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Your ref: Project Number 740
Our ref: DCP/NRC1943

June 15, 2007

Subject: AP1000 COL Standard Technical Report Submittal of APP-GW-GLR-010 Revision 2, (TR 52)

In support of Combined License application pre-application activities, Westinghouse is submitting Revision 2 of AP1000 Standard Combined License Technical Report Number 52. This report addresses, on a generic basis, activities required for COL Information Item 18.5-2 in the AP1000 Design Control Document. Changes to the Design Control Document identified in Technical Report Number 52 have been included in Revision 16 of the AP1000 Design Control Document. This report is submitted as part of the NuStart Bellefonte COL Project (NRC Project Number 740). The information included in this report is generic and is expected to apply to all COL applications referencing the AP1000 Design Certification.

The purpose for submittal of this report was explained in a March 8, 2006 letter from NuStart to the U.S. Nuclear Regulatory Commission.

Pursuant to 10 CFR 50.30(b), APP-GW-GLR-010, Revision 2, "AP1000 Main Control Room Staff Roles and Responsibilities," Technical Report Number 52, is submitted as Enclosure 1 under the attached Oath of Affirmation. Revision 1 of the aforementioned document was issued for internal Westinghouse use only and not transmitted to the NRC.

It is expected that when the NRC review of Technical Report Number 52 is complete, the assessment and conclusions in report number 52 will be considered valid for COL applicants referencing the AP1000 Design Certification.

Questions or requests for additional information related to the content and preparation of this report should be directed to Westinghouse. Please send copies of such questions or requests to the prospective applicants for combined licenses referencing the AP1000 Design Certification. A representative for each applicant is included on the cc: list of this letter.

Westinghouse requests the NRC to provide a schedule for review of this Technical Report within two weeks of its submittal.

DOT9
D063

Very truly yours,



/A. Sterdis, Manager
Licensing and Customer Interface
Regulatory Affairs and Standardization

/Attachment

1. "Oath of Affirmation," dated June 15, 2007

/Enclosure

1. APP-GW-GLR-010, Revision 2, "AP1000 Main Control Room Staff Roles and Responsibilities," Technical Report Number 52, dated June 2007.

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	E. Schmiech	- Westinghouse	1E	1A
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ATTACHMENT 1

“Oath of Affirmation”

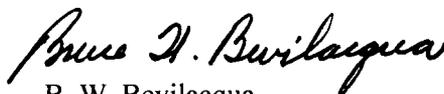
ATTACHMENT I

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

In the Matter of:)
NuStart Bellefonte COL Project)
NRC Project Number 740)

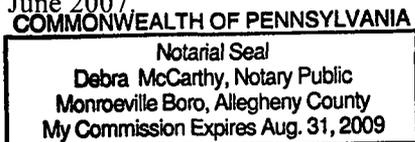
APPLICATION FOR REVIEW OF
"AP1000 GENERAL COMBINED LICENSE INFORMATION"
FOR COL APPLICATION PRE-APPLICATION REVIEW

B. W. Bevilacqua, being duly sworn, states that he is Vice President, New Plants Engineering, for Westinghouse Electric Company; that he is authorized on the part of said company to sign and file with the Nuclear Regulatory Commission this document; that all statements made and matters set forth therein are true and correct to the best of his knowledge, information and belief.



B. W. Bevilacqua
Vice President
New Plants Engineering

Subscribed and sworn to
before me this 15th day
of June 2007



Member, Pennsylvania Association of Notaries



Debra McCarthy
Notary Public

ENCLOSURE 1

APP-GW-GLR-010, Revision 2

“AP1000 Main Control Room Staff Roles and Responsibilities”

Technical Report Number 52

AP1000 DOCUMENT COVER SHEET

TDC: _____ Permanent File: _____ APY: _____
 RFS#: _____ RFS ITEM #: _____

AP1000 DOCUMENT NO. APP-GW-GLR-010	REVISION NO. 2	Page 1 of 31	ASSIGNED TO W-MCGINNIS
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ALTERNATE DOCUMENT NUMBER: _____ WORK BREAKDOWN #: GW

ORIGINATING ORGANIZATION: Westinghouse Electric Company, LLC

TITLE: AP1000 Main Control Room Staff Roles and Responsibilities

ATTACHMENTS:	DCP #/REV. INCORPORATED IN THIS DOCUMENT REVISION: Class 3 changes listed in Section 1.1, "Revision History"
CALCULATION/ANALYSIS REFERENCE:	

ELECTRONIC FILENAME APP-GW-GLR-010	ELECTRONIC FILE FORMAT PDF	ELECTRONIC FILE DESCRIPTION See EDMS
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VERIFIER William C. Kolb	SIGNATURE/DATE <i>W. C. Kolb 6-12-07</i>	VERIFICATION METHOD <i>page by page review</i>
AP1000 RESPONSIBLE MANAGER Cindi A. McGinnis	SIGNATURE <i>C. McGinnis</i>	APPROVAL DATE <i>6-12-07</i>

* Approval of the responsible manager signifies that document is complete, all required reviews are complete, electronic file is attached and document is released for use.

APP-GW-GLR-010
Revision 2

June 2007

AP1000 Standard Combined License Technical Report

AP1000 Main Control Room Staff Roles and Responsibilities Revision 2

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AP1000 Standard Combined License Application Technical Report

AP1000 Main Control Room Staff Roles and Responsibilities

Table of Contents

1.0	PURPOSE
1.1	REVISION HISTORY
2.0	GLOSSARY OF TERMS
3.0	SCOPE
4.0	ROLES AND RESPONSIBILITIES
4.1	ALLOCATION OF ROLES TO STAFF POSITIONS
4.2	MAIN CONTROL AREA REACTOR OPERATOR POSITION
4.3	MCR SUPERVISOR
4.4	SHIFT MANAGER
4.5	SHIFT TECHNICAL ADVISOR ROLE
4.6	EQUIPMENT OPERATOR
5.0	ALTERNATE STAFFING SCENARIOS
5.1	STAFFING SCENARIOS CONSIDERED
5.2	ADD A UNIT SUPERVISOR TO THE ASSUMED MINIMAL STAFF
5.3	ASSUMED LARGE STAFF COMPLEMENT IN THE MAIN CONTROL ROOM
5.4	OPERATION FROM THE REMOTE SHUTDOWN WORKSTATION
6.0	SUMMARY
7.0	REFERENCES
8.0	REGULATORY IMPACT
9.0	DCD MARKUP

