General Integrated Plan Elements (PWR & BWR)

Determine Applicable Extreme External Hazard **Ref: NEI 12-06 section 4.0 -9.0** **JLD-ISG-2012-01 section 1.0**	*Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps.* *Describe how NEI 12-06 sections 5 – 9 were applied and the basis for why the plant screened out for certain hazards* Palo Verde Nuclear Generating Station (PVNGS) has been evaluated and the following applicable hazards have been identified: • Seismic events • Extreme heat PVNGS has reviewed the NEI FLEX guidance and determined the hazards that FLEX equipment should be protected from include seismic and extreme high temperatures. PVNGS has determined the functional threats from each of these hazards and identified FLEX equipment that may be affected. The FLEX equipment is being purchased commercial grade and the storage locations will provide the protection required from these hazards. PVNGS is also developing procedures and processes to further address plant strategies for responding to these various hazards. ***Seismic:*** Per the Updated Final Safety Analysis Report (UFSAR) (Reference **Error! Reference source not found.**4) Section 3.7 and Reference **Error! Reference source not found.**~~13~~, Seismic Design, the seismic criteria for PVNGS includes two design basis earthquake spectra: Operating Basis Earthquake (OBE) and the Safe Shutdown Earthquake (SSE). The original site seismic design response spectra define the vibratory ground motion of the OBE the SSE for rock-supported structures. The SSE and the OBE are 0.20g and 0.10g, respectively. For additional conservatism, a seismic analysis for Seismic Category I structures was performed utilizing a 0.25g SSE and a 0.13g OBE. These values constitute the design basis of PVNGS. In summary, PVNGS is a high seismic plant and, per the FLEX guidance (References to be added), the impact of a seismic event must be considered for all nuclear plant sites. As a result, the credited FLEX equipment will be assessed based on the current PVNGS seismic licensing basis to

Comment [EEB1]: Reference doesn't work.

Comment [EEB2]: Reference doesn't work.

	ensure that the equipment remains accessible and available after a DBE event and that the FLEX equipment does not become a target or source of a seismic interaction from other systems, structures or components. This assessment will include ensuring that any storage location and deployment routes meet the FLEX criteria. ***External Flooding:*** Seismic Category I structures, systems and components specified in shall be located above the elevation of the probable maximum flood level (References to be added). The PVNGS site is susceptible to brief water buildup due to PMP; however, drainage systems onsite are expected to be sufficient to prevent flooding in or limit access to seismic category 1 structures. FLEX equipment is expected to be staged inside or near seismic category 1 buildings (Fuel Building, Auxiliary Building, and MSSS) and, as an additional precaution, FLEX connections will be installed a couple of feet above grade to protect against any potential flooding. PVNGS does not need to consider flooding as defined in NEI 12-06 (References to be added). However, brief buildup of water onsite should be considered when storage locations and deployment routes are selected, and the timing of FLEX Implementation is determined. ***High Wind:*** Per NEI 12-06: Hurricanes are extremely uncommon on the west coast of the US and are not considered to affect the PVNGS site. For considering the applicability of tornadoes to specific sites, data from the NRC's latest tornado hazard study, NUREG/CR-4461, is used. Tornadoes with the capacity to do significant damage are generally considered to be those with winds above 130 mph. Figure 7-2 of NEI 12-06 provides a map of the U.S. in 2 degree latitude/longitude blocks that shows the tornado wind speed expected to occur at a rate of 1 in 1 million chance of per year. This clearly bounding assumption allows selection of plants that are identified in blocks with tornado wind speeds greater than 130 mph. In general, plants west of the Rockies will be screened out. Figure 7-2 from the NEI FLEX implementation Guide (References to be added) was used for this assessment. It was determined the PVNGS site is in Region 3 and will not have winds exceeding 130 mph. Therefore, the high wind hazard is not applicable to PVNGS. ***Extreme Cold:***

Comment [EEB3]: This is not really a quote from NEI 12-06.

Comment [EEB4]: Not an accurate quote.

Comment [EEB5]: Include latitude/longitude in order to make this complete. (I can check using UFSAR, but keep it simple.)

	Per the NEI FLEX guidance (References to be added), all sites should consider the temperature ranges and weather conditions for their site in storing and deploying their FLEX equipment. However, NEI 12-06 clarifies the extreme cold is not expected at sites in Southern California, **Arizona**, the Gulf Coast, and Florida. Further, Figure 8-1 of NEI 12-06 (References to be added) provides a visual representation of the maximum three day snowfall records across the U.S. Figure 8-1 of NEI 12-06 (References to be added) shows that PVNGS is not susceptible to a large amount of snow that could be a significant problem for deployment of the FLEX equipment. The FLEX guidance also assumes that this same basic trend applies to extreme low temperatures. Figure 8-2 of the FLEX guidance (References to be added) provides a visual representation of the potential for ice storms across the U.S. Per Figure 8-2, PVNGS is in level 1, which is defined as "no ice." In summary, based on the available local data and Figures 8-1 and 8-2 of NEI 12-06 (References to be added), the PVNGS site does not experience snow or ice, nor extreme cold temperatures; therefore, the hazard is screened out. ***<u>Extreme Heat:</u>*** As stated in the NEI FLEX Implementation Guide (References to be added), “all sites will address high temperatures.” PVNGS will address it with administrative controls if temperature exceed design basis. PVNGS site may experience extreme high temperatures for a prolonged duration. However, the extreme drought and high temperature events are slow metrological evolutions. Existing plant administrative operational procedures are in place to ensure that the plant is shut down and is at safe conditions if temperature of any systems, structures, or components (SSCs) exceeds their respective design basis limiting conditions. The event considered herein is a loss of AC power as a result of short extreme high temperatures (less than 24 hr in duration) coincident with high electrical grid demands, resulting in regional black out. During this type of event, the equipment and water inventories in the station are within the Technical Specification limits and therefore no additional limitation on initial conditions/failures/ abnormalities are expected. It is concluded that this event is a bounded seismic event and the seismic event is used to establish strategies, EOP modifications, and FSGs..

Comment [EEB6]: Should be identified.

Key Site assumptions to implement NEI 12-06 strategies.
 	
Ref: NEI 12-06 section 3.2.1
	Provide key assumptions associated with implementation of FLEX Strategies:
	• Flood and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 are not completed and therefore not assumed in this submittal. As the re-evaluations are completed, appropriate issues will be entered into the corrective action system and addressed on a schedule commensurate with other licensing bases changes.
	• Following conditions exist
	  ○ DC banks are available.
	  ○ AC and DC distribution available.
	  ○ Plant initial response is the same as SBO.
	  ○ Entry to ELAP will be at 1hr and plant will exit Technical Specifications requirements.
	  ○ Best estimate analysis and decay heat is used to establish operator time and action.
	  ○ No single failure of SSC assumed. Therefore, TDAFW will perform. The Secondary pump will be deployed when steam supply to Permanent equipment AF reaches preset value dictated by procedure.
	• Margin will be added to design FLEX components and hard connection points to bound future increases as re-evaluation. All components will be procured commercially.
	• The design hardened connection is protected against external event or redundant locations.
	• Implementation strategies and roads are assessed for hazards impact.
	• All Phase II components are stored at site and available after the event they were designed to be protected against.
	• Additional staff resources are expected to arrive beginning at 6 hours and the site will be fully staffed 24 hours after the event.
	
	Exemptions:
	• Primary and secondary storage locations have not been selected yet; once locations are finalized implementation routes will be defined.
	• Exceptions for the site security plan or other (license/site specific) requirement s of 10CFR may be required.
	• Certain Technical Specifications cannot be complied with during FLEX implementation.

Comment [EEB7]: "considered" might be a better choice of words.

Comment [EEB8]: Battery banks?

Comment [EEB9]: What does this mean? What is the basis for exiting TS requirements?

Comment [EEB10]: Not really a condition.

Comment [EEB11]: Not really true; there is a necessary failure to function of all EDGs. Could be phrased as no concurrent failures of SSCs unrelated to the loss of ac power, or something like that.

Comment [EEB12]: If there is an existing document showing NRC approval of the current licensing basis for TDAFW, including the time it takes to start and the time it takes for an operator to start it if it fails to properly start automatically, there could be some value in citing that.

Comment [EEB13]: ??

Comment [EEB14]: Has the margin been identified?

Comment [EEB15]: Poorly worded.

Comment [EEB16]: Exemptions is not a good word choice because of the 50.11 usages.

Comment [EEB17]: Identify as open item and indicate that they will be communicated in the status update reports. Might be worth including as a milestone. This comment applies throughout.

Comment [EEB18]: Unclear what the meaning and intent of this is or whether exceptions will be requested.

Comment [EEB19]: Identify them and how they will be resolved.

Comment [J20]: Alternatively, could request a more general explanation of this statement with examples. Presumably there are a lot of TSs that can't be met with an extended loss of AC, and the noncompliance cannot be resolved until power is restored?

Inasmuch as the statement might refer to a functional requirement (e.g., a thermal limit) versus obvious equipment unavailability (e.g., almost all ESF systems disabled), then I would be interested in specifics.

Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06. **Ref: JLD-ISG-2012-01 NEI 12-06 13.1**	*Include a description of any alternatives to the guidance, and provide a milestone schedule of planned action.* PVNGS has one known deviations to the guidelines in JLD-ISG-2012-01 and NEI 12-06: the SFP spray capability is not considered a FLEX strategy. If additional deviations are identified, then the deviations will be communicated in a future 6 month update following identification.
Provide a sequence of events and identify any time constraint required for success including the technical basis for the time constraint. **Ref: NEI 12-06 section 3.2.1.7 JLD-ISG-2012-01 section 2.1**	*Strategies that have a time constraint to be successful should be identified with a technical basis and a justification provided that the time can reasonably be met (for example, a walk through of deployment).* *Describe in detail in this section the technical basis for the time constraint identified on the sequence of events timeline Attachment 1A* *See attached sequence of events timeline (Attachment 1A).* *Technical Basis Support information, see attached NSSS Significant Reference Analysis Deviation Table (Attachment 1B)* **Two examples for time constraints for PVNGS are provided here. Content is limited to illustrate concepts only** General : 1. A site specific NSSS evaluation has been performed for the station by NSSS vendor (WEC DAR-TD-12-2 (Reference 1)). The analysis was performed using computer code CENTS (Reference 2). Analysis is consistent with WCAP **17601-P**, Attachment 1B provides a summary of key parameters of interest. *[Other generic NSSS evaluations may have been completed and are to be listed with the intention that audits are to be performed for generic analyses to allow for a timely review process.]* *[Add discussion of why the generic analysis is applicable to the site.]* 2. Containment integrity was reviewed by use of computer code MAAP 4.0.7. 3. A best estimated decay heat curve was developed using SCALE 6 ORIGEN-APR (CN-REA-12-36 (Reference 3) for use in NSSS modeling.

Comment [EEB21]: This contains insufficient information to determine whether this is acceptable as an alternative approach. It also conflicts with the depiction of Figures 0-9 and 0-10 of spray nozzles.

Comment [J22]: What does this mean?

Who is to perform the audits?

	4. Environmental conditions within the station compartments were evaluated using following methods and tools on NUMARC 87-000, PCFLUD (Bechtel software) or Gothic 8.0 (EPRI software) 5. 10 CFR 50.63 and Regulatory Guide 1.55. The Palo Verde Nuclear Generating Station is an alternate AC, 16 hour coping plant. Applicable portions of supporting analysis have been used in ELAP evaluations. APS submittal and US NRC acceptance of the 16 hour coping analysis for station blackout are documented in Reference 3 and 4. Discussion of time constraints identified in Attachment 1A table. Table Item 4 - Entry into ELAP: Time period of one (1) hr is selected conservatively to ensure that ELAP entry conditions can be verified by control room staff and it is validated that alternate source AC, i.e. additional two redundant trains of Station Black Out Generators (SBOG) are not available. One hour is a reasonable assumption since 1) the SBOG has to be manually started and they are located at the boundary water reclamation facility and the station about a mile from unit one control room (Reference 6). ELAP entry conditions are: **I. Loss of Offsite Power** **II. Loss of all Emergency Diesels** **III. Loss of both Station Blackout Generators** **IV. Any doubt exists that 4160 VAC power can be restored within 4 hours of event.** Table Item 6 – Start Cooldown: *[Justification of the time constraint required]* Table Item 7 – Complete DC Load shed: *[Justification of the time constraint required]* Table Item 9 - Open TDAFW Pump Room Door for Ventilation: After ELAP, the essential HVAC unit would be also lost. However, the turbine driven essential auxiliary feed pump (AFP-A) would be actuated automatically and functional within a minute of the event. System is powered by duel steam source from each steam generators and 120 V power from essential convertors tied to DC bus. The physical configuration at PVNGS has this pump bunkered at 80 elevations (20 ft below ground

Comment [EEB23]: 1.155

Comment [EEB24]: ??? 4 and 5?

