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NUCLEAR REGULATORY COMMISSION

10 CFR Part 26

[Docket No. PRM-26-2]

Barry Quigley

OP-
ADJUD

AGENCY: Nuclear Regulatory Commission.

ACTION: Petition for rulemaking; Notice of receipt.

SUMMARY: The Nuclear Regulatory Commission is publishing for public comment a notice of receipt of a petition for rulemaking dated September 28, 1999, that was filed with the Commission by Mr. Barry Quigley. The petition was docketed by the NRC on October 7, 1999, and has been assigned Docket No. PRM-26-2. The petitioner requests that the NRC: (1) add enforceable working hour limits to 10 CFR Part 26; (2) add a criterion to 10 CFR Part 55.33 (a)(1) to require evaluation of known sleeping disorders; (3) revise the Enforcement Policy to include examples of working hour violations warranting various NRC sanctions; and (4) revise NRC Form-396 to include self-disclosure of sleeping disorders by licensed operators. The petitioner also requests changes to NRC Inspection Procedure 81502, Fitness for Duty Program. The petitioner believes that clear and enforceable working hour limits are required to ensure that the impact of personnel fatigue is minimized.

February 14, 2000
DATE: Submit comments by ~~(75 days after publication in the Federal Register)~~. Comments received after this date will be considered if it is practical to do so, but the Commission is able to assure consideration only for comments received on or before this date.

PDR PRM 26-2

Pub. on 12/1/99

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ADDRESSES: Submit written comments to the Secretary of the Commission, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Attention: Rulemakings and Adjudications Staff. Hand deliver comments to: 11555 Rockville Pike, Rockville, Maryland between 7:30 a.m. and 4:15 p.m. Federal workdays.

For a copy of the petition and the two reports submitted with the petition (referenced below), write to David L. Meyer, Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001.

You may also provide comments via the NRC's interactive rulemaking website at <http://ruleforum.llnl.gov>. This site provides the capability to upload comments as files (any format), if your web browser supports that function. For information about the interactive rulemaking website, contact Ms. Carol Gallagher, (301) 415-5905 (e-mail: cag@nrc.gov).

The petition and copies of comments received may be inspected and copied for a fee at the NRC Public Document Room, 2120 L Street, NW. (Lower Level), Washington, DC.

FOR FURTHER INFORMATION CONTACT: David L. Meyer, Chief, Rules and Directives Branch, Division of Administrative Services, Office of Administration, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, Telephone: 301-415-7162 or Toll Free: 1-800-368-5642.

SUPPLEMENTARY INFORMATION:

The Petitioner

The petitioner is licensed by the NRC as a Senior Reactor Operator who is required to comply with all applicable Commission regulations.

Background

The petitioner states that in an increasingly competitive electricity market, the battle cry is 'do more with less.' According to the petitioner, this translates into fewer people who are working more and sometimes many more hours at nuclear power plants. The petitioner believes that personnel mistakes at nuclear power plants can be attributed to fatigue and believes that work-hour limits should be required to minimize personnel fatigue.

The petitioner states that in a letter dated May 18, 1999, to Congressman Edward J. Markey, then-NRC Chairman Shirley Jackson stated that few significant industry events can be attributed to fatigue. While the petitioner agrees that this statement is correct, he asserts that a review of the NRC's Human Factors Information System (HFIS) database suggests that events related to fatigue occur but are not reported, or not properly attributed to fatigue. According to the petitioner, NRC inspection reports listed 87 occurrences of staffing as less than adequate, while the industry using data from the Licensee Events Report only listed 11. For occurrences attributable to excessive overtime/acute fatigue, the petitioner states that NRC reported 59 occurrences, as compared to 3 occurrences reported by the nuclear industry, and for frequent use of overtime/cumulative fatigue, NRC reported 28 cases and the industry reported none.

