EA-03-038

October 23, 2003

Mr. Mark J. Burzynski
Manager, Nuclear Licensing
Tennessee Valley Authority
1101 Market Street
Chattanooga, TN 37402-2801

SUBJECT: BROWNS FERRY NUCLEAR PLANT, UNIT NOS. 1, 2 AND 3, SEQUOYAH NUCLEAR PLANT, UNIT NOS. 1 AND 2, AND WATTS BAR NUCLEAR PLANT, UNIT 1 - REPLY TO RESPONSE TO ORDER FOR FITNESS-FOR-DUTY ENHANCEMENTS FOR NUCLEAR SECURITY FORCE PERSONNEL (TAC NOS MB9159, MB9160, MB9161, MB9239, MB9240, AND MB9255.)

Dear Mr. Burzynski:

On April 29, 2003, the Nuclear Regulatory Commission (NRC) issued Order EA-03-038 (the Order) modifying the operating license for the subject facilities to require compliance with the compensatory measures (CMs) related to fitness-for-duty enhancements applicable to nuclear facility security force personnel. The CMs were listed in Attachment 2 to the Order. In issuing the Order, the Commission recognized that you have voluntarily and responsibly implemented CMs since the events of September 11, 2001. However, work-hour demands on security force personnel have increased substantially over the past 25 months, and the current threat environment continues to require heightened security measures. Therefore, the Commission directed that the security measures addressed in Section III of the Order be implemented by licensees as reasonable and prudent measures to address issues associated with fatigue of nuclear facility security force personnel.

The Order, which was immediately effective, required responses and actions within specified timeframes. Section III.A of the Order required licensees to immediately start implementation of the requirements listed in Attachment 2 to the Order and to complete implementation no later than October 29, 2003. In addition, Section III required that licensees submit responses to conditions B.1, B.2, and C.1 in accordance with 10 CFR 50.4 within thirty-five (35) days of the date of the Order. Section IV of the Order stated that in accordance with 10 CFR 2.202, the licensee must submit an answer to, and may request a hearing on, the Order within 35 days of the date of the Order and that where good cause was shown, consideration would be given to extending the time to request a hearing.

In your initial response to the Order dated, June 3, 2003, you requested (1) a relaxation of the requirements of B.1, B.2, and C.1 of Section III of the Order; (2) an extension of thirty-five (35) days, from the date that the NRC provides the basis for the Order requirements, to submit an

answer to the Order or request a hearing; and (3) certain information to ensure that you fully understand the underlying basis for the Order. By letter dated July 10, 2003, the NRC staff granted your relaxation request, in part, by allowing you fifteen (15) days from the date of the letter to submit the required information and answer the Order or request a hearing. In its letter, the NRC staff also repeated the substance of the discussions between the staff and industry representatives prior to issuance of the Order. In your letter dated, July 25, 2003, you provided a supplemental response and made two specific requests. Your supplemental response consented to the Order and did not request a hearing. The NRC staff has reviewed your response and finds that you have satisfied the reporting requirements (i.e., B.1, B.2, and C.1 of Section III) of the Order. Your two requests are discussed below.

Your first request was that the Director, Office of Nuclear Reactor Regulation, rescind the interpretation in the July 10, 2003, NRC letter that shift turnover time must be included in the calculation of group work-hour controls. Your rationale for not including turnover time in group work-hour limits was that including it would (1) have negative safety implications, (2) undercut the intent of the Order, and (3) impose a record-keeping burden. The staff reviewed the interpretation included in its July 10, 2003, letter and determined it to be consistent with the intent and requirements of the Order. In addition, the staff considered your proposal as a request for relaxation and reviewed your rationale for this request.

On September 23, 2003, representatives of the industry met with the Nuclear Security Steering Committee (NSSC) in a public meeting to discuss the shift turnover time issue. The Commission held an open Commission meeting on September 25, 2003, in which industry executives raised issues related to your request to relax the work-hour limitations being imposed on security force personnel.

The staff continues to disagree with the industry position that the inclusion of shift turnover time in the group work-hour limits would result in the unintended consequence of incomplete turnovers. The staff also disagrees that including shift turnover time in group work-hour limits will undercut the intent of the Order. The overall intent of the Order is “to address issues that may arise from work-hour related fatigue of nuclear facility security force personnel.” You noted that turnover time is a numerically insignificant amount of the total group hours worked. The staff’s concern that turnover time could add substantially to the amount of overtime that security personnel work in the course of a year and increase the potential for worker fatigue was the basis for initially including turnover time in the group work-hour limits. The staff agrees that the tracking of work-hours spent on shift turnover imposes some regulatory burden. During public meetings with the NSSC on September 23, 2003, and with the Commission on September 25, 2003, the industry provided assurances that the amount of time spent on turnover was nominally 15 minutes. As a result, the staff concluded that, for the purposes of implementing this Order, the benefit of tracking this limited amount of time did not justify the regulatory burden. The Order limiting work hours for security force personnel will continue to ensure public health and safety and provide for the common defense and security even if the time required to conduct shift turnover is not counted as actual hours worked.