Comment [EEB25]: One hour was reasonable for SBO conditions affecting one unit. Why is it still a reasonable assumption when it is all three units? The operator would have to discover that neither SBOG would start, rather than just start and align one.

It would clearly be reasonably achievable for the first unit to enter ELAP since there are only two SBOGs. The second unit to enter would likely be reasonably achievable once the first SBOG fails. It would be the final unit that would need further explanation.

	elevation) in a water tight compartment. It is expected that the compartment temperature would increase as result of heat addition from a multiple sources such as steam piping, turbine, and gland seal or other leakages and heat generated by the control panel. To ensure that functionality of turbine driven auxiliary feed water pump is maintained for an indefinite duration operation as the strategy for ELAP requires, original design bases of SBO (50.63) was reviewed and it was found to be applicable. This analysis uses NUMARC 87-00 methods and PCFLUD software to predict a time depend room temperature profile (Ref 7). This analysis shows that the room temperature will remain below 150°F at 4 hr into the event which is within the equipment design limits ("condition C" - NUMARC 87-00). The limiting component for this room is a control panel whose function is required for TDAWF flow control. The temperature limit is 160°F (Reference 7). Therefore, it is concluded that, to maintain temperature in the compartment for duration event to a value at or below this limit until temporary ventilation is needed. A system evaluation for portable HVAC was preformed including duct losses and electrical power consumption (Reference 8). Final design of temporary skids is composed of two industrial grade fans operating in series with flexible ducts. The motive power for fans is supplied by two 10KW portable diesel driven generators. Fans and associate ducts and generator are all mounted on easy to push carts that can be manipulated by two individuals. If possible, these fans would be installed before 4hr, however procedurally (FSGs) they are required to be installed and be operational by 4hr. After installation the compartment temperature will approach to equilibrium about outside air (OSA). OSA design basis Maximum temperature for Palo Verde is 113°F. Table Item 13 – 500 kW 480V Generators Installed: *[Justification of the time constraint required]* Table Item 14 - Install RCS Makeup Pump/Start Charging Pump: *[Justification of the time constraint required]* Table Item 15 - CST Empties/Switchover to RMWT or (RWT for high Seismic Event): *[Justification of the time constraint required]*

Comment [EEB26]: ??

Comment [MM27]: What is the basis for the 4 hr requirement?

Comment [EEB28]: PVNGS UFSAR Rev 16, Table 2.3-9, shows an extreme maximum temperature of 114 F.

	Table Item 17 - Secondary Makeup Pump Installed: *[Justification of the time constraint required]* Table Item 18 - 4.16 kV Generator (from Regional Response Center) Installed: *[Justification of the time constraint required]* Table Item 19 - Demin Water from WRF to Units: *[Justification of the time constraint required]* Table Item 21 - Diesel SG Makeup Pump On/TDAFW Pump Off: *[Justification of the time constraint required]* Table Item 22 - B Train SDC Operable/Ultimate Heat Sink Established: *[Justification of the time constraint required]* [*Other justification of time constraint actions are to be listed once the Attachment 1A table is completed.*] References **1.** DAR-TD-12-2 "Palo Verde Units 1, 2 & 3 Beyond Design Bases Event - Extended Loss of AC Power" 11/2012 (available for audit) **2.** CENTS computer code SER NRC. (NRC reviewed document) **3.** CN-REA-12-36 "Palo Verde Units Best-Estimate Decay Heat for Extended Loss-of-AC Power" 8/2012. (available for audit) **4.** Letter APS to US NRC "Revised Station Blackout (SBO) Evaluation". No. 102-05370-CDM/TNW/RAB, issued October 28, 2005 (NRC reviewed document) **5.** Letter USNRC to APS, "Palo Verde Nuclear Generating Station, Units 1, 2, AND 3 Revised Station Blackout Coping Duration (TAC Nos. MC8787, MC8788, AND MC8789)" dated Oct 31, 2006. (NRC reviewed document) **6.** Letter APS to US NRC, "Response to NRC Request for Additional Information (RAI) Regarding Revised Station Blackout Evaluation" APS letter no. 102-05513-CE/SAB/DJS. Dated June 9, 2006. (NRC reviewed document) **7.** PVNGS calculation 13-MC-HA-052 (available for audit) **8.** PVNGS study 13-NS-A108 (available for audit)

Comment [EEB29]: Seems out of place as this is an NRC document.

Identify how strategies will be deployed in all modes. **Ref: NEI 12-06 section 13.1.6**	*Describe how the strategies will be deployed in all modes.* PVNGS has differentiated between the route from a storage location to its staging location, which is the "staging route," and the path from a staging location to the source and/or supply plant connections, which is the "deployment path." Staging routes and deployment paths are shown in Figure 1. These routes will be followed to transport the FLEX equipment to the required staging locations. The deployment paths will be followed to connect the FLEX equipment to the associated plant SSCs to allow the strategies to be implemented. The routes and paths will be maintained clear in all modes. These requirements will be included in an administrative program.

Provide a milestone schedule. This schedule should include:
• **Modifications timeline**
  ○ **Phase 1 Modifications**
  ○ **Phase 2 Modifications**
  ○ **Phase 3 Modifications**
• **Procedure guidance development complete**
  ○ **Strategies**
  ○ **Maintenance**
• **Storage plan (reasonable protection)**
• **Staffing analysis completion**
• **FLEX equipment acquisition timeline**
• **Training completion for the strategies**
• **Regional Response Centers operational**
 	
Ref: NEI 12-06 section 13.1
	The dates specifically required by the order are obligated or committed dates. Other dates are planned dates subject to change. Updates will be provided in the periodic (six month) status reports.
	
	See attached milestone schedule Attachment 2

Identify how the programmatic controls will be met. **Ref: NEI 12-06 section 11 JLD-ISG-2012-01 section 6.0**	*Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality. See section 11 in NEI 12-06. Storage of equipment, 11.3, will be documented in later sections of this template and need not be included in this section. See section 6.0 of JLD-ISG-2012-01.* Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control in accordance with NEI 12-06 Rev.0 Section 11.1. The unavailability of equipment and applicable connections that directly performs a FLEX mitigation strategy will be managed using plant equipment control guidelines developed in accordance with NEI 12-06 Rev.0 Section 11.5. Programs and controls will be established to assure personnel proficiency in the mitigation of beyond-design-basis events is developed and maintained in accordance with NEI 12-06 Rev.0 Section11.6. The FLEX strategies and basis will be maintained in an overall program document. Existing plant configuration control procedures will be modified to ensure that changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies in accordance with NEI 12-06 Rev.0 Section 11.8.
Describe training plan	*List training plans for affected organizations or describe the plan for training development* New training of general station staff and EP will be performed in 2014, prior to the 1st unit design implementation. Simulation and license operator training will not be impacted.
Describe Regional Response Center plan	The industry will establish two (2) Regional Response Centers (RRC) to support utilities during beyond design basis events. Each RRC will hold five (5) sets of equipment, four (4) of which will be able to be fully deployed when requested, the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Assemble Area, established by the SAFER team and the utility. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's playbook, will be delivered to the site

Comment [EEB30]: N.b., the discussion of quality attributes in 11.1 for the statement "in this section" will be read to mean "in Section 11" or "Chapter 11." That clause is not to be interpreted as limited to the Section 11.1 itself. It would be better to say Section 11 rather than Section 11.1.

	within 24 hours from the initial request. Also available will be locally held portable equipment that could be requested from site to site and utility to utility on an as required basis thus establishing 64 response centers capable of providing specific phase 2 equipment.
Notes:	

Comment [EEB31]: This doesn't really demonstrate compliance on the part of the licensee submitting the integrated plan. It should document that the licensee has entered into a contractual relationship with the offsite resource provider(s) (e.g., SAFER) and that the contractual relationship provides the capabilities specified in NEI 12-06 Section 12. It should cite whatever the renewal provisions of the contract are, or what means are implemented to ensure continued compliance.

Discussion in this section should include identification of the staging area for receipt of equipment from the RRC and how it will be transported from there to the on-site staging areas.

Maintain Core Cooling & Heat Removal	
Determine Baseline coping capability with installed coping[1] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **AFW/EFW** • **Depressurize SG for Makeup with Portable Injection Source** • **Sustained Source of Water** Ref: JLD-ISG-2012-01 section 2 and 3	
PWR Installed Equipment Phase 1	
Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain core cooling. Identify methods (AFW/EFW)and strategy(ies) utilized to achieve this coping time. At the initiation of the event operators will enter station existing SBP – EOP procedures. The ELAP procedures will be entered when the SBO generator is confirmed unavailable and off-site power cannot be restored and it is confirmed by dispatcher or visual verification of physical damage to infrastructure at site. Operators will begin DC electrical load shedding (this action beyond current design bases) and to cool down (70/hr) the plant to approximately 350°F (T_{cold}). Steam generator (SG) pressure will be between 130 and 150 psig at this temperature. During cooldown the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) will deliver CST inventory to the SGs. When CST inventory depletes the RMWT will be aligned to the TDAFWP suction. These two sources can support heat removal for over 72 hours. To preserve habitability for the	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.
Identify modifications	*List modifications and describe how they support coping time.* There are no modification required for Phase I.
Key Reactor Parameters	*List instrumentation credited for this coping evaluation phase.*

Comment [J32]: Note there is no discussion of cold shutdown / refueling, as comparable to the Hatch discussion, under which prompt action with portable equipment may be needed due to the unavailability of installed equipment. Is such a best-effort coverage required based on NEI 12-06 or up to the licensee?

Comment [MM33]: Any of the 2 SBO generators?

Comment [MM34]: Need to describe the loads that will be shed and the sequence and timing associated with load shedding. Also need to explain the drain of capacity associated with the time it takes to shed the loads and the remaining available capacity for supporting the extended coping duration. Also need to describe the extended loading profile of required equipment and how capacity to restore power will be assured.

Comment [MM35]: Presumably 70 degrees F/hr

[1] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

RCS essential instrumentation	Safety Function
Core Exit Thermocouples	RCS coolant inventory and core heat removal
Reactor Vessel Water Level (both Head and Plenum)	RCS coolant inventory
Steam Generator levels (WR)	RCS pressure boundary and pressure control
Steam Generator pressures	RCS pressure boundary and pressure control
Thot, Tcold (one Hot Leg and one Cold Leg on same loop)	RCS coolant inventory and core heat removal
Subcooling / Sat Margin (RCS and CET)	RCS coolant inventory and fuel integrity
RCS Pressure (WR)	RCS pressure boundary and pressure control
Safety Injection Tanks 2A & 2B Level and Pressure	RCS coolant inventory
Pressurizer level	RCS coolant inventory
Atmospheric Dump Valve Positions	RCS pressure boundary and pressure control
Aux Feedwater (turbine-driven pump) flow to each SG [A-train power]	RCS pressure boundary and pressure control and core heat removal
Containment essential instrumentation:	**Safety Function**
Containment Building pressure	Containment integrity
Spent Fuel Pool essential instrumentation	
None for 24 hours	See below for non-essential instruments

PVNGS expects to also have the following instruments available, but does not consider them essential for the IER L1 11-4 scope of 24 hours:

- Condensate Storage Tank (for AFW)
- Second Tcold from Cold Leg on monitored loop above
- Battery Voltages
- Battery Amperes
- Spent Fuel Pool level and temperature (portable drop-in instruments)

Notes: Seismic fragility evaluations have been performed. Total volume CST and RMWT is available to mitigate event. Tanks and associate piping survive beyond design bases SSE level.

