

**Fatigue Rulemaking
Issue Paper 23
Long term work hour limits
August 19, 2004**

Purpose:

To express the industry's strong objection to the July 20, 2004, revision to the draft work hours rule that removed group work hour limits in favor of quarterly and yearly limits on each individual.

We believe that imposition of a 13 week limit of 800 hour and annual limit of 2600 hour on each individual covered by this part of the rule is unacceptable for the following reasons:

1. There will be significant implementing burden.
2. The disruption of the work force has a potential negative impact on safety.
3. It will not pass an objective backfit analysis.
4. Manage hours worked for individuals when they are not working at a nuclear facility or for the licensee will be exceedingly difficult and compound the challenge of finding qualified people who are willing to support the industry.

The industry, therefore recommends that the NRC staff restore the group work hour language, developed over the last two years of meetings, from the June 25, 2004 version of the draft rule. The individual limits should be dropped from the draft rule.

Although there is still concern within the industry about the need for additional regulatory requirements to address chronic fatigue, the originally proposed group work hour limits will provide a rational basis for an effective analysis of potential impact on public health and safety.

Issues:

Lack of Draft Rule Stability:

Based on Commission direction to involve stakeholders, there have been numerous drafts and a series of public meetings to consider various options. Discussion has at times been heated and getting to the true facts has often been difficult. The interpretation of the science, based on research often conducted for other purposes, has also been difficult. It is all very subjective.

In addition to training, behavioral observation, and supervisor responsibility the NRC staff proposes to use limits on work hours as a mechanism to reduce the potential for fatigue related performance issues. The discussion has focused on two areas, acute and chronic fatigue.

The short term work hour limits, addressing acute fatigue, seem to have reached some level of stability. The limits provided in Generic Letter 82-12 have been updated to accommodate the now prevalent 12 hour shift length. Sleep experts made a rather convincing case that the most important factor in acute fatigue is not work time but rest time. If an individual was provided with a true 8 hours of rest each day they would recover fully. It is the only science that no stakeholder took exception to. The result, limits of 16 hours/24 hours, 26 hours/ 48 hours, 72 hours/7 days and a minimum 10 hour break between work periods seem to be acceptable to most stakeholders.

Chronic fatigue has been a much more difficult issue. Providing a regulatory mechanism that addresses the longer term potential for fatigue without unduly restricting plant operations and management flexibility is difficult. In early meetings the concept of long term individual limits was considered and dropped after considerable discussion of the implementation problems and unintended consequences. For the last two years effort has focused on developing a clear set of requirements related group work hour limits.

In a June 10, 2004, letter to the Chairman, NEI expressed concern that a combined rulemaking effort would delay completion of the drug and alcohol portion of the rule, an effort started in 1991. In his reply the Chairman stated, "A public meeting on the combined rulemaking was held on July 7 and 8 to solicit stakeholder comments on the proposed revision to 10 CFR Part 26. At that meeting, stakeholders' comments on the draft rule and the rulemaking timeline were discussed. There were no issues raised that would induce the Commission to reconsider our support for a combined rule."

Following the July 8, 2004, meeting NEI would have agreed with this assessment. However, we again have concerns, having now seen the major changes made by the NRC staff in the July 20 version of Subpart I and the ensuing effort to collect data from nine plants. If the annual limit remains in the draft rule, a number of stakeholder meetings will be required over the next several months to properly understand the impact. Failure to conduct these meetings would not meet the Commissions direction to involve stakeholders in the development process.

Backfit Considerations:

In SRM SECY-01-0113, authorizing this rulemaking, each of the Commissioners expressed concerns about the backfit analysis that would be required to support this rule. In part this concern was based on the fact that justification for the rulemaking was based on the potential for fatigue induced events, not risk significant events. As noted by Commissioner Diaz, “The staff found that few events at nuclear power plants had been attributed to fatigue, and in all instances, automated safety systems or other barriers were available to prevent events that may have had safety consequences.” Commissioner Dicus said, “I emphasized the word “potential” here because, staff has not identified any risk-significant events or performance trends to attributable to fatigue.