The staff concludes that you have shown good cause to exclude turnover time from the group work-hour limits. Therefore, the staff grants a relaxation to all power reactor licensees that received the April 29, 2003, Order (EA-3-038) regarding work-hour limitations for security force personnel. The relaxation allows licensees to exclude shift turnover time from the group work-hour average. Accordingly, the staff has modified the basis discussion provided in NRC's July 10, 2003, letter and provided a revised version of the CMs issued under Order EA-03-038 as shown in Enclosures 1 and 2, respectively.

Your second request was that the Director, Office of Nuclear Reactor Regulation, relax the application of the group work-hour controls during the preparation for and conduct of pilot and annual force-on-force (FOF) exercises. Your reasons for not including in group work-hour limits the time spent preparing for and conducting pilot exercises were (1) that the pilot FOF exercises are developmental and take place coincident with licensees' implementation of the other April 29, 2003, security-related orders, (2) that it takes a significant number of overtime hours for the security force personnel covered by the work-hour order to prepare for and conduct FOF exercises, (3) that hiring extra security officers beyond the long-term requirements is inefficient and injurious to workforce stability, (4) that imposing a staffing level requirement on licensees sufficient to support the FOF exercises will result in staff levels greater than are routinely needed, (5) that the benefit of conducting these exercises far outweighs the burden of the extra man-hours being expended, and (6) that the pilot exercises occur only once for each participating licensee and, therefore, would not have a long-term cumulative fatigue impact on the participating licensees' security forces or create any safety concerns.

On September 23, 2003, representatives of the industry met with the NSSC to discuss this request. The Commission held an open Commission meeting on September 25, 2003, in which industry executives raised issues related to the request to relax the work-hour limitations being imposed on security force personnel. By letter dated October 8, 2003, the Nuclear Energy Institute, acting as your representative, withdrew your request relative to preparation for the pilot and annual FOF exercises.

The staff does agree that the conduct of the pilot and annual FOF exercises warrant special consideration (i.e., the benefits of conducting an FOF exercise outweigh concerns regarding work-hour limits, the exercises are infrequent and intensive efforts and; the staffing demands during the exercises are significant over a short-term period). Therefore, the staff has concluded that you have shown good cause and demonstrated that it would be an unnecessary regulatory burden to impose the group work-hour limits for normal conditions for the conduct of the pilot and annual FOF exercises. The staff grants a relaxation to all power reactor licensees that received the April 29, 2003, Order (EA-3-038) regarding work-hour limitations for security force personnel. The relaxation addresses work hours within the scope of Order EA-03-038 during the period of the actual conduct of the FOF exercises. Specifically, the relaxation allows the use of the 60-hour per week average rather than the 48-hour per week average for this limited period of time as described in the revised CMs of Order EA-03-038 (Enclosure 2).

The NRC will determine the effectiveness of your implementation of the CMs through onsite inspections. I remind you that, pursuant to Section III.C.2 of the Order, you are to report to the Commission when you have achieved full compliance with the requirements described in Attachment 2 to the Order.

Please contact the NRC project manager for your plant if you have any questions on these matters.

Sincerely,

/RA by R. W. Borchardt for/

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

Enclosures: As stated

The NRC will determine the effectiveness of your implementation of the CMs through onsite inspections. I remind you that, pursuant to Section III.C.2 of the Order, you are to report to the Commission when you have achieved full compliance with the requirements described in Attachment 2 to the Order.

Please contact the NRC project manager for your plant if you have any questions on these matters.

Sincerely,

/RA by R. W. Borchardt for

J. E. Dyer, Director
Office of Nuclear Reactor Regulation

Enclosures: As stated

DISTRIBUTION:

PUBLIC	PD Reading
JDyer	DLPM PDs
JShea	DLPM Section Chiefs
ACRS	DLPM Project Managers
SECY	DLPM Licensing Assistants
OGC	

ADAMS Accession Number: ML032960363

OFFICE	PDI-1/PM	PDI-1/LA	PDI-1/SC	PDI/D	DLPM/D	D:NRR
NAME	RGuzman	CRaynor for SLittle	RLaufer	CHolden	LMarsh	RBorchardt for JDyer
DATE	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03	10/23/03

OFFICIAL RECORD COPY

DISCUSSION REGARDING THE WORK-HOUR LIMITS
IN ORDER EA–03-038 IMPOSING COMPENSATORY MEASURES
RELATED TO FITNESS-FOR-DUTY ENHANCEMENTS
FOR NUCLEAR FACILITY SECURITY FORCE PERSONNEL
(Revision 1, October 2003)