1.0 PURPOSE

The purpose of this document is to describe the scope and responsibilities for each position of the operating staff in the AP1000 Main Control Room (MCR), with consideration of the assumptions and results of the associated task analyses. The term “scope” used in the above context is defined in the following paragraphs because it is relevant to the purpose of this document:

The “role” that a staff member maintains in carrying out a responsibility is key to determining the “scope” of a staff position and the associated requirements for the Operations and Control Centers System (OCS) Human System Interface (HSI) design. The responsibilities of the operating staff are often shared; that is, a coordinated effort by multiple staff members is needed to achieve the objective. For these shared tasks or responsibilities, each staff member has a designated role. The staff roles determine who does what (i.e., the scope of each position), and what interface is needed at each scope boundary.

The scope of a staff position determines requirements for functions performed by the OCS and the associated HSI to support that role (e.g., monitoring or control capability). The scope boundaries between staff positions determine requirements for the interfaces between the staff positions that the OCS HSI must also support (e.g., means of communication, such as telephone or table layout space or staff briefing area). In order to clearly identify the “scope” boundaries (and associated interfaces) of the staff positions within the MCR, this document identifies the roles of operating staff positions external to the MCR as well as staff roles within the MCR. The objective is to provide a basis to support a comprehensive assessment of the requirements for the OCS HSI design for support of the roles performed by the operations staff.

The intent of this document, per APP-OCS-GBH-001, “AP1000 Human Factors Engineering Program Plan” (Reference 1, Section 4.10), is to contribute to the development of APP-OCS-GJR-002, “Concept of Operation” (Reference 2). The “Concept of Operation” will define the intended operational use of the AP1000 HSI resources at each MCR position.

Referencing this document will allow a Combined License applicant referencing the AP1000 certified design to satisfy Combined Operating License (COL) Information Item 18.5-2 in the “AP1000 Design Control Document” (Reference 3) and COL Action Item 18.5.3-1 in the “Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design” (Reference 4). Both Items relate to control room staff roles and responsibilities.

1.1 REVISION HISTORY

This revision is provided to address comments from the October 2006 design review meeting, including:

- Clarification of the relationship of the role of a staff member to the scope of a staff position in performing the responsibilities of the operating staff.
- Clarification that this document identifies the roles and responsibilities of staff positions for an “assumed minimal staff” consistent with the design goal of the AP1000 MCR.
- Clarification that consideration of other staffing scenarios is addressed by identifying the impact on staff roles of having additional staff for two alternate assumed staff complements.
- Clarification regarding the treatment of the Shift Technical Advisor (STA) role, such that the role may be performed by an available SRO with the applicable expertise who may also be performing another staff function.

This revision also includes consideration of the recently completed “AP1000 Operational Sequence Analysis (OSA-1) Summary Report” (Reference 6).

2.0 GLOSSARY OF TERMS

Main Control Area	The Main Control Area (MCA) is the area within the MCR that contains the reactor operator consoles, MCR supervisor console, Wall Panel Information System (WPIS) display units, safeguards panel, primary and secondary dedicated safety panels, and Diverse Actuation System (DAS) panel.
Reactor Operator	An individual holding an active Reactor Operator’s license, and who may fulfill a variety of staffing positions requiring such qualification.
Senior Reactor Operator	An individual holding an active Senior Reactor Operator’s license, and who may fulfill a variety of staffing positions requiring such qualification.

3.0 SCOPE

This document describes the roles and responsibilities for a minimal operating staff that corresponds to the AP1000 staffing goal originally established in WCAP-14694, “Designer’s Input to Determination of the AP600 Main Control Room Staffing Level” (Reference 5) and invoked for AP1000 in Section 18.1 of Reference 3. That staffing goal (per Reference 5) is as follows:

“A design goal for the (AP1000) MCR and its operating crew is to design the plant and the (HSI) such that one reactor operator (RO) and one [SRO] can safely monitor and control the plant under all conditions including normal operation, abnormal events, and accident conditions. In addition, the operating crew will include one [shift manager] (senior RO licensed) and two auxiliary equipment operators. During accidents assistance is available to the operating crew from personnel [available within the plant]. [An SRO available within the plant] will execute the duties and responsibilities of the [shift] technical advisor (STA) under the assumption that the individual meets the applicable engineering expertise requirements.”

Note: In the above quote, brackets [] indicate where AP1000 specific text is substituted to appropriately represent the intent of the Reference 5 quote.

The above design goal establishes the key assumptions related to staffing that need to be addressed in the task analyses for the AP1000 OCS HSI design. Therefore, this goal for a minimal staff complement provides the basis for the description of roles and responsibilities provided in this document.

Note that the staff complement associated with the above design goal is identified in this document as a “minimal staff complement” in order to differentiate it from the “minimum staff complement” that will be determined by the COL applicant.

The above design goal indicates an assumption that an SRO with the applicable expertise will be available to perform the STA function. In this document, the function of the STA is considered a role that must be performed by the available operating staff and appropriately supported by the OCS HSI design. The intent of the design is to support performance of the STA functions either by a staff member dedicated to the STA role if available, or by an available SRO with the applicable expertise who may also be performing another staff function.

In addition to identifying roles and responsibilities for a minimal staff complement corresponding to the above design goal, this document identifies the effect on staff roles of adding a Unit Supervisor, whose responsibilities include supervising plant work activities. Consideration of this scenario was included in response to feedback from expected owners/operators of AP1000 units.

This document also assesses the allocation of roles for a third staffing scenario that assumes that a large complement of control room staff is in attendance. For

this case, the total complement corresponds approximately to the maximum capacity that can be supported by the MCR emergency habitability system in a passive heat removal mode.

