fit to safely and competently perform his or her duties to be shared between the licensee and the individuals who perform duties on the licensee's behalf. Therefore, the final rule requires each licensee's FFD policy to delineate the licensee's fatigue management policy. Thus, individuals who are subject to this policy will be aware of and can comply with the fatigue management requirements for which they will be held accountable.

The final rule requires each licensee to incorporate the fatigue management policy statement into the written FFD policy that is required under § 26.27(b) [Policy]. As discussed with respect to § 26.27(b), the final rule requires the policy statement to be clear, concise, and readily available, in its most current form, to all individuals who are subject to the policy.

The NRC's past experience with worker fatigue, such as that documented in NRC Regulatory Issue Summary (RIS) 2002-007, “Clarification of NRC Requirements Applicable to Worker Fatigue and Self-Declarations of Fitness-For-Duty,” dated May 10, 2002 (referred to in this document as RIS 2002-007), indicates that a need exists for individuals to clearly understand their own fatigue management responsibilities, as well as those of the licensee. These responsibilities include the individual's duty to report FFD concerns, including concerns related to the impact of fatigue on the individual's ability to safely and competently perform his or her duties, as well as concerns related to others, and the licensee's obligation to assess such fatigue-related FFD concerns. Further, the final rule does not prohibit licensees from imposing sanctions on individuals who fail to comply with the portions of the licensees' fatigue management policies that assign certain responsibilities to individuals. For example, a licensee may impose sanctions on an individual who fails to seek recommended treatment for a sleep disorder that, as part of a determination of fitness performed in accordance with § 26.189 [Determination of fitness], a healthcare professional has determined is adversely affecting the individual's job performance and potentially could be medically resolved. The final rule does not establish minimum sanctions for specific failures to comply with such fatigue management requirements because the reasons that an individual may report to work in a fatigued state are varied and often highly personal. Rather, the NRC prefers to permit licensees and the appropriate healthcare professionals to respond to such circumstances on a case-by-case basis. However, to protect an individual's rights under the rule, it is necessary for a licensee's fatigue management policies to communicate any sanctions that the licensee may impose on an individual for failing to comply with the policy's requirements.

Section 26.203(b) [Procedures] requires each licensee to develop, implement, and maintain procedures to carry out the fatigue management policy that § 26.203(a) [Policy] requires.

Procedures are necessary to ensure that licensees' fatigue management programs are properly and consistently implemented. This section replaces § 26.197(b) of the proposed rule with limited editorial changes.

Section 26.203(b)(1) requires licensees to develop, implement, and maintain procedures that describe the process that an individual subject to the licensee's FFD program should follow when reporting to a supervisor that he or she is unfit for duty because of fatigue (i.e., he or she makes a self-declaration). In RIS 2002-007, the NRC noted that self-declaration is an important adjunct to behavioral observation in meeting the requirements of the performance objective in former § 26.10(b) (as retained in § 26.23(c)), which is “to provide reasonable measures for the early detection of persons who are not fit to perform the duties that require them to be subject to this part.” Because individuals are the first line of defense against the potential for fatigue-related impairment to adversely affect their job performance, it is essential that all individuals who are subject to a licensee's FFD program understand when and how to make a self-declaration that they are unfit for duty. Individuals must also understand how the licensee's response to a worker's self-declaration will differ from a licensee's response to an individual's general statement of fatigue (e.g., casually commenting to a co-worker, “I'm really tired today”), if the individual does not express a concern that is specific to his or her FFD (e.g., formally stating to a supervisor, “I am too tired right now to check these valve lineups accurately”).

Section 26.203(b)(1)(i) requires the licensee's self-declaration procedure to describe the responsibilities and rights of individuals and licensees and the actions they must take with respect to an individual's self-declaration of fatigue. The licensee's self-declaration procedure may explain the employees' right to know what is going to happen to them if they self-declare, including any sanctions that may be imposed on them. The procedure may also describe the employees' right to privacy regarding the causes for the self-declaration. This section ensures that all parties involved in the self-declaration process understand the process and responsibilities and the extent and limitations of their rights related to self-declaration. The NRC has considered industry experience with individuals refusing to report to work on the basis that they were too tired. The NRC concluded that detailed procedures are necessary to specify (1) the individual's

responsibility to be available at work for a fatigue assessment, which must be conducted face-to-face under § 26.211(b) for the reasons discussed with respect to that section, (2) the individual's responsibility to cooperate with the fatigue assessment process by providing the necessary information (see the discussion of § 26.211(c)(2)), and (3) the licensee's responsibility for conducting a fatigue assessment in response to an individual's self-declaration, as required under § 26.211(a)(2), to determine whether, and under what controls and conditions if any, the individual is permitted or required to work. Section 26.211 [Fatigue assessments] retains with, limited editorial changes, the requirements in proposed § 26.201 [Applicability].

Section 26.203(b)(1)(ii) requires the licensee's self-declaration procedure to describe requirements for establishing controls and conditions under which an individual is permitted or required to perform work after that individual declares that he or she is not fit for duty as a result of fatigue. This portion of the procedure ensures correct and consistent implementation of the requirements in § 26.211(b), which states that a supervisor or staff member of the FFD program must conduct the fatigue assessment and determine whether, and under what conditions, an individual who has self-declared can be returned to duty. For example, the licensee's procedure will provide guidance on establishing appropriate controls and conditions under which an individual could be permitted or directed to return to work after declaring that he or she is unfit because of fatigue. Controls and conditions will include, but will not be limited to, (1) controls on the type of work to be performed (e.g., physical or mental, tedious or stimulating, individual or group, risk-significant or not), (2) the required level of supervision (continuous or intermittent) and other oversight (e.g., peer checks, independent verifications, quality assurance reviews, and operability checks), and (3) the need to implement fatigue countermeasures (e.g., naps, rest breaks). The purpose of the controls and conditions is to mitigate the risks to public health and safety or the common defense and security that a fatigue-induced human error could pose, as discussed in Section IV.D.

Section 26.203(b)(1)(iii) requires licensee procedures to describe the processes to be followed if an individual disagrees with the results of a fatigue assessment conducted in response to the individual's self-declaration. These procedures will address situations in

which the individual disagrees with the licensee's determination either that the individual is capable of performing work safely (with appropriate controls and conditions, if necessary) or that the individual cannot safely be permitted to perform the duties listed in § 26.205(a) [Individuals subject to work hour controls] because of fatigue. For example, the licensee's procedure may refer an individual who disagrees with the outcome of the fatigue assessment to the bargaining unit to initiate a grievance process, the employee concerns program, or the corrective action program.

The final rule adds this requirement for several reasons. First, in RIS 2002-007, the NRC documented concerns associated with past instances of self-declaration. These instances indicate the need for licensees to describe the processes to be followed if an individual disagrees with the results of a fatigue assessment following a self-declaration. In addition, at the public meetings discussed in the preamble to the proposed rule, several stakeholders asked the NRC to add this provision to the final rule to ensure that individuals have recourse if they disagree with the results of a fatigue assessment conducted in response to a self-declaration. Some of the stakeholders expressed a concern for the potential impact on public health and safety if an individual is convinced that he or she is too fatigued to perform work safely, but the licensee requires the individual to work. Other stakeholders expressed concerns that an individual may experience adverse employment and financial consequences if he or she is prevented from working because of fatigue.

The NRC agrees that licensee policies and procedures related to implementing the requirements of this subpart must address these potential issues to protect the rights of individuals subject to the rule. However, the final rule does not establish specific requirements for the process(es) to be followed in such instances for two reasons, (1) licensees have already implemented a number of processes for addressing similar safety and employment issues that provide appropriate mechanisms for resolving fatigue-related issues, and (2) the wide variety of possible issues that may arise limits the ability of a single mechanism established in the final rule to appropriately address them all. Therefore, the final rule requires licensees to have procedures for addressing situations in which an individual who has self-declared disagrees with the outcome of a fatigue assessment, but it does not require a

new process or specify the required characteristics of the licensee's process(es).

Section 26.203(b)(2) requires licensees to develop, implement, and maintain procedures that describe the process for implementing the work hour requirements in § 26.205. For example, the procedures will detail individual and organizational responsibilities and requirements, including items such as scheduling, tracking and calculating work hours, granting waivers from the individual work hour requirements, reviewing the implementation of the work hour requirements, documenting the results of the reviews, and implementing any necessary corrective actions. These procedures are necessary to ensure that individuals understand the work hour requirements to which they are subject and that licensees consistently implement the work hour requirements in § 26.205 as the NRC intends.

Section 26.203(b)(3) requires licensees to develop, implement, and maintain procedures that describe the process(es) they will follow in conducting a fatigue assessment, as required under § 26.211(a). These procedures will establish the methods by which the licensee will determine whether an individual is fatigued, whether the individual will be permitted or required to perform work, and whether controls and conditions are necessary for the individual to be able to perform work safely and competently. The licensee's procedure will address fatigue assessments that are conducted following an individual's self-declaration or an event, for cause, or to reassess an individual after returning the individual to work despite a self-declaration of fatigue (the situations in which the final rule requires licensees to conduct fatigue assessments are discussed in § 26.211(a)). Because of the potentially subjective and personal nature of the fatigue assessment task and the potential for conflict and sanctions (e.g., if an individual is found to have been asleep while on duty), comprehensive procedures are necessary to ensure consistent implementation of the fatigue assessment requirements in § 26.211. Therefore, the NRC expects these procedures to describe measures to ensure that fatigue assessments (1) are performed by properly trained personnel, (2) are free of bias, (3) methodically address the factors that commonly contribute to fatigue, (4) are based on complete and accurate information, (5) protect the privacy of the individuals being assessed, (6) recognize the fact that an individual can

be fatigued and unfit for duty even though he or she has not exceeded the work hour limits, (7) are thoroughly documented, and (8) are reviewed, as required by § 26.205(e)(1)(iii). These procedures are necessary to implement the requirements in this subpart and protect the privacy rights and other rights of individuals, consistent with Goal 7 of this rulemaking.

Section 26.203(b)(4) requires licensees to develop, implement, and maintain procedures that describe the disciplinary actions they may impose on individuals, if any, following a fatigue assessment (e.g., termination or leave without pay) and the conditions and considerations for imposing those disciplinary actions. In the final rule, the NRC revised § 26.203(b)(4) to replace the word "sanctions" with the words "disciplinary actions" to avoid confusion that might develop from the multiple meanings of the word "sanctions." During the public meetings discussed in the preamble to the proposed rule, several industry representatives indicated that licensees may rely upon the results of a fatigue assessment as the basis for determining that an individual has not met management expectations for maintaining his or her FFD. Although the NRC neither endorses nor prohibits the imposition of disciplinary actions in cases of fatigue, clear communication regarding possible disciplinary actions and the considerations for taking those disciplinary actions is necessary for individuals to meet their responsibility for self-declaration without unwarranted fear of potential outcomes. For this reason, procedures are necessary to ensure that licensees fully disclose the conditions under which disciplinary actions will be considered; the nature of the possible disciplinary actions; and the process for administering and imposing the disciplinary actions, including management's expectations and the individual's right to a review of the determination that he or she has violated the FFD policy, as required under § 26.39 [Review process for fitness-for-duty policy violations].

Section 26.203(c) [Training and examinations] establishes fatigue-related training and examination requirements in addition to those required under § 26.29(a) [Training content] and (b) [Comprehensive examination]. This section retains without change the requirement in § 26.197(c) of the proposed rule. Several of the knowledge and abilities (KAs) requirements listed in § 26.29(a) ensure that individuals are familiar with a licensee's or other entity's fatigue policies and procedures.

However, individuals who are subject to Subpart I should also have a working-level knowledge of specific, fatigue-related topics that may facilitate personal decisions and actions that are consistent with the objective of preventing, detecting, and mitigating the adverse effects of fatigue on worker job performance. Individual workers typically do not possess these KAs without training (Folkard and Tucker, 2003; Knauth and Hornberger, 2003; Monk, 2000). Therefore, the final rule requires licensee FFD training and testing programs to address the topics specified in § 26.203(c)(1) and (c)(2).

Section 26.203(c)(1) requires FFD training and examinations to ensure that individuals who are subject to Subpart I understand 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. Examples of topics that licensee training and examinations will address that are related to this KA will include, but are not limited to, (1) the principal factors that influence worker fatigue, (2) knowledge that a worker's ability to perform and remain alert is influenced by physiological changes that follow a daily pattern, (3) the time periods during which workers are most likely to exhibit degraded alertness and performance, (4) the principal symptoms of common sleep disorders (e.g., sleep apnea and insomnia) and the conditions that can contribute to their onset, (5) the methods for optimizing sleep periods on a shiftwork schedule, and (6) how to safely and effectively counteract fatigue with measures such as caffeine and strategic napping. Knowledge of these topics is necessary to ensure that individuals are able to (1) self-manage fatigue that is caused by shiftwork and factors other than work hours, (2) take actions to maintain their alertness at work, and (3) recognize and seek treatment for sleep disorders that might be creating or exacerbating their own fatigue. In addition, training in methods for coping with the challenges of shiftwork may contribute to a more stable workforce by reducing worker turnover. A Circadian Technologies, Inc. survey of 550 facilities in the United States and Canada found that turnover at facilities with operations extending beyond 7 a.m. to 7 p.m. averaged 10 percent in 2003, compared with 3.4 percent in all U.S. companies. Facilities offering no training on specific coping strategies had an average turnover rate of 11.4 percent, compared to 7.6 percent

for facilities that offered such training to their employees, and 2.9 percent for those offering the training to employees and their family members (Circadian Technologies, Inc., 2004).

Section 26.203(c)(2) requires FFD training and examinations to ensure that individuals who are subject to Subpart I have the ability to identify symptoms of worker fatigue and contributors to decreased alertness in the workplace. Examples of topics that are related to this KA will include, but are not limited to, (1) behavioral symptoms of fatigue (e.g., yawning, red eyes, prolonged or excessive blinking, irritability), (2) task conditions that may contribute to degraded alertness and increased fatigue (e.g., repetitive tasks, tasks with high cognitive or attentional demands, tasks that require the individual to be sedentary, tasks that limit social interaction), and (3) environmental conditions that may contribute to degraded alertness and increased worker fatigue (e.g., high heat and humidity, low lighting, and low-frequency noise/white noise). Requiring individuals to be trained on this KA is necessary to ensure that an individual is able to determine when it is appropriate to self-declare that he or she is unfit for duty because of fatigue, as permitted under § 26.209 [Self-declarations] and § 26.211(a)(2), and to determine when it is appropriate to report an FFD concern about another individual who, based on behavioral observations, is exhibiting indications of fatigue, as required under § 26.33 [Behavioral observation].

Section 26.203(d) [Recordkeeping] establishes recordkeeping requirements related to the implementation of Subpart I. This section includes, with revisions, the requirements presented in § 26.197(d) of the proposed rule. Specifically, § 26.203(d)(1), which retains § 26.197(d)(1) of the proposed rule without change, requires licensees to retain records of the number of hours worked by individuals who are subject to the work hour requirements established in § 26.205. Section 26.203(d)(2) requires licensees to retain records of shift schedules and shift cycles of individuals who are subject to the work hour requirements established in § 26.205. The NRC added this requirement to the final rule. Section 26.203(d)(3) through (d)(5) retains the requirements in proposed § 26.197(d)(2) through (d)(4) without changes. Specifically, § 26.203(d)(3) requires licensees to retain records of the number of, and the bases for, waivers they have granted, § 26.203(d)(4) requires licensees to retain documentation of the work hour reviews that are required under § 26.205(e)(3) and (e)(4), and

§ 26.203(d)(5) requires retaining documentation of any fatigue assessments licensees conduct. The NRC removed the proposed § 26.197(d)(5) from the final rule because the NRC eliminated the collective work hour requirements. The final rule establishes these recordkeeping requirements for four reasons: (1) These records are necessary to ensure that documentation of the licensee's fatigue management program is retained and available for NRC inspectors to verify that licensees are complying with the work hour requirements and waiver and fatigue assessment provisions, (2) the documentation is necessary for a review process under § 26.39 or in legal proceedings related to a determination that an individual has violated the fatigue provisions of an FFD policy, (3) the documentation is necessary to perform the trending and self-assessments that § 26.205(e) [Reviews] requires; and (4) the documentation is necessary to meet the reporting requirements in § 26.203(e) [Reporting]. To ensure that the records remain available for NRC inspections and the review process or legal proceedings, the final rule requires licensees to retain these records for 3 years or until the completion of any related legal proceedings, whichever is later.

Section 26.203(e) [Reporting] requires licensees to report to the NRC certain data related to their fatigue management programs as part of the annual FFD program performance report, which § 26.717 [Fitness-for-duty program performance data] requires. This requirement replaces, with revisions, § 26.197(e) of the proposed rule. This section is revised to specify that reports are required in a standard format. The final rule requires licensees to include the following information in the annual report: (1) Information on the number of waivers granted from work hour requirements in the previous calendar year, and (2) a summary of corrective actions, if any, resulting from the analyses of these data, including fatigue assessments. This section does not retain the requirements in the proposed § 26.197(e)(2) for the reporting of information pertaining to the control of collective work hours because the final rule does not include collective work hour limits. In addition, this section does not retain the proposed rule requirement for licensees to report a summary of instances of fatigue assessments that the licensee conducted.

The NRC considered comments that the requirements for including fatigue management information should be

deleted from the rule because they will not provide new or unique information to the NRC, are unnecessary to protect public health and safety, are unnecessary to facilitate NRC oversight of the revised rule, and are unduly burdensome. In choosing to retain reporting requirements for waiver use, the NRC considered several aspects of the work hour requirements in the final rule. First, the NRC established the work hour limits in the final rule at levels such that the potential for fatigue is substantive for individuals working in excess of those limits. Second, the rule permits licensees to authorize waivers of the limits only for circumstances in which the additional work hours are necessary to prevent or mitigate a condition adverse to safety or security. Finally, the rule only requires a waiver if the individual is operating or maintaining an SSC that a risk-informed evaluation process has shown to be important to the protection of public health and safety or if the individual is performing specified functions that are essential to an effective response to a fire, plant emergency, or implementation of the site security plan. As a result, information concerning licensee use of waivers indicates (1) the number of hours worked on risk-significant activities by individuals at increased potential for impairment, and (2) how often a licensee must mitigate or prevent a condition adverse to safety while using individuals at increased potential for impairment. The NRC considers this unique information, not otherwise reported, to be relevant to the agency's mission.

The NRC similarly considered the need to retain reporting requirements regarding fatigue assessment and any management actions in response to the fatigue assessments. The NRC concluded that the fatigue assessment information that would have been reported under the proposed rule requirements are more the purview of a licensee's corrective action program, and would have been more detailed than the program performance data for drug and alcohol testing required under § 26.717(c) of the final rule. Accordingly, the final rule requires licensees to report a summary of corrective actions, if any, resulting from the licensee's analysis of waiver and fatigue assessment data. As a consequence, the required reports will provide information that will focus more on licensee performance in managing worker fatigue and will enable the NRC to review licensee reporting of waivers in the context of associated corrective actions.

The NRC expects that the information provided by licensees in response to the annual reporting requirements in Subpart I will facilitate NRC oversight of the implementation of the requirements through the following means:

- Consistency, efficiency, and continuity of NRC oversight—Information provided through the annual FFD program performance reports concerning fatigue management will enable the NRC to achieve a higher level of consistency and efficiency in the oversight of the implementation of the requirements in Subpart I and in the enforcement of those requirements. Without the reporting requirements, the NRC's inspection of licensee FFD programs would likely be limited to individual inspectors evaluating licensee fatigue management for a sample of workers at a site for a limited time period. These assessments would necessarily be conducted without the benefit of broader contextual information of the site and industry normative information that would be available through the annual reports. In contrast, the annual reports will help ensure a common perspective and maintain consistency among inspectors conducting the oversight process. In addition, the annual reports can enhance the efficiency of the NRC inspection process by providing information necessary to allow the agency to focus inspection resources on duty groups (e.g., security or maintenance) or issues (e.g., self-declaration) that may warrant review. The reports will enable the NRC to be better focused in preparing for the inspection, reduce the burden of onsite inspection hours, and potentially reduce the total number of hours required for a baseline inspection. Furthermore, the annual reporting will also help to achieve a more complete and continuous assessment of licensee performance because the NRC intends to conduct the baseline inspection of FFD programs only once every 2 years.

- Evaluation of rule implementation for lessons learned—Although the NRC and stakeholders have made extensive efforts to ensure clear and enforceable requirements that are effective and practical for the management of worker fatigue, the rule introduces the potential for unintended consequences and lessons learned. In addition, changes in the size and composition of the nuclear industry may have unforeseen implications for site staffing and fatigue management. The NRC expects that the site-specific and normative information obtained through the annual reports can provide important insights regarding opportunities to amend the rule to

improve its effectiveness or reduce unnecessary burden. The NRC notes that such information was the basis for reducing the random testing rate for drugs and alcohol required in the final rule.

- Consistent interpretation of waiver criterion—The final rule provides licensees the discretion to use waivers to exceed the work hour limits, thereby allowing levels of work hours that could adversely affect worker FFD. The principal basis for allowing waivers is to reduce the additional staffing burden that licensees would otherwise incur if waivers were not available to address exigent circumstances. The annual reporting of waiver use will enable the NRC to ensure that licensees use this discretion in a manner consistent with the objectives of the rule and not as a means to compensate for a lack of adequate staffing. Furthermore, although the use of waivers is limited to conditions when the work hours are “necessary to prevent or mitigate a condition adverse to safety or security,” the NRC recognizes the potential for licensees to develop different interpretations regarding this criterion. Some industry commenters on the proposed rule took exception to the NRC’s characterization of high levels of waiver use at some sites as abuse. These commenters suggested that differences in licensee waiver practices could be attributed to the policy being subject to a number of interpretations during the many years that it has been in effect. Regardless of the cause of the differences in licensee use of work hour control waivers, the NRC considers it prudent to address, through rulemaking, the lessons learned from past implementation of the policy and provide a level of oversight through the annual reporting requirement that will ensure consistent implementation of the waiver criteria in the future.

In addition to the reasons cited in the preceding paragraphs explaining the need for reporting requirements to ensure the effective and efficient oversight of the implementation of the rule, the NRC considers the reporting requirements to be justified and beneficial for the following additional reasons:

- Consistency with Part 26 requirements and performance objective—The final rule retains the requirement that licensees report the results of drug and alcohol testing and the performance objective for reasonable assurance that individuals are not impaired from any cause (§§ 26.719 [Reporting requirements] and 26.23(b) of the final rule, respectively). In addition, several studies discussed in detail in

Section IV.D of this document have demonstrated that worker fatigue can produce levels of impairment that are comparable to blood alcohol concentrations above the levels permitted by this rule. Furthermore, given the frequency of worker concerns regarding fatigue and the work scheduling practices that are common during outages, the incidence of impairment from fatigue is likely to be greater than the very low incidence of drug and alcohol use that is detected through testing. The NRC therefore considers the reporting of information pertaining to licensee management of worker fatigue to be consistent with (1) the requirements for reporting information pertaining to drug and alcohol testing, (2) the performance objective of this rulemaking for licensees to implement a comprehensive FFD program, and (3) the NRC’s belief that the management of worker fatigue is no less important to worker FFD than the effective detection and deterrence of drug and alcohol use.

- Public confidence—Public interest groups such as the UCS and the Project on Government Oversight have commented at public meetings that relevant information regarding worker fatigue is withheld to either protect alleged identity or, in the case of security personnel, plant security. In addition, several public media articles have been published during the past 2 years reporting instances of guards sleeping and guards fearing repercussions for refusing forced and excessive overtime. Information submitted by licensees in the annual reports will be publicly available and will reassure public stakeholders that the NRC is appropriately cognizant of licensee actions regarding fatigue management and that the NRC’s oversight of these activities is transparent to all stakeholders.

- The burden is limited and justified—Section 26.203(e) requires licensees to report information concerning management of worker fatigue as part of the annual FFD program report. As a result, the burden associated with this reporting requirement is an incremental change to the reporting requirement for drug and alcohol testing. In addition, the fatigue management information required by § 26.203(e) is largely information that licensees will have already generated to demonstrate compliance with other provisions of Subpart I. As a result, the burden associated with the report will be largely associated with compiling the information in an appropriate form and reviewing that compilation. The NRC has reviewed the public comments

suggesting that the agency underestimated the number of clerical and management hours associated with this requirement and has taken these comments into consideration in estimating the burden of the reporting requirements in § 26.203(e) of the final rule. Nevertheless, the NRC considers the burden associated with the annual reporting requirements to be justified for the reasons described in this and the preceding paragraphs.

The NRC also considered comments that the reporting requirement ignores significant duplication in licensee efforts. The NRC agrees that § 26.205(e) of the final rule requires licensees to periodically review and assess the effectiveness of the work hour controls and that the licensee’s corrective action program, which is routinely inspected by the NRC, will document and trend these reviews. However, as noted previously, the NRC considers the annual reports to be a limited burden that will enable the NRC to provide more effective and consistent oversight and achieve other objectives for the effective implementation of the requirements in Subpart I.

Section 26.203(e)(1) requires licensees to provide the NRC with an annual summary of all instances during the previous calendar year in which the licensee waived each of the work hour controls specified in § 26.205(d)(1) and (d)(2) for each of the duties listed in § 26.4(a)(1) through (a)(5). This section revises the requirements in proposed § 26.197(e)(1). The agency revised this reporting requirement in response to comments that the required information would not provide a meaningful indication of licensee performance in managing work hours because a number of valid conditions may warrant waivers of work hour controls.

Section 26.203(e)(1) revises the reporting requirements in proposed rule § 26.197(e)(1) to clarify that licensees are required to report the number of waivers for each work hour requirement and not the sum total of all waivers for all work hour requirements. For example, if the licensee permits an operator to work 18 hours in a 24-hour period three times in a year, another operator to work 80 hours in a 7-day period, and another operator to take a rest break of only 6 hours between shifts, then the licensee will report that it granted three waivers of § 26.205(d)(1)(i), one waiver of § 26.205(d)(1)(iii), and one waiver of § 26.205(d)(2)(i), for the operations group that year. This clarification ensures that the waiver information is reported at a level of detail that will enable the NRC to know which limits

are most frequently exceeded and therefore better understand the specific scheduling challenges to licensee management of worker fatigue.

Section 26.203(e)(1) also requires licensees to include only those waivers under which work was actually performed in the annual report. This section contains requirements presented in § 26.197(e)(1)(i) of the proposed rule. The final rule retains this provision of the proposed rule because it may sometimes be unnecessary for individuals to work the extended hours for which a licensee planned when granting a waiver. Licensees may anticipate that it will be necessary to waive one or more of the work hour controls listed in § 26.205(d)(1) and (d)(2) in order to complete a task and so will implement the process specified in § 26.207 [Waivers and exceptions] for granting waivers. However, on some occasions, the work will be finished sooner than the licensee anticipated with the result that the waiver was granted but no one was required to work an extended work period. The final rule requires licensees to exclude waivers under which no work was performed from the annual report because this circumstance provides no meaningful information about the licensee's management of fatigue during extended work periods.

Section 26.203(e)(1) further specifies that licensees shall report all waivers granted for each of the work hour controls in § 26.205(d)(1) through (d)(5) for those instances in which a single extended work period required a waiver of more than one work hour control. This section contains the requirements presented in § 26.197(e)(1)(ii) of the proposed rule. For example, if an individual works 12 hours on day 1 and on day 2 the licensee needs the individual to work more than 16 hours to resolve a condition adverse to safety, the licensee would need to authorize and report a waiver of § 26.205(d)(1)(i), for exceeding 16 hours in a 24-hour period, and (d)(1)(ii), for exceeding 26 hours in a 48-hour period. Although this example included only one work period, both waivers are required and must be reported because the potential for fatigue results not only from the length of the workday (e.g., exceeding 16 hours of work in a 24-hour period) but also the cumulative effect of prior work (e.g., exceeding 26 hours of work in a 48-hour period).

Section 26.203(e)(1)(i) and (e)(1)(ii) requires licensees to report whether work hour controls are waived for individuals working on normal plant operations or working on outage activities. In establishing this

requirement the NRC considered comments that the use of waivers should be considered in context. Through its review of authorized waivers from the work hour limits in plant technical specifications, the NRC has found that waivers are most frequently associated with outage activities. Accordingly, the NRC has revised the final rule to require licensees to report whether a waiver of the work hour requirements in § 26.205 was associated with an outage activity. This revision will enable the NRC to better understand a site's changes in waiver use over time and understand why certain annual reports for a given site may indicate a heightened level of waiver use relative to the site's other reports.

The NRC recognizes that outages are not the only cause of waivers; however, the agency expects that most other causes of waiver use will be for substantially shorter periods of time or involve smaller groups of workers and that these other conditions would not have a substantive effect on overall waiver use. For unique causes that may have more substantive effects (e.g., licensee response to hurricanes), the NRC is likely to be aware of or able to identify these conditions if they were to significantly affect waiver use. Furthermore, the NRC intends to consider waiver use in conjunction with the reported fatigue assessment information. Therefore, the agency will be able to determine whether waiver use may be associated with the incidence of fatigue assessments conducted for cause, following events, or in response to self-declarations by individuals asserting that they are not able to safely and competently perform their duties because of fatigue. The NRC notes that the frequency of waiver use (i.e., how often individuals exceed the work hour limits while performing functions important to safety and security) indicates the potential for worker fatigue to affect the performance of these functions, regardless of whether a waiver is the result of an activity associated with an outage or a cause that is beyond the licensee's control.

Section 26.203(e)(1)(i) requires licensees to report 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)(iv) was waived for individuals not working on outage activities. Section 26.203(e)(1)(ii) requires licensees to report 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)(iv), and (d)(4)

and (d)(5)(i) was waived for individuals working on outage activities. The differences between § 26.205(e)(1)(i) and (e)(ii) in the work hour requirements specified reflects whether requirements are applicable to outage activities.

Section 26.203(e)(1)(iii) requires licensees to report a summary that shows the distribution of waiver use among the individuals within each category of individuals § 26.4(a) identifies. This summary will show, for example, how many individuals received only one waiver during the reporting period, how many individuals received two waivers, how many received three waivers, and so on. This reporting requirement enables the NRC to determine the extent to which waivers are concentrated among a few individuals or distributed more broadly within a group of individuals who perform the same duties. The NRC incorporated this requirement in the final rule in response to comments that the rule should also require licensees to report the number of workers covered under § 26.199(a) of the proposed rule to provide an appropriate context for the annual reporting of waivers. The NRC understood that the intent of this comment was to provide a basis for evaluating the number of waivers from the work hour controls relative to the number of individuals subject to those controls. The NRC chose not to require licensees to report the number of individuals covered under § 26.4(a) of the final rule because that number will vary throughout the course of the reporting period, particularly when the reporting period includes a unit outage. In addition, the NRC believes that the required distribution of waivers more effectively provides context to the waiver use by indicating if the waivers were concentrated among individuals performing a certain duty and if the waiver use in a duty group was associated with relatively few individuals or distributed among many individuals.