The effort over the last two years on the group work hour limits provide a good picture of the implementation issues and potential burden associated with that option. NEI piloted the security officer requirements at six sites, has developed implementing guidelines and has a pilot program underway at three sites for the other affected personnel. Many of the implementation issues and administrative burden did not come to light until we were well into the program pilots.

The short term effort to collect and analyzing employment data from nine facilities will not provide a true picture of the burden associated with the proposed annual limits. The impact on the work force cannot be accurately estimated. The reaction of unions and contractors to restrictions on their workers will be difficult to quantify.

NEI believes that establishing a linkage between an annual limit on individuals and the performance issues the staff is trying to address is very tenuous. There clearly can be no direct correlation to improved plant safety or reduced core damage frequency. It may be easier to justify group work hour limits that at least have some nexus to maintaining adequate staff manning during normal plant operations, a concept that goes all the way back to generic letter 82-12.

The 2600 hour/year individual limit was considered in early meetings on the draft rule and, after extensive discussions with all stakeholders, was rejected as impractical. It is very disturbing to see this limit resurface at the eleventh hour.

NEI does not believe that the proposed annual limits would meet the requirements of an objective backfit review.
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Focus Shift:

Shifting from group work hours to individual annual limits will cause a shift in focus that NEI believes will have significant implications that are very difficult to evaluate. Under the group work hour limits the focus is a management issue, largely independent of the individual. As the limit is approached management must take some action to increase the size of the workforce in the functional area or reduce the overall workload. Largely unaffected by this approach are the individual overtime preferences, bargaining agreements, and whether an individual is in or out of the functional group.

Under individual limits the focus shifts to each and every worker. It becomes a personal issue. It affects overtime preferences. It will impact bargaining agreements and other labor relations issues. We are also concerned that it does not do a good job of evaluating the adequacy of the manning within the plants workforce.

There is a great concern that the NRC is injecting itself into the very difficult area of management-labor relations where the impact of seemingly simple actions can have far reaching consequences. For example, when the industry started moving to more efficient, shorter outages it was found that the pool of available workers quickly decreased. There were not enough hours and not enough overtime. Many individuals moved to supporting other industries that needed the same skills. To compensate companies have, in some cases tried to group outages and provide the work opportunity that people desire. What is the impact of these limits going to be on the labor pool? What detailed analysis has been done in this area?

We seem to be trying to solve three problems, (1) back to back outages of 120 days, (2) corporate pools of workers that work multiple outages, and (3) the transient labor pool that supports outages. The first two need to be discussed; there should be an easy solution within the group work hour concept. However, management of the transient labor pool is an impossible objective that will have consequences that neither the NRC nor industry can properly quantify and evaluate in any reasonable period of time.

NEI is concerned that the shift in focus to the individual in the labor pool could result in a negative impact on safety.

Individual long-term work hour limits:

Language from June, 25, 2004 posting of Subpart I

- “(2) Limit these individuals’ work hours in accordance with one of the following individual or collective work hour requirements:
“(i) Licensees shall limit an individual’s work hours to no more than 700 hours quarterly and no more than 2600 hours annually, including hours worked during planned and unplanned outages and increased threat conditions; or...”

Language from July 20, 2004 posting of Subpart I

- “(3) Licensees shall ensure that the work hours of individuals who are performing the job duties listed in paragraphs (a)(1)-(4) and, at the licensee’s discretion, those individuals who are performing the job duties listed in paragraph (a) (5) of this section, do not exceed the following additional limits, excluding shift turnover:
“(i) 800 work hours in consecutive periods that may not exceed 13 weeks; and
“(ii) 2600 work hours in any annual period, as defined by the licensee.”

In the discussion provided with this change it is clear that the intent is to require tracking hours worked for any outside individual who performs any work as part of the defined group, no matter how short the time period.

Performance based rulemaking?

