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NUCLEAR ENERGY INSTITUTE

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DOCKETED
USNRC

March 8, 2006 (5:10pm)

OFFICE OF SECRETARY
RULEMAKINGS AND
ADJUDICATIONS STAFF

PROJECT NUMBER: 689

Dear Mr. Desaulniers:

The NRC staff has scheduled a public meeting for March 30, 2006, to discuss implementing guidance for the work hour portion of proposed 10 CFR Part 26. Enclosed is an outline of an implementing guide to support discussion at that meeting.

Throughout the development of Subpart I, the work hour portion of the rule, it was recognized that implementing guidance would be needed for key portions of the rule. In several public meetings, the industry indicated it was prepared to develop the implementing guidance. In presenting the rule to the Commission, SECY-05-0074 provided the expectation that the industry would develop implementing guidance for NRC endorsement.

In a September 22, 2005 public meeting, the areas needing implementing guidance were reviewed and there was general agreement on what needed to be addressed in an implementing guide. The enclosed outline expands on that discussion.

It should be recognized that this is a straw-man to foster discussion, not an industry proposal. Additionally, a number of changes to rule language were proposed by stakeholders during the public comment period. Some areas of the guidance cannot be finalized until the final rule text is available. For example, in addressing collective work hours, the scope of the draft metric is adequate for the security functional group. However, it does not address the complexities that will be faced if expanded to the operations and maintenance functional groups.

If you have any questions or comments, please contact me at 202-739-8105; jwd@nei.org.

Sincerely,

James W. Davis

Enclosure

Template = SECY-067

SECY-02

MANAGING FATIGUE AT POWER REACTOR SITES

1 INTRODUCTION

References: Part 26 General

[Note: The introduction should only provide an overview and contain no guidance.]

This guide provides an acceptable approach to meeting 10 CFR Part 26, Subpart I requirements related to managing fatigue at power reactor sites. Implementation of the drug and alcohol portion of the fitness for duty program and training requirements are addressed in NEI 03-01, *Nuclear Power Plant Access Authorization Program*.

Licensees have a number of programs in place to promote worker alertness and reduce the potential for human performance errors. In 1982 the Regulatory Commission issued Generic Letter 82-12 providing guidelines for managing the hours worked for individuals performing safety related work. The current rule was driven, in part, by the variation in approaches used across the industry to meet these guidelines. To the criteria in Subpart I a detailed process for managing and documenting hours worked is required.

The goals of this guide are to provide the tools needed to meet regulatory requirements while:

- Recognizing that a wide variety of work situations exist across the industry.
- Support management flexibility and decision making when unplanned work is required.
- Avoid unnecessary administrative burden in documenting hours worked.
- Provide the records needed to allow the required performance evaluations to be performed efficiently.

This guide attempts to address a number of challenges on the level of detail needed in the program.

2 PURPOSE AND SCOPE

References: Part 26 General
26.195
26.197(c)
26.199(f)
26.199(i)

[Note: The scope needs to be very clear]

The purpose of this guide is to provide the tools needed by licensees to have an effective program for meeting the requirements of 10 CFR Part 26 Subpart I related to managing

fatigue. The goal is to provide a record keeping process and monitoring tools that ensures compliance while providing the needed flexibility for day to day operations.

The Scope of this guide applies to work performed at power reactor sites that have implemented a fitness for duty program under the criteria of 10 CFR Part 26.3(a). The process described in this guide shall be used where a fatigue assessment is required for any individual with unescorted access to the protected area. The work hour controls described in this guide are only applicable to the functional groups described in 10 CFR Part 26.199(a).

Licensees shall ensure compliance with the requirements of this guide for any contactor/vendor authorized to implement any portion of the requirements in 10 CFR Part 26 Subpart I.

The training required by 10 CFR Part 26.197(c) is not within the scope of this guide. Implementation guidance for this training will be conducted in conjunction with the overall drug and alcohol program of 10 CFR Part 26.29 as discussed in NEI 03-01 and NEI 03-04.

3 DEFINITIONS

[Note: Usually the definitions become one of the more important sections to the clarity of requirements. It is also one of the more difficult to get right. Definitions contained in 26.5 should not be repeated here, for example "directing"]

The following definitions are used in this guide:

Supplemental Worker--

Functional Group—A clearly defined group made up of individuals who must be under work controls as defined in Section 26.199(a). An individual may be a member of only one functional group.

Averaging Period—A period not to exceed 91 days used in determining a functional groups cumulative work hours. An averaging period shall be whole days. For example the day an outage starts must be either counted as part of the averaging period or excluded as an outage day. Averaging periods of less than 14 days should be avoided.