The petitioner believes that, based on NRC's much higher reporting of fatigue-type events, industry's accounting and reporting process is non-conservative. The petitioner believes that the tendency of the industry to under-report events related to fatigue is all the more significant in light of the NRC's trend, as asserted by the petitioner, of reducing its inspection efforts at nuclear power plants.

The petitioner states that while NRC's HFIS database contains more events related to fatigue than industry's reporting, the NRC also under reports fatigue issues. The petitioner states that among other things, fatigue causes inattention to detail, increased risk-taking, and poor work practices. The petitioner cites the following categories in the HFIS database to support his position:

Work practices or skill of the craft less than adequate - - If the skill of the craft activities are not performed consistent with management expectations, safety significance of activity or industry standard. 4913 occurrences (NRC and industry combined).

Non-conservative decision making or questioning attitude less than adequate - - If personnel fail to stop work or establish appropriate controls when presented with unfavorable or uncertain work conditions. 1805 combined occurrences.

Self-checking less than adequate - - If a worker fails to self-check adequately before performing task (Stop, Think, Act, Review). 618 combined occurrences.

Awareness or attention less than adequate - - Includes problems that are due to failing to maintain situational awareness, infrequent or ineffective control board monitoring and problems arising from being distracted or interrupted. 2389 combined occurrences.

The petitioner states that the 9725 occurrences included in these four categories account for almost 30% of the total HFIS entries for 1996 through 1998. The petitioner believes

that while there are certainly other causes for these occurrences, such as distractions and interruptions, fatigue most probably played a role in a respectable percentage of them. The petitioner cites a National Transportation Safety Board (NTSB) report, which was attached to the petition, that found that, depending on the transportation mode, 21% to 33% of consequential events were fatigue related, whereas the NRC only attributed 90 occurrences (out of the 9725 included in the HFIS database) directly to fatigue. The petitioner states that it is highly unlikely that less than 1% were caused by fatigue. The petitioner compares the fact that the Department of Transportation (DOT) spent over \$30 million on fatigue research in fiscal years 1990 to 1998, while no figures could be found in the NRC budget related to fatigue research. The petitioner compares NTSB and DOT research reports to recent NRC research reports and asserts that the NRC may not be qualified to detect fatigue-related events until they grow to the size of the Peach Bottom occurrence (the NRC ordered two reactors at Peach Bottom nuclear plant to be shut down in March 1987 after NRC inspectors discovered licensed operators asleep in the control room).

The petitioner specifies three other factors that reduce faith in NRC and the industry's reporting on fatigue:

1. Some fatigue errors have latent effects that may not be discovered for quite sometime. The examples the petitioner provided were valve mispositionings and procedures with technical errors caused by an over-worked and fatigued staff. The petitioner asserts that the cause for such errors would be difficult to trace.
2. The HFIS database shows 392 occurrences for which a root cause analysis was determined to be less than adequate. The petitioner questions the quality of the LER's presented by industry to identify all causes of an event.

3. The NRC is not aggressive in looking for fatigue issues. The petitioner notes that NRC indicated that it is very difficult to get overtime issues into Inspection Reports because it is concerned that the licensee may object.

The petitioner states that it appears that the policy of NRC is to wait for something bad to happen and then raise the issue with licensee management.

Petitioner's Conclusion

The petitioner states that the NRC issued a Generic Letter 82-12 on June 15, 1982, to all plant owners that provided guidelines that established controls to prevent situations where fatigue could reduce the ability of personnel to maintain the reactor in a safe condition. According to the petitioner, the issuance of the Generic Letter 17 years ago indicates that NRC is well aware of the threat and undue risk posed by fatigue on workers to safely operate a nuclear power plant, and therefore required plant owners to control working hours. The petitioner notes that with electricity deregulation forcing plant owners to slash staffing levels and work the survivors longer and longer hours, that the NRC has redefined the fatigue risk because few significant events can be precisely attributed to fatigue. However, according to the petitioner, the NRC shut down the Peach Bottom plant without first proving that a single significant event at the facility could be attributed to operator inattentiveness (i.e., napping). The petitioner also states that in the 1980's, although few significant events were attributed to drug or alcohol abuse, the NRC took action to reduce the risk of an accident caused by degraded human performance. Specifically, the NRC implemented a Fitness-for-Duty rule that includes individual and corporate sanctions. The petitioner requests that the NRC take comparable steps to prevent degraded human performances resulting from fatigue.

