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United States Nuclear Regulatory Commission
Washington, DC 20555-0001

DOCKETED
USNRC

July 13, 2004 (11:00AM)

SUBJECT: PROPOSED RULE ON MANAGING FATIGUE

OFFICE OF THE SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

Dear Dr. Desaulniers:

I regret being unable to fully articulate my concerns about the NRC staff's most recent version of its proposed rule for managing fatigue of workers at U.S. nuclear power plants or to propose alternate wording to the proposed rulemaking language for my incompletely articulated concerns during the public meeting on July 8th. Given that the most recent version of the proposed rule only became publicly available hours before the public meeting, my ability to prepare cogent comments was limited. It is unrealistic for the NRC staff to take months to draft proposed rulemaking language and then expect the public to review the draft in scant days and provide fully informed comments on the many substantive changes.

I have supported the proposed rulemaking since Mr. Barry Quigley submitted the petition late last century. My concerns all essentially stem from my belief that the staff's most recent version of its proposed rule merely rewraps the problem Mr. Quigley's petition sought to remedy. I have little interest and far less patience for a rewrapped problem.

Allow me to explicitly define the problem that the proposed rulemaking seeks to remedy. Quoting from the April 3, 2001, staff paper (SECY-01-0113):

- "On June 15, 1982, the U.S. Nuclear Regulatory Commission (NRC) published Generic Letter 82-12, which included the NRC's "Policy on Factors Causing Fatigue of Operating Personnel at Nuclear Reactors." The objective of this policy statement is to ensure, to the extent practicable, that personnel are not assigned to shift duties while in a fatigued condition." Att. 1, page iii
- "The NRC provided the following interim guidelines: ... (2) there should be a break of at least 12 hours between work periods; (3) individuals should not work more than 14 consecutive days without having 2 consecutive days off ..." Att. 1, page 1
- "...the limitation regarding working no more than 12 hours was qualified to exclude turnover time, and the guidance was clarified to indicate that the use of overtime should be limited to unavoidable or unanticipated circumstances." Att. 1, page 2
- "The revised policy statement was published in the Federal Register (47 FR 23823, June 1, 1982) and disseminated by GL 82-12, "Nuclear Power Plant Staff Working Hours," dated June 15, 1982. The revised policy statement clarified that (1) the objective is to have operating personnel work an 8-hour day and a 40-hour week, (2) the limits in the policy statement apply during extended periods of shutdown, and (3) the requirement to consider use of overtime of overtime on an individual basis does not apply during periods when the plant is shutdown." Att. 1, page 2

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- “All sites that responded indicated that they had administrative procedures that implement working hour policies. However, licensees for 16 of the 47 sites that responded indicated that their TSs did not include all of the restrictions of GL 82-12.” Att. 1, page 17
- “Figure 4 shows annual overtime overtime uses for 1997, 1998, and 1999, and indicates that the percentage of personnel working in excess of 600 hours was higher in 1999 than 1997. A approximately one-fourth of the sites, more than 20 percent of the personnel covered by working hour limits work more than 600 hours of overtime annually. This number is more than two to three times the level allowed for personnel at some foreign nuclear power plants and more than twice the level recommended by an expert panel in 1985 (NUREG/CR-4248).” Att. 1, page 20
- “Some sites have large percentages of personnel working in excess of 600 hours of overtime per year (i.e., more than two to three times the level allowed for operators at some foreign nuclear power plants, and more than twice the level recommended by a 1985 expert panel).” Att. 1, page 22
- “The staff found that the NRC’s general approach to plant personnel fatigue (i.e., limiting the number of hours worked) is consistent with the approach taken by other Federal agencies. However, the NRC has not put these limits in a regulation as have other Federal agencies that have a public safety mission.” Att. 1, page 30
- “The NRC’s policy statement also does not provide guidance to limit work hours accumulated over periods longer than 7 days, whereas commercial and air force pilots have limits for longer periods of time.” Att. 1, page 30
- “The NRC policy statement is generally the least restrictive of the Federal agencies that regulate hours of work in other industries and allows more flexibility than other agency regulations.” Att. 1, page 31

Thus, the problem to be remedied by the rulemaking is that the NRC’s policy statement was not restrictive enough to provide adequate protection against chronic fatigue of nuclear plant workers, the deficient policy statement was inconsistently applied, the deficient policy statement was difficult to enforce due to its varied implementation processes, and workers at some nuclear plants were working in excess of the deficient policy statement.