The waiver data that licensees are required to report to the NRC under § 26.203(e)(1)(i) through (e)(1)(iii) are important because waivers represent "assumed risk." As discussed in Section IV.D, fatigued workers experience impaired cognitive functioning, including difficulties in decisionmaking and maintaining attention. If a licensee permits an individual to work extended hours that cause the individual to become fatigued, the individual may experience momentary lapses in attention or degraded decisionmaking from fatigue. These performance degradations can be mitigated by establishing controls and conditions

under which the individual is permitted to work, as required under § 26.211(e). However, controls and conditions can reduce, but not eliminate, the potential risks from fatigue-induced errors. The more often that a licensee permits individuals to exceed work hour limits, the more risk from fatigue-induced errors a licensee is assuming. The risk of fatigue-induced errors increases further when an individual is permitted to exceed more than one of the work hour limits contained in § 26.205(d)(1)(i) through (d)(1)(iii) because of the potential for the combined effects of both acute and cumulative fatigue. Any waivers from the rest breaks that are required under § 26.205(d)(2) or the minimum day off requirements of § 26.205(d)(3) through (d)(5) will also contribute to the accumulation of a sleep deficit, especially when inadequate rest breaks are combined with long work hours. Repeated and continual use of waivers may indicate a staffing or other programmatic weakness at a site that warrants additional inspection resources. Therefore, the NRC considers the number of waivers granted from the work hour limits to be a key element in evaluating FFD program performance.

Section 26.203(e)(2) requires that licensees include in the annual report the reporting of corrective actions resulting from the analyses of waiver and fatigue assessment data. The NRC considers the reporting of a summary of corrective actions to be consistent with the requirement of § 26.717 for reporting of drug and alcohol test results. For example, the NRC views the number of for-cause drug and alcohol tests that a licensee conducts each year to be one indicator of the health of the licensee's behavioral observation program and its effectiveness in meeting the rule's performance objective identified in § 26.23(c) to provide for the early detection of individuals who are not fit to perform the duties that require them to be subject to this part. The NRC similarly views the reporting of corrective actions resulting from the analyses of these data, including fatigue assessments, to be another indicator of the health of the licensee's behavioral observation and self-declaration processes with respect to fatigue. Annual reports, which will include the distribution of waiver use among individuals performing the same duties, will enable NRC to determine the extent to which waivers are concentrated among a few individuals or distributed broadly among individuals within each category specified in § 26.4.

Collectively, the reporting of waivers required in § 26.203(e)(1) and the

reporting of corrective actions required in § 26.203(e)(2) provides important information concerning the effectiveness of fatigue management at a licensee site. The reports permit the NRC to (1) efficiently monitor the ongoing effectiveness of licensees' fatigue management programs by providing interpretable data, (2) efficiently allocate inspection resources, (3) track the effectiveness of the requirements of Subpart I in controlling the fatigue of nuclear power plant workers, (4) assess whether the objectives of the final rule are being achieved, and (5) determine whether any further changes to the requirements are necessary to ensure that worker fatigue is managed consistent with the intent of the provisions.

Section 26.203(f) [Audits] requires the licensee to audit the management of worker fatigue as part of the overall FFD program audits required in § 26.41 [Audits and corrective action]. This section does not add a new requirement, but is included in Subpart I for clarity.

Section 26.205 Work Hours

The NRC substantively revised § 26.199 of the proposed rule in response to public comments. The revised provisions are in § 26.205 of the final rule and establish controls on the work hours of select individuals who are subject to nuclear power plant licensees' FFD programs, as follows.

Section 26.205(a) [Individuals subject to work hour controls] establishes the scope of individuals who are subject to the work hour requirements in § 26.205. These individuals are subject to the work hour requirements, in addition to the training, behavioral observation, and self-declaration requirements of Subpart I that apply to all individuals who are subject to nuclear power plant licensees' FFD programs. In determining the scope of personnel who are subject to the work hour controls, the NRC considered the burdens on individuals and licensees associated with the practical control of work hours in conjunction with the potential for individuals' work activities to affect public health and safety or the common defense and security if their performance is degraded by fatigue. The NRC also considered the nature of these individuals' work activities and work environments relative to their potential to induce or exacerbate fatigue (e.g., whether the work is monotonous or the environment is not stimulating), the risk significance of the work, and the potential for other controls to prevent or mitigate the consequences of a fatigue-related error. As a result of these deliberations, the rule requires that individuals who perform the duties

specified in § 26.4(a)(1) through (a)(5) must be subject to work hour controls. The duties specified in § 26.4(a)(1) through (a)(5) are the same as the duties that were specified in § 26.199(a)(1) through (a)(5) of the proposed rule. Rather than list the duties in § 26.205(a), the final rule references § 26.4(a) which provides a consolidated list of individuals subject to the requirements of Part 26.

Section 26.205(a) requires that individuals identified in § 26.4(a)(1) (i.e., individuals who operate or provide onsite direction of the operation of systems and components that "a risk informed evaluation process has shown to be significant to public health and safety") must be subject to the work hour requirements in this section. To implement the work hour requirements, nuclear power plant licensees are required to delineate the operations personnel who are subject to the work hour requirements, on the basis of the risk significance of the safety SSCs being operated. At a minimum, this must include personnel who are performing activities on SSCs that are determined to be significant to public health and safety. To delineate the scope of the operations duty group, licensees can use, for example, the risk-significance determination process and criteria that they currently employ to meet the requirements of § 50.65(a)(4) of this chapter for assessing and managing the risk associated with maintenance activities. The work hour requirements of § 26.205 would typically apply to individuals who are operating or directing, while on site, the operation of SSCs that are included within the scope of an assessment required by § 50.65(a)(4). Therefore, the work hour requirements would apply to the individuals who most directly affect the operation of those SSCs most important to the protection of public health and safety. Controlling the work hours of these individuals would achieve the NRC's objective to minimize the potential for fatigue-related errors in operating these risk-significant SSCs.

Licensed operators who perform the duties specified in § 26.4(a)(1) are responsible for correctly performing actions that are necessary for the safe operation of nuclear power plants and the mitigation of accidents at these facilities. These responsibilities include monitoring the plant for off-normal conditions and taking appropriate actions to prevent these conditions from challenging the reactor core, safety systems, and fission product barriers. The importance of licensed operator actions to the protection of public health and safety is reflected in the 10

CFR Part 55, "Operators' Licenses," requirements that are applicable to these individuals, including specific licensing, examination and testing, requalification, and FFD requirements. In addition to performing actions that are necessary for accident mitigation, operator actions, if performed incorrectly, can be accident initiators. Section IV.D discussed the effects of fatigue on decisionmaking, risk-taking, communications, and other key skills. Fatigued operators have an increased potential to commit errors, raising the probability of component failures, system misalignments, and incorrect execution of accident mitigation strategies. Operator actions are highly dependent on cognitive skills (e.g., attention, decisionmaking) that are susceptible to fatigue, and operators are frequently exposed to conditions that can induce fatigue (e.g., long work hours, shiftwork). The NRC highlighted this concern in 1982 by issuing its Policy on Worker Fatigue. The Policy specifically addressed the need for "controls to prevent situations where fatigue could reduce the ability of operating personnel to keep the reactor in a safe condition."

Despite the NRC's Policy on Worker Fatigue and subsequent technical specifications to limit operator work hours, an NRC staff review of technical specification implementation from 1997–99 found that a significant percentage of licensed and non-licensed operators worked more than 600 hours of overtime in a year (Attachment 1 to SECY-01-0113, "Rulemaking Plan: Fatigue of Workers at Nuclear Power Plants"). This level of overtime is two to three times the level that is permitted for operations personnel at some foreign nuclear plants and twice the level recommended by a 1985 expert panel (NUREG/CR-4248). In addition, the NRC staff has noted that some licensees appeared to be abusing the authority to permit deviations from the technical specification limits on working hours, including deviations for operators. For example, data provided by NEI on August 29, 2000, from J. W. Davis, NEI, to G. T. Tracy (ADAMS Accession No. ML003746495), indicated that during a sample of 37 refueling outages conducted in 1999, licensees authorized more than 1,800 deviations for licensed operators and more than 1,100 deviations for non-licensed operators. This frequency of deviations is inconsistent with the intent of the NRC's Policy on Worker Fatigue that deviations should be authorized only for "very unusual circumstances." The failure of some licensees to limit the

work hours of operations personnel, considered together with the risk significance of the activities performed by operators, indicates the need for more readily enforceable work hour limits for operators whose job duties are important to protect public health and safety.

Further, the work hour requirements in § 26.205 also apply to individuals who direct risk-significant operations on site. These individuals include management on shift, such as shift operations management or special outage managers, if those individuals provide direction to operators. Individuals to whom the work hour requirements apply also include engineers who provide onsite technical direction to operations, such as test directors or reactor engineers. These individuals perform tasks that are often highly dependent on cognitive skills (e.g., problem-solving, decisionmaking, communications) and are susceptible to fatigue-induced errors, as described in Section IV.D. Incorrect technical direction provided to operators can significantly challenge licensed operators and increase the possibility of errors or events, particularly when the direction is provided by an individual who supervises the operators or an individual who the operator reasonably expects to have specialized technical knowledge of the system or component being operated.

Section 26.205(a) requires that individuals identified in § 26.4(a)(2) (i.e., individuals who perform health physics or chemistry duties that are required of the onsite emergency response organization minimum shift complement) must be subject to the work hour requirements of this section. Although § 26.207(d) [Plant emergencies] exempts licensees from applying the work hour controls during declared emergencies, the intent of this provision is to provide reasonable assurance that the work schedules of these individuals during non-emergency conditions ensure that fatigue does not compromise their abilities to safely and competently perform their duties should an emergency occur. NUREG-1465, "Accident Source Terms for Light-Water Nuclear Power Plants," concluded that significant fission product releases from the bulk of the fuel can occur within 30–60 minutes after the onset of an accident. As a function of the accident and its severity, certain areas within the plant, while predictable and benign during normal operations, could present elevated levels of airborne/external radiation levels (greater than 300 Rad/hour). Additionally, industrial hazards (e.g., explosive mixtures, smoke, toxic

gas, oxygen deficiency) that may be immediately dangerous to life and health could be present. In these circumstances, health physics technicians (HPTs) support necessary plant staff actions to assess conditions, perform search and rescue missions, and take timely mitigation actions (e.g., local manual operations by operators). The overall success of responding safely and appropriately to emergencies and the protection of public health and safety depends, in part, on the ability of HPTs to safely and competently perform their emergency response duties.

Similarly, NUREG-0654, Revision 1, "Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants," issued March 2002, identifies the need for an on-shift chemistry/radiochemistry emergency response capability. An on-shift chemistry technician(s) provides an important component for a successful response at the onset of a radiological emergency. The independent and timely actions of the chemistry technician(s) in response to a radiological event can provide key information for assessing core status and estimating the source term of a potential release. By providing defense-in-depth support for operations personnel, chemistry technicians also assist with offsite dose calculations and ancillary radiological protection tasks, such as sampling spaces for toxic gases or explosive mixtures. Chemistry technicians may also be needed to conduct analyses for the detection of hydrogen and oxygen gas concentrations in both the reactor coolant and the containment atmosphere. These analyses support severe accident management decisions with respect to minimizing radiological release potential. As a consequence, ensuring that chemistry technicians are able to safely and competently perform their emergency response duties is essential to the overall success of responding safely and appropriately to emergencies and to the protection of public health and safety.

Section 26.205(a) requires that individuals identified in § 26.4(a)(3) (i.e., individuals who are performing the duties of a fire brigade member who is responsible for understanding the effects of fire and fire suppressants on safe shutdown capability) must be subject to the work hour requirements of this section. The work hour requirements are applicable to the members of the fire brigade who are responsible for providing the control room operators and fire brigade leader with information that is critical to implementing a fire mitigation strategy

to maintain safe shutdown capability for the reactor. Attachment 1 to SECY-99-140, "Recommendation for Reactor Fire Protection Inspections," dated May 20, 1999, states that "based on IPEEE results, fire events are important contributors to the reported core damage frequency (CDF) for a majority of plants. The reported CDF contribution from fire events can, in some cases, approach (or even exceed) that from internal events." Fire brigade members must retain their cognitive abilities to be able to determine the best way to suppress a fire to prevent additional damage to safety-related equipment, evaluate equipment affected by a fire to report to control room operators concerning equipment availability, make decisions concerning smoke ventilation to prevent the fire effects from affecting other plant operations, and coordinate fire brigade activities with control room operators.

As discussed in Section IV.D, fatigue can substantially degrade an individual's decisionmaking and communication abilities, cause an individual to take more risks, and maintain faulty diagnoses throughout an event. The abilities to make accurate and conservative decisions, communicate effectively, and accurately diagnose events are key to the duties of the fire brigade members who are responsible for providing the control room operators and fire brigade leader with information that is critical to implementing a fire mitigation strategy to maintain the safe-shutdown capability for the reactor. Degradations of these abilities could have significant consequences on the outcome of an event involving a fire. For instance, a fatigued individual could incorrectly decide to vent smoke or toxic gas to an area required for alternate shutdown, which could prevent or impair access to equipment needed for safe shutdown of the plant. In addition, a fatigued worker could incorrectly apply the wrong fire suppressant, which could affect additional equipment in the plant. Further, impaired decisionmaking could lead a worker to fail to properly control flooding, which could impact other needed equipment, or to incorrectly determine whether an area contains critical equipment and improperly apply a suppressant in that area. Impaired communications could also lead to incomplete disclosure of information to licensed operators in the control room, which could adversely impact the decisionmaking of those operators. If information known to the impaired fire brigade member is not properly communicated, operators may not initiate appropriate actions to

mitigate the fire effects, or the effects of suppressant activities, on critical equipment. As a consequence, ensuring that fire brigade members, who are responsible for understanding the effects of fire and fire suppressants on safe-shutdown capability, are able to safely and competently perform their duties is essential to the overall success of the fire mitigation strategy and the protection of public health and safety.

In addition, the NRC periodically grants exemptions from the requirements of Appendix R [Fire Protection Program for Nuclear Power Facilities Operating Prior to January 1, 1979] to 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities," based on protection of the levels of defense in depth listed in Section II(A) of Appendix R to Part 50, which are "To prevent fires from starting; to detect, rapidly control, and extinguish promptly those fires that do occur; to provide protection for structures, systems, and components important to safety so that a fire that is not promptly extinguished by the fire suppression activities will not prevent the safe shutdown of the plant." Granting these exemptions is often predicated on effective manual suppression of the fire by the fire brigade. Therefore, it is necessary to ensure that fire brigade members who are responsible for understanding the effects of fire and fire suppressants on safe-shutdown capability remain rested so that they are able to safely and competently perform their duties in plant events involving a fire.

Section 26.205(a) requires that individuals identified in § 26.4(a)(4) (i.e., individuals who are performing maintenance or the onsite directing of maintenance of systems, structures, or components that "a risk informed evaluation process has shown to be significant to public health and safety") must be subject to the work hour requirements in this section. Section 26.5 [Definitions] includes a definition of "maintenance" to clarify the scope of individuals described by § 26.4(a)(4). To implement this requirement, licensees are required to delineate the maintenance personnel, as well as the personnel who direct maintenance on site, who would be subject to the work hour controls on the basis of the risk significance of the SSCs that they maintain. At a minimum, this must include personnel who maintain SSCs that are determined to be significant to public health and safety. To delineate the scope of the maintenance job duty group, licensees can use, for example, the risk-significance determination process and criteria that they currently

employ to meet the requirements of § 50.65(a)(4) for assessing and managing the risk associated with maintenance activities. As a consequence, the work hour requirements of § 26.205 would typically apply to individuals who are maintaining or directing on site the maintenance of SSCs that are included within the scope of an assessment required by § 50.65(a)(4). Therefore, the work hour requirements would apply to the individuals who most directly affect the maintenance of SSCs that are most important to the protection of public health and safety, which would achieve the NRC's objective to minimize the potential for fatigue-related errors in maintaining these risk-significant SSCs.

Nuclear power plant maintenance personnel perform tasks that are often highly dependent on cognitive skills (e.g., the ability to comprehend oral and written instructions, problem-solving, communication) that are susceptible to fatigue, as described in Section IV.D. These tasks may require extensive physical effort in high heat, humidity, and noise conditions that can exacerbate fatigue. In addition, maintenance personnel are subject to the work scheduling conditions of round-the-clock operations and emergent work conditions that also can exacerbate fatigue (e.g., long work hours, unscheduled overtime, shiftwork). Compared to rested workers, fatigued maintenance personnel would have a higher probability of (1) taking longer to complete maintenance activities or using non-conservative work practices, (2) making errors that would increase the risk of failure of the affected SSCs to perform their functions or operate for their required mission time during post-maintenance testing, thus delaying their return to unrestricted service, and (3) making errors that could introduce latent defects that may not be readily detected by post-maintenance testing, but that may cause degraded reliability (i.e., degraded performance or failure of the SSCs at a later time). Collectively, the effects of fatigue on the performance of maintenance personnel have the potential to decrease the availability and reliability of SSCs that are important to the protection of public health and safety. Therefore, the rule requires these maintenance personnel to be subject to the work hour requirements to ensure that fatigue does not compromise their abilities to safely and competently perform their duties relative to the maintenance of these SSCs.

The work hour requirements also apply to those who direct risk-significant maintenance on site. For example, these individuals include maintenance supervisors who provide

direction to maintenance technicians and engineers who provide onsite technical direction to maintenance crews, during key outage maintenance activities. These individuals perform tasks that are often highly dependent on cognitive skills (e.g., problem solving, decisionmaking, communications) that are susceptible to fatigue, as discussed in Section IV.D. Incorrect technical direction provided to maintenance technicians can significantly challenge maintenance technicians and increase the possibility of errors or events, particularly when that direction is provided by an individual who supervises them or an individual who the maintenance technician reasonably expects to have specialized technical knowledge of the system or component being maintained.

Section 26.205(a) requires that individuals identified in § 26.4(a)(5) (i.e., individuals who are performing the duties of an armed security force officer, alarm station operator, response team leader, or watchperson at a nuclear power plant) must be subject to the work hour requirements of this section. Individuals who perform these duties are the members of licensees' security forces who are responsible for implementing the licensees' physical security plans. To ensure that these individuals are able to meet their responsibilities for maintaining the common defense and security, it is necessary to ensure that they are not subject to fatigue, which could reduce their alertness and ability to perform the critical job duties of identifying and promptly responding to plant security threats. Security personnel are the only individuals at nuclear power plants who are entrusted with the authority to apply deadly force. Decisions regarding the use of deadly force are not amenable to many of the work controls (e.g., peer checks, independent verification, post-maintenance testing) that are implemented for other personnel actions at a nuclear plant to ensure correct and reliable performance. In contrast to most other nuclear power plant job duty groups, security personnel are typically deployed in a configuration in which some members of the security force have very infrequent contact with other members or with other plant personnel. A lack of social contact can exacerbate the effects of fatigue on individuals' abilities to remain alert (Horne, 1988). In addition, these deployment positions can be fixed posts where very little physical activity is required, further promoting an atmosphere in which fatigue could transition into sleep. Many security

duties are largely dependent on maintaining vigilance, and vigilance tasks are among the most susceptible to degradation from fatigue (Rosekind, 1997; Monk and Carrier, 2003). Finally, unlike operators, security forces lack automated backup systems that can prevent or mitigate the consequences of an error caused by fatigue. For these reasons, and in light of the excessive hours that some security force personnel were required to work following the elevated threat condition(s) in effect after the terrorist attacks of September 11, 2001, the Commission issued orders for Compensatory Measures Related to Fitness-for-Duty Enhancements Applicable to Nuclear Facility Security Force Personnel on April 23, 2003. The security force personnel who are subject to work hour controls in the orders are the same individuals who are subject to the work hour requirements in this section.

Section 26.205(b) [Calculating work hours] specifies the time periods that licensees shall include when calculating the work hours of the individuals listed in § 26.205(a) for the purposes of this subpart. This requirement replaces, with editorial and substantive modifications, the requirements presented in § 26.199(b) of the proposed rule. The editorial changes are renumbering and reorganization of the requirements for clarity. The substantive change is the deletion of the provisions concerning the calculation of collective work hours as a conforming change resulting from the deletion of the collective work hour controls as described with respect to § 26.205(d)(3).

The NRC's Policy on Worker Fatigue established guidelines for the control of work hours but did not define the concept of "work hours" or establish criteria for calculating them. As a consequence, licensees have inconsistently defined and calculated work hours when implementing the Policy through their technical specifications and administrative procedures. This inconsistency has contributed to some licensees permitting individuals to work excessive hours that caused them to become fatigued. Therefore, the rule defines work hours and requirements for calculating them, as well as certain specific periods that may be excluded from the calculation to ensure consistent implementation of the work hour controls established in § 26.205(d) [Work hour controls].

The rule requires licensees to calculate work hours as the amount of time that an individual performs duties for a licensee, including all within-shift break times and rest periods during

which there are no reasonable opportunities or accommodations appropriate for restorative sleep. The rule also details the periods excluded from the calculation.

The rule specifically does not limit work hours to hours that are assigned to an individual by the licensee, that are worked on site, or that are worked as part of a scheduled shift, but does require licensees to include hours during which an individual performs duties for the licensee. The rule defines hours worked in this broad manner because the NRC is aware that some licensees permit individuals to perform duties on behalf of the licensee from offsite locations and during periods when the individual is not assigned to a shift or scheduled by the licensee to be working on site. For example, because of the large amount of administrative work that is frequently assigned to individuals in the shift manager role, some shift managers stay at work to review and act upon administrative matters after the end of their scheduled shifts in order to complete the reviews and meet deadlines. Anecdotal reports from these individuals have indicated that they may work for 3–4 hours after going off shift to manage their workload, with the result that the hours they have available for personal obligations and sleep are reduced. Many licensees operate multiple sites and at times send personnel to other sites for short periods to fill in or to extend expertise. This time away from their normal duty site must be included when calculating work hours. If the rule limited the calculation of work hours to only those hours that an individual is paid by the licensee, works on shift, works on site, and/or is scheduled to be working by the licensee, many individuals may continue to be permitted to work excessive hours, thereby becoming fatigued. Therefore, § 26.205(b) [Calculating work hours] requires licensees to include these work hours in their work hour calculations.

Section 26.205(b)(1) [shift turnover] excludes the time periods during which an individual participates in shift turnover from the calculation of the individual's work hours. Section 26.199(b)(1) of the proposed rule defined the specific shift turnover activities that licensees may exclude from their work hour calculations. The final rule defines shift turnover as only those activities that are necessary to safely transfer information and responsibilities between two or more individuals between shifts. Shift turnover is a vital activity, but it also contributes to the length of the workday,

and therefore, to worker fatigue. The NRC understands that shift turnovers routinely add approximately 30 minutes to the length of a shift and typically no more than 2–2.5 hours to the length of a typical work week. Stakeholder comments during the public meetings described in the preamble to the proposed rule highlighted the importance of this activity for communicating plant status information between work crews and expressed concern that including turnover time in work hour calculations could cause indirect pressure on individuals to abbreviate shift turnovers in order to ensure that work hour limits would not be violated. This pressure could compromise the quality of shift turnovers and have unintended adverse safety consequences, such as omitting important equipment or maintenance status information. Although some stakeholders believe that turnover is part of the workday and, therefore, should be included in the calculation of hours worked, the NRC concluded that the benefit of including turnover for managing worker fatigue would be outweighed by the potential adverse consequence on the quality of shift turnovers.

The exclusion of shift turnover from work hour calculations is consistent with current requirements in most licensee technical specifications for the control of work hours for personnel performing safety-related functions and with GL 82–12, “Nuclear Power Plant Staff Working Hours,” dated June 15, 1982. For example, most technical specifications state, “An individual should not be permitted to work more than 16 hours in any 24-hour period, nor more than 24 hours in any 48-hour period, nor more than 72 hours in any 7-day period, all excluding shift turnover time” (see SECY–01–0113, Attachment 1, Table 2). However, the final rule more clearly describes the activities that may be included in turnover and the activities that may not be included. This provision addresses the NRC concerns arising from observations that some licensees have occasionally excluded 2 or more hours from calculated work hours on the basis that the individuals were engaged in “turnover.” To ensure that turnover is not hurried, the rule does not establish a time limit for an acceptable turnover period. However, by clearly delineating the activities that licensees may consider to be turnover activities, the rule reduces the potential for individuals and/or licensees to use the shift turnover exclusion to perform other work activities.

Section 26.205(b)(2) [Within shift break and rest periods] permits licensees to exclude within-shift breaks and rest periods from their work hour calculations if the individual has both a reasonable opportunity and accommodations for restorative sleep. The rule permits licensees to exclude breaks from the accounting of work hours only when the exclusion can be justified on the basis that the break substantively mitigates fatigue. The exclusion allows workers to be scheduled for round-the-clock duties (e.g., dedicated fire brigades) during which they are on site and available to respond as needed but the licensee provides sleeping accommodations and the individuals are allowed periods of time to obtain restorative sleep. This exclusion also permits licensees to make use of strategic napping, a well-proven fatigue countermeasure (McCallum, et al., 2003; Petrie, et al., 2004; Rosekind, et al., 1994, 1995; Dinges, et al., 1988; Kemper, 2001; Schweitzer, et al., 1992; Sallinen, et al., 1998), without requiring the nap period to be included in work hour calculations.

The exclusion is limited to that portion of a break or rest period that provides a reasonable opportunity for restorative sleep. For example, a 15-minute coffee break would not provide a reasonable opportunity for restorative sleep. The rule limits the exclusion to the amount of time the individual has available to actually sleep and does not include transit time to and from the sleep accommodations. The term “restorative sleep” means an amount of sleep that mitigates fatigue, which is generally considered to be a minimum of approximately 30 minutes (Buxton, et al., 2002; McCallum, et al., 2003; Sallinen, 1998; Rosekind, 1995).

The final rule also requires that individuals must have reasonable accommodations available for sleep in order to exclude the break period from the calculation of the individual’s work hours. Reasonable accommodations would include a sleep surface (e.g., bed, recliner) in a darkened, quiet room (Priest, 2000).

The degree of specificity in this section is necessary because some licensees currently exclude within-shift breaks from the calculation of work hours required by their technical specifications. Excluding break periods from the calculation of work hours can add up to as many as 12 hours over the course of a week, which permits individuals to work an additional 12-hour shift. As a consequence, licensees may assign seven consecutive 12-hour shifts to individuals, but only include 72 hours in their work hour

calculations, rather than the 84 hours that the individuals are actually at work. The discussion of § 26.205(d)(1)(iii) details the basis for limiting individuals to 72 work hours per week.

Although breaks without sleep have some fatigue mitigation value (Tucker, Folkard, and Macdonald, 2003), the benefits are principally limited to short-term improvements in vigilance. Horne (1988), Mitler and Miller (1996), and Dinges, et al. (1997) have pointed out that the only non-pharmacological cure for fatigue is sleep. The duration of within-shift break times is normally insufficient to allow a worker to obtain sleep and, consequently, these periods add to the total amount of time an individual remains awake while at work. Time since awakening is a principal determinant of worker fatigue (Folkard and Akerstedt, 1992; NTSSB, 1994; Akerstedt, 2004) and performance generally declines as a function of the amount of time that an individual remains awake (Dawson and Reid, 1997). Because within-shift breaks and rest periods provide only short-term mitigation of fatigue (Kruger, 2002; Baker, et al., 1990), the rule requires licensees to include short breaks in the calculation of work hours.

Section 26.205(b)(3) [Beginning or resuming duties subject to work hour controls] permits licensees to assign individuals, who are qualified to perform the duties listed in § 26.4(a), to duties other than those listed § 26.4(a), without controlling their work hours in accordance with the work hour controls contained in § 26.205(d). However, if these individuals are assigned or returned to performing any duties that are listed in § 26.4(a) during the calculation period, the rule requires the licensee to include all of the hours that they worked when calculating their work hours and to subject the individual to the work hour controls in § 26.205(d). For example, if a licensed operator was assigned to training for an entire calculation period, then his or her work hours would not be subject to § 26.205(d) for that period because he or she would not be performing any of the duties listed in § 26.4(a). However, if the same individual were assigned to training for only a portion of the calculation period and performed the duties listed in § 26.4(a) during the remainder of the calculation period, all of his or her hours, including those worked while assigned to training, would be included in the calculation of the individual’s work hours as if the individual were performing operations duties for the entire calculation period. Licensees would be required to count the hours that the individual worked

performing other duties if an individual begins performing the duties listed in § 26.4(a) during the calculation period because the individual's level of fatigue is largely dependent on the total number of hours he or she has worked, regardless of where the work was performed or the nature of the work itself. Therefore, including the hours worked performing other duties would provide assurance that fatigue would not compromise that individual's ability to safely and competently perform the duties that are specified in § 26.4(a).

Section 26.205(b)(4) [Unannounced emergency preparedness exercise and drills] allows licensees to exclude certain time associated with unannounced emergency preparedness exercises and drills from the calculation of an individual's work hours. Only the time an individual works unscheduled work hours for the purpose of participating in the actual conduct of an unannounced emergency preparedness exercise or drill can be excluded. This exclusion is incorporated in the final rule in response to stakeholder comments that adjusting work schedules in anticipation of an unscheduled exercise or drill would negate the element of surprise for the individuals. The nature of such drills is that they are relatively infrequent and short in duration. Therefore, they would not have a major impact on individual fatigue and any impact would be offset by the potential contribution to safety.

Section 26.205(b)(5) [Incidental duties performed off site] allows licensees to 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 § 26.205(d)(2) and the minimum day off requirements of § 26.205(d)(3) through (d)(5), such duties do not constitute work periods or work shifts. The final rule includes this exclusion in response to stakeholder comments regarding the necessity of obtaining expert advice or details on recent operating experience that may not have been included in a turnover and the burden that would be imposed by resetting the clock to account for the disruption in a break period. The nominal 30-minute reduction in the break period is not expected to have a detrimental impact on the individual's overall fatigue level and would be offset by the potential contribution to safety.

Proposed § 26.199(b)(2) would have established requirements for calculating

the collective work hours of certain job duty groups that would have been subject to the collective work hour limits in proposed § 26.199(f). The final rule does not include these requirements because the NRC eliminated the concept of collective work hours in the final rule, as discussed in § 26.205(d)(3) of this section-by-section analysis. Therefore, to conform with other changes in the final rule, § 26.205(b) does not include those aspects related to calculating collective work hours.

Section 26.205(c) [Work hour scheduling] requires licensees to schedule the work hours of individuals who are subject to this section in a manner that is consistent with the objective of preventing impairment from fatigue resulting from the duration, frequency, or sequencing of successive shifts. This section retains the requirement presented in § 26.199(c) of the proposed rule. The NRC intends for the maximum work hour and minimum break and day off requirements specified in § 26.205(d) to apply to infrequent, temporary circumstances and not be considered guidelines or limits for routine work scheduling. In addition, the work hour controls in § 26.205(d) do not address several elements of routine schedules that can significantly affect worker fatigue, such as shift length, the number of consecutive shifts, the duration of breaks between blocks of shifts, and the direction of shift rotation. Therefore, § 26.205(c) requires licensees to schedule personnel consistent with preventing impairment from fatigue from these scheduling factors.

The rule requires licensees to address scheduling factors because human alertness and the propensity to sleep vary markedly through the course of a 24-hour period. These variations are referred to as circadian rhythms and are the result of changes in physiology brought about by a circadian clock or oscillator inside the human brain that is outside the control of the individual. Work may be scheduled, and the consequent timing of periods of sleep and wakefulness, in a manner that either facilitates an individual's adaptation to the work schedule or challenges the individual's ability to get adequate rest. Therefore, the duration, frequency, and sequencing of shifts, particularly for personnel who work rotating shifts, are critical elements of fatigue management. Section IV.D also discusses the effects of circadian rhythms on worker fatigue. The importance of these elements for fatigue management is reflected in guidelines for work scheduling, such as EPRI NP-

6748 (Baker, et al., 1990), and in technical reports, such as, NUREG/CR-4248 and the Office of Technology Assessment's report, "Biological Rhythms: Implications for the Worker" (Liskowsky, 1991). For example, the EPRI guidelines address issues related to the sequencing of day, evening, and night shifts and the use of break periods between shifts to optimize the ability of personnel to obtain adequate sleep and effectively transition from one shift to another. Although research provides clear evidence of the importance of these factors in developing schedules that support effective fatigue management, the NRC also recognizes that the complexity of effectively addressing and integrating each of these factors in work scheduling decisions precludes a prescriptive requirement. Therefore, § 26.205(c) establishes a non-prescriptive, performance-based requirement.