Comment [EEB36]: 1. IER L1 11-4 comment is unnecessary here.
2. How is this equipment to be powered/re-powered?
3. Have means to read the instrumentation using portable equipment been identified (i.e., locally repowering the instrumentation)?

Comment [J37]: In the bulleted list, presumably this is CST level? It is not considered necessary because the tank will not be emptied within 24 hours?

But monitoring the CST level would presumably ensure readiness to transfer the TDAFW suction in a timely manner as the supply is running out, etc. If the reason for exclusion is time based (i.e., 24 hours), then why doesn't CST level show up (along with RMWT level for Phases 2 and 3) in the Phase 2 and/or Phase 3 discussions? The SGs do have significant inventory, but does this make monitoring the feedwater supply tank level superfluous?

Are only SITs 2A and 2B specified for a particular reason? Why not at least one from each SG loop?

Comment [EEB38]: This would presumably have been discussed in the section covering time constraints, along with reference to the evaluations.

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
Provide a general description of the coping strategies using on-site portable equipment including station modifications that are proposed to maintain core cooling. Identify methods and strategy(ies) utilized to achieve this coping time. Phase 2 Core cooling will be achieved with a portable diesel driven pump. The pump suction will come from the CST and RMWT. The discharge will be into the AFW lines downstream of the containment isolation valves.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.
Identify modifications	*List modifications necessary for phase 2* Piping, from the tie-in to the AFW system to the staging area will be added.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* Same instrumentation as Phase 1 except for instrumentation needed to operate portable equipment.

Comment [EEB39]: Is the intent to use the pump to feed a depressurized steam generator? That's not clearly stated here.

Comment [EEB40]: Identify the instrumentation needed. E.g., pump discharge pressure, flow rate, fuel tank level, etc.

Storage / Protection of Equipment : Describe storage / protection plan or schedule to determine storage requirements	
Seismic	*List Protection or schedule to protect* *TBD*
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List Protection or schedule to protect* *TBD*
Severe Storms with High Winds	*List Protection or schedule to protect* *TBD*
Snow, Ice, and Extreme Cold	*List Protection or schedule to protect* *TBD*
High Temperatures	*List Protection or schedule to protect* *TBD*

Deployment Conceptual Design
(Attachment 3 contains Conceptual Sketches)

Strategy	Modifications	Protection of connections
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Storage location and structure have not been decided yet. Figure 1~~Figure 1~~ identified	There are two modifications to the B train suction line. The first, installation of a valve and	Piping and valves for FLEX will all be enclosed within a Seismic Category 1 structure.

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Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
clear deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging area plant north of the CST.	blind flange connection. The blind flange would then be replaced with a universal connector for the portable pump suction. The second, a cross-tie between the RMWT suction line and the CST suction line is needed so the portable FLEX pump can utilize the RMWT inventory.	New FLEX piping shall be installed to meet necessary seismic requirements. All connection will be above the PVNGS flood level. Connection point for the suction and discharge will be outside the CT Pump house and designed to withstand the applicable hazards.
Notes:		

Comment [EEB41]: Will there be a box of some sort to protect the connection point from damage by external effects? Any type of cap?

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 3	
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods and strategy(ies) utilized to achieve this coping time. Phase 3 equipment for PVNGS includes portable water processing trailer and a 4.16 kV generator. The water processing units are capable of providing demineralized water to all three units for indefinite makeup for the SGS. Supply to the portable water processing trailer will come from the 45 and 85 acre reservoirs. To transport water to the portable water processing trailers temporary piping will be run to either the 45 acre or 85 acre reservoir. At the reservoir a portable pump will be staged with a short length of suction hose run into the reservoir. Piping and valves connecting the two reservoirs can be opened to allow suction from both sources can be used simultaneously. The 4.16 kV generators will be used to repower one train of cooling. With one train of cooling operable, the plant can restore a shutdown cooling loop and achieve cold shutdown.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.
Identify modifications	*List modifications necessary for phase 3* Refill connection needed on CST. (A hose and an existing manway could be used instead of a refill connection given the time this connection would be needed.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* Same as Phase 1 not including instrumentation to support portable equipment.

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Storage location and structure have not been decided yet. Figure 1~~Figure 1~~ identified clear deployment paths onsite for the transportation of FLEX	Refill connections to the CST at each unit are needed. A drain valve beneath a hatch on the plant north east side of the CST has been proposed to be	The refill connection will be designed to withstand the applicable hazards. All other equipment will be portable

Comment [EEB42]: How much will they make and how much is necessary?

Comment [J43]: And is it necessary to know the level of the tank (presumably CST eventually?) where this water will be discharged?

Comment [MM44]: Need to describe how the generators will be connected into the system and the fuel supply capabilities.

Comment [EEB45]: What does this really mean? What systems? Will the power be provided via the internal power distribution system or will it be provided locally? What is the capacity of the generator and how does that compare to the loads needed for one train of cooling?

Comment [EEB46]: Is there an existing means of connecting the portable generator to repower the train of cooling?

Comment [EEB48]: Provide conceptual details or identify as an open item. Is it to be within a Class 1 structure?

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Comment [EEB49]: Outside the scope of this section.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
equipment within the power block. For this function a deployment from a storage facility assumed within the power block will utilized these roads to transport equipment to the northeast corner of the site. Then necessary equipment can be transported on the highlighted hose routings show in Figure 5~~Figure 6~~0 and Figure 6~~Figure 7~~.	modified so it can be utilized as a refill connection.	
Notes:		

Comment [EEB47]: ???

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Maintain RCS Inventory Control	
Determine Baseline coping capability with installed coping[2] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Low Leak RCP Seals or RCS makeup required** • **All Plants Provide Means to Provide Borated RCS Makeup**	
PWR Installed Equipment Phase 1:	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup)and strategy(ies) utilized to achieve this coping time. Two functions are lost during an ELAP which challenge the RCS's ability to maintain inventory; the charging system and seal injection. Without seal injection, the PVNGS RCP seal are expected to deteriorate and provide a leak path for RCS inventory. A function of FLEX is to establish a means of RCS makeup however until that can be done, the system's ability of cope was analyzed. PVNGS RCP seals are assumed to have a maximum leakage of 17 gpm per pump. A PVNGS specific analysis was done, assuming various RCP seal leakage rates up to 25 gpm per pump. Of the cases analyzed, the maximum seal leakage rate of 25 gpm case shows no core uncovery for at least 230 hours (9.6 days), assuming there is sufficient AFW inventory throughout the event.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.
Identify modifications	*List modifications* No Modifications are required for Phase I
Key Reactor Parameters	*List instrumentation credited for this coping evaluation.*

Comment [EEB50]: What is the basis for this assumption?

Comment [EEB51]: Reference?

Comment [J52]: WCAP-17601-P (should be added)

[2] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain RCS Inventory Control

RCS essential instrumentation	Safety Function
Core Exit Thermocouples	RCS coolant inventory and core heat removal
Reactor Vessel Water Level (both Head and Plenum)	RCS coolant inventory
Steam Generator levels (WR)	RCS pressure boundary and pressure control
Steam Generator pressures	RCS pressure boundary and pressure control
Thot, Tcold (one Hot Leg and one Cold Leg on same loop)	RCS coolant inventory and core heat removal
Subcooling / Sat Margin (RCS and CET)	RCS coolant inventory and fuel integrity
RCS Pressure (WR)	RCS pressure boundary and pressure control
Safety Injection Tanks 2A & 2B Level and Pressure	RCS coolant inventory
Pressurizer level	RCS coolant inventory
Atmospheric Dump Valve Positions	RCS pressure boundary and pressure control
Aux Feedwater (turbine-driven pump) flow to each SG [A-train power]	RCS pressure boundary and pressure control and core heat removal
Containment essential instrumentation:	**Safety Function**
Containment Building pressure	Containment integrity
Spent Fuel Pool essential instrumentation	
None for 24 hours	See below for non-essential instruments

PVNGS expects to also have the following instruments available, but does not consider them essential for the IER L1 11-4 scope of 24 hours:

- Condensate Storage Tank (for AFW)
- Second Tcold from Cold Leg on monitored loop above
- Battery Voltages
- Battery Amperes
- Spent Fuel Pool level and temperature (portable drop-in instruments)

Notes:

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain core cooling. Identify methods(Low Leak RCP Seals and/or borated high pressure RCS makeup)and strategy(ies) utilized to achieve this coping time.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.
Identify modifications	*List modifications* New piping will run from the tie in points in the HPSI system to the staging areas.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* Same as Phase 1 not including instrumentation to support portable equipment.
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List Protection or schedule to protect* *TBD*
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List Protection or schedule to protect* *TBD*
Severe Storms with High Winds	*List Protection or schedule to protect* *TBD*
Snow, Ice, and Extreme Cold	*List Protection or schedule to protect* *TBD*
High Temperatures	*List Protection or schedule to protect* *TBD*

Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*

Comment [EEB53]: This section appears to be blank due to the long time available for RCS makeup initiation described in the phase 1 portion. If this is the case, it should be documented here as unnecessary rather than merely left blank.

Actually, the safety support system section on page 31 indicates the RCS makeup pumps are on site, so this appears to need some information filled in.

Comment [EEB54]: Should indicate how this will be implemented, perhaps by reference to the other portion on page 31.

Maintain RCS Inventory Control
PWR Portable Equipment Phase 2:
Notes:

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 3:	
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain core cooling. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup)and strategy(ies) utilized to achieve this coping time.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation*
Identify modifications	*List modifications* No Modifications Required for Phase III
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Notes:		

Maintain Containment	
Determine Baseline coping capability with installed coping[3] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • Containment Spray • Hydrogen igniters (ice condenser containments only)	
PWR Installed Equipment Phase 1:	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/Hydrogen igniter) and strategy(ies) utilized to achieve this coping time. **There are no phase 1 actions required at this time that need to be addressed.**	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*N/A*
Identify modifications	*N/A*
Key Containment Parameters	*List instrumentation credited for this coping evaluation.*
Notes:	

[3] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Containment

PWR Portable Equipment Phase 2:

Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.

Details:

Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation*
Identify modifications	*List modifications*
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*

Storage / Protection of Equipment:
Describe storage / protection plan or schedule to determine storage requirements

Seismic	*List how equipment is protected or schedule to protect*
Flooding	*List how equipment is protected or schedule to protect*
Severe Storms with High Winds	*List how equipment is protected or schedule to protect*
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect*
High Temperatures	*List how equipment is protected or schedule to protect*

Deployment Conceptual Modification
(Attachment 3 contains Conceptual Sketches)

Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*

Notes:

Maintain Containment		
PWR Portable Equipment Phase 3:		
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time.		
Details:		
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation*	
Identify modifications	*List modifications*	
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.*	
Deployment Conceptual Modification (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Notes:		

Maintain Spent Fuel Pool Cooling	
Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06: • **Makeup with Portable Injection Source**	
PWR Installed Equipment Phase 1:	
Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source)and strategy(ies) utilized to achieve this coping time. **There are no phase 1 actions required at this time that need to be addressed.**	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	N/A
Identify modifications	N/A
Key SFP Parameter	Per EA 12-051
Notes:	

[4] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Maintain Spent Fuel Pool Cooling	
PWR Portable Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source)and strategy(ies) utilized to achieve this coping time. There will be one spent fuel pool (SFP) makeup pumps for each unit (plus a site spare) capable of providing sufficient makeup capability for boil off from the SFP. New piping will be run from two staging areas available. The first will be outside the fuel building, the second in the bay of the fuel building. The new piping will run from the staging area up to about 10 ft above the fuel deck on the north wall of the fuel building and direct coolant into the SPF. The FLEX pump will be electric driven with connections available near the pump staging area. The pump suction will be connected to the drain line on the RWT. The RWT drainline will be modified to allow multiple quick connections. One of those connections will be utilized for SFP makeup.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.
Identify modifications	*List modifications* Two new pipes will be installed from the fuel deck to the pump staging areas. No valves will be required on the piping. A modification to the RWT drain line for a suction connection.
Key SFP Parameter	*Per EA 12-051*
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List how equipment is protected or schedule to protect* TBD
Flooding	*List how equipment is protected or schedule to protect* TBD
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* TBD
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect* TBD
High Temperatures	*List how equipment is protected or schedule to protect* TBD
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**	

Comment [EEB55]: Identify the boil off rate to remove the design basis heat load for the SFP.

