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April 30, 2013

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- References:
1. NRC Letter, *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 Force Review of Insights from the Fukushima Dai-Ichi Accident*, dated March 12, 2012 (ADAMS Accession No. ML12056A046)
 2. APS Letter No. 102-06523 to NRC, *60-Day Response to NRC Letter, 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 Force Review of Insights from the Fukushima Dai-ichi Accident*, dated May 11, 2012 (ADAMS Accession No. ML 12139A324)
 3. NEI 12-01, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*, Revision 0, dated May 2012 (ADAMS Accession No. ML12125A412)

Dear Sirs:

Subject: **Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2, and 3
Docket Nos. STN 50-528, 50-529, and 50-530
APS Response to NRC Request for Information Regarding Licensee
Emergency Preparedness Phase 1 Staffing Requirements Associated
with Near-Term Task Force (NTTF) Recommendation 9.3**

On March 12, 2012, the Nuclear Regulatory Commission (NRC) issued a letter entitled, *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 Force Review of Insights from the Fukushima Dai-ichi Accident* to Arizona Public Service Company (APS) (Reference 1). Enclosure 5 of that letter contains specific Requested Actions, Requested Information, and Required Responses associated with Recommendation 9.3 for Emergency Preparedness (EP) programs.

In accordance with 10 CFR 50.54(f), addressees were requested to submit a written response to the information requests within 90 days. In Reference 2, APS proposed an alternative course of action and committed to provide, in two phases, an assessment of the EP staffing required during a multi-unit emergency event.

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NLR

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PVNGS Fukushima NTF EP Phase 1 Staffing Assessment
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In Reference 2, APS committed to provide in Phase 1 the onsite and augmented staffing assessment considering all required functions except those related to NTF Recommendation 4.2, *Mitigation Strategies for Beyond-Design-Basis External Events*. The Phase 1 staffing assessment was performed using the guidance provided in Reference 3. The enclosure to this letter contains the APS Phase 1 staffing assessment results, which provides the information requested in Reference 1, Enclosure 5, *Staffing*, Requested Information Items 1, 2, and 6.

No commitments are being made to the NRC by this letter.

Should you have any questions concerning the content of this letter, please contact Mark McGhee, Operations Support Manager, Regulatory Affairs, at (623) 393-4972.

I declare under penalty of perjury that the foregoing is true and correct.

Executed on 4/30/13
(Date)

Sincerely,



DCM/MAM/TLC/hsc

Enclosure – APS Response to NRC Tier 1 Near-Term Task Force Recommendation 9.3
Emergency Preparedness Phase 1 Staffing Assessment

cc: E. J. Leeds, NRC Director, Office of Nuclear Reactor Regulation
A. T. Howell III NRC Region IV Regional Administrator
J. K. Rankin NRC NRR Project Manager [send electronic]
M. A. Brown NRC Senior Resident Inspector for PVNGS
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ENCLOSURE

**APS Response to NRC Tier 1 Near-Term
Task Force Recommendation 9.3
Emergency Preparedness Phase 1
Staffing Assessment**



Palo Verde Nuclear Generating Station

NEI 12-01 Phase 1 Staffing Analysis Report

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1 Introduction

Enclosure 5 of Nuclear Regulatory Commission (NRC) Letter, *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 Force Review of Insights from the Fukushima Dai-Ichi Accident*, dated, March 12, 2012, requested Arizona Public Service (APS) to provide an assessment of the onsite and augmented Palo Verde Nuclear Generating Station (PVNGS) staff needed to respond to a large scale natural event meeting the conditions described in the 50.54(f) letter (Reference 1). APS letter number 102-06523 (Reference 2), dated May 11, 2012, responded to the 50.54(f) letter and presented an alternate schedule to Reference 1 which stated that an on-site and augmented staffing assessment, considering all requested functions except those related to Near Term Task Force (NTTF) Recommendation 4.2 (Phase 1 staffing analysis), would be provided. This report provides the Phase 1 staffing analysis for PVNGS Units 1, 2, and 3. The analysis was conducted using the guidance in Nuclear Energy Institute (NEI) Technical Report 12-01, Revision 0, May 2012, *Guideline for Assessing Beyond Design Basis Accident Response Staffing and Communications Capabilities*, NEI 10-05, Revision 0, June 2011, *Assessment of On-Shift Emergency Response Organization Staffing and Capabilities*, and NSIR/DPR ISG-01, *Interim Staff Guidance Emergency Planning for Nuclear Power Plants* (References 3, 4, and 5 respectively).

An assessment was conducted to determine the resources required to respond to a three unit, Beyond Design Basis External Event (BDBEE), which results in an extended loss of alternating current (AC) power (ELAP) and impeded access to the site. This assessment included the numbers and composition of the augmented response personnel required to implement mitigation strategies and repair actions intended to maintain or restore functions of core cooling, containment, and spent fuel pool cooling for all three units. The on-shift staffing analysis considered applicable actions from current PVNGS procedures which include the Institute of Nuclear Power Operations (INPO) Event Reports (IER) related to Fukushima actions. The minimum on-shift staffing levels, as described in the PVNGS Emergency Plan, Revision 49, were then assessed to determine if there was an appropriate level of staffing to fill necessary positions as required by the assessment conducted.

2 **Executive Summary**

The following are the results of the assessment conducted to determine the ability of the emergency response organization (ERO) staff to respond to a large scale natural event. This assessment is based upon a current snapshot of the organization and staffing.

For the on-shift staffing, the Phase 1 assessment identified the following:

- The minimum on-shift staffing, as defined in the PVNGS Emergency Plan, Revision 49, is sufficient to support the implementation of current PVNGS procedures simultaneously for Units 1, 2, and 3 in response to a BDBEE that results in an Extended Loss of AC Power (ELAP).
- No conflicts, deficiencies, or overlaps in functions or tasks required to be performed by on-shift operations and support personnel were identified during the post event 0 to 6 hour “no site access” time period.
- There were no unanalyzed tasks that required a time motion study.
- Using existing procedures and strategies, the event response analysis did not result in conditions that necessitated entry into procedure 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines (SAMG)*.

For the expanded response capability, the Phase 1 assessment identified the following:

- The number and composition of staffing necessary to support the Expanded Response Capability for the BDBEE as defined in NEI 12-01 (refer to section 6.2.2.1 for NEI 12-01, Table 3.1, *Expanded Response Functions for Phase 1 Staffing Assessment*).
- The PVNGS staffing resources for the ERO are sufficient to implement all required coping strategies as required by NEI 12-01 guidance and to fill the expanded ERO functions.

2.1 **Enhancements Identified**

The following enhancement actions were identified during the assessment:

- Revise procedure 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines (SAMG)*, to allow any capable emergency worker to run fire hoses with direction provided by a qualified Fire Fighter.
- Develop an expanded ERO staffing process that ensures the appropriate responders are activated to support the limited site access period (6-24 hours post-event). This process will enable the ERO to staff necessary expanded ERO positions for a BDBEE.
- Develop a process to prioritize the order in which responders are transported to the site during the limited site access period. This process will enable the ERO to specify the order in which emergency workers are transported to the site during the limited site access period for a BDBEE.
- Develop an implementing process to integrate the expanded response capability into existing augmented ERO, as described in the PVNGS NEI 12-01 Phase 1 Staffing Analysis, by establishing the ability to transition to unit-specific Outage Control Centers (OCCs) for each of the affected units. The OCCs would be directed by the Operations Support Center thereby maintaining the fundamental principle of Unity of Command

that is required by the National Incident Management System incident command protocol.

- Evaluate the PVNGS ERO drill and exercise program to address multi-unit events and expanded response capabilities and revise the program as determined to be appropriate.
- Provide appropriate training to ERO members prior to implementing the integrated expanded ERO process.

3 Staffing Analysis Process Overview

3.1 On-Shift Staffing Analysis Process

The PVNGS NEI 12-01 On-Shift Staffing Analysis (OSA) Phase I 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 PVNGS Emergency Plan, Revision 49. Task areas analyzed include:

- Event Mitigation (as specified in Emergency Operating Procedures (EOP), Abnormal Operating Procedures (AOP), and other site procedures)
- Radiation Protection (RP) and Chemistry Technician functions (as specified in site response procedures)
- Emergency Preparedness functions [as described in NUREG-0654 Table B-1 (Reference 12) and NSIR/DPR ISG-01 (Reference 5)]

Existing strategies for responding to an extended loss of AC power (Station Blackout) affecting all on-site units were evaluated in the OSA. The staffing analysis addressed the ability of the on-shift staff to perform any required emergency response functions that would be degraded or lost prior to the delayed arrival of the augmenting Emergency Response Organization (ERO).

