



Calvert Cliffs Nuclear Power Plant

NEI 12-01 On-Shift Staffing Analysis

Phase 1

NRC Submittal - Draft

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

References:

1. Letter from E. J. Leeds (NRC) and M. R. Johnson, (NRC) to All Power Reactor Licensees and Holders of Construction Permits in Active or Deferred Status, dated March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendation 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident
2. CENG letter to the NRC dated May 11, 2012, Sixty-Day Response to 10CFR50.54(f) Request for Information
3. NEI 12-01, Revision 0, May 2012, Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities
4. NEI 10-05, Revision 0, June 2011, Assessment of On-Shift Emergency Response Organization Staffing and Capabilities
5. NSIR/DPR ISG-01, Interim Staff Guidance Emergency Planning for Nuclear Power Plants, Revision 0, November 2011
6. CENG letter to the NRC dated June 8, 2012, Ninety-Day Response to Recommendation 9.3 of 10 CFR 50.54(f) Request for Information
7. Letter from D. L. Skeen (NRR) to Susan Perkins-Grew (NEI) dated May 15, 2012, U.S. Nuclear Regulatory Commission Review of NEI 12-01, "Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities," Revision 0, dated May 2012
8. CENG letter to the NRC dated June 6, 2012, Supplemental Information for the Sixty-Day Response to 10 CFR 50.54(f) Request for Information

Introduction

Enclosure 5 to Reference 1 requested licensees to provide a report of an assessment of staffing needed to respond to a large scale natural event. Reference 7 endorsed a 2-phase approach to the schedule presented in Reference 1. Reference 2 presented an alternate schedule to Reference 1 and stated that an onsite and augmented staffing assessment considering all requested functions except those related to Near Term Task Force (NTTF) Recommendation 4.2 (Phase 1 staffing assessment) would be provided. This report provides that assessment for Calvert Cliffs Nuclear Power Plant (CCNPP), which was conducted using the guidance in Interim Staff Guidance NSIR/DPR ISG-01, NEI 10-05, and NEI 12-01 (References 5, 4, and 3, respectively).

Staffing Assessment Process Overview

The NEI 12-01 On-Shift Staffing Analysis (OSA) Phase 1 was conducted by a multi-disciplined team using site procedures to determine if tasks have been sufficiently analyzed for performance by the minimum on-shift staff as designated in the Emergency Plan. Task areas analyzed include:

- Event Mitigation (Emergency Operating Procedures (EOP), Abnormal Operating Procedures (AOP), other site procedures)
- Radiation Protection (RP) and Chemistry Technician Functions (as specified in site response procedures)
- Emergency Preparedness Functions (NUREG-0654 Table B-1/ISG -01)

Existing strategies for responding to an extended loss of AC power affecting all on-site units were considered in the OSA. The staffing assessment addressed the ability of the on-shift staff to perform any

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

required emergency response functions that would be degraded or lost prior to the delayed arrival of the augmented Emergency Response Organization (ERO).

The regulatory analysis requires that the scenarios be evaluated using the approved minimum staffing in the Emergency Plan. The results of the CCNPP NEI 10-05 On-shift Staffing Analysis Phase II conducted early in 2012 (to meet requirements of 10CFR50 Appendix E, effective on December 23, 2011) identified that Attachment 3-2 of the CCNPP Emergency Response Plan (ERP) required revision to be consistent with minimum staffing requirements as delineated in CCNPP Procedure NO-1-200, Control of Shift Activities. As a result, the following minimum on-shift personnel staffing table was used for performance of the CCNPP NEI 12-01 Phase 1 staffing assessment.

Staffing Table 1 – Minimum On-Site Staffing

Position	On-Shift
Shift Manager (SRO)	1
CR Supervisor U-1 (SRO)	1
CR Supervisor U-2 (SRO)	1
Shift Technical Advisor	1
Control Operator U-1 (RO)	1
Control Operator U-2 (RO)	1
Reactor Operator U-1 (RO)	1
Reactor Operator U-2 (RO)	1
OSO (AO)	1
TBO-1 (AO)	1
TBO-2 (AO)	1
ABO-1 (AO)	1
ABO-2 (AO)	1
Shift RP Technician (RPT)	1
Shift Chemistry Technician	1
Fire Brigade (AO)	5
Security	Per Sec Plan

On December 13, 2012, based on the results of the CCNPP On-Shift Staffing Analysis (Phases I, II, and III) conducted to meet requirements of the revised 10 CFR Part 50, Appendix E, Emergency Preparedness Rule, the on-shift minimum staffing commitment in the CCNPP ERP was revised to include on-shift staff that were not previously credited. Compared to the minimum required on-shift positions staffing table used for this NEI 12-01 Phase 1 assessment, the revised CCNPP ERP includes two additional minimum required on-shift positions. Staffing Table 2 represents the current CCNPP ERP requirements. Differences from Staffing Table 1 are denoted in bold font and italics.

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

Staffing Table 2 – Current CCNPP ERP Minimum On Site Staffing Requirements

Revised CCNPP ERP Attachment 3-2, Minimum On-Site Staffing Requirements	
Position	On-Shift
Shift Manager (SRO)	1
CR Supervisor U-1 (SRO)	1
CR Supervisor U-2 (SRO)	1
Shift Technical Advisor	1
Control Operator U-1 (RO)	1
Control Operator U-2 (RO)	1
Reactor Operator U-1 (RO)	1
Reactor Operator U-2 (RO)	1
<i>Operations Technical Advisor (SRO/RO)</i>	<i>Per CCNPP FSAR</i>
OSO (AO)	1
TBO-1 (AO)	1
TBO-2 (AO)	1
ABO-1 (AO)	1
ABO-2 (AO)	1
Shift RP Technician (RPT)	2
Shift Chemistry Technician	1
<i>Emergency Communicator</i>	<i>1</i>
Fire Brigade (AO)	5
Security	Sec Plan

NEI 12-01 Phase 1 Assessment Results:

No conflicts or overlaps in functions or tasks required to be performed by on-shift operations and support personnel were identified during this analysis. No Transition Phase actions were required within the first six hours of the event.