Comment [EEB56]: What will supply the power?

Comment [MM57]: Need to describe electrical loading. If relying on a gas powered generator, need to describe generator and fuel capacity/capability.

Comment [MM58]: Need to explain the type of connections to be used.

Maintain Spent Fuel Pool Cooling		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Storage location and structure have not been decided yet. Figure 1~~Figure 1~~ identified clear deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging area plant north of the CST.	There are two new pipes to be installed. The first, routes from the primary staging area to outside the north side of the fuel building up the outside wall to the approximately 10 ft above the fuel deck. The pipe will penetrate the wall to a location where is can pour into the SFP. The second pipe will run from the bay of the fuel building, run along the inside of the north side of the Fuel building wall up to approximately 10 ft. above the fuel deck (Elevation 150 ft). At that elevation the pipe will run inside the north wall from the bay to north of the SFP and be directed to pour into the SFP.	The most of the new piping will be enclosed within a Seismic Category 1 structure. New FLEX piping shall be installed to meet necessary seismic requirements. All connection will be above the PVNGS flood level. Connection point for the suction and discharge will be outside the CT Pump house and designed to withstand the applicable hazards.
Notes:		

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Comment [EEB59]: Will there be some sort of box around it to prevent damage from external effects?

Maintain Spent Fuel Pool Cooling		
PWR Portable Equipment Phase 3:		
Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source)and strategy(ies) utilized to achieve this coping time. The strategy used in Phase II will be continued in Phase III to provide SFP Cooling.		
Details:		
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation* APS Procedure 79IS-9ZZ07, "PVNGS Extended Loss of All Site AC Guideline" is being developed to support this event.	
Identify modifications	*List modifications* No modifications will be required	
Key SFP Parameter	*Per EA 12-051*	

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
Same as the Phase II strategy.	No modifications Required	Same as the Phase II strategy.
Notes:		

Comment [EEB60]: Refill RWT?

Comment [EEB61]: How does water get to RWT if refill is necessary?

Safety Functions Support
Determine Baseline coping capability with installed coping[5] modifications not including FLEX modifications.
PWR Installed Equipment Phase 1
During Phase 1, PVNGS requires vital instrumentation power to cope with an ELAP and loss of ultimate heat sink (LUHS). All vital instrumentation is powered from the 125V DC Class 1E power system. The 125V DC Class 1E power system (PK) batteries are NCN-33 lead-acid and consist of four Trains: A, B, C, and D. Each train consists of a battery charger, battery, DC bus, inverter, and respective vital loads. The battery coping time with no load shedding is 10.59 hours. If load shedding, as described in Reference 3, is completed, the battery coping period is extended to 47.88 hours. Load shedding will begin one hour after the ELAP and be completed within one hour by two operators. The A and C buses share a swing charger and the B and D buses share a swing charger. Although the swing chargers provide a connection between trains, a mechanical interlock prevents the paralleling of buses. The PVNGS coping study describes a method to defeat the interlock on the shared swing charger to cross tie (parallel) batteries B and D. This can extend the coping time to 90.4 hours. If required, small portable generators with portable light stands or light strings will be used for lighting during Phase 1. Ventilation is not required during Phase 1 and doors will be propped open to alleviate high temperatures in the main control room and electrical equipment rooms. PVNGS will use satellite phones for communications that will have sufficient charge to last at least 24 hours until the normal communication system is repowered by the 480V system. An alternate strategy is to use the sound-powered phones. PVNGS will develop lighting, ventilation, and communication strategies.

Details:	
Provide a brief description of Procedures / Strategies / Guidelines	• FLEX Load Shedding • Deploying Temporary Control Room Lighting • Deploying Control Room/Electrical Equipment Room Ventilation
Identify modifications	Modifications are not required for this phase.
Key Parameters	DC bus voltage is required so operators can ensure that the DC bus voltage remains above 105 volts.
Notes:	

[5] Coping modifications consist of modifications installed to increase initial coping time, i.e. generators to preserve vital instruments or increase operating time on battery powered equipment.

Comment [EEB62]: Identify means to power locally. (NEI 12-06, Section 3.2.2(13).

Comment [EEB63]: ??

Comment [EEB64]: Time constraint of 2 hours should be mentioned here with respect to the dffect on coping period.

Comment [MM65]: Need to demonstrate that their batteries are capable of supporting this extended duration.

Comment [EEB66]: If it's portable, it would be more appropriate to describe as being part of phase 2.

Comment [EEB67]: Is this 24 hours of talking or 24 hours with some amount of that being in standby? Is there a means to recharge them? Administrative controls on maintaining them charged?

Comment [EEB68]: Not really phase 1.

Comment [EEB69]: Anything like use of CFL or LED lighting?

Safety Functions Support
PWR Portable Equipment Phase 2

The critical equipment required during Phase 2 is vital instrumentation, battery chargers, FLEX reactor coolant system (RCS) makeup pumps, FLEX SFP makeup pump, ventilation, lighting, and communications. Energizing these loads will be accomplished using FLEX generators connected to one train of the Class 1E 480V switchgear and aligning the required equipment in that train.

Eight 500-kW FLEX generators, as required for N+1, will be stored on site. No later than 18 hours after the ELAP, two generators will be deployed from a storage area (area to be determined) to the staging area south of the diesel building. FLEX generators will be trailer mounted to ease deployment. A set of FLEX cables will be stored with each generator and will be either deployed on the generator trailer or on a separate cart. The FLEX generator will be grounded via a flexible cable to a ground test well. This test well will provide an accessible ground in the staging area that will not affect traffic.

The generator connection to the primary and diverse connection points will include a neutral and a ground conductor because the 480V load centers are a three-phase, four-wire system. When the system is aligned to accept power from the FLEX generator, the load centers will maintain a bonded neutral. The neutral and ground at the FLEX generator will not be bonded in this case; however, a jumper is provided. The jumper can be used with a connection that does not have a bonded neutral in the event the primary and diverse connections are not available.

These FLEX cables will provide a positive locking mechanism to ensure a tight waterproof connection. Proper phase rotation is ensured due to the color coding and labeling on all FLEX cables and connectors.

The FLEX generators will be connected to the Class 1E 480V load centers via FLEX connection junction boxes. Two boxes will be mounted on the south wall of the control building to support the primary connection. Two boxes will be mounted on the east wall of the diesel building to support the alternate connection. Both strategies will be available for all BDBEE (Reference to be added).

The primary strategy is to repower the 480V Class 1E load centers on Train A (L31, L33, and L35). Repowering these load centers will allow PVNGS to repower the vital battery chargers A and C, thus allowing for indefinite vital battery coping time. Prior to energizing the FLEX generators, all breakers in load centers L31, L33 and L35 must be opened (approximately 30 breakers – two operators – 30 minutes). All breakers in the motor control centers (MCCs) M31, M33, M35, M37 and M71 must be opened also (approximately 120 breakers – two operators – 2 hours). This will isolate all loads so the FLEX generators do not fail because of overload. A procedure or guideline for aligning the system, however, will be required.

The primary strategy for energizing the FLEX RCS pumps is to energize MCC M33 from load center L33. The pumps will be connected to a FLEX junction box located outdoors near the refueling water tank (RWT). Power will be provided from spare breakers in MCC M33.

The alternate strategy is to repower the 480V Class 1E load centers on Train B (L32, L34, and L36). Repowering these load centers will allow PVNGS to repower the vital battery chargers B and D, thus allowing for indefinite vital battery coping time. Prior to energizing the FLEX generators, all breakers in load centers L32, L34 and L36 must be opened (approximately 30 breakers – two operators – 30 minutes). All breakers in MCCs M32, M34, M36, and M72 also must be opened (approximately 90 breakers – two operators - 2 hours). This will isolate all loads so the FLEX generators do not fail because of overload. A procedure or guideline for aligning the system, however, will be required.

The alternate strategy for energizing the FLEX RCS pumps is to energize the circuit feeding the swing

Comment [EEB70]: This phrasing would prompt an RAI.

Comment [EEB71]: Id.

Comment [EEB72]: Should say "will be developed"

Comment [EEB73]: makeup

Comment [EEB74]: See comments above

Comment [EEB75]: makeup

Safety Functions Support	
PWR Portable Equipment Phase 2	
charging pump 1M-PHE-P01 located in the auxiliary building. This pump is fed from load center L36, breaker C2. A double throw switch installed in the circuit will redirect power to the FLEX pumps during an ELAP. The primary and alternate strategy to provide makeup to the SFP is to use existing diesel fire trucks. To provide defense in depth, PVNGS will install an electrical connection point on Train B for a FLEX SFP makeup pump. The connection point will be energized by the circuit feeding the installed cooling pump 1M-PCB-P01 located in the fuel building. This pump is fed from load center L36, breaker C4. A double throw switch installed in the circuit will redirect power to the FLEX pump during an ELAP. The 480V FLEX generators must be deployed and operational at T+24 hours. Deploying the FLEX generators from storage to the staging area, connecting the FLEX generators to the FLEX junction boxes, and aligning the system to the required loads will take four operators roughly six hours. To ensure that 480V power is restored at T+24 hours, FLEX generator deployment will begin no later than T+18 hours. Since the battery coping with load shedding is 47.88 hours, and the battery chargers will be re-energized at T+24 hours, there are 23.88 hours of margin. The FLEX generators will be stored on site with no fuel. Once deployed to the staging area, the FLEX generators will be fueled with a gravity-fed hose from either of the two safety-related diesel day tanks located in the nearby diesel building. Each tank in the diesel building has a capacity of 1100 gallons and a technical specification minimum of 550 gallons according to Study 13-NS-A108.R000 (Reference). Each FLEX generator will be filled using 550 gallons from one tank, leaving the other full if the installed Class 1E generators are recovered. The FLEX generators will consume roughly 36 gal/hr of fuel at 100-percent load. Once the FLEX generators are running, the existing 3hp diesel transfer pump will be available, allowing the day tanks to be refilled from the underground 7-day tanks. The alternate strategy to transfer fuel is to use a portable 120V, 5-gpm pump to transfer fuel from the 7-day tanks.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.*
Identify modifications	To facilitate FLEX generator connections, primary and alternate FLEX junction boxes must be installed and permanently connected to the 480V Class 1E load centers. To facilitate FLEX RCS makeup pump connections, primary and alternate FLEX junction boxes, double throw switches, etc. must be installed and permanently connected to the electrical system. To facilitate a defense-in- depth strategy for the FLEX SFP pump, a junction box and double throw switch must be installed and permanently connected to the electrical system. General installation requirements are listed below, with more detail for each strategy provided in the subsections below. All FLEX cables and connectors will be color coded and labeled to

Comment [MM76]: Still need to demonstrate that the batteries are capable of supplying loads for this duration.

Comment [EEB77]: If this has been done for environmental impact reasons, it raises the question of whether the generators will be tested upon receipt.

Comment [EEB78]: Why refer to the study rather than to the TS? Are there any administrative controls on level?

Safety Functions Support	
PWR Portable Equipment Phase 2	
	ensure proper phase rotation. All permanent installations and terminations will be made in accordance with PVNGS standard procedures and specifications. Supports for conduit, junction boxes, and switches will be seismically mounted. The exact raceway layout, cable routes and equipment modifications will be determined in the detailed design phase. All new breakers, switches, etc. will be labeled in accordance with PVNGS standard labeling requirements. A ground test well will be installed at the generator staging location to allow a quick access point to the station ground. The well will be installed so that the top is flush with grade to avoid causing tripping or traffic hazards. From each test well, a 4/0 bare copper grounding conductor will be buried in earth and routed in opposite directions to the two nearest station grounding conductors. All ground system connections will be made in accordance with the station standard grounding procedures and specifications. **Primary 480V Connection Train A** To facilitate the primary FLEX generator connections to Train A, two junction boxes will be installed on the south wall of the control building and permanently connected to the 480V Class 1E load centers L31, L33, and L35. Two junction boxes (JB1 associated with FLEX generator 1 and JB2 associated with FLEX generator 2) will be permanently installed on the south wall of the control building. These boxes are approximately 45 x 30 x 16 inches. Adequate space is available on the south wall of the control building. Load center L31 has a spare breaker in location D4. A new circuit will be installed from the spare breaker in L31 to JB1. The circuit will consist of one #4/0 AWG per phase, one #4/0 neutral, and one #1/0 ground wire. The distance from JB1 to L31 is approximately 90 feet. Load center L33 has a spare breaker in location C4. A new circuit will be installed from the spare breaker in L33 to JB1. The circuit will consist of two #4/0 AWG per phase, two #4/0 neutrals, and two #1/0 ground wires. The distance from JB1 to L33 is approximately 70 feet. Load center L35 has a spare breaker in location D4 (B3 in Unit 2). A new circuit will be installed from the spare breaker in L35 to JB2.