Operating staff roles and responsibilities are described for normal operations (i.e., from refueling to full power), abnormal operations, and emergency operations. In allocating roles among the staff for each responsibility, the responsibilities are grouped according to whether they apply for normal operations or for transients and emergencies. The intent is to group responsibilities and roles according to their context (i.e., emergency/transient versus normal operation), since the context can be relevant in assessing the interfacing needs between staff roles and on the resulting requirements for the OCS HSI design to provide appropriate support. Responsibilities/roles that apply for both contexts are allocated to a third category (i.e., applicable to all operating modes and conditions) in order to support consideration of the staff role in both contexts.

Determinations of staff roles for administrative responsibilities that are part of plant operations responsibilities, such as tagging, are included in this document. Administrative responsibilities that are typically performed by the operations department, but are not part of plant operations, are not included, such as training, review of procedures, performance management, operations planning, and scheduling. Also, non-operational routine tasks (e.g., completing time sheets and reading email communications) that do not comprise roles and responsibilities of the operations staff are not included.

This document includes an assessment of the impact on the roles of the MCR staff if their roles are performed from the Remote Shutdown Workstation (RSW).

The document does not address staff roles at support facilities such as the Technical Support Center, the Emergency Operations Facility, the Operational Support Center, or local control stations.

Preparation of this document included a review of OSA-1 (Reference 6) to ensure that the assumptions and results of that task analysis are appropriately considered here.

4.0 ROLES AND RESPONSIBILITIES

4.1 ALLOCATION OF ROLES TO STAFF POSITIONS

This section describes the role of each staff position for responsibilities performed by the operating staff. Figure 4.1-1 illustrates that when an operating staff responsibility is accomplished through the combined efforts of multiple staff members, each member's role defines his or her scope in the overall effort to perform the responsibility. The role (or scope) of a staff position determines the OCS HSI resources needed to support that staff position. Also, the interfaces between staff roles determine the OCS HSI resources needed to support the associated communications.

Tables 4.1-1 and 4.1-2 each provide an example of individual staff roles that are combined to accomplish a shared responsibility. Table 4.1-1 shows the roles performed by the Main Control Area Reactor Operator (MCA RO), MCR Supervisor, Shift Manager, and Equipment Operators in support of their shared responsibility to perform equipment tagging. As shown, the Equipment Operators perform the physical tagging of the equipment while the roles of the other staff primarily involve planning, coordinating and communicating. As a second example, Table 4.1-2 shows the roles of the MCA RO, MCR Supervisor, Shift Manager and Shift Technical Advisor (STA) in support of operator actions to use non-safety plant systems to mitigate or terminate plant transients without challenging the safety systems. It shows that the MCA RO has the responsibility for taking the appropriate control actions (i.e., via the OCS HSI). It also illustrates that the MCR Supervisor, Shift Manager and STA have roles that need to be supported by the OCS HSI. Five activities are identified for the MCR Supervisor's role, and each activity has specific implications for the OCS HSI.

The following role descriptions designate the MCA RO as the "RO at the controls," such that this staff position is restricted to the access controlled area within the MCA portion of the MCR. In comparison, the MCR Supervisor may be located anywhere within the MCA. The relationship of the MCA to the MCR is illustrated in Figure 4.1-2.

4.1.1 Assumption of Minimal Staff Complement

The role descriptions in this section (Section 4) are determined based on the assumption of a minimal complement of operating staff that corresponds to the Reference 5 design goal. Consideration of the implications of alternate staff complements on the individual staff roles is addressed in Section 5.

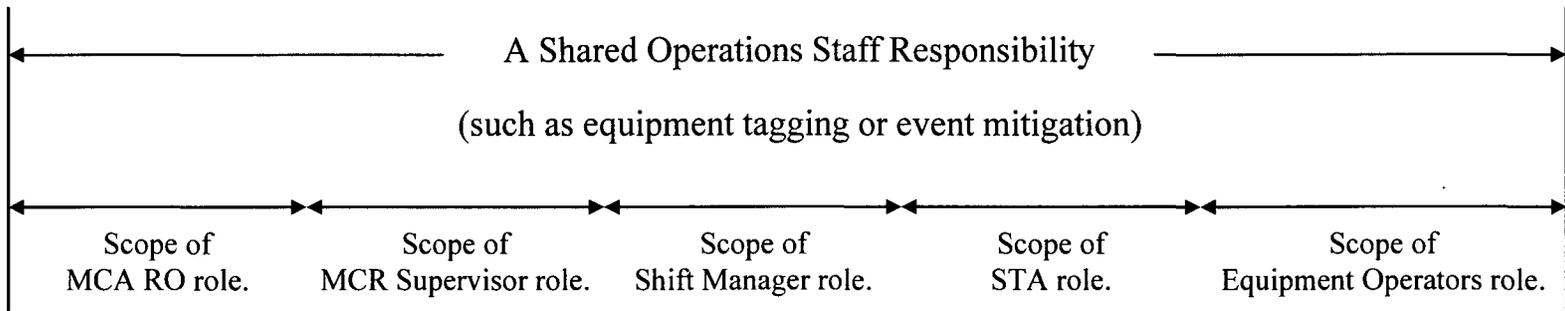
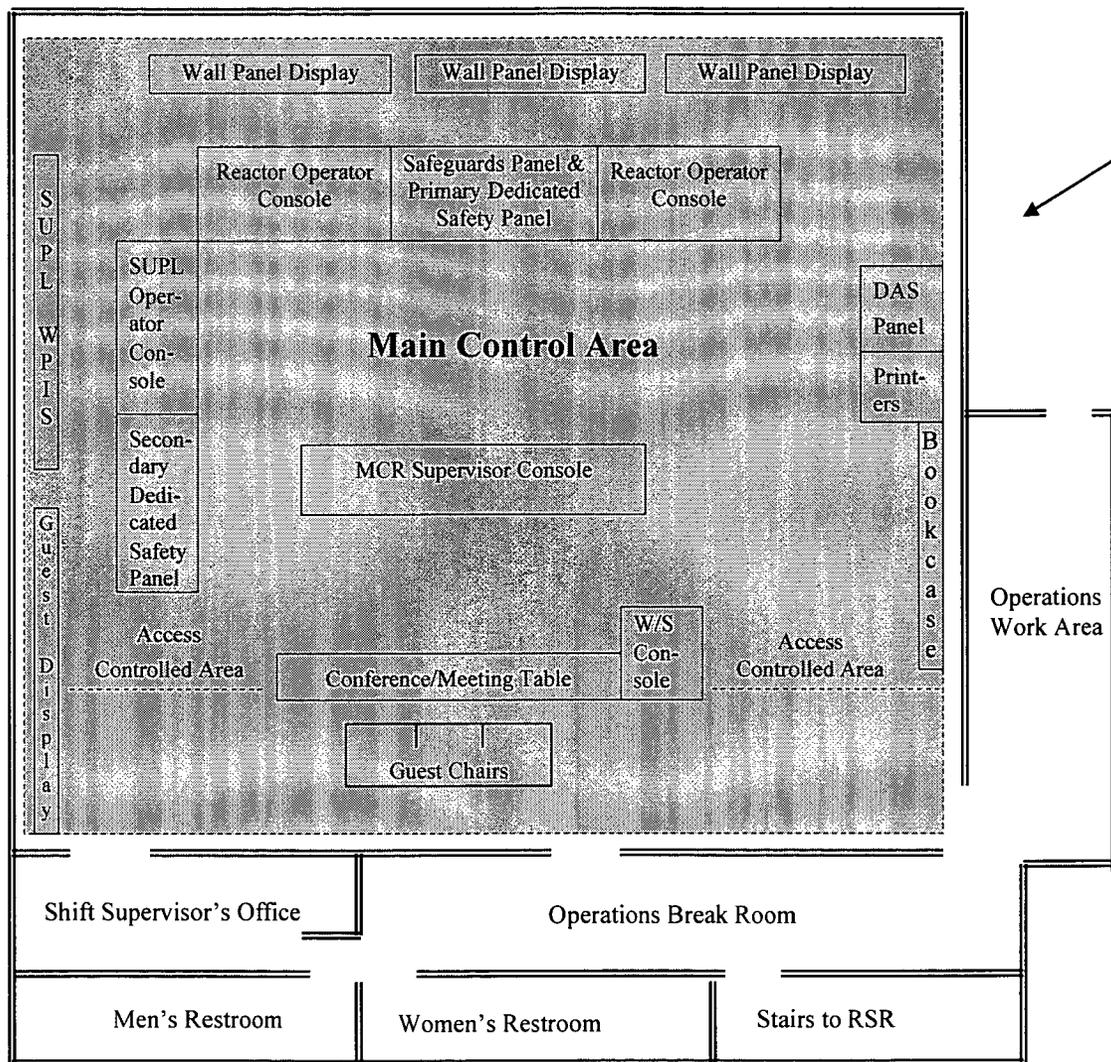