On the surface the change seems to be fairly straight forward. It represents the ultimate in deterministic rulemaking, providing absolute limit which is easily inspected. Unfortunately, it totally ignores the concept of performance based rulemaking. A set of prescriptive requirements will never be developed that solve all potential fatigue related problems. We seem to have lost the fact that licensees are accountable for insuring individuals are fit for duty when they perform work.

Like most deterministic requirements, the unintended consequences in implementation will be significant and a constant source of irritation.

By addressing Subpart I separate from the rest of the draft rule it is easy to lose sight of many of the changes that have been made in other sections to reduce the potential for fatigue related performance issues.

- As part of training all individuals will have to be trained on recognizing and managing potential fatigue related issues.
- Procedures are required to allow individuals to report they are fatigued and provide appropriate direction to management.

- The draft rule requires everyone, not just supervisors to monitor and report behavior related issues.
- The concept of degraded behavior now goes beyond drug and alcohol problems and provides more appropriate tools when the cause could be fatigue.

What do the limits mean?

An individual can work no more than an average 61.5 hours/week per quarter and 50 hours/week per year. During a year of normal operations, with no outages, the need to work a large number of people at or above these limits would indicate the lack of adequate manpower.

However during any year in which there is an outage the annual limits will become a significant problem. If an individual were to work 800 hours in any one quarter, an average of 46 hours/week would have to be achieved for the rest of the year. Working at the individual limit of 72 hours/week for one 35 day outage a year requires less than 47.7 hours/week for the rest of the year. If there are two 35 day outages only 44.8 hours/week. Remember that a normal shift rotation requires 42 hours/week. This working two 35 day outages effectively eliminates any reserve response for an individual.

Most troubling is that during a 90 day outage in one quarter, an individual would only be allowed to average only 61.5 hours/week.

What is the real limit?

With the above as absolute regulatory limits, management will have to set lower targets for the workforce to prevent approaching the limits. A key factor in this is the nature of the work in this industry. The work load is not steady with the 9 to 5 mentality seen in many other areas of this countries workforce. There are times, both planned and unplanned, that require a higher level of effort. Managers will be forced to come up with intricate schemes to “bank” hours and have a reserve for the unplanned event. No manager is going to want to approach the end of the year with no reserve, or the December 15 unplanned outage would be a disaster.

Administrative burden.

Tracking the actual hours worked for personnel on-site will involve the same level of effort under either of the annual limit or group work hour limit. The lines between licensee staff and contractor personnel have become blurred. There are frequently people on site performing long term functions for the

licensee. Clearly the requirements should apply to any individual who is on-site performing the indicated functions.

However, the concept of including time for Contractor personnel when they are working off-site or at another company generates a major challenge and significantly increases the administrative burden.

The best parallel is the tracking of radiation exposure of individuals to insure that no one exceeds the 5 REM/year limit. But it is worse than that, radiation exposure is at least tracked by others using the same basic regulatory approach. Trying to get an individual who arrives on site in June to accurately report his hours actually worked for ABC Company is an impossible challenge. The worker has an economic disincentive to be accurate coupled with little personal belief that there are few "real" risks of working the hours. Unlike the dose levels, which are measured by others, or alcohol or drug levels, which can be directly measured, the actual level of fatigue is not directly measurable, much less the contribution of hours worked during some earlier time period.

The logic also fails. A Westinghouse turbine technician who works in a variety of settings, not just nuclear, participates in the modification of a BWR feed pump during a May outage. He is there for 4 days. What sense does it make to determine his collective hours for the first four months of the year? Are we now going to restrict him to 2600 hours for the rest of the year? How? Why? If he comes back for 4 days in the fall to do a feed pump on the other plant what restrictions apply?

This is an area that will show significant growth during implementation. It is a regulatory limit! Where are the audits? Where is the management certification that the reported hours are correct? Do I report it to the minute hour or second? Who does the audits of non-licensee facilities that would have to report hours? How do I get certification of hours in a timely manner? What if there are multiple employers in a year? The list of issues is just starting to build.