1. EXECUTIVE SUMMARY

The April 29, 2003, Order was issued to address concerns regarding the readiness of nuclear security officers that work long periods of elevated overtime. The terrorist attacks of September 11, 2001, further sensitized the NRC to the important role that nuclear security officers perform in providing protection at commercial nuclear power plant sites. Since September 11, 2001, licensees have implemented voluntary initiatives and the NRC has imposed new security requirements that have increased the demands on the security force. Additionally, the NRC has received information that indicates that the majority of licensees utilized overtime responsibly in providing security for the site. However, numerous licensees continued to rely on elevated amounts of overtime and at a few sites the overtime usage was considered excessive. Therefore, the NRC determined that it was reasonable and prudent to establish requirements to limit security force personnel work hours as a means of providing reasonable assurance that the effects of fatigue will not adversely impact the readiness of nuclear security officers in the performance of their duties.

In developing its position, the staff considered the unique job-specific demands that are placed on nuclear security officers. Nuclear security officers are faced with making life and death decisions in the event of an attack on the site. The nuclear security officer is the first line of defense in the event of an attack on the facility with limited automatic or back-up systems to rely upon in contrast to other types of plant workers (e.g., plant operators). Nuclear security officers often work alone for long periods with limited socialization or physical activity as a stimulus. As a result, special attention must be given to the security force to ensure that the effects of fatigue do not adversely impact the readiness of nuclear security officers.

The staff is currently pursuing a rulemaking effort to address worker fatigue and propose work hour limitations for a number of types of critical job functions at commercial nuclear power plants. This effort was initiated in response to recognized weaknesses in Generic Letter (GL) 82-12, "Nuclear Power Plant Staff Work Hours." The rulemaking effort was in process when the staff initiated its specific effort regarding security force personnel. In the development of the compensatory measures (CMs) for the Order, the staff's initial proposal closely paralleled the requirements that were under discussion in the rulemaking effort. The individual limits adopted the approach taken in GL 82-12 with a few exceptions. The group limits were modified from the initial proposal as a result of external stakeholder feedback received during public meetings conducted on January 23 and February 21, 2003. The most significant change was the development of a 60-hour per week average limit for security force personnel for planned plant outages and planned security system outages which can last up to 120 days. The CMs do not impose restrictions on group work hours for unplanned outages, unplanned security system outages, or increased threat conditions which can last up to 120 days. The 60-hour limit was intended to provide reasonable assurance that the effects of fatigue would not adversely impact the readiness of security force personnel, given their unique job-specific demands, if an extended planned plant outage and increased threat condition occurred sequentially.

2. HISTORICAL OVERVIEW

The terrorist attacks of September 11, 2001, further sensitized the NRC to the importance of the role of nuclear security officers in providing protection for commercial nuclear power plant sites. The threat advisories issued by the NRC following September 11, 2001, and the February 25, 2002, and April 29, 2003, Orders to power reactor licensees imposing new security requirements have increased demands on the security force. The Regulatory Issue Summary on the Homeland Security Advisory System (HSAS) provides NRC guidance on security force readiness for various national threat conditions which make additional demands on security officers. Further, unlike other plant personnel, security personnel are (1) often required to work alone, (2) armed, (3) required to make quick decisions about the use of deadly force, and (4) not currently covered by GL 82-12.

Since September 11, 2001, the Commission has received reports of nuclear security officers found asleep while on duty. In addition, the Commission has received numerous allegations from nuclear security officers that certain licensees have made them work excessive amounts of overtime over long periods to deal with the post-September 11 threat environment. The nuclear security officers questioned their readiness and ability to perform their required job duties due to the adverse effects of chronic fatigue and stated that they feared reprisal if they refused to work assigned overtime. Additionally, the staff received similar information from newspaper articles and from interactions with intervener groups. For example, the Project on Government Oversight (POGO) issued a report titled “Nuclear Power Plant Security: Voices from Inside the Fences” and submitted this report to the NRC staff (ADAMS Accession No. ML031670987). POGO interviewed more than 20 nuclear security officers protecting 24 nuclear reactors (at 13 plants) to obtain material for its report. POGO reported that security officers interviewed said “their plants are relying on increased overtime of the existing guard force.”

The NRC conducted a survey to determine the degree to which licensees rely on overtime to provide security at all of the commercial nuclear power plant sites. This survey was conducted over an 8-week period in August and September 2002. The survey showed a responsible use of overtime by the majority of licensees. However, numerous licensees continued to rely on elevated amounts of overtime and a few licensees had overtime usage that was considered excessive a year after the events of September 11, 2001, and approximately 6 months after the February 25, 2002, physical protection Orders were issued.