Comment [EEB79]: This implies that they will be single conductor cables. Will there be controls on cable runs to avoid associated changes in impedance if they are run separately? Or are the cable runs short enough that it won't matter?

Comment [EEB80]: 2 over 1?

Comment [EEB81]: #4/0?

Safety Functions Support	
PWR Portable Equipment Phase 2	
	The circuit will consist of three #4/0 AWG per phase, three #4/0 neutral, and three #1/0 ground wires. The distance from JB2 to L35 is approximately 50 feet. The new circuits will be installed in rigid steel conduit and routed through the south wall of the control building to the respective load centers. **Alternate 480V Connection Train B** To facilitate the alternate FLEX generator connections to Train B, two junction boxes will be installed on the east wall of the diesel building and permanently connected to the 480V Class 1E load centers L32, L34, and L36. Two junction boxes (JB3 associated with FLEX generator 1 and JB4 associated with FLEX generator 2) will be permanently installed on the south wall of the control building. These boxes are approximately 45 x 30 x 16 inches. Adequate space is available on the east wall of the diesel building. Load center L32 has a spare breaker in location D4. A new circuit will be installed from the spare breaker in L32 to JB3. The circuit will consist of two #4/0 AWG per phase, two #4/0 neutrals, and two #1/0 ground wires. The distance from JB3 to L32 is approximately 90 feet. Load center L34 has a spare breaker in location C4. A new circuit will be installed from the spare breaker in L34 to JB3. The circuit will consist of one #4/0 AWG per phase, one #4/0 neutral, and one #1/0 ground wire. The distance from JB3 to L34 is approximately 70 feet. Load center L36 has a spare breaker in location B3. A new circuit will be installed from the spare breaker in L36 to JB4. The circuit will consist of three #4/0 AWG per phase, three #4/0 neutrals, and three #1/0 ground wires. The distance from JB4 to L36 is approximately 50 feet. The new circuits will be installed in rigid steel conduit and routed through the east wall of the control building to the respective load centers. **Defense-in-Depth FLEX SFP Makeup Pump Train B** The primary and alternate strategy to provide makeup to the SFP is to use existing diesel fire trucks. As a defense-in-depth strategy, PVNGS will provide an electrical connection point on Train B for a FLEX SFP makeup pump. The FLEX SFP makeup pump is a 50hp

Comment [EEB82]: East wall of the diesel building? South wall of control building is used by primary connections and doesn't match the prior paragraph description of the location.

Safety Functions Support	
PWR Portable Equipment Phase 2	
	electric pump. To minimize the FLEX cable routing, power will be derived from the existing Train B fuel pool cooling (FPC) pump circuit. The Train B FPC pump (1MPCB-P01) is a 100hp pump, sourced from L36, breaker C4, and is located in the fuel building. The existing 350-kcmil circuit to the Train B FPC pump is routed through junction box 1EZF1BBKFJ01. This junction box will be converted to a splice box. Two new 350-kcmil circuits will be routed from the splice box, approximately 20 feet, to a new manual, double-throw switch mounted to the outside south wall of the fuel building. Another 350-kcmil circuit will be installed from the double-throw switch, approximately 135 feet, to a new FLEX junction box mounted indoors on the north wall of the fuel building. The double-throw switch will normally feed the Train B FPC pump. During an ELAP, the switch can be aligned to the FLEX junction box, energizing the defense-in-depth SFP makeup pump. **Primary RCS FLEX Makeup Pumps Train A** Two 50hp pumps are required to support the primary RCS makeup strategy. The primary strategy to power the two RCS FLEX makeup pumps is to install two new circuits from the spare breaker cubicles 03 and 15 on the 480V MCC 1E-PHA-M33. The MCC is located in the electrical penetration room on the 120' elevation of the auxiliary building. The MCC is powered from load center L33, breaker C2, and can be fed from the FLEX generators. Two new #1/0 circuits will be routed down through two new floor penetrations to gain access to the 88-foot essential tunnel. Once in the tunnel, the circuits will be routed west through the tunnel penetrating to grade near the RWT. The circuit will terminate in a new free-standing FLEX junction box near the RWT. **Alternate RCS FLEX Makeup Pumps Train B or Train A** Two 50hp pumps are required to support the alternate RCS makeup strategy. To minimize the FLEX cable routing, power will be derived from the existing swing charging pump 1M-CHE-P01 circuit. The swing charging pump is a 100hp pump, sourced from L36, breaker C2 or from L35, breaker C3, and is located in the auxiliary building. The existing 350-kcmil circuit to the swing charging pump is routed through an existing junction box that will be converted to a splice box. Two new 350-kcmil circuits will be routed from the splice box, approximately 30 feet, to a new manual, double-throw switch mounted to the wall of the charging pump room just inside the man

Safety Functions Support	
PWR Portable Equipment Phase 2	
	door. Two 350-kcmil circuits will be installed from the double-throw switch, approximately 30 feet, to a new FLEX junction box mounted on the west wall just outside the charging pump room. The double-throw switch will normally feed the swing charging pump. During an ELAP the switch can be aligned to the FLEX junction box, energizing the alternate RCS makeup pumps.
Key Parameters	DC bus voltage is required so operators can ensure that the DC bus voltage remains above 105 volts.

Comment [EEB83]: EDG day tank levels? 7 day tank levels?

Storage / Protection of Equipment : Describe storage / protection plan or schedule to determine storage requirements	
Seismic	Storage locations will be defined in the future. These decisions will be communicated via the six month update reports.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	
Severe Storms with High Winds	Not applicable
Snow, Ice, and Extreme Cold	Not applicable
High Temperatures	Storage locations will be defined in the future. These decisions will be communicated via the six month update reports.

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
All primary and alternate strategies as described above.	All modifications to support the primary and alternate strategies as described above.	All FLEX connection locations and equipment are protected from all BDBEE that apply. Note that connections are not protected from high winds and ice.
Notes:		

Comment [EEB84]: This would be very difficult to show because of the unbounded nature of BDBEEs.

How are they protected from mundane things like someone backing a truck into them?

Comment [EEB85]: Are the boxes sufficient to protect them from design basis wind hazards?

Safety Functions Support

PWR Portable Equipment Phase 3

During Phase 3 the plant will reach cold shutdown. At that time, one train of shutdown cooling will be repowered. Three pumps will be repowered, the low-pressure safety injection (LPSI) (residual heat removal (RHR)) (800hp), component cooling water (CCW) (800hp), and the essential spray pond (ESP) (600hp) pumps. A diesel pump may be used as a contingency for the ESP pump. A 3MW, 4.16kV, medium voltage (MV) FLEX generator will provide adequate power to start and operate this equipment.

Early in the FLEX implementation, the site will notify the RRC and request equipment. The 3MW, 4.16kV FLEX generator is expected to arrive on site between 24 and 72 hours into the ELAP. When the generator and enough personnel are available on site, one train of the Class 1E, 4.16kV switchgear will be energized.

The 3MW FLEX generator will be deployed to the same staging area as the 480V FLEX generators just south of the diesel building. The deployment path is the same path used for the 480V FLEX generators. Four mobile generator connection panels/junction boxes and four sets of FLEX cables (N+1) will be stored in the same location as the 480V equipment.

To allow generators from the RRC to be used at all sites in the region, the generator is supplied with bus bar connections. To make FLEX connections, the mobile generator connection panel/junction box will be placed near the generator and jumper cables installed from the generator terminals to the FLEX connection panel/junction box.

The MV FLEX generator will be connected to the Class 1E 4.16kV switchgear via an installed FLEX junction box mounted outside on either the west or east wall of the diesel building. Train A switchgear will be energized via a new breaker installation and Train B switchgear will be energized through an existing spare breaker.

The FLEX cables provide a positive locking mechanism to ensure a tight waterproof connection. Proper phase rotation is ensured by the color coding and labeling on all FLEX cables and connectors. Using one conductor per phase instead of bundled cables reduces weight and eases deployment.

The generator connection to the primary and alternate connection points will not require neutral and a ground conductors because the medium voltage system is impedance grounded at all transformers and generators. The generator from the RRC will include an impedance-grounded neutral or the means to ground the neutral through an impedance will be stored on site.

The primary strategy to repower the 4.16kV system is to power the Class 1E switchgear on Train A (1E-PBA-S03). To align Train A and the MV FLEX generator, all breakers must be opened on 1E-PBA-S03 (14 breakers, two operators, 30 minutes)

This will isolate all loads so the FLEX generator does not fail because of overload. After the FLEX generator is running, breaker S03U (new breaker) is closed to energize the 4.16kV bus. Then breakers S03F, S03M, and S03C are closed to energize the LPSI (residual heat removal (RHR)), CCW, and ESP pumps.

The alternate strategy to repower the 4.16kV system is to power the Class 1E switchgear on Train B

Comment [MM86]: This would be a goal, but it is not guaranteed.

Comment [EEB87]: *Passim;* use the same nomenclature throughout.

Comment [EEB88]: Post installation testing to ensure proper phase rotation?

Comment [EEB89]: Will there be controls on cable runs to avoid associated changes in impedance if they are run separately? Or are the cable runs short enough that it won't matter?

Safety Functions Support	
PWR Portable Equipment Phase 3	
(1E-PBB-S04). To align Train B and the MV FLEX generator, all breakers must be opened on 1E-PBB-S04 (14 breakers, two operators, 30 minutes). This will isolate all loads so the FLEX generator does not fail because of overload. After the FLEX generator is running, breaker S04P is closed to energize the 4.16kV bus. Then breakers S04F, S04M, and S04C are closed to energize the LPSI (RHR), CCW, and ESP pumps. The 480V loads running on the FLEX generators will not be transferred to the 3MW MV FLEX generator. The MV FLEX generator deployment is not time critical, but is expected to be complete by T+72 hours after the ELAP.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation with a description of the procedure / strategy / guideline.*
Identify modifications	To facilitate MV FLEX generator connections a primary and alternate FLEX connection panel must be installed and permanently connected to the 4160V Class 1E switchgear. Train A switchgear S03 does not have a spare breaker so a new vertical section will be installed. The primary FLEX connection panel will be installed on the west wall of the diesel building. To accommodate the required connection these panels will be approximately 72 x 38 x 24 inches. Adequate space is available on the west wall of the diesel building. Train B switchgear S04 has a spare at S04P. The primary FLEX connection panel will be installed on the east wall of the diesel building. To accommodate the required connection these panels will be approximately 72 x 38 x 24 inches. Adequate space is available on the west wall of the diesel building. Overcurrent protective relays in the spare cubicle provide adequate protective functions. New relays will be included with the vertical section to be added to S03. Relay settings will be calculated as part of the detailed design. New circuits will be installed in the switchgear rooms from the switchgear to the FLEX connection panels. Each circuit will consist of three 500-kcmil phase-conductors and one 1/0 AWG ground conductor. The raceway supports will be seismic rated in accordance with PVNGS standard requirements. All terminations will be made in accordance with the station standard

Comment [EEB90]: East?

Safety Functions Support		
PWR Portable Equipment Phase 3		
	procedures and specifications. The exact routing of the cable tray will be completed during the detailed design phase. The ground test well installed for the 480V FLEX generator can support both FLEX generators so no additional ground well will be installed.	
Key Parameters	No instrumentation is required to support the electrical coping strategies.	
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
All primary and alternate strategies as described above.	All modifications to support the primary and alternate strategies as described above.	All FLEX connection locations and equipment are protected from all BDBEE that apply. Note that connections are not protected from high winds and ice.
Notes:		

Comment [EEB91]: Fuel tank level gauges for the generators?