Figure 4.1-1. Individual Staff Roles Combine to Perform a Shared Responsibility



Main Control Room

Legend:

- ==== Walls that enclose rooms that are included in the MCR.
- ▨ MCA is shaded.
- Component outline, e.g. console, panel, display or printer.

Note: This figure is provided to illustrate the relationship of the MCA to the MCR. Equipment arrangement and room names are provided for example and are not intended to represent the final MCR layout.

Figure 4.1-2. Illustration of Main Control Area within the Main Control Room

Table 4.1-1. Example 1 - Staff Roles for Equipment Tagging

<u>MCA RO</u>	<u>MCR Supervisor</u>	<u>Shift Manager</u>	<u>Equipment Operators</u>
<ul style="list-style-type: none"> • Communicates with other staff members to maintain his cognizance of equipment status and to adjust plant operations accordingly. 	<ul style="list-style-type: none"> • Provides coordination of plant operations and tag-out activities. 	<ul style="list-style-type: none"> • Identifies the need for tag-out of equipment for surveillance or maintenance. 	<ul style="list-style-type: none"> • Implements tag-outs on equipment and communicates status to MCA RO.

Table 4.1-2. Example 2 - Staff Roles for Plant Event Mitigation

<u>MCA RO</u>	<u>MCR Supervisor</u>	<u>Shift Manager</u>	<u>STA</u>
<ul style="list-style-type: none"> • Takes reasonable actions using non-safety plant systems to mitigate or terminate plant transients without challenging the safety systems. 	<ul style="list-style-type: none"> • Commands and supervises activities in the MCA. Designates specific operational responsibilities to ROs when multiple ROs are conducting operations. • Conducts frequent, periodic, direct monitoring of MCR activities and performs job observations. • Approves all evolutions or testing affecting core reactivity. • Evaluates plant performance and makes operational judgments based on operating characteristics, reactor behavior, and instrument interpretation. • Ensures shift operations are conducted in accordance with plant procedures and operating license, including tracking limiting conditions for operation. 	<ul style="list-style-type: none"> • Determines the rate for required shutdown or cooldown such that the required condition is completed in a controlled manner within specified times. 	<ul style="list-style-type: none"> • Reports to MCR Supervisor in a technical advisory capacity during emergencies, but has no control or command functions. • Independently performs an evaluation of operability of equipment to comply with technical specifications.

4.1.2 Staffing Assumption:

In the access controlled area within the MCA section of the MCR

One MCA RO (a licensed RO)

In the MCA section of the MCR

One MCR Supervisor (a licensed Senior Reactor Operator [SRO])

Elsewhere in the Plant (but available to the MCR, when necessary)

One Shift Manager (licensed SRO)

One SRO with expertise applicable for performing the STA role
(This role can be performed by one of the available staff members performing a different role.)

Two Equipment Operators (non-licensed)

In Subsections 4.2 through 4.6, role-specific responsibilities are identified for each of the above staff positions. The responsibilities of the STA are listed as a separate role that can be performed by an available SRO with the applicable expertise, who may also be performing another staff function. The STA role is listed separately because it has a specific and unique scope and is therefore a distinct job. STA interfaces to staff members and the OCS HSI are also specific for that role.

4.2 MAIN CONTROL AREA REACTOR OPERATOR POSITION

The role of the MCA RO position includes the following operations duties and responsibilities:

4.2.1 All Operations

RO-1. Operates equipment controlled from the MCA. These responsibilities include:

- a. Manipulating actual controls
- b. Monitoring equipment and system parameters
- c. Documenting evolutions and significant events
- d. Performing operator actions required by Alarm Response Procedures

- e. Prioritizing alarms and interpreting alarm significance
(NUREG 1122, Sections 2.4.31 and 2.4.45 [Reference 8])
- f. Diagnosing and recognizing trends
(NUREG 1122, Section 2.4.47 [Reference 8])

RO-2. Conducts and verifies component lineups.
(NUREG 1122, Section 2.1.29 [Reference 8])

RO-3. Uses valid and redundant/supporting plant indications when deciding to act on observations.