The staff decided that it was reasonable and prudent to establish requirements to limit security force personnel work hours as a means to provide reasonable assurance that the effects of fatigue will not adversely impact the readiness of security force personnel. This decision was based on the following factors: the importance of the role of nuclear security officers in providing protection for commercial power plant sites, the staff’s concern that continuing over reliance on overtime could adversely impact security force readiness, and the knowledge that additional demands would be placed on the existing security force as the staff issued additional requirements in the areas of training and the design basis threat.

There were no NRC requirements that addressed this issue prior to the issuance of the April 29, 2003, Order limiting work hours for security force personnel. GL 82-12 provided limits for work hours for other types of workers at commercial nuclear power plant sites. Specifically, GL

82-12 provided individual limits to address the issue of acute fatigue for short periods (i.e., a day, 48 hours, and a week). GL 82-12 also contained a policy statement that a nominal 40-hour work week was expected during normal operating conditions.

The staff was aware of previously recognized weaknesses in GL 82-12 as a regulatory approach to provide reasonable assurance that fatigue will not adversely impact human performance. The staff initiated a rulemaking effort to address weaknesses in the GL 82-12 approach. The objectives of the rulemaking were to incorporate security force personnel into the scope of covered workers, minimize the use of deviations for the individual limits, and develop limits (e.g., nominal 40-hour work week) that minimize the potential for cumulative fatigue.

The rulemaking process takes time and the NRC determined that it was appropriate to act immediately to address security force personnel while the rulemaking proceeds. The Order is the most time-efficient means that the NRC has to impose immediately effective new requirements on licensees. As a result, the Commission determined that the development and issuance of an Order limiting the number of work hours for security force personnel was reasonable and prudent.

In developing the Order, the staff initially proposed CMs that largely paralleled the effort under development in the rulemaking process. The staff modified this approach based on the comments received from external stakeholders at public meetings held on January 23 and February 21, 2003.

Rulemaking activities regarding work-hour limits continue for the larger scope of commercial nuclear power plant workers that includes security force personnel. This effort will be informed, in part, by comments received from external stakeholders as well as lessons learned from the implementation of the Orders limiting security force personnel work hours. It is the staff's intention to rescind these Orders after the rulemaking activity is complete and a regulation covering security force personnel is in effect.

3. INDIVIDUAL WORK HOUR CONTROLS

The individual work-hour limits establish maximum allowable work hours for security personnel and controls for exceeding the limits when necessary to maintain the security of the facility. The individual work-hour limits mostly adopt the approach taken in GL 82-12. These limits have been in place for approximately 20 years and have been the subject of substantive stakeholder input during both the rulemaking process and the development of the Order. In developing the CMs, the staff considered the information gained through these interactions. The staff increased the maximum work hours in a 48-hour period from 24 hours to 26 hours to decrease the administrative burden of approving deviations for personnel on 12-hour shifts that hold over for short periods to accommodate a delayed relief or similar circumstances. Similarly, the staff increased the minimum break period from 8 hours to 10 hours to provide greater assurance that personnel have adequate opportunity to obtain the 7-8 hours of sleep recommended by most experts in work scheduling and fatigue. Note that the staff allowed shift turnover to occur during the break period to eliminate a potential unintended consequence—an individual might rush the turnover process in an attempt to manage an individual limit. Finally, the staff established more limiting criteria for deviations from the individual limits to require assurance

that the deviation is needed to maintain the safety of the plant and to require an assessment of the individual's readiness to work beyond the individual work-hour limit.

The individual work-hour limits, with a few exceptions, follow the guidelines of the Commission's Policy on Factors Causing Fatigue of Operating Personnel at Nuclear Reactors. The policy (including the basis for the individual requirements) was the subject of a substantive review. The review is documented as Attachment 1 to SECY-01-0113.

4. GROUP WORK-HOUR CONTROLS: NORMAL PLANT CONDITIONS

The objectives of the 48-hour group limit for security personnel during normal plant operations are (1) to ensure that the amount of overtime typically worked by security force personnel does not adversely impact guard readiness during various conditions (e.g., outages, increased threat conditions, and emergencies), (2) to define an enforceable upper limit for the nominal 40-hour work-week policy stated in GL 82-12, and (3) to allow licensees to manage overtime in a manner that reflects the differing desires and capabilities of individuals with respect to work hours. The 48-hour group limit allows a reasonable amount of overtime (approximately 400 hours per year on average in addition to overtime during outages and increased threat conditions) while ensuring the readiness of security force personnel during various demands and plant conditions.

The 48-hour group limit during normal operations is the most effective mechanism contained in the CMs to provide the staff reasonable assurance that cumulative fatigue will not adversely impact the readiness of security force personnel. The 48-hour group limit excludes the time required to conduct shift turnover. The staff expects that under the CMs the individual limits will be used to address emergent operational issues and will not be routinely used for normally scheduled activities. In addition, the staff expects that the 48-hour group limit will minimize the need for deviations from the individual limits during normal operations. By limiting the work hours for security force personnel during normal conditions, the staff has reasonable assurance that fatigue will not adversely impact the readiness of security force personnel during outages, increased threat conditions, and emergencies. Licensees typically rely on elevated amounts of overtime during these conditions. The CMs impose only limited restrictions during these conditions to give licensees flexibility in meeting their mission, to minimize unintended consequences, and to reduce unnecessary burden. As a result of this approach, the 48-hour group limit during normal operations has an enhanced role in minimizing the overall effects of fatigue.

