Westinghouse

To: Mark Kloock
cc: Susan Baier

Date: February 22, 2013

From: Alan Retersdorf
Ext: 860-731-6184
Fax: 860-731-1149

Our ref: LTR-FSE-13-24, Revision 0

References: 1. Westinghouse Report, TR-FSE-13-4, Revision 0, "Callaway Plant FLEX Integrated Plan," February 2013.

Subject: Transmittal of Callaway Plant NRC FLEX Submittal for February 2013

The purpose of this letter is to transmit a non-proprietary version of Appendix G of Reference 1 for Callaway Plant. This non-proprietary version of this reference is contained in Attachment 1 to this letter. A word version of this Attachment is electronically attached in EDMS.

It is requested that Callaway Plant review the latest Revision of Reference 1 prior to submittal to the Nuclear Regulatory Commission (NRC) to ensure that the submittal is in alignment with the latest information. Reference 9 (TR-FSE-13-4) of Attachment 1 will need to be updated accordingly.

Please transmit this letter to John Patterson.

Author:
A. F. Retersdorf
Systems and Equipment Engineering II
Electronically Approved*

Verifier:
C. P. Arnold
Systems and Equipment Engineering III
Electronically Approved*

Manager:
S. L. Baier
Fluid Systems Engineering
Electronically Approved*

***Electronically approved records are authenticated in the electronic document management system.**

Attachment 1

Callaway Plant FLEX Integrated Plan Submittal

THIS PAGE INTENTIONALLY LEFT BLANK

THIS PAGE INTENTIONALLY LEFT BLANK

General Integrated Plan Elements
Callaway Plant

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 through 9 were applied and the basis for why the plant screened out for certain hazards.*

Callaway Plant has been evaluated and the following applicable hazards have been identified:

- Seismic events
- Storms such as high winds and tornadoes
- Extreme snow, ice and cold
- Extreme heat

Callaway Plant has determined the functional threats from each of these hazards and identified FLEX equipment that may be needed. The FLEX equipment will provide the protection required from these hazards. Callaway Plant is also developing procedures and processes to further address plant strategies for responding to these various hazards.

Seismic:

Per FSAR seismic input, for Callaway Plant the seismic criteria include two design basis earthquake spectra: Operating Basis Earthquake (OBE) and Safe Shutdown Earthquake (SSE).

The site seismic design response spectra define the vibratory ground motion of the OBE and SSE. The maximum horizontal acceleration for the SSE is 0.20g, and the OBE has a maximum horizontal acceleration of 0.12g (Reference 4, Section 2.5.2.8).

All safety-related structures are founded on granular structural fill composed mainly of crushed limestone and dolomite or on Graydon chert conglomerate. Neither material is susceptible to liquefaction (Reference 4, Section 2.5.4.8).

In summary, the seismic hazard applies to Callaway Plant. As a result, the credited FLEX equipment will be assessed based on the current Callaway Plant seismic licensing basis to ensure that the equipment remains accessible and available after a beyond design basis external event (BDBEE) scenario as outlined in NEI 12-06 (Reference 2) and that the FLEX equipment does not become a target or source of a seismic interaction from other systems, structures or components. The FLEX strategies developed for Callaway Plant will include documentation ensuring that any storage locations and staging routes and routes from off-site resource support meet the FLEX seismic criteria.

External Flooding:

The types of events evaluated to determine the worst potential flood included (1) potential maximum flood (PMF) due to nearby water sources, and (2) flood due to local intense precipitation equal to the potential maximum precipitation (PMP) at the plant site.

Specific analysis of flood levels resulting from ocean front surges and tsunamis is not required because of the inland location of the plant. Flood waves from landslides into upstream reservoirs required no specific analysis due to the lack of topographic and geologic features conducive to landslide formation.

The maximum plant site flood level from any cause is Elevation 840.16 ft mean sea level (MSL) (Reference 9). The grade level for all SSCs (except UHS and RWST) is an elevation of about 840.5 ft MSL (plant elevation 2000 ft) (Reference 9). Per NEI 12-06 (Reference 2), plants that are considered "dry" (i.e., the plant is built above the design basis flood level) are not susceptible to the external flooding hazard; therefore, the external flood hazard is screened out for Callaway Plant. However, Callaway Plant is developing procedures and strategies for delivery of offsite FLEX equipment during Phase 3 which considers regional impacts from flooding.