3.2 Expanded ERO Analysis Process

The expanded ERO analysis was conducted using the guidelines in NEI 12-01 (Reference 3), which provides recommended staffing considerations to assess the performance of unit-specific accident assessment and mitigation functions. PVNGS assessed the ability of the current ERO staff to perform expanded ERO functions.

4 Assumptions

The Phase 1 staffing assessment assumptions were based on the guidance described in NEI 12-01 (Reference 3) and NEI 10-05 (Reference 4).

4.1 NEI 12-01 - Assumptions for Staffing Analysis

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.
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: Greater than 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.

Each licensee should identify transportation and site access-enhancing methods in accordance with Section 3.9 of Reference 3, and include this information in the response to Staffing Information Request number 4 of Reference 1, Enclosure 5. The response to Staffing Information Request number 4 should also include an overview discussion of how the identified methods will be implemented following a BDBEE. The discussion of how the site access-enhancing methods will be implemented is contained in section 6.2.1.2 of this report.

A staffing assessment may utilize a “no site access” end time of less than six hours and greater than or equal to four hours, if supported by a documented basis. This basis should include a discussion of the site-specific transportation-related resources and capabilities, and related supporting arrangements, which provide assurance that augmented staff would be available on the site starting at the time used in the assessment. These resources and capabilities could be provided by company-internal, private or public sources (including vehicles and aircraft, such as helicopters from military and National Guard organizations). All arrangements with the anticipated service providers should be documented (e.g., Letter of Agreement, contract, etc.). The PVNGS Phase 1 Staffing Analysis did not utilize a “no-site access” end time of less than six hours.

A staffing assessment may not utilize a “no site access” end time of less than four hours. The PVNGS Phase 1 Staffing Analysis did not utilize a “no-site access” end time of less than four hours.

5. On-shift personnel are limited to the minimum complement allowed by the site emergency plan.
6. The Phase 1 staffing analysis uses the applicable actions from the Station Blackout (SBO) coping strategies in place at the time of the analysis.
 - a. 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.
 - b. These actions do not include those associated with cross-tying AC power sources or electrical distribution busses between units since all on-site units are experiencing an ELAP.
7. The Phase 1 staffing analysis includes the INPO Event Reports (IER) improvement actions already implemented at the time of the analysis.

4.2 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. Personnel assigned to the major response area of Plant Operations and 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. Performance of the function of the on-site security organization 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.
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. 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.

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). The ERO augmentation time is based on the time of event declaration and the time of turnover of the function/responsibility. Specifically, any time needed by the augmenting ERO to acquire materials or prepare for turnover is accounted for.

For purposes of this analysis, and consistent with assumption 4 in section 4.1, 360 minutes (six hours) was used as the time period for the conduct of on-shift ERO response actions.

4.3 Other Assessment Assumptions

1. Equipment credited in current coping strategies remains available for use (e.g., a non-seismic water tank).
2. For purposes of assessing augmented staffing, it is assumed that the on-shift staff successfully performs Initial Phase coping actions as described in Reference 3. No Transition Phase actions involving the use of portable equipment are required in the first six hours, based on plant conditions.
3. Offsite facilities and staging areas are available.
4. Actions do not include those associated with use of the SBO Generators since all units are experiencing an ELAP.

4.4 Event Description

The event conditions, as described by the assumptions listed above, result in a Site Area Emergency Classification Level (ECL). The ECL escalates to a General Emergency if it has been determined that AC power cannot be restored before the coping time has been exceeded. This scenario impacts all three units resulting in an ELAP.

Initial Conditions:	All three units in Mode 1 at 100 percent reactor power.
Abnormal Conditions:	None
Scenario Events:	An offsite electrical transient occurs resulting in a loss of all offsite power. The SBO Generators are not credited and none of the Emergency Diesel Generators (EDGs) can be synchronized to any Unit 1, 2, or 3 AC busses, resulting in a three-unit ELAP.
Notes:	This scenario constitutes a three unit event whereby restoration of any AC power source is not possible.

5 On-Shift Staffing Analysis

5.1 On-Shift Staffing Analysis Process Details

The Phase 1 OSA was conducted in accordance with the guidance contained in NEI 12-01 and NEI 10-05. The assessment analyzed the ability of the on-shift staff to perform the required emergency response functions that may be degraded or lost prior to the arrival of the augmented ERO.

The task analysis was conducted using a table top procedural analysis and a simulated desktop run-through with PVNGS subject matter experts and an outside consultant. Current PVNGS procedures were utilized to determine if tasks had been sufficiently analyzed for performance by the minimum on-shift staff. The guidance and documentation in NEI 12-01 and NEI 10-05 were used to document a review of the on-shift staffing actions. The following provides a summary of the process that was utilized.

5.1.1 On-Shift Analysis Methodology

The OSA was performed using NEI 12-01, section 3, and NEI 10-05, section 2.2.

Each on-shift position from the Emergency Plan minimum Shift Staffing listed in section 5.1.2 of this report was entered in NEI 10-05 Table 1, On-Shift Positions, contained in Attachment 1 of this report. For position titles with more than one position holder, a unit number followed by a sequence number was assigned to each position (e.g., RO #1-1, RO #2-1, 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 additional tables were completed by entering the shift position that fills a described role, or performs a specific function or task. These tables are also contained in Attachment 1 of this report.

- NEI 10-05 Table 2 – Plant Operations & Safe Shutdown. Minimum Operations Crew Necessary to Implement AOPs and EOPs, or SAMGs if applicable
- Table 2A – Procedural Task Timing (timeline of activities corresponding to Table 2)
- NEI 10-05 Table 3 – Firefighting (not applicable for this event analysis)
- NEI 10-05 Table 4 – Radiation Protection & Chemistry (time line of activities)
- NEI 10-05 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 Attachment 1, Table 1. For each position, the table number and associated line number was then entered in column 4, “Role in Table#/Line#”. Based on a review of the information contained in the table, there were no tasks identified that required a compensatory action or time motion study (TMS).

5.1.2 Minimum On-Shift Complement

The shift staffing table below identifies the functional areas, position/function title, and emergency positions required to be on-shift and used as input to the staffing analysis. The on-shift personnel complement is the minimum required number and composition as described in the PVNGS Emergency Plan, Revision 49.

SHIFT STAFFING (Immediate Response)

MAJOR FUNCTIONAL AREA	POSITION/FUNCTION TITLE	Staffing/Unit	Shared Site Staffing	Site Staffing Totals
Plant Operations and Assessment of Operational Aspects	Shift Manager / Emergency Coordinator	1		3
	Control Room Supervisor	1		3
	Control Room Operators	2		6
	Fire Team Advisor		1	1
	Auxiliary Operators (AO)	4		12
	Radiation Protection Monitor		1	1
	Shift Technical Advisor		2	2
Notification/ Communications	Satellite Technical Support Center (STSC) Communicator (Covered by Affected Unit)	See AO above		
	ENS Communicator		1	1
Support Staff	Chemistry Technician (OSC)		2	2
	Electrical Technician (OSC)		3	3
	Mechanical Technician (OSC)		2	2
	I&C Technician (OSC)		1	1
	Radiological Field Assessment Team (RFAT) Driver		1	1
	Radiation Protection Technician (OSC)		3	3
	Radiation Monitoring Technician		1	1
	RM or RP Technician (OSC)		1	1
	Survey Qualified Position (OSC)		1	1
Security Section Leader/Director (TSC) (not committed to armed response)		1	1	
Fire Suppression / Rescue Operations and First Aid	Plant Fire Department /Emergency Medical Technicians (EMT) (At least 2 Fire Techs are EMT qualified by position qualifications)		5	5
Site Access Control and Personnel Accountability	Plant Security		Staffing per Security Plan	Staffing per Security Plan
	TOTALS	8/Unit =24	26 Shared	Total 50

5.1.3 Tabletop Procedural Analysis of On-Shift Staffing for ELAP

A tabletop review of on-shift actions for an ELAP for all three units was performed using the guidance and documentation in NEI 10-05, Section 2. This review included the identification of needed resources and the time required to complete identified actions for the first six hours of the ELAP. The review team consisted of the personnel listed in the table below.