Hours actually worked—All hours in a work period, excluding turnover time, are included. This includes duties as defined in the scope, other duties, break time and meal times. It does not include non-work periods such as paid vacation or paid sick time. An individual who is called in and works two hours has two "hours actually worked" even if paid for four hours.

Day—For the purpose of calculations a day is any 24 hour period with the start time defined by the licensee. For example, the day may start at 7:00 am to conform to the start

of a shift or pay day. Once defined, the same time period must be used throughout all calculations.

Restorative Sleep – A term used in 199.b.ii and not otherwise defined. Definition should be linked to 10 hour break providing adequate opportunity for restorative sleep.

4 JOB DUTY GROUPS

References: 26.199(a)

[Note: There are issues in this section that will depend on what changes are made in rule language.]

The licensee program must clearly define when an individual is in a functional group and subject to work hour controls. Based on pilot program experience it is clear for a majority of the people in a functional group. However, there are several challenges that must be addressed. Some of these challenges include:

- Is the operation of maintenance being performed risk significant?
- How are people who join or leave the functional group managed?
- When must an individual meet the work hour limits?
- When is an individual directing activities as opposed to advising?

The security functional group will be the easiest to bound. The same terminology has been used in the rule, security orders, site security plans and training requirements. Thus, there is little question on who meets the criteria for an armed security force officer. The maintenance functional group provides the biggest challenge since much of the maintenance activity involves. Tracking individuals based on actual watchstanding or performance of safety related maintenance represents a significant burden and does not provide needed flexibility.

4.1 MAINTAINING STABLE FUNCTIONAL GROUPS

As a first step each individual who is qualified for the particular duties or maintenance involved should be considered for inclusion in the functional group. From this list individuals who clearly will not be standing watch or perform maintenance activities can be removed. This provides a group that is relatively stable and easier to control administratively. Additionally, it provides flexibility for unplanned situations where qualified and available personnel can be used because they meet all the work hour restrictions.

Licensee procedures should allow removing individuals from the functional group for periods of time where work hour controls would not apply. For example, a maintenance team formed for a three week job on a non-safety component would be removed from the

functional group and exempt from the work hour controls. However, these individuals would have to meet all work hour limits before they performed any safety-related work.

4.2 DIRECTING

[Guidance is needed to ensure it is clear when an individual is directing activities.]

Is an individual who writes a work procedure for a future job directing? What about an engineer that visits a work site to understand why a work procedure is not working so he/she can prepare a change?

4.3 ADDING AND REMOVING INDIVIDUALS FROM A FUNCTIONAL GROUP

This section will to address several situations:

- An individual at the site qualifies for or is assigned to duties that require they be added to the functional group. In this case, recent work history is available.
- An individual from off site, a new employee, or others arrive to perform safety related maintenance. In this case past work history is not available.
- An individual is reassigned within the company. Does he/she still have to meet the 72 hour limit for a 7 day period?
- An individual, not part of the maintenance group, is called on to do maintenance on a component because of a unique skill? How is that handled?

In general, an individual must meet all short term work hour limits at the time that they start to perform safety related work or duties. Where the individual has worked on site for the last 7 days, meeting the 72 hour/7 day limit can be established. However, it needs to be clear what is expected for an individual who arrived at the site more recently.

In tracking breaks over a four to six week work cycle or security officer collective work hours there needs to be a provision for individuals to perform a one time job.

5 WORK HOUR SCHEDULING

References: 26.199(c)

This section covers the normal long range schedule used for a functional group. It does not address the process for scheduled or unscheduled overtime needed to support work activity.

Work hours scheduling. Licensees shall schedule the work hours of individuals who are subject to this section consistent with the objective of preventing impairment from fatigue due to the duration, frequency, or sequencing of successive shifts.

Non-outage schedules can be evaluated according to the following criteria:

- Duration of work period (not to exceed 12 hours)
- Duration of break period (Normally 12 hours or more)
- Average hours per week (approximately 42)
- Variation in scheduled hours per calendar week (not excessive)
- Consistent start/stop times for work periods
- Consistent start/stop days for work weeks
- Stable 24 hour shift rotation (e.g., 3 8's, 2 12's, 2 10's with 4 hours unmanned)
- Long range predictability (rare for individuals to move from one crew to another)
- Rotating schedules provide suitable transition between shifts (days/nights, days/swings/nights) three shift rotations rotate forward or provide more than (mumble) hours between work weeks to adjust circadian rhythm; two shift rotations provide (mumble) hours during day/night transitions.