Comment [MM92]: Volt and Current meter to monitor battery recharge?

PWR Portable Equipment Phase 2							
	Use and (potential / flexibility) diverse uses					*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		Maintenance / PM requirements
Eight (8) self prime pumps	X	X	X			[350 gpm, 500 psia]	Will follow EPRI template requirements
Eight (8) 480 VAC Generators	X		X	X	X	[500 kW]	Will follow EPRI template requirements
Four (4) High Pressure RCS Makeup Pumps	X					[30 gpm, 1525 psia]	Will follow EPRI template requirements
Four (4) SFP Makeup Pumps			X			[110 gpm, 20 psia]	Will follow EPRI template requirements
Four (4) Diesel Transfer Pumps	X		X		X	[5 gpm, 20 psia]	Will follow EPRI template requirements

Comment [EEB93]: Diesel fire trucks for SFP makeup?

Comment [MM94]: What is the electrical loading for each component?

PWR Portable Equipment Phase 3							
	Use and (potential / flexibility) diverse uses					*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Three (3) 4160 VAC Generator	X			X	X	[3 MW]	Portable 4160 VAC generator will power one installed SDC train.
High Pressure RCS Makeup Pumps	X					[30 gpm, 1525 psia]	Positive Displacement Pump, Portable AC motor driven skid mounted.
Diesel Transfer Pumps	X		X	X	X	[5 gpm, 20 psia]	Diesel Pumps will provide coolant from 45 and 85 acre reservoir to water processing trailers. The length of piping to determine the need for booster pumps will be evaluated. This is an open item.
HDPE Pipe	X	X	X			N/A	HDPE- 12"- SDR 17 40 ' Bundles Length = Approximately 3 miles
HDPE Pipe Fusion Welder	X	X	X			N/A	Fusion Machine (HDPE 10"-18")
Portable Water	X	X	X			700 gpm deminerlizer system	Longterm RCS injection

Comment [MM95]: What is the electrical loading of each component?

Comment [EEB96]: How do you resupply diesel fuel?

Comment [EEB97]: Referred to as 4.16 kV generators above.

Comment [EEB98]: Nomenclature usage is confusing between these pumps and the ones that transfer diesel fuel discussed above.

purification system (1)							
Liquid Radwaste processing equipment						Unknown	Water management long term
Portable tanks						Unknown	Water management

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling	
Commodities • Food • Potable water	
Fuel Requirements	
Heavy Equipment • Transportation equipment • Debris clearing equipment	

Attachment 1A
Sequence of Events Timeline

(insert site specific time line to support submittal)

Action item	Elapsed Time (hr)	Action	Time Constraint Y/N [1]	Remarks / Applicability
	0	Event Starts	NA	Plant @100% power
1	0.017	TDAFWP Starts	N	No operator action required
2	0.25	SBO Procedures are Entered	N	
3	1	SBO DG Fails to start	N	
4	1	Enter ELAP Procedure	Y	
5	1	Begin DC Load shed	N	
6	1	Start Cooldown	Y	
7	2	Complete DC Load shed	Y	
9	2	Open TDAFW Pump Room Door for Ventilation	Y	
8	3	SITs Begin to Inject	N	
10	4	Operator complete cooldown, maintains SG pressure	N	
11	16	N2 Supply out on ADV. Manual Operation of ADVs	N	
13	24	500 kW 480V Generators Installed	Y	
14	40	Install RCS Makeup Pump/Start Charging Pump	Y	Required to Prevent two phase Natural circulation, not core uncovery
15	42	CST Empties/Switchover to RMWT or (RWT for high Seismic Event)	Y	
16	45	SITs Empties	N	Plant respons
17	45	Secondary Makeup Pump Installed	Y	
18	72	4.16 kV Generator (from RRC) Installed	Y	
19	72	Demin Water from WRF to Units	Y	
20	72	Minimum Reactivity Reached (K_eff = 0.93)	N	
21	75	Diesel SG Makeup Pump On/TDAFW Pump Off	Y	
22	80	B Train SDC Operable/Ultimate Heat Sink Established	Y	

Comment [EEB99]: Justification should be in the remarks column for all Ns.

Comment [J100]: Is the loss of electrical power or feedwater a start signal for TDAFW, independent of SG level? If SG level is a criterion, is it satisfied this quickly? Or is this a manual action?

Comment [EEB101]: Could refer to previously licensed sequences.

Comment [J102]: WCAP 17601 generically assumed 2 hours. Is 1 hour really enough time? This is essentially saying the cooldown initiation will be immediate from declaration of ELAP.

Comment [J103]: Should be specific here given the extended WCAP -17601 treatment of preventing N2 injection – are SITs really empty, or emptied of useful volume with margin to N2 injection? How is N2 injection prevented or addressed?

Comment [J104]: Secondary inventory is crucial; TDAFW is a single-point vulnerability. Why, setting aside stylized beyond-DBA non-failure assumptions, is it reasonable to plan on this long an implementation time?

Though apparently unpostulable, is it unreasonable that a turbine-driven pump might fail to start or fail to run to term? Or that an ELAP might occur with TDAFW out of service? Or that reactor depressurization might go too far and disable (temporarily) TDAFW.

Were I the plant operator, no way could I wait this long to set up a secondary makeup pump and place it in standby.

Comment [J105]: Presumably this implies minimum margin to criticality, versus minimum reactivity?

[1] Instructions: Provide justification if No or NA is selected in the remark column
If yes include technical basis discussion as requires by NEI 12-06 section 3.2.1.7

Attachment 1B
NSSS Significant Reference Analysis Deviation Table
(May not be required for BWR)

Item	Parameter of interest	WCAP value (WCAP-17601-P August 2012 Revision 0)	WCAP page	Plant applied value	Gap and discussion
	Applicable computer code for NSSS analysis	CENTS	WCAP 17601-P (All Cases applicable) Page 4-8	CENTS	No deviation
	RCS leakage	1 gpm	WCAP 17601-P Page 4-14	1 gpm	No deviation
	RCP leakage	15 gpm/RCP	WCAP 17601-P Section 4.4.2	0-25 gpm , bases case 17gpm/RCP	KSB pumps – Site specific RELAP calculation
	Number of Steam Generators used to establish natural circulation	Two - Symmetric	WCAP 17601-P Page 4-13	Two - Symmetric	No deviation
	Total Turbine Driven AFW flow	600 gpm	WCAP 17601-P Case 26 Table 4.2.3.2.5-1	750 gpm	Site Specific value (Palo Verde UFSAR Chapter 8)
	Start Cooldown and cooldown rate	2 hours @ 75°F/hr	Table 4.1.2.1-1 (Shutdown Margin Case)	1 hour @ 70°F/hr	See description on Page 2 for item 4 of the 1 hour value. A more conservative cooldown rate is used in the plant specific evaluation.

Comment [J106]: Leak rates seemingly must be determined or estimated based on empirical data / judgment – not sure code can meaningfully distinguish seal leakage rates to such a fine degree.

February 2013 FLEX Integrated Plan

Attachment 2

Milestone Schedule

	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13	Nov-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15
Task						■						■						■						■						■				
6 Month Status Update	■																																	
Develop Strategies	■	■																																
Develop Mods	■	■	■	■	■	■	■	■																										
Implement Mods									■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Perform Staffing Analysis					■	■	■	■	■	■	■																							
Develop Training Plan														■	■	■	■	■	■	■	■													
Implement Training																					■	■	■	■	■	■	■	■						
Issue FSGs	■	■	■	■	■	■																												
Develop Strategies/Contract with RRC						■	■	■	■																									
Install Offsite Delivery Pad																		■	■	■	■	■												
Purchase Equipment	■	■	■	■																														
Procure Equipment	■	■	■	■	■	■	■	■	■	■	■																							
Create Maintenance Procedures											■	■	■	■	■	■																		
N-1 Walkdowns		■	■																															
Unit 1 Implementation Outage (2 Trains)																					■	■												
Unit 2 Implementation Outage														■	■																		■	■
Unit 3 Implementation Outage									■	■																■	■							