Organization/Department	Personnel (Position or Title)
Emergency Preparedness	Director of Security and Emergency Preparedness
Operations – SRO/SM	Shift Manager
Operations – STA	Shift Technical Advisors
Radiation Protection	Radiation Protection Sr. Technical Advisor
Chemistry	Chemistry Sr. Technical Advisor
Security	Team Leader Nuclear Security
Operations – Fire Brigade Response	Sr. Program Advisor
Engineering	Sr. Engineer (Electrical/I&C)
Engineering	Reactor Engineering
Engineering	Engineer III Probabilistic Risk Assessment
EP Consulting, LLC	Consultant

Prior to conducting the table top review, initial conditions and event assumptions were reviewed for basic understanding of the event. The senior reactor operator (SRO) reviewed emergency operating procedures (EOP) and other operating procedure actions and identified them to the team. Other team members, such as the RP and Chemistry Technicians, identified functions that would be required to support in-plant mitigation activities in accordance with PVNGS procedures. Emergency Plan functions were reviewed and assigned to the appropriate on-shift resources. Attachment 1, Table 1, identifies the resulting on-shift resources and their applicable actions. The following PVNGS procedures were referenced during the tabletop review:

- EP-0900, *EMERGENCY RESPONSE ORGANIZATION (ERO) POSITION CHECKLISTS*
- EP-0901, *CLASSIFICATIONS*
- EP-0902, *NOTIFICATIONS*
- EP-0903, *ACCIDENT ASSESSMENT*
- EP-0904, *ERO/ERF ACTIVATION AND OPERATION*
- EP-0905, *PROTECTIVE ACTIONS*
- 40EP-9EO01, *STANDARD POST TRIP ACTIONS*
- 20SK-0SK08, *COMPENSATORY MEASURES FOR LOSS OF SECURITY EQUIPMENT/EFFECTIVENESS*
- 40EP-9EO10, *STANDARD APPENDICES*
- 40EP-9EO08, *BLACKOUT*
- 40EP-9EO09, *FUNCTIONAL RECOVERY*
- 40AO-9ZZ23, *LOSS OF SFP LEVEL OR COOLING*
- 79IS-9ZZ05, *PVNGS SEVERE ACCIDENT MANAGEMENT GUIDELINES*

5.2 On-Shift Staffing Analysis Summary

The following are the results of the assessment conducted to determine the ability of the ERO staff to respond to a large scale natural event.

For the on-shift staffing, the Phase 1 assessment identified the following:

- The minimum on-shift staffing, as defined in the PVNGS Emergency Plan Revision 49, is sufficient to support the implementation of current PVNGS procedures simultaneously for Units 1, 2, and 3 in response to a BDBEE that results in an ELAP.
- No conflicts, deficiencies, or overlaps in functions or tasks required to be performed by on-shift operations and support personnel were identified during the post event 0 to 6 hour “no site access” time period.
- There were no unanalyzed tasks that required a time motion study.
- Using existing procedures and strategies, the event response did not result in conditions that necessitated entry into procedure 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines (SAMG)*.

6 Expanded ERO Response Analysis

The augmenting ERO, which is currently established for a single-unit event and consists of five ERO teams plus pooled RP Technicians, was assessed to determine prioritization of augmented response capabilities during the period of limited site access for the post event time of 6 to 24 hours. The purpose of this assessment was to determine the ability of the augmenting ERO to perform the additional functions that would be required during a multi-unit BDBEE.

The assumption is that the augmented ERO for a multi-unit site would be challenged to effectively respond to a BDBEE that resulted in an ELAP affecting more than one unit. In an event of this magnitude, it would be necessary to “expand” the capability of the augmented ERO in order to facilitate timely and effective performance of critical emergency response functions. The focus of this “expanded response capability” at PVNGS is to enable the performance of unit-specific accident assessment and mitigation functions across multiple units.

6.1 Expanded ERO Response Analysis Process Details

For purposes of assessing augmenting and expanded ERO staffing, it is assumed that the on-shift staff successfully performs Initial Phase, and any required Transition Phase, coping actions in accordance with Reference 3.

6.1.1 Augmenting ERO Response Analysis Methodology

The current augmenting ERO roster positions and Emergency Plan required augmenting pooled RP technician positions were obtained from the PVNGS Emergency Plan, Revision 49, and entered into the table in this section titled, *Augmenting ERO Positions Described in the Emergency Plan*.

The PVNGS augmenting ERO consists of five teams staffed with qualified ERO members and pooled RP Technician positions as described in the table below:

Augmenting ERO Positions Described in the Emergency Plan				
EMERGENCY OPERATIONS FACILITY (EOF)	TECHNICAL SUPPORT CENTER (TSC)	JOINT INFORMATION CENTER (JIC)	OPERATIONS SUPPORT CENTER (OSC)	STATE EMERGENCY OPERATIONS CENTER (EOC)
POSITION TITLE	POSITION TITLE	POSITION TITLE	POSITION TITLE	POSITION TITLE
Emergency Operations Director	Emergency Coordinator	JIC Manager	OSC Manager	Offsite Technical Representative
Assistant Emergency Operations Director	Ops Manager	PVNGS Spokesperson	Repairs Coordinator	
NAN Communicator	Electrical Engineer	Spokesperson Coordinator	ERF Communicator – OSC	
Radiological Assessment Coordinator	Mechanical Engineer	ERF Communicator – JIC	RP Group Leader	
Engineering Director	Reactor Analyst	Research/Writing Coordinator	Administrative Support	
HPN Communicator	Security Director	Distribution Services Coordinator	Pooled position 6 RP Technicians	
Admin & Logistics Coordinator	RP Coordinator	Video/Photo Coordinator		
Dose Assessment Health Physicist	ENS Communicator			
ERF Communicator – EOF	Chemistry Coordinator			
Information Coordinator	EC Technical Assistant			
IS Manager	Engineering Manager			
Rad Assessment Communicator	Maintenance Manager			
Security Manager	Ops Advisor (STSC)			
Systems Engineering	ERF Communicator - TSC			
Administrative Support	Safety Analysis Engineer			
	Administrative Support			

6.1.2 Expanded ERO Response Analysis Methodology

The expanded ERO analysis was conducted in accordance with NEI 12-01, section 3.4, which provides recommended staffing considerations for the postulated event to enable the performance of unit-specific accident assessment and mitigation functions at a multi-unit site.

PVNGS has been regularly conducting design basis multi-unit drills since June 2011. Insights and lessons learned from these multi-unit drills were used to assist with the development of the proposed enhancements.

The capability of the current ERO staffing at PVNGS to perform these expanded ERO functions was assessed as described below:

1. Number and composition of personnel required to perform the expanded ERO response functions of NEI 12-01, Table 3.1, *Expanded Response Functions for Phase 1 Staffing Assessment* (see pages 18-21), were determined by performing a SAMG assessment. The purpose of this assessment was to identify the two strategies for each unit that require the greatest number of staff to implement within time periods compatible with successful performance and the corresponding total number and composition of staff to implement them.
2. Work areas for the expanded ERO were identified for the expanded response functions.
3. Transportation and access to the site were assessed to reasonably ensure that the expanded ERO may arrive onsite by the sixth hour of the event.
4. Position specific guidance was assessed in accordance with NEI 12-01, section 3.5.

6.2 Expanded ERO Response Analysis Summary

Based on the results of the staffing assessment, sufficient augmenting ERO resources are available to perform the expanded ERO functions. The ability of the responding ERO members to implement coping strategies required after the end of the post event 0 to 6 hour “no site access” time period has been assessed and determined to be adequate. Refer to the Qualified Augmenting and Expanded ERO table in Attachment 2 of this report for additional documentation of the expanded ERO staffing resources.

Sufficient expanded ERO resources exist to implement the two most resource intensive SAMG strategies simultaneously in all three units.

The following enhancement actions were identified during the assessment:

- Revise procedure 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines (SAMG)*, to allow any capable emergency worker to run fire hoses with direction provided by a qualified Fire Fighter.
- Develop an expanded ERO staffing process that ensures the appropriate responders are activated to support the limited site access period (6-24 hours post-event). This process will enable the ERO to staff necessary expanded ERO positions for a BDBEE.
- Develop a process to prioritize the order in which responders are transported to the site during the limited site access period. This process will enable the ERO to specify the order in which emergency workers are transported to the site during the limited site access period for a BDBEE.
- Develop an implementing process to integrate the expanded response capability into existing augmented ERO, as described in the PVNGS NEI 12-01 Phase 1 Staffing Analysis, by establishing the ability to transition to unit-specific Outage Control Centers (OCCs) for each of the affected units. The OCCs would be directed by the Operations Support Center thereby maintaining the fundamental principle of Unity of Command that is required by the National Incident Management System incident command protocol.

- Evaluate the PVNGS ERO drill and exercise program to address multi-unit events and expanded response capabilities and revise the program as determined to be appropriate.
- Provide appropriate training to ERO members prior to implementing the integrated expanded ERO process.

6.2.1 Mobilization of Expanded Response Staffing Capability

6.2.1.1 Notification of the ERO

The PVNGS ERO augmentation process consists of an all call / all respond expectation including the pooled RP Technicians. When the ERO notification system is activated, all qualified ERO members are contacted and expected to report if fit for duty.