High Wind:

Figures 7-1 and 7-2 from the NEI 12-06 (Reference 2) were used for this assessment.

Callaway Plant is not susceptible to hurricanes based on its location in central Missouri. The plant site is a significant distance from the final contour line shown in Figure 7-1 of NEI 12-06 (Reference 2).

It was determined that the Callaway Plant site has the potential to experience damaging winds caused by a tornado exceeding 130 mph. Figure 7-2 of NEI 12-06 (Reference 2) indicates a maximum wind speed of 200 mph for Region 1 plants, including Callaway Plant. Therefore, high-wind hazards are applicable to the Callaway Plant site.

In summary, (1) based on Figure 7-1 of NEI 12-06 (Reference 2), Callaway Plant would not be susceptible to hurricanes so the hazard is screened out, and (2) based on Figure 7-2 of NEI 12-06 (Reference 2), Callaway Plant has the potential to experience damaging winds so the hazard is screened in.

Snow, Ice, and Extreme Cold

Per the FLEX guidance all sites should consider the temperature ranges and weather conditions for their site in storing and deploying their FLEX equipment. That is, the equipment procured should be suitable for use in the anticipated range of conditions for the site, consistent with normal design practices.

Applicability of snow and extreme cold:
NEI 12-06 (Reference 2) states plants above the 35th parallel should provide the capability to address the impedances caused by extreme snow and cold. Callaway Plant site is above the 35th parallel; therefore, the FLEX strategies must consider the impedances caused by extreme snowfall with snow removal equipment, as well as the challenges that extreme cold temperature may present. Callaway Plant is located at Universal Transverse Mercator Coordinates Latitude 38°45'40.7" North and Longitude 91°46'50.5" (Reference 4, Section 2.1.1.1).

Applicability of ice storms:
Callaway Plant site is not a Level 1 or 2 region as defined by Figure 8-2 of the NEI 12-06 (Reference 2); therefore, the FLEX strategies must consider the impedances caused by ice storms.

In summary, based on Figures 8-1 and 8-2 of NEI 12-06 (Reference 2), Callaway Plant site does experience significant amounts of snow or ice, and extreme cold temperatures; therefore, these hazards are screened in.

Extreme Heat:

Per NEI 12-06 (Reference 2), all sites must address high temperatures. Virtually every state in the lower 48 contiguous United States has experienced temperatures in excess of 110˚F. Many states have experienced temperatures in excess of 120˚F. Sites that should address high temperatures should consider the impacts of these conditions on the FLEX equipment and its deployment.

The climate at Callaway Plant site is temperate-continental with cold, snowy winters and warm, humid summers. Based on climatological data from nearby weather stations, the normal average temperature is 55°F in Columbia, Missouri. Extreme temperatures are 116°F and -26°F in Fulton, Missouri Reference 4, Section 2.3).

In summary, based on the available local data and industry estimates, the Callaway Plant site does not experience extreme high temperatures. However, per NEI 12-06 (Reference 2), all sites will address high temperatures. Therefore, for FLEX equipment Callaway Plant will consider the site maximum expected temperatures in their specification, storage, and deployment requirements, including ensuring adequate ventilation or supplementary cooling, if required.

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:*

Assumptions are consistent with those detailed in NEI 12-06, Section 3.2.1. Analysis has been performed consistent with the recommendations contained within the Executive Summary of the Pressurized Water Reactors Owners Group (PWROG) Core Cooling Position Paper (Reference 10) and assumptions from that document are incorporated into the plant-specific analytical bases. Key industry guidance and site-specific assumptions are presented here:

NEI 12-06 Assumptions

Section 3.2.1 of NEI 12-06 (Reference 2) provides the following assumptions:

Initial Plant Conditions

The initial plant conditions are assumed to be the following:

A1. Prior to the event the reactor has been operating at 100 percent rated thermal power for at least 100 days or has just been shut down from such a power history as required by plant procedures in advance of the impending event.

A2. At the time of the postulated event, the reactor and supporting systems are within normal operating ranges for pressure, temperature, and water level for the appropriate plant condition. All plant equipment is either normally operating or available from the standby state as described in the plant design and licensing basis.

Initial Conditions

The following initial conditions are to be applied:

A3. No specific initiating event is used. The initial condition is assumed to be a loss of offsite power (LOOP) at a plant site resulting from an external event that affects the off-site power system either throughout the grid or at the plant with no prospect for recovery of off-site power for an extended period. The LOOP is assumed to affect all units at a plant site.