Attachment 3
Conceptual Sketches

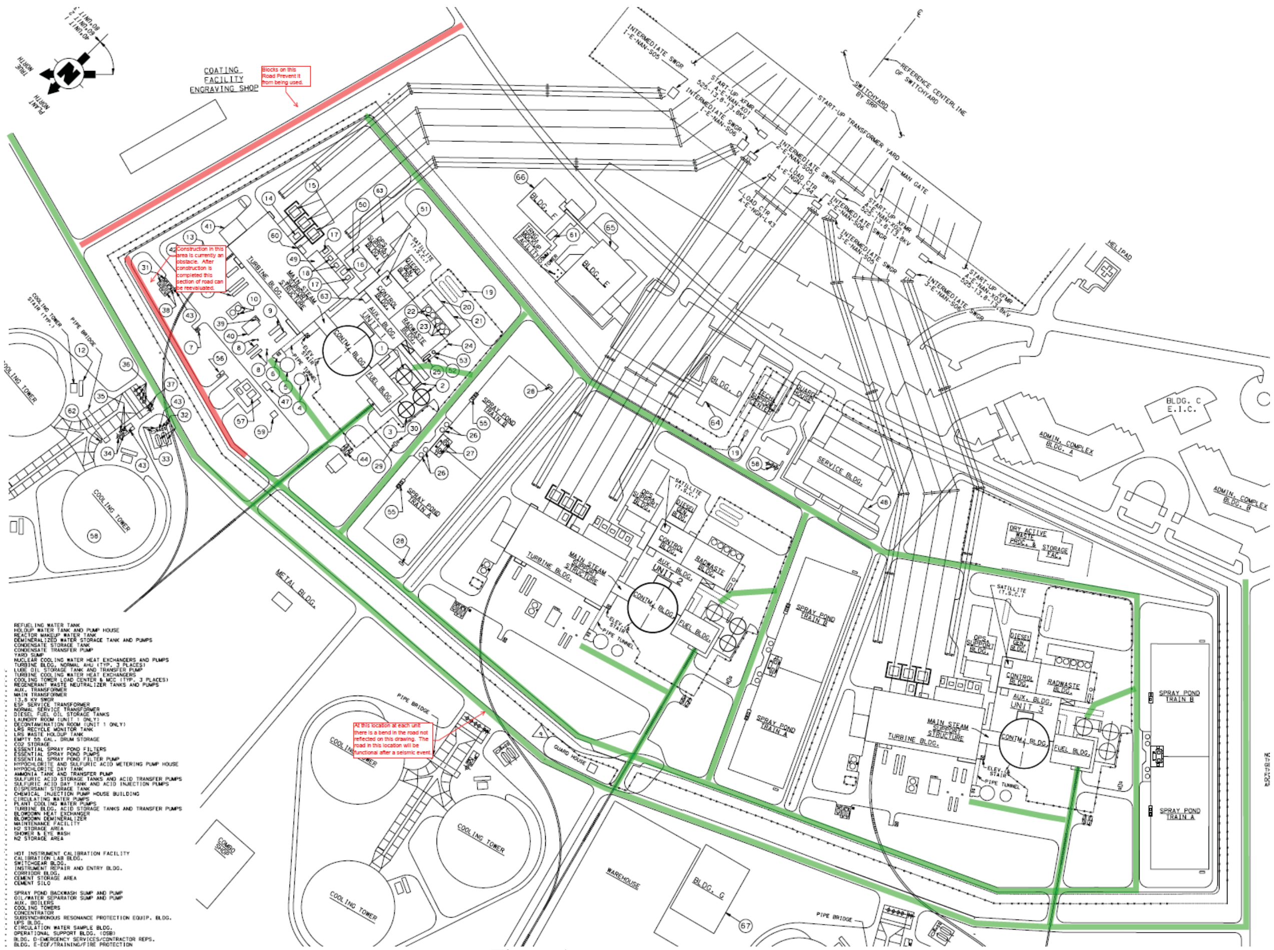

Figure 1 PVNGS Power Block Deployment Paths

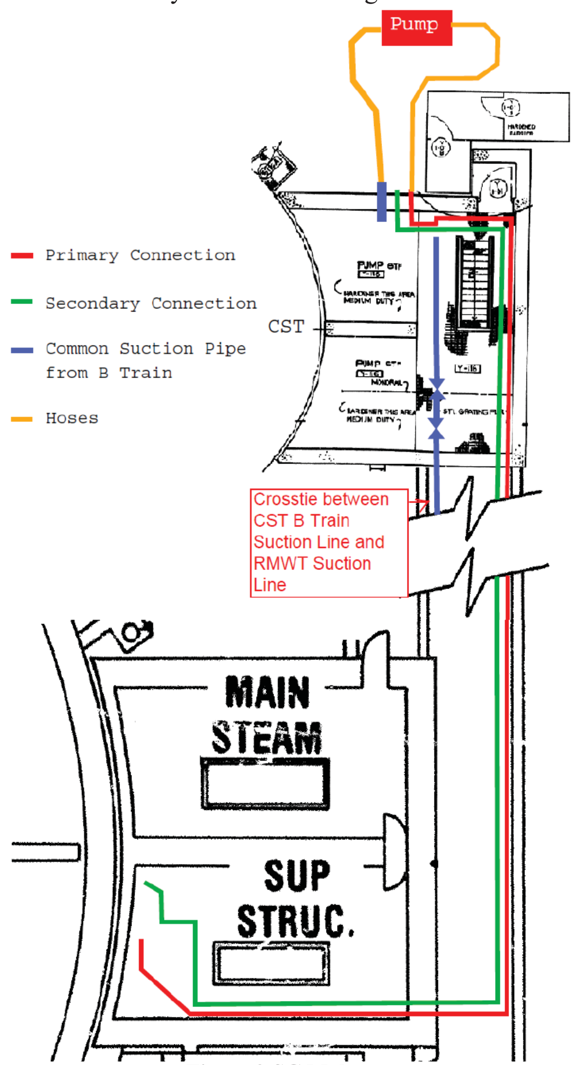

Figure 2 SG Makeup

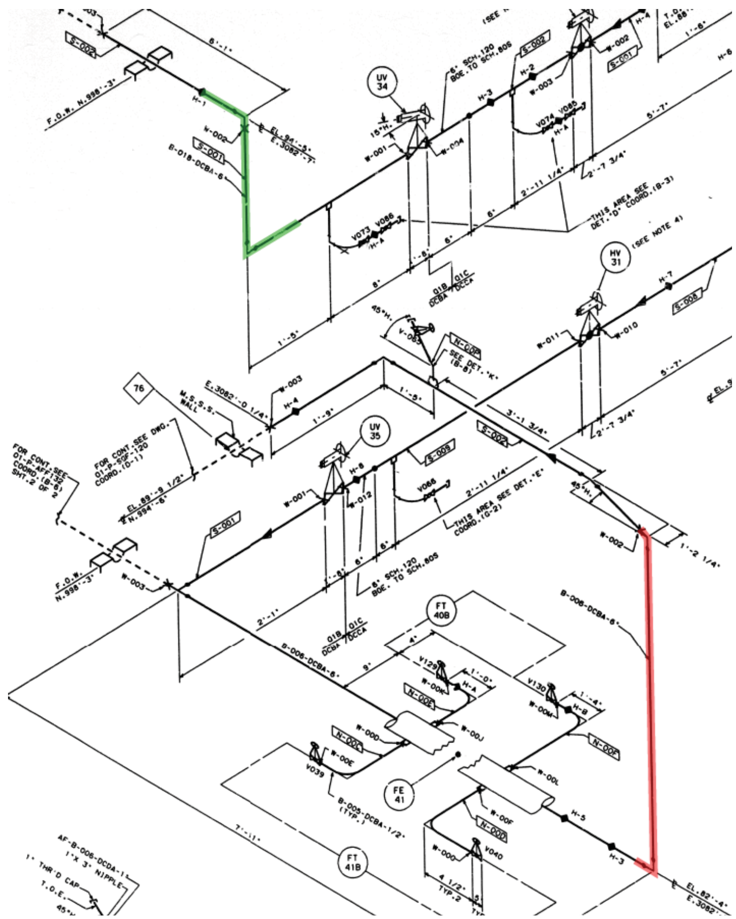

Figure 34 AFW Primary (Red) and Secondary (Green) Connection Point (01-P-AFF-133 Sht. 2)