Using NEI 12-01 guidance, the minimum On-Shift Staff as defined in Staffing Table 1 performed all actions required by operating and emergency plan procedures in the 6 hour period relying only on installed structures, systems and components remaining in the initial phase of the response. Plant conditions did not require any other equipment to be used.

During the tabletop procedural analysis, enhancements to Block Step J of EOP-7, Station Blackout, to protect electronic equipment from overheating were discovered. Specifically,

- The procedure expects the actions in Block Step J to be completed within the first 30 minutes. The tabletop review did not get to the step until after the first half hour.
- The notes in the procedure differ from the wording in the basis. The Technical Basis for Block Step J defines that performing this step early is important because the plant computer is a

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

significant load on the batteries. However, the step occurs too far into the procedure to permit it to be performed in the appropriate time frame.

These two enhancements were subsequently corrected with a revision to ensure Block Steps J.1 through J.3 can be completed in less than 30 minutes.

One additional enhancement was identified. The transitions between the EOPs and the ERP Implementing Procedures (ERPIPs) for Severe Accident Management Guidelines (SAMG) and Extensive Damage Management Guideline (EDMG) are not clearly referenced. This enhancement is related to NTF Recommendation 8.0, Integration of Emergency Procedures, and is currently planned to be addressed when CCNPP completes actions for this recommendation.

Phase 1 Staffing Assessment Details

The On-shift Staffing Analysis (Phase 1 of NEI 12-01) for Calvert Cliffs Units 1 and 2 was conducted on September 5, 2012 using the guidance of NEI 12-01(Reference 3) and NEI 10-05 (Reference 4).

The following personnel were present to complete the assessment:

Personnel (Position/Title)	Number	Organization/Department
Shift Manager (SM)	2	CCNPP / Operations
Senior Reactor Operator (SRO)	2	CCNPP / Operations
Shift Technical Advisor (STA) / SRO	1	CCNPP / Operations
Reactor Operator (RO)	3	CCNPP / Operations
Auxiliary Operator (AO) / Fire and Safety Watch	1	CCNPP / Operations
Radiation Protection Technician (RPT)	1	CCNPP / RP
Chemistry Technician	2	CCNPP / Chemistry
Emergency Preparedness (EP) Director	1	CCNPP / EP
EP Analyst	2	CCNPP / EP
Sr. Project Manager - EP	1	CENG / Nuclear Safety & Security
EP Specialist	3	EP Consulting, LLC

Assumptions:

The event was evaluated in the analysis using the combined staff from CCNPP Units 1 and 2 utilizing the following assumptions, consistent with NEI 12-01 and applicable assumptions from NEI 10-05.

NEI 12-01 - Assumptions for Staffing Assessment:

1. A large-scale external event occurs (earthquake) that results in:
 - all on-site units affected
 - extended loss of AC power
 - impeded access to the units
2. Initially, all on-site reactors are operating at full power and are successfully shut down.
3. A Hostile Action directed at the affected site does not occur during the period that the site is responding to the event.

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

4. The event impedes site access as follows:
 - A. Post-event time: 6 hours – No site access. This duration reflects the time necessary to clear roadway obstructions, use different travel routes, mobilize alternate transportation capabilities (e.g., private resource providers or public sector support), etc.
 - B. Post-event time: 6 to 24 hours – Limited site access. Individuals may access the site by walking, personal vehicle or via alternate transportation capabilities (e.g., private resource providers or public sector support).
 - C. Post-event time: 24+ hours – Improved site access. Site access is restored to a near-normal status and/or augmented transportation resources are available to deliver equipment, supplies and large numbers of personnel.
5. On-shift personnel are limited to the minimum complement allowed by the site emergency plan (i.e., the minimum required number for each required position). This would typically be the on-shift complement present during a backshift, weekend or holiday.
6. The phase 1 staffing assessment will consider the applicable actions from the Station Blackout (SBO) coping strategies in place at the time of the assessment. Such actions may include the shedding of non-essential battery loads, use of portable generators or batteries, opening room and cabinet doors, water/coolant conservation or makeup using portable equipment, etc. These actions do not include those associated with cross-tying AC power sources or electrical distribution busses between units since, as stated in assumption number 1; all on-site units are experiencing an extended loss of AC power.

Following the accident at Fukushima Dai-ichi, the Institute of Nuclear Power Operations (INPO) issued three Event Reports (referred to as IERs) requiring the assessment and implementation of a range of actions intended to improve the capabilities for responding to a beyond design basis event and an extended loss of AC power, including events that impact the cooling of spent fuel. The staffing assessment should include consideration of those IER improvement actions already implemented at the time of the assessment (e.g., incorporated into plant procedures). *Note: No IER improvement actions related to on-site staffing have been implemented at CCNPP at this time.*

Existing strategies for responding to an extended loss of AC power affecting all on-site units should be considered in the Phase 1 staffing assessment.

NEI 10-05 - Applicable Assumptions:

1. On-shift personnel can report to their assigned response locations within timeframes sufficient to allow for performance of assigned actions.
2. The on-shift staff possesses the necessary Radiation Worker qualifications to obtain normal dosimetry and to enter Radiologically Controlled Areas (but not high, locked high or very high radiation areas) without the aid of a Radiation Protection Technician.
3. It is assumed that personnel assigned to the major response area of Plant Operations & Safe Shutdown meet the requirements and guidance established by NRC regulations and are able to satisfactorily perform the functions and tasks necessary to achieve and maintain safe shutdown. Staff performance within this area is not evaluated as part of this assessment, unless a role/function/task from another major response area is assigned as a collateral duty.
4. On-site security organization: Performance of this function is regularly analyzed through other station programs and will not be evaluated here, unless a role or function from another major response area is assigned as a collateral duty.

