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NSD-NRC-97-4988  
DCP/NRC0742  
Docket No.: STN-52-003

February 21, 1997

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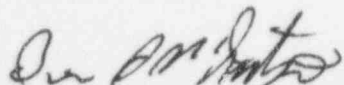
TO: T. R. QUAY

SUBJECT: REVISED RESPONSE TO RAI 100.10 FOR THE TECHNICAL SUPPORT  
CENTER (TSC)

Dear Mr. Quay:

Attached is Enclosure 1, the response to RAI 100.10, revised to address NRC concerns related to unavailability of the Technical Support Center. Given this revision of the RAI response, the Westinghouse status for DSER open item tracking system (OITS) items 1222 and 2033 is Closed as shown in Enclosure 2. Please review the attached RAI response and provide Westinghouse with the NRC status so that the OITS can be updated.

If you have any questions regarding the response to RAI 100.10, or this letter, please contact Robin K. Nydes at (412) 374-4125.

  
Brian A. McIntyre, Manager  
Advanced Plant Safety and Licensing

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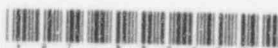
Enclosures

cc: N. J. Liparulo, Westinghouse (w/o Enclosures)  
W. C. Huffman, NRC (w/Enclosures)

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**Enclosure 1 to Westinghouse  
Letter NSD-NRC-97-4988**

**February 21, 1997**

## NRC REQUEST FOR ADDITIONAL INFORMATION



### Question 100.10

In accordance with 10 CFR 50.34(f)(2)(xxv), an applicant must provide for an onsite Technical Support Center (TSC) and Operational Support Center (OSC). Guidance for the function and habitability of the TSC are provided in NUREG-0696 and Supplement 1 to NUREG-0737.

In Q100.6, the staff concluded that the design considerations for emergency planning specified in the AP600 SSAR were not sufficient because the facilities and equipment necessary to support TSC operations were not specified as recommended in Supplement 1 to NUREG-0737 and NUREG-0696. Additionally, the staff asked for a description of design considerations for onsite emergency response facilities as part of the AP600 design.

As a result of the July 14, 1993, meeting on Control Room and TSC Habitability, a portion of the design details for the TSC were provided and the staff is now able to identify specific issues of concern. Of primary concern to the staff is the need for the TSC to remain functional in a manner comparable to the Main Control Room under accident conditions. Address the following concerns:

- a. The staff is particularly concerned with the AP600's ability to adequately respond to plant emergencies when non-vital ac power is unavailable and only "passive" safety features can be relied upon. Describe Westinghouse's plans for meeting the requirements for maintaining TSC functionality/habitability during plant accidents. Do these plans include events involving a loss of non-vital ac power?
- b. If TSC functionality/habitability cannot be maintained, do these functions revert to the Main Control Room (MCR)?
- c. Was a job task analysis used during the design of the MCR habitability system? Has a task analysis been performed to estimate any additional number of personnel manning the MCR during accident conditions?
- d. Has a task analysis been employed to consider the effects of vital TSC functions reverting to the Main Control Room during events in which TSC functionality/habitability are lost (such as loss of non-vital ac power events)?
- e. How are MCR temperature, humidity, oxygen and carbon dioxide levels expected to change due to TSC functions reverting to the MCR during these events?
- f. Has Westinghouse considered providing TSC functionality and /or habitability by means of any source of power other than the non-vital ac power system?



## Response:

- a. When a source of ac power is available, the nuclear island nonradioactive ventilation system (VBS) provides normal and abnormal HVAC service to the main control room and technical support center. ~~habitability is provided by the nuclear island nonradioactive ventilation system (VBS) if ac power is available.~~ The VBS system provides for cooling, heating, humidity control, filtration (HEPA and charcoal), and pressurization following a design basis accident. The VBS and its support systems provide these functions in a reliable and failure tolerant fashion. If offsite power is not available, backup power is automatically provided by either of the two non-safety related diesels within the onsite standby power system. See SSAR Subsection 9.4.1 for additional design details of the VBS.

If nonsafety-related ac power is not available, ~~including the diesels,~~ the habitability of the main control room is provided by the main control room emergency habitability system (VES) as discussed in SSAR Section 6.4. Should habitability be challenged within the TSC due to lack of cooling, or filtration/pressurization (radiation protection) ~~as might be experienced during a loss of nonsafety-related ac power including loss of the two non-safety related diesels,~~ the TSC personnel and the functions of the TSC center ~~would be split between the main control room and transferred to an emergency operations offsite facility (EOF) where habitability is not dependent on plant systems and with communication and data transfer links to the main control room to provide essential exchange of information.~~

A communicator is assigned to the main control room as part of the emergency staffing. The communicator is responsible for providing direct interface between the TSC and the main control room operators. If the TSC function has been transferred to the EOF, then the communicator provides the direct interface between the EOF and the control room operators. The Combined License applicant is responsible for the EOF design, including the specification of its location (SSAR 18.2.6) and emergency planning, and associated communication interfaces among the main control room, the technical support center, and the emergency operations facility (SSAR 13.3).