A4. All installed sources of emergency on-site ac power and SBO Alternate ac power sources are assumed to be not available and not imminently recoverable.

A5. Cooling and makeup water inventories contained in systems or structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles are available.

A6. Normal access to the ultimate heat sink is lost, but the water inventory in the UHS remains available and robust piping connecting the UHS to plant systems remains intact. The motive force for UHS flow, i.e., pumps, is assumed to be lost with no prospect for recovery.

A7. Fuel for FLEX equipment stored in structures with designs that are robust with respect to seismic events, floods and high winds and associated missiles, remains available.

A8. Permanent plant equipment that is contained in structures with designs that are robust with respect to seismic events, floods, and high winds, and associated missiles, are available.

A9. Other equipment, such as portable ac power sources, portable backup dc power supplies, spare batteries, and equipment for 10 CFR 50.54(hh)(2), may be used provided it is reasonably protected from the applicable external hazards per Sections 5 through 9 and Section 11.3 of NEI 12-06 (Reference 2) and has predetermined hookup strategies with appropriate procedures/guidance and the equipment is stored in a relative close vicinity of the site.

A10. Installed electrical distribution system, including inverters and battery chargers, remain available provided they are protected consistent with current station design.

A11. No additional events or failures are assumed to occur immediately prior to or during the event, including security events.

A12. Reliance on the fire protection system ring header as a water source is acceptable only if the header meets the criteria to be considered robust with respect to seismic events, floods, and high winds, and associated missiles.

Reactor Transient

The following additional boundary conditions are applied for the reactor transient:

A13. Following the loss of all ac power, the reactor automatically trips and all rods are inserted.

A14. The main steam system valves (such as main steam isolation valves, turbine stops, atmospheric dumps, etc.), necessary to maintain decay heat removal functions operate as designed.

A15. Safety/Relief Valves (S/RVs) or Power Operated Relief Valves (PORVs) initially operate in a normal manner if conditions in the RCS so require. Normal valve reseating is also assumed.

A16. No independent failures, other than those causing the ELAP/LUHS event, are assumed to occur in the course of the transient.

Reactor Coolant Inventory Loss

Sources of expected PWR reactor coolant inventory loss include:

A17. Normal system leakage

A18. Losses from letdown unless automatically isolated or until isolation is procedurally directed

A19. Losses due to reactor coolant pump seal leakage (rate is dependent on the RCP seal design)

SFP Conditions

The initial SFP conditions are:

A20. All boundaries of the SFP are intact, including the liner, gates, transfer canals, etc.

A21. Although sloshing may occur during a seismic event, the initial loss of SFP inventory does not preclude access to the refueling deck around the pool.

A22. SFP cooling system is intact, including attached piping.

A23. SFP heat load assumes the maximum design basis heat load for the site.

Containment Isolation Valves

A24. It is assumed that the containment isolation actions delineated in current station blackout coping capabilities are sufficient.

The following assumptions are specific to Callaway Plant:

A25. Callaway Plant will be able to identify an ELAP condition within 1 hour to enable actions that place the plant outside the current design and licensing basis.

A26. From Reference 11: This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical

Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications and/or with its Security Plan, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p).

A27. Required staffing levels will be determined consistent with guidance contained in NEI 12-06 for each of the site specific FLEX strategies. Assumed available staffing levels will be determined consistent with NEI 12-01, as described below.
The event impedes site access as follows:
A. Post event time: 6 hours – No site access. This duration reflects the time necessary to clear roadway obstructions, use different travel routes, mobilize alternate transportation capabilities (e.g., private resource providers or public sector support), etc.
B. Post event time: 6 to 24 hours – Limited site access. Individuals may access the site by walking, personal vehicle or via alternate transportation capabilities (e.g., private resource providers or public sector support).
C. Post event time: 24+ hours – Improved site access. Site access is restored to a near-normal status and/or augmented transportation resources are available to deliver equipment, supplies and large numbers of personnel.
These results will be compared to confirm this assumption, or adjustments will be made to plant staffing or FLEX design to meet this requirement.

A28. 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.

A29. It is assumed that each FLEX component can store a minimum supply of 10 hours of fuel at constant operation. This forms the basis for deployment of the refueling strategies. This will be confirmed as more detailed design information becomes available.