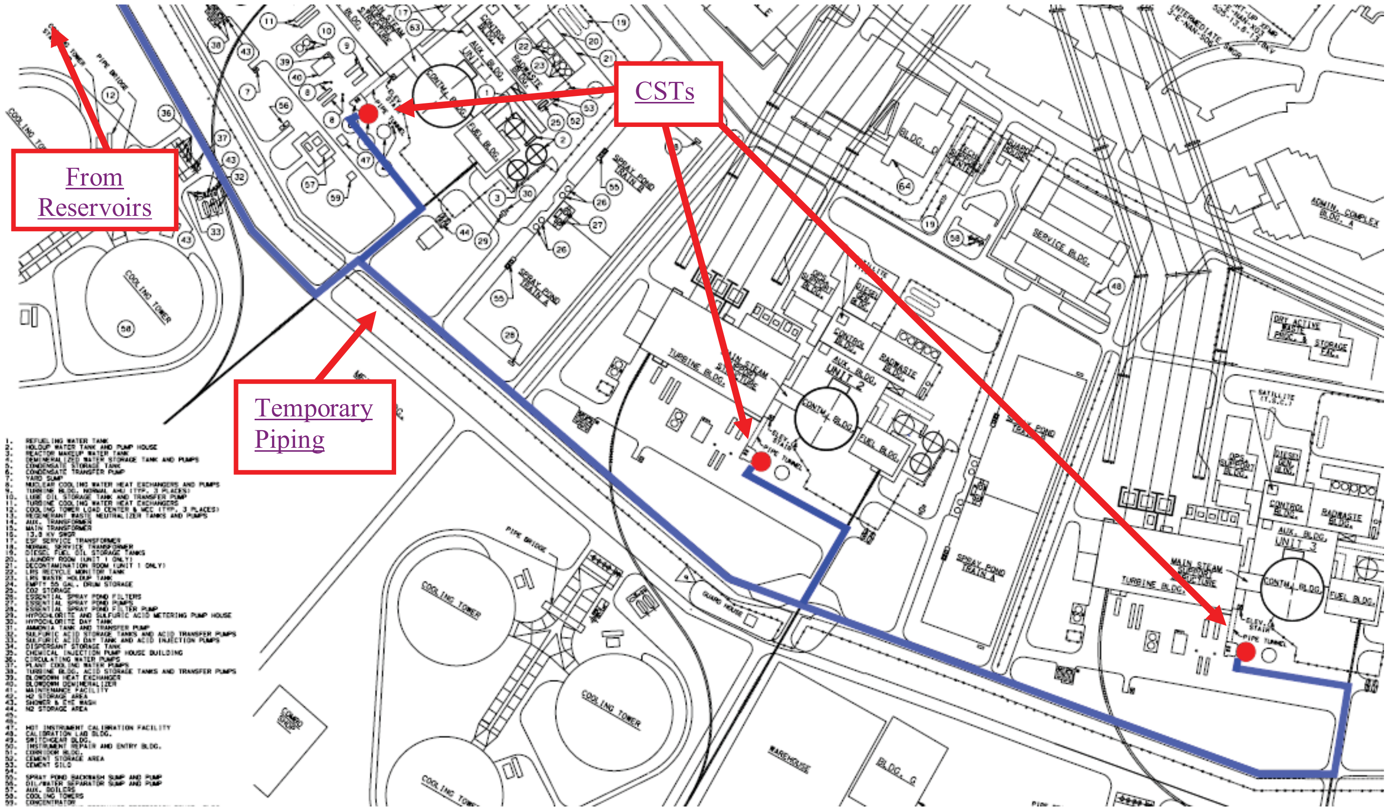

Figure 45 Temporary Piping from WRF to Refill CSTs

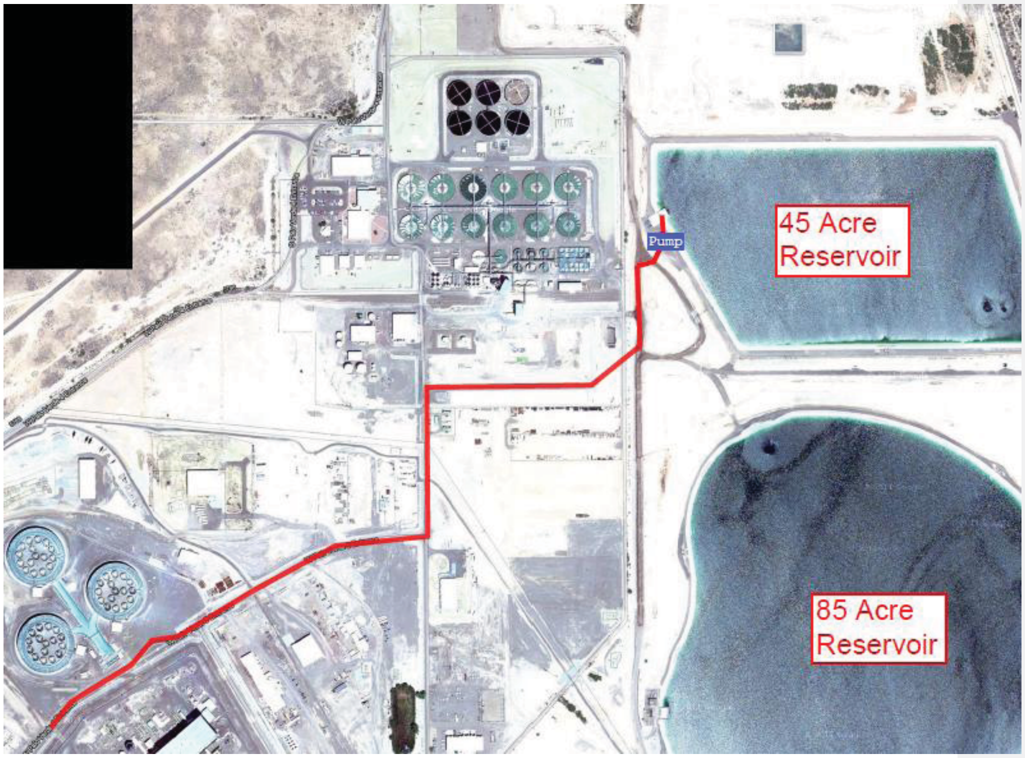

Figure 56 0Proposed Piping from 45 Acre Reservoir to Powerblock

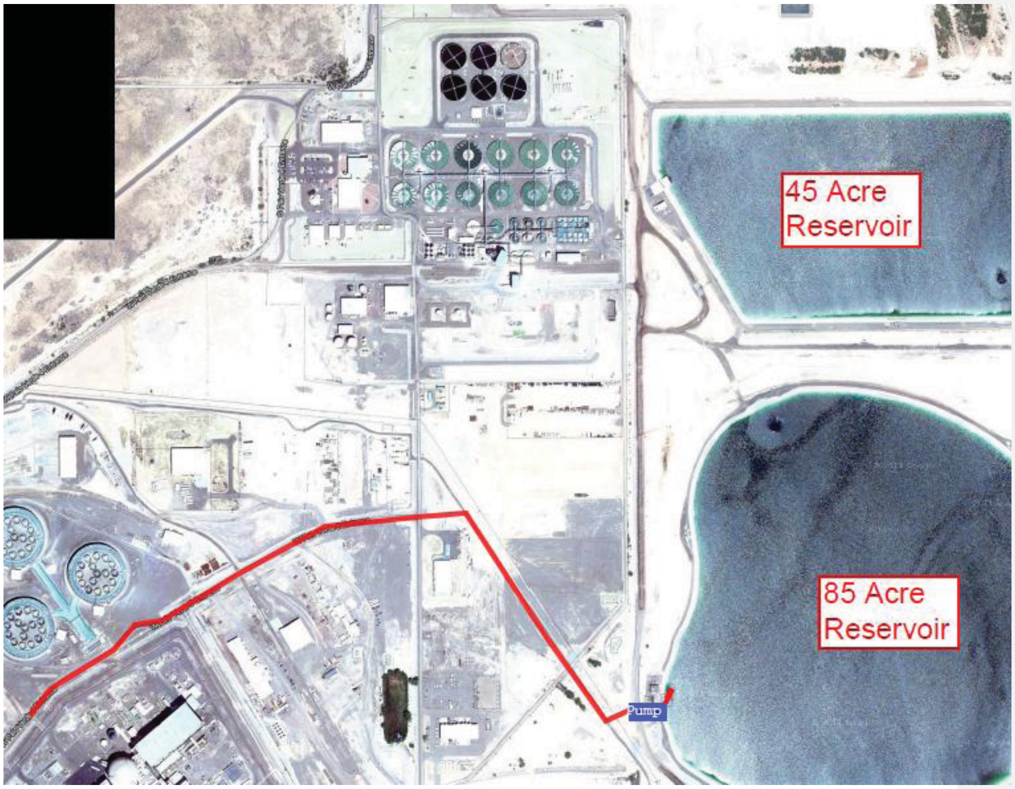

Figure 6~~7~~ Proposed Piping from 85 Acre Reservoir to Powerblock

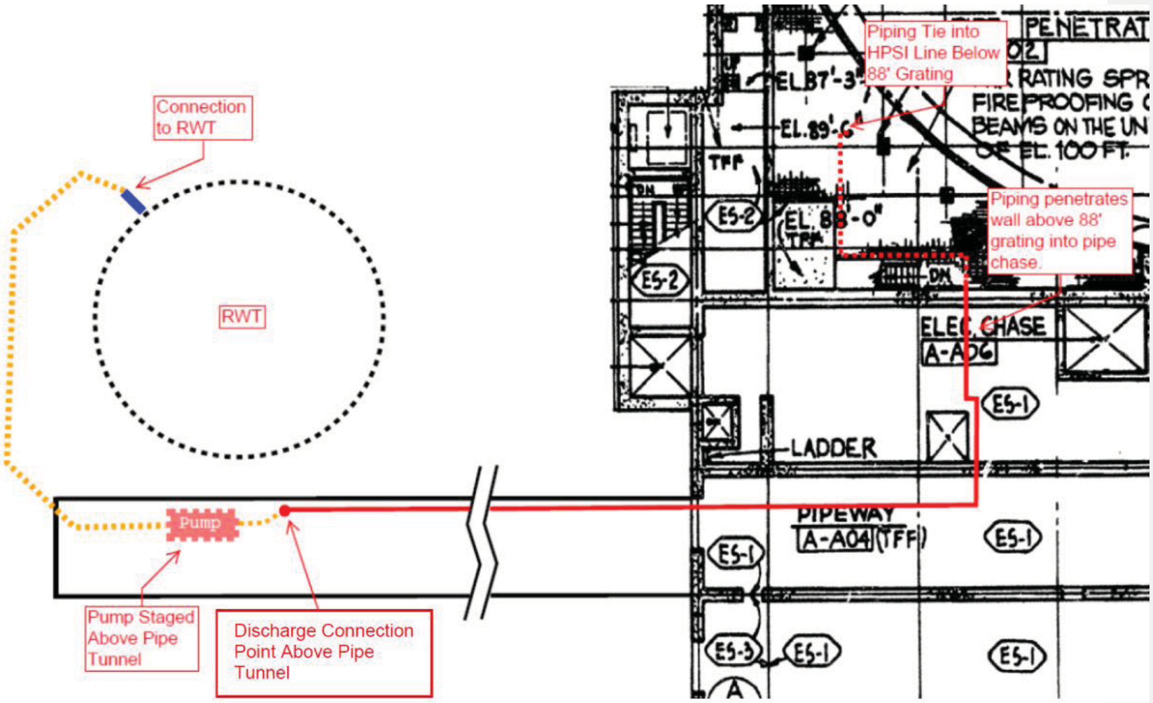

Figure 0-71 RCS Makeup Primary Connection

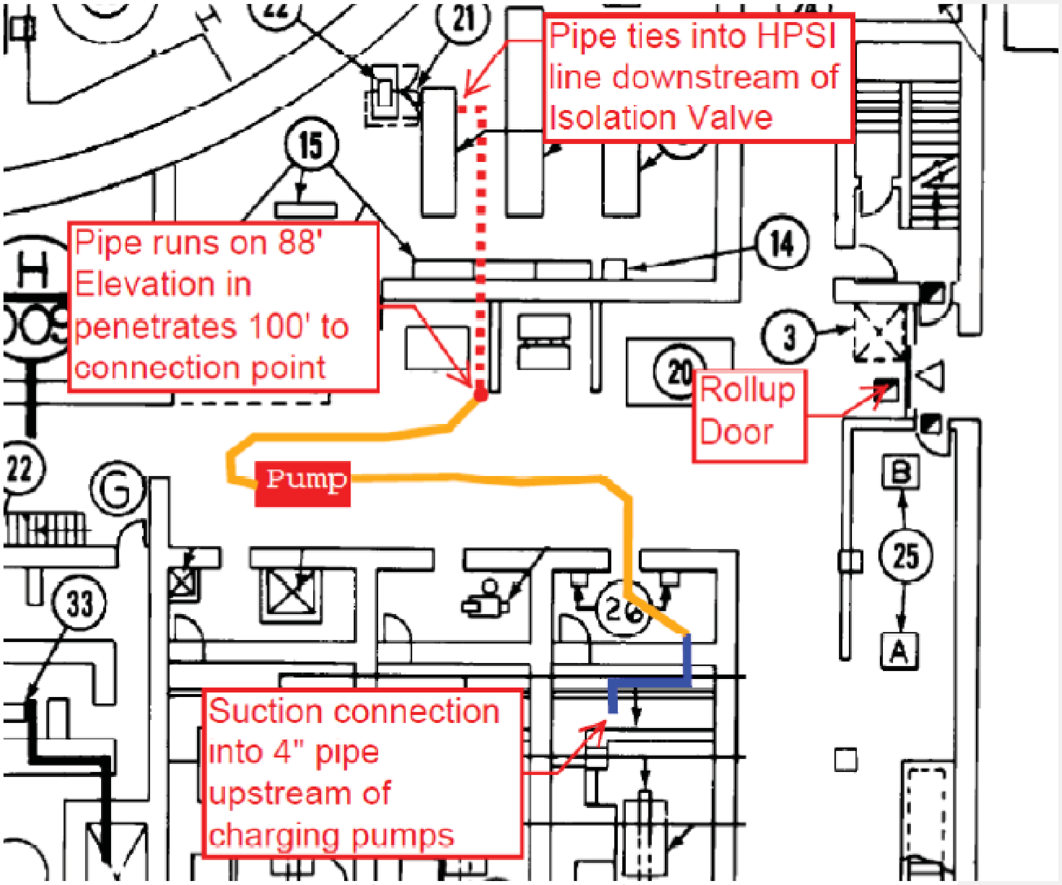

Figure 0-82 RCS Makeup Alternate Connection

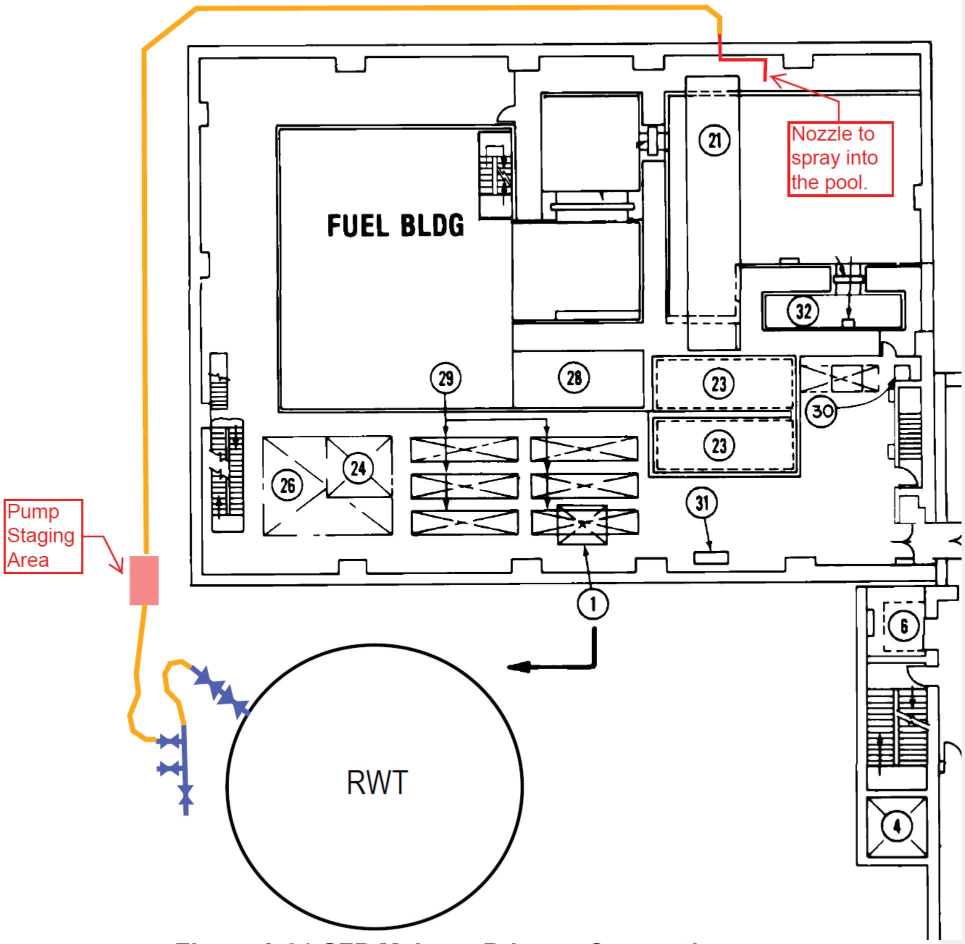

Figure 0-~~1~~9 SFP Makeup Primary Connection

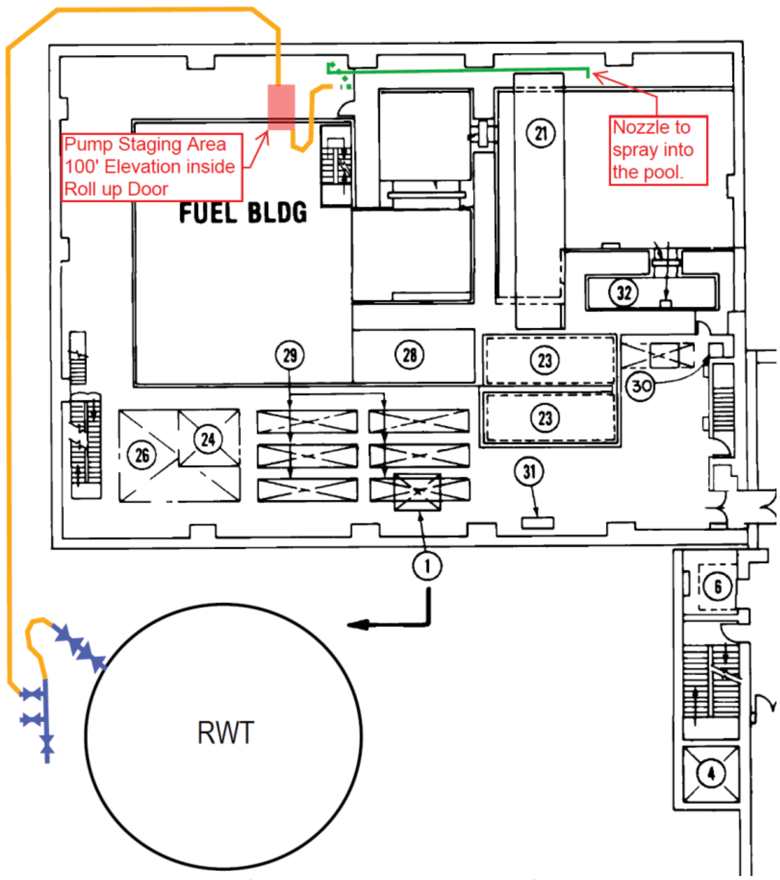

Figure 0-102 SFP Makeup Alternate Connection