RO-4. Takes reasonable actions to preserve the integrity of plant components.

RO-5. Takes reasonable actions to protect the health and safety of plant personnel and others working on and around the plant process equipment.

RO-6. Maintains cognizance of short-term information such as standing orders or night orders. (NUREG 1122, Section 2.1.15 [Reference 8])

RO-7. Interfaces with plant personnel to coordinate activities supporting or otherwise related to plant operations, such as:

- a. Announcement of mode changes (OSA-1 [Reference 6])
- b. Notification of grid control (load dispatcher) of conditions that could significantly affect station load
- c. Requests to Chemistry to take primary or secondary system samples (OSA-1 [Reference 6])
- d. Requests to Mechanical Maintenance (OSA-1 [Reference 6])
- e. Requests to Health Physics (OSA-1 [Reference 6])
- f. Requests to Plant Engineering (OSA-1 [Reference 6])

RO-8. Remains in the access controlled area within the MCA unless another individual with a valid RO license is designated as the “operator at the controls” to take over that position in the MCA.

4.2.2 Normal Operations

- RO-9. Performs operator actions required by system specific or normal (general) operating procedures. (NUREG 1122, Section 2.1.23 [Reference 8])
- RO-10. Initiates power reductions if required to prevent reactor trip or equipment damage.
- RO-11. Maintains plant conditions within limitations of plant license and identifies less than one hour technical specification action statements when they occur. (NUREG 1122, Sections 2.1.10 and 11 [Reference 8])
- RO-12. Initiates holds during plant evolutions to ensure that the evolution does not threaten plant stability, damage equipment, threaten personnel safety or violate plant Technical Specifications or operating procedures.
- RO-13. Coordinates conduct of surveillance tests.
- RO-14. Takes control room log readings and reviews and approves logs that are generated automatically.
- RO-15. Provides current plant and system status for shift turnover briefing. (NUREG 1122, Section 2.1.3 [Reference 8])
- RO-16. Performs operator MCR actions supporting fuel handling, including response to alarms, communicating with the fuel storage facility, operating systems supporting refueling operations, and stopping fuel movement if conditions warrant. (NUREG 1122, Section 2.2.30 [Reference 8])
- RO-17. Understands and maintains system and equipment status required by Technical Specifications for reduced inventory and mid-loop operations during an outage.
- RO-18. Directly supervises hot license class candidates taking the controls or non-licensed operators operating control room equipment.
- RO-19. Interfaces with maintenance personnel who are conducting periodic tests of plant equipment or systems, and monitors control room responses to test activities.
Example: Instrumentation and Control (I&C) maintenance personnel testing I&C hardware or software. (OSA-1 [Reference 6])

4.2.3 Plant Transients and Emergencies

- RO-20. Takes reasonable actions using non-safety plant systems to mitigate or terminate plant transients without challenging the safety systems.
- RO-21. Anticipates, as can be reasonably expected, impending reactor trip and manually initiates reactor trip. Initiates reactor trip if indications exceed automatic reactor trip setpoints and a trip has not occurred.
- RO-22. Anticipates, as can be reasonably expected, impending turbine trip and manually initiates turbine trip. Initiates turbine trip if indications exceed automatic turbine trip setpoints and a trip has not occurred.
- RO-23. Anticipates, as can be reasonably expected, impending engineered safety feature (ESF) actuations and manually initiates (with the concurrence of the MCR Supervisor) the ESF prior to automatic initiation. Initiates ESFs if indications exceed automatic actuation setpoints and an actuation has not occurred.
- RO-24. Executes Emergency Operating Procedure (EOP) or Abnormal Operating Procedure (AOP) steps and initiates or performs required operator actions.
- RO-25. Takes reasonable actions (with the concurrence of the MCR Supervisor) to operate equipment that is not specifically called for by the EOPs for accident mitigation.
- RO-26. Monitors post accident instrumentation to determine critical safety function status, safety system status and radiological release. (NUREG 1122, Section 2.4.3 [Reference 8])

4.3 MCR SUPERVISOR

The role of the MCR Supervisor includes the following operations duties and responsibilities:

4.3.1 All Operations

- MCRS-1. Commands and supervises activities in the Main Control Area. Designates specific operational responsibilities to ROs when multiple ROs are conducting operations.
- MCRS-2. Conducts frequent, periodic direct monitoring of MCR activities and performs job observations.

- MCRS-3. Approves all evolutions or testing affecting core reactivity.
- MCRS-4. Obtains and verifies controlled procedure version. (NUREG 1122, Section 2.1.21 [Reference 8])
- MCRS-5. Determines mode of operation. (NUREG 1122, Section 2.1.22 [Reference 8])
- MCRS-6. Evaluates plant performance and makes operational judgments based on operating characteristics, reactor behavior and instrument interpretation. (NUREG 1122, Section 2.1.7 [Reference 8])
- MCRS-7. Tracks inoperable alarms. (NUREG 1122, Section 2.4.33 [Reference 8])
- MCRS-8. Ensures MCR staff maintains cognizance of short-term information such as standing orders or night orders. (NUREG 1122, Section 2.1.15 [Reference 8])
- MCRS-9. Remains in the MCA unless another individual with a valid SRO license is designated to assume responsibility as the MCR Supervisor.