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

5. Individuals holding the position of Radiation Protection Technician or Chemistry Technician are qualified to perform the range of tasks expected of their position.
6. The task of making a simple and brief communication has minimal impact on the ability to perform other assigned functions/tasks, and is therefore an acceptable collateral duty for all positions. Examples include making a plant page announcement or placing a call for assistance to an offsite resource such as local law enforcement. This assumption does not apply to emergency notification to an Offsite Response Organization (ORO) or the NRC.
7. The task of performing a peer check has minimal impact on the ability to perform other assigned functions/tasks, and is therefore an acceptable collateral duty for all positions. Examples include performing a peer check on a recommended emergency classification or notification form for transmittal to offsite authorities.
8. The analyzed events occur during off-normal work hours at a time when augmented ERO responders are not at the site (e.g., during a backshift, weekend or holiday). For purposes of this analysis, and consistent with NEI 12-01 assumption 4, 360 minutes (6 hours) will be used as the time period for the conduct of on-shift ERO response actions.

Methodology

As previously stated, the on-shift staffing assessment was performed using NEI 12-01 (Reference 3) and NEI 10-05 (Reference 4). Subject matter experts from CCNPP, CENG, and an outside consultant were assembled to provide analysis support during the Phase 1 OSA. The assessment was conducted via a tabletop procedural analysis using CCNPP site procedures to determine if tasks have been sufficiently analyzed for performance by the minimum on-shift staff as designated in the Emergency Plan. The following provides a summary of the process that was utilized:

Each on-shift position from Staffing Table 1 was entered in Table 1 of Attachment 1. For position titles with more than one position holder, a unique sequential number was assigned to each position. For example, RO #1, RO #2 etc. The site emergency plan reference that describes the requirement for the position to be on-shift was then entered into column 3 of Table 1 of Attachment 1. Using only the on-shift positions entered in Table 1 of Attachment 1, the following Attachment 1 tables were completed by entering the shift position that fills a described role, or performs a specific function or tasks:

- Table 2 - Plant Operations & Safe Shutdown
- Table 3 – Firefighting
- Table 4 – Radiation Protection & Chemistry
- Table 5 - Emergency Plan Implementation

Following completion of each of the above tables, each On-shift position assigned to the associated table was located on Table 1 of Attachment 1. For each position, the table number and associated line number was then entered in column 5, “Role in Table#/Line#”. If the associated task was not analyzed (i.e., performance capability has not been validated), a “Yes” would have been placed in column 6, “Unanalyzed Task?” If the task was analyzed, a “No” was placed in column 6. For any “Yes” in column 6, a Time Motion Study would have been required. For CCNPP, there were no unanalyzed tasks; thus, no Time Motion Studies were required to be conducted. In addition, the “CCNPP Timing Template” of Attachment 1 was populated listing each required task and resource (on-shift position) and the time required to complete the task. The timeline was analyzed out to six hours post-event time. Table 1 of Attachment 1 and the CCNPP Timing Template were then analyzed to identify any conflicts.

Minimum Shift Staffing Complement Determination

On-shift personnel are limited to the minimum complement allowed by the site emergency plan.

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

This would typically be the on-shift complement present during a backshift, weekend or holiday. The Staffing Table 1 – Minimum On-Site Staffing presented in the Staffing Assessment Process Overview section was used for performance of the CCNPP staffing assessment.

Tabletop Procedural Analysis of On-Shift Staffing for Extended SBO

The tabletop procedural analysis was conducted in the training area of the Office / Training Facility (OTF), which enabled the team to have ready access to procedures and other support documents. Using the guidance and documentation in NEI 10-05, the team performed a tabletop review of on-shift actions performed for both Units to address the extended SBO. This review included the identification of needed resources and the time required to complete identified actions for the first 6 hours.

The OSA was conducted by first reviewing the event initial conditions. This review provided the team with a basic understanding of the event and resulting emergency classification. The SRO reviewed EOP, AOP and other operating procedure actions and identified them to the team. Specific site procedures referenced during assessment of this postulated event included:

- U1/2 EOP-0, Post Trip Immediate Actions
- U1/2 EOP-7, Station Blackout, (Block Steps A through P)
- U1/2 EOP-8, Functional Recovery Procedure
- EOP Attachments (Attachment 12)
- AOP-6F, Spent Fuel Pool Cooling System Malfunctions
- AOP-7J, Loss of 120 Volt AC or 125 Volt DC Power
- ERPIP-3.0, Immediate Actions
- ERPIP-3.0 Attachment 28, Steam Generator Level Monitoring During Extensive Damage Mitigation

Specific resources needed to perform initial event response actions were identified from the EOP, AOP, or other operations procedures and documented as per the guidance in NEI 12-01 using the NEI 10-05 documentation process. The team determined when other on-shift resources, such as the RP or Chemistry Technician, would be required and identified the time required to perform expected emergency plan functions. This information was documented on the applicable tables from NEI 10-05. These tables are located in Attachment 1 of this report. The Emergency Plan functions for the event were reviewed and assigned to the on-shift resource responsible for performance of the identified function and documented as per NEI 12-01 using the NEI 10-05 documentation. Finally, the on-shift resources and their actions were summarized in the tables using the NEI 10-05 documentation process.

Phase 1 Staffing Assessment Conclusions:

No conflicts or overlaps in functions or tasks required to be performed by onsite operations and support personnel were identified during this analysis for both CCNPP Units 1 and 2. No Transition Phase actions were required within the first six hours of the event.

Using NEI 12-01 guidance, the minimum On-Shift Staff performed all actions required by operating and emergency plan procedures in the 6 hour period relying only on installed structures, systems and components remaining in the initial phase of the response. Plant conditions did not require any other equipment to be used.