Outage schedules can be evaluated according to the following criteria:

- Duration of work period
- Duration of break period
- Scheduled work hours are within limits
- Consistent start/stop times for work periods
- Consistent start/stop days for work weeks
- Stable 24 hour shift rotation (e.g., 3 8's, 2 12's, 2 10's with 4 hours unmanned)
- Long range predictability (rare for individuals to move from one crew to another)
- Rotating schedules are not used when outage scheduling well in excess of the non-outage average work hours is chosen for a work group

Staffing levels should be sufficient so that on average, over non-outage periods, minimum tech spec on-shift staffing can be maintained in the face of vacation and training demand without relying on overtime in excess of the schedule. It is expected and allowed that normal variation in the vacation demand and training demand may occasionally require overtime to be used to cover minimum tech spec on-shift staffing. Local management is responsible for understanding the total vacation, training, and work loads, and for maintaining sufficient staff to get the work done. Note, for scheduling purposes, it is acceptable to defer vacations and or training during outage periods, however, any other requirements or commitments regarding vacations or training must be preserved as well.

[Appendix B would provide a series of shift schedules that are agreed to meet the criteria of this section. As part of the process each licensee would be invited to provide their current shift schedules for review and inclusion in the appendix if they were found to

meet the criteria. The goal is to avoid second-guessing on existing schedules after the implementation period is complete.]

6 MANAGING HOURS WORKED

References: 26.197(d)(1)
26.199(b)(1)
26.199(d)(1)
26.199(d)(2)

This section needs to address what the expectations are relative to the short term limits and what records are needed to document compliance.

The guidance should provide a method to demonstrate that an individual has not worked more than 16 hours in a 24 hour period. Guidance should be clear as to achieving a reasonable level of granularity. (e.g., it would be reasonable to document hours worked to a quarter hour if payroll practices already required documenting hours worked to a quarter hour. Clearly preventing exceeding short term limits cannot be done by recordkeeping, it needs to be the worker and managers responsibility. We do not need the fine details; however, without clear discussion in the guide, someone will want to see minute-by-minute records.

6.1 CALCULATING HOURS WORKED

The concepts for this section are:

- Licensees shall establish the accounting practices to be used in monitoring hours worked. In many cases this will parallel the established system for compensation. For example, work periods could be rounded to the nearest 10 minute period or quarter hour.
 - If a limit is exceeded under this approach you cannot recalculated on a minute-by-minute basis.
- Managers and employees are responsible for meeting the short term limits. A tracking system cannot be responsive enough to tell when a 16/24 or 26/48 limit is about to be exceeded.
- Work hour records should show hours worked on a day by day basis, not an hour-by-hour basis.

When considering work hour extensions for individuals performing work within the scope of this document, all hours worked by the individual must be included. For example, if an individual has performed 15 hours of work not within the scope of this document, and the individual is needed to perform additional work that extends beyond 16 hours in a 24 hour period, then a work hour extension must be approved prior to the individual exceeding the 16 hour limit. On the other hand, if the individual has performed 14 hours of work within the scope of this document, and is needed to perform

additional work not within the scope of this document, then the programmatic approvals of this document do not apply. However, the additional work hours are included in consideration of any other limits if the individual subsequently performs work within the scope of this document.

Designated lunches and breaks are included in work hours counted toward limits.

6.2 WAIVERS

References: 26.197(b)(2)
26.199(d)(3)
26.199(e)

[The rule requirements are clear in this area. The guide will provide a recommended, but not mandatory, form for completing Waivers.

The process for granting waivers includes the following distinct steps:

1. Identification by the job supervisor that a waiver is needed:

- Name of the individual for which a waiver is to be requested. If multiple individuals are involved in the work, a separate waiver is required for each individual.
- Date and time request initiated.
- Limits for which a waiver is required.
- Date and time waiver would start.
- Duration of the waiver requested. For example, how many hours beyond 16?
- Description of the work to be performed. This must be in adequate detail to support the supervisory fatigue assessment.
- Circumstances that caused the job extension.

2. Review and approval by the operations shift manager or security shift manager.

- Basis for approval
- Name, signature, date, and time.

3. Supervisory evaluation (Note: must be completed within 4 hours of start of waiver period.)

- Work history for past 14 days as reported by the individual for whom the waiver is requested.
- Statement of check box that the following were considered;
 - Potential for acute fatigue—time since last 10 hour break.
 - Potential for cumulative fatigue—review work history above.
 - Circadian factors—time of day and recent work cycle.
 - Observation and statements of the individual.

- Nature of work to be performed.
 - Are controls and conditions on work required? If yes describe.
 - Name, signature, date, time review completed.
4. Closeout. In many cases waivers are generated as a contingency for a job and not used. The information in this section is to support the periodic reviews that are required.
- Hours actually worked, beyond limits, under this waiver.
 - Was the job completed satisfactorily?
 - Name, Signature and date of job supervisor or individual for whom waiver was granted.