The staff’s most recent version of its proposed rule for managing fatigue of workers does little to resolve the problem. My reasons for this conclusion:

1. The NRC’s policy statement established the expectation of a normal 40-hour work week, with longer hours permitted during non-routine evolutions. Under proposed §26.199 paragraph (c)(2)(i), the NRC would allow the entire affected work force to put in 53-hour work weeks for at least 39 consecutive weeks. Under proposed §26.199 paragraph (c)(2)(ii), the NRC would allow the entire affected work force to put in 48-hour work weeks for the entire 52-week year. Thus, the NRC’s proposed rule “erodes” fatigue protection by 20 to 34 percent.
2. The SECY paper pointed out that at some sites, around 20 percent of the workers were logging 600 hours of overtime annually and implied this was a bad thing with respect to fatigue management. The proposed fix under §26.199 paragraph (c)(2)(i) would allow 100 percent of the affected work force to log 600 overtime hours annually. Under §26.199 paragraph (c)(2)(ii), close to but not quite 100 percent of the affected work force could log 600 overtime hours annually. Thus, the NRC plans to go from bad to worse.
3. Generic Letter 82-12 established an expectation that workers not put in more than 24 hours in any 48-hour period. §26.199 paragraph (d)(1)(ii) relaxes that expectation to a more roomy 26 hours in any 48-hour period.

For reasons I cannot discern, the NRC staff at the July 8th public meeting took comfort in the most recent version of its proposed rule for managing fatigue tightening down on the use of waivers (or exemptions/deviations) from the working hour limits. This comfort level is illusionary at best. The reality is that the extension relaxation of the working hours limits precludes the need for waivers. Plant owners will be able to do by rule that which they used to do by waiver.

The preliminary regulatory analysis for the proposed rulemaking was discussed during the July 8th public meeting. I do not plan to review and comment on the regulatory analysis. I am not a fan of science fiction.

To be fair to the regulatory analysts, their assigned task is to justify an illogically constructed rule. One simply cannot develop a technically defensible regulatory analysis for this proposed rule. Some of the many logic disconnects in the proposed rule:

1. Plants owners could opt to manage fatigue by limiting the affected workers under §26.199 paragraph (c)(2)(i) to 2,600 hours annually. The 2,600-hour annual limit corresponds to average 50-hour work weeks. But the average work week limit that plant owners could alternatively opt to impose under §26.199 paragraph (c)(2)(ii) is 48 hours. If 50 hours per week is correct, then the 48-hour limit represents undue regulatory burden. Conversely, if 48 hours per week is the proper limit, then the 50-hour limit represents inadequate protection against fatigue. The regulatory analysis will simply be unable to reconcile this illogical disparity.
2. Plant owners could opt to manage fatigue during outages of any duration by limiting the affected workers under §26.199 paragraph (c)(2)(i) to 700 hours quarterly. The 700-hour quarterly limit corresponds to average 53.84-hour work weeks. But the work week limit that plant owners could alternatively opt to impose during outages lasting up to 120 days under §26.199 paragraph (c)(2)(ii)(B) and §26.199 paragraph (d)(1)(iii) is 72 hours. If 72 hours per week is correct, then the 53.84-hour limit represents undue regulatory burden. Conversely, if 53.84 hours per week is the proper limit, then the 72-hour limit represents inadequate protection against fatigue. The regulatory analysis will simply be unable to justify both sides of this disconnect.
3. When the owners of a single unit nuclear plant site like Ginna opt to manage fatigue §26.199 paragraph (c)(2)(ii), two conditions apply. When the reactor is operating or in an outage over 120 days, the affected work groups are limited to average 48-hour weeks. When the reactor is in the first 120 days of an outage, the affected work groups are not limited by the 48-hour group limits, but instead are controlled by the less restrictive individual limits under §26.199 paragraph (d)(1). The owners of a multiple unit nuclear plant site like Indian Point or Palo Verde can also opt to manage fatigue via the work group limits. But the Indian Point Unit 2 reactor can be operated by work groups controlled not by the 48-hour limits that Ginna would have to meet if it was operating if the Indian Point 3 reactor was in the first 120 days of an outage. If the 48-hour average work weeks are necessary to properly manage worker fatigue when Ginna is operating, than the less restrictive individual working hour limits applied when one reactor at a multiple unit site is operating represents inadequate protection. Conversely, if the individual working hour limits really do provide adequate protection for an operating reactor, than it represents undue regulatory burden to impose the more restrictive group limits.
4. Subpart I is intended to be an addition to the broader Fitness for Duty provision under 10 CFR Part 26. Among other things, the remainder of 10 CFR Part 26 requires owners to implement various measures to provide assurance that workers at nuclear power plants are not impaired by the effects of drugs and alcohol. The proposed addition of Subpart I seeks to extend that assurance to potential impairment by fatigue. The group work hour limits of §26.199 paragraph (c)(2)(ii) are totally erased by §26.199 paragraph (c)(2)(ii)(B) when the reactor at a single unit site or any reactor at a multiple unit site is in the first 120 days of an outage and replaced by the less restrictive requirements of §26.199 paragraph (d)(1). The permissible blood-alcohol concentration (BAC) is not increased for workers when a reactor is shutdown. Plant owners

cannot restock the vending machines with Bud instead of Pepsi during outages, even though work force morale might be significantly increased (apologies to Pepsi). Part 26 doesn't allow marijuana to be smoked during refueling outages. The regulatory analysis will have to blow some smoke of its own to reconcile this mess.