Stakeholder interactions have interpreted this requirement as a performance-based approach in that licensees' fatigue management performance could be assessed in terms of adherence to the schedules developed in response to § 26.205(c). Although the NRC had intended this requirement to be limited to the development of work schedules, the NRC acknowledges the benefit of implementing this provision as a performance-based requirement applicable to licensee control of the actual hours worked by individuals performing the duties specified in § 26.4(a)(1) through (a)(5) and adopts this interpretation for the final rule. As a consequence, this provision of the final rule requires the work hours of individuals subject to the requirements of this section to be controlled in a manner that prevents impairment from fatigue resulting from elements of routine schedules that can significantly affect worker fatigue, such as shift length, the number of consecutive shifts, the duration of breaks between blocks of shifts, and the direction of shift rotation.

Section 26.205(d) [Work hour controls] requires licensees to establish work hour controls for individuals who are subject to the requirements of § 26.205. The provision requires licensees to establish controls that limit work periods and provide for breaks that are of sufficient length to allow the individual to obtain restorative rest. This requirement replaces § 26.199(d) of the proposed rule, with limited editorial changes.

Section 26.205(d)(1) establishes work hour limits for consecutive, rolling periods of 24 and 48 hours and 7 days. The majority of licensees have incorporated the work hour controls

from the NRC's Policy on Worker Fatigue, as disseminated by GL 82-12, into either their technical specifications or administrative procedures. The Policy (including the bases for the individual requirements) has been in place for over 20 years and was the subject of a substantive review documented in Attachment 1 to SECY-01-0113. The work hour limits from GL 82-12 also were the subject of substantial stakeholder comments during the public meetings described in the preamble of the proposed rule. In developing the requirements in this section, the NRC staff considered the information gained through these stakeholder interactions.

Section 26.205(d)(1)(i) limits the number of hours that an individual may work in any 24-hour period. The section permits individuals to work no more than 16 hours in any 24-hour period. This provision retains without change the requirement in § 26.199(d)(1)(i) of the proposed rule. This limit is identical to that specified in GL 82-12. Attachment 1 to SECY-01-0113 provides the basis for this limit, which is summarized as follows. Studies have shown that task performance declines after 12 hours on a task (Folkard, 1997; Dawson and Reid, 1997; Rosa, 1991). Other studies have shown that the relative risk of having an accident increases dramatically after 9 consecutive hours on the job (Hanecke, et al., 1998; Colquhoun, et al., 1996; U.S. DOT, 49 CFR Parts 350, et al., Proposed Rule, May 2, 2000, 65 FR 25544). Further, nine experts who met in 1984 to develop recommendations for NUREG/CR-4248 recommended a maximum of 12 work hours per day. Therefore, in originally developing its Policy on Worker Fatigue, the NRC had planned a 12-hour maximum limit, but revised it to 16 hours in response to practical concerns raised by the industry that the 12-hour limit required personnel who worked 8-hour shifts to split shifts when they work overtime. Those practical concerns remain valid, and the final rule retains a 16-hour limit.

Although the rule permits 16-hour shifts, other work hour limits in the rule would effectively limit the number of 16-hour shifts that licensees could assign. The NRC's response to a comment from PROS on this issue is discussed in the preamble to the proposed rule.

Section 26.205(d)(1)(ii) limits the number of hours that an individual may work in any 48-hour period. This provision retains without change the requirement presented in § 26.199(d)(1)(ii) of the proposed rule.

The section permits an individual to work no more than 26 work hours in a 48-hour period; by contrast, GL 82-12 limits individuals' work hours to 24 work hours in any 48-hour period. This change accommodates the fact that most licensee sites are now routinely working 12-hour shifts, rather than 8-hour shifts, as was the case when the NRC published GL 82-12. At that time, the basis for the 24-hour limit was to permit a worker to work one 16-hour double shift, followed by an 8-hour break, and then start another 8-hour shift at the worker's normal starting time, but only in very unusual circumstances. With the majority of plants now routinely working 12-hour shifts, the rule increases the maximum work hours in a 48-hour period from 24 to 26 hours to decrease the burden on licensees by accommodating situations in which a worker's relief is delayed or similar circumstances. For example, a 12-hour shift worker is able to work up to 14 hours in one day and still return to work at his or her normal time the next day, but can only work 12 hours that day. In the extreme, the 26-hour limit permits an individual to work up to 16 hours one day, followed by a minimum 10-hour break, as required in § 26.205(d)(2)(i). The individual is then limited to 10 hours of work over the next 22 hours.

When developing this requirement, which effectively relaxes by 2 hours the NRC's policy guideline in GL 82-12 for the maximum hours individuals should work in 48 hours, the NRC considered: (1) The burden associated with granting a waiver for the additional 2 hours; (2) the increased stringency of the criteria for granting a waiver of the work hour limits in § 26.207 relative to those in plant technical specifications; and (3) the increased potential for worker fatigue and fatigue-related errors that may accrue from working 26 hours in a 48-hour period versus working 24 hours in that same period.

The increase of 2 additional work hours during a 48-hour period will likely contribute to some increase in fatigue and fatigue-related errors, particularly when these hours come at the end of a work period of 12 or more hours or coincide with a decrease in an individual's circadian level of alertness, as might be expected at the end of a 12-hour day shift. However, because the revised criteria for granting a waiver of the work hour limits in § 26.207 are expected to substantially reduce the number of waivers that are granted, the licensee will have to either delay or turn over any work that the individual is performing when it is necessary for him or her to go off shift. Either delaying or

turning over work could contribute to errors. In addition, licensees commonly use waivers to exceed the 24-hours of work in any 48-hour period limit for short durations. As a result, the NRC concluded that the relaxation will principally reduce the paperwork burden, rather than increase the hours that individuals would have actually worked under the proposed rule. Accordingly, the relaxation provides a substantive reduction in burden with a limited net effect on human performance reliability.

Section 26.205(d)(1)(iii) limits the number of hours an individual may work in any 7-day period. This section retains without change the requirement presented in § 26.199(d)(1)(iii) of the proposed rule. The requirement limits an individual to working no more than 72 hours in any 7-day period. This limit is identical to the related limit specified in GL 82-12. Attachment 1 to SECY-01-0113 provides the basis for this limit, which is summarized in this section. In the absence of the break and day off requirements in § 26.205(d)(2) and (d)(3), respectively, the limit would permit a worker to work six 12-hour shifts per week continuously. Studies have shown that longer work schedules cause fatigue (Colquhoun, 1996; Rosa, 1995). Human reliability analysis experts have recommended that the NRC set "a maximum of 60 hours in any 7-day period and a maximum of 100 hours in any 14-day period," noting studies indicating that fatigue from long work hours can result in personnel developing their own subjective standards of what is important in their jobs (NUREG/CR-1278, "Handbook on Human Reliability Analysis with Emphasis on Nuclear Power Plant Applications"). Further, NUREG/CR-4248 recommends a limit of 60 hours of work in a 7-day period. However, in its Policy on Worker Fatigue, the NRC established a 72-hour maximum limit based on the expectation that individuals would work up to this limit on an infrequent and temporary basis. The rule codifies this expectation, in part, through § 26.205(d)(3), which requires licensees to ensure a minimum number of days off per week, averaged over a shift cycle, for individuals who are subject to the work hour controls. The rule effectively prevents an individual from consistently working six 12-hour shifts in a week.

Section 26.205(d)(2) requires licensees to provide adequate rest breaks for individuals who are performing the duties listed in § 26.4(a). This section contains, with substantial revisions, the requirements presented in § 26.199(d)(2) of the proposed rule.

Although § 26.205(d)(2) retains without change the requirement presented in proposed rule § 26.199(d)(2)(i) for a 10-hour break, the final rule revises the 24-hour break requirement proposed in § 26.199(d)(2)(ii) and replaces the 48-hour break requirement proposed in § 26.199(d)(2)(iii) with an alternative break requirement. The following section-by-section discussion of § 26.205(d)(2) and (d)(3) provides a rationale for these specific changes.

Section 26.205(d)(2) is necessary to ensure that licensees provide individuals with sufficient time off between work periods (shifts) to permit them to recuperate from fatigue and provide reasonable assurance that acute and cumulative fatigue do not compromise the abilities of these individuals to safely and competently perform their duties. Acute fatigue results from excessive cognitive work, especially if an individual is missing significant amounts of sleep, and is readily relieved by obtaining adequate rest and sleep. Cumulative fatigue results from receiving inadequate amounts or poor quality sleep for successive days. An extensive body of research has shown that a lack of adequate days off and extended workdays result in a cumulative sleep debt and performance impairment (Williamson and Feyer, 2000; Tucker, 1999; Colquhoun, 1996; Baker, et al., 1994; Webb and Agnew, 1974; U.S. DOT (65 FR 25546, May 2, 2000)).

Section 26.205(d)(2) defines a rest break as an interval of time that falls between successive work periods during which the individual does not perform any duties for the licensee. For example, individuals would not perform work-related duties during rest breaks such as completing paperwork reviews, mandatory reading, or required self-study. Rest breaks could include periods during which an individual is "on-call" because actual demands on an individual's time while he or she is on-call would be infrequent and of limited duration, such as answering a phone call. However, if an individual who is "on-call" is "called-in" to report to the site, the licensee would be required to include the hours that the individual worked as work hours, not as break time, because the individual would be performing duties on behalf of the licensee while on site.

Section 26.205(d)(2)(i) requires licensees to provide a 10-hour break between successive work periods, but permits 8-hour breaks in limited circumstances in which a shorter break is necessary for a crew's scheduled transition between work schedules. Current licensee technical specifications

and administrative procedures that are based on GL 82–12 require a minimum 8-hour break between work periods. Section 26.205(d)(2)(i) increases the minimum break period from 8 hours to 10 hours to provide greater assurance that individuals have an adequate opportunity to obtain the 7–8 hours of sleep that is recommended by most experts in work scheduling and fatigue. When considering shift turnover and commute times, which do not provide individuals with opportunities for rest and recovery, a nominal rest break of 8 hours actually leaves the individual with approximately 6 hours available to meet personal needs, including sleep (8 hours off-duty minus an average 1.5-hour round-trip commute minus an average 0.5 hours spent in shift turnover, equaling 6 hours available for personal needs). However, individuals typically also require 0.5 hours for preparing (or buying) and eating at least one meal off-shift and 0.5 hours for personal hygiene, which leaves, at best (i.e., assuming no social or domestic commitments that day), a total of 5 hours available for sleep. By contrast, the 10-hour break ensures that individuals generally have 7 hours available each day for sleep, which is close to the 7–8 hours of sleep needed by adults in the United States (National Sleep Foundation, 2001; Monk, et al., 2000; Rosekind, et al., 1997; Rosa, 1995).

The scientific literature provides strong evidence of the negative effects on performance and alertness of a week when sleep is restricted to 5 hours per day. Dinges, et al., 1997, and Belenky, et al., 2003, who have headed key laboratories in the field of sleep deprivation (the University of Pennsylvania and the Walter Reed Army Institute of Research, respectively), have conducted studies in this area. Belenky, et al. (2003) clearly demonstrates that limiting sleep to 5 hours per night leads to significant impairment in both alertness and actual performance, which builds up over the week, when compared to the alertness and performance of individuals who obtain 7 hours of sleep per night. The difference was found to be significant on all days during which sleep was restricted to 5 hours. Compared to the research subjects' performance after two baseline nights during which they obtained 7 hours of sleep, the subjects' performance after nights during which they were restricted to 5 hours of sleep showed more than twice as many lapses (extra slow responses). Dinges, et al. (1997) obtained similar results. From the second baseline day (the last day

during which a full 7 hours of sleep was obtained) through the 7 partial sleep restriction days, the research subjects' sleepiness and performance became progressively worse and these effects achieved a high level of statistical significance. The Dinges, et al. study also concluded that "recovery from these deficits appeared to require two full nights of sleep."

The importance of adequate sleep and the need to provide adequate opportunity for sleep in work schedules are reflected in studies (e.g., Kecklund and Akerstedt, 1995; Wylie, et al., 1996), guidelines (Pratt, 2003; Baker, et al., 1990), handbooks (Tepas and Monk, 1987), and the panel recommendations of sleep and fatigue experts (e.g., NUREG/CR-4248). An EPRI/NEI Work Hours Task Force white paper, "Managing Fatigue in the Nuclear Energy Industry: Challenges and Opportunities" (ADAMS Accession No. ML0221740179), also notes the importance of providing an opportunity for at least 8 hours of sleep. The report, prepared by Mark Rosekind, states that "the strongest and most extensive data demonstrate that sleep is a critical factor in promoting alertness and performance in subsequent wakefulness. Data clearly show that acute and cumulative sleep loss degrade subsequent alertness and performance. Therefore, any 'hours of service' policy should emphasize the provision of an appropriate sleep opportunity prior to duty." More specifically, human reliability analysis experts have recommended that the NRC require "a break of at least 12 hours between all work periods" (NUREG/CR-1278). Similarly, a panel of sleep and fatigue experts criticized a DOT requirement for an 8-hour break for motor carriers as inadequate because 8 hours of off-duty time does not translate into 8 hours of sleep. The DOT has since amended its regulations for motor carriers to require 10-hour rest breaks (68 FR 22456–22517, April 28, 2003).

Although a longer minimum rest break requirement would provide greater assurance that individuals have adequate opportunities for sleep, the 10-hour break requirement provides adequate opportunity for rest when used infrequently, as is expected given other requirements in this rule. For example, § 26.205(d)(1)(ii) limits individuals to working 26 hours in any 48-hour period. Although licensees could use routine 10-hour breaks in conjunction with atypical shift durations (e.g., alternating 12- and 14-hour shifts), the practical implications of these schedules, such as varied start times, make their use improbable. As a consequence, the 10-hour break requirement is sufficient to

assure adequate rest during infrequent circumstances in which individuals work extended hours (e.g., more hours than their typical 8-, 10-, or 12-hour shift) and that rest opportunities will typically vary between 12 and 16 hours in duration.

The minimum 10-hour break duration also accommodates most scheduling circumstances for the common shift durations that are currently in use in the industry. A notable exception is that the 10-hour break requirement could potentially prevent an individual who has worked 16 hours straight (e.g., two consecutive 8-hour shifts) from returning to duty at the start of his or her next regularly scheduled shift. However, the 10-hour break requirement appropriately prevents the individual from working in this circumstance because the potential for degraded job performance resulting from fatigue would be substantial given the individual's continuous hours of work and limited opportunity to sleep.

Section 26.205(d)(2)(i) permits licensees to schedule a minimum 8-hour break in only one circumstance: if the 8-hour break is necessary to accommodate a crew's scheduled transition between work schedules. During the public meetings described in the preamble of the proposed rule, the NRC received comments that a 10-hour break requirement would occasionally interfere with a transition from 12-hour shifts to 8-hour shifts. This transition typically occurs at the end of an outage for individuals who normally work an 8-hour shift, but work a 12-hour shift during outages. Although the exception provides individuals with less time for recovery, the shorter break is limited to one break occurring on a very restricted frequency. Therefore, the permission for an 8-hour break for the specific circumstances of a shift transition provides scheduling flexibility with minimal potential to adversely affect an individual's ability to safely and competently perform his or her duties.

Section 26.205(d)(2)(ii) replaces and revises § 26.199(d)(2)(ii) of the proposed rule which would have required a minimum 24-hour break in any rolling 7-day period. Section 26.205(d)(2)(ii) of the final rule requires a minimum 34-hour break in any rolling 9-day period. This provision requires a periodic long duration break thereby preventing an excessive number of consecutive work shifts that would not otherwise be prevented by the requirements of § 26.205 of this rule.

Break periods longer than the minimum 10 hours between shifts required by § 26.205(d)(2)(i) are necessary on a regular basis in order to

maintain reliable human performance. For example, Belenky, et al. (2003) found that the performance of subjects whose sleep periods were restricted to 7 hours per night over 7 consecutive days increasingly degraded as the number of sleep-restricted days increased. Van Dongen, et al. (2003) similarly found that the performance of subjects whose sleep was limited to 8-hours per night also declined over a 2-week period. The only subjects in these studies who did not show any performance decrements were those who were permitted 9-hour sleep periods in the Van Dongen study. These results clearly demonstrate that individuals require more rest than a 10-hour break provides over time to prevent performance degradation from cumulative fatigue, including that which accrues from a series of days of mild sleep restriction (e.g., 7 hours per night). Recent changes in the DOT regulations for the work hours of commercial truck drivers also reflect the need for longer breaks to mitigate fatigue. On April 28, 2003, the DOT published final regulations (68 FR 22456–22517) for hours-of-service for drivers of motor carriers, which amended 49 CFR Parts 385, 390, and 395. These regulations require a minimum 34-hour break after any period of 8 consecutive days with no more than 70 hours on duty. The intent of this 34-hour break is to provide for two consecutive sleep periods.

Further, a 10-hour break provides an opportunity for 7 hours of sleep only if one assumes the minimal times for meals, hygiene, and commuting described with respect to § 26.205(d)(2)(i), with no other daily living obligations. These assumptions are realistic only for unusual circumstances and limited periods of time during which individuals may be able to temporarily defer their other obligations. As the number of consecutive days increases in which individuals have only a 10-hour break available to meet these other obligations, the pressure on individuals to restrict sleep time in order to meet these other obligations increases. In addition, after a series of moderately restricted sleep periods (i.e., 6 hours per night), individuals' subjective feelings of sleepiness stabilize and they report feeling only mild sleepiness (Van Dongen, et al., 2003), which may further encourage individuals to restrict their sleep periods in order to meet daily living obligations. Van Dongen, et al. noted "the lack of reports of intense feelings of sleepiness during chronic sleep restriction may explain why sleep

restriction is widely practiced—people have the subjective impression they have adapted to it because they do not feel particularly sleepy." However, results of the Van Dongen study also demonstrated that the performance of subjects in that study continued to degrade as the number of consecutive restricted sleep periods increased over a 2-week period, including the performance of subjects who were permitted 6- and 8-hour sleep periods.

Section 26.199(d)(2)(ii) of the proposed rule would have established a requirement for a minimum 24-hour break in any 7-day period. The NRC revised the maximum number of days between the breaks in response to stakeholder comments that the proposed requirement would have substantially reduced licensee flexibility in scheduling 8-hour shifts. Stakeholders noted that many licensees currently use 8-hour schedules that include periods of 7 consecutive days. In revising the proposed requirement, the NRC considered that, although the final rule allows more consecutive days for 8-hour and 10-hour shifts, the final rule allows licensees the flexibility to more readily optimize 8-hour shift schedules to minimize the transitions between day, evening, and night shifts that can lead to worker fatigue. Although this relaxation also allows more consecutive shifts for individuals on 10-hour shifts, individuals on 10-hour shifts typically do not work a rotating schedule and thereby do not experience the disruption of their circadian cycle that exacerbates the cumulative fatigue effects of consecutive work shifts. The final rule also provides flexibility to accommodate other practical considerations such as scheduling training on a Monday through Friday basis and allows a contingency day in 8-hour shift schedules that includes a series of seven consecutive 8-hour shifts as part of the routine shift cycle.

The final rule also revises the minimum duration of the break period from 24 hours, as specified in § 26.199(d)(2)(ii) of the proposed rule, to a minimum 34-hour break. The revision more clearly states the NRC's intent to require a periodic "day off" in which individuals have the opportunity for two consecutive sleep periods without an intervening work period. The 34-hour break duration provides opportunity for two consecutive sleep periods without an intervening work period, supports use of forward rotating and fixed shifts, and allows for the possibility that individuals may work 26 hours in a 48-hour period contiguous to the break.

Given these considerations, the NRC concluded that § 26.205(d)(2)(ii) of the final rule provides a level of assurance of worker FFD relative to fatigue that is comparable to that which would have been achieved through the requirement in § 26.199(d)(2)(iii) of the proposed rule. The provision for a 34-hour break in any rolling 9-day period serves both to prevent and mitigate cumulative fatigue. The 34-hour break periods will not only provide some opportunity for recovery sleep, but also time that individuals need to meet the many daily living obligations that they cannot otherwise readily meet. Without such long break opportunities, individuals must either forego activities that can be important to general mental and physical fitness (e.g., family interactions, exercise, recreation, doctor appointments) or sacrifice sleep and increase their sleep debt (Presser, 2000), resulting in impairment on the job.

Section 26.205(d)(2) of the final rule does not retain the requirement for a minimum 48-hour break in any rolling 14-day period as would have been required by § 26.199(d)(2)(iii) of the proposed rule. The NRC received many stakeholder comments in opposition to the 48-hour break requirement. One commenter stated that fixed break requirements and collective work hour restrictions will lead to significant safety implications and could affect a licensee's ability to restore inoperable equipment in a timely manner. This view was echoed by many other commenters. Another commenter found fault with focusing on days off without considering the number of hours worked in a particular day and the breaks between work periods. In addition, many commenters raised the issue of work schedule disruption as a result of the 48-hour break requirement. They asserted that, for workers on the night shift, having one day off provides an additional rest period and allows the worker to maintain a consistent pattern of work and sleep habits, which reduces the risk of accidents on the job. Two days off, however, may interfere with his or her sleep cycle, and as a result, the individual would have to readjust to the night shift after the 2-day break. According to the commenters, some workers have stated that having 2 days off is worse than having no days off. They also argued that a 1-day break in any 7-day period is more than adequate when combined with other rule provisions to address cumulative fatigue. Thus, commenters requested that the 48-hour break requirement during outage periods be deleted.

In response to stakeholder comments, the NRC replaced the requirement

proposed in § 26.199(d)(2)(iii) with alternative requirements that ensure that each worker receives a minimum number of days off per week, on average, while the plant is operating or receives a minimum number of days off in each consecutive 15-day period of a plant outage. Security personnel subject to the requirements of § 26.205 are also subject to requirements for minimum days off in 15-day periods during security system outages and increased threat conditions. These alternative extended break requirements are in § 26.205(d)(3) through (d)(5) of the final rule and are addressed in the section-by-section analysis applicable to those requirements. In adopting the alternative requirement for the final rule, the NRC considered that, whereas the alternative requirements assured that workers subject to the requirement would receive a minimum number of days off, which would serve to limit the potential for cumulative fatigue, the requirements would not assure that any of the days off would be consecutive, as would have been required by the minimum 48-hour break requirement of proposed § 26.199(d)(2)(iii). In proposing the 48-hour break requirement, the NRC cited several studies that demonstrate the benefits of consecutive days off, noting that one night of unrestricted sleep is not sufficient to fully recover from the cumulative fatigue that can result from restricted sleep and extended work hours. However, the NRC also considered that the minimum day off requirements would, in effect, limit each individual's average number of work hours and the average number of consecutive work shifts between days off, thereby reducing the potential for cumulative fatigue. As a consequence, the final rule's requirements reduce the need for consecutive days off to prevent or mitigate fatigue. The NRC also expects that common scheduling constraints and worker preferences will cause licensees to schedule days off in succession. In addition, the NRC considered that the alternative requirements of § 26.205(d)(3) and (d)(4) of the final rule provides licensees greater flexibility in meeting scheduling demands and minimizing circadian disruption for workers.

Section 26.205(d)(3) requires individuals subject to the requirements of § 26.205 to have a minimum average number of days off per week. The specific number of days off depends upon the length of shifts in the work schedule of the individual. This requirement replaces the requirements presented in proposed § 26.199(f)

[Collective work hour limits], which would have required licensees to control the collective work hours of each group of individuals performing the duties subject to the work hour requirements and ensure that the collective work hours of each job duty group would not have exceeded an average of 48 hours per person per week in any averaging period. Section 26.205(d)(3), by requiring a minimum number of days off, indirectly limits average weekly work hours to levels comparable to those that would have been permitted by the collective work hour limits of the proposed rule. Consequently, § 26.205(d)(3) of the final rule performs the same function as the requirements of proposed § 26.199(f), providing reasonable assurance that the FFD of individuals subject to the work hour requirements is not impaired by cumulative fatigue. As described with respect to § 26.205(d)(2), this requirement also addresses an objective of the 48-hour break requirement of the proposed rule by limiting the potential for the cumulative fatigue of individuals while the plant is operating. The provision does not require that days off be provided consecutively, as would have been required by proposed § 26.199(d)(2)(iii), but rather allows licensees discretion, within the constraints of the other work hour limit and break requirements, in distributing days off throughout the shift cycle. As a consequence, § 26.205(d)(3), like proposed § 26.199(d)(2)(iii), is intended to ensure that individuals receive sufficient days off on a periodic basis to prevent cumulative fatigue.

The minimum day off requirements of § 26.205(d)(3) will ensure that licensees manage during periods of normal plant operation the potential for cumulative fatigue (i.e., fatigue from successive weeks of overwork or inadequate rest) to adversely affect the abilities of individuals to perform functions that are important to maintaining the safety and security of the plant. The requirements prevent excessive use of the maximum work hours and minimum rest breaks that are permitted under § 26.205(d)(1) and (d)(2). In addition, proactively controlling work hours to ensure individuals receive a minimum weekly average number of days off while the plant is operating is likely to reduce the need for licensees to grant waivers of the work hour requirements in § 26.205(d)(1) and (d)(2). Individuals will be better rested and less susceptible to cumulative fatigue from the increased work hours that are common during outages and that are necessary to augment security

staffing during increased threat conditions. Therefore, the minimum day off requirement is essential for limiting cumulative fatigue and augments other important elements of licensees' fatigue management programs.

Requiring a minimum number of days off that results in a maximum average work week of approximately 48–54 hours per week helps to ensure that licensees meet a fundamental objective of the NRC's Policy on Worker Fatigue. The Policy, promulgated in GL 82–12, is intended to ensure that there are a sufficient number of operating personnel available to "maintain adequate shift coverage without routine heavy use of overtime." Routine overtime can cause cumulative fatigue, thereby degrading workers' abilities to safely and competently perform their tasks. Section 26.205(d)(3) establishes requirements that are expected to result in maximum average work weeks in the range of 48–54 hours, thereby ensuring that work hours approaching the limits in § 26.205(d)(1) and NRC's Policy on Worker Fatigue are the exception and not routine.

The minimum day off requirements of § 26.205(d)(3) also address, in part, the cumulative fatigue concerns reported by security personnel in the months following the terrorist attacks of September 11, 2001. These individuals questioned their readiness and ability to perform their required job duties because of the adverse effects of cumulative fatigue. The NRC reviewed the actual hours worked by security personnel and determined that, in the vast majority of cases, individual work hours did not exceed the guidelines specified in the NRC's Policy on Worker Fatigue. However, the review confirmed that individuals had been working up to 60 hours per week for extended periods. Individual concerns regarding their FFD, in light of work schedules that did not exceed the specific guidelines of the policy, as well as relevant technical research supporting the basis for cumulative fatigue, led the NRC to conclude that the work hour guidelines of the Policy are inadequate for addressing cumulative fatigue. The NRC obtained additional support for this conclusion following a review of worker fatigue concerns and work hours during a long-term outage at the Davis Besse nuclear plant (NRC Inspection Report 05000346/2004003, dated March 31, 2004, ADAMS Accession No. ML040910335).

Through public interactions during the development of order EA–03–038, the NRC developed a collective work hour requirement, rather than a limit on individual work hours, in response to

stakeholder comments regarding differences among individuals in their abilities and desires to work overtime. The proposed rule would have permitted a group of workers who perform similar duties to average 48 hours of work over a period not to exceed 13 weeks. Because the proposed limit would have been imposed on a job duty group's average number of work hours during an averaging period, licensees would have been able to distribute overtime among their workers based on their assessment of individuals' abilities and desires to work overtime. Stakeholder comments on the proposed requirement for collective work hour controls raised several concerns.

Some stakeholders expressed the concern that the collective work hour controls were not an effective means for addressing fatigue. One stakeholder expressed the concern that the collective work hour controls would allow licensees to force individuals to work overtime. Another stakeholder expressed the opinion that collective work hour controls are not an effective means to address the known physiological fatigue risks contributed by individual operators. Other stakeholders expressed the concern that licensees may be able to manipulate the collective work hour calculations. Other commenters asserted that the collective work hour controls were unnecessary to mitigate the effects of cumulative fatigue and that the controls would limit the flexibility to increase work hours in a job-duty group based on operational needs. These commenters stated that other rule provisions, such as the work schedule, individual work hour limits, and individual break requirements, as well as the provisions concerning fatigue assessments and the self-declaration process adequately address cumulative fatigue.

Although the NRC acknowledges that Subpart I provisions concerning fatigue assessment and self-declaration are important for the detection of cumulative fatigue, these provisions, like the individual work hour limit and break requirements of the proposed rule, do not adequately address the prevention of cumulative fatigue. Accordingly, the final rule addresses the comments on the limitations of the collective work hour requirements by replacing the requirements of § 26.199(f) of the proposed rule with the minimum day off requirements in § 26.205(d)(3) of the final rule. The minimum day off requirements were largely derived from a work hour control proposal submitted by NEI as a comment on the proposed rulemaking. Although in several

instances the NRC did not adopt the specific minimum number of days off that NEI proposed in its comments, § 26.205(d)(3) establishes requirements similar to those proposed by NEI by requiring each individual subject to the requirements of § 26.205 to have a minimum average numbers of days off per week.

Section 26.205(d)(3) defines, for the purposes of Subpart I, the term *day off* as a calendar day in which an individual does not start a work shift. The definition ensures consistent licensee implementation of the requirements in § 26.205(d)(3). In developing the definition, the NRC considered the alternative of defining the requirements of § 26.205(d)(3) in terms of 24-hour break periods. A stakeholder at the March 29, 2006, public meeting concerning this rulemaking noted that the number of 24-hour breaks in a schedule could be readily influenced by the number of rotations between shifts and therefore could encourage scheduling practices that achieved compliance with the requirement through schedules that were adverse to the circadian adjustment of workers. As defined in the final rule, use of the term *day off* does not encourage such adverse scheduling practices and results in requirements that establish uniform limits for all schedule designs. In addition, the definition enables workers and schedulers to readily determine the number of days off in a schedule without the need to calculate the duration of break periods.

Section 26.205(d)(3)(i) through (d)(3)(iv) specifies the minimum number of days off for each individual subject to the requirements of § 26.205 in terms of a minimum number of days off per week, averaged over the shift cycle. The requirements in this section thereby allow the number of days off for an individual to vary from week to week, but mandate that over the duration of the shift cycle, the average number of days off per week meets the specified minimum. Section 26.205(d)(3) requires that, for the purposes of calculating the average number of days off required in this section, the duration of a shift cycle may not exceed 6 weeks. This maximum duration of a shift cycle limits the period over which licensees are permitted to average the number of days off and thereby limits the potential for cumulative fatigue by preventing an excessive number of consecutive weeks in which individuals may be working the maximum hours allowed by § 26.205(d)(1) while having only the minimum breaks required by

§ 26.205(d)(2). The 6-week maximum for shift cycles also corresponds to the longest shift cycle commonly used in the U.S. nuclear industry.