Anytime the ERO becomes aware (e.g., direct observation, media posts, word-of-mouth) of an area-wide disaster (e.g., loss-of-grid, natural or man-made disaster, etc.) that may impact the safe operation of PVNGS and ERO pagers, cell phones, and home phones are being challenged or are not working, the ERO is expected to report to their respective Emergency Response Facility.

During this response, if the ERO members discover that the site is inaccessible due to the event (e.g., bridges damaged, roads blocked with debris, etc.) the ERO will report to the Energy Education Center as the Alternative Facility.

6.2.1.2 Site Access/Alternate Transportation Capability

It is assumed that there is limited site access during the post-event time period of 6 to 24 hours by roadway and ground transportation or air.

In accordance with the State of Arizona, Maricopa County Offsite Emergency Plan, dated December 2012, in the event of a release or potential for release of a radioactive plume from PVNGS, transportation and other resources may be required by emergency responders. The State Emergency Operations Center (EOC) Logistics Section is responsible for providing coordination and mobilizing transportation and non-radiological technical equipment, along with equipment operators and drivers needed for the government's offsite emergency response activities. State transportation equipment and operators will be used to augment local resources for the government's emergency response. All equipment will be available within six hours of the request (Reference 11).

In accordance with procedure EP-0900, *Emergency Response Organization (ERO) Position Checklists*, Appendix B, the Administrative/Logistics Coordinator will contact the Offsite Technical Representative at the State EOC if National Guard ground or air transportation is required to transport supplies, material, or ERO personnel to the site.

Roadway and ground access includes:

Major area access:

- Interstate 10 (Eastbound): From California and the northwest
- Interstate 17: From Nevada and New Mexico via Highway 40
- Interstate 10 (Westbound): From Tucson, New Mexico and Texas

Local access:

- Interstate 10 from the west or the east and then south on Wintersburg Rd.
- From State Route 85: West on Old U.S. 80 and then west on Salome Highway to the north plant alternate access road.

Ground transportation:

- PVNGS operates approximately 170 pool vans for ground transportation. These vans have pre-established protocols for pick-up or assembly locations. The use of personal vehicles is also anticipated. PVNGS is located on a large site (4,250 acres) and there are several access points from which to reach the Owner Controlled Area.

Air access can be provided from pre-identified staging areas that include:

- Luke Air Force Base
- Phoenix-Mesa Gateway Airport
- Phoenix-Goodyear Municipal Airport
- Falcon Field Airport (Mesa)
- Stellar Airpark – Chandler
- Pinal Airpark Airport / Evergreen
- Buckeye Municipal Airport (State of Arizona and PVNGS have a field office at this location)
- Silverbell Army Heliport, Western Army National Guard Aviation Training Site (WAATS)

Available aircraft include active-duty and reserve National Guard resources which include medium duty (Blackhawk rotary-wing for personnel transport and medi-vac) and heavy-lift operations (i.e., transport large vehicles to the site via air). Additionally, an air ambulance is available with Air-Evac and Native American Air via Letters of Agreement delineated in the PVNGS Emergency Plan, Revision 49.

6.2.1.3 Work Areas for Personnel Performing Expanded Response Functions

The sizes and capabilities of the work areas were determined to be sufficient. The Energy Education Center (EEC), which is located approximately 21 miles from the site, houses the EOF and JIC. The EEC is available as a staging facility and is provided with a diesel generator for back-up power to the facility during a loss of normal power.

For the on-site expanded response, there is an Outage Control Center located on the fourth floor of each Operations Support Building with sufficient size and capability for repair team staging and dispatch.

6.2.2 Expanded ERO Response Analysis

6.2.2.1 Expanded ERO Response Functions

To be effective, the expanded response capability at PVNGS will encompass those functions necessary for preventing damage to irradiated fuel, or if such damage occurs, minimizing radiological releases. Selected functions must directly support the assessment and implementation of a range of mitigation strategies intended to maintain or restore the functions of core cooling, containment, and spent fuel pool cooling.

NEI 12-01, Table 3.1, *Expanded Response Functions for Phase 1 Staffing Assessment*, lists the emergency response functions identified by the NEI Beyond Design Basis Event Response Staffing Study Task Force as meeting these requirements. This table further provides key roles and staffing considerations for each expanded response function and specifies the staffing necessary to support the simultaneous deployment of emergency repair and corrective action teams to each affected unit.

The personnel required for implementation of strategies for a BDBEE may vary depending upon several factors. However, the process should facilitate a flexible response strategy that can be applied in a graded approach for unit specific response by the ERO personnel (i.e., the extent and type of BDBEE determines the associated event challenges, which then influences the assignment of unit specific expanded ERO response functions and unit specific resources).

NEI 12-01, Table 3.1
Expanded Response Functions for Phase 1 Staffing Assessment
 (Page 1 of 4)

Expanded Response Function	Typical Location	Key Roles and Staffing Considerations	Position Performing this Function and Location	Resources Required	Resources Available
Unit Response Coordination	TSC	<ul style="list-style-type: none"> Overall cognizance of the activities related to implementation of repair and corrective actions, and implementation of Transition Phase coping and Severe Accident Management (SAM) strategies for an assigned unit One individual per unit; individuals should not be assigned other functions 	<ul style="list-style-type: none"> TSC Emergency Coordinator Shift Outage Manager, each Unit OCC* 	3	5
Operations Coordination	TSC	<ul style="list-style-type: none"> Provides coordination of Operations staff and support for an assigned unit One individual per unit; individuals should not be assigned other functions 	<ul style="list-style-type: none"> TSC Operations Manager Operations Outage Manager, each Unit OCC* 	3	5
Maintenance Coordination	TSC	<ul style="list-style-type: none"> Provides coordination of Maintenance staff and support for an assigned unit One individual per unit; individuals should not be assigned other functions 	<ul style="list-style-type: none"> TSC Maintenance Manager Maintenance Outage Manager, each Unit OCC* 	3	5
Engineering Coordination	TSC	<ul style="list-style-type: none"> Provides coordination of Engineering staff and support for an assigned unit One individual per unit; individuals should not be assigned other functions 	<ul style="list-style-type: none"> TSC Engineering Manager Engineering Outage Manager, each unit OCC* 	3	5

* Note: This position does not exist under the current ERO. It will be developed for the expanded ERO. See Section 9, PVNGS Enhancement 5.

NEI 12-01, Table 3.1
Expanded Response Functions for Phase 1 Staffing Assessment
(Page 2 of 4)

Expanded Response Function	Typical Location	Key Roles and Staffing Considerations	Position Performing this Function and Location	Resources Required	Resources Available
Engineering Assessments	TSC	<ul style="list-style-type: none"> • One team for each unit to perform engineering assessments in support repair and corrective actions • Team composition (i.e., number and represented disciplines) as described in the emergency plan • Team may include personnel responsible for performing other functions for the same assigned unit 	<ul style="list-style-type: none"> • Mechanical, Electrical, and System Engineer 	9	15
Evaluation of Severe Accident Management (SAM) Strategies	TSC	<ul style="list-style-type: none"> • One team for each unit to evaluate selection of SAM strategies; team performs evaluations not done by Control Room personnel • Team composition (i.e., number and represented disciplines) as described in governing site programs, procedures and guidelines • Team may include personnel responsible for performing other functions for the same assigned unit 	<ul style="list-style-type: none"> • TSC Engineering Manager, and Shift Technical Advisor 	6	Eng Mgr 5 STA 15
Unit In-Plant Team Coordination	OSC	<ul style="list-style-type: none"> • Overall cognizance of on-site and in-plant teams performing or supporting repair and corrective actions for an assigned unit • One individual per unit; individuals should not be assigned other functions 	<ul style="list-style-type: none"> • OSC Manager • Shift Outage Director, each unit OCC* 	3	5

* Note: This position does not exist under the current ERO. It will be developed for the expanded ERO. See Section 9, PVNGS Enhancement 5.