Appendix C provides (or will) a sample form for completing waivers.

7 FATIGUE ASSESSMENTS

References: 26.197(b)(3)
26.197(b)(4)
26.201

The different types of fatigue assessments will need different treatment. There is a performance element to the fatigue assessments required by Section 26.201 that makes it necessary to treat them separately from the evaluations required in support of waivers.

A fatigue assessment is evaluating an individual's ability to perform any assigned duties within the scope of the fitness for duty rule. It is not limited to those in a functional group performing safety related duties.

Site procedures need to clearly identify how a self-declaration is to be made and leave no room for confusion. A casual statement to a supervisor that an individual is tired is not a self-declaration. The process must leave no confusion that a declaration was made and when it was made. It should also be clear that an assessment is not needed if the supervisor agrees with the individual and provides a rest break of at least 10 hours.

The process for conducting a fatigue assessment includes the following steps:

1. Identification condition requiring a fatigue assessment:
 - Name of the individual.
 - Date and time.
 - Type of evaluation: For-Cause, Self-declaration, Past-event, Follow-up
 - Narrative supporting the type of evaluation
 - For Cause—Description of observed behavior
 - Self-declaration—description of current job duties, time in a duty status, and scheduled end of tour.
 - Post-event—describe the event and individuals involvement.

- Follow-up—length of rest period, reason for early return, and expected duties
- Name, date, time, signature of individual completing this section.

2.. Supervisory

- Work history for past 14 days as reported by the individual
- Statement of check box that the following were considered;
 - Potential for acute fatigue—time since last 10 hour break.
 - Potential for cumulative fatigue—review work history above.
 - Circadian factors-time of day and recent work cycle.
 - Observation and statements of the individual.
 - Nature of work to be performed.
- Results of evaluation
 - Individual is not fatigued—return to full work status.
 - Individual is fatigued—provide a 10 hour break.
 - Individual is returned to duties with the following restrictions (Describe)
- Name, date, signature of supervisor.

(note—it may be simpler to have a two different forms 1. for cause/events and 2. self-declaration

Appendix D provides (will provide) a form for conducting Fatigue Assessments.

8 COLLECTIVE WORK HOURS

References: 26.197(d)
26.199(b)(2)
26.199(f)
26.199(g)

[Note: the draft rule has collective work hours for all functional groups. The industry has proposed that collective work hours only be applied to security personnel. No matter what the final rule says, this section will be needed. The material in this section is based on 6 security pilots, 2 years experience in the security area, and 4 pilots of the other functional groups.]

This section provides the details of the metric needed to calculate collective work hours. Several simplifications were included in the rule requirements to mitigate the burden of tracking collective work hours. This was done in a manner that still preserves the overall objective of ensuring adequate manning to reduce the potential for long term cumulative fatigue. The 48 hour per week limit is not a precise scientific number. The 75 percent cut point for including people in the calculation is also a simplification.

Companies should avoid overly precise calculations that add unneeded administrative burden. However, simplifications must be defined and rigorously followed. For example, calculations are on a full day basis. A day may start at any time, for example 7:00 am to use the same basis as that used for pay. Overtime worked as part of one days shift, but extending into the next day, does not need to split and is included in the first days work period. However, when the average hours worked calculates out to an average 48.01 a site cannot go back and start changing the calculation assumptions for the period.

[Note: The intent is for the following subsections to discuss the general approaches with the detailed calculations is an appendix.]

8.1 GROUPS

The bounds of the functional group used for this calculation needs to be rigorously defined. For Security this is relatively easy since a consistent set of definitions are now used for watchperson, armed security force officer, alarm station operator, and response team leader are rigorously defined throughout security regulations.

However, there may be a need for some differences for the applicability of short term limits. It should be clear that any individual who performs safety related work, or other elements defined in 26.199(a) must meet all the hours worked requirements at the time that they actually perform the work. It is not clear that these individuals need to always be included in the group for collective work hour calculations. If a manager stands one watch a month to maintain proficiency, must he be included in the group.

8.2 PERIOD

The period of calculation shall not exceed 13 weeks. During a year of normal operations this would not be a problem. There would be a succession of periods. Based on the pilot program experience, most licensees will select a 12 week period, not 13 weeks. This allows linkage to the normal 2 week pay periods.

Clear discussion is need on when periods stop and start when there is an outage or force on force exercise in the middle of the period. The intent is to provide flexibility so that the period can be closed at the start of the outage or, if desired, continued after the outage. Part of the problem is that short periods of 1 to 2 weeks will not calculate well.