The Petitioner's Proposed Amendments

The petitioner recommends the following amendments to 10 CFR Part 26.

(1) The following limits apply for personnel performing safety-related work:

(a) During non-outage periods:

(i) 60 hours per week, and

(ii) 108 hours in two weeks.

(b) During outage periods¹:

(i) 72 hours per week, and

(ii) 132 hours in two weeks.

(c) The maximum annual limits² as a percentage over 2080 hours are:

Year ending	Shift Workers		Non-Shiftworkers	Roving Crews
	Licensed	Non-licensed		
Dec 31, 2003 ³	20	20	30	30
Dec 31, 2002	25	20	35	35
Dec 31, 2001	30	25	40	40

(d) No part of a 16-hour shift shall occur between the hours of 11 pm and 7 am, except for turnover.

¹Outage periods are defined as the 48 hours prior to reactor shutdown, the duration of the shutdown and the 48 hours after synchronizing to the grid.

²Exclusive of turnover time.

³And all subsequent years.

(e) No more than two 16-hour shifts shall occur in a rolling 7-day period. The first 16-hour shift shall be followed by a 16-hour rest period. The second 16-hour shift shall be preceded by a 24-hour rest period. The rest periods may be combined.

(f) No more than 24 hours in a 48 hour period.

(g) The limits apply to an individual regardless of work location or employer.

(h) Turnovers:

(i) A turnover time of 1-hour (1-1/2 hours outage) may be allocated in any manner between an individual's oncoming and offgoing turnovers. Any balance of time remaining from turnover shall not be used for other purposes.

(ii) Exceeding the turnover time limit shall not constitute violation of the working hour limits provided:

(1) The condition is entered into the Licensee's Corrective Action program, and

(2) No more than one occurrence per individual per week.

(iii) The turnover time allowance shall only apply to written turnovers conducted face-to face.

(2) The following exceptions apply to the work hour limits of paragraph (1) provided the licensee takes action to minimize the effects of fatigue on human performance. Such actions may be demonstrated by compliance with paragraph (3) in addition to increased supervisory oversight.

(a) Activation of the Emergency Plan under 10 CFR 50.47,

(b) For those plants which shutdown for severe weather, the limits are suspended from the beginning of the power reduction until the severe weather has passed,

(c) The transition to Daylight Savings time in the Fall. No showing of minimization of fatigue is required for this exemption.

(d) Plant transients, typically large unplanned power changes or initiation of major Engineered Safety Features. Avoidance of Technical Specifications required shutdowns is not a transient covered by this exemption.

(e) For extended shutdown, the biweekly limit increases to 144 hours per week (weekly remains at 72 hours) provided:

(i) Prior to restart or fuel load, a plan is in place to ensure adequate rest for personnel performing critical tasks. Critical tasks are on a higher tier than safety-related work and are physical and administrative tasks directly related to fuel load and startup of the primary and secondary plant. Critical tasks would typically be those related to fuel load, primary and secondary system fill and vents, safety-related system testing, plant heatup and reactor startup (through the reaching of full power).

(ii) The role of fatigue is specifically and promptly evaluated for all⁴

(1) Events classified as Conditions Adverse to Quality under 10 CFR 50, Appendix B, Criterion XVI,

(2) Events classified as Conditions Adverse to Quality under 10 CFR 50, Appendix B, Criterion XVI and attributed to personnel error,

(3) Reportable events of 10 CFR 50 and 10 CFR 20,

(4) OSHA recordable injuries,

(5) Traffic accidents involving employees on their way home from work⁵

(3) Training and monitoring of fatigue.