Section 26.205(d)(3)(i) requires individuals who are working 8-hour shift schedules to have at least 1 day off per week, averaged over the shift cycle. This minimum day off requirement allows an average of 48 hours of work per week, assuming individuals receive the minimum number of days off with no work shifts extended beyond 8 hours. This requirement is therefore generally consistent with the 48-hour collective work hour requirement of § 26.199(f) of the proposed rule, though it imposes the requirement on an individual rather than a group basis. This requirement is also consistent with the NEI proposal for an average of 1 day off per week, averaged over a shift cycle, for predominantly 8-hour shift schedules.

In developing requirements to address cumulative fatigue, the NRC considered several types and sources of information, including (1) past recommendations from experts and expert panels on work scheduling and maintaining worker alertness in the nuclear industry, (2) surveys of nuclear power plant workers on their desire and ability to work overtime, (3) data on the amount of overtime worked by security personnel, and (4) the requirements and practices in other industries.

EPRI NP-6748 (Baker, et al., 1990) and NUREG/CR-4248 are two of the most comprehensive documents on worker fatigue in the U.S. nuclear industry. Like the collective work hour limits of the proposed rule, the minimum average number of days off requirement is a new concept developed to meet the rule's objectives while also addressing stakeholders' unique circumstances and specific concerns. As a consequence, neither of the documents provides specific guidelines for establishing collective work hour limits. Nevertheless, the documents contain information and guidelines relevant to this requirement. Collectively, the shift scheduling guidelines of EPRI NP-6748 and NUREG/CR-4248 suggest a maximum routine work schedule of 44-46 hours per week. This maximum includes an assumed turnover time of 30 minutes per shift. The NRC also considered the recommendations of experts concerning the use of overtime. The expert panel that developed the guidelines for NUREG/CR-4248 also addressed overtime use and recommended an individual limit of 213 hours per month, including shift turnover time. The expert panel emphasized that overtime

should not be approved for an entire crew, noting that this individual maximum on overtime should not be a group norm. Work schedules that meet the minimum day off requirements will result in levels of individual work hours that are typically in the middle of the range of work hours defined by the maximum routine scheduling limits and maximum individual overtime. The expert panel further recommended that the NRC authorize no more than 400 hours of overtime in a year. A limit of 400 hours of overtime annually is very similar to a 48-hour average (i.e., 52 weeks × 8 hours = 416 hours).

In addition to considering the opinions of experts in work scheduling and fatigue, the NRC staff also considered the opinions of individuals who work in nuclear power plants. These opinions were expressed in surveys conducted by PROS and EPRI.

In 2002, PROS surveyed the attitudes of its members towards work hours and the development of a proposed rule concerning fatigue of workers at nuclear power plants (ADAMS Accession No. ML05270310). One of the survey questions was, "What is your personal tolerance for overtime?" The responses indicated that 75 percent of the respondents had a "tolerance" for up to 350 hours per year. Only 13 percent expressed a tolerance for more than 350 hours of overtime.

The work conducted in the development of EPRI NP-6748 also included a survey of operators. The results were consistent with the PROS survey, indicating that the amount of overtime that operators wanted to work ranged from 100 to 400 hours per year. A survey of nuclear power plant personnel in the United Kingdom yielded similar results.

A minimum day off requirement will limit individuals to approximately 400 to 500 hours of overtime in a year. Therefore, the minimum day off requirements permit levels of overtime while the plant is operating that are at the upper extreme of the number of overtime hours for which nuclear power plant personnel have expressed a tolerance. In addition, the minimum day off requirements are less restrictive than the limit implied by worker opinions because the minimum day off requirements of § 26.205(d)(3) would not apply during the first 60 days of plant outages, and for security personnel, during the first 60 days of plant outages, security system outages, or increased threat conditions.

Together with expert and worker opinions, the NRC considered industry practices concerning the use of overtime for security personnel. The NRC

collected work scheduling data for security personnel at all nuclear power plants following the events of September 11, 2001, as part of the process of evaluating the need to require licensees to implement compensatory measures to address security personnel fatigue. The NRC's analysis, as described in letters from the NRC to licensees (e.g., ADAMS Accession No. ML031880257), indicated that at some of the sites (31 percent), security personnel worked more than 55 hours per week and at a few sites (11 percent) they worked 60 hours or more per week. The data also indicated that at the majority of the sites (58 percent) security personnel typically worked 50 hours per week or less. The NRC also reviewed work hours data collected by NEI (ADAMS Accession No. ML003746495) and found that, although individual sites varied substantially, the average annual overtime for licensed operators was 375 hours and 361 hours for non-licensed operators. These findings suggest that an average work week of approximately 48 hours is an achievable objective for operations personnel as well, although it was not a current practice at a small fraction of nuclear power plants.

The minimum day off requirements are comparable to, though less restrictive than, limits on workers in other industries within the United States and the limits imposed by other countries that regulate overtime for nuclear power plant workers. The NRC staff noted that several other countries address cumulative fatigue of nuclear power plant personnel through individual monthly and/or annual work hours limits on overtime. These limits, summarized in Table 6 of Attachment 1 to SECY-01-0113, are generally more restrictive than the minimum day off requirements because they directly limit hours of work, rather than work days, and permit fewer hours of work (e.g., Finland limits overtime to 250 hours per year). Table 5 of Attachment 1 to SECY-01-0113 includes a summary of limits on work hours in other industries in the United States.

The NRC also considered the requirements of the European Union (EU) Working Times Directive (WTD) (Council Directive, 1993). The WTD establishes requirements concerning the working hours of workers across various industries in EU member nations. The WTD establishes a requirement that "workers cannot be forced to work more than 48 hours per week averaged over 17 weeks."

Moreover, the amount of overtime permitted by the minimum day off requirements would be greater than the

amount used in most continuous operations. Circadian Technologies, Inc., a consulting firm that is expert in fatigue management, regularly surveys U.S. and Canadian companies conducting 24/7 operations. Its 2000 survey of 550 major companies indicates that shift workers at 89 percent of the companies surveyed averaged less than 400 hours of overtime per year (Circadian Technologies, Inc., 2000). Circadian Technologies, Inc., noted that the average overtime for workers in extended operations in the United States was 12.6 percent above the standard work week in the first 8 months of 2003, with utilities averaging 14.9 percent (Circadian Technologies, Inc., 2003).

Therefore, the minimum day off requirements establish appropriate limits on work schedules while the plant is operating. The requirements would ensure that individuals subject to the work hour requirements of § 26.205 have sufficient days off to prevent fatigue. The minimum day off requirements will indirectly permit levels of overtime at the upper extreme desired by most nuclear power plant workers while limiting overtime to levels comparable to those recommended by work scheduling and fatigue experts.

Section 26.205(d)(3)(ii) requires that individuals who are working 10-hour shift schedules have at least 2 days off per week, averaged over a shift cycle. Individuals working schedules that meet the minimum day off requirements of this section would therefore be working, on average, five 10-hour shifts (50 hours) per week. In developing this requirement the NRC considered the NEI proposal for a minimum of 1 day off per week average for 10-hour shift schedules. The NRC concluded that such a limit would allow excessive work hours (i.e., an average of 60 hours per week) for routine scheduling, thus creating the potential for cumulative fatigue. The NRC would not expect such a limit for long-term work hour control to prevent fatigue concerns such as those reported by security personnel working on the order of 60 hours per week in the months following the terrorist attacks of September 11, 2001. The section-by-section analysis for § 26.205(d)(3)(i) addresses in detail the basis for minimum day off requirements that effectively limit work schedules to work weeks averaging approximately 48 hours per week. Section 26.205(d)(3)(i) would permit an average work schedule of approximately 50 hours. Although this requirement for 10-hour schedules would allow 2 more hours per week

than the requirement for 8-hour schedules, 10-hour schedules are not typically used for rotating shift schedules. As a consequence, the individuals on those schedules are less likely to experience the disruption of their circadian cycles that is caused by rotating shifts and therefore better able to cope with the additional work hours.

Section 26.205(d)(3)(iii) requires that individuals performing the duties described in § 26.4(a)(1) through (a)(3) have at least 2.5 days off per week averaged over a shift cycle and individuals described in § 26.4(a)(4) have at least 2 days off per week, averaged over a shift cycle. In developing this requirement, the NRC considered NEI's proposal to require a minimum of 2 days off per week for all individuals working 12-hour shifts subject to the work hour requirements, except security personnel. For individuals performing the duties described in § 26.4(a)(1) through (a)(3), the NRC judged 2 days off per week to be insufficient for routine scheduling of 12-hour shifts because it would allow an average work week of 60 hours, which the NRC expects would lead to cumulative fatigue. Furthermore, such a requirement would ensure substantially fewer days off than would be recommended by the scheduling guidelines contained in EPRI NP-6748 (Baker, et al., 1990) and NUREG/CR-4248.

In developing § 26.205(d)(3)(iii), the NRC also considered the effect of scheduled training weeks on the overall work hours of operations personnel. Operators have 1 week of requalification training in most shift cycles. The training week typically consists of four 9-hour days or five 8-hour days. As a consequence, § 26.205(d)(3)(iii) has the effect of limiting covered operations personnel to an average work week ranging from 48.8 hours to 52 hours, in most shift cycles (i.e., when the shift cycle contains a training week). The specific number of hours depends on the number of weeks in the shift cycle and the training week schedule. This estimate also assumes that individuals do not work longer than their scheduled 12-hour shift.

Section 26.205(d)(3)(iv) of the rule requires that licensees ensure that individuals who are working 12-hour shifts while performing the maintenance duties described in § 26.4(a)(4) have a minimum of at least 2 days off per week, averaged over a shift cycle. For individuals described in § 26.4(a)(4) the NRC judged 2 days off per week to be sufficient for routine scheduling of 12-hour shifts. Relative to the duties described in § 26.4(a)(1)–(a)(3) and

(a)(5), the duties described in § 26.4(a)(4) involve fewer and less prolonged periods of sedentary activities, which can contribute to degraded alertness, and monitoring activities, which are particularly susceptible to degraded vigilance.

Section 26.205(d)(3)(v) of the rule requires that licensees ensure that individuals who are working 12-hour shifts and performing the security duties described in § 26.4(a)(5) have a minimum of 3 days off per week, averaged over a shift cycle. This requirement limits the security personnel who are subject to this requirement to an average work week of 48 hours. In developing this requirement the NRC considered the technical basis described with respect to § 26.205(d)(3) and public comment on the collective work hour controls of the proposed rule. The NRC also considered its experience with implementing the group work hour controls that were required for security personnel by the compensatory measures of order EA-03-038. The NRC has generally found that licensees have implemented work hour controls consistent with the requirements of the compensatory measures. However, the NRC has received a limited number of concerns from security personnel stating that they are still experiencing excessive fatigue leading to the perception that the requirements have not been fully protective of all security personnel. The NRC also notes that it has received numerous reports of inattentive security personnel at U.S. nuclear powerplants within the last 2 years. In addition, the NRC considered the critical importance of mental alertness and maintaining vigilance to the effective performance of security personnel and the unique challenges of security duties and work environments to meeting these needs (see the section-by-section analysis of § 26.205(a) for a more detailed discussion of the relationship between security duties and fatigue). Given these considerations, the NRC concluded that it is appropriate to establish more stringent work hour requirements for security personnel than other individuals subject to the requirements of § 26.205. Accordingly, § 26.205(d)(3)(iv) requires a minimum of 3 days off per week, averaged over a shift cycle, for individuals working 12-hour shifts who are performing the security duties described in § 26.4(a)(5).

Section 26.205(d)(4) provides a limited exception from the minimum day off requirements in § 26.205(d)(3) for individuals performing the duties specified in § 26.4(a)(1) through (a)(4) (i.e., certain operations, chemistry,

health physics, fire brigade, and maintenance personnel). The exception from the minimum day off requirements is available during the first 60 days of a unit outage while a subject individual is working on outage activities. In these circumstances, § 26.205(d)(4) requires licensees to ensure that individuals specified in § 26.4(a)(1) through (a)(3) have a minimum of 3 days off in each successive (i.e., non-rolling) 15-day period and that individuals specified in § 26.4(a)(4) (maintenance personnel) have at least 1 day off in any 7-day period. If at any time during a unit outage an individual performs duties specified in § 26.4(a)(1) through (a)(4) on or for a unit that is not disconnected from the electrical grid, the individual is subject to the minimum day off requirements of § 26.205(d)(3) while the individual is performing those duties, except as permitted by § 26.205(d)(6). After the first 60 days of a unit outage, regardless of whether the individual is working on unit outage activities, the individual is again subject to the minimum day off requirements of § 26.205(d)(3), except as permitted by § 26.205(d)(6).

The minimum day off requirements in § 26.205(d)(3) address the long-term control of work hours while permitting the occasional use of extended work hours for short duration circumstances such as equipment failure, personnel illness, or attrition. The requirements in § 26.205(d)(4) address the control of work hours for unique plant conditions (i.e., unit outages) which require extended work hours for a more sustained period of time. In developing the minimum day off requirements of § 26.205(d)(4), the NRC considered several factors, including current policy, the bases for the policy, lessons learned from the policy implementation, and public comment on the proposed rule.

The NRC's Policy on Worker Fatigue provides guidelines for controlling work hours, "on a temporary basis," during periods requiring substantial overtime. The Policy reflects the NRC's recognition that outages are unique, relatively short term, and involve levels of activity that are substantially higher than most non-outage operating periods. The policy also reflects the NRC's understanding that, although individuals are capable of working with limited rest without degraded performance for short periods of time, research has shown that the ability to sustain performance without adequate rest is clearly limited (Knauth and Hornberger, 2003; Pilcher and Huffcutt, 1996; Van Dongen, et al., 2003), as discussed in Section IV.D. However, as noted in SECY-01-0113, Attachment 1,

the NRC has never defined the term "temporary basis" as used in the Policy. As a result, licensees have relied on this phrase in the guidelines to permit extended work hours for periods ranging from a few days to more than a year. Industry experience with conditions such as sustained plant shutdowns and the increased work hours of security personnel following the terrorist attacks of September 11, 2001, have demonstrated the need for the NRC to establish clearer and more readily enforceable requirements limiting the sustained use of extended work hours.

Differences between individuals, job demands, and work-rest schedules can each have a substantial effect on the period of time that an individual can work without compromising his or her ability to safely and competently perform duties. As a result, studies of work scheduling and fatigue provide insights into the potential for cumulative fatigue of workers, but do not provide a direct basis for establishing the maximum acceptable period for excluding plant outage work hours from the collective work hour controls. In setting the maximum duration of the exclusion period, the NRC considered that, by the end of 60 days of work at the limits permitted by § 26.205(d)(1) and (d)(2), individuals who are performing the duties specified in § 26.4(a)(1) through (a)(4) will have (1) worked 576 hours, including more than 200 hours of overtime, and (2) missed as many as 17 normally scheduled days off. The loss of the 17 normally scheduled days off represents a 60-percent reduction in the time available to recover and prevent cumulative fatigue. Further, with each passing week of increased work hours and decreased time off, deferring daily living obligations becomes increasingly difficult, causing increased pressure on individuals to reduce their sleep time in order to meet the demands of both work and daily life, resulting in an increased potential for cumulative fatigue.

In addition to considering the potential for cumulative fatigue, the NRC considered current industry data on the duration of unit outages in determining whether the cost to licensees imposed by limiting the exclusion period to 60 days is justified in terms of the benefit. The average outage duration, as indicated by outage data from 2000–2002, is approximately 39 days (Information System on Occupational Exposure Database, ADAMS Accession No. ML050190016). Eighty-nine percent of plant outages during this period were less than 8 weeks in duration. In reviewing the

frequency of outages, by duration, the NRC found that it would be necessary to increase the exclusion period substantially to address a marginal number of additional outages of longer lengths. Many comments on the proposed rule recommended that the 8-week exclusion period be increased to a 10-week exclusion period. This increase in the exclusion period would substantially increase the period of time that an individual would be working with reduced recovery time. During the exclusion period, individuals are permitted to work up to 72 hours in a 7-day period and are assured of just 3 days off in each 15-day period. Individuals who work 12-hour shifts, which is common during outages, will average up to 67.2 hours per week, which represents 160 percent of their normally scheduled hours with less than half of their normally scheduled days off for recovery, for a period of up to 2 months. Extending the outage exclusion period to prolong these conditions would substantively increase the potential for cumulative fatigue and fatigue-related personnel errors. Therefore, the NRC did not adopt the recommendation to increase the duration of the exclusion period in the final rule.

The NRC also received several comments on the proposed rule which recommended that the NRC eliminate the exclusion for outage periods. In an early phase of developing the work hour requirements in Subpart I, the NRC considered establishing a set of uniform requirements that would be applicable regardless of whether a unit was operating or shut down. However, as noted with respect to § 26.205(d)(4), the NRC recognizes that individuals are capable of working with limited rest without degraded performance for short periods of time. As a consequence, the NRC considers it appropriate to allow flexibility within the work hour requirements to accommodate limited periods of more intensive work schedules, such as unit outages. However, the NRC limits this flexibility to infrequent circumstances, such as unit outages, to limit the potential for cumulative fatigue. Further, the NRC considered the substantial cost to licensees for meeting the requirements applicable to periods of plant operation through either increasing staffing (to minimize outage durations) or increasing outage durations to accommodate a less intensive work schedule. Given these considerations, the NRC concluded that a limited period of less restrictive work hour requirements, as included in the final

rule, is better justified by the costs and benefits.

The 60-day exclusion period that § 26.205(d)(4) permits from the minimum day off requirements of § 26.205(d)(3) replaces the 8-week exclusion period that proposed § 26.199(f) would have permitted from the collective work hour limits. The discussion with respect to § 26.205(d)(3) presents the issues the NRC considered in deciding to replace the collective work hour limits with minimum day off requirements. The NRC revised the maximum duration of the permitted exclusion period to a duration that is comparable to the 8-week (56-day) period of the proposed rule, but better conforms with the minimum day off requirements in § 26.205(d)(4) and (d)(5). For most categories of individuals, the final rule establishes minimum day off requirements in terms of 15-day periods, rather than weeks, as the proposed rule would have required. As a consequence, the NRC revised the maximum duration of the exclusion period to 60 days (4 × 15) to encompass four complete periods of time.

Section 26.205(d)(4) requires licensees to ensure that individuals performing the duties 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 during the first 60 days of a unit outage and that individuals specified in § 26.4(a)(4) (maintenance personnel) have at least 1 day off in any 7-day period. This requirement replaces, in part, proposed § 26.199(d)(2)(ii), which would have required that these individuals have a minimum 24-hour break in any 7-day period. This requirement also replaces, in part, proposed § 26.199(d)(2)(iii), which would have required that these individuals have a minimum 48-hour break in any 14-day period, except during the first 14 days of an outage. The NRC is replacing these requirements with § 26.205(d)(4) in response to public comment (see the discussion of public comment with respect to § 26.205(d)(2)(i) and (d)(3)). The combined effect of § 26.199(d)(2)(ii) and (d)(2)(iii) of the proposed rule would have been to require 2 days off in the first 2 weeks of the outage and 3 days off in each subsequent 14-day period. Section 26.205(d)(4) establishes a requirement that is similar to, though more flexible and less complex than, the requirements it replaces.

The NRC also received stakeholder comments on the proposed rule which recommended that the NRC eliminate the minimum day off requirements for outage periods. In additions, the NRC received comments asserting that

attracting qualified supplemental workers is challenging in the entire commercial reactor industry, that for many supplemental workers the availability of overtime is a key factor in where they decide to work, and that the industry has already experienced cases where individuals have left during an outage to go to a job that offered more overtime. The final rule partially addresses these comments by requiring that maintenance personnel have at least 1 day off in any 7-day period instead of the requirement for at least 3 days off in each successive (i.e., nonrolling) 15-day period. The NRC notes that critical maintenance tasks performed by individuals within the scope of § 26.4(a)(4) are subject to quality assurance and corrective action programs and that these programs are subject to NRC inspection. In addition, post-maintenance testing provides additional assurances of equipment performance.

As described with respect to § 26.205(d)(2), the NRC received many stakeholder comments on the proposed rule regarding the 48-hour break requirement. Several commenters asserted that, for workers on the night shift, having 1 day off provides an additional rest period and allows the worker to maintain a consistent pattern of work and sleep habits, which reduces the risk of accidents on the job. However, two days off may interfere with his or her sleep cycle and, as a result, the individual would have to readjust to the night shift after the 2-day break. The NRC acknowledges that these concerns may be particularly applicable during outage periods when it is common for licensees to schedule many individuals on a fixed night shift for the duration of an outage. The final rule addresses this concern by providing licensees increased flexibility in the distribution of the days off. As a consequence, licensees may schedule single days off to limit circadian disruption for workers on the night shift. Alternatively, they may provide the days off in consolidated blocks to provide extended breaks of 2 or more consecutive unrestricted sleep periods which are important to reducing cumulative fatigue.

The objective of the requirement in § 26.205(d)(4) is to ensure that individuals performing the duties described in § 26.4(a)(1) through (a)(4) have sufficient periodic long-duration breaks to prevent cumulative fatigue from degrading their ability to safely and competently perform their duties. The minimum day off requirement in § 26.205(d)(4) serves the same general function as the minimum day off

requirements of § 26.205(d)(3). However, whereas § 26.205(d)(3) is principally applicable to extended periods while a unit is operating, § 26.205(d)(4) is applicable to periods of limited duration during unit outages. As a consequence, the specific limits and details of these requirements differ to accommodate these different plant conditions and periods of applicability.

In its development of § 26.205(d)(4), the NRC considered industry work scheduling practices during outages and the applicability of other proposed requirements during these periods. In SECY-01-0113 and NRC staff reviews of records of deviations from technical specification work hour controls from 2003 and 2004, the most common deviation identified was to permit individuals to work more than 72 hours in 7 days, frequently by working more than six consecutive 12-hour days. These reviews also indicated that this practice was used extensively at a number of sites. Industry comments at the public meetings described in the preamble to the proposed rule also confirmed the NRC observation that some licensees were scheduling outages with several weeks of 12-hour shifts with no scheduled days off. The NRC also considered industry comments submitted during the public comment period that asserted 1 day off in 7 is adequate for maintaining worker performance and that offering schedules that included these levels of overtime is necessary to attract supplemental outage workers. The minimum day off requirement of § 26.205(d)(4) is the one requirement of this final rule that prevents individuals who perform the duties listed in § 26.4(a)(1) through (a)(3) from working 72 hours per week for the entire first 8 weeks of a unit outage. In addition, the minimum day off requirement of § 26.205(d)(4) is the one requirement of this final rule that prevents individuals from performing the duties listed in § 26.4(a)(4) with no scheduled days off for the entire first 8 weeks of a unit outage. In this regard, the NRC notes that the duties listed in § 26.4(a)(1) through (a)(4) are those the NRC considers most important for fatigue management because of their relationship to the protection of public health and safety. In particular, these duties include operating and maintaining systems and components that a risk-informed process has shown to be significant to public health and safety.

As described with respect to § 26.205(d)(2)(ii), break periods longer than the minimum 10 hours required by § 26.205(d)(2)(i) are necessary on a regular basis to maintain reliable human

performance. A 10-hour break provides an adequate opportunity to sleep (approximately 7 hours for most individuals) only if one assumes the minimal times for meals, hygiene, and commuting, as described with respect to § 26.205(d)(2)(i), with no other daily living obligations. During unit outages, work schedules of 12-hour shifts and limited days off are common. As the ratio of 12-hour work shifts to days off increases, the pressure on individuals to restrict sleep time in order to meet daily living obligations that cannot be deferred increases. Without periodic days off, individuals must either forego activities that can be important to general mental and physical fitness (e.g., family interactions, exercise, recreation, doctor appointments) or sacrifice sleep and increase their sleep debt (Presser, 2000). Such sleep restriction will compound the effect of the long (12-hour) work shift resulting in impairment on the job.

The NRC also considered ways to prevent and mitigate cumulative fatigue in roving outage crews and other transient workers who predominantly work during plant outages in the development of this requirement. During the stakeholder meetings discussed in the preamble to the proposed rule, many stakeholders expressed a strong desire for transient workers to be subject to work hour controls. One stakeholder observed that assuring transient outage workers are not impaired by fatigue is particularly important because these individuals typically do not have the extensive training in methods for maintaining reliable human performance that is provided to permanent plant personnel.

During development of the proposed rule, the NRC staff considered establishing long-term work hour controls. However, collective work hour controls would not be effective because these individuals typically work during outages when the collective work hour controls would not be applicable or practical. The NRC staff then considered individual long-term (quarterly and yearly) work hour limits for transient workers. However, industry representatives strongly objected because these transient workers move from one licensee to another, and the burden of obtaining work hour information for all of these individuals from other licensees would be extremely high. In part because of the practical difficulties of controlling long-term work hours for transient individuals, the NRC developed the 48-hour break requirement as a replacement for long-term work hour limits for transient individuals. As noted with respect to

§ 26.205(d)(4), the minimum day off requirement of this section replaces, in part, the 48-hour break requirement of the proposed rule, and is the single requirement that prevents individuals responsible for performing risk-significant duties from working extended periods of 72-hour work weeks or extended periods with no days off.

The NRC further considered that some transient personnel include licensee employees and long-term C/Vs. Many of these individuals may move from site to site within a fleet during plant outage periods. For large fleets, some individuals may work much of the spring and fall outage seasons under only the work hour limits and break requirements applicable to unit outage periods. For these individuals, the minimum day off requirement of § 26.205(d)(4) is the single requirement that will prevent such individuals from performing risk-significant duties while working with no days off for substantial portions of a year.

In developing the minimum day off requirements for the final rule, the NRC considered scheduling practices during outages and determined that it could not practically extend the same approach used in § 26.205(d)(3) because the requirements of this section are based on shift cycles which provide a defined period to which the average day off requirement will apply. The length of outages and increased threat conditions is variable and therefore does not provide a consistent averaging period. The NRC further considered establishing a requirement of a minimum of 3 days off in any 14-day period for individuals specified in § 26.4(a)(1) through (a)(3) because that would have been similar to the requirements it would have replaced. However, the NRC ultimately determined that 3 days off within a 15-day period provides licensees scheduling flexibility (e.g., establishing a schedule comprising a repeating series of 4 work shifts followed by 1 day off). As a consequence, the rule allows licensees the option to establish a schedule that is predictable, a characteristic desired by schedulers and workers, and that both mitigates and prevents cumulative fatigue by including periodic rest breaks.

During the development of the final rule the NRC also considered a graded approach to the minimum day off requirements for outages. Specifically, the staff considered an option which would have allowed licensees to defer 1 of the 3 required days off in a 15-day block to the subsequent 15-day block (i.e., licensees could provide

individuals only 2 days off in a 15-day block but would be required to provide those individuals 4 days off in the subsequent 15-day block). This option would have required fewer days off for outages of less than 15 days and provided additional scheduling flexibility for longer outages. At the March 29, 2006 public stakeholder meeting regarding this rulemaking the staff discussed the potential of a graded approach and solicited stakeholder comment. Only one licensee representative stated that a graded approach may provide useful flexibility. The NRC subsequently considered the increased potential for cumulative fatigue that would result from deferring days off, the increased complexity of the rule and scheduling to meet the requirements, the minimal stakeholder interest in a graded approach, and determined that the option for deferring a required day off to a subsequent 15-day block was not warranted.

Section 26.205(d)(5) requires that during the first 60 days of unit outages, security system outages, and increased threat conditions, licensees control the hours worked by individuals performing the security duties specified in § 26.4(a)(5) in accordance with the requirements in § 26.205(d)(5)(i) and (d)(5)(ii). The effect of this section is to provide a 60-day exception from the minimum day off requirements in 26.205(d)(3) for these plant conditions. After the first 60 days of these periods, these individuals are again subject to the minimum day off requirements of § 26.205(d)(3), except as permitted by § 26.205(d)(6). The purpose of this exception is to allow licensees the flexibility provided by the less stringent day off requirements of § 26.205(d)(5)(i) and (d)(5)(ii) to provide the increased level of security staffing that is required by these unique circumstances. The requirements in § 26.205(d)(5)(i) and (d)(5)(ii) provide the restrictions necessary to prevent and mitigate excessive cumulative fatigue during these periods.

Section 26.205(d)(5)(i) provides an exception from the minimum day off requirements of § 26.205(d)(3) for personnel performing the duties described in § 26.4(a)(5) during unit outages or unplanned security system outage. The requirement limits this exception period to 60 days from the beginning of the outage and requires that individuals performing the security duties identified in § 26.4(a)(5) during this period have a minimum of 4 days off in each non-rolling 15-day period. This requirement replaces the collective work hour limit of 60 work hours per person per week that § 26.199(f)(2)(i) of

the proposed rule would have required for these individuals during the first 8 weeks of a unit outage or a planned security system outage.

Section 26.205(d)(5) permits licensees to meet the minimum day off requirements of § 26.205(d)(5)(i) as an exception to the more stringent minimum day off requirements in § 26.205(d)(3). The rule permits this exception for a limited duration, 60 days to accommodate the short-term demand for increased work hours associated with these outages while limiting cumulative fatigue. Therefore, the requirement provides reasonable assurance that security personnel will remain capable of safely and competently responding to a security incident or an increased security threat condition, should one occur during or shortly after a period of increased work hours.

The basis for limiting the duration of the exception from the requirements of § 26.205(d)(3) during unit outages is described with respect to § 26.205(d)(4). In addition to establishing a minimum day off requirement for personnel performing the security duties identified in § 26.4(a)(5) during the first 60 days of a unit outage, § 26.205(d)(5) establishes minimum day off requirements for these individuals for the first 60 days of a planned security system outage. Planned security system outages are typically of very short duration relative to unit outages and the NRC does not expect that planned security system outages will exceed 60 days. However, the rule establishes the 60-day limit for planned security system outages to simplify implementation of the rule by applying identical exclusion periods for all outages and increased threat conditions. Additionally, the ability of security personnel to perform their duties safely and competently during these outage and increased threat conditions is based on the length of time individuals work additional hours, not on the nature of the site condition.

Section 26.205(d)(5)(i) replaces, in part, the requirements limiting work hours of security personnel established by order EA-03-038 with alternative requirements that will achieve the same objective. Collectively, the requirements in Subpart I more effectively achieve the objectives of the compensatory measures and therefore the NRC intends to revoke order EA-03-038 following implementation of this rule. This requirement limits, with the exception specified in § 26.205(d)(6), the maximum duration of the outage requirements to 60 days instead of the 120-day period order EA-03-038 permits.

Since September 11, 2001, the NRC has received several reports of nuclear security officers found asleep while on duty. In addition, the NRC received numerous allegations from nuclear security officers that certain licensees have required them to work excessive amounts of overtime over long periods as a result of the post-September 11 threat environment. The nuclear security officers questioned their readiness and ability to perform their required job duties because of fatigue and stated that they feared reprisal if they refused to work assigned overtime. The NRC received similar information from newspaper articles and from interactions with public stakeholder groups. For example, the Project on Government Oversight (POGO) issued a report entitled, "Nuclear Power Plant Security: Voices from Inside the Fences," and submitted this report to the NRC staff (ADAMS Accession No. ML031670987). POGO interviewed more than 20 nuclear security officers protecting 24 nuclear reactors (at 13 plants) to obtain material for its report. POGO reported that the security officers who were interviewed said, "Their plants are heavily relying on increased overtime of the existing guard force * * *. These guards raised serious concerns about the inability to remain alert." After reviewing the work hours and FFD concerns of security personnel subsequent to September 11, 2001, the NRC issued Order EA-03-038 to limit the work hours of security personnel and ensure that they remain capable of safely and competently performing their duties. The order requires compensatory measures for limiting work hours to a collective work hour average of 48 hours per person per week during normal operations, as well as limiting work hours to an average of 60 hours per week for planned plant outages and planned security system outages.