During the tabletop procedural analysis, enhancements to Block Step J of EOP-7, Station Blackout to protect electronic equipment from overheating were discovered. Specifically:

- The procedure expects the actions to be completed within the first 30 minutes. The tabletop analysis did not get to the step until after the first half hour.

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

- The notes in the procedure differ from the wording in the basis. The Technical Basis for Block Step J defines that performing this step early is important because the plant computer is a significant load on the batteries. However, the step occurs too far into the procedure to permit it to be performed in the appropriate time frame.

These two enhancements were subsequently corrected with a revision to ensure Block Steps J.1 through J.3 can be completed in less than 30 minutes.

One additional enhancement was identified. The transitions between the EOPs and the ERPIPs for SAMG and EDMG are not clearly referenced. This enhancement is related to NTTF Recommendation 8.0, Integration of Emergency Procedures, and is currently planned to be addressed when CCNPP completes actions for this recommendation.

Event Analysis Post-Event Time > Six Hours – Plant Stabilization

As described in Assumption 4.B of this document, limited site access is assumed for the time period between 6 to 24 hours post-event time. The major tasks that are conducted by the on-shift crew for the post-event time greater than six hours include:

- Maintain (Reactor Coolant System (RCS)) Natural Circulation Flow Verification
- Maintain Sub-cooling, Controlled Cooldown (RCS)
- Steam Generator Inventory Control
- Restore Battery Charger
- ALTEK Thermocouple CET Temperatures (EOP attachment that provides direction for reading core exit thermocouples locally at the Post Accident Monitoring Sample (PAMS) cabinet).
- Monitor Spent Fuel Pool

Installed plant batteries will not be available at this time. Operations personnel will be performing manual actions to continue plant cooldown for both units and manually monitoring RCS and spent fuel pool parameters. It is assumed that the Technical Support Center (TSC) Manager, Operational Support Center (OSC) Director and several craft individuals will arrive on-site at this time. Shortly after arrival, the TSC Manager will need to begin implementing SAMGs. Two strategies will need to be employed to complete cooldown of the RCS at both units and establish long term decay heat removal.

1. Complete actions to restore power to the 125VDC battery buses. CCNPP procedure ERPIP-611, Severe Accident Management Restorative Actions, Attachment 2, Electrical Power Supplies.
2. Establish make up water to the Condensate Storage Tank (CST) from other on-site water storage tanks (e.g., fire water storage tank or the Ultimate Heat Sink (UHS) Chesapeake Bay). CCNPP procedure ERPIP-611, Severe Accident Management Restorative Actions, Attachment 8, CST Makeup using the B.5.b Pump.

Restoration of the 125VDC battery buses will allow operations to re-establish normal RCS monitoring. Establishing water to the CST is necessary to maintain decay heat removal of the RCS. To prevent depleting the CST, makeup will need to be initiated at ten hours post-event time. Currently, a B.5.b pump would be used to transfer water to the CST from another on-site water storage tank. Given the specified assumptions for the postulated event, completing this action should ensure adequate reactor core cooling through the 24 hour post-event time at which time full site access is restored.

In addition to a TSC Manager and OSC Director, four electricians would be required to complete

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

tasks associated with action 1 and four mechanics for action 2.

Mobilization of Expanded Response Capability Staffing:

CCNPP assumes that augmented ERO resources will be available at six hours post-event time. This is reasonable based on ERO notification protocols and the various methods available to restore site access.

Note: The CCNPP ERP specifies that all ERO personnel will initially report to the site in a declared event at an Alert level or higher. As a result, it is assumed that a majority of the ERO personnel, trained for their assigned positions will be on-site after 24 hours in the event of a Beyond Design Basis External Event (BDBEE). The CCNPP ERO consists of four fully staffed ERO teams.

Regarding notification of the augmented staff; site procedure EP-1-107, Emergency Response Organization Expectations and Responsibilities, Section 5.2.E.2 provides the following direction: “In the event of a regional blackout that causes an extended loss of communications capabilities, the Regulated/Required ERO positions for the duty team are expected to report to their ERFs as a precaution, as safe travel conditions allow.” This expectation has been communicated to the ERO via site-wide communications, and is reinforced in Basic Emergency Response Training taken annually by all ERO members.

ERPIP-901, Communications Equipment, provides detailed instructions to the ERO population on the various communications means available to them in the event their primary method is unavailable.

ERPIP-105, Control Room Communicator, provides detailed instructions on how to activate the Emergency Response Organization Notification System (ERONS) system, including back-up methods.

Regarding site access, the following methods of access are available to the CCNPP site. One or more of these methods are expected to be available after a widespread large scale natural event:

A. Types of Transport

1. Airlift

- CCNPP Visitor Center Field (Primary)
- Emergency Operations Facility (Alternate)
- Lower Laydown Area (Alternate)
- Old Bay Farm Field (Alternate)
- CCNPP site Parking lots
- Several large, level, open fields at the CCNPP site

2. Water

- Boats via the Chesapeake Bay to the CCNPP barge dock.

3. Roadways

- Maryland State Highway Route 2-4 North and South to site access roads
 - 1 primary (Calvert Cliffs Parkway)
 - 2 alternate access roads (Contractor and Camp Conoy).
- 500kV right of way inspection road south from Calvert Beach Road in Saint Leonard to Calvert Cliffs Parkway

B. Transport providers for the above types of transport available to CCNPP include:

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

1. Airlift
 - Maryland National Guard
 - Aberdeen Proving Ground
 - Maryland State Police
 - Atlantic Rotors Inc., St. Mary's County Airport
2. Water
 - Chesapeake Energy Services
3. Roadways
 - Personal vehicles

C. Provisions for restoring site access at CCNPP include:

1. Calvert and St. Mary's Counties will coordinate with the Maryland State Highway Administration to ensure traffic impediments are removed to ensure restored traffic flow for evacuation and/or return. The activities involved may include: debris clearance; emergency repairs to roads and bridges; maintaining essential plant services; and assistance, when needed, with the removal of road impediments. The evacuation route includes Maryland State Highway Route 2/4.
2. Site Procedure EP-1-108, "Severe Weather Preparation," provides direction for personnel to prepare the site for various natural events including: High Winds, Severe Storms, Hurricanes, Heavy Snow and Ice. These preparations include actions to ensure the availability of access roads and to stage ERO personnel at their facilities in advance of a predicted severe weather event.