Discussion is also needed on start and stop times, how a day is defined, and what is counted in each day. Each licensee should have flexibility to pick its own limits, but once set they should be inflexible. For example, based on pay periods the day starts at 0700 in the morning and goes to 0700 the next morning.

8.3 HOURS ACTUALLY WORKED:

This section will be closely linked to the hours worked as applied to the short term and break requirements. What is different is the discussion of how this information is to be recorded and monitored in the metric.

Discussion is also needed of the concept that all hours worked for the licensee count, whether those hours are on safety related work or non-safety related work. In general inclusion in the group can be determined up front based on qualification and skill.

8.4 TURNOVER TIME:

The concept is simple, but in the security arena a number of people have tried to make it hard. Specific detail is needed to prevent individual auditor and inspector interpretations. The goal was to exclude turnover from the records that needed to be maintained to support this rule. There is no relationship to what an individual gets paid.

The rule provides adequate discussion of the difference between turnover and other work that must be included in the work period.

8.5 EXCLUSION:

The 75% exclusion is a simplification to make the process easier and more predictable. It eliminates the need to decide whether the individual was part of the group for an adequate period of time. There has been some confusion on what the normally scheduled hours means. For a security officer working three 12 hour shifts one week and four 12 hour shifts the next week the normally scheduled hours is 42 hours/week $((36 + 48)/2)$. What if the actual collective hours being worked average 46 hours per week?. The scheduled is still 42.

8.6 GROUP AVERAGE HOURS WORKED:

Guidance on the calculation and spreadsheet to be used is needed. There must be enough information presented to allow the periodic reviews that are called for in Section 9. The spreadsheet used should also be able to give management an advanced indication that the group is near the limit before the end of the period.

8.7 ADDITIONAL SECURITY REQUIREMENTS

The 60 hour limit and conditions related to security outages, and increased threat levels.

9 REVIEWS AND RECORDS

References: 26.197(b)(2)
26.199(j)

Need to provide some discussion of what the reviews need to include. Items that need to be reviewed, and therefore have some records are:

- Waivers
- Fatigue assessments
- Individuals exceeding 54 or 66 hours for functional groups with cumulative work hours.
- Schedule review—In 26.199(c) licensees are required to lay out a schedule. For security schedule adherence is defined as being below the 48 hour/week average limit. For other groups, that do not have a collective work hour limit, there is a need for evaluation to meet the performance basis of this section.

Significant discrepancies identified during the performance assessment or implementation review should be entered into the corrective action program.

APPENDIX A

References

1. 10 CFR Part 26, Fitness For duty, dated XXXX
2. EPRI NP-6748, Control-Room Operator Alertness and Performance in Nuclear Power Plants, February 1990
3. NUREG/CR-4248, Recommendations for NRC Policy on Shift Scheduling and Overtime at Nuclear Power Plants, July 1985

APPENDIX B

Acceptable Work Hour Schedules

The following nominal schedules have been reviewed and meet the performance based scheduling criteria of 10 CFR Part 26.199(c).

Plant Three
Group Operations
Status Operating

D is 12 hour days
N is 12 hours night
T is 9 hour training

Total cycle is 35 days or 5 weeks.
Schedule average is 40.8 hours/week

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
A		T	T	T	T			D	D	D					N	N	N	N								N	N	N				D	D	D	D
B	D	D	D					N	N	N	N								N	N	N				D	D	D	D		T	T	T	T		
C				D	D	D	D		T	T	T	T			D	D	D					N	N	N	N							N	N	N	N
D					N	N	N					D	D	D	D		T	T	T	T			D	D	D				N	N	N	N			
E	N	N	N	N								N	N	N				D	D	D	D			T	T	T	T			D	D	D			

Plant Four
Group Operations
Status Operating

D is 12 hour days
N is 12 hours night
T and A are 8 hours. Alternate 5 days training, 4 days admin every other cycle.

Total cycle is 35 days or 5 weeks.
Schedule average is 42 hours/week

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
A		N	N	N					D	D	D	D			T	T	T	T	T	D	D	D				N	N	N	N						
B	N								N	N	N					D	D	D	D			A	A	A	A		D	D	D				N	N	N
C	D				N	N	N	N								N	N	N					D	D	D	D			A	A	A	A		D	D
D	T	T	T	T	T	D	D	D				N	N	N	N								N	N	N					D	D	D	D		
E		D	D	D	D				T	T	T	T	T	D	D	D				N	N	N	N							N	N	N			