⁴This includes events on other units of multi-unit sites if the personnel are under the extended outage provision.

⁵Letter from D. Lochbaum, Union of Concerned Scientists to Chairman Jackson, NRC, March 18, 1999.

(a) Licensees shall provide initial and continuing fatigue mitigation training to personnel performing safety-related work, their supervisors and managers. This training shall be developed in accordance with the systems approach to training of 10 CFR 55.4. At a minimum this training will cover:

- (i) Effects of diet, gender, and age on fatigue,
- (ii) Importance and ways to maximize rest in off-hours,
- (iii) Symptoms of major sleep disorders, and
- (iv) Other items as determined during the rule comment period.

(b) Licensees shall provide training to supervisors of personnel performing safety-related work in the monitoring and detection of fatigue.

(4) Section 26.20, "Written Policy and Procedures," should be revised to remove the word "fatigue" from:

"Licensee policy should also address other factors that could affect fitness for duty such as mental stress, fatigue and illness." (The purpose of this change is to eliminate conflicts with the prescriptive working hour limits and inclusion of the word "fatigue" in a statement that is essentially only a recommendation as indicated by the word "should".)

(5) A new definition should be added to 10 CFR Part 26 for the term "Working Hours."

Working Hours - All hours performing safety-related services for the licensee while on property owned or controlled by the licensee. This includes training and meetings. Breaks, paid, or unpaid, are also included in the calculation of working hours for fatigue. This is appropriate since fatigue is related to several factors, including time since awakening.

Proposed Revisions to NRC Form-396 and 10 CFR Part 55

NRC Form -396 and 10 CFR Part 55 should be revised to require self-disclosure and evaluation of known sleep disorders.

(7) Other Changes

A full set of examples ranging from non-cited to Level I violations should be provided in the Enforcement Manual.

Bases for Proposed Changes

Weekly/Biweekly

The petitioner states that the weekly and biweekly limits are to prevent cumulative fatigue over the short-term. A 60-hour limit allows 5 twelve-hour shifts or 7 eight-hour shifts. The biweekly limit would limit one of the weeks to 48 hours. The 108-hour total is based on limiting the total hours worked for twelve hour shifts to a reasonable number and ensuring those working eight-hour shifts have at least one day off every two weeks.

Annual

The petitioner states that the annual limits address longer-term cumulative fatigue and are based on NUREG/CR-4248, "Recommendation for NRC Policy on Shift Scheduling and Overtime at Nuclear Power Plants,"⁶ which recommended limiting overtime to 2,260 hours per year. The petitioner specifies that the maximum allowed by this petition exceeded this amount but it is not likely that the limit of 2260 hours could be reached. According to the petitioner, the table includes a workdown curve for each of the categories to ensure that some amount of

⁶Battelle Pacific Northwest Laboratories, Richland WA. July 1985.

immediate relief is provided while allowing a gradual transition period. The shiftworker limits are lower to allow for the impact of rotating shiftwork, constant disruption of circadian rhythms and working during the pre-dawn trough in performance. The licensed operator curve is more gradual to allow more time to increase the number of operators, if the licensee chooses to do so. The roving crew limits are needed to prevent multi-site utilities from almost constantly having people move from site to site using the outage limits on working hours.

16-Hour Shifts

The petitioner states that the 16-hour shift limits address acute fatigue. The petitioner offers that a substantial amount of first- and second-hand experience is available to him that shows that any 16-hour shift involving a midshift is foolhardy. The petitioner offers the following scenario for a 16-hour shift from 3 pm to 7 am.

Assume the worker arises at 8 am, after a restful sleep, on the day he is to work. A nap prior to 3 pm will be difficult, absent the use of sleeping aids, since sleeping during the day is not natural and the worker should still be rested from the previous night. Near the end of the shift, the worker will have been awake for almost 24 hours.