5. Regardless of the scheme selected by plant owners to manage fatigue and independent of whether one or all reactors at a specific site or operating, §26.199 paragraph (d)(2) requires that affected individuals have at least a 10 hour break between work periods. Among all the so-called "requirements" in the proposed rule, this is the one with the strongest and most direct link to science. Nevertheless, §26.199 paragraph (d)(2)(i) excludes shift turnover time from the limit. Thus, an affected worker could continually cover shifts with a 10-hour break reduced by shift turnovers of 15 minutes, or 30 minutes, or 1 hour, or 90 minutes, or 2 hours or however long the totally uncontrolled, unmanaged, undocumented, unauditible shift turnovers lasted. The regulatory analysis cannot show that this proposed rule adequately manages fatigue because the basic underlying science is violated by excluding shift turnover time from the 10-hour break between work periods. The regulatory analysis will have to ignore the underlying science to justify this part of the proposed rule.
6. The individual work hour limits of §26.199 paragraph (d)(1) may be waived under the provisions of §26.199 paragraph (d)(4)(i) including a formal determination "that the waiver is necessary to mitigate or prevent a condition adverse to safety." That's hardly a robust barrier when one considers all the safety-challenged things that have been changed at nuclear power plants under the far more restrictive provisions of 10 CFR 50.59. Or, consider all the fuzzy – to be charitable – logic employed in granting Notices of Enforcement Discretion (NOEDs). Time and time again, the NRC grants NOEDs to allow reactors to continue operating with broken emergency equipment on the flimsy grounds that the quantifiable risk increase from the broken equipment is more than offset by an undocumented qualitative assessment that the risk from shutting down and restarting the reactor poses larger risk. Similar shenanigans could easily be used to justify any waiver for any purpose. Thus, a genuine regulatory analysis would show zero benefit from this proposed rule (because unlimited waivers could be generated to allow any affected worker to work any hours) and plenty of costs.
7. §26.199 paragraph (d)(4)(ii) states: "*To the extent practicable, licensees shall rely upon the granting of waivers only to address circumstances that could not have been reasonably foreseen or controlled.*" The regulatory analysis cannot fail to justify this "requirement" because it has neither benefit nor burden. It has as much regulatory "meat" as the page numbers on the proposed rule.
8. There's a contradiction in the work group limits for security force personnel versus the other four groups described in §26.199 paragraph (a). The long term average work week limits (e.g., 48 hours) can be relaxed during the first 120 days of an outage and during the first xxx days after the national security warning level is increased. Based on numerous discussions during prior public meetings, the justification for the "relaxation" during outages is reportedly due to a combination of a general reduction in risk level when a reactor is not operating and the fact that errors made by personnel covered by the work group limits may be detected and corrected before they adversely impact safety levels. For example, mistakes made during maintenance tasks may be found during post-maintenance and/or surveillance testing prior to resumption of power operations. That philosophy contradicts the "relaxation" for security force personnel following an increase in the national security level. The regulatory analysis cannot realistically square this inconsistency.

The regulatory analysis for this version of the proposed rule would also contradict the regulatory analyses performed for the security orders issued by the NRC staff in the wake of 09/11 (assuming, of course, that the staff even bothered to prepare regulatory analyses). Those regulatory analyses justified (or would have justified) the increased security measures as being

necessary to mitigate the heightened threat to nuclear power plants when the national security warning level is increased. An honest regulatory analysis could not reconcile meeting that heightened threat with security force personnel more prone to impairment by fatigue – which would be the consequence of the work group limit “relaxation.”

UCS would strongly oppose the NRC’s most recent version of the proposed rule for managing fatigue simply because it manages to do everything but that. It is worse than the situation in 1999 that prompted our report and the petition for rulemaking. It would reduce safety. It would reduce NRC efficiency and effectiveness. It would increase regulatory burden. And it will reduce public confidence.

A regulation should clearly communication requirements so that it can be followed and enforced. The proposed rule does not satisfy this simple, reasonable standard.

UCS does not believe the NRC should proceed with this version of the proposed rule. It is not ready for public comment. The comments this language would prompt from the industry, from the labor unions, and from groups like ours would most likely not lead to issuance of a final rule. This version of the proposed rule needs much more work.