NEI 12-01, Table 3.1
Expanded Response Functions for Phase 1 Staffing Assessment
 (Page 3 of 4)

Expanded Response Function	Typical Location	Key Roles and Staffing Considerations	Position Performing this Function and Location	Resources Required	Resources Available
Non-Licensed Operators	OSC	<ul style="list-style-type: none"> Two individuals per unit to assist with implementation of repair and corrective actions Should not include members of the on-shift staff 	<ul style="list-style-type: none"> Auxiliary Operators, each unit OCC 	6	121
Mechanical Maintenance Repair and Corrective Action	OSC	<ul style="list-style-type: none"> Two individuals per unit to implement repair and corrective actions Staffing may include an on-shift individual (i.e., 2 individuals for a unit composed of 1 on-shift and 1 augmented) 	<ul style="list-style-type: none"> Mechanical Maintenance Technician, each unit OCC 	6	70
Electrical Maintenance Repair and Corrective Action	OSC	<ul style="list-style-type: none"> Two individuals per unit to implement repair and corrective actions Staffing may include an on-shift individual (i.e., 2 individuals for a unit composed of 1 on-shift and 1 augmented) 	<ul style="list-style-type: none"> Electrical Maintenance Technicians, each unit OCC 	6	52
I&C Repair and Corrective Action	OSC	<ul style="list-style-type: none"> Two individuals per unit to implement repair and corrective actions Staffing may include an on-shift individual (i.e., 2 individuals for a unit composed of 1 on-shift and 1 augmented) 	<ul style="list-style-type: none"> I&C Technician, each unit OCC 	6	33

NEI 12-01, Table 3.1
Expanded Response Functions for Phase 1 Staffing Assessment
(Page 4 of 4)

Expanded Response Function	Typical Location	Key Roles and Staffing Considerations	Position Performing this Function and Location	Resources Required	Resources Available *
Implementation of SAM Strategies	OSC, TSC, Control Room	<ul style="list-style-type: none"> • Number and composition of personnel capable of simultaneous implementation of any 2 SAM strategies at each unit • Should not include personnel assigned to other functions (e.g., emergency repair and corrective actions); however, may include members of the on-shift staff and personnel responsible for implementation of Transition Phase coping strategies 	<ul style="list-style-type: none"> • (6) Control Room Operators • (9) Auxiliary Operators • (3) Security • (6) I&C Technicians • (3) Mechanical Maintenance Technicians • (18) Fire Fighters • (21) RP Technicians 	66	RO 83 AO 115 Sec >3 I&C 27 Mech 64 FF 25 RPT 57

* Resources available exclude personnel used for repair and corrective actions.

6.2.2.2 On-Site Radiation Protection Technicians

The equation in Section 3.5.1 of NEI 12-01 was used to determine the required number of on-site Radiation Protection (RP) Technicians (on-shift plus augmented ERO RP Technicians that perform on-site response functions) for PVNGS.

The equation in NEI 12-01, Section 3.5.1 is as follows:

$$RPT_T = RPT_{COP} + RPT_{RCA} + RPT_{NC}$$

Where:

RPT_T = Total required number of on-site RP Technicians.

RPT_{COP} = Number needed to support implementation of the two extended loss of AC power coping strategies that require the greatest number of staff per unit. Determine this number by reviewing strategies for each unit.

RPT_{RCA} = Number needed for repair and corrective action = 2 x the number of units.

RPT_{NC} = Number of on-site RP Technicians 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.

$$10 (RPT_T) = 1 (RPT_{COP}) + 6 (RPT_{RCA}) + 3 (RPT_{NC})$$

$$RPT_{COP} = 1$$

The RPT_{COP} number is based upon the coping strategies of currently implemented EOPs and AOPs which were evaluated during the task analysis. Coping strategies of procedure 40AO-9ZZ23, *Loss of SFP Level or Cooling*, requires one RP Technician to monitor Fuel Building radiation levels assuming SFP boiling and loss of level occurs in only one unit approximately 11.5 hours after the beginning of the event (Reference 8).

$$RPT_{RCA} = 6$$

Based on the number needed for repair and corrective actions, two are required per unit.

$$RPT_{NC} = 3$$

The RPT_{NC} number is based upon PVNGS Emergency Plan, Revision 49, which requires one RP Technician to perform dose assessment, one RP Technician to perform off site radiological monitoring activities and one RP Technician (Radiation Monitoring Technician) to perform in-plant area surveys as necessary which would preclude them from performing job coverage for extended loss of AC power coping, repair or corrective action teams.

The minimum number of RPTs required for expanded response is 10. To account for 24-hours of coverage, the total required number of RPTs is 20 based on 12-hour shifts.

Following a BDBEE, more than 20 RP Technicians are available to support performance of assigned emergency plan functions and the expanded response capability as listed in Attachment 2, Table 1 of this report, *Qualified Augmenting and Expanded ERO Resources*.

In the event of fuel damage, prevailing dose rates would likely require the site’s RP Technician complement to be augmented with technicians from outside sources. The PVNGS Emergency Plan, Revision 49, identifies INPO, service companies, and contract support as non- licensee support, and in accordance with procedure EP-0900, *Emergency Response Organization (ERO) Position Checklists*, Appendix M, the EOF Emergency Operations Director (EOD) is responsible for directing the Administrative/Logistics Coordinator to obtain any required offsite assistance.

6.2.2.3 Administrative Support Personnel

PVNGS has administrative support personnel assigned to each Emergency Response Facility (ERF). PVNGS maintains five ERO teams with qualified administrative support ERO members on each team. This analysis determined the current assignments and locations of administrative support personnel are adequate for implementation of the expanded response capability.

6.2.2.4 Severe Accident Management Guideline Implementation

The ELAP event analysis concludes that SAMG entry conditions would not be reached for greater than 24 hours. However, for purposes of assessing the emergency response functions identified in Reference 3, the assessment considered the number and qualifications of SAMG implementation personnel required for simultaneous implementation of the two most task intensive SAMG strategies in Units 1, 2, and 3. This analysis relies on the use of the expanded ERO because implementation of the SAMGs is not assumed to occur during the post event 0 to 6 hour “no site access” time period. The following two SAMG strategies were determined to be the most resource intensive:

- 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines*, Appendix 15, *Depressurize Steam Generator (SG) and Feed With Fire Pump (FP)*
 - Attachment 15A, *Preferred Strategy Circulating Water (CW) Feed to SGs*
- 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines*, Appendix 12, *Makeup to Refueling Water Tank (RWT)*
 - Attachment 12A, *CW Makeup to RWT*

Attachment 15A, Preferred Strategy Circulating Water (CW) Feed to SGs			
Resource	Number per unit	Number per site	Function
Control Room Operator	1	3	Respond to recommendations from the TSC for actions to take and monitor indications
Auxiliary Operator	1	3	Manual operate the Atmospheric Dump Valves
Auxiliary Operator	1	3	Align feed water
Auxiliary Operator	1	3	Connect required fire hose adapters
I&C Technician	2	6	Monitor Steam Generator Level and Pressure
Fire Fighters	3	9	Operate Fire Truck and fire hoses
RP Technician	5	15	Job coverage for Auxiliary Operators, I&C Technician, Fire Fighter teams
TOTAL	14	42	

Attachment 12A, CW Makeup to RWT			
Resource	Number per unit	Number per site	Function
Control Room Operator	1	3	Respond to recommendations from the TSC for actions to take and monitor indications
Security	1	3	Present for removal of RWT Drain Valve (CHEV011) security barrier
Mechanical Maintenance Technician	1	3	Remove the blind flange and install the 6" flange at RWT Drain Valve (CHEV011)
Fire Fighters	3	9	Operate Fire Truck and run fire hoses
RP Technician	2	6	Monitor dose rates in the Radwaste yards and job coverage for Fire Fighters, Mechanical Maintenance and Security
TOTAL	8	24	

Simultaneous Attachment 15A, Preferred Strategy Circulating Water (CW) Feed to SGs and Attachment 12A, CW Makeup to RWT			
Resource	Number per unit	Number per site	
Control Room Operator	2	6	
Auxiliary Operator	3	9	
Security	1	3	
I&C Technician	2	6	
Mechanical Maintenance Technician	1	3	
Fire Fighters	5	15	
RP Technician	7	21	
TOTAL	22	66	

The following enhancement was identified to address the current use of Fire Fighters for routing of hoses while implementing SAMG strategies.

- Revise procedure 79IS-9ZZ05, *PVNGS Severe Accident Management Guidelines (SAMG)*, to allow any capable emergency workers to run fire hoses with direction provided by a Fire Fighter.

6.2.3 Activating the Expanded Response Capability

In accordance with PVNGS Policy Guide 1503-01, *Emergency Preparedness*, all qualified ERO members that are fit for duty and capable of responding are required to respond to their Emergency Response Facility for an event classification of Alert or higher.

Procedure EP-0900, *Emergency Response Organization (ERO) Position Checklists*, Appendix B, Administrative/Logistics Coordinator Checklist has instructions to contact additional ERO support personnel for duty as directed by the Emergency Operations Director.

The following enhancements were identified to address expanded response capabilities:

- Develop an expanded ERO staffing process that ensures the appropriate responders are activated to support the limited site access period (6-24 hours post-event). This process will enable the ERO to staff necessary expanded ERO positions for a BDBEE.
- Develop a process to prioritize the order in which responders are transported to the site during the limited access period. This process will enable the ERO to specify the order in which emergency workers are transported to the site during the limited site access period for a BDBEE.