Ensuring that work schedules incorporate adequate break periods is an important mitigation strategy for cumulative fatigue. The need for periodic long breaks was discussed with respect to § 26.205(d)(2) and (d)(3). The NRC's initial concept for compensatory measures to prevent fatigue of security personnel from the long work hours of outages included a feature that required a 48-hour break in any 7-day period for periods of increased work hours that exceeded 45 days (ADAMS Accession No. ML030300470). Through stakeholder interactions during development of the order, the NRC concluded that a 60-hour collective work hour limit would be an effective alternative to meet the same objective

and would also provide more flexibility. The 60-hour limit of the proposed rule would have ensured that security force personnel who work a 12-hour shift receive, on average, 2 days off in every 7-day period, thereby reducing the potential for cumulative fatigue.

As discussed with respect to § 26.205(d)(3), stakeholder comments on the proposed rule expressed a range of concerns regarding the need for, and effectiveness of, collective work hour controls. As a consequence, the NRC replaced the collective work hour limits of the proposed rule with the minimum day off requirements outlined in § 26.205(d)(3) through (d)(5). More specifically, the requirement for a minimum of 4 days off in each 15-day period of the first 60 days of an outage required in § 26.205(d)(5)(i) establishes a requirement in the final rule that is comparable to the 60-hour collective work hour limit of the proposed rule, while addressing stakeholder comments regarding the importance of addressing worker fatigue on an individual basis. Although § 26.205(d)(5)(i) does not directly limit work hours, the requirement has the effect of limiting individuals to an average work week of 61.6 hours, assuming no work shifts exceed 12 hours. The NRC established the minimum day off requirement in terms of 15-day periods to establish requirements for security personnel in time periods consistent with the minimum day off requirements for other personnel to simplify licensee implementation of the requirements of this section.

For several reasons, control of work hours for security personnel must be more stringent than for other individuals who are subject to the work hour controls. First, security personnel are the only individuals at nuclear powerplants who are entrusted with the authority to apply deadly force. Decisions regarding the use of deadly force are not amenable to many of the work controls (e.g., peer checks, independent verification, post-maintenance testing) that are implemented for other personnel actions at a nuclear plant to ensure correct and reliable performance. Second, unlike most other work groups, security personnel are typically deployed in a configuration in which some members of the security force have very infrequent contact with other members of the security force or with other plant personnel. A lack of social interaction can exacerbate the effects of fatigue on individuals' abilities to remain alert (Horne, 1988). Third, these deployment positions can be fixed posts where very little physical activity is

required, further promoting an atmosphere in which fatigue could transition into sleep. Fourth, many security duties are largely dependent on maintaining vigilance. Vigilance tasks are among the most susceptible to degradation from fatigue (Rosekind, 1997; Monk and Carrier, 2003). Finally, unlike operators, security forces lack automated backup systems that can prevent or mitigate the consequences of an error caused by fatigue.

Consistent with the requirements of the proposed rule, the final rule requirement differs from that in Order EA-03-038 by establishing more stringent work hour requirements for unplanned plant outages than for increased threat conditions. Order EA-03-038 currently does not impose collective work hour limits for unplanned plant outages. As discussed in the preceding paragraph, security duties are particularly susceptible to fatigue. Therefore, the NRC considers that the minimum day off requirement for security personnel should only be waived in cases in which (1) licensees would be unable to sufficiently plan for the increased security demands, and (2) the increased potential for fatigue-induced errors is outweighed by the need for a higher complement of security personnel on shift to maintain the common defense and security. In the case of unplanned plant outages, although licensees would be unable to sufficiently plan for the increased security demands that typically accompany plant outages, licensees can control the demands on the work hours of security personnel by controlling the outage activities (e.g., maintenance) that create the increased demand for security personnel. As a consequence, work hours that may compromise the FFD of security personnel, such as those that would be permitted in the absence of the minimum day off requirements of § 26.205(d)(5)(i), cannot be justified. The economic benefit gained by licensees cannot justify the increased potential for fatigue-induced errors.

Section 26.205(d)(5)(ii) provides an exception from the minimum day off requirements for security personnel for the first 60 days of an unplanned security system outage or an increased threat condition. This requirement replaces proposed § 26.199(f)(2)(iii), which would have provided an exception to the collective work hour limits for security personnel for the first 8 weeks of an unplanned security system outage or an increased threat condition. The exception allowed by § 26.205(d)(5)(ii) is consistent with compensatory measures required by Order EA-03-038. However, Order EA-

03-038 provides an exception from the collective work hour limits in the compensatory measures for these conditions for a period of up to 120 days. Section 26.205(d)(5)(ii) establishes a more stringent exception period.

Unplanned security system outages and increased threat conditions require extensive increases in security force labor in terms of compensatory measures. These increases can make it very difficult to maintain work hour controls during these periods, especially because licensees are unable to plan in advance for these circumstances. Although the increased work hours increase the potential for cumulative fatigue, other fatigue management requirements, including the work hours controls in § 26.205(d)(1) and (d)(2), provide reasonable assurance of guard readiness during the exception period. Therefore, the benefit to plant security of ensuring adequate staffing during such unplanned conditions outweighs the potential for excessive worker fatigue.

Staffing to a level necessary to meet the minimum day off requirements of § 26.205(d)(3) during unplanned security system outages or increased threat conditions would not be practical because it would require licensees to maintain security staffing in numbers that would be excessive for the vast majority of circumstances. Limiting periods of extended work hours for security personnel to 60 days aligns the exception period for security personnel with the exception period for other personnel subject to the work hour requirements, simplifying the rule and its implementation. Further, the cost to licensees of the compensatory measures required to address security system outages is significant, and most security systems are modular. Therefore, an unplanned security system outage is unlikely to exceed 60 days. Outages of this duration have been uncommon. Therefore, reducing the exclusion period from 120 days to 60 days is not likely to have a practical impact on licensees.

The Department of Homeland Security has refined its threat system to compartmentalize increases in threat conditions for individual business sectors and regions of the country. In addition, since the inception of the system, the threat level has not been increased for any period that exceeded 6 weeks. An event that would cause NRC-regulated sites to maintain increased protective measures for a period of more than 60 days would likely mean a significant domestic attack had occurred. In this event, § 26.207(c) [Common defense and

security] provides a means for extending the proposed 60-day exception period, as discussed with respect to that provision.

Proposed § 26.199(f)(2)(iv) would have clarified the instances in which security personnel would be subject to a collective work hour limit for certain instances in which multiple plant conditions exist. The NRC has not retained this provision for the final rule because § 26.205(d)(ii), in conjunction with the definition of increased threat condition as described in § 26.5, adequately addresses the applicability of the work hour requirements for circumstances in which multiple plant conditions (e.g., a unit outage and increased threat condition) occur simultaneously. Specifically, § 26.205(d)(ii) states that during the first 60 days of an unplanned security system outage or increased threat condition, licensees need not meet the requirements of either § 26.205(d)(3) or (d)(5)(i). As a consequence, should an unplanned security system outage or increased threat condition occur at any time during a unit outage, security personnel subject to the work hour requirements would not be required to meet the minimum day off requirements of § 26.205(d)(3) or (d)(5)(i) during the first 60 days of the unplanned security system outage or increased threat condition.

Proposed § 26.199(f)(2)(iv) would have also clarified the applicability of the collective work hour controls to instances in which a threat level increases and then decreases. In the final rule, the NRC has defined an increased threat condition in § 26.5 as "an increase in protective measure level, relative to the lowest level applicable to the site during the previous 60 days, as promulgated by an NRC advisory." Accordingly, any time a threat level changes, whether by increasing or decreasing, the determination of whether a site is in an increased threat condition, for purposes of applying the work hour requirements of Subpart I, is made by comparing the current threat level with the lowest level applicable to the site during the previous 60 days.

Proposed § 26.199(f)(2)(v) would have clarified the applicability of the collective work hour limits for security personnel during multiple consecutive and concurrent plant conditions. The NRC has not retained this provision for the final rule because the requirements in § 26.205(d)(5) and (d)(7), in conjunction with the definition of increased threat condition as described in § 26.5, adequately define the requirements applicable to multiple

consecutive and concurrent plant conditions. In the case of multiple consecutive increases in threat conditions, § 26.205(d)(ii) would permit a 60-day exception from the minimum day off requirements, with the 60 days beginning with each increase. As described in the preceding paragraph, should the threat level decrease, the determination of which work hour requirements are applicable (i.e., whether the increased threat level exception applies) depends upon a comparison of the current threat level to the lowest level applicable in the previous 60 days.

Proposed § 26.199(f)(2)(vi) would have established requirements controlling the exception period from the collective work hour controls when a threat condition decreases during an unplanned security system outage or increased threat condition. In these circumstances, the proposed rule would have established the beginning of the exception period based upon the date upon which the current threat condition was last entered as a result of a threat condition increase. The NRC has not retained this provision for the final rule because the requirement in § 26.205(d)(5) in conjunction with the definition of increased threat condition as described in § 26.5, adequately define the requirements. For example, if the threat level increases at the beginning of week 1, increases again at the beginning of week 3, and then decreases in week 5 to the level of week 1, the beginning of the maximum 60-day exception period would be the beginning of week 1 because the definition of increased threat condition is based upon an increase from the lowest level of protective measures in the past 60 days. The requirements ensure that the duration of the exception period is no longer than necessary based upon the current threat level, thereby providing licensees with the flexibility to respond to increased threat conditions while minimizing the potential for cumulative fatigue of security personnel. As a consequence, § 26.205(d)(5), in conjunction with the definition of increased threat condition in § 26.5, establishes requirements applicable to changes in threat conditions that are consistent with the work hour controls order EA-03-038 requires.

Section 26.205(d)(6) permits licensees to extend the 60-day exception periods in § 26.205(d)(4) and (d)(5) 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. For example, during

weeks 5 and 6 of a 10-week outage, an individual may work 42-hour work weeks because of reduced demand for his or her skills during those weeks of the outage. That individual would then be eligible to work an additional 2 weeks beyond the 60-day exception period under the minimum day off requirements applicable to the first 60 days of an outage. The NRC added this provision to the final rule partly in response to public comment on the proposed rule that the exception for outage periods should be extended to 10 weeks. As described with respect to § 26.205(d)(4), the NRC does not believe it is appropriate to extend the outage exception period to 10 weeks without restriction because of the increased potential for cumulative fatigue when individuals work at the limits established by § 26.205(d)(4) for extended periods of time. However, during public meetings on the proposed rule, stakeholders also commented that during extended outages individuals do not always work an outage schedule for the entire outage but may have periods of reduced activity that provide opportunity for individuals to recover from cumulative fatigue. The break requirements exception allowed by § 26.205(d)(6) acknowledges this circumstance. The provision accommodates longer outages without increasing the risk of worker fatigue by allowing licensees to extend the outage exception, and therefore the reduced requirements applicable to outages, by taking credit for these periods of reduced work hours. As a result, this requirement also provides licensees the flexibility of planning outages longer than the normal 60-day exception period by incorporating periods of reduced work hours appropriate to maintaining worker FFD over an extended duration outage. In addition, this provision also applies to increased threat conditions and provides a mechanism for a limited extension of the reduced requirements applicable to scheduling individuals performing security functions during increased threat conditions.

Proposed § 26.199(f)(3) would have permitted the collective work hours of any job duty group specified in proposed § 26.199(a) to exceed an average of 48 hours per week in one averaging period if all of the conditions specified in § 26.199(f)(3)(i) through (f)(3)(iii) of the proposed rule were met. The criteria in proposed § 26.199(f)(3)(i) through (f)(3)(iii) would have permitted licensees to control work hours to a higher collective work hour limit under certain occasional, short-term exigent

circumstances. The NRC has not retained this provision for the final rule because the requirements in § 26.205(d)(3) and (d)(6), and § 26.207 adequately define the requirements applicable to these circumstances.

The objective of proposed § 26.199(f)(3) would have been to establish a regulatory framework that accommodated circumstances beyond the reasonable control of licensees, while ensuring that licensees continue to provide reasonable assurance that the effects of fatigue and degraded alertness on individuals' abilities to safely and competently perform their duties are managed commensurate with maintaining public health and safety. The requirements of the final rule provide licensees the flexibility to accommodate these circumstances in a manner that is consistent with reasonable assurance of worker FFD. Section 26.205(d)(3) establishes minimum day off requirements that accommodate variation in workload because it does not require a minimum number of days off each week but requires licensees to ensure that individuals have an average number of days off over the duration of a shift cycle of up to 6 weeks. As a consequence, individuals are able to work up to 72 hours in a week, to the extent that they are still able to meet the minimum days off requirement for the shift cycle. For example, individuals on 12-hour shifts can work 72 hours per week for 2 weeks, and still have enough days off to work an average of 45 hours per week for the remaining 4 weeks of a 6-week cycle. Section 26.205(d)(3) also accommodates circumstances that may require increased work hours for more extended periods of time. Again, as an example, § 26.205(d)(3)(iii) requires an average of 2.5 days off per week for individuals performing the job duties specified in § 26.4(a)(1) through (a)(4). Individuals can meet this requirement while working an average of 54 hours per week. This limit is comparable to the limit that would have been required by § 26.199(f)(3)(ii) of the proposed rule, which would have restricted the exception allowed by § 26.199(f)(3) to a group collective work hour average of not more than 54 hours per person per week. Section 26.205(d)(6) can also accommodate limited unplanned extensions of an outage beyond the 60-day exception period, provided individuals have periods of reduced work hours that qualify for the 7-day extensions. Such circumstances may arise if unexpected complications in an outage task occur that cause the work to be deferred until later in the outage,

leaving the assigned work crew with a reduced period of activity.

The NRC also notes that the work hour limits of Subpart I are only applicable to a limited scope of personnel and therefore not all exigent circumstances would necessarily involve individuals or duties subject to these controls. In addition, should the circumstances require increased work hours by individuals who perform the duties specified in § 26.5(a)(1) through (a)(5), the provisions of § 26.207 address waivers of the work hour requirements when necessary to prevent or mitigate conditions adverse to safety and provide exceptions from the requirements when necessary to ensure common defense and security and allow adequate staffing during declared plant emergencies.

Proposed § 26.199(f)(4) would have prohibited licensees from repeatedly permitting the collective work hours of any job duty group to exceed an average of 48 hours per person per week. The final rule does not retain this requirement because the NRC has deleted collective work hour control requirements from the final rule. As a consequence, a limit on repeatedly exceeding the collective work hour limit is not necessary for the final rule.

Proposed § 26.199(f)(5) would have permitted licensees to exceed any collective work hour limit of proposed § 26.199(f) if the licensee submitted and obtained advance approval of a written request to the NRC that included the information in proposed § 26.199(f)(5)(i) through (f)(5)(iii). The primary objective of this provision was to provide a regulatory framework for addressing unique and infrequent circumstances, such as steam generator replacements or other extended outages, that would be difficult to manage within the collective work hour controls of § 26.199(f) of the proposed rule. As described with respect to § 26.205(d)(6), § 26.205(d)(6) provides a mechanism in the final rule for licensees to establish work hour schedules for extended outages without the need for NRC approval of a written request and therefore allows licensees to directly and more simply address the circumstances that would have otherwise been handled through the process that proposed § 26.199(f)(5) would have required.

Proposed § 26.199(g) [Successive plant outages] would have established requirements for the control of work hours during unit and security system outages that follow a preceding outage by less than 2 weeks. The objective of the proposed requirements would have been to limit the potential for cumulative fatigue that could result from working successive outages in

close succession. The final rule does not retain these requirements.

A comment on the proposed rule noted that several companies own and operate reactors at multiple sites and it is common for these companies to develop outage work groups and deploy these work groups to outages in close succession at their sites. Another comment noted that recruiting qualified supplemental workers to support outages is challenging for the entire commercial reactor industry and that for many supplemental workers the availability of overtime is a key factor in where they decide to work. This comment further stated that the industry has already experienced cases where individuals have left during an outage for employment that offered more overtime.

In determining to eliminate the requirements pertaining to successive plant outages the NRC concluded that although reduced work hours between successive outages would reduce the potential for cumulative fatigue, the NRC expects that in many cases transient workers would have days off between outages as they travel between nuclear power plant sites or wait for the beginning of the next outage. As a result, a rule requirement for reduced work hours between successive outages would provide no or limited additional benefit in these circumstances. The NRC also considered the limited applicability of the requirement, i.e., the requirement would have been limited to instances in which individuals worked successive outages for the same licensee. As a result, the requirement would have provided a benefit for only a limited scope of individuals in these circumstances. The NRC also considered the increased challenge licensees would face in retaining crews of supplemental workers between outages if these workers were required to take a full 2 weeks off between outages. The NRC further considered that licensees could have alternatively complied with the requirement by employing supplemental workers for a 2 week period at the conclusion of an initial outage or the beginning of a successive outage at the levels applicable to an operating plant. The NRC acknowledges that such a practice would likely extend outages and the reduced work hours could cause some individuals to seek alternative employment. In addition, the NRC considered the potential for the successive outage requirements to adversely affect outage schedules. Specifically, if a planned outage must be extended due to unforeseen complications, the schedule for

subsequent outages could be affected if the outage extension affects the ability of individuals to have 2 weeks of reduced work hours before the subsequent outage.

Given the limited scope of individuals that would benefit from the requirements in proposed § 26.199(g) and the potential for substantial adverse impacts on licensee's ability to plan and conduct outages, the NRC has not retained these requirements in the final rule. However, the NRC notes that the final rule includes other provisions that will reduce the potential for cumulative fatigue from successive outages, including more stringent work hour controls, requirements for a process through which individuals may self-declare if they believe they are not fit for duty because of fatigue, and requirements for training in fatigue management.

Section 26.205(e) [Reviews] has been added to require licensees to periodically self-assess their performance with respect to controlling the work hours of those individuals who perform the job duties specified in proposed § 26.4(a). This section replaces with substantive changes the requirements in § 26.199(j) of the proposed rule. The NRC revised the review requirements to eliminate reviews related to the collective work hour limits that were deleted from the final rule and to add a review requirement for the implementation of the requirements in § 26.205(d)(3).

Work hour controls in proposed § 26.205(d) would provide licensees with substantial flexibility in controlling work hours. Accordingly, periodic self-assessments are needed for the licensee to maintain reasonable assurance that they are implementing the specific work hour control provisions of § 26.205(d) consistent with the general performance objective in § 26.23(e). In addition, it is necessary for the self-assessments to be scheduled in a manner that ensures corrective action, if necessary.

Outages and increased threat conditions increase the risk of human error as a result of higher workload, the performance of more complex and infrequent tasks, and the pressure to meet schedular goals. Therefore, it is particularly important to include those periods of time in any assessment of the effectiveness of a licensee's work hour controls. Accordingly, licensees are required to conduct a review 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.

Section 26.205(e)(1) requires licensees to review the actual work hours and performance of individuals who are subject to this section for consistency with the requirements of § 26.205(c), so that licensees can determine if they are scheduling individuals with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts. This review is consistent with the performance-based approach in § 26.205(c).

Section 26.205(e)(1)(i) requires the licensees to assess 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). Individuals that average more than 54 hours over a shift cycle have a substantial number of extended work days, or have received minimal days off, or both. Although the objective of the minimum day off requirements of § 26.205(d)(3) is a maximum average work week of 48 hours, the requirements do not prevent individuals from exceeding an average of 54 hours per week. The requirement is necessary to ensure that licensees fully evaluate the work hours and performance of these individuals. Several studies have indicated a tendency for individuals to underestimate their levels of fatigue (Wylie, et al., 1996; Dinges, 1995; Rosekind and Schwartz, 1988). This tendency may cause an individual to fail to recognize that his or her ability to perform is degraded. The final rule requires licensees to independently evaluate the performance of these individuals to determine whether their abilities to safely and competently perform their duties had actually been compromised.

Section 26.205(e)(1)(ii) requires that licensee assessments include individuals who were granted more than one waiver during the review period. This provision requires licensees to assess the work hours and performance of these individuals to ensure that licensees adequately evaluate whether an individual's abilities to safely and competently perform their duties had actually been compromised while working under a waiver. This requirement is necessary to ensure that licensees' use of waivers did not result in degraded worker fitness-for-duty.

Section 26.205(e)(1)(iii) requires that the licensee assessments include individuals who were assessed for fatigue in accordance with § 26.211 during the review period. This section requires licensees to evaluate whether these individuals' abilities to safely and competently perform their duties had actually been compromised. An individual who has been assessed for fatigue may be working above his or her tolerance for overtime, and it would be necessary for licensees to fully evaluate the individual's overall performance. The requirement is necessary to ensure that licensee fatigue assessments are consistent with worker performance and are providing an effective basis for licensee fatigue management decisions.

Section 26.205(e)(2) requires licensees to review each individual's hours worked and the waivers under which work was performed to assess staffing adequacy for all of the jobs that are subject to the work hour controls of § 26.205. The minimum day off requirements of § 26.205(d)(3) through (d)(5) provide assurance that licensees are managing cumulative fatigue at a gross level, and an indication of whether staffing is adequate to support the objectives of the rule. However, there is a potential that individuals with specialized skills may work a disproportionate number of hours and, consequently, may be more susceptible to fatigue than others. Accordingly, § 26.205(e)(2) requires licensees to review work hours and waivers of the work hour controls to provide assurance that fatigue is properly managed for all jobs.

Section 26.205(e)(3) requires licensees to document the methods used to conduct their reviews and the results of the reviews. The NRC will use the documentation during site inspections as a means of assuring compliance with the regulations. The methods and results of the reviews are indicative of a licensee's performance in managing the fatigue of its workers who are subject to the requirements of this section. Irregularities in the review process may indicate a programmatic weakness that might trigger further inspection activities. The NRC considers the additional recordkeeping burden for documenting this information to be outweighed by the NRC's need to ensure that licensees are complying with the proposed requirements of this section and maintaining effective fatigue management programs.

Section 26.205(e)(4) requires licensees to 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 Part 26. Accordingly, licensees are required to maintain the documentation that is necessary for NRC reviews of licensees' compliance with the work hour controls within the licensees' existing corrective action programs. The requirement is in keeping with the existing requirements in 10 CFR Part 50 Appendix B, Criterion XVII, "Quality Assurance Records," and Criterion XVI, "Corrective Action." The NRC will use the documentation during site inspections as a means of assuring compliance with the regulations. The corrective actions and trending would be indicative of a licensee's performance in managing the fatigue of its workers who are subject to the requirements of this part. Irregularities in the corrective action process may indicate a programmatic weakness that might trigger further inspection activities. The NRC considers the additional recordkeeping burden for documenting this information under the existing corrective action program to be outweighed by the NRC's need to ensure that licensees are complying with the requirements and maintaining effective fatigue management programs.

Section 26.207 Waivers and Exceptions

Section 26.207 permits licensees to authorize waivers from the work hour requirements in § 26.205(d)(1) through (d)(5)(i) for conditions that meet the two criteria specified in this section. Section 26.207 contains the revised requirements in proposed § 26.199(d)(3) and 26.199(h) and (i) of the proposed rule. The final rule consolidates these requirements into a single section to improve the organization of Subpart I. Although the provisions are renumbered, the NRC made only limited changes to the requirements for the final rule.

Section 26.207(a) permits licensees to grant a waiver of the work hour controls in § 26.205(d)(1) through (d)(5)(i). Exceeding the individual work hour limits is justified for limited circumstances in which compliance with the work hour requirements could have immediate adverse consequences for the protection of public health and safety or the common defense and security. Limited use of waivers is also consistent with the Commission's position stated in the NRC's Policy on Worker Fatigue. However, as specified in § 26.207(a)(2), which contains the requirements in proposed § 26.199(d)(3)(ii), the NRC expects a licensee to grant waivers only to address circumstances that it cannot reasonably control.

Section 26.207(a)(1)(i) requires an operations shift manager to determine that the waiver is necessary to mitigate or prevent a condition adverse to safety, or a security shift manager to determine that the waiver is necessary to maintain site security, or a site senior-level manager with requisite signature authority to make either determination. This section establishes one of two criteria in the final rule for granting a waiver from the individual work hours requirements. This section replaces proposed § 26.199(d)(3)(i)(A), with limited editorial revisions.

The NRC's Policy on Worker Fatigue recognized that "very unusual circumstances may arise requiring deviation from the above [work hour] guidelines." In SECY-01-0113, the NRC noted that the frequency of guideline deviations at a substantial proportion of sites appeared to be inconsistent with the intent of the policy and that some licensees abused the authority to grant deviations from the work hour guidelines. Section 26.207(a)(1)(i) more clearly articulates the NRC's expectations with respect to exceeding the work hour limits; licensees must limit the granting of waivers from the work hour limits to circumstances in which such a waiver is necessary to prevent or mitigate a condition adverse to safety or to maintain the security of the plant. The criterion in the final rule limits waivers to conditions that are infrequent while still permitting waivers that are necessary for safety or security. For example, § 26.207(a)(1)(i) permits a licensee to grant a waiver from a work hour requirement if necessary to prevent a condition adverse to safety, if compliance with the work hour requirement will cause the licensee to violate other NRC requirements, such as the minimum onsite staffing requirements in 10 CFR 50.54(m), or if a delay in the recovery of failed plant equipment that is necessary for maintaining plant safety will occur. Similarly, the NRC considers it appropriate to grant a waiver from the work hour requirements if necessary to prevent a condition adverse to safety or if compliance with the work hour requirements would cause a forced reactor shutdown, power reduction, or other similar action, as a result of exceeding a time limit for a technical specification limiting condition for operation (LCO). LCOs require nuclear power plant licensees to take certain actions to maintain the plant in a safe condition under various conditions, including malfunctions of key safety systems.

The criterion for granting waivers in § 26.207(a)(1)(i) was the subject of

considerable stakeholder comment and discussion during the public meetings described in the preamble to the proposed rule. Industry representatives stated that the criterion is overly restrictive because it would prohibit the granting of waivers for conditions that could be cost beneficial to the licensee without a substantive decrease in safety. However, the potential for worker fatigue in conditions that require a waiver is substantial (Baker, et al., 1994; Dawson and Reid, 1997; Stephens, 1995; Strohl, 1999). Therefore, the NRC does not believe that licensees can reasonably justify the performance of risk-significant functions by individuals who have worked hours in excess of the limits on the basis that granting the waiver will not have an adverse impact on safety or security. The preamble to the proposed rule details the NRC's decision not to incorporate industry's comment on this provision.

Section 26.207(a)(1)(i) further requires that an operations shift manager or a senior-level site manager with requisite signature authority must make the determination that a waiver is necessary to mitigate or prevent a condition adverse to safety. Similarly, the final rule requires that a security shift manager, or a senior-level site manager with requisite signature authority, must make the determination that a waiver is necessary to maintain the security of the facility. Operations shift managers and security shift managers have the requisite knowledge and qualifications to make the respective safety or security determinations and making such determinations is consistent with the scope of duties currently performed by individuals in these positions. The NRC considered industry stakeholder comments during the public meetings described in the preamble to the proposed rule, expressing concern that limiting the authority to approve waivers to operations shift managers and security shift managers could contribute to overburdening individuals in these positions and prevent distributing the administrative burden of granting a waiver to other qualified individuals. The NRC also considered other stakeholder comments concerning the need to ensure that the individuals making these determinations are not unduly influenced by schedule pressures. The NRC noted that some licensees had delegated the authority to authorize deviations to organizational levels that appeared to be inconsistent with the guidelines in the NRC's Policy on Worker Fatigue, which recommend that the plant manager or plant manager designee authorize deviations from the

guidelines. Accordingly, § 26.207(a)(1)(i) permits senior site managers with the signature authority of operations shift supervisors to make the safety determinations that are required to grant waivers and senior site managers with the signature authority of security shift supervisors to make the security determinations required to grant waivers.

Section 26.207(a)(1)(ii) establishes the second of two criteria for granting a waiver from the individual work hour controls of § 26.205(d)(1) through (d)(5)(i). This section contains, with revision, the requirements in § 26.199(d)(3)(i)(B) of the proposed rule. Section 26.207(a)(1)(ii) requires that a supervisor, who is qualified to direct the work to be performed by the individual to whom the waiver will be granted and is trained in accordance with the requirements of §§ 26.29 [Training] and 26.203(c) [Training and examinations], must assess the individual face to face and be reasonably sure that the individual will be able to safely and competently perform his or her duties during the additional work period for which the waiver is sought. These determinations require knowledge of the specific skills that are necessary to perform the work and the conditions under which the work will be performed in order to assess the potential for fatigue to adversely affect the ability of an individual to safely and competently perform the work. This knowledge is generally limited to individuals who are qualified to direct the work. The training required by §§ 26.29 and 26.203(c) provides the KAs that are essential for a supervisor to make valid assessments in this regard. Among other FFD topics, the training addresses the contributors to worker fatigue and decreased alertness in the workplace, the potential adverse effects of fatigue on job performance, and the effective use of fatigue countermeasures. Accordingly, the training is necessary for individuals to perform these assessments.

The NRC revised the proposed rule to account for the situation in which no supervisor qualified to direct the work is on site. To address this circumstance, § 26.207(a)(1)(ii) of the final rule states that a supervisor who is qualified to provide oversight of the work to be performed by the individual can make the assessment if he or she is trained in accordance with the requirements of §§ 26.29 and 26.203(c). Although this individual may be less familiar with the details of how the work is to be performed, the exception prevents the substantial burden of a licensee requiring a supervisor who is qualified

to direct the work to report to the site to perform the assessment, as well as preventing the potential fatigue of the supervisor if called in during the night.

Section 26.207(a)(1)(ii) further requires that supervisors must perform the assessment face to face with the individual to which the waiver will apply. This requirement ensures that the supervisor who is performing the assessment has the opportunity to observe the individual's appearance and behavior and note any indications of fatigue (e.g., decreased facial tone, rubbing of eyes, slowed speech). The supervisor can also interact with the individual to assess his or her ability to continue to safely and competently perform his or her duties during the period for which the waiver will be granted.

Section 26.207(a)(1)(ii) also requires that the supervisory assessment must address, at a minimum, the potential for acute and cumulative fatigue, considering the individual's work history for at least the past 14 days, and the potential for circadian degradations in alertness and performance, considering the time of day for which the waiver will be granted. The potential for acute fatigue can be practically assessed by estimating the total number of continuous hours that the individual will have worked by the end of the work period for which the waiver is being considered. The potential for cumulative fatigue can be practically assessed by reviewing the individual's work schedule during the past 14 days to determine whether (1) the individual had adequate opportunity to obtain sufficient rest, considering the length and sequencing of break periods, (2) the available sleep periods occurred during the night or at other times when sleep quality may be degraded, and (3) the potential exists for transitions between shifts (e.g., from days to nights) to have interfered with the individual's ability to obtain adequate rest. The potential for circadian degradations in alertness and performance can be practically assessed by considering the time of day or night during which the work would be performed, as well as the times of day of the individual's recent shift schedules. Section 26.207(a)(1)(ii) in effect requires supervisors to address the three work schedule factors (i.e., shift timing, shift duration, and speed of rotation) that are generally considered to be the largest determinants of worker fatigue (Akerstedt, 2004; McCallum, et al., 2003; Mallis, et al., 2002; Folkard and Monk, 1980; Rosa, 1995; Rosa, et al., 1996). In determining the scope of the assessment, the NRC also considered

the need for licensees to be able to focus the assessment on information that is readily available and could be verified.

Section 26.207(a)(1)(ii) further requires that the supervisory assessment for granting a waiver address the potential for fatigue-related degradations in alertness and performance to affect risk-significant functions and whether it is necessary to establish controls and conditions under which the individual is permitted to perform work. This requirement is consistent with the NRC's Policy on Worker Fatigue, which states that "the paramount consideration in such authorizations shall be that significant reductions in the effectiveness of operating personnel would be highly unlikely." However, § 26.207(a)(1)(ii) requires the supervisor to identify any risk-significant functions that may be compromised by worker fatigue, thereby focusing the assessment on worker activities that have the greatest impact on the protection of the public, considering the types of skills and abilities that are most sensitive to fatigue-related degradations.