The petitioner states that Australian researchers⁷ show that after 24 hours awake, the performance degradation is equivalent to a Blood Alcohol Content of 0.10%. Additionally, the petitioner states that with the increase in online maintenance, midshifts are no longer the quiet times they were a few years ago and that although the increased workload provides increased stimulation, stimulation is no substitute for rest. The petitioner believes the increased activities provide more opportunities for mishaps.

⁷Nature, Vol. 388, July 17, 1997 pg 235.

The petitioner offers a similar scenario for a worker who rises at 8 am and works on a shift from 11 pm to 3 pm. The petitioner states that at the end of the shift, the worker will have been up for 31 hours with a 3-hour nap. The petitioner states that although short naps (30 minutes) may have some restorative ability, they must be taken when tired. The petitioner notes that this would qualify as a 'split rest period' under NTSB rules and that NTSB is requesting the DOT to abolish split rest periods due to lack of effectiveness.

Individual Basis

The petitioner believes that limiting hours worked, regardless of employer or location, is necessary to ensure that contractors or others are not excessively fatigued.

Turnover Limits

The petitioner states that turnovers require special consideration. The petitioner believes that orderly transfer of information from one shift to the next is essential for plant safety and that it is as equally important that the work hours are minimized and the turnover allowance is not abused. The petition states there is substantial potential for abuse of the turnover allowance since some may see it as a 'free' extra hour. For example, a maintenance worker or engineer (personnel who typically do not have written turnover) could simply tack on an hour to their workday, absent a specific prohibition. The petitioner also notes that abuses are possible for personnel using written turnovers, i.e., if a turnover is normally completed in 15 minutes, the extra 45 minutes shall not be used for other administrative duties. The petitioner states that this is consistent with the requirement to control working hours to limit the effect of fatigue.

The petitioner further states that there are times when plant events require extended turnovers. The once a week exception is judged adequate based on the petitioner's experience as an on-shift SRO. The petitioner indicated that the requirement to enter the condition into the Licensee's Corrective Action program is required to provide both visibility and tracking, the assumption being that a high number indicates either an excessive administrative burden or an individual performance issue.

Exemption

The list of exemptions is considered reasonable based on the petitioner's experience. It is anticipated to grow slightly during the rulemaking phase as more experience is added. The overriding goal of the exemptions is that they be limited both in circumstance and number. The purpose is to avoid the ambiguity of Generic Letter 82-12.

NRC Form 396 and 10 CFR Part 55

The petitioner believes this revision would allow the NRC to issue conditional licenses with the appropriate compensatory actions. The petitioner states that this approach was adopted by the Coast Guard.

Other Changes

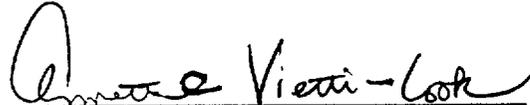
The petitioner believes that a full set of examples in the Enforcement Manual would provide clear guidance to NRC staff on the appropriate level of sanctions required.

Reference Documents

The petitioner states that documents used in support of this petition were readily available on websites of the NRC and the NTSB and in the NRC Public Document Room. The petitioner also attached two documents that in his view summarize the hazards of fatigue. They are Overtime and Staffing Problems in the Commercial Nuclear Power Industry, Union of Concerned Scientists (March 1999), and Evaluation of U.S. Department of Transportation Efforts in the 1990s to Address Operator Fatigue, NTSB Safety Report NTSB/SR-99/01 (May 1999).

Dated at Rockville, Maryland, this 24th date of November, 1999.

For the Nuclear Regulatory Commission.

A handwritten signature in black ink that reads "Annette L. Vietti-Cook". The signature is written in a cursive style with a large initial "A".

Annette L. Vietti-Cook,
Secretary of the Commission.