7 Program Controls

7.1 Emergency Response Drill & Exercise Program

NEI 12-01 states that a licensee should determine if any changes are necessary to documents describing the emergency response drill and exercise program. In particular, standard objectives and extent-of-play may need to be revised to clarify the expected demonstration of functions that are dependent upon the type of scenario event or accident (i.e., within or beyond design basis, and number of affected units). For example, functions associated with an expanded response capability would not be demonstrated during a drill or exercise that involved a design basis accident affecting only one unit.

The current PVNGS list of master objectives contains a broad set of objectives that are capable of evaluating performance of multi-unit activities including SAMG. The following enhancement was identified to address expanded response capabilities:

- Evaluate the PVNGS ERO drill and exercise program to address multi-unit events and expanded response capabilities and revise the program as determined to be appropriate.

7.2 Training

The following enhancement was identified to address expanded response capabilities:

- Provide appropriate training to ERO members prior to implementing the integrated expanded ERO process

7.3 Implementing Guidance

The following enhancement was identified to address expanded response capabilities:

- Develop an implementing process to integrate the expanded response capability into existing augmented ERO, as described in the PVNGS NEI 12-01 Phase 1 Staffing Analysis, by establishing the ability to transition to unit-specific Outage Control Centers (OCCs) for each of the affected units. The OCCs would be directed by the Operations Support Center thereby maintaining the fundamental principle of Unity of Command that is required by the National Incident Management System incident command protocol.

7.4 On-site Staff Ability to Move Back-up Equipment

A description of the methodology that will be used to move back-up portable equipment (e.g., pumps, generators) from alternate on-site storage facilities to repair locations at each reactor will be provided in the Phase 2 staffing analysis.

8 Security Considerations

Existing coping strategies do not anticipate the use of Security Officers to perform duties unrelated to their assigned roles. Security Officers will perform functions within their current roles such as monitoring and controlling site access and providing compensatory measures for any vital area doors that may need to remain open to facilitate improved room environmental conditions.

9 Implementation Schedule for Identified Enhancements

	PVNGS Enhancement	Completion Date
1	Revise procedure 79IS-9ZZ05, <i>PVNGS Severe Accident Management Guidelines (SAMG)</i> , to allow any capable emergency workers to run fire hoses with direction provided by a Fire Fighter.	12/31/2013
2	Develop an expanded ERO staffing process that ensures the appropriate responders are activated to support the limited site access period (6-24 hours post-event). This process will enable the ERO to staff necessary expanded ERO positions for a BDBEE.	10/31/2014
3	Develop a process to prioritize the order in which responders are transported to the site during the limited access period. This process will enable the ERO to specify the order in which emergency workers are transported to the site during the limited site access period for a BDBEE.	10/31/2014
4	Provide appropriate training to ERO members prior to implementing the integrated expanded ERO process.	10/31/2014
5	Develop an implementing process to integrate the expanded response capability into existing augmented ERO, as described in the PVNGS NEI 12-01 Phase 1 Staffing Analysis, by establishing the ability to transition to unit-specific Outage Control Centers (OCCs) for each of the affected units. The OCCs would be directed by the Operations Support Center thereby maintaining the fundamental principle of Unity of Command that is required by the National Incident Management System incident command protocol.	10/31/2014
6	Evaluate the PVNGS ERO drill and exercise program to address multi-unit events and expanded response capabilities and revise the program as determined to be appropriate.	10/31/2014

10 References:

1. NRC letter from E. J. Leeds and M. R. Johnson, 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. APS letter number 102-06523, dated May 11, 2012, *60-Day Response to NRC Letter, 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 Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2012*
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, Revision 0, November 2011, *Interim Staff Guidance Emergency Planning for Nuclear Power Plants*
6. APS letter number 102-06529, dated June 8, 2012, *90-Day Response to Emergency Preparedness Information Requested by NRC Letter, 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 Force Review of Insights from the Fukushima Dai-ichi Accident*
7. NRC letter from D. L. Skeen 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. APS letter number 102-06670, dated February 28, 2013, *APS Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*
9. Updated Final Safety Analysis Report (UFSAR) Revision 16
10. PVNGS Emergency Plan, Revision 49, December 2012
11. State of Arizona-Maricopa County Offsite Emergency Plan, December 2012
12. NUREG 0654, *Criteria for Preparation and Evaluation of Radiological Emergency Response Plans and Preparedness in Support of Nuclear Power Plants.*

Attachment 1

ELAP Staffing Assessment Tables

NEI 10-05 TABLE 1 - On-Shift Positions

Line	On-Shift Position	Emergency Plan Reference	Role in Table#/Line#	Compensatory Action Required?
1	Shift Manager #1-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L1 T5/L1 T5/L2 T5/L3 T5/L4 T5/L7	No
2	Shift Manager #2-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L2	No
3	Shift Manager #3-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L3	No
4	Control Room Supervisor #1-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L4	No
5	Control Room Supervisor #2-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L5	No
6	Control Room Supervisor #3-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L6	No
7	Control Room Operator #1-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L9	No
8	Control Room Operator #1-2	PVNGS Emergency Plan Rev 49 Table 1	T2/L10	No
9	Control Room Operator #2-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L11	No
10	Control Room Operator #2-2	PVNGS Emergency Plan Rev 49 Table 1	T2/L12	No
11	Control Room Operator #3-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L13	No
12	Control Room Operator #3-2	PVNGS Emergency Plan Rev 49 Table 1	T2/L14	No
13	Fire Team Advisor (RO)	PVNGS Emergency Plan Rev 49 Table 1	T2/L15 T3/L1	No
14	Auxiliary Operator #1-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L16	No
15	Auxiliary Operator #1-2	PVNGS Emergency Plan Rev 49 Table 1	T2/L17 T5/L6 T5/L8	No
16	Auxiliary Operator #1-3	PVNGS Emergency Plan Rev 49 Table 1	T2/L18	No
17	Auxiliary Operator #1-4	PVNGS Emergency Plan Rev 49 Table 1	T2/L19	No
18	Auxiliary Operator #2-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L20	No
19	Auxiliary Operator #2-2	PVNGS Emergency Plan Rev 49 Table 1	T2/L21	No
20	Auxiliary Operator #2-3	PVNGS Emergency Plan Rev 49 Table 1	T2/L22	No
21	Auxiliary Operator #2-4	PVNGS Emergency Plan Rev 49 Table 1	T2/L23	No

NEI 10-05 TABLE 1 - On-Shift Positions (continued)

Line	On-Shift Position	Emergency Plan Reference	Role in Table#/Line#	Compensatory Action Required?
22	Auxiliary Operator #3-1	PVNGS Emergency Plan Rev 49 Table 1	T2/L24	No
23	Auxiliary Operator #3-2	PVNGS Emergency Plan Rev 49 Table 1	T2/L25	No
24	Auxiliary Operator #3-3	PVNGS Emergency Plan Rev 49 Table 1	T2/L26	No
25	Auxiliary Operator #3-4	PVNGS Emergency Plan Rev 49 Table 1	T2/L27	No
26	Shift Technical Advisor #1	PVNGS Emergency Plan Rev 49 Table 1	T2/L7 T5/L5	No
27	Shift Technical Advisor #2	PVNGS Emergency Plan Rev 49 Table 1	T2/L8	No
28	ENS Communicator	PVNGS Emergency Plan Rev 49 Table 1	T2/L28 T5/L9 T5/L12	No
29	Chemistry Technician #1	PVNGS Emergency Plan Rev 49 Table 1	T4/L9	No
30	Chemistry Technician #2	PVNGS Emergency Plan Rev 49 Table 1	T4/L10	No
31	Radiation Protection Monitor	PVNGS Emergency Plan Rev 49 Table 1	T4/L5	No
32	Radiation Protection Technician #1	PVNGS Emergency Plan Rev 49 Table 1	T4/L6 T2/L37	No
33	Radiation Protection Technician #2	PVNGS Emergency Plan Rev 49 Table 1	T4/L4 T2/L38	No
34	Radiation Protection Technician #3	PVNGS Emergency Plan Rev 49 Table 1	T4/L8 T2/L39	No
35	Radiation Monitoring Technician	PVNGS Emergency Plan Rev 49 Table 1	T4/L7	No
36	RM or RP Technician	PVNGS Emergency Plan Rev 49 Table 1	T4/L1	No
37	Survey Qualified Position (OSC)	PVNGS Emergency Plan Rev 49 Table 1	T4/L2	No
38	RFAT Driver	PVNGS Emergency Plan Rev 49 Table 1	T4/L11	No
39	Security Section Leader/Director	PVNGS Emergency Plan Rev 49 Table 1	T2/L29 T5/L6	No
40	Electrical Technician #1	PVNGS Emergency Plan Rev 49 Table 1	T2/L31	No
41	Electrical Technician #2	PVNGS Emergency Plan Rev 49 Table 1	T2/L32	No