Section 26.207(a)(1)(ii) also requires the supervisor to identify any additional controls and conditions that he or she considers necessary to grant the individual a waiver from a work hour control. For example, applicable controls and conditions may include, but are not limited to (1) peer review and approval of assigned job tasks, (2) assignment of job tasks that are non-repetitive in nature, (3) assignment of job tasks that allow the individual to be physically active, and (4) provisions for additional rest breaks. The requirement to consider establishing controls and conditions is necessary to ensure that licensees take steps to mitigate fatigue from an extended work period and reduce the likelihood of fatigue-related errors adversely affecting public health and safety or the common defense and security.

Section 26.207(a)(2) requires licensees, to the extent practical, to grant waivers only in circumstances that could not have been reasonably controlled. This section contains the requirement presented in § 26.199(d)(3)(ii) of the proposed rule. This requirement is necessary because conditions for meeting the waiver criteria that are specified in § 26.207(a)(1) could routinely result from inadequate staffing or work planning. Licensees have authorized deviations from their technical specification limits on work hours for such reasons in the past. However, because of the significant adverse effects of worker fatigue, as detailed in Section

IV.D, waivers should be used infrequently and only when necessary to protect the public. Licensees should take all reasonable care to ensure the use of waivers is minimized. Therefore, § 26.207(a)(2) prohibits the use of waivers in lieu of adequate staffing or proper work planning, for example, but would permit the use of waivers for circumstances that the licensee could not have reasonably controlled, which may include, but are not limited to, equipment failures or a sudden increase in the personnel attrition rate.

Section 26.207(a)(3) requires that the face-to-face supervisory assessment required by § 26.207(a)(1)(ii) be performed sufficiently close in time to the period during which the individual will be performing work under the waiver to ensure that the assessment will provide a valid indication of the potential for worker fatigue during the extended work period. This section contains the requirements presented in § 26.199(d)(3)(iii) of the proposed rule. This requirement is needed because worker alertness and the ability to perform can change markedly over several hours (Baker, et al., 1990; Dawson and Reid, 1997; Robert, 1997; Folkard and Monk, 1980; Rosa, 1995). These changes can be particularly dramatic if fatigue from sustained wakefulness coincides with circadian periods of decreased alertness (Baker, et al., 1990; Gander, et al., 1998; Rosekind, 1997; Folkard and Tucker, 2003; Carrier and Monk, 2000). Therefore, the final rule requires licensees to conduct supervisory assessments within a time period that provides reasonable assurance that the individual's condition will not substantively change before work is performed under the waiver.

Section 26.207(a)(3) also establishes a period of 4 hours before the individual begins working under the waiver as the period within which the supervisory assessment must be performed. In establishing a maximum time period the NRC considered several factors. Conducting the assessment as close in time as practical to the period during which the individual will perform work under the waiver will provide the greatest assurance of a valid assessment. However, conducting the assessment immediately before the individual will begin performing work under the waiver could, in some circumstances, cause the timing of assessments to conflict with the conduct of shift turnovers and other practical administrative and operational constraints. Additionally, assessments for granting waivers from the longer term individual limits (e.g., the maximum number of work hours in 7

days) would be less sensitive to the specific timing of the assessment. However, certain licensees have periodically authorized blanket deviations from technical specification work hour limits days and weeks in advance of the actual performance of the work. A maximum limit of 4 hours would address the need for an enforceable requirement that would provide reasonable assurance of valid assessments and would take into account the relevant technical and practical considerations. An added benefit of this requirement is that it would prevent the simultaneous granting of blanket waivers for large groups of individuals that do not take into account each individual's level of fatigue.

Section 26.207(a)(4) requires licensees to document the bases for granting waivers from the individual work hour controls of § 26.205(d). This section contains the requirement presented in § 26.199(d)(3)(iv) of the proposed rule. This section requires licensees to document 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 by § 26.207(a)(1). This documentation is necessary to support NRC inspections of compliance with requirements for granting waivers from the work hour limits as well as for the licensee self-assessments of the effectiveness of implementing work hour controls that would be required under § 26.205(e).

Section 26.207(b) [Force-on-force tactical exercises] of the final rule relieves licensees from the requirements of § 26.205(d)(3) by allowing them to 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. This provision is an addition to the requirements of the proposed rule and is similar to a slightly different exception contained in Order EA-03-08 that applied to group work hour controls. The NRC believes this provision is appropriate in order to provide licensees flexibility in accommodating the NRC-evaluated tactical exercises, which are not under a licensee's full control. For example, it allows licensees to use security personnel on their normally scheduled days off to support the conduct of the exercise without violating the rule. The exception in Order EA-03-08 also applied to other force-on-force tactical exercises (i.e., any not evaluated by the NRC), but the NRC believes this is not an appropriate exception for the

minimum days off requirement because these exercises can be fully planned and scheduled by licensees in advance in a manner that complies with the requirements. Nevertheless, the more limited exception should provide adequate flexibility to licensees given that (1) the final rule removes all restrictions on group work hour controls for security personnel, and (2) the exception applies to all security personnel working during affected shifts (including staff that do not participate in the exercise) even though the minimum days off requirement applies to security personnel on an individual basis. In contrast, the group work hour controls applied to security personnel collectively. During the limited exception period for these triennial (every 3 years) NRC-evaluated exercises, the requirements in § 26.205(d)(1) and (d)(2) provide reasonable assurance that fatigue does not impair the ability of these individuals to safely and competently perform their duties.

Section 26.207(c) [Common defense and security] provides a licensee relief from the work hour control requirements of § 26.205(d) upon written notification from the NRC, for the purpose of assuring the common defense and security for a period the NRC defines. This section contains the requirements presented in § 26.199(h) of the proposed rule. The exception granted by this section provides necessary relief from the requirements of the work hour controls in cases of emergencies that are not otherwise covered in this section, including war, in which the increased risk from fatigue-induced errors would be outweighed by the need to maintain the common defense and security. This section also indicates that the NRC would provide such relief in writing.

Section 26.207(d) [Plant emergencies] adds the potential to temporarily waive the requirements of § 26.205(c) and (d) during declared emergencies, as defined in the licensee's emergency plan. This section contains the requirements presented in § 26.199(i) of the proposed rule. Plant emergencies are extraordinary circumstances that may be most effectively addressed through staff augmentation that can only be practically achieved through the use of work hours in excess of the limits of § 26.205(c) and (d). The objective of the temporary exemption is to ensure that the control of work hours and management of worker fatigue do not impede a licensee's ability to use whatever staff resources may be necessary to respond to a plant emergency and ensure that the plant reaches and maintains a safe and secure

status. At the conclusion of the declared emergency, the rule would require licensees to again comply with the work hour controls.

Section 26.209 Self-Declarations

Section 26.209(a) retains, with limited editorial changes, the requirements presented in § 26.199(e) of the proposed rule. Section 26.209(a) requires licensees to take immediate action in response to a self-declaration (as discussed with respect to § 26.203(b)(1)) by an individual who is working under, or being considered for, a waiver from the work hour controls in § 26.205(d)(1) through (d)(5)(i). Licensees are required to immediately stop the individual from performing any duties listed in § 26.4(a) unless the individual is required to continue performing those duties under other requirements of 10 CFR Chapter I, such as the minimum control room staffing requirements in 10 CFR 50.54(m). If other requirements make it necessary for the individual to continue working, this section requires the licensee to immediately take action to relieve the individual. For example, the licensee should immediately begin a call-in procedure for another individual to fill the required position and remove the individual from duties as soon as relief becomes available.

The final rule retains this requirement of the proposed rule because correct performance of the duties specified in § 26.4(a) is critical to maintaining public health and safety and the common defense and security. In addition, there is a significantly increased potential for fatigue-related errors when individuals work more than the maximum work hours or obtain less rest than the minimum rest requirements of § 26.205(d)(1) through (d)(5)(i). Individuals working extended hours under a waiver will have a clear and legitimate basis for a self-declaration of being unfit for duty because of fatigue. Further, by self-declaring fatigue, the individual will effectively provide an assessment of his or her ability to continue to safely and competently perform these critical duties. Several studies indicate a tendency for individuals to underestimate their level of fatigue (Wylie et al., 1996; Dinges, 1995; Rosekind and Schwartz, 1988). Therefore, it is very likely that an individual who makes a self-declaration of fatigue is potentially more impaired than he or she realizes.

Section 26.209(a) does not require that licensees immediately relieve an individual who self-declares when it is necessary for the individual to continue performing his or her duties under other requirements of 10 CFR Chapter I. The

failure to meet minimum staffing or similar requirements will, in the majority of cases, have a greater potential to adversely affect public health and safety and the common defense and security than permitting a fatigued individual to continue performing his or her duties for a limited period of time. Further, in these circumstances, licensees can implement any fatigue mitigation strategies they deem necessary while the individual remains on duty. Fatigue mitigation measures in these circumstances include, but are not limited to, controls on the type of work that the individual may perform until he or she is relieved (e.g., physical or mental, tedious or stimulating, individual or group, risk-significant or not) and an increased level of supervision (continuous or intermittent) and other oversight (e.g., peer checks, independent verifications, quality assurance reviews, and operability checks).

Section 26.209(b) establishes the requirements for returning an individual to duty following a self-declaration under the conditions described in § 26.209(a). These provisions allow the individual to be reassigned to duties that are not subject to work hour requirements, if the individual is fit for such duties, and requires that the individual have a break of at least 10 hours before returning to duties that are subject to the work hour requirements of Subpart I.

Section 26.209(b)(1) permits licensees to reassign an individual who has made a self-declaration of fatigue to perform other duties than those specified in § 26.4(a). This section contains with limited editorial revisions the requirements presented in § 26.199(e)(1) of the proposed rule. The final rule includes this flexibility because, although an individual may not be fit to perform the activities specified in § 26.4(a), he or she may be able to safely and competently perform other duties. Other duties can include, but are not limited to, tasks that require skills that are less susceptible to degradation from fatigue or do not have the potential to adversely affect public health and safety or the common defense and security if the individual commits fatigue-related errors. The final rule permits licensees to reassign individuals who make a self-declaration of fatigue to other duties, if the results of a fatigue assessment (as required under § 26.211) indicate that he or she is fit to perform them, because permitting the individual to remain at work and continue performing such duties will not have the potential to adversely impact public health and

safety or the common defense and security.

Section 26.209(b)(2) requires licensees to permit or require an individual who has made a self-declaration to take a rest break of at least 10 hours before the individual returns to performing any duties listed in § 26.4(a). This section contains, with limited editorial revisions, the requirements presented in § 26.199(e)(2) of the proposed rule. The final rule includes this requirement to ensure that individuals who have self-declared are given an opportunity to sleep before they are permitted to resume performing any duties that have the potential to adversely affect public health and safety or the common defense and security. Sleep is widely considered the only non-pharmacological means of reducing fatigue. As discussed with respect to § 26.205(d)(2)(i), a 10-hour rest break generally allows individuals to obtain the 7–8 hours of sleep that is recommended by most experts for maintaining human performance (National Sleep Foundation, 2001; Dinges et al., 1997; Belenky et al., 2003; Akerstedt, 2003; Monk et al., 2000; Rosekind et al., 1997; Rosa, 1995).

Although one sleep period of 7–8 hours may be insufficient to ensure full recovery from excessive fatigue, nothing in the final rule precludes an individual in this circumstance from making a second self-declaration of fatigue if the individual believes that he or she remains unable to safely and competently perform his or her duties following the rest break. Section I.B of NRC RIS 2002–07 addressed the applicability of the protections of 10 CFR 50.7, [Employee protection] to workers who self-declare that they are unfit for duty as a result of fatigue.

Section 26.211 Fatigue Assessments

Section 26.211 requires licensees to conduct fatigue assessments under several conditions and contains, with limited editorial changes, the requirements presented in proposed § 26.201. The numbering and content of the paragraphs in § 26.211 remain consistent with that of proposed § 26.201. These conditions, specified in § 26.211(a)(1) through (a)(4), include for cause, after a self-declaration, after an event that requires post-event drug and alcohol testing, and as a followup to returning an individual to work after a self-declaration. The assessments are necessary to determine whether individuals who are observed to be in a condition creating a reasonable suspicion of impaired individual alertness or have indicated that they are not fit for duty because of fatigue can,

in fact, safely and competently perform their duties. Further, in situations in which a plant event requires drug or alcohol testing as specified in § 26.31(c) [Conditions for testing], this section requires the licensee to conduct a fatigue assessment to determine whether fatigue contributed to the event.

Work hour requirements are necessary, but not sufficient, to manage worker fatigue effectively. Worker fatigue, and its effects on worker alertness and performance, can result from many causes in addition to work hours (e.g., stress, sleep disorders, daily living obligations) (Rosa, 1995; Presser, 2000). Further, individuals differ substantially in their ability to work for extended periods without performance degradation from fatigue (Gander, 1998; Jansen et al., 2003; Van Dongen et al., 2004a; Van Dongen et al., 2004b). The work hour requirements of § 26.205 provide only partial assurance that individuals are not fatigued. Therefore, fatigue assessments are essential.

Appropriately assessing fatigue is also important because workers who are experiencing either acute or cumulative fatigue may not be able to perform their duties safely and competently, as discussed in Section IV.D. A large body of research demonstrates the negative effects of fatigue on individuals' abilities to perform. The literature includes studies comparing the effects of fatigue with those of alcohol intoxication. The effects of both conditions can be expressed in the form of performance decrements. Studies have correlated hours of wakefulness with equivalent blood alcohol concentrations showing that the performance decrements resulting from fatigue are at least as severe as the performance decrements observed when individuals consume the legal limit of alcohol (Dawson and Reid, 1997; Falletti et al., 2003). At the extreme, workers who have acute fatigue show symptoms that are similar to those of intoxication. Speech is less precise, attention may be lacking, and normal body movements and posture may be absent. Therefore, it is just as important for a worker to be assessed to determine if he or she is unduly impaired from fatigue as it is for the worker to be evaluated to determine whether he or she is impaired from consuming alcohol.

The objective of the assessments required by § 26.211(a)(1) through (a)(4) is for licensees to address instances of worker fatigue appropriately, including those that are not prevented by the work hour requirements, regardless of the number of hours that the subject individual has worked or rested. As discussed with respect to § 26.211(c),

these assessments provide the basis for subsequent management actions for fatigue management (e.g., relieving an individual of duties or requiring additional fatigue mitigation actions). Therefore, fatigue assessments are important for effective fatigue management because they provide the basis for any short-term corrective actions that may be necessary to ensure that individuals are able to safely and competently perform their duties and any long-term corrective actions that may be necessary to address individual or programmatic issues contributing to recurring instances of fatigue.

Section 26.211(a)(1) specifies that licensees must perform a fatigue assessment, in addition to any other testing that is required under §§ 26.31(c) and 26.77, if a worker is observed to be in a condition of impaired alertness and there is a reasonable suspicion that he or she may not be fit to safely and competently perform his or her duties. The objective of the requirement is to ensure that fatigue is considered, in addition to drugs or alcohol, as a cause for impaired alertness. As noted in SECY-01-0113, approximately 80 percent of all for-cause FFD tests conducted annually yield negative results for drugs and alcohol. A fatigue assessment will help to determine if fatigue was the cause for the perceived impairment when testing does not support drugs or alcohol as the probable cause.

Common indications of impaired alertness include yawning, red eyes, prolonged or excessive blinking, rubbing of the face with the hands, and gross body movements to maintain alertness. Individuals may take substantially longer to complete routine tasks, exhibit difficulty processing written or oral communications, and may become less talkative. At the extreme, workers who are experiencing acute fatigue have symptoms that are similar to those of intoxication. Individuals who are fatigued are more likely to complain of illness, pain, or discomfort. In addition to decreased vigor, fatigued individuals may be more irritable, engage in inappropriate humor, exhibit less conservative decisionmaking, and persevere in using ineffective problem solutions (Horne, 1988; Harrison and Horne, 2000; Dinges et al., 1997; Pilcher and Huffcutt, 1996; Belenky et al., 2003; Monk, 2003).

Section 26.211(a)(1) does not require licensees to conduct a fatigue assessment if indications of impaired individual alertness are observed during an individual's break period. The NRC considered a comment from the IBEW at a September 14, 2004, public meeting

expressing concern with for-cause assessments for work performed outside of the protected area (PA). Although whether a worker is inside the PA is not a criterion for being subject to Part 26 requirements, the NRC recognizes that napping is an effective means for reducing worker fatigue. Therefore, § 26.211(a)(1) excludes napping during a break period as a condition for which the final provision requires a for-cause fatigue assessment.

Section 26.211(a)(1) also permits licensees to conduct a fatigue assessment, without drug and alcohol testing, if the observed condition is impaired alertness with no other indication of possible substance abuse. In developing the requirement related to for-cause fatigue assessments, the NRC considered stakeholder comments during the public meetings described in the preamble to the proposed rule. Stakeholders expressed concern that testing for drugs and alcohol, in addition to fatigue, when the only apparent cause of impairment was decreased alertness, would cause stigma, burden, and reluctance to raise FFD concerns that may result in for-cause testing. Accordingly, the requirement permits licensees to assess only fatigue if there are no indications of possible substance abuse.

Section 26.211(a)(1) also permits licensees to conduct drug and alcohol testing, without a fatigue assessment, when the licensee has reason to believe that the observed condition is not caused by fatigue. The NRC considered stakeholder comments at the public meetings described in the preamble to the proposed rule that a requirement to perform a fatigue assessment when the licensee has a reasonable basis for believing that the condition is from causes other than fatigue is an undue burden. In many cases, an observed condition may clearly relate to drugs or alcohol only (such as the smell of alcohol on an individual), and in such cases, a fatigue assessment will have no benefit.

Section 26.211(a)(2) requires licensees to conduct a fatigue assessment if an individual makes a self-declaration that he or she is not fit to safely and competently perform his or her duties because of fatigue, except if the licensee permits or requires the individual to take a rest break of at least 10 hours. Self-declarations provide assurance that instances of worker fatigue, including those that are not prevented by the work hour requirements in § 26.205, are appropriately addressed, regardless of the number of hours the individual has worked or rested. Former § 26.27(b)(1) required that "impaired workers, or

those whose fitness may be questionable, shall be removed from activities within the scope of this part, and may be returned only after determined to be fit to safely and competently perform activities within the scope of this part." A statement by an individual to his or her supervisor that he or she is not fit to safely and competently perform his or her duties because of fatigue is an indication that the individual's FFD is questionable, and that an assessment, or a rest break of at least 10 hours, is necessary before the individual may be returned to duty. Therefore, in circumstances in which an individual requests to be relieved of duties because of fatigue and the individual is relieved of duties for at least 10 hours, the final rule does not require the licensee to conduct another fatigue assessment before permitting the individual to return to duty, consistent with current industry practice. Providing a 10-hour break is consistent with § 26.205(d)(2)(i), which establishes required break times between work periods, and is generally considered sufficient to address most acute fatigue conditions.

As discussed with respect to § 26.211(c), a fatigue assessment provides a basis for a licensee to determine whether the individual is able to safely and competently perform his or her duties and what, if any, subsequent management actions for fatigue management are necessary (e.g., relieving an individual of duties or requiring additional fatigue mitigation actions). As discussed with respect to § 26.203(b)(1)(ii), licensees are required to establish 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 because of fatigue.

In developing the final requirement for fatigue assessments of individuals who have self-declared, the NRC considered research on subjective assessments of alertness. Self-declarations are generally based on an individual's subjective evaluation of his or her alertness. Studies have indicated that individuals often misjudge their own fatigue, typically by underestimating their level of fatigue and propensity for uncontrolled sleep episodes. This effect is widely recognized by scientists who study sleep and fatigue. Rosekind, et al. (1997) noted that "An important phenomenon, highly relevant to operational environments, is that there is a discrepancy between subjective reports of sleepiness/alertness and physiological measures. In general, individuals will report higher levels of

alertness than indicated by physiological measures.” As a consequence, individuals who self-declare will tend to be more impaired than they realize. An exception to this tendency has been noted by Dinges, et al. (1988) who noted that naps can benefit the performance of those experiencing sleep loss, without that benefit being apparent in subjective measures. Therefore, it is not only important to assess self-declarations as an indicator that an individual may not be able to safely and competently perform his or her duties, but also to consider factors in addition to a self-declaration as part of the fatigue assessment.

Section 26.211(a)(2) also specifies that licensees must perform fatigue assessments for self-declarations made to an individual’s supervisor. The NRC considered stakeholder comments at public meetings that the final rule should be clear with respect to the behavior that constitutes a self-declaration. For example, stakeholders expressed concern that an individual’s off-hand remark to a co-worker that he or she is groggy would be considered a self-declaration under the final rule and, therefore, require a fatigue assessment in conditions that could be satisfactorily addressed through less formal processes. The NRC’s objective is not to supplant these normal processes for licensee workforce management, but to ensure that formal declarations of fatigue are appropriately evaluated and addressed. Therefore, the requirement specifies that fatigue assessments must be conducted for self-declarations concerning an individual’s ability to “safely and competently perform his or her duties” and require that the self-declaration must be made to the individual’s supervisor. However, as discussed with respect to § 26.211(a)(1), a fatigue assessment must be performed in response to an observed condition of impaired alertness. If, in the preceding example, the groggy individual remains on duty and is observed to exhibit impaired alertness, a fatigue assessment is required for cause in accordance with § 26.211(a)(1).

Section 26.211(a)(3) specifies that licensees must perform a fatigue assessment after an event that requires drug or alcohol testing, as required in § 26.31(c)(3). Section 26.31(c)(3)(i) through (c)(3)(iii) specifies the events and conditions requiring post-event drug and alcohol testing. A fatigue assessment is also necessary in these circumstances to determine whether worker fatigue contributed to the event and, if so, to identify the need for any corrective actions to prevent similar

future events. The assessment will also provide the basis for subsequent management actions for fatigue management, as required by § 26.211(c) (e.g., relieving an individual of duties or requiring additional fatigue mitigation actions). Further, the fatigue assessment will provide insights concerning the effectiveness of the licensee’s fatigue management program.

Consistent with § 26.31(d)(5)(ii), the requirement specifies that licensees may not delay necessary medical treatment in order to conduct a fatigue assessment, if the event involved physical harm to the individual. The NRC considers the immediate medical needs of the individual to be paramount. In these circumstances, it is reasonable to presume that the individual has been removed from duty and consequently the individual’s level of fatigue is irrelevant to the immediate protection of public health and safety or the common defense and security.

Section 26.211(a)(4) requires licensees to perform a followup fatigue assessment if an individual is returned to work after a break of fewer than 10 hours following a fatigue assessment that was performed for cause or in response to a self-declaration. Although sleep periods of less than 8 hours (e.g., naps) can mitigate some effects of fatigue, such sleep periods are typically insufficient to provide complete recovery from fatigue (McCallum, et al., 2003; Dinges, et al., 1997; Totterdell, et al., 1995). As a consequence, the objective of this provision is to ensure that, in circumstances of sleep periods of less than 8 hours (e.g., if a licensee provides an individual an opportunity for a nap rather than a 10-hour break), the short rest break has provided sufficient rest to mitigate the individual’s fatigue and that the individual is not still groggy from sleep inertia. Sleep inertia is the grogginess that an individual experiences in the transition from sleep to wakefulness that can temporarily affect an individual’s ability to safely and competently perform his or her duties (Bruck and Pisani, 1999; Sallinen, et al., 1998). Further, the assessment ensures that the individual is capable of performing his or her duties safely and competently during the upcoming work period. It also provides the information necessary for the licensee to determine whether any controls or conditions must be implemented during the work period (Priest, 2000; Baker, et al., 1990; Sallinen, 1998; Kruger, 2002).

Section 26.211(b) requires that either a supervisor or a staff member of the FFD program, who is trained in accordance with the requirements of

§§ 26.29 and 26.203(c), must conduct any fatigue assessment that is required under § 26.211. Under § 26.211(c), fatigue assessments provide the basis for subsequent actions for fatigue management (e.g., relieving an individual of duties or requiring additional fatigue mitigation actions). In addition, the NRC recognizes that fatigue assessments may be used by some licensees as a basis for imposing sanctions on individuals. Therefore, the authority to perform fatigue assessments should be limited to supervisors or staff members of the FFD program. The training required by §§ 26.29 and 26.203(c) provides the KAs that are essential to a supervisor’s or FFD program staff member’s ability to make valid assessments in this regard. Among other FFD program topics, the training addresses (1) the contributors to worker fatigue and decreased alertness in the workplace, (2) symptoms of worker fatigue, (3) indications and risk factors for common sleep disorders, and (4) the effective use of fatigue countermeasures. Section 26.29(b) [Policy] also requires individuals to demonstrate successful completion of the training by passing a comprehensive examination that addresses the KAs.

Section 26.211(b) further requires that supervisors or FFD program staff members must perform the fatigue assessment face to face with the subject individual. This requirement ensures that the individual performing the assessment has the opportunity to (1) observe the subject individual’s appearance and behavior to note indications of fatigue (e.g., decreased facial tone, rubbing of eyes, slowed speech), (2) interact with the individual to understand the individual’s self-assessment of his or her ability to safely and competently perform his or her duties, and (3) understand any factors in addition to the individual’s work schedule that may have contributed to fatigue.

Section 26.211(b)(1) prohibits individuals who observe another individual exhibiting indications of impaired alertness from performing the for-cause fatigue assessment of that individual. Without this prohibition, a single supervisor could potentially both observe a worker exhibiting indications of impairment from fatigue and also conduct the for-cause assessment of that worker. In accordance with § 26.211(c), fatigue assessments provide the basis for subsequent management actions for fatigue management. In addition, some licensees may use fatigue assessments as a basis for imposing sanctions on individuals, if, for example, a licensee believes that an individual has been

negligent in maintaining his or her FFD. Therefore, in the case of fatigue assessments that are conducted for cause, an independent third party shall perform the fatigue assessment to provide reasonable assurance of an objective assessment.

Section 26.211(b)(2) prohibits individuals from performing a post-event fatigue assessment in those circumstances specified in § 26.211(b)(2)(i) through (b)(2)(iii), in which a conflict of interest may be present. An individual who has a conflict of interest may not provide an objective assessment of the subject individual's fatigue. This requirement provides assurance of an objective fatigue assessment by prohibiting individuals from performing the assessment who were directly responsible for performing the work or assessing the individuals who were involved in the event.

Section 26.211(b)(2)(i) prohibits individuals from performing a post-event fatigue assessment if they performed or directed the work activities during which the event occurred. A supervisor who performed some of the work activities during which the event occurred may benefit from either positive or negative results from a fatigue assessment of another individual, depending on the circumstances. Similarly, a supervisor who directed the work activities of an individual may avoid an adverse action against himself or herself for the actions of a fatigued individual under his or her supervision if the supervisor erroneously assessed the individual as not fatigued. Therefore, the final rule prohibits these individuals from performing fatigue assessments under the specified conditions.

Section 26.211(b)(2)(ii) prohibits individuals from performing a post-event fatigue assessment if they performed a fatigue assessment of the individuals who were performing or directing the work activities during which the event occurred within 24 hours before the event occurred. These individuals may have a conflict of interest. For example, if an individual previously self-declared fatigue, but a fatigue assessment determined he or she was fit to continue work and an event subsequently occurred that required the subject individual to be assessed again, then the supervisor who performed the first assessment may avoid adverse action for the previous determination by performing the post-event fatigue assessment and erroneously determining that the individual was not fatigued. The final rule prohibits these individuals from performing fatigue

assessments under the specified conditions.

Section 26.211(b)(2)(iii) prohibits individuals from performing a post-event fatigue assessment if they 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 the work activities during which the event occurred if the event occurred while such individuals were performing work under that waiver. This provision limits the potential for bias in assessments that can result from prior involvement in assessing the individual or responsibility for the work activities associated with the event.

Section 26.211(c) requires that fatigue assessments must provide the information necessary for management decisions and actions in response to the circumstance that initiated the assessment. This information is necessary to determine the subject individual's ability to safely and competently perform his or her duties, as well as any controls or conditions that must be implemented. Section 26.211(c) provides assurance that fatigue assessments include sufficient and appropriate information to support a valid assessment of the individual relative to fatigue and therefore an appropriate basis for management decisions and actions. The criteria listed in § 26.211(c)(1)(i) through (c)(1)(iii) specify the minimum considerations for fatigue assessments.

In determining the scope of the assessments, the NRC considered the need for licensees to be able to focus the assessment on information that is readily available and verifiable. Section 26.211(c) requires the assessment to address the three work schedule factors described in § 26.211(c)(1) through (c)(3), which are generally considered to be the largest determinants of worker fatigue (Akerstedt, 2003, 2004; McCallum, et al., 2003; Mallis, et al., 2002; Folkard and Monk, 1980; Rosa, 1995; Rosa, et al., 1996), as follows.

Section 26.211(c)(1)(i) specifies the first criterion that fatigue assessments will address, acute fatigue. Acute fatigue directly affects an individual's ability to safely and competently perform his or her duties, as discussed in Section IV.D. Licensees will assess the potential for acute fatigue by estimating, at a minimum, the total number of continuous hours the individual has been awake, as well as considering other individual factors or information provided by the individual (such as his or her ability to obtain rest during break periods).

Section 26.211(c)(1)(ii) specifies the second criterion that fatigue assessments will address, cumulative fatigue. Cumulative fatigue also directly affects an individual's ability to safely and competently perform his or her duties, as discussed in Section IV.D. Licensees will assess the potential for cumulative fatigue by reviewing, at a minimum, (1) the individual's work schedule during the past 14 days to assess whether the individual had adequate opportunity to obtain sufficient rest, considering the length and sequencing of break periods, (2) whether the available sleep periods occurred during the night or at other times when sleep quality may be degraded, (3) the potential for transitions between shifts (e.g., from days to nights) to have interfered with the ability of the individual to obtain adequate rest, and (4) other individual factors or information provided by the individual (such as any personal issues that may impact his or her ability to obtain adequate sleep). For cumulative fatigue, the sleep medicine scientific establishment uses the concept of a "sleep debt," which is analogous to a bank account becoming overdrawn, and is a measure of how much an individual's sleep is being cumulatively reduced from his or her everyday sleep need. Many individuals build up a slight sleep debt during the working week, dissipating it by "catch-up" sleep on weekends (National Sleep Foundation, 2000; Monk, et al., 2001). Therefore, in evaluating cumulative fatigue, how much of a "sleep debt" the worker has accrued in the preceding week needs to be evaluated. Dinges and colleagues (1997) noted a five- to seven-fold increase in the percentage of subjects noting a significant "illness, infection, pain, discomfort, worry or problem" in their daily logs as they progressed from baseline through the 7 nights of restricted sleep. In addition to the expected decrements in vigor over the restricted sleep days, subjects' ratings indicated increases in confusion-bewilderment, tension-anxiety, and total mood disturbance.

Symptoms of cumulative fatigue are in some ways similar to those of acute fatigue, but in other ways quite different. The term "burnout" has been used to describe workers experiencing cumulative fatigue. Similar to burnout from other sources, burnout from cumulative fatigue is often characterized by a lack of initiative and/or creativity, with the individual just "going through the motions like a zombie" without being actively engaged or involved in the job he or she is being asked to

perform. Harrison and Horne (2000) advanced the view that the more creative thought processes are those most likely to be impaired by the individual receiving insufficient amounts of the “core” sleep needed for cognitive restitution. They note “[sleep deprivation] presents particular difficulties for decisionmaking involving the unexpected, innovation, revising plans, competing distraction and effective communication.”