D. The following agreements with CCNPP are in place:

1. Calvert County Radiological Emergency Planning (REP) Procedure, Attachment 10, Department of Public Works Standard Operating Guidelines; states in part "In the event of seasonal, or other causes of traffic impediments, the Department of Public Works in cooperation with State Highway Administration (SHA) will provide necessary equipment, vehicles and personnel to restore traffic flow for evacuation and/or return."
2. St. Mary's County Radiological Emergency Planning (REP) Procedure, Attachment 2, Department of Public Safety, states in part that "Insure that evacuation routes are passable through evaluation of current road conditions and any potential impediments (snow, ice, flooding, constructions, and bridges) and coordinate actions of key support agencies." The evacuation route includes Maryland State Highway Route 2/4.

Augmented ERO Expanded Response Capability:

The on-site ERO at the CCNPP dual-unit site would be challenged to effectively respond to a BDBEE that resulted in an extended loss of AC power affecting both units. In an event of this magnitude, CCNPP would likely need to "expand" the capability of the augmented ERO in order to facilitate timely and effective performance of critical emergency response functions.

The focus of an "expanded response capability" at CCNPP will be to enable the performance of unit-specific accident assessment and mitigation functions. To be effective, the CCNPP expanded response capability will encompass those functions necessary for preventing damage to irradiated fuel, or if such damage occurs, minimizing radiological releases. Selected functions will directly support the assessment

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

and implementation of a range of mitigation strategies intended to maintain or restore the functions of core cooling, containment, and spent fuel pool cooling.

Given that the total range of effects to the site as a result of a BDBEE cannot be anticipated, the Emergency Director, TSC Manager, and other ERO personnel should have a flexible response strategy for determining which additional ERO functions are needed and how many resources to apply. The Emergency Director and/or TSC Manager should be able to allocate unit specific ERO functions and resources based on priorities at hand given the challenges presented to the site following a BDBEE.

Activating the CCNPP Expanded Response Capability

Based on the above considerations, CCNPP will develop and implement a process to integrate the expanded response capability into existing augmented ERO (i.e., put in place the ability to transition to unit-specific performance). The expanded response capability process will be formalized via an EP standing order or similar guideline. During performance of the NEI 12-01 Phase 2 assessment, the process will be re-assessed and revised as necessary. This process is expected to:

- Provide flexibility to the Emergency Director and TSC Manager in establishing the expanded response capability based on site priorities at the time of the event.
- Include decision-making criteria for initiating the actions necessary to ensure timely performance of expanded response functions.
- Require the Emergency Director and TSC Manager to take into account the functions and recommended staffing considerations listed in Table 3.1 of NEI 12-01 as they establish the “expanded response capability.” Training and or briefings, as appropriate, will be given to ERO members prior to implementing this process. **(Commitment)**

Table 3.1 of NEI 12-01 lists the emergency response functions identified by the NEI Beyond Design Basis Event Response Staffing Study Task Force as meeting these requirements for Phase 1 of the staffing assessment. The table also provides recommended staffing considerations for each listed function. The expanded response ERO functions in Table 3.1 of NEI 12-01 are:

➤ Unit Response Coordination	TSC
➤ Operations Coordination	TSC
➤ Maintenance Coordination	TSC or OSC
➤ Engineering Coordination	TSC or Emergency Offsite Facility (EOF)
➤ Engineering Assessments	TSC or EOF
➤ Evaluation of SAMG strategies	TSC or EOF
➤ Unit In-Plant Team Coordination	OSC
➤ Non-Licensed Operators	OSC
➤ Mechanical Maintenance Repair and Corrective Action	OSC
➤ Electrical Maintenance Repair and Corrective Action	OSC
➤ Instrumentation and Controls Repair and Corrective Action	OSC
➤ Implementation of SAM Strategies	OSC

This staffing will promote timely evaluation of accident conditions and mitigation strategies, and facilitate subsequent performance of mitigation actions, for each affected unit. Table 3.1 of NEI 12-01 also

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

specifies the staffing necessary to support the simultaneous deployment of emergency repair and corrective action teams to each affected unit. The availability of this staffing will promote timelier restoration of installed plant safety systems to service and facilitate implementation of component modifications necessary to utilize equipment brought-in from offsite locations.

On-Site Radiation Protection Technicians

The CCNPP process for providing an expanded response capability will include provisions for a minimum number of available Radiation Protection (RP) Technicians following a BDBEE, to support performance of assigned emergency plan functions and the expanded response capability. The equation in Section 3.5.1 of NEI 12-01 will be provided to the ERO personnel to use as a reference in determining the required number of on-site RPTs. **(Commitment)**

The equation in Section 3.5.1 NEI 12-01 is:

$$\text{RPTT} = \text{RPTCOP} + \text{RPTRCA} + \text{RPTNC}$$

Where:

RPTT = Total required number of on-site RPTs

RPTCOP = Number needed to support implementation of any 2 extended loss of AC power coping strategies per unit. Determine this number by reviewing strategies for each unit.

RPTRCA = Number needed for repair and corrective action
= 2 x the number of units

RPTNC = Number of on-site RPTs performing other emergency plan functions that would preclude them from performing job coverage for extended loss of AC power coping, repair or corrective action teams.