<p>It is exceedingly difficult to believe that we can succeed in any attempt to track and control long term hours worked by the transient labor pool.</p>

Work Force implications:

Management of overtime is a very complex issue with many long standing agreements between management and labor. The annual limit will totally

disrupt this process and, NEI believes, generate significant work force instability.

It is clear from discussions that voluntary overtime is much more palatable and less disruptive than forced overtime. There are three distinct groups of people within the plant workforce: (1) those that would prefer not to have any overtime, (2) those that accept some overtime, and (3) those that seek a higher level of overtime. Management will be forced to level load the work hours across the work force to keep each individuals bank of hours level, requiring an increased use of forced overtime. We believe the net result will be a negative impact on the plant culture and safety.

As discussed in meetings on the security fatigue order, at some point, as work hours are reduced an increasing number of individuals will seek second jobs. Again this is a negative effect and beyond the control of NRC regulations and will result in increased worker fatigue.

Some licensees have reported that this provision will generate major problems with bargaining agreements. The control of overtime, the right of first refusal, and order of assignment are very important issues to workforce stability.

The burden of being in the monitored group will also generate problems. Over time it may result in a licensee reducing the number qualified and experienced in performing certain maintenance. It will result in some individuals refusing to perform safety related work, with the resulting restrictions on their work hours.

NEI believes that imposition of the 2600 hour/year limit has a good potential of a net negative impact on plant culture and safety.

What about people that enter and leave the workforce?

NEI estimates that between 25 and 35 percent of the individuals covered by the work hours restrictions will enter or leave the plant work force during the year. This generates the additional implementation issues of defining when and how to apply hours to those individuals who were not there for the entire quarter or year.

Who does the work?

Over the last 10 years the industry has made significant improvements in the management of refueling outages. This has resulted from focused

management, decreased lengths, and increased involvement of dedicated company staff. Any objective review will show that today's approach to outages contributes to plant safety.

Imposition of work hour limits on outages is not going to change the need for an intense period of work. When challenged without enough work hours in the bank, increased use of outside resources will result. Decreasing the involvement of dedicated plant staff, with their long term accountability, and unique safety culture cannot have a positive effect on safety.

Unintended Consequences:

At the time work assignments are being made, there are two primary concerns: who is best qualified for the task and are those persons fit. These two questions should be the only considerations necessary and appropriate to selecting people for the task. Individual quarterly limits adds a third consideration to the decision making process: who still has the most hours available in their "quarterly hour bank?" It takes a generalized limit and intrudes into specific tasks.

This new consideration pushes the outcome away from the first two questions, away from the best candidates. The logic of this asserts a philosophy that chronic fatigue is undetectable in the fitness determination. Furthermore, it contradicts one of the primary tenets elsewhere in the proposed rule: that fitness of an individual with respect to fatigue is best determined by face to face observation and interaction with the employee at the time of the decision. The individual quarterly limits override that to say a lesser qualified individual who has not exceeded his or her quarterly limit may be a better choice for the work. This logic is not supported by scientific evidence for the limits being considered and does not consider the high variability of individuals with respect to their needs for sleep.

Another aspect of this unintended consequence is an **adverse impact on safety culture**. The supervisor choosing workers to perform a task can be presented with a dilemma. If the best choice for a task appears fit but does not have enough "hours" left in the quarter for this job, the supervisor has two choices: choose the best person anyway or chose a lesser qualified person.