Section 26.211(c)(1)(iii) specifies the third criterion that fatigue assessments will address, circadian variations in alertness and performance. Section IV.D discusses the impact of such variations on an individual’s ability to safely and competently perform his or her duties. Licensees can assess the potential for circadian degradations in alertness and performance by considering the time of day or night during which the work was or will be performed and whether the time period coincides with a circadian variation through in the individual’s level of alertness.

Section 26.211(c)(2) requires that individuals must provide complete and accurate information that may be required by the licensee to address the factors listed in § 26.20(c)(1) (i.e., acute fatigue, cumulative fatigue, and circadian variations in alertness and performance). Although work hours are an important determinant of worker fatigue, many other factors can affect worker fatigue, not all of which may be readily apparent to a licensee. As a consequence, individuals and licensees share the responsibility for effective assessment and management of fatigue which depends upon complete and accurate communication between the individual and the licensee concerning matters that may influence an individual’s level of fatigue. For example, licensees may be able to estimate the total number of continuous hours that an individual has been awake through review of the individual’s work schedule and assumptions regarding typical waking times for individuals on that schedule. However, individuals can provide information to better approximate the number of hours they have been continuously awake and facilitate a more accurate assessment of acute fatigue. Additionally, individuals may be able to provide information about their general level of work- and non-work-related activities, as well as opportunities for rest during the period addressed in the fatigue assessment.

Licensees can practically assess the potential for cumulative fatigue by reviewing the individual’s work schedule during the past 14 days to identify schedule features that typically

influence whether an individual has had adequate opportunity to obtain sufficient rest. However, individuals differ substantially in their ability to adapt to various schedules (Monk and Folkard, 1985). Therefore, individuals can provide general information related to the quality and quantity of sleep that they actually obtained during this period, which substantively improves the licensee’s assessment of the potential for cumulative fatigue.

Licensees can practically assess the potential for circadian degradations in alertness and performance by considering the time of day or night during which the work is or will be performed and whether the time period coincides with a circadian trough in alertness for the individual. However, individuals differ in the extent and rate at which they adapt to work during periods in which they would otherwise be asleep (Folkard and Tucker, 2003; Carrier and Monk, 2000) and can provide information (e.g., the timing of their sleep periods) that can better inform a licensee’s assessment of the potential for circadian degradations in alertness.

Section 26.211(c)(2) also limits licensees’ inquiries to only obtaining information from the subject individual that is necessary to assess the factors listed in § 26.211(c)(1). The fatigue assessment will provide a valid basis for licensee decisions and actions for fatigue management without undue invasion of an individual’s privacy. For example, inquiries limited to the amount, quality, and timing of sleep and general activity level of the individual can support an accurate fatigue assessment without the need for an individual to divulge personal details about the reasons for missed sleep or abnormal timings for sleep. Consistent with § 26.37 [Protection of information], licensees are required to keep any information from the individual’s self-disclosures confidential.

Section 26.211(d) prohibits licensees from concluding that fatigue had 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 rest breaks required in § 26.205(d)(2) or the minimum days off required in 26.205(d)(3) through (d)(5). The work hour controls of § 26.205(d)(1) and (d)(2) provide reasonable measures to prevent fatigue resulting from excessive work hours. However, these controls address only work hours and work schedules, and as a consequence, compliance with these

controls may not prevent an individual from experiencing fatigue from one or more of the many other factors that can cause fatigue, some of which may not be readily apparent to an employer.

Workload and the type of work an individual performs, home stresses, sleep disorders, and differences in an individual’s ability to work extended hours or adapt to certain schedules can all substantively affect worker fatigue (Rosa, 1995; Totterdell, et al., 1995; Knauth and Hornberger, 2003). Although the NRC considered the findings from studies of work hours and worker fatigue in developing the work hours requirements of § 26.205(d)(1) through (d)(5), it is neither practical nor possible to establish limits that will prevent fatigue for all individuals. Therefore, the final rule requires licensees to consider factors in addition to work hours and rest breaks when determining whether an individual is fit to safely and competently perform duties.

Section 26.211(e) requires that, following a fatigue assessment, the licensee must decide whether the individual may perform duties without a rest break, and, if so, whether controls and conditions must be established under which the individual may perform those duties. Examples of controls and conditions include, but are not limited to (1) a rest break, (2) peer review and approval of assigned job tasks, (3) assignment of job tasks that are non-repetitive in nature, (4) assignment of job tasks that are simple in nature, and (5) assignment to duties that are not important to the protection of public health and safety or common defense and security. Section 26.211(e) also requires licensees to ensure that any controls and conditions that they determine to be necessary to return an individual to duty will be implemented.

Section 26.211(f) requires that licensees document the results of any fatigue assessments that were performed, the circumstances that necessitated the fatigue assessments, and any controls and conditions that were implemented. The documentation is necessary for NRC inspectors to evaluate the fatigue assessment component of licensees’ FFD programs and for the licensee to conduct the reviews required under § 26.205(e). The information that the final rule requires licensees to document will indicate how well a licensee’s fatigue mitigation program at a site is performing.

Section 26.211(g) requires that licensees 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). The NRC revised the reporting provisions in § 26.197(e)(3) of the proposed rule to eliminate the requirement to include information regarding fatigue assessments in an annual report to the NRC. However, the NRC concluded that the fatigue assessment information that would have been required in the annual report should be documented in an annual summary available on site for NRC inspection. Specifically, § 26.211(g)(1) requires that the summary include the conditions under which each fatigue assessment was conducted (i.e., whether the assessment was conducted for cause, for a self-declaration, after an event, or as a followup, as described in § 26.211(a)(1) through (a)(4)). As a result, the annual reports will indicate the means by which licensees are identifying potential instances of worker impairment from fatigue, including whether these instances are identified through plant events. Section 26.211(g)(2) requires that the annual summaries include a statement for each fatigue assessment of whether or not the assessed individual was working on outage activities at the time of the self-declaration or condition resulting in the fatigue assessment. The annual summaries will therefore show the incidence of fatigue assessments during known periods of increased work hours (i.e., outage periods) relative to other times during the reporting period. Section 26.211(g)(3) requires that the annual summary indicate for each fatigue assessment the category of duties that 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. Accordingly, the annual summaries will show the relative incidence of fatigue assessments for each category of duties subject to the work hour requirements of § 26.205 in addition to the incidence of fatigue assessments for individuals subject to the FFD requirements of Part 26 but not subject to the work hour controls of § 26.205. Section 26.211(g)(4) requires that the annual summaries include for each fatigue assessment the management actions, if any, resulting from each fatigue assessment. The annual summaries will therefore show the incidence of fatigue assessments that warranted management actions, and the nature of those actions.

Subpart J—[Reserved]

As a result of reorganization of the proposed rule, the provisions contained

in Subpart J of the proposed rule have been moved to Subpart N of the final rule. This section is currently reserved.

Subpart K—FFD Programs for Construction

Section 26.401 General

Section 26.401(a) provides that a licensee or other entity specified in § 26.3(c) may, at its discretion, establish, implement, and maintain an FFD program that meets the requirements of Subpart K for those individuals who are specified in § 26.4(f). Alternatively, if an FFD program for those individuals that meets the requirements of Subpart K is not established, those individuals must be subject to an FFD program that meets the requirements of Subparts A [Administrative Provisions] through H [Determining Fitness-for-Duty Policy Violations and Determining Fitness], N [Recordkeeping and Reporting Requirements], and O [Inspections, Violations, and Penalties] of Part 26. The NRC recognizes that some new plants will be constructed near existing nuclear power plants, and it may be more efficient for the licensees of those plants to extend their existing FFD programs to cover the individuals specified in § 26.4(f). Therefore, this section of the final rule provides licensees and other entities flexibility to implement either the Subpart K program or a program meeting all of the requirements of Subparts A through H, N, and O. Subparts A through H, N, and O include all elements of the FFD program that apply to operating nuclear power plant licensees, except fatigue management requirements. This section meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs. It also meets Goal 6 to improve clarity in the organization and language of the rule.

This section of the final rule differs in several respects from those sections of the former rule and the proposed rule that established the general applicability requirements for FFD programs during construction. The former rule did not specify the construction activities that would be subject to the FFD program. Consequently, it applied to all workers performing any construction activities, whether or not the SSCs under construction could have an impact on public health and safety or the common defense and security. In addition, it did not provide a choice between applying the FFD program in § 26.2(c) of the former rule or a complete Part 26 program to the new reactor construction workforce (although the former § 26.2(c) could have been interpreted as requiring a complete Part 26 program). The

proposed rule also did not specify the individuals to whom the program would apply, thus making it applicable to the entire new reactor construction workforce. The proposed rule also did not provide the option that is included in § 26.401(a) of the final rule. The final rule provides greater flexibility to licensees and other entities than either the former rule or the proposed rule by giving them an option concerning the type of FFD program to apply. It also clarifies and narrows the scope of the group to which Subpart K applies. This is consistent with Goal 6 of this rulemaking to improve clarity in the organization and language of the rule.

The former rule in § 26.2(c) imposed FFD requirements on construction permit holders “with a plant under active construction” but did not define that term. The proposed rule in § 26.3(e) would have required an FFD program for construction following NRC authorization to construct, and the Part 52 final rule made these changes to the former § 26.2(c). However, the NRC recognizes that there may be a period of time that elapses between the authorization to construct and the commencement of specific construction activities that have the potential to affect public health and safety and the common defense and security when the nuclear power plant begins operations. Therefore, the final rule clarifies that an FFD program for construction is not required until a licensee or other entity begins “fabricating, erecting, integrating, and testing safety- and security-related SSCs, and the installation of their foundations, including the placement of concrete.”

In addition, the FFD program for construction in the final rule applies only to construction activities that are performed at the location where the new plant will be constructed and operated. The NRC added this phrase to the definition of construction activities in § 26.5 of the final rule to clarify that any fabrication, integration, or testing of safety- or security-related SSCs that is not performed within or near the licensee’s or other entity’s owner-controlled area in which the new plant will be operated would not be subject to Subpart K. For example, fabricating, integrating, and testing safety- or security-related SSCs at a vendor’s or manufacturer’s facility that is located in another city, state, or country would not be subject to Subpart K, whereas producing (i.e., “fabricating”) the concrete to be used for the foundation of the reactor building in a facility located on the site where the nuclear power plant will be constructed and operated would be subject to Subpart K

(although the construction of the cement mixing facility would not). The NRC anticipates that the focus of the Subpart K program on construction activities performed at the location where the new plant will be constructed and operated will lead licensees and other entities to ensure that the program covers all those individuals who perform construction activities within the footprint of the new power reactor (e.g., the exterior boundary of the reactor building once it is completed) as well as the nearby areas where safety- and security-related SSCs will be installed and operated when the plant begins operations.

The NRC considered whether the FFD program for construction should also cover individuals who construct safety- and security-related SSCs at a vendor's or manufacturer's facility that is geographically remote from the location where the new plant will be operated. Because of the modular design of new reactors, many of the safety-related SSCs that will be relied on to protect public health and safety will be fabricated by vendor personnel at remote locations and transported to the site for installation and integration. Similarly, the small, complete nuclear reactors that may be constructed by manufacturing licensees under Part 52 will also be constructed at remote locations and transported to the site for installation and integration. However, because of the complexity of the technical and regulatory issues raised by imposing FFD requirements on these entities, the staff has decided to defer adopting requirements for reactor manufacturing facilities, which were included in the proposed rule, and has declined to impose a Subpart K program on modular fabrication facilities located at a distance from the site where the nuclear power plant will be constructed and operated at this time. Although the Part 52 final rule added manufacturing licensees to the scope of Part 26, this final rule removes holders of manufacturing licenses from regulation under Part 26.

The former rule and the proposed rule also did not limit the applicability of the FFD program to individuals who are constructing only safety- or security-related SSCs. However, the NRC recognizes that there will be other construction work being performed at the location where a new plant will be constructed and operated that will not have the potential to affect public health and safety or the common defense and security when the nuclear power plant begins operations, such as constructing a building that will be used only for training or administration purposes. The NRC does not intend that individuals

who are performing these other construction activities must be subject to the FFD program. Therefore, the final rule also limits the scope of the requirements to cover only those individuals who are constructing (i.e., fabricating, erecting, integrating, testing, and installing foundations of) these specific SSCs. Thus, as one example of a safety-related SSC, the rule requires individuals who are constructing the containment structure that surrounds the reactor to be subject to an FFD program because the containment is relied on to mitigate the consequences of accidents that could result in potential offsite exposure. Similarly, individuals who are constructing security-related SSCs, such as the central and secondary alarm stations, physical barriers, communications systems, guard towers, surveillance and detection systems, or installing locks and illumination systems, that will be necessary to implement the physical security and safeguards contingency plans that are required under 10 CFR Part 73 also are subject to an FFD program for construction.

Section 26.401(b) provides that licensees and other entities who intend to implement an FFD program under Subpart K shall submit a description of the FFD program and its implementation as part of the license, permit, or limited work authorization application. The former rule and the proposed rule did not contain a reference to a limited work authorization application, because the requirements in 10 CFR parts 50 and 52 pertaining to limited work authorization had not yet been developed. The reference to a limited work authorization application in § 26.401(b) is consistent with Goal 6 of this rulemaking to improve clarity in the organization and language of the rule.

Licensees and other entities who intend to implement an FFD program for construction that meets all of the requirements of Subparts A through H, N, and O are not required under Part 26 to submit a description of their FFD program and its implementation because the details of the program are specified by 10 CFR Part 26, Subparts A through H, N, and O.

Submission of a description of the FFD program and its implementation was not required by § 26.2(c) of the former rule or § 26.3(e) of the proposed rule, but is a logical and necessary component of Subpart K because of the flexibility that Subpart K provides in § 26.401(a) and (d). The description of the FFD program and its implementation will provide the information that the NRC needs to enable it to review as a part of the

license, permit, or limited work authorization application the particular FFD requirements that are selected for implementation by licensees and other entities. Subpart K provides licensees and other entities substantial flexibility in the design of the program to accommodate local circumstances and the logistical challenges associated with construction. The NRC believes this flexibility is necessary because it cannot reasonably anticipate all of the circumstances that may affect implementation of an FFD program for construction (e.g., proximity to a licensee testing facility, proximity to a population center that offers alternative collection sites, stability in the composition of the workforce at a specific site, variations in the need for an FFD program during different construction stages based on the potential risks imposed by the construction activities at each stage) and, therefore, could not develop prescriptive requirements that would be appropriate for all potential circumstances. However, because Subpart K is not prescriptive and includes several new concepts (e.g., the fitness monitoring program, permission to use specimens other than urine for drug testing), the NRC believes that it is necessary to verify that a licensee or other entity has understood the intent of the Subpart K provisions and will implement a program that meets that intent, including ensuring that any procedures used for testing specimens other than urine for drugs will be scientifically sound and legally defensible.

Requiring a Part 50 applicant to submit a description of its FFD program for construction and its implementation is also consistent with the Part 52 license application requirements. In the Part 52 rulemaking, the NRC implemented the Commission's SRM-SECY-02-0067, dated September 11, 2002, in which the Commission disapproved the use of ITAAC for operational programs such as FFD as long as combined license applicants provide descriptions of the operational programs in their applications:

[A]n ITAAC for a program should not be necessary if the program and its implementation are fully described in the application and found to be acceptable by the NRC at the COL stage. The burden is on the applicant to provide the necessary and sufficient programmatic information for approval of the COL without ITAAC.

This requirement to include descriptions of operational programs in combined license applications was reiterated in the Commission's SRM-SECY-04-0032, "Programmatic

Information Needed for Approval of a Combined License Application Without Inspections, Tests, Analyses, and Acceptance Criteria," dated May 14, 2004:

In this context, "fully described" should be understood to mean that the program is clearly and sufficiently described in terms of the scope and level of detail to allow a reasonable assurance finding of acceptability. Required programs should always be described at a functional level and at an increased level of detail where implementation choices could materially and negatively affect the program effectiveness and acceptability.

Accordingly, Part 52 requires a combined license applicant to include a description of its FFD program and its implementation, including the FFD program to be implemented during construction. Similarly, § 26.401(b) requires license, permit, or LWA applicants under Part 50 to submit a description of their FFD programs during construction and their implementation. The NRC believes that prior review of the description of the FFD program for construction and its implementation will be more efficient than inspecting FFD programs for construction because it will significantly reduce the inspection resources necessary to ensure proper program implementation once construction has begun. In addition, delaying an evaluation of the program until an inspection can be scheduled, which may occur after construction has begun, could mean that an ineffective FFD program may be in place during early construction, when important tasks are being performed and errors resulting in faults could not be easily detected and corrected (e.g., the pouring of concrete). Finally, the emphasis on performance objectives in Subpart K, compared to the specific, prescriptive requirements in the remainder of the rule, means that the Subpart K requirements will be difficult to enforce without prior NRC knowledge of a licensee's FFD program secured through the description of the FFD program and its implementation.

Consistent with the Part 52 final rule, the NRC expects a Part 50 applicant's FFD program for construction and its implementation to be "fully described," as explained by the Commission in SRM-SECY-04-0032. The applicant should provide a description of the FFD policy and procedures prepared by licensees or other entities, including, but not limited to, procedures for implementing either random testing or fitness monitoring and for performing drug and alcohol testing, and identification of the personnel covered

by the FFD program. This requirement meets Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs.

Section 26.401(c) provides that nothing prohibits the licensees and other entities listed in § 26.3(c) from subjecting the individuals described in § 26.4(f) to an FFD program that meets all of the requirements of Part 26, or program elements that meet all of the applicable requirements of Part 26. This provision provides flexibility to licensees and other entities to cover all individuals with an FFD program that includes all the requirements of Part 26 or to adopt certain FFD requirements for individuals described in § 26.4(f) from Subpart K and certain FFD requirements from other subparts of Part 26, as long as the latter meet all of the applicable requirements of Part 26. In either case, workers conducting preliminary work that does not involve building any safety- or security-related SSCs of a facility are not required to be subject to an FFD program. This section allows licensees and other entities, if they so choose, to include fatigue management requirements under Subpart I in their FFD programs for reactor construction. It also allows licensees to mingle elements of the requirements of Subpart K and program elements under Subparts A through H, N, and O, as long as the elements selected from Subparts A through H, N, and O meet all of the requirements in Part 26 for that element. Because neither the former rule nor the proposed rule included this provision, the final rule provides greater flexibility than either the former rule or the proposed rule. This section achieves Goals 3 and 5 of the rulemaking to improve the effectiveness and efficiency of FFD programs and to improve consistency between FFD requirements and access authorization requirements established in 10 CFR 73.56, as supplemented by orders to nuclear power plant licensees dated January 7, 2003.

Section 26.403 Written Policy and Procedures

Section 26.403 addresses the requirements related to the FFD policy for personnel listed in § 26.4(f) and the requirements related to the procedures for such FFD programs. These requirements are presented in separate sections to ensure that the requirements related to FFD policy and procedures are easy to locate within this section. This is consistent with Goal 6 of this rulemaking to improve clarity in the organization and language of the rule.

Section 26.403(a) requires FFD programs under Subpart K to ensure

that a clear, concise, written FFD policy statement is provided to individuals who are subject to the program. Section 26.403(a) specifies that the policy statement must be written in sufficient detail to provide affected individuals with information on the program's expectations of them and the consequences that may result from a lack of adherence to the policy. Because Subpart K does not require licensees and other entities to provide site-specific FFD training to individuals, the FFD policy statement will be the primary means for communicating information with respect to, for example, the sanctions that are applied for confirmed positive, adulterated, substituted, or invalid test results, the types of specimens and cutoff levels used in drug or alcohol testing, or the time periods within which an individual who has been selected for random testing must report to the collection site, if the program includes random testing. Because of the likely large numbers and transient nature of construction workers involved in new reactor plant construction, requiring each of them to be provided with a copy of the FFD policy statement is the most effective and efficient means of ensuring that each individual listed under § 26.4(f) is informed of the contents of the policy. A clear and concise FFD policy statement that is provided to individuals subject to the program will promote their awareness of the site-specific FFD policy to which they are subject. This section satisfies Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, as well as Goal 7 to protect the privacy and other rights (including due process) of individuals who are subject to the rule.

If a licensee or other entity chooses, under § 26.401(d), to adopt FFD elements from Subparts A through H, N, and O of Part 26, the requirements established by those elements will need to be documented in the FFD policy and procedures, and in the FFD program plan. Also, notice will need to be provided to the relevant workers falling under the scope of the program, as required by this section of the rule.

The final rule differs in several other respects from the former rule and the proposed rule. The former rule contained a simple cross-reference to the section of the former rule pertaining to the requirement to adopt an FFD policy and procedures in writing and did not describe or circumscribe the requirement. Thus, the policy and procedures requirement for FFD programs applicable to only the reactor construction workforce was the same as

the requirement for other FFD programs. In contrast, the proposed rule did not contain any explicit cross-reference to the requirement pertaining to FFD program and procedures. However, the program and procedures section could be interpreted to apply to FFD programs applicable to the reactor construction workforce. The final rule both clarifies and adds flexibility to the requirement for an FFD policy statement and FFD procedures for FFD programs for construction by explaining the limited nature of the Subpart K FFD policy and procedures and indicating that they need to be provided only to those persons subject to the Subpart K FFD program. This is consistent with Goal 6 of this rulemaking to improve clarity in the organization and language of the rule.

Section 26.403(b) requires FFD programs under Subpart K to develop, implement, and maintain written procedures that address the topics specified in section (b)(1) through (b)(3). However, the procedures must address a more limited set of topics than specified in § 26.27 [Written policy and procedures], the section of Part 26 that deals with policy and procedures for FFD programs generally. Thus, the final rule reduces the scope of the FFD procedures that are required for FFD programs applicable to the individuals listed in § 26.4(f), compared to the scope of the former rule and the proposed rule. This section implements Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs.

Section 26.403(b)(1) requires the written procedures to address the methods and techniques to be used in testing for drugs and alcohol, including procedures for protecting the privacy of the individual who provides a specimen, procedures for protecting the integrity of the specimen, and procedures for ensuring that the test results are valid and attributable to the correct individual.

Section 26.403(b)(2) requires the procedures to describe the immediate and followup actions that must be taken if an individual is determined to have: (1) Been involved in the use, sale, or possession of illegal drugs; (2) consumed alcohol to excess before or while constructing safety- or security-related SSCs, as determined by a test that accurately measures BAC; (3) attempted to subvert the testing process by adulterating or diluting specimens (in vivo or in vitro), substituting specimens, or by any other means; (4) refused to provide a specimen for testing; or (5) had legal action taken relating to drug or alcohol use.

Section 26.403(b)(3) requires the procedures to describe the process to be followed if an individual's behavior raises a concern regarding the possible use, sale, or possession of illegal drugs on or off site; the possible possession or consumption of alcohol while constructing safety- or security-related SSCs; or impairment from any cause which in any way could adversely affect the individual's ability to safely and competently perform his or her duties.

The NRC considers the procedures specified in § 26.403(b)(1) to (b)(3) to be the minimum set of procedures necessary to implement an effective FFD program meeting the requirements of Subpart K. Those sections clarify the requirements in the former rule and the proposed rule for FFD policy and procedures by explaining what is meant by the requirements and limiting them to the listed topics. The section satisfies Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 of the rulemaking to improve clarity in the organization and language of the rule. As specified in § 26.401(c), licensees and other entities are free to adopt procedures for other aspects of their FFD programs that are applicable to the individuals listed in § 26.4(f).

Section 26.405 Drug and Alcohol Testing

The former rule required reactor construction permit holders to implement a chemical testing program, including random tests. The proposed rule made the requirement more explicit, by requiring the implementation of a drug and alcohol testing program, including random testing, during construction. The final rule requires pre-assignment, for-cause, post-accident, and followup testing, as discussed with respect to § 26.405(c), but does not require random testing of all individuals who are constructing safety- or security-related SSCs, as discussed with respect to § 26.405(b), if a licensee or other entity implements a fitness monitoring program, as discussed with respect to § 26.406.

The NRC concludes that there is a strong empirical basis for requiring drug and alcohol testing for construction. SAMHSA conducts annual surveys that investigate the prevalence, patterns, and consequences of alcohol and illegal drug use and abuse in the general U.S. civilian population. Its National Household Survey on Drug Abuse (NHSDA) covering the years 2000–2001, for example, indicated that over 23 percent of male construction workers aged 18–24 and over 11 percent of those 25 and older admitted to the use of an

illicit drug within the month previous to the survey, while over 75 percent of the 18–24 age group and almost 55 percent of the over 25 group admitted to binge drinking or heavy use of alcohol at least once during the prior month. Because of the relatively small number of female construction workers, the data pertain only to male construction workers. A study based on the results of the SAMHSA NHSDA conducted in 1994 and in 1997 showed that in 1994 15.6 percent of full-time construction workers, ages 18–49, reported current illicit drug use and 17.6 percent reported heavy alcohol use, while in 1997 14.1 percent and 12.4 percent reported such drug and alcohol use, respectively. The report of the 2000 SAMHSA NHSDA stated that “workers in the construction and mining industries reported the highest rates” of heavy alcohol use, illicit drug use, dependence on or abuse of alcohol, and dependence on or abuse of illicit drugs among full time workers aged 18 through 49 in the U.S. labor force. SAMHSA's 2004 National Survey on Drug Use and Health indicated that from 2002–2004, past month illicit drug use among full-time construction and extraction workers aged 18 to 64 was 15.1 percent, and past month heavy alcohol use among this same group was 17.8 percent, which was the highest level among surveyed occupational groups. Also, construction industry groups, such as the Construction Safety and Drug Abuse Executive Roundtable, also have concluded that “drug abuse continues to be widespread in the construction industry,” affecting up to 25 percent of the workforce. Finally, data collected annually through the FFD program performance reports and evaluated by the NRC show a consistent pattern of substantially higher incidence of detections of drugs and/or alcohol in the population of short-term contractors, which includes construction workers who seek employment or are employed during outages, who are given pre-access, random, for-cause, and post-event drug and alcohol tests by the FFD programs of reactor licensees, compared to long-term permanent employees at reactors.

To clarify that the drug and alcohol testing requirements under Subpart K are not intended to incorporate all of the requirements in Subparts C [Granting and Maintaining Authorization], E [Collecting Specimens for Testing], F [Licensee Testing Facilities], and G [Laboratories Certified by the Department of Health and Human Services] of Part 26, but at the same time to ensure that the drug and alcohol

testing requirements of Subpart K are clear, the final rule clarifies the proposed rule by substantially expanding the description of the program requirements in § 26.405. This section meets Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.405(a) requires Subpart K FFD programs to provide a means to deter and detect substance abuse. The FFD programs must include drug and alcohol testing that complies with the requirements of § 26.405. The final rule clarifies that if a licensee or other entity complies with the requirements of § 26.405 with respect to drug and alcohol testing, it is not required to meet the drug and alcohol testing requirements in the balance of Part 26.

Section 26.405(b) specifies that if the licensee or other entity elects to impose random testing for drugs and alcohol on individuals who are constructing safety- or security-related SSCs, the random testing must meet the requirements specified in § 26.405(b)(1) through (b)(4). Random testing must—

(1) Be administered in a manner that provides reasonable assurance that individuals are unable to predict the time periods during which specimens will be collected.

(2) Require individuals who are selected for random testing to report to the collection site as soon as reasonably practicable after notification, within the time period specified in the FFD program policy.

(3) Ensure that all individuals in the population that is subject to testing on a given day have an equal probability of being selected and tested.

(4) Provide that an individual completing a test is immediately eligible for another unannounced test.

The random testing requirements in Subpart K are considerably more flexible than the random testing requirements in § 26.31 [Drug and alcohol testing]. These requirements represent those elements of the random testing requirements under § 26.31 that the NRC has concluded are necessary and appropriate for random testing of individuals identified in § 26.4(f). They are intended to ensure randomness of selection for testing but also take into account the potentially difficult logistical problems associated with testing at such large and diverse locations. Licensees and other entities who adopt random testing will need, in particular, to develop a system for tracking individuals who are subject to the random testing program to identify when they are physically present and

therefore available and eligible for testing. Licensees and other entities may also need to develop programs to ensure that subcontractors who operate independently also implement random testing programs, and it will be necessary for licensees and other entities to conduct audits of subcontractor programs. Section 26.405 provides licensees and other entities flexibility to design their random testing programs to address those problems. For example, the final rule in Subpart K does not specify that random testing must take place at times including weekends, backshifts, and holidays, and at various times during a shift because the construction schedule may not in all cases include work during those periods. The final rule also provides flexibility for licensees and other entities to determine the number of random tests to be performed annually and the probability that a member of the population that is subject to the FFD program will be selected for random testing. Because of the likely fluctuations in the numbers of reactor construction workers over the course of a year, the NRC cannot specify that the number of random tests performed annually must be equal to at least 50 percent of the population that is subject to the FFD program, as it does under § 26.31. Finally, Subpart K provides licensees and other entities with the flexibility to adopt a fitness monitoring program under § 26.406 to detect and deter substance abuse, rather than conducting random testing of individuals identified in § 26.4(f).

Section 26.405(c) specifies that the individuals who are constructing safety- and security-related SSCs shall be subject to drug and alcohol testing under the following four conditions: (1) Before assignment to construct safety- or security-related SSCs; (2) When the licensee or other entity has adequate cause, arising either in response to an individual's observed behavior or physical condition indicating possible substance abuse or after the licensee or other entity has received credible information that an individual is engaging in substance abuse, as defined in § 26.5; (3) Following an accident in which the individual was involved. Post-accident testing should be conducted as soon as practical after an event involving a human error that was committed by an individual specified in § 26.4(f), where the human error may have caused or contributed to the accident. The licensee or other entity is not required to test individuals who were affected by the event but whose actions likely did not cause or

contribute to the event. Post-accident testing may involve more than one individual, and should be conducted if the event resulted in either: (i) A significant illness or personal injury to the individual to be tested or another individual, which within 4 hours after the event is recordable under the U.S. Department of Labor standards contained in 29 CFR 1904.7, and subsequent amendments, and results in death, days away from work, restricted work, transfer to another job, medical treatment beyond first aid, loss of consciousness, or other significant illness or injury as diagnosed by a physician or other licensed health care professional, even if it does not result in death, days away from work, restricted work or job transfer, medical treatment beyond first aid, or loss of consciousness; or (ii) Significant damage to any safety-related SSC of a facility that is required by the Commission's rules and regulations to be described in the site safety analysis report or preliminary or final safety analysis report. Finally, (4) followup testing should be conducted as part of a followup plan to verify an individual's continued abstinence from substance abuse.