Plant Five
Group Operations
Status Operating

D is 12 hour days
N is 12 hours night
T is not specified assumed 9 hours

Total cycle is 35 days or 5 weeks.
Schedule average is 40.8 hours/week

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
A	T	T	T	T		D	D	D				N	N	N	N								N	N	N					D	D	D	D		
B		D	D	D	D			T	T	T	T		D	D	D				N	N	N	N													
C		N	N	N					D	D	D	D			T	T	T	T		D	D	D				N	N	N	N						
D	N								N	N	N					D	D	D	D			T	T	T	T		D	D	D				N	N	N
E	D				N	N	N	N								N	N	N	N				D	D	D	D			T	T	T	T		D	D

Plant Six and Seven
Group Operations
Status Operating

D is 12 hour days
N is 12 hours night
T is 9 hour training

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
1		T	T	T	T			N	N	N					D	D	D								N	N	N	N				D	D	D	D
2	N	N	N					D	D	D								N	N	N	N				D	D	D	D		T	T	T	T		
3	D	D	D								N	N	N	N				D	D	D	D			T	T	T	T		N	N	N				
4				N	N	N	N				D	D	D	D		T	T	T	T			N	N	N				D	D	D					
5				D	D	D	D		T	T	T	T			N	N	N					D	D	D							N	N	N	N	

Plant Eight
Group Operations
Status Operating

D is 12 hour days
N is 12 hours night
T is 9 hour training

Total cycle is 35 days or 5 weeks.
Schedule average is 40.8 hours/week

Crew/Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S	M	T	W	T	F	S	S
A	T	T	T	T				D	D	D				N	N	N	N							D	D	D	D					N	N	N	
B	D	D	D				N	N	N	N							D	D	D	D			N	N	N		T	T	T	T					
C	N	N	N								D	D	D	D			N	N	N			T	T	T	T			D	D	D				N	
D				D	D	D	D				N	N	N		T	T	T	T				D	D	D			N	N	N	N					
E				N	N	N		T	T	T	T				D	D	D				N	N	N	N							D	D	D	D	

Etc. -----

APPENDIX C

Waiver Checklist

Details to be provided

APPENDIX D

Fatigue Assessment Checklists

Details to be provided

APPENDIX E

Collective Work Hour Metric

[Note: This is the current metric being used for security officers and will need to be updated to reflect linkage to 10 CFR Part 26]

This Appendix provides a process, or metric, that may be used to calculate average work hours.

The individual work hour controls are intended to address the near term impact of working long hours on the potential for fatigue induced errors. The group work hour controls are intended to address the potential impact over a longer period. The metric provided in this paper provides an effective method of monitoring the adequacy of manning during routine operations or during planned outage periods.

To be effective in evaluating the adequacy of the workforce the metric needs to establish a close relationship between the manpower assigned and work actually performed. The exclusion of paid vacation, paid sick time, and turnover time simplify the metric and better supports the fundamental goal.

1 METRIC PARAMETER:

Key objectives in developing this metric were to keep it as simple as possible and to provide adequate data to support a review of manning adequacy. Collective work hour criteria are defined in a manner that provides some flexibility to fit with other licensee practices for managing personnel. The five key parameters that were considered in defining the metric to be used are:

- **Group**—One or more functional groups that include all individuals who must be under work controls as defined in section 26.30 of the draft rule. The key is that every individual within the scope be in a monitored group. Covered individuals could be divided into several monitoring groups if desired. This could, for example, be licensed operators and non-licensed operators under 26.30(a)(1). **However an individual will only be counted in one functional group.**
- **Period**—A period not to exceed a quarter. Using a shorter time period will not improve the overall monitoring of the adequacy of the workforce. Pilot plant data indicates that the impact of the 75% exclusion increases as the time period decreases and starts to have a significant impact for periods less than three weeks. Laying out a long range schedule of monitoring periods would assist in programming resources and training evolutions conducted outside the normal shift rotation. Because of the manner in which pay records are maintained it is recommended that the schedule be based on full weeks. **It is recommended that 12 week monitoring periods be used during normal operations. Periods should normally run back to back and not**

normally overlap.

- **Hours actually worked**—All hours in a work period, excluding turnover time, are included. This includes duties as defined in the scope, other duties, break time and meal times. It does not include non-work periods such as paid vacation or paid sick time. An individual who is called in and works two hours has two “hours actually worked” even if paid for four hours.
- **Turnover Time**—Turnover time need not be included as part of the work period for group work controls. This will significantly improve the usefulness of this metric as a management tool. Scheduling is done on an 8 or 12 hour basis. Tracking will now be on the same basis allowing a more direct comparison of what is scheduled against the hours that are actually worked.
- **Exclusion**—Any individual within the work group who does not work at least 75 percent of the scheduled hours for the “period” is excluded. This may be based on a nominal schedule week and does not have to be recalculated each week. For example, a 12 hour shift rotation with 36 hours one week and 48 hours the next is a nominal 42 hour week. During normal operations nominal week will most likely be 40 or 42 hours per week. For an outage schedule of five 12-hour shifts per week, the nominal value would be 60 hours.