In addition, the 48-hour group limit is consistent with recommendations of experts for maintaining nuclear plant worker alertness, with nuclear plant worker opinions concerning overtime, with current U.S. nuclear industry practices, and with nuclear industry practices outside the U.S.

4.1 Background

A 40-hour work week during normal operations is a key element of the NRC's Policy on Factors Causing Fatigue of Personnel at Nuclear Reactors. The policy, promulgated via GL 82-12, is intended to ensure that there are enough operating personnel to "maintain adequate shift coverage without routine heavy use of overtime." Routine overtime can cause cumulative

fatigue effects, thereby degrading the ability of workers to safely and competently perform their tasks. For the purposes of the CMs, the staff developed a requirement limiting individuals to a 48-hour average, allowing 20% overtime in excess of the nominal 40-hour work week (COMSECY-02-0066). In response to stakeholder input on the draft CMs with respect to individual differences in ability and desire to work overtime, the staff developed a requirement for security personnel, as a group, to average 48 hours of work over a period not to exceed 6 weeks. Because the limit is a group average, licensees have the flexibility to distribute overtime among their staff based on their assessment of individuals' ability and desire to work overtime. The use of an averaging methodology was introduced to address licensee concern regarding the restriction of voluntary overtime.

4.2 Discussion

The decision to establish a group average limit of 48 hours for normal plant conditions was based on consideration of several types and sources of information. These included past recommendations from experts and expert panels on work scheduling and maintaining worker alertness in the nuclear industry, surveys of nuclear power plant workers on their desire and ability to work overtime, data on the amount of overtime worked by security personnel, and requirements and practices in other industries.

4.2.1 Expert Recommendations for Maintaining Nuclear Plant Worker Alertness

Two of the most comprehensive guideline documents on worker fatigue in the U.S. nuclear industry are Electric Power Research Institute (EPRI) NP-6748, "Control Room Operator Alertness and Performance in Nuclear Power Plants," and NUREG/CR-4248, "Recommendations for NRC Policy on Shift Scheduling and Overtime at Nuclear Power Plants." The group average requirement is a new concept developed by the staff to meet the NRC's objectives while addressing the unique circumstances and specific concerns of the stakeholders. Although neither of the documents provides specific guidelines for group averages, the documents contain information and guidelines relevant to the group average requirement.

Collectively, the shift scheduling guidelines of EPRI NP-6748 and NUREG/CR-4248 suggest a maximum routine work schedule of 44-46 hours per week. This maximum includes an assumed turnover time of 30 minutes per shift. The staff also considered the recommendations of experts concerning use of overtime. The expert panel which developed the guidelines for NUREG/CR-4248 also addressed use of overtime and recommended an individual limit of 213 hours per month (including turnover time). The expert panel emphasized that overtime should not be approved for an entire crew, indicating that this individual maximum on overtime should not be a group norm. The group average requirement of 48 hours establishes a requirement that is in the middle of the range of work hours defined by the maximum routine scheduling limits and maximum individual overtime and allows for individual differences regarding fatigue. The staff also notes that the expert panel recommended that the NRC authorize no more than 400 hours of overtime in a year. A limit of 400 hours of overtime is consistent with a 48-hour week average (i.e., 50 weeks x 8 hours).

4.2.2 Nuclear Plant Worker Opinions Concerning Overtime

In addition to considering the opinions of experts in work scheduling and fatigue, the staff considered the opinions of individuals that work in the nuclear power plant setting. These opinions were expressed in surveys conducted by the Professional Reactor Operator Society (PROS) and EPRI.

In 2002, PROS surveyed the attitudes of its members towards work hours and the development of a proposed rule concerning fatigue of workers at nuclear power plants. One of the survey questions was “What is your personal tolerance for overtime?” The responses indicated that 75% of the respondents had a “tolerance” for up to 350 hours per year. Only 13% expressed a tolerance for more than 350 hours of overtime.

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

A 48-hour week group average allows security personnel, as a group, to average approximately 400 hours of overtime, or 2400 hours of work, in a year. The group average is therefore consistent with the upper extreme of overtime hours for which nuclear power plant personnel have expressed a tolerance. In addition, the average is less restrictive than the limit implied by worker opinions because the 48-hour average excludes hours worked during an outage.