In the event of fuel damage, prevailing dose rates would likely require that the site's RPT complement be augmented with technicians from outside sources. CCNPP will verify that provisions exist for obtaining additional RPTs (e.g., from other fleet or alliance sites, INPO emergency resources manual, contracted service providers, etc.). **(Commitment)**

Administrative Support Personnel

CCNPP will determine if current assignments and locations of administrative support personnel are adequate for implementation of the expanded response capability, and implement necessary changes in the expanded response capability process. **(Commitment)**

Work Areas for Personnel Performing Expanded Response Functions

The CCNPP expanded response capability process will identify additional work areas necessary for the performance of expanded response functions: alternate emergency response facilities will be considered. In the interim, existing site facilities will be utilized based on availability following the event. **(Commitment)**

On-site Staff's Ability to Move Back-up Equipment

On March 12, 2012, the NRC issued the *Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task*

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

Force Review of Insights from the Fukushima Dai-Ichi Accident. It requested licensees perform the following assessment:

“How onsite staff will move back-up equipment (e.g., pumps, generators) from alternate onsite storage facilities to repair locations at each reactor as described in the Order regarding the NTIF Recommendation 4.2. It is requested that consideration be given to the major functional areas of NUREG-0654, Table 8-1, such as plant operations and assessment of operational aspects, emergency direction and control, notification/communication, radiological accident assessment, and support of operational accident assessment, as appropriate.”

CCNPP will perform the requested assessment as part of the Phase 2 staffing assessment.

(Commitment)

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results

Table of Regulatory Commitments Contained in CCNPP Staffing Assessment

	CCNPP Commitments	Completion Date
1	Develop and implement a process to integrate the expanded response capability into existing augmented ERO (i.e., put in place the ability to transition to unit-specific performance). Formalize this process via an EP standing order or similar guideline. (During performance of the NEI 12-01 Phase 2 assessment, the process will be re-assessed and revised as necessary).	12/20/13
	a) This process is expected to provide flexibility to the Emergency Director and TSC Manager in establishing the expanded response capability based on site priorities at the time of the event.	
	b) The process will include implementing strategy and decision-making criteria for initiating the actions necessary to ensure timely performance of expanded response functions.	
	c) The process will require the Emergency Director and TSC Manager to take into account the functions and recommended staffing considerations listed in NEI 12-01 Table 3.1 as they establish the “expanded response capability.”	
	d) Provide training and or briefings, as appropriate, to ERO members prior to implementing this process.	
2	a) Include provisions for a minimum number of available RPTs following a BDBEE, to support performance of assigned emergency plan functions and the expanded response capability. Provide the equation in Section 3.5.1 of NEI 12-01 to the ERO personnel to use as a reference in determining the required number of on-site RPTs.	12/20/13
	b) Verify that provisions exist for obtaining additional RPTs (e.g., from other fleet or alliance sites, INPO emergency resources manual, contracted service providers, etc.)	12/20/13
3	Determine if current assignments and locations of administrative support personnel are adequate for implementation of the expanded response capability, and implement necessary changes in the expanded response capability process	12/20/13
4	Identify additional work areas necessary for the performance of expanded response functions	12/20/13
5	Respond to the NRC’s request regarding the ability of the On-site Staff to move back-up equipment as part of the Phase 2 staffing assessment	As provided in Reference 2 and supplemented in Reference 4

Attachment 1

CCNPP Staffing Assessment Tables

Attachment 1 – CCNPP Staffing Assessment Tables
 CCNPP Timing Template – Scenario: #12-01 Phase 1
 Title: 10 CFR 50.54(f) On-Shift Staffing Analysis

Procedure Step/Actions			Performance Time (minutes) After Procedure Implementation											
Procedure/Step	Task	Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
U1/2-EOP-0	Unit Trip Response	CRS1 RO1 RO2 CRS2 RO3 RO4 AO1 AO2 AO3 AO4		x										
U1/2-EOP-0	Investigate Loss of Diesel Generators	AO5 AO6 AO7 AO8 SEC		x			x							
NA	Shift Technical Advisor (STA) Duties	OWC	x											
U-1/2-EOP-7 (Transition from EOP-0)	Station Blackout													
U-1/2-EOP-7, A	Intermediate Safety Function Status Checks	STA				x								
U-1/2-EOP-7, B	Determine Emergency Response Actions	SM		x										
ERPIP-3.0 (Directed from EOP-7, B)	Classify Site Area Emergency	SM		x										
U-1/2-EOP-7, C	Placekeeper (Command & Control for EOP-7)	CRS1 CRS2				x								
U-1/2-EOP-7, D	Protect Condenser from Over pressurization; Minimize Steam Generator (S/G) Loss	RO2 RO4				x								
U-1/2-EOP-7, E	Minimize Reactor Coolant System (RCS) Inventory Loss	RO1 RO3				x								
U-1/2-EOP-7, F	Establish RCS Heat Sink	RO2 RO4 AO3 AO4				x								

Attachment 1 – CCNPP Staffing Assessment Tables
 CCNPP Timing Template – Scenario: #12-01 Phase 1
 Title: 10 CFR 50.54(f) On-Shift Staffing Analysis

Procedure/Step	Task	Resource	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60
U-1/2-EOP-7, F	Monitor Auxiliary Feedwater (AFW) Pumps	AO1 AO2				x								
U-1/2-EOP-7, G	Verify Emergency DC Pumps Operating	RO1 RO3				x								
U-1/2-EOP-7, H	Align Electrical System for Power Restoration	RO2 RO4					x							
U-1/2-EOP-7, I	Attempt to Restore Power to at Least One 4KV Bus	AO5 AO6 AO7 AO8							x					
U-1/2-EOP-7, I	Check 125VDC Bus Steady State Amps < Listed	RO2 RO4							x					
U-1/2-EOP-7, J	Protect Electronic Equipment from Overheating	RO2 RO4							x ¹	x				
U-1/2-EOP-7, K	Maintain Natural Circulation Flow Verification	RO1 RO3					x							
U-1/2-EOP-7, L	Maintain Sub-cooling	RO1 RO3 AO3 AO4						x						
U-1/2-EOP-7, M	Block Steam Generator Isolation Signal (SGIS) and Safety Injections Actuation Signal (SIAS)	RO1 RO3							x					
U-1/2-EOP-7, N	Ensure Containment Integrity	RO1 RO3							x					
U-1/2-EOP-7, O	Lower Main Generator H2 Pressure to 2 PSIG	AO1 AO2										x		

¹ Procedure expects actions within 30 minutes.