4.3.2 Normal Operations

- MCRS-10. Ensures shift operations are conducted in accordance with plant procedures and operating license including tracking limiting conditions for operation. (NUREG, Section 1122 2.2.23 [Reference 8])
- MCRS-11. Maintains primary and secondary chemistry control. (NUREG 1122, Section 2.1.34 [Reference 8])
- MCRS-12. Maintains awareness of all maintenance, testing, troubleshooting or other activities that could affect unit operation and the risk associated with each activity, and takes necessary actions to prevent inadvertent actuation signals.
- MCRS-13. Ensures operations surveillances are conducted on schedule.
- MCRS-14. Prepares scheduled work activities including:
- a. Reviewing work order schedules and their potential impact on operations
 - b. Implementing and removing tag-outs
 - c. Directly interfacing with work crews

- MCRS-15. Approves removal from service of equipment and systems for maintenance, testing, or operational activities, and return of such equipment to service.
- MCRS-16. Conducts shift briefings prior to the start of each shift.
- MCRS-17. Controls access to the MCA (in the absence of the Shift Manager).
- MCRS-18. Supervises implementation of radiological waste management program with respect to shift operations.
- MCRS-19. During plant operating modes 4, 5, and 6, maintain awareness of the following in order to ensure that the requirements regarding safe shutdown configuration controls are satisfied:
- a. Defense-in-depth configuration
 - b. Thermal margin
 - c. Containment closure status; including equipment hatch status and exceptions to containment closure including contingency actions for these exceptions
- MCRS-20. Initiates maintenance or trouble shooting requests for identified equipment problems.

4.3.3 Plant Transients and Emergencies

- MCRS-21. Determines circumstances surrounding and causes of a reactor trip or substantial unexplained power excursion and determines if the reactor can be returned to power operation safely. Obtains necessary approvals before return to power.
- MCRS-22. Initiates reports of reactor trips and other events reportable to the Nuclear Regulatory Commission (NRC).
- MCRS-23. Selects and prioritizes emergency procedure implementation. (NUREG 1122, Section 2.4.23 [Reference 8])
- MCRS-24. Assesses anticipated ESF actuations and, if appropriate, provides concurrence for the MCA RO to manually initiate the ESF prior to automatic initiation.
- MCRS-25. When necessary, coordinates with the RO and performs control actions to actuate ESF functions that have onerous consequences.

- MCRS-26. Assesses critical safety function status and priorities with appropriate logic and parameters. (NUREG 1122, Sections 2.4.21 and 2.4.22 [Reference 8])
- MCRS-27. Assesses effectiveness of EOP implementation and, if appropriate, provides concurrence for the MCA RO to take reasonable actions to operate equipment that is not specifically called for by the EOPs for accident mitigation.
- MCRS-28. Controls radiation releases and guards against personnel exposure. (NUREG 1122, Sections 2.3.10 and 2.3.11 [Reference 8])
- MCRS-29. Performs MCR functions required by Emergency Plan, Health Physics Manual, and Security Plan.

4.4 SHIFT MANAGER

The role of the Shift Manager includes the following operations, duties, and responsibilities that are normally performed from outside the MCR:

4.4.1 All Operations

- SMGR-1. Ensures plant operations are conducted in accordance with Technical Specifications and approved procedures.
- Including:
- a. Approval of Plant Engineering recommendations (OSA-1 [Reference 6])
- SMGR-2. Makes equipment operability determinations.
- SMGR-3. Ensures proper conduct of shift turnover and crew briefs.
- SMGR-4. Ensures that temporary procedure changes are properly administered.
- SMGR-5. Determines the rate for required shutdown or cooldown such that the required condition is completed in a controlled manner within specified times.
- SMGR-6. Reviews operations logs, condition and event reports, and other documentation from the MCR and ensures notification to appropriate operations management.

SMGR-7. Ensures clear communication between the MCR and other groups. These responsibilities include:

- a. Coordination of personnel activities outside the MCR, including control of access to vital/controlled areas (NUREG 1122, Sections 2.1.8 and 2.1.13 [Reference 8]).

4.4.2 Normal Operations

SMGR-8. Maintains cognizance of current and upcoming maintenance activities for proper coordination.

SMGR-9. Coordinates refueling operations.

4.4.3 Plant Transients and Emergencies

SMGR-10. Assesses risk and makes conservative operations decisions.

SMGR-11. Ensures that required trip investigations are completed.

SMGR-12. Ensures clear communication of emergency related information between the MCR and other groups. These responsibilities include:

- a. Declaring plant emergencies
- b. Ensuring mitigating actions are implemented by all plant groups
- c. The interface to the Technical Support Center (OSA-1 [Reference 6])
- d. Ensuring on-site and off-site notifications are executed
- e. Notifying plant management of the emergency condition
- f. Acting as Interim Emergency Director until relieved by a designated Emergency Director

SMGR-13. Controls access to the MCA; however, may delegate this responsibility to the MCR Supervisor.

SMGR-14. Maintains broad perspective of conditions affecting overall plant safety and oversight of MCR operations.

SMGR-15. Coordinates the fire protection program and the fire brigade, and directs fire protection procedures. (NUREG 1122, Section 2.4.25 [Reference 8])

4.5 SHIFT TECHNICAL ADVISOR ROLE

The role of the Shift Technical Advisor includes the following operations, duties, and responsibilities:

4.5.1 All Operations

STA-1. Assesses possible significant plant abnormalities (e.g., RCS abnormalities) observed during normal operations at the request of the MCR Supervisor.

4.5.2 Plant Transients and Emergencies

STA-2. Reports to MCR Supervisor in a technical advisory capacity during emergencies, but has no control or command functions.

STA-3. Independently performs an evaluation of operability of equipment to comply with Technical Specifications.

STA-4. Independently performs investigation of causes of abnormal events and classifies emergency conditions.

STA-5. Independently evaluates effectiveness of AOPs or EOPs to terminate or mitigate events.

STA-6. Independently monitors and validates Critical Safety Function Status Trees and recommends transition to Functional Restoration Procedures.

STA-7. Independently assesses plant parameters to ascertain whether core damage has occurred or is imminent.

4.6 EQUIPMENT OPERATOR

The role of the Equipment Operator is to perform operations, duties, and responsibilities as directed from the MCR. These are normally performed outside the MCR and include:

4.6.1 All Operations

- EO-1. Locally performs unit evolutions and system operations under the direction and command of the MCR Supervisor.
- EO-2. Communicates any abnormal conditions or operability concerns to supervision.

4.6.2 Normal Operations

- EO-3. Locally monitors plant equipment.
- EO-4. Takes responsibility for cleanliness of plant equipment.