4.2.3 Current U.S. Nuclear Industry Practices

In addition to expert and worker opinions, the staff considered industry practices concerning use of overtime. As part of the process for evaluating the need for CMs to address security worker fatigue, the staff collected work scheduling data for security workers at all nuclear power plants. The data indicated that at some of the sites (31%) security personnel worked greater than 55 hours per week and at a few sites (11%) they worked 60 or more hours per week. The data also indicated that at the majority of the sites (58%) security personnel typically worked 50 hours per week or less. This suggests that a 48-hour average work week is an achievable objective though not a current practice at a substantial minority of sites.

4.2.4 Additional Considerations and Perspectives

The work-hour limits contained in the Order are comparable to restrictions on workers in other industries within the U.S. and the limits imposed by other countries that regulate overtime for nuclear power plant workers. The staff considered that cumulative fatigue of nuclear power plant workers is addressed in several other countries through individual monthly and/or annual limits on overtime. These limits, summarized in Table 6 of Attachment 1 to SECY-01-0113, are generally more restrictive than the 48-hour group average limit in that they allow fewer hours of work and provide less flexibility because the limits are applied on an individual rather than group basis (e.g., Finland limits overtime to 250 hours per year). Table 5 of Attachment 1 to SECY-01-0113 includes a summary of hourly limits on work in other industries in the U.S.

In developing the group average requirement to address cumulative fatigue of workers, the staff also considered the requirements of the European Union (EU) Working Times Directive (WTD). The WTD establishes requirements concerning the working hours of workers across various industries in EU member nations. The staff notes that the WTD establishes a requirement that "workers cannot be forced to work more than 48 hours per week averaged over 17 weeks."

Finally, the staff notes that the amount of overtime allowed by the 48-hour group average requirement is more than the amount used in most continuous operations. Circadian Technologies, a consulting firm expert in fatigue management, regularly surveys U.S. and Canadian companies conducting 24/7 operations. Their most recent survey (2000) of 550 major companies indicates that shift workers at 89% of the companies surveyed averaged less than 400 hours of overtime per year.

4.3 Conclusion

The staff believes that the 48-hour average work week requirement for security personnel subject to the CMs establishes an appropriate upper limit for control of work hours while the plant is operating. The limit is consistent with expert and worker opinions concerning work hours, provides substantial licensee flexibility, and recognizes individual differences in the ability and desire to work overtime.

5. GROUP WORK HOUR CONTROLS: PLANNED PLANT OR PLANNED SECURITY SYSTEM OUTAGES

In contrast to other plant personnel, security guard force personnel are substantially impacted by an increased threat condition given their unique job-specific demands. Nothing precludes an increase in threat condition from occurring after a planned outage. The 60-hour group limit for security personnel during planned plant or planned security system outages was established to ensure that the elevated amount of overtime typically worked by security force personnel during outages does not adversely impact guard readiness to respond to increases in threat conditions.

Ensuring that work schedules incorporate adequate break periods is an important mitigation strategy for fatigue. COMSECY-02-0066 proposed a continuous 48-hour break for periods of elevated overtime that exceed 45 days. Through stakeholder interactions, the staff concluded that a 60-hour group average was an effective alternative to implement the same objective, providing more flexibility while directly addressing the potential conjunctions of outages and increases in threat condition. The 60-hour limit ensures that security force personnel that work a 12-hour shift have 2 days off in every 7-day period. For licensees that utilize an 8-hour shift, the break between work periods built into this schedule provides reasonable assurance that security force personnel will not be adversely affected by fatigue during outages.

The 60-hour group limit allows licensees flexibility in using overtime for security force personnel to meet outage needs. Since the 60-hour limit is an average, licensees can manage overtime in a manner that reflects the differing desires and capabilities of individuals with respect to fatigue. Licensees can use the 60-hour group limit for the duration of the outage or a period not to exceed 120 days, whichever is shorter. The CMs also permit licensees to define an outage as starting up to 3 weeks prior to exiting Mode 1 to allow for outage preparations. The 60-hour limit provides reasonable assurance that elevated overtime during planned outages will not

adversely affect the readiness of security force personnel in the performance of their function during outage periods or periods of increased threat that might occur before, during, or after planned outages.

6. GROUP WORK-HOUR CONTROLS: INCREASED THREAT CONDITIONS AND DECLARED PLANT EMERGENCIES

No group limits were recommended for conditions of increased threat and no group or individual limits were recommended for declared plant emergencies. The staff wanted to provide licensees maximum flexibility in responding to these conditions and did not want the Order to require that nuclear security officers be sent home when they are needed most. The staff determined that the individual limits and the group limits during normal and planned outage conditions were sufficient to provide reasonable assurance that the effects of fatigue would not adversely impact the readiness of security force personnel. In addition, increased threat conditions are limited to 120 days and plant emergencies are typically of limited duration.