NEI 10-05 TABLE 1 - On-Shift Positions (continued)

Line	On-Shift Position	Emergency Plan Reference	Role in Table#/Line#	Compensatory Action Required?
42	Electrical Technician #3	PVNGS Emergency Plan Rev 49 Table 1	T2/L33	No
43	Mechanical Technician #1	PVNGS Emergency Plan Rev 49 Table 1	T2/L34	No
44	Mechanical Technician #2	PVNGS Emergency Plan Rev 49 Table 1	T2/L35	No
45	I&C Technician #1	PVNGS Emergency Plan Rev 49 Table 1	T2/L36	No
46	Fire/Rescue Staff #1	PVNGS Emergency Plan Rev 49 Table 1	T3/L2	No
47	Fire/Rescue Staff #2	PVNGS Emergency Plan Rev 49 Table 1	T3/L3	No
48	Fire/Rescue Staff #3	PVNGS Emergency Plan Rev 49 Table 1	T3/L4	No
49	Fire/Rescue Staff #4	PVNGS Emergency Plan Rev 49 Table 1	T3/L5	No
50	Fire/Rescue Staff #5	PVNGS Emergency Plan Rev 49 Table 1	T3/L6	No
51	Plant Security	PVNGS Emergency Plan Rev 49 Table 1	T2/L30 T5/L14	No

NEI 10-05 TABLE 2 – Plant Operations & Safe Shutdown

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

Line	Generic Title/Role	On-Shift Position	Task Analysis Controlling Method
1	Shift Manager	Shift Manager #1-1	Operator Training
2	Shift Manager	Shift Manager #2-1	Operator Training
3	Shift Manager	Shift Manager #3-1	Operator Training
4	Unit Supervisor	Control Room Supervisor #1-1	Operator Training
5	Unit Supervisor	Control Room Supervisor #2-1	Operator Training
6	Unit Supervisor	Control Room Supervisor #3-1	Operator Training
7	Shift Technical Advisor	Shift Technical Advisor #1	Operator Training
8	Shift Technical Advisor	Shift Technical Advisor #2	Operator Training
9	Reactor Operator	Control Room Operator #1-1	Operator Training
10	Reactor Operator	Control Room Operator #1-2	Operator Training
11	Reactor Operator	Control Room Operator #2-1	Operator Training
12	Reactor Operator	Control Room Operator #2-2	Operator Training
13	Reactor Operator	Control Room Operator #3-1	Operator Training
14	Reactor Operator	Control Room Operator #3-2	Operator Training
15	Fire Team Advisor (RO)	Fire Team Advisor	Operator Training
16	Auxiliary Operator	Auxiliary Operator #1-1	Operator Training
17	Auxiliary Operator	Auxiliary Operator #1-2	Operator Training
18	Auxiliary Operator	Auxiliary Operator #1-3	Operator Training
19	Auxiliary Operator	Auxiliary Operator #1-4	Operator Training
20	Auxiliary Operator	Auxiliary Operator #2-1	Operator Training
21	Auxiliary Operator	Auxiliary Operator #2-2	Operator Training
22	Auxiliary Operator	Auxiliary Operator #2-3	Operator Training
23	Auxiliary Operator	Auxiliary Operator #2-4	Operator Training
24	Auxiliary Operator	Auxiliary Operator #3-1	Operator Training
25	Auxiliary Operator	Auxiliary Operator #3-2	Operator Training
26	Auxiliary Operator	Auxiliary Operator #3-3	Operator Training
27	Auxiliary Operator	Auxiliary Operator #3-4	Operator Training
28	Communicator	ENS Communicator	Operator Training
29	Security Director	Security Director	Emergency Preparedness Training
30	Security Force	Security Force (number not designated)	Security Training

NEI 10-05 TABLE 2 – Plant Operations & Safe Shutdown (continued)

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

Line	Generic Title/Role	On-Shift Position	Task Analysis Controlling Method
31	Electrical Technician	Electrical Technician #1	Accredited Craft Training
32	Electrical Technician	Electrical Technician #2	Accredited Craft Training
33	Electrical Technician	Electrical Technician #3	Accredited Craft Training
34	Mechanical Technician	Mechanical Technician #1	Accredited Staff Training
35	Mechanical Technician	Mechanical Technician #2	Accredited Staff Training
36	I&C Technician	I&C Technician #1	Accredited Staff Training
37	Radiation Technician	Radiation Technician #1	Accredited Staff Training
38	Radiation Technician	Radiation Technician #2	Accredited Staff Training
39	Radiation Technician	Radiation Technician #3	Accredited Staff Training

TABLE 2A – Procedural Task Timing

Procedure Steps/Actions			Performance Time (Mins) After Procedure Implementation														
Proc/Step	Task	Resource	0-10	10-20	20-30	30-40	40-50	50-60	60-75	75-90	90-105	105-120	120-150	150-180	180-240	240-300	300-360
Post Trip Actions 40EP-9EO01	Standard Post Trip Actions	RO #1-2, RO #2-2, RO #3-2 CRS #1-1 CRS #2-1 CRS #3-1 SM #1-1 SM #2-1 SM #3-1	X	X													
40EP-9EO01	STA Post Trip Actions	STA #1 STA #2 Support all three units	X	X													
20SP-0SK08	Loss of All AC Security Comp Measures Until 54x is implemented	Sec. Force All Three Units	X	X	X	X	X	X									
40EP-9EO08 Step 1:	Safety Function Status Check Acceptance Criteria Satisfied (Every 15 minutes)	STA #1 STA #2			X	X	X	X	X	X	X	X	X	X	X	X	X
Step 2:	Classify Event	SM #1-1	X	X													
EP- 0902	STSC Comm. to Control Room	AO #1-2			X	X	X	X	X	X	X	X	X	X	X	X	X
Step 4:	Initiate MSIS	RO #1-1 RO #2-1 RO #3-1			X												
Step 5	Notify Energy Control Center	ENS Comm.			X												
Step 6	CAS Notification for access to SBO	RO #1-1			X												
Step 7	Dispatch AO to SBO Generator	AO #1-1			X	X	X	X									

TABLE 2A - Procedural Task Timing (continued)

Procedure Steps/Actions			Performance Time (Mins) After Procedure Implementation														
Proc/Step	Task	Resource	0-10	10-20	20-30	30-40	40-50	50-60	60-75	75-90	90-105	105-120	120-150	150-180	180-240	240-300	300-360
Step 8	Place Charging Pumps in Pull to Lock	RO #1-1 RO #2-1 RO #3-1			X												
Step 9	Minimize RCS Leakage	RO #1-1 RO #2-1 RO #3-1			X												
Step 10	Maintain T cold to less than 570	RO #1-2 RO #2-2 RO #3-2			X	X	X	X	X	X	X	X	X	X	X	X	x
Step 11	Notify RP of steaming to atmosphere	CRS #1-1 CRS #2-1 CRS #3-1			X												
Step 12	Maintain SG Level (AFW Pump A)	RO #1-2 RO #2-2 RO #3-2	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Step 13	Appendix 80 – Aligning SBO Gen.	RO #1-1 RO #2-1 RO #3-1			X	X	X	X									
Step 14	Appendix 53 – Aligning Deenergized busses	RO #1-1 RO #2-1 RO #3-1			X	X	X	X									
Step 18	Appendix 98 – Open Doors	AO #1-3 AO #2-3 AO #3-3				X	X	X	X	X	X	X					
Step 19	Appendix 31 – Local Monitoring of Instrument Air	AO #1-4 AO #2-4 AO #3-4				X	X	X	X	X	X	X	X	X	X	X	X
Step 20	PA Announcement	RO #1-1 RO #2-1 RO #3-1				X	X	X	X	X	X	X					
Step 21	Verify Natural Circ	RO #1-1 RO #2-1 RO #3-1				X	X	X	X	X	X	X	X	X	X	X	X

TABLE 2A - Procedural Task Timing (continued)