5.0 ALTERNATE STAFFING SCENARIOS

5.1 STAFFING SCENARIOS CONSIDERED

The OCS is designed to accommodate a wide range of MCR staff complements.

In this section, the impact on the staff role descriptions provided in Section 4 is identified for 3 conditions:

- Addition of a Unit Supervisor (SRO qualified) to the minimal staffing contingent addressed in Section 4.
- Accommodation of a large complement of control room staff, approximately corresponding to the maximum capacity that can be supported by the MCR emergency habitability system in a passive heat removal mode. MCR staff for this condition includes multiple ROs at the controls and multiple observers attending within the MCR.
- A brief assessment of the effect on staff role descriptions, if the MCA RO and MCR Supervisor are performing their functions from the RSW.

5.2 ADD A UNIT SUPERVISOR TO THE ASSUMED MINIMAL STAFF

This section identifies the effect on staff roles of adding a Unit Supervisor to the minimal staff complement addressed in Section 4. The Unit Supervisor, whose responsibilities include supervising plant-wide activities, is sometimes referred to as a “Work Supervisor.” An SRO license is required for this position, which is normally performed outside of the MCR.

This staffing scenario is included to address feedback from operations personnel representing expected owner operators of AP1000 units.

5.2.1 Staffing Assumption

In the access controlled area within the MCA section of the MCR

One MCA RO (licensed RO)

In the MCA section of the MCR

One MCR Supervisor (licensed SRO)

Elsewhere in the Plant (but available to the MCR when necessary)

One Shift Manager (licensed SRO)

One Unit Supervisor (licensed SRO)

One SRO with expertise applicable for performing the STA role
(This role can be performed by one of the available staff members
performing a different role.)

Two Equipment Operators (non-licensed)

5.2.2 Role of MCA RO, Shift Manager, STA and EOs

For this staffing scenario, the roles for the MCA RO, Shift Manager, STA, and non-licensed operators remain unchanged from those determined for the minimum staffing assumption in Section 4. The role of the Unit Supervisor, and changes to the role of the MCR Supervisor, are described below.

5.2.3 Role of MCR Supervisor

The MCR Supervisor has the same duties and responsibilities as determined for the minimal staffing complement in Section 4, except that the following two normal operations duties are transferred to the Unit Supervisor:

MCRS-14. Prepares scheduled work activities including:

- a. Reviewing work order schedules and their potential impact on operations
- b. Implementing and removing tag-outs
- c. Directly interfacing with work crews

MCRS-19. During plant operating modes 4, 5, and 6, maintain awareness of the following in order to ensure that the requirements regarding safe shutdown configuration controls are satisfied:

- a. Defense-in-depth configuration
- b. Thermal margin

- c. Containment closure status; including equipment hatch status and exceptions to containment closure including contingency actions for these exceptions

5.2.4 Unit Supervisor

The role of the Unit Supervisor includes the following operations, duties, and responsibilities:

5.2.4.1 Normal Operations:

- US-1. Prepares scheduled work activities, including:
 - a. Reviewing work order schedules and their potential impact on operations
 - b. Implementing and removing tag-outs
 - c. Directly interfacing with work crews
- US-2. Communicates through the MCR Supervisor to request work activities performed by the MCA RO.
- US-3. Informs the MCR Supervisor of information from work activities involving Technical Specification compliance or equipment operability determinations.
- US-4. During plant operating modes 4, 5, and 6, maintains awareness of the following in order to ensure that the requirements regarding safe shutdown configuration controls are satisfied:
 - a. Defense-in-depth configuration
 - b. Thermal margin
 - c. Containment closure status; including equipment hatch status and exceptions to containment closure including contingency actions for these exceptions

5.2.4.2 Plant Transients and Emergencies:

- US-5. Coordinates plant actions under direction from the Shift Manager.
- US-6. Supports the operations staff in the MCA and MCR on an as-needed basis.

5.3 ASSUMED LARGE STAFF COMPLEMENT IN THE MAIN CONTROL ROOM

This section identifies the operating staff roles for a large complement of staff and visitors in attendance in the MCR. For this staffing scenario, the total complement corresponds approximately to the maximum capacity of the emergency habitability system for the MCR (i.e., assuming passive heat removal).

5.3.1 Staffing Assumption

In the access controlled area within the MCA section of the MCR

- One MCA RO (licensed RO)
- One MCR Supervisor (licensed SRO)
- First additional licensed RO (normally non-designated elsewhere in the MCR)
- Second additional licensed RO (normally elsewhere in the plant)
- One Unit Supervisor (licensed SRO)
- One STA

Elsewhere in the MCA section of the MCR

- One Shift Manager (licensed SRO)
- One Communicator (for communications external to the MCR)
- One NRC Observer
- One Plant Management Observer
- One additional member of the operations staff

Elsewhere in the Plant

- Two Equipment Operators (non-licensed)

5.3.2 Staff Roles

This assessment determined that, for the large complement of operators and observers assumed above, the duties and responsibilities of the MCR Supervisor, the Shift Manager, and the non-licensed operators remain unchanged from the roles determined in Section 4 for the minimal staff complement.

The STA performs the same duties and responsibilities that were identified for the STA role for the minimal staffing scenario addressed in Section 4.

The duties and responsibilities performed by the MCA RO as outlined in Section 4 are now divided between the MCA RO and the first additional RO. Coordination of their activities would now be an additional responsibility of the MCR Supervisor.

The duties and responsibilities performed by the second additional RO in the MCR are special tasks not affecting plant control and are directed by the MCR Supervisor or Shift Manager.

The Unit Supervisor performs the same role as identified in Section 5.2 and any additional tasks assigned by the Shift Manager or the MCR Supervisor.

The MCR Supervisor and the Shift Manager have the same duties as defined in Section 4, as well as coordination and direction of the additional attendant staff, including the Communicator. Also, the Shift Manager will interface with the NRC observer and plant management observer. The observers do not take active part in operations and will not require HSI devices for their observations of the MCR operations.

In summary, the only additional duties and responsibilities identified for the operating staff when there is a large complement in the MCR, is the additional supervision, coordination, and communication required. It is anticipated that these additional duties and responsibilities will be adequately accommodated by the additional staff available.