The conditions that can lead to drug and alcohol testing of an individual specified in § 26.405(c)(1) through (c)(4) parallel generally the conditions listed in § 26.31(c)(1) through (c)(4), with changes to reflect the different reasons for testing individuals identified in § 26.4(f) under Subpart K and testing individuals at an operating nuclear reactor under Part 26. Thus, pre-assignment testing is limited to those individuals who will construct safety- or security-related SSCs. Because the NRC has concluded that there is no basis to distinguish between for-cause testing under Subpart K and for-cause testing under Part 26 generally, the final rule in Subpart K and § 26.31(c)(2) provide the same basis for for-cause testing. Similarly, § 26.405(c)(3)(i) requires post-accident testing for exactly the same significant illness and personal injury situations as required under § 26.31(c)(3)(i). However, the Subpart K post-accident testing requirement that is triggered by property damage is limited to damage to any safety- or security-related SSC of a facility. The NRC recognizes that in the context of reactor plant construction, damage incidents can occur in a number of contexts that are not related to the impairment or potential sabotage bases for FFD programs under Subpart K (e.g., vehicle accidents, injuries to persons not working on safety- or security-related

SSCs). Followup testing under § 26.405(c)(4) is defined exactly the same as followup testing under § 26.31(c)(4). In the NRC's view, the purpose of the testing, to verify an individual's continued abstinence from substance abuse, is exactly the same in both cases. These requirements meet Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.405(d) specifies that, at a minimum, FFD programs under Subpart K shall test specimens for marijuana metabolite, cocaine metabolite, opiates (codeine, morphine, 6-acetylmorphine), amphetamines (amphetamine, methamphetamine), phencyclidine, adulterants, and alcohol at the cutoff levels specified in this part for testing the respective specimens, or comparable cutoff level, if alternate specimens, such as oral fluids, are used for drug screening. The list of substances for which testing must be conducted under Subpart K exactly parallels the list in § 26.31(d)(1). The NRC considers this the minimum set of substances that an effective and adequate FFD program must include for both construction and operation. However, this section does not prohibit Subpart K programs from testing for additional drugs, consistent with the permission in § 26.31(d)(1)(i)(A) for licensees and other entities who are implementing an FFD program for operating plants to test for additional drugs.

The NRC is not prohibiting drug testing of specimens other than urine under Subpart K because it recognizes that there may be circumstances during construction where waiting for the results of urine drug tests could unacceptably delay the assignment of individuals to construct safety- or security-related SSCs. For example, for some construction activities or in some locations, licensees and other entities may rely on craftspersons from a local union hall and may not know in advance which specific individuals will be assigned to work on a particular day. If the union local does not offer pre-employment testing to its members, a licensee or other entity may elect to conduct an oral fluids drug screen, for example, that provides very rapid results, as long as the collection procedures and testing of oral fluids meet the criteria established in § 26.405(e) by protecting the donor's privacy and the integrity of the specimen, and stringent quality controls are implemented to ensure that test results are valid and attributable to the correct individual. The NRC does not

permit testing of oral fluids for drugs in FFD programs for other licensees and entities who are subject to Part 26 because the window of detection for marijuana use when testing for oral fluids is very short compared to the window of detection for marijuana use when testing urine specimens, and the NRC has a higher expectation that individuals will be trustworthy and reliable, as demonstrated by the avoidance of substance abuse, for the categories of individuals who are subject to Part 26 under the licensees' and entities' FFD program for operating plants. However, the NRC believes that oral fluids drug test results would be adequate to demonstrate that an individual who will be constructing safety- and security-related SSCs is not impaired that day from recent marijuana use or the other substances for which testing is required under § 26.405(d). Permitting testing of alternate specimens under FFD programs for construction is consistent with Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs. This permission is also consistent with § 26.2(c) of the former rule and § 26.3(e)(2) of the proposed rule that required drug and alcohol testing during construction, but did not specify the specimens to be tested.

Section 26.405(d) also requires that urine specimens collected for drug testing must be subject to validity testing. Although § 26.405(d) specifies that urine specimens collected for drug testing must be subject to validity testing and does not further elaborate on the validity testing requirement, the NRC considers the regulatory detail found in § 26.31 to provide useful guidance to licensees and other entities on the agency's expectations. However, Subpart K also provides flexibility to licensees and other entities with respect to this requirement by not specifying that they are required to meet the standards of § 26.31. This section limits the requirement for validity testing to urine specimens because the final rule does not prohibit the use of specimens other than urine for drug testing under Subpart K and scientifically sound and legally defensible means of testing the validity of other types of specimens are not yet available for some alternate specimens. The requirements in this section meet Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.405(e) specifies that the specimen collection and drug and alcohol testing procedures of FFD programs under this subpart must

protect the donor's privacy and the integrity of the specimen and implement stringent quality controls to ensure that test results are valid and attributable to the correct individual. At the licensee's or other entity's discretion, specimen collections and alcohol testing may be conducted at a local hospital or other facility in accordance with the specimen collection and alcohol testing requirements of 49 CFR Part 40, "Procedures for Department of Transportation Workplace Drug and Alcohol Testing Programs" (65 FR 41944; August 9, 2001), and subsequent amendments. This section of the final rule is intended to provide licensees and other entities with additional flexibility about the locations where specimen collections and alcohol testing may be carried out and to help ensure that licensees will not be required, before construction can begin, to build specimen collection and alcohol testing facilities at sites that are distant from a current licensee's specimen collection facilities for drug and alcohol testing. This provision is consistent with the former and proposed rules, which also did not require the construction of specimen collection and alcohol testing facilities. This requirement meets Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.405(f) specifies that testing of urine specimens for drugs and validity, except validity screening and initial drug and validity tests that may be performed by licensee testing facilities, must be performed in a laboratory that is certified by HHS for that purpose, consistent with its standards and procedures for certification. This section requires that urine specimens collected for drug testing must be subject to initial validity and drug testing by the laboratory because means to attempt to adulterate or substitute a urine specimen are readily available, but does not apply these requirements to drug testing of other specimens for two reasons: (1) Some HHS-certified laboratories may not have the capability to perform tests of alternate specimens, such as oral fluids, or validity testing of alternate specimens, and (2) means for attempting to adulterate or substitute some alternative specimens (e.g., oral fluids) are not readily available. However, any initial drug test performed by a licensee or other entity subject to Subpart K, including tests of alternate specimens, must use an immunoassay that meets

the requirements of the Food and Drug Administration for commercial distribution. Urine specimens that yield positive, adulterated, substituted, or invalid initial validity or drug test results must be subject to confirmatory testing by an HHS-certified laboratory, except for invalid specimens that cannot be tested. Alternate specimens that yield positive drug test results must be subject to confirmatory testing by a laboratory that meets quality control requirements that are at least as stringent as the requirements those laboratories are required to meet for HHS-certification, such as the accreditation process of the American College of Pathologists. These requirements constitute the general administrative procedures that the NRC considers necessary for drug testing. Licensees and other entities would be allowed to conduct initial testing of urine or alternate specimens at a licensee testing facility, provided that the licensee testing facility staff members possess the necessary training and skills for the tasks assigned, the staff's qualifications are documented, and adequate quality controls for testing are implemented. However, in parallel with § 26.31, Subpart K requires licensees and other entities to use only HHS-certified laboratories to perform drug testing of urine specimens, except if a licensee testing facility performs initial tests. This requirement is consistent with the former and proposed rules, which also required the use of only HHS-certified laboratories for testing urine specimens for drugs.

Section 26.405(g) requires FFD programs under Subpart K to provide for an MRO review of positive, adulterated, substituted, and invalid drug and validity test results from confirmatory testing to determine whether the donor has violated the FFD policy, before reporting the results to the individual designated by the licensee or other entity to perform the suitability and fitness evaluations required under § 26.419. This requirement in Subpart K parallels the requirement in § 26.169 [Reporting results] of the final rule. This requirement is an integral component of all Federally-mandated drug and alcohol testing programs, and required by the Department of Health and Human Services Mandatory Guidelines for Federal Workplace Drug Testing Programs. It is fully consistent with the former and proposed rules, which also followed the HHS Guidelines. This requirement meets Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs, and

Goal 6 to improve clarity in the organization and language of the rule.

Section 26.406 Fitness Monitoring

Section 26.406(a) of Subpart K specifies that the requirements in § 26.406 apply only if a licensee or other entity does not elect to subject the individuals specified in § 26.4(f) to random testing for drugs and alcohol under § 26.405(b). The NRC considers fitness monitoring of the individuals who are constructing safety- and security-related SSCs, as specified in § 26.406, to be a means of detecting and deterring substance abuse that can function as effectively as random testing, given the logistical and other issues associated with random testing. Daily monitoring of individuals by trained personnel provides a constant source of information about their fitness, in contrast to the sporadic information provided by random testing during construction. Fitness monitoring can immediately detect situations where for-cause testing is required as well as provide a degree of deterrence comparable to the deterrence provided by the potential for a random test. Subpart K gives a licensee or other entity the flexibility to adopt either random testing under § 26.405(b), or fitness monitoring under § 26.406, or to implement both if the licensee or other entity chooses. Neither the former rule nor the proposed rule explicitly required fitness monitoring. However, both listed the performance objective standards section as one of the specific rule sections that an FFD program applicable to individuals involved with the construction of a new reactor plant was required to satisfy. Attainment of the performance objectives clearly implied that licensees and other entities would undertake a program to deter substance abuse and detect impairment. Section 26.406(b) described below contains a similar performance objective. The requirement for fitness monitoring in § 26.406, if a licensee or other entity does not implement random testing of individuals who construct safety- and security-related SSCs, meets Goal 3 of the rulemaking to improve the effectiveness and efficiency of FFD programs and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.406(b) establishes the performance objective for a fitness monitoring program. It requires licensees and other entities to implement a program to deter substance abuse and detect indications of possible use, sale, or possession of illegal drugs, use or possession of alcohol while constructing safety-or security-related

SSCs, and impairment from any cause that if left unattended may result in a risk to public health and safety or the common defense and security. Both the former rule and the proposed rule included a cross-reference to the performance objectives standard. Thus, § 26.406(b) of the final rule extends and clarifies the former and proposed rules.

Section 26.406(c) requires licensees and other entities to establish procedures that fitness monitors shall follow in response to the indications and actions specified in § 26.406(b) and to train the monitors to implement the program. Section 26.406(d) provides licensees and other entities with significant flexibility in determining the number of individuals required to monitor fitness and the procedures they are required to follow, commensurate with the potential risk. Development of fitness monitoring procedures and training of monitors in those procedures as well as the licensee's or other entity's requirements for program implementation will ensure that fitness monitors know what is meant by the requirement and are informed about the procedures for implementing this requirement.

Section 26.406(d) requires licensees and other entities to ensure that the fitness of individuals who are constructing safety- and security-related SSCs is monitored effectively, commensurate with the potential risk to public health and safety and the common defense and security imposed by the construction activity. To achieve this objective, the rule requires licensees and other entities to consider the number and placement of monitors required, the necessary ratio of monitors to individuals specified in § 26.4(f), and the frequency with which the individuals shall be monitored while performing each construction activity. The NRC does not expect that the individuals designated as fitness monitors will be dedicated solely to the task of fitness monitoring. Licensees and other entities may assign fitness monitoring responsibilities to first-line supervisors, security personnel, and others who are performing other activities for the licensee or other entity while monitoring the fitness of individuals who are constructing safety- and security-related SSCs. In determining the number of such monitors licensees and other entities may need to consider how to ensure that equipment, walls, and other temporary or permanent barriers do not interfere with the monitors' abilities to maintain visual contact with individuals performing the construction activity and whether monitoring will be conducted

continuously until completion of the construction activity, continuously only at critical points during a construction activity, once at the beginning of a shift and again after a lunch break, or at a frequency of every few hours on an irregular schedule. Licensees and other entities thus have considerable flexibility in designing their fitness monitoring program. However, they must ensure that the program meets the performance objective stated in § 26.406(b). This requirement is consistent with the requirement in the former rule that FFD programs pertaining to licensees actively constructing nuclear power plants satisfy former § 26.10(b), calling for measures for the early detection of persons who are not fit to perform activities within the scope of Part 26.

Section 26.407 Behavioral Observation

Section 26.407 provides that individuals in § 26.4(f) shall be subject to behavioral observation while they are constructing safety- and security-related SSCs at the location where a nuclear power plant is under construction and will be operated. However, if these individuals are subject to a fitness monitoring program under § 26.406, they are not required to be subject to behavioral observation under § 26.407. Thus, this section provides licensees and other entities with the flexibility of subjecting the individuals specified in § 26.4(f) to either fitness monitoring under § 26.406 or to a combination of random drug and alcohol testing under § 26.405(b) and behavioral observation under § 26.407.

Behavioral observation is an important component of an FFD program because it increases the likelihood that the licensees and other entities who are subject to the rule detect and appropriately address impairment and other adverse behaviors. The individuals listed under § 26.4(e) will be trained in behavioral observation, because § 26.4(e) specifies that they shall be subject to an FFD program that meets all of the requirements of Part 26, except Subparts I and K, and such a program includes behavioral observation training. The individuals who will perform the behavioral observation are specified under § 26.4(e) as including any individual whose duties for the licensees and other entities in § 26.3(c) require him or her to perform the following activities at the location where the nuclear power plant will be constructed and operated: (1) Serves as a security officer under NRC requirements; (2) performs quality assurance activities, as specified in

Appendix B to Part 50; (3) based on a designation under § 26.406 by a licensee or other entity, monitors the fitness of the individuals specified in § 26.4(f) (and thus has also received fitness monitoring training); (4) determines that inspections, tests, and analyses, or parts thereof, required under 10 CFR Part 52 have been successfully completed; (5) supervises or manages the construction of safety-or security-related SSCs; or (6) directs, as defined in § 26.5, or implements the licensee's or other entity's access authorization program. Because of their important oversight responsibilities, these individuals will be subject to an FFD program that meets the requirements for Subparts A through H, N, and O of Subpart 26. In addition to behavioral observation training, they will be subject to random testing at the 50 percent annual rate and a suitable inquiry/employment history check.

Neither the former rule nor the proposed rule explicitly required behavioral observation. However, both listed the performance objective standards section as one of the specific rule sections that an FFD program applicable to individuals involved with the construction of a new reactor plant was required to satisfy, and attainment of the performance objectives clearly implied the use of behavioral observation. The final rule clarifies the requirement and adds flexibility. This requirement is consistent with the requirement in the former rule that FFD programs pertaining to licensees actively constructing nuclear power plants satisfy former § 26.10(b), calling for measures for the early detection of persons who are not fit to perform activities within the scope of Part 26. Section 26.407 meets Goal 3, to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.409 Sanctions

Section 26.409 requires FFD programs under Subpart K to establish sanctions for FFD policy violations that, at a minimum, prohibit the individuals specified in § 26.4(f) from being assigned to or performing the duties specified in that section until the licensee or other entity determines that the individual's behavior does not pose a threat to public health and safety or the common defense and security. This section meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs and Goal 6 to improve clarity in the organization and language of the rule.

The former rule provided for flexibility in the development and

application of sanctions by specifying only that an FFD program applicable to individuals involved in the construction of a new reactor plant should make provision for the imposition of sanctions but did not otherwise specify the level or type of sanctions to be applied. The proposed rule, in § 26.3(e)(3), included an identical provision, also without specifying the level or type of sanctions to be included in the FFD program. By adding explicit criteria for the types of FFD policy violations to which sanctions shall be applied, the final rule clarifies the sanctions provision of the former and proposed rules. This provision in the final rule adds flexibility because it does not require FFD programs under Subpart K to implement the minimum requirements for sanctions in § 26.75 [Sanctions] or to apply the specific procedures for conducting a determination of fitness in § 26.189. Subpart K also allows licensees and other entities the flexibility to assign individuals who violate the FFD policy under Subpart K to other duties at the site not covered by the FFD program, depending on the licensee's assessment of the violation and the other duties involved.

Section 26.411 Protection of Information

Section 26.411(a) requires FFD programs that collect personal information about an individual for the purpose of complying with Subpart K to establish and maintain a system of files and procedures to protect the personal information. It also requires FFD programs to maintain and use such records with the highest regard for individual privacy. This requirement exactly parallels the requirement in § 26.37 [Protection of information] of the final rule pertaining to protection of information under Part 26 generally. The NRC does not believe that any lesser standard of protection can be justified for personal information collected under Subpart K than is required for personal information collected under Part 26 generally. This section meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs, Goal 6 to improve clarity in the organization and language of the rule, and Goal 7 to protect the privacy of individuals.

The final Subpart K rule parallels the requirements in the former rule and in the proposed rule. Both included a requirement that FFD programs applicable to individuals involved with the construction of a new reactor plant make provisions for the protection of information. Section 26.411(a) provides

additional detail about the level of protection (the highest regard for individual privacy) required of FFD programs that maintain and use records of personal information. Thus, this final rule provides additional clarity, compared to the former rule or the proposed rule, that the program should achieve the necessary protection through a system of files and procedures.

Section 26.411(b) requires licensees and other entities to obtain a signed consent that authorizes the disclosure of the personal information collected and maintained under Subpart K before disclosing the personal information, except for disclosures to the individuals and entities specified in § 26.37(b)(1) through (b)(6), (b)(8), and persons deciding matters under review in § 26.413 [Review process]. These persons include the subject individual or his or her representative, when the individual has designated the representative in writing for specified FFD matters; assigned MROs and MRO staff; NRC representatives; appropriate law enforcement officials under court order; a licensee's or other entity's representatives who have a need to access the information to perform assigned duties, including determinations of fitness, audits of FFD programs, and human resources functions; the presiding officer in a judicial or administrative proceeding that the subject individual initiates; and other persons pursuant to court order. The NRC did not include a reference to § 26.37(b)(7) because it refers to persons deciding matters under another section of Part 26 that Subpart K does not include. Instead, this section adds a new reference to persons deciding matters under review in § 26.413. The requirement to obtain permission to release the personal information to individuals who are not specified in § 26.37(b)(1) through (b)(6), (b)(8), and persons deciding matters under review in § 26.413 is necessary because licensees have misinterpreted the former requirement as prohibiting them from releasing the personal information under any circumstances. In some instances, such failures to release information have inappropriately inhibited an individual's ability to obtain information that was necessary for a review or appeal of the licensee's determination that the individual had violated the FFD policy. Therefore, the final rule includes the explicit permission for licensees and other entities to release personal information when an individual consents to the release, in writing. This requirement

precisely parallels the requirement in § 26.37, except for the differences noted, because the NRC does not believe that any different procedures for handling personal information can be justified for personal information collected under Subpart K than are required for personal information collected under Part 26 generally.

Section 26.413 Review Process

Section 26.413 requires FFD programs under Subpart K to establish and implement procedures for the review of a determination that an individual listed in § 26.4(f) has violated the FFD policy. The procedure must provide for an objective and impartial review of the facts related to the determination that the individual has violated the FFD policy. This requirement parallels the one in § 26.39(a) of the final rule. Because the NRC recognizes that much of the construction workforce will be transient and rapidly changing, it is leaving licensees and other entities the flexibility to adopt the additional review procedures found in § 26.39(b) through (e), but is not mandating their adoption by including them in the review process requirements in § 26.413. This section meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs and Goal 6 to improve clarity in the organization and language of the rule.

The final rule is more explicit than the former rule, which specified only that the FFD program for the reactor construction workforce should make provisions for appeals procedures. The proposed rule in § 26.3(e)(3) similarly required FFD program for construction to make provisions for procedures for the objective and impartial review of authorization decisions. This final rule more clearly requires FFD programs under Subpart K to establish and implement procedures and more clearly specifies that the procedures are for the review of the facts related to the determination that an individual has violated the FFD policy. However, the basic requirement in this final rule is the same as that in the former rule and the proposed rule. The requirement for an objective and impartial review establishes the same criteria for the review as did the proposed rule, which also mandated an impartial and objective review.

Section 26.415 Audits

Section 26.415 establishes audit requirements for Subpart K FFD programs. Section 26.415(a) requires licensees and other entities to ensure that audits are performed to assure the continuing effectiveness of the FFD

program, including FFD program elements that C/Vs provide, and the FFD programs of C/Vs that are accepted by the licensee or other entity. This requirement parallels the audit requirement in § 26.41(a) of the final rule. The agency has not identified any circumstances relating to the reactor construction workforce that would support different auditing requirements for Subpart K FFD programs than for FFD programs under the other subparts of Part 26. The criterion to be applied for each audit program is that it must assure the continuing effectiveness of the FFD program. Although the former rule did not contain a requirement for audits of the FFD programs for construction, the proposed rule referred explicitly to § 26.41 [Audits and corrective action] as one of the requirements to be complied with by licensees authorized to construct a nuclear power plant. Thus, § 26.415 extends and clarifies the requirement in the proposed rule, meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs, and satisfies Goal 6 to improve clarity in the organization and language of the rule.

Section 26.415(b) requires each licensee and other entity who implements an FFD program under Subpart K to ensure that these programs are audited at a frequency that ensures their continuing effectiveness and that corrective actions are taken to resolve any problems identified. The section also provides that licensees and entities may conduct joint audits, or accept audits of C/Vs conducted by others, so long as the audit addresses the relevant services of the C/V. The NRC expects that in determining the frequency of audits, licensees and other entities will consider the frequency, nature, and severity of discovered problems, testing errors, personnel or procedural changes, previous audit findings, and lessons learned. The requirement is intended to promote performance-based rather than compliance-based audit activities. By allowing joint audits, the final rule creates additional flexibility for Subpart K FFD programs.

Section 26.415(c) provides that licensees and other entities who implement FFD programs under Subpart K need not audit the HHS-certified laboratories or specimen collection and alcohol testing services that meet the requirements of 49 CFR Part 40, "Procedures for Department of Transportation Workplace Drug and Alcohol Testing Programs" (65 FR 41944, August 9, 2001) upon which licensees and other entities may rely to meet the drug and alcohol testing requirements of Subpart K. Because the

DOT conducts audits of collection sites that the agency's grantees use, the NRC has concluded that audits of those sites when they are used by NRC licensees and other entities are unnecessary.

Section 26.417 Recordkeeping and Reporting

Section 26.417(a) of the final rule provides that FFD programs shall ensure that records pertaining to the administration of the program, which may be stored and archived electronically, are maintained so that they are available for NRC inspection purposes and for any legal proceedings resulting from the administration of the program. This recordkeeping provision provides more extensive detail than the equivalent recordkeeping sections of the former rule or the proposed rule, both of which provided only that the FFD program for the reactor construction workforce should make provisions for recordkeeping. This final rule provides notice that records may be stored and archived electronically, which clarifies the requirement and provides flexibility to licensees and other entities. This rule also incorporates standard language pertaining to the availability of records for NRC inspection purposes and for any legal proceedings resulting from the administration of the program. These provisions are inherent to the NRC's recordkeeping requirements. While adding clarity, they do not significantly change the recordkeeping requirement from that in the former or proposed rule. Both the former rule and the proposed rule contained an explicit requirement for recordkeeping by the FFD program applicable to reactor construction workers. This section meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Section 26.417(b) requires licensees and other entities that implement FFD programs under Subpart K to make the reports described in § 26.417(b)(1) and (b)(2). Section 26.417(b)(1) requires reports to the NRC Operations Center by telephone within 24 hours after the licensee or other entity discovers any intentional act that casts doubt on the integrity of the FFD program and any programmatic failure, degradation, or discovered vulnerability of the FFD program that may permit undetected drug or alcohol use or abuse by individuals who are subject to Subpart K. This provision also specifies that these events must be reported under Subpart K, rather than under the provisions of 10 CFR 73.71 [Reporting of safeguards events]. Section 26.417(b)(2)

requires annual program performance reports for the FFD program. The former rule contained detailed reporting requirements similar to those in the final rule. In addition, the NRC considers the reporting of acts that cast doubt on the integrity of the FFD program and any programmatic failure, degradation, or discovered vulnerability of the FFD program that may permit undetected drug or alcohol use or abuse by individuals subject to Subpart K, as well as annual program performance reports, to be clearly logical and necessary components of the program and outgrowths of the recordkeeping requirements.

Section 26.419 Suitability and Fitness Evaluations

Section 26.419 requires licensees and other entities who implement FFD programs under Subpart K to develop, implement, and maintain procedures for evaluating whether to assign individuals to the duties specified in § 26.4(f). These procedures must provide reasonable assurance that such individuals are fit to safely and competently perform their duties and are trustworthy and reliable, as demonstrated by the avoidance of substance abuse. This section provides flexibility for Subpart K programs to develop procedures for determining suitability. The requirement that licensees and other entities develop, implement, and maintain procedures for evaluating whether to assign individuals to the duties specified in § 26.4(f) is necessary to enable licensees and other entities to implement Subpart K. These procedures will allow licensees, other entities, and the individuals who are subject to the FFD program to know who the Subpart K requirements cover. This section meets Goal 3 of this rulemaking to improve the effectiveness and efficiency of FFD programs, and Goal 6 to improve clarity in the organization and language of the rule.

Although neither the former rule nor the proposed rule contained an explicit requirement for suitability and fitness evaluations, each contained a cross-reference to the general performance objectives sections of their respective rules (§ 26.10 of the former rule and § 26.23 of the proposed rule). Section 26.10 required the FFD programs applicable to reactor construction workers to provide reasonable assurance that personnel would perform their tasks in a reliable and trustworthy manner and that they are not under the influence of any substance, legal or illegal, or mentally or physically impaired from any cause, which in any way would affect their ability to safely and competently perform their duties.

Section 26.23 of the proposed rule used language similar to that in this final rule, requiring FFD programs to provide reasonable assurance that individuals who are subject to Part 26 are trustworthy and reliable, as demonstrated by the avoidance of substance abuse, and to provide reasonable assurance that individuals who are subject to Part 26 are not under the influence of any substance, legal or illegal, or mentally or physically impaired from any cause, which in any way adversely impairs their ability to safely and competently perform their duties.

Subpart L—[Reserved]

Subpart M—[Reserved]

Subpart N—Recordkeeping and Reporting Requirements

As a result of the reorganization of the proposed rule, the NRC has moved the provisions from Subpart J of the proposed rule to a new Subpart N of the final rule. The final rule includes minor clarifications of the language of the proposed rule that are discussed with respect to those sections. The NRC has also made more substantive changes to the proposed rule in § 26.711(c) and (d). Otherwise, the provisions in this subpart have been adopted as proposed without change.

Section 26.709 Applicability

The NRC has added § 26.709 to the final rule to specify the licensees and other entities to whom the requirements of this subpart apply.

Section 26.711 General Provisions

The NRC has added § 26.711 to the final rule to define general requirements related to recordkeeping and reporting under Part 26.

Section 26.711(a) of the final rule establishes a requirement that licensees and other entities must maintain records and submit certain reports to the NRC, consistent with Goal 6 of this rulemaking to improve clarity in the organization and language of the rule. In addition, this section requires that licensees and other entities retain the records required under this part for either the periods that are specified in Subpart N or for the life of the facility's license, certificate, or other regulatory approval, if no records retention requirement is specified. This general records retention requirement clarifies the language of the rule and is a standard administrative provision that is used in all other parts of 10 CFR that contain substantive requirements applicable to licensees and applicants, such as 10 CFR 50.71(c).

The NRC has added § 26.711(b) to the final rule to permit records to be stored and archived electronically if the method used to create the electronic records (1) provides an accurate representation of the original records, (2) prevents the alteration of any archived information and/or data once it has been committed to storage, and (3) allows easy retrieval and re-creation of the original records. This provision recognizes that most records are now stored electronically and must be protected to ensure the integrity of the data. The requirements are consistent with related requirements in the access authorization orders issued to nuclear power plant licensees dated January 7, 2003. Therefore, these requirements meet Goal 4 of this rulemaking to improve consistency between FFD requirements and access authorization requirements established in 10 CFR 73.56 [Personal access authorization requirements for nuclear power plants], as supplemented by orders to nuclear power plant licensees dated January 7, 2003.

In the final rule, the NRC has added a new provision in § 26.711(c). This provision requires licensees and other entities to inform individuals of the right to review and correct the records maintained about the individual under this part and imposes a requirement on licensees and other entities to ensure that the information they maintain and share with other licensees and entities is correct and complete. The NRC added this provision to provide further assurance that individuals who are subject to an FFD program under this part are not unjustly or inaccurately portrayed as having violated FFD requirements in any written documentation that licensees and other entities rely on when making authorization decisions. This provision meets Goal 7 of this rulemaking to protect the privacy and other rights (including due process) of individuals who are subject to Part 26. This provision is also meets Goal 4 of this rulemaking to improve consistency between this rule and access authorization requirements established in 10 CFR 73.56, as supplemented by orders to nuclear power plant licensees dated January 7, 2003.

The NRC has also added § 26.711(d) to the final rule to require licensees and other entities to ensure that only correct and complete information about individuals is retained and shared. This provision specifies that licensees and other entities shall correct or augment shared information contained in the records if this information changes or new information is developed. Also, if

the changed or new information has implications for adversely affecting an individual's eligibility for authorization, the final rule requires that the licensee or other entity who discovers the incorrect information or developed new information shall inform the reviewing official of the updated information. The NRC has added this provision to meet Goal 7 of this rulemaking to protect the privacy and other rights (including due process) of individuals who are subject to Part 26. This provision also meets Goal 4 of this rulemaking to improve consistency between this rule and access authorization requirements established in 10 CFR 73.56, as supplemented by orders to nuclear power plant licensees dated January 7, 2003.

Section 26.713 Recordkeeping Requirements for Licensees and Other Entities

Section 26.713 of the final rule amends former § 26.71 [Recordkeeping requirements]. Former § 26.71(d), which established requirements for FFD program performance reports, is retained in § 26.717 [Fitness-for-duty program performance data], a separate section that focuses only on those reports. Section 26.713 retains but amends former § 26.71(a) through (c) and adds other requirements that are interspersed throughout the former rule. The NRC has made these changes to meet Goal 6 of this rulemaking to improve clarity in the organization and language of the rule by grouping recordkeeping requirements that apply to licensees and other entities in one section.

Section 26.713(a) of the final rule requires licensees and other entities to retain certain records related to authorization decisionmaking for at least 5 years after an individual's authorization has been terminated or denied, or until the completion of all related legal proceedings, whichever is later. The agency has added the requirement to retain records until the completion of all related legal proceedings at the suggestion of stakeholders during the public meetings discussed in Section I.D. The stakeholders noted that some legal proceedings involving records of the type specified in the paragraph have continued longer than the 5 years that the former rule required these records to be retained and that adding a requirement in the final rule to retain the records until all legal proceedings are complete protects an individual's right to due process under the rule. This provision is consistent with Goal 7 of this rulemaking to protect the privacy

and other rights (including due process) of individuals who are subject to Part 26 and Goal 3 to improve the effectiveness and efficiency of FFD programs.

Section 26.713(a)(1) amends former § 26.71(a). Former § 26.71(a) required licensees to retain records of the inquiries that licensees conduct in granting unescorted access to an individual for 5 years following the termination of such access authorizations. The final rule updates the terminology used in the former paragraph for consistency with the revised language used throughout the rule. For example, the paragraph refers to "self-disclosures," "employment histories," "suitable inquiries," and "granting authorization," but retains the intent of the former paragraph. The NRC has made the changes in terminology for the reasons discussed with respect to §§ 26.61 [Self-disclosure and employment history] and 26.63 [Suitable inquiry]. In addition, the agency has updated the former cross-reference to § 26.27(a) to reflect the new organization of the rule.

Section 26.713(a)(2) amends former § 26.71(b). Former § 26.71(b) required licensees to retain records that are related to positive drug test results that the MRO has confirmed. The final rule revises the former requirement by mandating that licensees and other entities retain records related to any violation of the FFD policy, which includes confirmed positive drug and alcohol test results. This change ensures that licensees and other entities who may be considering granting authorization to an individual who has previously violated any aspect of an FFD policy can obtain these records for review as part of the authorization decisionmaking process specified in § 26.69 [Authorization with potentially disqualifying fitness-for-duty information].

The NRC has added § 26.713(a)(3) to the final rule to require licensees and other entities to retain records that are related to the granting and termination of an individual's authorization. This provision ensures that licensees and other entities who may be considering granting authorization to an individual under Subpart C [Granting and Maintaining Authorization] can determine which category of authorization requirements in Subpart C applies to the individual, based upon the length of time that has elapsed since the termination of the individual's last period of authorization and whether it was terminated favorably. The new section discusses the categories of authorization requirements with respect to §§ 26.55 [Initial authorization], 26.57