Group work-hour limits:

Language from June, 25, 2004 posting of Subpart I

- (2) Limit these individuals' work hours in accordance with one of the following individual or collective work hour requirements:

- (i) ...
- (ii) Licensees shall control the collective work hours of each group of individuals who are performing similar job duties, as listed paragraph (a)(1)-(5) of this section, to prevent each group's collective work hours from exceeding an average of 48 hours per person per week, as follows:
 - (A) Licensees shall ensure that the collective work hours of each job duty group does not exceed an average of 48 hours per person per week in any averaging period for causes that can be reasonably foreseen and controlled. If the average for any group exceeds 48 hours per person per week within any averaging period for causes that the licensee could not have reasonably foreseen or controlled, the licensee shall restore the collective average to 48 hours or less within the subsequent averaging period. The collective work hours for any group may not exceed an average of 48 hours per person per week in any two consecutive averaging periods.
 - (B) Licensees may exclude from the average any work hours that individuals worked during outages of less than 120 days in duration, but shall include in the average any work hours that individuals worked in any portion of an outage that exceeds 120 days in duration.

The above language is essentially the same as that from August 2003 drafts.

What is the issue to be solved?

Over the last five years of meetings on work hours, both stakeholders and the NRC staff have provided isolated examples of plants in which groups of individuals have claimed to have been working long hours for an extensive time. In each case cited, after some discussion, the root cause has always been attributed to inadequate manning. If this is true, then the most effective regulatory solution would be closely linked to adequate staffing.

There needs to be provisions for outages, both planned and unplanned. In all the meetings there has never been a suggestion that the nominal 42 hour per week schedule should be continued through these periods. More importantly, there was no scientific evidence that chronic fatigue was an issue with moderate length outages.

As indicated by Commissioner Dicus, "The staff must give serious consideration to management flexibility to deal with unforeseen and emergent work at the plants..."

How do group work hours relate to manning?

By focusing on periods of normal workload the group work hours metric will provide a better indication of the adequacy of manning and a value that can be trended with some consistency over time. Of the limits considered it also comes closest to the method in which work is scheduled.

For example, during a year in which there is no outage, the manning adequacy will be checked in each of the four quarters. Any trends can be reacted to promptly. During a year with an outage a facility will continue to get comparable indications. This indication will be independent of whether that year there was a 30 day refueling or a 60 day steam generator replacement.

How long should an outage be?

Being in an outage at increased manning for a long time is clearly unacceptable. Lots of discussion has been conducted and expert testimony heard on this issue. Over several years of discussion numbers between 30 and 150 days have been proposed. Ultimately, the NRC staff selected 120 days as the limit providing a balance between flexibility to schedule and the point at which management action was needed to reduce the work hour load.

The presumption in this discussion was that there would be an extended period of normal operations at significantly reduced work levels to counter the potential impact of chronic fatigue. As pointed out in the July 8 public meeting, as written, essentially back to back outages could be conducted. This appears to be something that could be easily fixed within the overall concept that has been developed.

As discussed below, none of this discussion was based on accepting a reduced level of safety during outages.

Is the Plant safer when operating or shutdown?

There has been considerable discussion of this issue during the past five years of discussion on work hour limits. As convenient for the issue at hand there have been statements that the plant is at higher risk shutdown. At other times there are concerns expressed related to operators at a plant that is on-line. This discussion is irrelevant to the work hour issue. There is no proposal to accept a higher level of fatigue under any operating conditions.

Short term individual limits are planned to be applicable under any plant conditions. The contentious discussion has focused on what is the most

effective method of dealing with the potential for long term fatigue. This discussion has been complicated by the fact that the work load is not level throughout the year, particularly during outages. Trying to accommodate the cyclic nature of the work load is an important feature of this rulemaking.

What about people entering and leaving the workforce?

The exclusion of individuals who do not work 75% of the scheduled time from the calculation has proven to be an effective simplification, without diluting the group work hours limit as an indication of work force adequacy.

This limit also solves the problem of individuals being in the monitored group for short periods. If they do not work 75% of the scheduled hours, they don't count.

Contract personnel vs licensee employees

It is becoming increasingly difficult to differentiate between licensee employees and contractor vendor personnel. As discussed in the drug rulemaking the requirements need to apply to individuals performing the indicated functions at the licensee facility. Under the group work hours concept, any individual who is assigned to the functional group and working 75% of the groups scheduled hours would count and any hours worked would count. The focus is on adequacy of manning of the functional group.