5.4 OPERATION FROM THE REMOTE SHUTDOWN WORKSTATION

5.4.1 Staffing Assumption

At the Remote Shutdown Workstation

One RO (licensed RO)

One Supervisor (licensed SRO)

Elsewhere in the Plant

One Shift Manager (licensed SRO)

One SRO with expertise applicable for performing the STA role
(This role can be performed by one of the available staff members performing a different role.)

Two Equipment Operators (non-licensed)

5.4.2 Staff Duties and Responsibilities

The duties and responsibilities of the RO and Supervisor (SRO) stationed at the RSW are the same as determined, respectively, for the MCA RO and the MCR Supervisor for the minimal staffing complement described in Section 4. Based on U.S. NRC licensing criteria, it is not expected that operators will have to mitigate accidents from the RSW.

6.0 SUMMARY

As a basis for proceeding with the AP1000 MCR design and HSI detailed designs, this document has defined the operational roles and responsibilities for three staffing scenarios:

1. A minimal complement of operating staff:
 - One RO and one MCR Supervisor (SRO) in the MCA
 - One Shift Manager (SRO)
 - One SRO with expertise applicable for performing the STA role (This role can be performed by one of the available staff members performing a different role.)
 - Two Equipment Operators
2. The minimal staff complement plus a Unit Supervisor (SRO) to supervise plant work activities.
3. A large staff complement, including ten staff members plus two observers present in the MCA.

This document, “AP1000 Standard COLA Technical Report,” also considers the affect on the roles of the RO and SRO if they are stationed at the RSW.

A review of OSA-1 (Reference 6) was performed to establish that the assumptions and results of that task analysis are appropriately considered in determining the scope and responsibilities for the operating staff identified here. Reference 6 presents detailed task sequences associated with the operation of the AP1000 plant for a broad spectrum of plant scenarios, including both normal operations and emergency procedures. It provides operational sequence diagrams for normal operating procedures, and for each selected plant event scenario it provides a road map of the path to follow through the associated EOP. The review established that both Reference 6 and the COLA Technical Report provided here apply the same assumptions regarding staffing goals (see Section 3). The review also determined that the detailed task sequences presented in Reference 6 are appropriately represented in the more general descriptions of operating staff roles and responsibilities identified in this document.

This document provides information which may be used by a Combined License (COL) applicant (referencing the AP1000 certified design) to address COL Information Item 18.5-2, specified in Reference 3.

7.0 REFERENCES

1. APP-OCS-GBH-001, Rev. A (Proprietary), "AP1000 Human Factors Engineering Program Plan," Westinghouse Electric Company LLC.
2. APP-OCS-GJR-002, Rev. B (Proprietary), "Concept of Operation (AP1000)," Westinghouse Electric Company LLC. [LATER]
3. APP-GW-GL-700, Rev. 15 (Non-Proprietary), "AP1000 Design Control Document," Westinghouse Electric Company LLC.
4. NUREG-1793, *Final Safety Evaluation Report Related to Certification of the AP1000 Standard Design*, U.S. Nuclear Regulatory Commission, September 2004.
5. WCAP-14694, Rev. 0 (Non-Proprietary), "Designer's Input to Determination of the AP600 Main Control Room Staffing Level," Westinghouse Electric Company LLC.
6. APP-OCS-JIR-120, Rev. 0 (Proprietary), "AP1000 Operational Sequence Analysis (OSA-1) Summary Report," Westinghouse Electric Company LLC.
7. APP-OCS-J7-001, Rev. B (Proprietary), "AP1000 Operations and Control Centers System System Specification Document," Westinghouse Electric Company LLC.
8. NUREG 1122, Rev. 2, *Knowledge and Abilities Catalog for Nuclear Power Plant Operators: Pressurized Water Reactors*, U.S. Nuclear Regulatory Commission.
9. APP-GW-GLR-081, Rev. 0 (Proprietary), "Closure of COL Information Item 18.5-1, Task Analysis," (Technical Report 81), Westinghouse Electric Company LLC.

8.0 REGULATORY IMPACT

Reference 4, the Final Safety Evaluation Report (FSER), discusses the AP1000 task analysis process in Subsection 18.5. Preparation of a report on MCR staff roles and responsibilities is one of the activities included in the process. The FSER conclusions in Subsection 18.5 are not impacted by the completion of this report prior to submittal of a Combined License application.

The change to the DCD (Reference 3) presented in this report do not represent an adverse change to the design function or to how design functions are performed or controlled. The changes to the DCD do not involve revising or replacing a DCD-described evaluation methodology, nor do they involve a test or experiment not described in the DCD. The DCD change does not require a license amendment per the criteria of VIII. B. 5.b. of Appendix D to 10 CFR Part 52.

The DCD change does not affect resolution of a severe accident issue and does not require a license amendment based on the criteria of VIII. B. 5.c of Appendix D to 10 CFR Part 52.

The DCD change does not affect any security assessment performed for AP1000.

9.0 DCD MARKUP

The following DCD markups are intended for Revision 16 of the DCD.

18.5.4 Combined License Information

Westinghouse intends to divide section 18.5.4 into two subsections. Section 18.5.4.1 will be titled "Task Analysis Implementation" and is addressed by "Closure of COL Information Item 18.5-1, Task Analysis" (Reference 9). Section 18.5.4.2 will be titled "Main Control Room Position Scope and Responsibilities" and is addressed by this document.

The second sentence of 18.5.4 will be replaced by:

18.5.4.2 Main Control Room Position Scope and Responsibilities

The Combined License information requested in this subsection has been fully addressed in APP-GW-GLR-010 (Reference 15), and the applicable changes are incorporated into the DCD. No additional work is required by the Combined Operating License applicant to address the Combined License information requested in this subsection.

The following words represent the original Combined Operating License Information Item commitment, which has been addressed as discussed above.

Combined License applicants referencing the AP1000 certified design will document the scope and responsibilities of each main control room position, considering the assumptions and results of the task analysis.

18.5.5 References

Add Reference 15 to Subsection 18.5.5:

15. APP-GW-GLR-010, Rev. 2, "AP1000 Main Control Room Staff Roles and Responsibilities," June 2007.

* Note: APP-GW-GLR-081 (Reference 9) adds Reference 14 to Section 18.5 of the DCD.