Compensatory Measures
(October 2003, Revision 1)

A. Background:

These compensatory measures (CMs) are established to delineate licensee responsibility in response to the threat environment presently in existence in the aftermath of the events of September 11, 2001. Excessive work schedules can challenge the ability of security force personnel to remain vigilant and effectively perform their duties.

B. Scope:

Operating nuclear power reactor licensees shall comply with the following CMs to ensure, in part, that nuclear facility security force personnel are not assigned to duty while in a fatigued condition that could reduce their alertness or ability to perform functions necessary to identify and promptly respond to plant security threats. Work hour controls shall apply to personnel performing the following functions: armed member of the security force, central alarm station operator, secondary alarm station operator, security shift supervisor, and watchperson (i.e., watchman).

C. Compensatory Measures:

1. Individual Work Hour Controls

(a) Personnel performing the functions identified in B:

(1) Shall not exceed the following limits, excluding shift turnover time:

(i) 16 hours in any 24-hour period,
(ii) 26 hours in any 48-hour period, and
(iii) 72 hours in any 7-day period.

(2) Shall have a minimum 10-hour break between work periods. The participation in turnover is permitted during the break period.

(3) May be authorized, by the licensee, to deviate from the limits specified in C.1(a)(1) and/or C.1(a)(2) provided:

(i) The licensee could not have reasonably foreseen or controlled the circumstance necessitating the deviation,
(ii) The security shift supervisor has determined that the deviation is required to maintain the security for the facility,
(iii) An evaluation is performed, in advance, by individuals with training, as provided by the licensee, in the symptoms, contributing factors, and effects of fatigue that determined that the individual's fitness for duty would not be

adversely affected by the additional work period to be authorized under the deviation, and
(iv) The basis and approval for C.1(a)(3) items (i), (ii), and (iii) are documented.

Note 1: An 8-hour break may be authorized as deviation from the 10-hour requirement of C.1(a)(2) if the deviation is required for a scheduled transition of crews between work schedules or shifts.

(b) The number and duration of approved deviations shall be reviewed by the Security Manager and limited to the extent practicable.

(c) The licensee shall monitor and control individual work hours to ensure that excessive work hours are not compromising worker alertness and performance.

2. Group Work Hour Controls

Group average work hours for personnel performing the functions identified in B shall be controlled in accordance with the following limits:

(a) Normal Plant Conditions: The average number of hours actually worked by personnel performing the functions identified in B, shall not exceed 48 hours per week, excluding shift turnover time, averaged over consecutive periods not to exceed six (6) weeks. Workers who did not work at least 75 percent of the normally scheduled hours during the averaging period shall not be included when calculating the average. If the group average limit is exceeded, the licensee shall take prompt action to reduce the average hours worked in accordance with this compensatory measure and take actions to prevent recurrence.

(b) Planned Plant or Planned Security System Outages:

(1) The average number of hours actually worked by personnel performing the functions identified in B, shall not exceed 60 hours per week, excluding shift turnover time, averaged over consecutive periods, not to exceed six (6) weeks. For planned abnormal plant conditions whose duration is less then the averaging period the limit would be 60 hours per week averaged over the duration of the condition. Workers who did not work at least 75 percent of the normally scheduled hours during the averaging period shall not be included when calculating the average. If the group average limit is exceeded, the licensee shall take prompt action to reduce the average hours worked in accordance with this compensatory measure and take actions to prevent recurrence.

Note 2: Licensee may define the beginning of a planned plant outage to be up to 3 weeks prior to the plant shutdown (i.e., plant operational mode not equal to 1).

(2) The limit defined in C.2(b)(1) can be used for up to 90 days. For periods greater than 90 days, the licensee shall take prompt action to limit hours worked in accordance with the requirements of C.2(a). The use of the limits defined in C.2(b)(1) shall not exceed 120 days.

(c) Unplanned Plant or Unplanned Security Outages or An Increase in Plant Threat Condition (i.e., increase in protective measure level as promulgated by NRC Advisory):

(1) There are no specific group limits for this condition.

(2) For periods greater than 90 days, the licensee shall take prompt action to limit hours worked in accordance with the requirements of C.2(a). The use of the allowance defined in C.2(c)(1) shall not exceed 120 days.

Note 3: For the purposes of these CMs, the baseline threat condition is defined as the least significant threat condition in effect in the last 120 days.

Note 4: If an increase in threat condition occurs while the plant is in a planned outage, the requirements of C.2(c) apply for the increased threat condition. If the threat condition returns to the baseline threat condition during the planned outage, the requirements of C.2(b) apply using the original licensee defined start date for the planned outage.

Note 5: If multiple increases in threat condition occur while the conditions of C.2(c) are in effect, the requirements of C.2(c)(2) reset with each increase.

Note 6: If the threat condition decreases, the new threat condition shall be compared to the baseline to determine if the requirements of C.2(c) apply as a result of an increased threat condition. If so, C.2(c)(2) shall be referenced to the date when the current threat condition was last entered as the result of an increase.