What should the proposed rule contain? I strongly recommend the following:

1. A requirement that procedures address unfettered self-declaration of fatigue by all workers covered by 10 CFR Part 26 – not just the limited subset of workers under §26.199 paragraph (a).
2. Work hour limits that apply at least to the five groups of workers described in §26.199 paragraph (a). The work hour limits for these affected work groups are as follows.
3. A minimum break time between work period with no ifs, ands, or buts. A minimum break time that excludes shift turnover time is NOT a minimum break time.
4. Individual work hour limits that protect against fatigue in the short-term and in the long-term. Basically, this could be the Generic Letter 82-12 short-term limits plus an added component (limit) to cover cumulative or long-term fatigue.
5. No waivers. The blood alcohol concentration and controlled substance limits don’t need waivers. The minimum staffing levels don’t need waivers. The industry’s assertions that it is better to keep an individual or team working to finish a job rather than turn the task over to a potentially less knowledgeable individual or team is bogus. Hopefully, the industry does not call in intoxicated veterans to perform tasks assigned to “rookies.”
6. No outage or national security color “relaxations.” Workers must be protected from impairment PERIOD, not just when it is convenient.

The work hour limits must not turn on and turn off the cumulative limits based on some unrelated artificial construct, such as outage duration(s) and national security levels. Rather than guess or assume operational conditions (i.e., no back-to-back outages at multiple unit sites, etc.), the rule should state the work hour limits for short and long terms. There can be as many term intervals as deemed necessary, but their application must be constant, uniform, and inviolable. The result would be a plot of working hour limits versus time period, such as the example chart at the end of this letter. The minimum time period interval (assumed to be 24 hours) would dictate the left end of the plot. The maximum period (assumed to be one year) would dictate the right end. There could be numerous intermediate intervals: 48 hours, 7 days, 30 days, 13 weeks, etc.

This approach is sensible and not unprecedented at NRC-land. For example, the operating license for every power reactor operating in the U.S. contains a maximum thermal power limit expressed in megawatts thermal (Mwt). But that is, in fact, not an absolute limit as clearly discussed in the following:

Core thermal power evaluation is performed on a daily basis for both PWRs and BWRs. The specific requirements can be found in plant's TS although the plant may follow more stringent guidelines as recommended by the manufacturer. ... In addition, the inspector should check that the average thermal power over any 8-hour shift did not exceed the "full steady-state licensed power level" (and similarly worded terms). The exact 8-hour periods defined as "shifts" are up to the plant, but should not be varied from day to day (the easiest definition is a normal shift manned by a particular "crew").

It is permissible to briefly exceed the "full, steady-state licensed power level" by as much as 2% for as long as 15 minutes. In no case should 102% power be exceeded, but lesser power "excursion" for longer periods should be allowed with the above as guidance. For example, 1% excess for 30 minutes and 1/2% for 1 hour should be allowed. There are no limits on the number of times these "excursions" may occur, or the time interval that must separate such "excursions." The above requirement regarding the 8-hour average power will prevent abuse of this allowance.¹

Thus, the NRC allows the "maximum" or licensed power level to go up to, but not exceed, 2% for 15 minutes as long as the 8-hour average power level is at or below the licensed limit. These short and long term limits are not contingent on restart date or xenon transient status or three members of the operating crew all having a birthday that date. The NRC should apply this same concept to managing fatigue. An affected worker can work up to, but not exceed, XX hours including turnover (work is work, suffer is suffer) in 24 hours; up to, but not exceed, YY hours including turnover in 48 hours; up to, but not exceed, ZZ hours including turnover in 7 days; up to, but not exceed, AA hours including turnover in one year. Collectively, these work hour limit intervals manage fatigue and prevent abuses.

The goal of the rulemaking should be to provide reasonable assurance that the affected workers are protected against impairment by fatigue. If work hours are the chosen vehicle for providing that assurance, then the proper way to proceed is to identify the right work hour limits to protect individual from short-term and cumulative fatigue effects. If those work hour limits are properly established, they will be independent of plant operating status and won't be conditional on the reactor status, the national security color, or the duration of any outage. They will depend solely and rightfully on how many hours an individual has worked. The self-declaration component is necessary to properly account for other factors, such as events occurring away from the job site, that can contribute to an individual's fatigue.

Sincerely,

<ORIGINAL SIGNED BY>

David Lochbaum
Nuclear Safety Engineer
Washington Office

¹ Nuclear Regulatory Commission, Inspection Manual Inspection Procedure 61706, "Core Thermal Power Evaluation," July 14, 1986.

Work Hour Limits