A30. The designed hardened connections applicable to FLEX strategies are protected against external events or are established at multiple and diverse locations.

A31. Callaway Plant will be installing the Westinghouse Spent Fuel Pool Level Instrumentation System.

A32. Callaway Plant will be installing Westinghouse Low Leak RCP seals (SHIELD®[1]) prior to FLEX implementation.

A33. The location of the Primary Storage bunker will be located within the protected area prior to FLEX implementation.

[1] SHIELD® is a registered trademark of Westinghouse Electric Company LLC, its subsidiaries and/or affiliates in the United States of America and may be registered in other countries throughout the world.

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** **Ref: NEI 12-06 Section 13.1**	*Include a description of any alternatives to the guidance, and provide a milestone schedule of planned action.*
Ameren will fully comply with the guidance in JLD-ISG-2012-01 (Reference 3) and NEI 12-06 (Reference 2) in implementing FLEX strategies for Callaway Plant.	
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 walkthrough 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 Reconciliation Table (Attachment 1B)*

The sequence of events and any associated time constraints are identified below for Callaway Plant Modes 1-4 strategies for FLEX Phases 1 through Phase 3 (Reference 9). See attached sequence events timeline (Attachment 1A) for a summary of this information.

1. Declare ELAP – 0.75 hours
   - ELAP entry conditions can be verified by control room staff and it is validated that both emergency diesel generators are not available. This is a reasonable assumption for system operators to perform initial evaluations of the EDGs. Entry into ELAP provides guidance to operators to perform ELAP actions. Time constraint is required to allow taking actions which place the plant SSCs outside License Basis alignments (Reference 9).
2. Control Room Lighting – 0.75 hours
   - Lighting in the control room will initially be powered by plant batteries (Reference 9). Portable lighting systems will be used once load shed procedures are implemented. Lighting strategies in Phase 2 are the same as in Phase 1. Existing plant circuits are not expected to be directly repowered using the 480V FLEX generators.
3. Control Room Ventilation – 0.75 hours

- Callaway Plant procedure ECA-0.0, Loss of All AC Power, directs opening control room cabinet doors (Reference 6.a). Strategies for providing temporary ventilation are still being developed, which include propping open doors and possibly using small generators to power mobile fans.

4. NK Power Load Shed – 1 hour
   - Load shed should be initiated no later than 0.75 hours after the event to complete no later than 1 hour (Reference 9).
5. Vent SFP Area– 5.4 hours
   - This constraint time is based on the SFP time to boil, assuming sloshing occurs and the initial temperature of the SFP is 140°F (Reference 9).
6. Perform Damage Assessment – 6 hours
   - Callaway Plant will develop a post event damage assessment walkdown procedure. The purpose of the damage assessment walkdown is to evaluate and document the condition of plant systems, structures and components (SSCs) after an ELAP event. The damage assessment will be comprehensive enough such that plant management and staff can plan the best recovery strategy. Based on the expected complexity of the task, it is assumed that the damage assessment will take 6 hours, depending on local site conditions. It is assumed that critical plant conditions will be known by the control room coordinator to inform appropriate actions following the completion of this task (Reference 9). This damage assessment will guide FLEX strategies and will be a future FSG requirement.
7. Debris Removal – 7 hours
   - Based on earliest need for deployment paths (Reference 9).
8. Deploy FLEX SG Makeup pump (FLEX Core Cooling Pump) – 9 hours
   - Stage as early as possible in event to provide defense in depth (Reference 9).
9. Perform Plant Cooldown – 12 hours
   - Based on Reference 9, a plant cooldown will begin within 8 hours and will have a duration of 4 hours. The ARVs and the TDAFWP will be used to ensure a symmetric plant cooldown. Actual cooldown time is projected to be approximately 1.5 hours but 4 hours is assumed because local AFW and ARV control is required (Reference 9).
10. Energize NK Power 480V Generator – 14 hours
    - This time constraint is dependent upon the earliest need for the generator based on providing power to the NK Power System (Reference 9).
11. Establish Battery Room Ventilation – 14.5 hours
    - Battery room ventilation must occur shortly after battery charging is initiated to vent hydrogen (Reference 9).
12. Align CST Makeup from the UHS – 17 hours
    - Based on current CST credited volume depleting in 17 hours (Reference 9). The UHS is the preferred seismic alternate coolant source (ACS) (Reference 9).
13. Initiate RCS Makeup (boration) from BAT – 17 hours
    - This time constraint was calculated by dividing the total volume of boron injected by the volumetric flow rate of the injection stream (Reference 9).
14. FLEX Fuel Deployment – 24 hours
    - This is an assumption. Callaway Plant will provide a more exact basis once all FLEX equipment has been purchased and equipment specifications (fuel consumption rate) are known.
15. TDAFWP Room Ventilation – 24 hours
    - Callaway Plant will perform analysis to prove indefinite coping or provide actions necessary to maintain EQ requirements for the TDAFWP.