Procedure Steps/Actions			Performance Time (Mins) After Procedure Implementation														
Proc/Step	Task	Resource	0-10	10-20	20-30	30-40	40-50	50-60	60-75	75-90	90-105	105-120	120-150	150-180	180-240	240-300	300-360
Step 22	Appendix 4 – Verify CST Inventory	RO #1-2 RO #2-2 RO #3-2				X	X	X	X	X	X	X	X	X	X	X	X
Step 23	Initiate Cooldown	RO #1-2 RO #2-2 RO #3-2							X	X	X	X	X	X	X	X	X
Step 24	Calculate Shutdown Margin	STA #1 STA #2							X	X	X	X	X	X	X	X	X
Step 25	Lower SIAS Setpoint	RO #1-2 RO #2-2 RO #3-2							X	X	X	X	X	X	X	X	x
Step 26	Break Vacuum	RO #1-2 RO #2-2 RO #3-2				X											
Step 27	Appendix 62 - Vent Main Generator	AO #1-2 AO #2-2 AO #3-2							X	X	X	X					
Step 28	Appendix 8 – Boron Dilution Alarm Check	RO #1-1 RO #2-1 RO #3-1							X								
Transition to Functional Recovery Procedure 40EP-9EO09	Enter functional recovery procedures (No additional actions available)	CRS #1-1 CRS #2-1 CRS #3-1 STA #1 STA #2											X	X	X	X	X

Assumptions:

1. CST designed to last for 36 hours – Standard Appendix 4 of 40EP-9EO10, *STANDARD APPENDICES*)
2. Class Batteries available for 6 hours – Engineering Calculation 1/2/3-EC-PK-0207
3. Spent Fuel Pool actions are unnecessary (Spent Fuel Pool time to boil is greater than 6 hours)

NEI 10-05 TABLE 3 - Firefighting

Line	Performed By	Task Analysis Controlling Method
1	Fire Team Advisor	Operations Training
2	Fire Fighter #1	Fire Department Training
3	Fire Fighter #2	Fire Department Training
4	Fire Fighter #3	Fire Department Training
5	Fire Fighter #4	Fire Department Training
6	Fire Fighter #5	Fire Department Training

Notes: No fire in this scenario. Resources may be used to assist other operations.

NEI 10-05 TABLE 4 - Radiation Protection & Chemistry

Line	Position Performing Function/Task	Performance Time Period After Emergency Declaration (minutes)														
		0-10	10-20	20-30	30-40	40-50	50-60	60-75	75-90	90-105	105-120	120-150	150-180	180-240	240-300	300-360
1	In-Plant Survey On-Shift Position:RM or RPT															
2	On-Site Survey On-Shift Position: Survey Qualified (OSC)															
3	Personnel Monitoring On-Shift Position:															
4	Job Coverage – On-Shift Position: RPT#2															
5	Offsite Radiological Assessment On-Shift Position: RP Monitor		X	X	X	X	X	X	X	X	X	X	X	X	X	X
6	Other Site-Specific RP – Describe: On-Shift Position: RPT#1 Off Site Surveys				X	X	X	X	X	X	X	X	X	X	X	X
7	Other Site-Specific RP – Describe: On-Shift Position:RM		X	X	X	X	X	X	X	X	X	X	X	X	X	X
8	Other Site-Specific RP – Describe: On-Shift Position: RPT#3 Repair, Search and Rescue															
9	Chemistry function/task #1 – Describe: On-Shift Position:															
10	Chemistry function/task #2 – Describe: On-Shift Position:															
11	Other Site-Specific – Describe: On-Shift Position: RFAT Driver		X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes:

Chem Techs report to STSC Unit 1 for assignment.

Chemistry sampling capability is unavailable until cooling water for sample coolers is restored.

Radiation Protection Technician (RPT)

Radiological Field Assessment Team (RFAT)

Radiation Monitoring Technician (RM)

NEI 10-05 TABLE 5 – Emergency Plan Implementation

Line	Function/Task	On-Shift Position
1	Declare the Emergency Classification Level (ECL)*	Shift Manager Unit 1
2	Approve Offsite Protective Action Recommendations*	Shift Manager Unit 1
3	Approve content of State/local notifications*	Shift Manager Unit 1
4	Approve extension to allowable dose limits*	Shift Manager Unit 1
5	Notification and direction to on-shift staff (e.g., to assemble, evacuate, etc.)	STA #1
6	ERO Notification	STSC Communicator (AO #1-2)/ Security Director
7	Complete State/local notification form	Shift Manager Unit 1
8	Perform State/local notifications	STSC Communicator (AO #1-2)
9	Complete NRC event notification form	ENS Communicator
10	Activate ERDS	Not performed due to loss of AC power
11	Offsite radiological assessment	See Table 4/Line 6
12	Perform NRC notifications	ENS Communicator
13	Perform other site-specific event notifications (e.g., INPO, ANI, etc.)	Performed by Emergency Operations Facility (EOF) personnel
14	Personnel Accountability	Plant Security

* Shift Manager non-delegable duty

Attachment 2

Qualified Augmenting and Expanded ERO Resources¹

¹The data for Qualified Augmenting and Expanded ERO Resources was obtained from the Training database on 4/30/13.

TABLE 1 (Page 1 of 2)
QUALIFIED AUGMENTING AND EXPANDED ERO RESOURCES

Position	Number Qualified	Qualification
Emergency Operations Director or Asst Emergency Operations Director	10	EP: EOF: EOD/ASST EOD
NAN Communicator	5	EP: EOF: NAN COMM
Radiological Assessment Coord	5	EP: EOF: RAD ASSMT COORD
Engineering Director	5	EP: EOF: ENG DIR
HPN Communicator	6	EP: EOF: HPN COMM
Admin & Logistic Coordinator	5	EP: EOF: ADMIN LOGISTIC CORD
Dose Assessment Health Physicist	5	EP: EOF: DOSE ASSESSMENT HP
EOF ERF Communicator	6	EP: EOF: ERF COMM
Information Coordinator	4	EP: EOF: INFO COORD
Information Services Manager	4	EP: EOF: IS MANAGER
Rad Assessment Communicator	5	EP: EOF: RAD ASST COMM
Security Manager	7	EP: EOF: SECURITY MANAGER
System Engineering	5	EP: EOF: SYSTEMS ENG
Emergency Coordinator	6	EP: TSC: EMERGENCY COORD
Operations Manager	4	EP: TSC: OPS MGR
Electrical Engineer	5	EP: TSC: ELEC ENG
Mechanical Engineer	5	EP: TSC: MECH ENG
Reactor Analyst	6	EP: TSC: RX ANALYST
Security Director	29	EP: TSC: SECURITY DIR
RP Coordinator	5	EP: TSC: RP COORD
ENS Communicator	5	EP: TSC: ENS COMM
Chemistry Coordinator	6	EP: TSC: CHEMISTRY COORD
Emergency Coordinator Technical Asst	6	EP: TSC: EC TECH ASST
Engineering Manager	5	EP: TSC: ENG MGR
Maintenance Manager	5	EP: TSC: MNTC MGR
Operations Advisor	6	EP: STSC: OPS ADV
TSC Emergency Response Facility Communicator	5	EP: TSC: ERF COMM
Safety Analyst Engineer	6	EP: TSC: SAFETY ANALYSIS ENG

TABLE 1 (Page 2 of 2)
QUALIFIED AUGMENTING AND EXPANDED ERO RESOURCES

Position	Number Qualified	Qualification
OSC Manager	4	EP: OSC: OSC MGR
Repairs Coordinator	10	EP: OSC: REPARS COORD
RP Group Leader	5	EP: OSC: RP GROUP LEAD
OSC Emergency Response Facility Communicator	5	EP: OSC: ERF COMM
Offsite Technical Rep	6	EP: EOC: OFFSITE TECH REP
JIC Manager	6	EP: JIC: JIC MGR
PVNGS Spokesperson	5	EP: JIC: PV SPOKESPERSON
Spokesperson Coordinator	4	EP: JIC: SPOKESPERSON COORD
JIC Emergency Response Facility Communicator	5	EP: JIC: ERF COMM
Research/Writing Coordinator	5	EP: JIC: RESEARCH CH/WRITING CR
Distribution Services Coordinator	5	EP: JIC: DIST SERVICES COOR
JIC Video/Photo Coordinator	5	EP: JIC: VIDEO/PHOTO COORD
Emergency Response Facility Administrative Support Staff	20	EP: ERF ADMIN
Mechanic E-Plan	70	MECH: EPLAN
Electrician E-Plan	52	ELEC: EPLAN
I&C Technician E-Plan	33	IC: EPLAN
Advanced Radiation Protection Technician	57	RP: ADVANCED RP TECH
Auxiliary Operator	121	OPS: AO-9
Fire Fighter E-Plan	25	FIRE DEPT./E-PLAN
Shift Technical Advisor	15	OPS: STA
Chemistry Tech E-Plan	21	CHEM: EPLAN ERO
System Engineering	12	General Engineering Qualifications*
Civil Engineering	7	General Engineering Qualifications*
Mechanical Engineering	26	General Engineering Qualifications*
Electrical Engineering	16	General Engineering Qualifications*

Notes:

* These positions do not have specific EPLAN training but have engineering qualifications that can be used for event response