Note 7: Licensees shall reference changes in threat condition prior to the issuance of these CMs to determine the baseline threat condition and whether the requirements of C.2(c) apply.

(d) Pilot and Annual Force-on-Force Exercises: The average number of hours actually worked by personnel performing the functions identified in B, shall not exceed 60 hours per week, excluding shift turnover time, during the period of the actual conduct of the FOF exercises (i.e., licensee annual exercises and NRC observed FOF exercises).

3. Licensees shall be exempt from the requirements of C.1 and C.2 during declared emergencies as defined in the licensee's emergency plan.

4. Procedures

   Develop or augment procedures, as necessary, for personnel within the scope of this CM to:

   (a) Describe the process for implementing the controls for hours worked specified in C.1, C.2, and C.3 of this CM.

   (b) Describe the process to be followed if an individual reports prior to or during a duty period that he or she considers himself or herself unfit for duty due to fatigue.

   (c) Document self-declarations of unfit for duty due to fatigue if upon completion of the licensee's evaluation it is determined the individual should be returned to work without a break of at least 10 hours.

cc:
Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Mr. Karl W. Singer, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. James E. Maddox, Vice President
Engineering & Technical Services
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Ashok S. Bhatnagar, Site Vice President
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. Robert J. Adney, General Manager
Nuclear Assurance
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Michael D. Skaggs, Plant Manager
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Mr. Mark J. Burzynski, Manager
Nuclear Licensing
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Timothy E. Abney, Manager
Licensing and Industry Affairs
Browns Ferry Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Decatur, AL 35609

Senior Resident Inspector
U.S. Nuclear Regulatory Commission
Browns Ferry Nuclear Plant
P.O. Box 149
Athens, AL 35611

State Health Officer
Alabama Dept. of Public Health
RSA Tower - Administration
Suite 1552
P.O. Box 303017
Montgomery, AL 36130-3017

Chairman
Limestone County Commission
310 West Washington Street
Athens, AL 35611

cc:
Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Mr. Karl W. Singer, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. James E. Maddox, Vice President
Engineering & Technical Services
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Richard T. Purcell
Site Vice President
Sequoyah Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Soddy Daisy, TN 37379

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. Robert J. Adney, General Manager
Nuclear Assurance
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Mark J. Burzynski, Manager
Nuclear Licensing
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Pedro Salas, Manager
Licensing and Industry Affairs
Sequoyah Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Soddy Daisy, TN 37379

Mr. D. L. Koehl, Plant Manager
Sequoyah Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Soddy Daisy, TN 37379

Senior Resident Inspector
Sequoyah Nuclear Plant
U.S. Nuclear Regulatory Commission
2600 Igou Ferry Road
Soddy Daisy, TN 37379

Mr. Lawrence E. Nanney, Director
Division of Radiological Health
Dept. of Environment & Conservation
Third Floor, L and C Annex
401 Church Street
Nashville, TN 37243-1532

County Executive
Hamilton County Courthouse
Chattanooga, TN 37402-2801

Ms. Ann P. Harris
341 Swing Loop Road
Rockwood, Tennessee 37854

Tennessee Valley Authority
WATTS BAR NUCLEAR PLANT

cc:

Mr. J. A. Scalice
Chief Nuclear Officer and
Executive Vice President
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, Tennessee 37402-2801

Mr. Karl W. Singer, Senior Vice President
Nuclear Operations
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. James E. Maddox, Vice President
Engineering & Technical
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. William R. Lagergren, Site Vice President
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

General Counsel
Tennessee Valley Authority
ET 11A
400 West Summit Hill Drive
Knoxville, TN 37902

Mr. Robert J. Adney, General Manager
Nuclear Assurance
Tennessee Valley Authority
6A Lookout Place
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Mark J. Burzynski, Manager
Nuclear Licensing
Tennessee Valley Authority
4X Blue Ridge
1101 Market Street
Chattanooga, TN 37402-2801

Mr. Paul L. Pace, Manager
Licensing and Industry Affairs
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Mr. Larry S. Bryant, Manager
Watts Bar Nuclear Plant
Tennessee Valley Authority
P.O. Box 2000
Spring City, TN 37381

Senior Resident Inspector
Watts Bar Nuclear Plant
U.S. Nuclear Regulatory Commission
1260 Nuclear Plant Road
Spring City, TN 37381

Rhea County Executive
375 Church Street
Suite 215
Dayton, TN 37321

County Executive
Meigs County Courthouse
Decatur, TN 37322

Mr. Lawrence E. Nanney, Director
Division of Radiological Health
Dept. of Environment & Conservation
Third Floor, L and C Annex
401 Church Street
Nashville, TN 37243-1532

Ms. Ann P. Harris
341 Swing Loop Road
Rockwood, Tennessee 37854