2 METRIC DETAILS

2.1 GROUP:

Establish groups encompassing all individuals under work hours controls as defined in 26.30.(a).(1) to (3). Note: Security officers will not be included in this pilot program.

- Everyone under work hour controls as defined in the Scope shall be in a group.
 - Managing this is not as easy as it seems. New people are being added to the group and others leave. Some individuals may only occasionally stand a watch covered by the scope.
 - Under the individual limits this is not an issue. Individual limits must be met each and every time an individual stands one of the listed watches and hours worked count no matter what duties were being performed.
 - Defining those counted in a specific group monitoring period is discussed in more detail under the 75% limit application.
- Distribution between sections should be monitored, but need not be individually limited under the order.

- There may be other groups for which the average hours are calculated for licensee monitoring. For example, each watch section could be tracked as a group.

2.2 Period:

There are two types of periods specified in the draft rule. The only difference is the limits of 48 hours/week during normal operations and no limit during outage periods. The calculations process is the same for each. As a basic principal every day must be counted in at least one period.

- Normal Operations
 - For normal plant conditions the period should be no more than 12 weeks in length.
 - The period may start at a point most convenient for the company. This is normally the start of a pay period, such as 7:00 am Sunday or 6:00 am Monday.
 - During extended periods of normal operations, monitoring periods should not normally overlap.
 - A day for the purpose of this metric is a 24 hour period as defined by the licensee. For example, the day can be midnight to midnight or 7:00 am to 7:00 am whichever best fits with current accounting practices and watch rotation.
 - For overtime the company should establish a clear policy how it will be assigned. For example an individual whose shift ends at 7:00 am puts in 4 hours of overtime. This may be included with the 8 hours worked and credited for the preceding day if desired.
 - Hours worked will counted only once. For example the overtime hours that include time in two days will count in the first, the second or split between the two depending on the policy established by the licensee.
 - Whatever approach is used, it must be consistently applied.
 - Calculations will only be based on full days, not partial days.
 - Days in which an outage starts may be counted as either a normal day or as an outage day.
- Outage periods (planned or unplanned)
 - In defining outage periods attempt to maintain the sequence of the normal schedules.
 - There is significant flexibility in calculating outage periods, making it impossible to define every possible condition.
 - In general, attempt to avoid calculations for periods less than 7 days if possible.

- Short periods may be included in the normal 12 week calculation if they do not cause the group to exceed the 48 hour/week limit.
 - As an example, a site has been averaging 43 hours per week over several six week monitoring periods. The next period has a one week unplanned outage. When calculated over the full 12 weeks, the average hours worked is 45, there is no need to go back and calculate a separate limit for the one week outage. If the average was 48 hours, separate calculations would be needed.
- Transition periods. There are several ways to handle short periods. As an example, a scheduled outage starts 3 weeks after the end of a normal monitoring period. How should this three week period be handled?
 - Calculate the average hours for the 3 week period to see if it exceeds 48 hours/week.
 - Calculate a 4, 5, or 6 week period that overlaps the previous period to see if the 48 hour/ week limit is met. Note that, in this case, to get a representative sample the same data is considered in two periods.
 - Combine the 3 weeks with an additional period after the outage for a period not to exceed 6 weeks.
 - The same principal would apply to splitting an 8 week outage.

2.3 HOURS ACTUALLY WORKED:

This represents the total hours worked each day of the work period for an individual. This information may be recorded on a daily basis or a weekly basis.

- An individual who stands a normal 12 hour shift would be credited for 12 hour.
- The hours actually worked includes all breaks, meals, and non-safety related duties within that period.
 - Remember it is actual hours. If an individual is paid double time for a one-hour meal break it is one hour, not the two hours on the pay record.
 - For example an individual works a 12 hour shift, followed by four hours of non-safety related work. The hours worked is 16 hours.

2.4 Turnover time.

Turnover time is the routine period at the beginning of a shift when an individual is obtaining required information before assuming duties from

another individual. It may include time at the end of the shift for stowing equipment.

- Turnover time is not included in the calculation of hours worked for this metric.
- Turnover conducted within a work period can not be excluded. For example an individual conducts 4 hours of training then stands his normal 8 hour shift. The individual has 12 hours actually worked since the turnover is now within the work period and cannot be excluded.
- Turnover time will not be used to reduce the nominal shift length.
 - There are 24 hours in a day. For rotating shifts someone is the responsible watch at all times. The hours worked for a position would be expected to add up to 24 hours, not 23.5 hours.
 - Thus, an individual who works a normal 8 or 12 hour shift shall be assigned at least 8 or 12 hours, as appropriate.