~~The location of the offsite facility and the necessary information resources will be specified by the COL applicant. The Westinghouse function based task analysis will be the basis for the determination of the communication link interface requirements between the main control room and the offsite facility and for establishing the functional responsibilities that reside with the offsite facility versus those that necessarily will be transferred to the main control room.~~

- b. No, if TSC functionality/habitability cannot be maintained, ~~these the~~ TSC functions that can be effectively performed ~~at an are transferred~~ to the EOF, not the MCR offsite facility will be moved there. Those functions that require direct interface to the main control room, will revert to the MCR. Preliminary identification of the "vital TSC functions" indicates that the functions of management of plant operations, management of recovery operations, communication with outside facilities and authorities, and NRC oversight and communication with other NRC personnel located elsewhere, will be maintained or revert to the main control room in the event of a loss of TSC functionality or habitability. A detailed task analysis with assessment of time dependent activities including TSC functions, will be performed to verify how many people are needed





in the MCR during the time periods when the TSC is not habitable or able to function. The communicator, assigned to the main control room for all emergencies, provides the direct contact between the EOF and the main control room for the TSC functions.

- c. A preliminary job task analysis has been performed for the main control room, but it did not include the TSC functions. The task analysis will be revised to include the TSC functions assigned to the MCR, and it will be verified through testing. In lieu of a task analysis, SSAR 18.2.1.2 provides a description of assumptions and constraints, including utility requirements, that are used as inputs to the human factors engineering program and the human system interface design. As stated in SSAR 18.8, the human system interface design includes the design of the operation and control centers (main control room, TSC, remote shutdown facility, operational support centers, local control stations, and associated workstations) and each of the human system interface resources. One example of utility requirements that impact the human system interface design is the maximum crew size for the main control room during emergencies. The control room design (environment, layout, number and design of workstations) in the main controlling area of the main control room supports emergency operations with a maximum crew complement consisting of eleven individuals. These eleven include two individuals with SRO licenses, three with RO licenses, one observer from the NRC, one from the plant owner's management and one communicator.
- d. The analysis mentioned previously in b) and c) will be performed as a post design certification activity.

Although a task analysis is not required for Design Certification, the effects of reverting vital TSC functions to the MCR when the TSC is unavailable have been considered. As stated in b) above, the TSC functions are transferred to the EOF when the TSC functionality/habitability cannot be maintained. The communicator, assigned to the main control room for emergencies, provides the direct contact between the EOF and the main control room for the TSC functions. The Combined License applicant is responsible for the EOF design including the specification of the location (SSAR 18.2.6). Emergency planning and its communication interfaces among the main control room, the technical support center and the EOF is the responsibility of the Combined License applicant (SSAR 13.3).

The design of the TSC's interfaces is included with the design of the human system interface. SSAR 18.8 provides an implementation plan for the design of the human system interface. As shown in SSAR figure 18.2-3, the results of other human factors engineering program elements are used as input and bases for developing the operation and control center system and human system interface resources functional design. This includes task analysis. SSAR 18.5 provides the implementation plan for the task analysis activities.

- c. The current design of the main control habitability system (VES) provides the following functions for the main control room with an assumed staffing of 5 personnel following a design basis accident:

- \_\_\_\_\_ • A breathable air supply in accordance with the CO<sub>2</sub> limits of OSHA, 29 CFR 1910
- \_\_\_\_\_ • Ambient temperature control limiting temperature rise within the main control room to 15°F.
- \_\_\_\_\_ • Radiation exposure protection consistent with the requirements of GDC 19.



# NRC REQUEST FOR ADDITIONAL INFORMATION

Round: 0 Revision: 1

Question Set: 09/23/92



Although a detailed function-based task analysis will be performed to determine staffing levels as identified above, the design and sizing calculations for the VES assumed an operating staffing of 5 would be adequate for the design basis case where the habitability of the main control room is provided by the VES including those more remote cases when TSC habitability is lost due to equipment failure. The peak carbon dioxide levels and radiation protection are somewhat insensitive to a reasonable number of personnel in the main control room. Sensitivity analysis will be utilized to determine the degree of margin for additional heat loads resulting from additional personnel.

Using the utility requirement for maximum crew size of the main control room described in c) above as an input, the main control room is designed to include the following, which are unaffected by TSC habitability (SSAR 6.4.1.1 and 6.4.3.2):

- o A maximum crew occupancy of up to 11 persons.
- o With both VES trains delivering, the emergency habitability system maintains CO<sub>2</sub> concentration to less than 0.5 percent for up to 11 main control room occupants. With one train delivering, the emergency habitability system maintains CO<sub>2</sub> concentration less than 0.5 percent for up to 5 main control room occupants, and maintains CO<sub>2</sub> concentration less than 1.0 percent for up to 11 main control room occupants.
- o The temperature rise in the main control room pressure boundary following a loss of the VBS is less than 15° F over a 72 hour period.
- o Radiation exposure protection consistent with the requirements of GDC 19.