Attachment 1 – CCNPP Staffing Assessment Tables
 CCNPP Timing Template – Scenario: #12-01 Phase 1
 Title: 10 CFR 50.54(f) On-Shift Staffing Analysis

Procedure Step/Actions			Performance Time (mins) After Procedure Implementation											
Proc/Step	Task	Resource	60-75	75-90	90-105	105-120 (2hr)	120-150	150-180 (3hr)	180-210	210-240 (4hr)	240-270	270-300 (5hr)	300-330	330-360 (6hr)
U-1/2-EOP-7, A	Intermediate Safety Function Status Checks	OWC	x											
U-1/2-EOP-7, C	Placekeeper	CRS1 CRS2	x											
U-1/2-EOP-7, F	Monitor AFW Pumps	AO1 AO2	x											
ERPIP-3.0, Attachment 28 ¹	Steam Generator Inventory Control	AO3 AO4											x	
U-1/2-EOP-7, K	Maintain Natural Circulation Flow Verification	RO1 RO3	x											
U-1/2-EOP-7, L	Maintain Subcooling, Controlled Cooldown	RO1 RO3 AO3 AO4	x ²											
U-1/2-EOP-7, O	Lower Main Generator H2 Pressure to 2 PSIG	AO1 AO2	x											
U-1/2-EOP-7, P	Monitor Spent Fuel Pool (Transition to AOP-6F)	AO4 RPT1	x			x		x		x		x		x
U-1/2-EOP-8	Transition to EOP-8 "Functional Recovery" Assessment	SM CRS1 RO1 RO2 CRS2 RO3 RO4										x		
ERPIP-3.0	Classify General Emergency	SM										x		
U-1/2-EOP-8, VA3	Go to AOP-7J	CRS1 CRS2										x		
AOP-7J	Restore Battery Charger	RO1 RO3											x	
EOP Attachment 12	ALTEK Thermocouple CET Temperatures	RO2 RO4											x	

¹ No current procedure link to these steps (Entry condition available through SAMG Guidance)

² After 6 hours, Water Inventory Concerns for Maintaining Hot Standby

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results
Attachment 1 – CCNPP Staffing Assessment Tables
Table 1 – On-Shift Positions

NEI 10-05, Appendix B

Analysis # 10CFR50.54(f) NEI 12-01 Staffing Phase 1:

Emergency Classifications Level: SAE - GE

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
1.	Shift Manager	CCNPP ERP, Attachment 3-2	N/A	T2/L1 T5/L1 T5/L2 T5/L3 T5/L4 T5/L8 T5/L10 T5/L14	NO	NO
2.	Control Room Supervisor U-1 (CRS #1)	CCNPP ERP, Attachment 3-2	N/A	T2/L2	NO	NO
3.	Control Room Supervisor U-2 (CRS #2)	CCNPP ERP, Attachment 3-2	N/A	T2/L3	NO	NO
4.	Shift Technical Advisor	CCNPP ERP, Attachment 3-2	N/A	T2/L4	NO	NO
5.	Control Operator (RO #1)	CCNPP ERP, Attachment 3-2	N/A	T2/L5	NO	NO
6.	Reactor Operator U-1 (RO #2)	CCNPP ERP, Attachment 3-2	N/A	T2/L7	NO	NO
7.	Reactor Operator U-2 (RO #3)	CCNPP ERP, Attachment 3-2	N/A	T2/L6	NO	NO
8.	Turbine Building Operator (TBO) (AO #1)	CCNPP ERP, Attachment 3-2	N/A	T2/L9	NO	NO
9.	TBO (AO #2)	CCNPP ERP, Attachment 3-2	N/A	T2/L10	NO	NO
10.	Auxiliary Building Operator (ABO) (AO #3)	CCNPP ERP, Attachment 3-2	N/A	T2/L11	NO	NO
11.	Shift RP Technician	CCNPP ERP, Attachment 3-2	N/A	T4/L1 T4/L4	NO	NO

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results
Attachment 1 – CCNPP Staffing Assessment Tables
Table 1 – On-Shift Positions

Line	On-shift Position	Emergency Plan Reference	Augmentation Elapsed Time (min)	Role in Table#/Line#	Unanalyzed Task?	TMS Required?
12.	Shift Chemistry Technician	CCNPP ERP, Attachment 3-2	N/A	T4/L7	NO	NO
13.	Control Operator (RO#4)	CCNPP ERP, Attachment 3-2	N/A	T2/L8	NO	NO
14.	ABO (AO #4)	CCNPP ERP, Attachment 3-2	N/A	T2/L12	NO	NO
15.	Outside Operator (OSO) (AO #5)	CCNPP ERP, Attachment 3-2	N/A	T2/L13	NO	NO
16.	Fire and Safety Watch (FASW) – Fire Brigade Leader (FBL) (AO #6)	CCNPP ERP, Attachment 3-2	N/A	T2/L14	NO	NO
17.	Fire and Safety Responder (FASR) – Fire Brigade Member (FBM) (AO #7)	CCNPP ERP, Attachment 3-2	N/A	T2/L15	NO	NO
18.	FBM (AO #8)	CCNPP ERP, Attachment 3-2	N/A	T2/L16	NO	NO
19.	FBM (AO #9)	CCNPP ERP, Attachment 3-2	N/A	T5/L6 T5/L9 T5/L13	NO	NO
20.	Security	CCNPP ERP, Attachment 3-2	N/A	T5/L15	NO	NO