2.5 Exclusion:

Workers who do not work at least 75 percent of the normally scheduled hours during the averaging period shall not be included when calculating the average.

- Normally scheduled hours represents the expected working hours for the monitoring period.
 - The sample spread sheet will calculate the 75% limit for the number of days included in the period. For periods of 14 days or less the calculation will not work properly and manual evaluation is required.
 - The most common values are 40 or 42 hours during normal operations and may be up to 60 hours during outage periods where an enhanced work schedule is used.
 - Caution: Do not use 48 hours/ week for the 75% calculation unless you are actually scheduling at that rate.
 - For most shift rotations this would be 42 hours per week times the number of weeks, or 252 for the standard 6 week period. For a standard 6 week period, any individual whose hours actually worked were less than 189 total hours would not be counted in the group.
- Hours worked are the "Hours actually worked" for the individual during the monitoring period. This may be normally scheduled shift time, rescheduled, overtime, etc. All hours actually worked count in this calculation.
- Personnel entering and leaving the group.

- An individual was not under work hour controls but enters the group. Hours count from the point that the individual enters the monitored group. Hours worked at other duties before that point do not count.
- An individual permanently leaves the group. Only the hours up to the point that he leaves count.
- An individual within the group is temporarily assigned other duties, such as two week administrative functions or a training course, and returns to the group. All hours worked count including the other duties performed.

2.6 Group Average Hours Worked:

The average must be based on the total actual hours worked during the period by all individuals within the group that meet the 75% scheduled work criteria. This calculation warrants careful attention since it is easy to set up a spreadsheet that does not give the correct average.

- Calculations conducted in the following sequence were less prone to errors during the pilot program.
 - Sum the hours worked by each individual for the period. You will need this number to monitor individuals or subgroups with a large number of hours in several monitoring periods.
 - Apply the 75% test to determine those to be included in the average.
 - Count the number of individuals who meet the 75% test and sum the total hours for these individuals.
 - Determine the average.
- In setting up spread sheet be particularly cautious in using predefined functions.
 - A “null” value and zero “0” are sometimes handled differently. It is recommended that the spreadsheet you use be able to handle either value.
 - If the average function is used, make sure it supports the way you enter data. Know what it is really averaging.

3. SAMPLE SPREADSHEET

From: "DAVIS, Jim" <jwd@nei.org>
To: <drd@nrc.gov>
Date: Wed, Mar 8, 2006 4:33 PM
Subject: Dave-

Dave-

Attached is a copy of the letter that forwards the draft guide to support our discussion on March 30. I have included the guide in both PDF and MSWord format to facilitate your use. The two should be identical.

The original has been sent, via FEDEX, this afternoon.

Thanks,

Jim Davis
NEI
202-739-8105

This electronic message transmission contains information from the Nuclear Energy Institute, Inc. The information is intended solely for the use of the addressee and its use by any other person is not authorized. If you are not the intended recipient, you have received this communication in error, and any review, use, disclosure, copying or distribution of the contents of this communication is strictly prohibited. If you have received this electronic transmission in error, please notify the sender immediately by telephone or by electronic mail and permanently delete the original message.

From: David Diec
To: Carol Gallagher; Evangeline Ngbea
Date: Wed, Mar 8, 2006 5:03 PM
Subject: Fwd: Dave-

Pls process the attached NEI document into ADAMS. Carol, pls post this on the web. Thanks.

David Diec, Project Manager
U.S. Nuclear Regulatory Commission
Phone: 301-415-2834
Fax: 301-415-1032
Email: dtd@nrc.gov

This message is for the designated recipient only and may contain privileged or confidential information. If you have received it in error, please notify the sender immediately and delete the original. Any other use of this e-mail by you is prohibited.

Mail Envelope Properties (440F54B0.ED0 : 5 : 982)

Subject: Fwd: Dave-
Creation Date: 3/8/06 5:03PM
From: David Diec

Created By: DTD@nrc.gov

Recipients

nrc.gov
owf5_po.OWFN_DO
ESN (Evangeline Ngbea)

nrc.gov
twf4_po.TWFN_DO
CAG (Carol Gallagher)

Post Office

owf5_po.OWFN_DO
twf4_po.TWFN_DO

Route

nrc.gov
nrc.gov

Files	Size	Date & Time
MESSAGE	1088	03/08/06 05:03PM
Mail		
David Diec.vcf	232	03/08/06 05:03PM

Options

Expiration Date: None
Priority: Standard
Reply Requested: No
Return Notification:
Send Notification when Opened

Concealed Subject: No
Security: Standard