- f. Westinghouse has determined that providing an alternate source of power for the TSC is not required. For those remote events that jeopardize the habitability of the TSC, distribution transfer of the TSC functions and the TSC personnel to the EOF, between the MCR and an offsite facility provision of a communicator in the control room, and assuring adequate communication and data transfer between the main control room and the EOF sites alleviates the need and the additional complexity of providing another power source for the VBS system as well as additional diversity to other support services to the TSC. An offsite facility affords provide a reliable and flexible means of providing the TSC functions for those remote sequences that result in an uninhabitable onsite TSC.

It should be noted that the non-Class 1E batteries within the non-Class 1E dc and UPS system provide approximately 2 hours of backup power supply to the TSC displays should offsite power and both diesels fail. The probability of the loss of all ac is approximately  $5.2 \times 10^{-2}$  calculated based on the probability of a loss of offsite power and the probability of a diesel generator failure (both from Reference 100.10-1), with the probability of .76 for recovering offsite power within that two hours is provided in Reference 100.10-2.

## References:

- 100.10-1 AP600 Probability Risk Assessment, DE-AC03-90SF18495, Chapter 59, September 1996.
- 100.10-2 ALWR Passive Plant Utility Requirement Document, December 1993.



**Enclosure 2 to Westinghouse  
Letter NSD-NRC-97-4988**

**February 21, 1997**

# AP600 Open Item Tracking System Database: Executive Summary

Date: 2/26/97

Selection: [item no] between 1222 And 1222 Sorted by Item #

| Item No. | Branch   | DSER Section/<br>Question | Type    | Title/Description<br>Detail Status | Resp<br>Engineer | (W)<br>Status | NRC<br>Status | Letter No. /    | Date |
|----------|----------|---------------------------|---------|------------------------------------|------------------|---------------|---------------|-----------------|------|
| 1222     | NRR/PERB | 13 3-5                    | DSER-OI |                                    | MMIS/Kerch       | Closed        | Action W      | NSD-NRC-96-4805 |      |

Westinghouse should demonstrate the ability of the main control room to support the appropriate number of staff when the TSC is unavailable.

Action W - The ERG development will provide the task analysis necessary to determine the number of staff required to support main control room operation and the required TSC functions. The capability of the MRC to support this staffing level will be provided.

Resolved - Per DCP/NRC0589, this item will be closed with submittal of the at-power ERG's.

This is an MMIS item. Westinghouse to write a letter to the NRC explaining when the TSC would be unavailable and that the staff would not be moved to the MCR. Expect letter by 12/30. This will address items 1222 and 2033. rkn 12/3

Letter not complete by 12/30, expect by Jan 31, 1997. rkn 1/15/97.

This letter, which transmits a revised response to RAI 100.10 is in review. rkn 2/18

Letter NSD-NRC-97-4988 (DCP/NRC0742) provides the revised response. rkn 2/26/97



# AP600 Open Item Tracking System Database: Executive Summary

Date: 2/26/97

Selection: [item no] between 2033 And 2033 Sorted by Item #

| Item No.  | Branch   | DSER Section/<br>Question | Type      | Title/Description<br>Detail Status | Resp<br>Engineer | (W)<br>Status | NRC<br>Status | Letter No. / | Date |
|---|----------|---------------------------|-----------|------------------------------------|------------------|---------------|---------------|--------------|------|
| 2033  | NRR/PERB | 13                        | DSER-OI50 |                                    | MMIS/Kerch       | Closed        | Action W      |              |      |
| <p>37. Habitability of Technical Support Center</p> <p>The staff is concerned with the acceptability of the habitability requirements specified by Westinghouse for the TSC under accident conditions. Westinghouse has proposed that a detailed task analysis be performed post-certification to determine disposition of TSC staff when the facility is not habitable. The staff believes that this analysis should be performed pre-certification. (See DSER Open Item 13.3-4)</p> <p>Need to determine what is needed to close this item. rkn 10/16/96</p> <p>Met on 10/24 (Wills, Schulz, Kerch, Nydes) and developed plan to research this then discuss with NRC. Appears to be a RTNNS-related item. To close this item, the letter being written for OITS item 1222 will close this (Kerch- author, Wills and Schulz to review). rkn 12/2</p> <p>A revised response to RAI 100.10 is in review. rkn 2/18</p> <p>Letter NSD-NRC-97-4988 provides the revised response. rkn 2/26/97</p> |          |                           |           |                                    |                  |               |               |              |      |