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results
Attachment 1 – CCNPP Staffing Assessment Tables
Table 2 – Plant Operations & Safe Shutdown
Analysis #: NEI 12-01 Phase 1

CCNPP Two Units - One Control Room

Applicable to site unit(s) # 1 & 2

**Minimum Operations Crew Necessary to Implement
AOPs and EOPs, or SAMGs if applicable**

Line	Generic Title/Role	On-Shift Position	Task Performance Validation
1	Shift Manager	Shift Manager	Operator Training
2	Unit Supervisor	Control Room Supervisor U-1 (SRO #1)	Operator Training
3	Unit Supervisor	Control Room Supervisor U-2 (SRO #2)	Operator Training
4	Shift Technical Advisor	Shift Technical Advisor	Operator Training
5	Reactor Operator #1	Control Operator U-1 (RO #1)	Operator Training
6	Reactor Operator #4	Control Operator U-2 (RO #3)	Operator Training
7	Reactor Operator #2	Reactor Operator (RO#2)	Operator Training
8	Reactor Operator #3	Reactor Operator (RO#4)	Operator Training
9	Auxiliary Operator #1	TBO (AO #1)	Operator Training
10	Auxiliary Operator #2	TBO (AO #2)	Operator Training
11	Auxiliary Operator #3	ABO (AO #3)	Operator Training
12	Auxiliary Operator #4	ABO (AO #4)	Operator Training
13	Auxiliary Operator #5	OSO (AO #5)	Operator Training
14	Auxiliary Operator #6	FBL	Operator Training
15	Auxiliary Operator #7	FASR	Operator Training
16	Auxiliary Operator #8	FBM	Operator Training
17	Auxiliary Operator #9	FBM	Operator Training

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results
 Attachment 1 – CCNPP Staffing Assessment Tables
 Table 3 – Firefighting
 Analysis #: NEI 12-01 Phase 1

Line	Performed By	Task Analysis Controlling Method
1	Not Needed for this Scenario	N/A
2	Not Needed for this Scenario	N/A
3	Not Needed for this Scenario	N/A
4	Not Needed for this Scenario	N/A
5	Not Needed for this Scenario	N/A
6	Not Needed for this Scenario	N/A

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results
Attachment 1 – CCNPP Staffing Assessment Tables
Table 4 – Radiation Protection & Chemistry
Analysis #: NEI 12-01 Phase 1

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)																	
		0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	55-60	60-65	65-70	70-75	75-80	80-85	85-90
1	In-Plant Survey On-Shift Position: Shift HP Technician 1 and 2	As Directed by Shift Manager																	
2	On-Site Survey On-Shift Position: Shift HP Technician																		
3	Personnel Monitoring On-Shift Position:																		
4	Job Coverage On-Shift Position:	As Directed by Shift Manager																	
5	Offsite Radiological Assessment On-Shift Position:																		
6	Other Site-Specific RP – Describe: On-Shift Position:																		
7	Chemistry function/task #1 – Describe: On-Shift Position: Shift Chemistry Tech	As Directed by Shift Manager																	
8	Chemistry function/task #2 – Describe: On-Shift Position: Shift Chemistry Tech																		

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)									
		90-120	120-150	150-180	180-210	210-240	240-270	270-300	300-330	330-360	360-390
1	In-Plant Survey On-Shift Position: Shift HP Technician	As Directed by Shift Manager									
2	On-Site Survey On-Shift Position: Shift HP Technician										
3	Personnel Monitoring On-Shift Position:										
4	Job Coverage On-Shift Position:	As Directed by Shift Manager									
5	Offsite Radiological Assessment On-Shift Position:										
6	Other Site-Specific RP – Describe: On-Shift Position:										
7	Chemistry function/task #1 – Describe: On-Shift Position: Shift Chemistry Tech	As Directed by Shift Manager									
8	Chemistry function/task #2 – Describe: On-Shift Position: Shift Chemistry Tech										

Calvert Cliffs Nuclear Power Plant Staffing Assessment Results
Attachment 1 – CCNPP Staffing Assessment Tables
Table 5 – Emergency Plan Implementation
Analysis #: NEI 12-01 Phase 1

Line	Function/Task	On-Shift Position	Task Analysis Controlling Method
1	Declare the Emergency Classification Level	Shift Manager	EP/Ops Training and EP Drill Program
2	Approve Offsite Protective Action Recommendations	Shift Manager	EP/Ops Training and EP Drill Program
3	Approve content of State/local notifications	Shift Manager	EP/Ops Training and EP Drill Program
4	Approve extension to allowable dose limits	Shift Manager	EP/Ops Training and EP Drill Program
5	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	CRS1	EP/Ops Training and EP Drill Program
6	ERO notification	EC-AO9	EP/Ops Training and EP Drill Program
7	Abbreviated NRC notification for Design Basis Threat event	N/A	N/A
8	Complete State/local notification form	Shift Manager	EP/Ops Training and EP Drill Program
9	Perform State/local notifications	EC-AO9	EP/Ops Training and EP Drill Program
10	Complete NRC event notification form	Shift Manager	EP/Ops Training and EP Drill Program
11	Activate ERDS	N/R (ERDS VPN In Service)	N/A
12	Offsite radiological assessment	N/A	N/A
13	Perform NRC notifications	EC-AO9	EP/Ops Training and EP Drill Program
14	Perform other site-specific event notifications (e.g., INPO, American Nuclear Insurers, etc.)	Shift Manager	EP/Ops Training and EP Drill Program
15	Personnel accountability	Security	EP/Ops Training and EP Drill Program