16. Initiate SFP Makeup – 33 hours
    - Per Reference 9, the time for the SFP to boil is 5.4 hours and the time for the level to reach 15 ft. above the top of the racks is 48 hours.
17. Switch RCS Makeup from BATs to RWST – 46 hours
    - This need time is based on the depletion of the BATs and the need to maintain RCS inventory (Reference 9).
18. Large Debris Removal –72 hours
    - Need time is based on the need for large equipment arriving on-site requiring for additional debris clearing. Equipment of this size is not expected to arrive on site until 24 hours (Reference 9).
19. Mobile Water Purification System –72 hours
    - The current credited CST volume will deplete in 17 hours. The volume of the UHS Retention Pond can be credited indefinitely. This mobile purification skid would be aligned as soon as possible to prevent continued injection with untreated water (Reference 9).
20. Ultimate Heat Sink Pump – 72 hours
    - Assumption based on current plant analysis limited applicability of 72 hours. Need time is based on loss of capability to support SG feed strategy (Reference 9).
21. 4160V generator – 72 hours
    - Assumption based on current plant analysis limited applicability of 72 hours. Need time is based on eventual loss of capability to support SG feed strategy (Reference 9).
22. Mobile Boration Unit – 72 hours
    - This time constraint is based on on-site borated sources depleting (Reference 9).
23. Establish Large Fuel Truck Service – 72 hours
    - Assumption regarding the depletion of on-site supply and supplying larger equipment. Callaway Plant will provide a more exact basis once all FLEX equipment has been purchased and equipment specifications are known (Reference 9).

To confirm the times given, Callaway Plant will prepare procedures for each task, perform time study walkthroughs for each of the tasks under simulated ELAP conditions, and account for equipment and tagging and other administrative procedures required to perform the task.

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.*

Callaway Plant 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 connection, which is the “deployment path.” Staging routes are shown in Figure A3-1 and Figure A3-32. Deployment paths are shown in Figure A3-4, Figure A3-5, Figure A3-10, Figure A3-11, Figure A3-12, Figure A3-13, Figure A3-14, Figure A3-15, Figure A3-17, Figure A3-18, Figure A3-19, and Figure A3-20. Staging routes will be followed to transport the FLEX equipment to the required staging locations. The deployment paths will be followed to connect the associated plant SSCs to

<table>
<tr><td colspan="2">allow the strategies to be implemented. Deployment paths with respect to the applicable plant mode will be maintained clear. Evaluations will need to be performed to demonstrate the integrity of the staging and deployment paths with regard to a BDBEE scenario as outlined in NEI 12-06 (Reference 2). For Phase 3, the deployment routes from the staging area will be evaluated based on an assessment of the damage in the affected area; the equipment will be deployed to the site in accordance with that assessment. These requirements will be included in an administrative program. Updates on these activities will be included in the appropriate six month status updates required by Reference 1.</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>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</td><td>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</td></tr>
<tr><td colspan="2">See attached milestone schedule Attachment 2</td></tr>
<tr><td colspan="2"></td></tr>
<tr><td>Identify how the programmatic controls will be met.

Ref: NEI 12-06 Section 11

JLD-ISG-2012-01 Section 6.0</td><td>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 latter sections of this template and need not be included in this section.

See Section 6.0 of JLD-ISG-2012-01.</td></tr>
</table>

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, Section 11.0 (Reference 2). 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, Section 11.5 (Reference 2). Programs and controls will be established to assure personnel proficiency in the mitigation of a BDBEE scenario as outlined in NEI 12-06 (Reference 2). 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, Section 11.8 (Reference 2).	
Describe training plan	*List training plans for affected organizations or describe the plan for training development*
Training plans will be developed for plant groups such as the emergency response organization (ERO), Fire, Security, emergency planning (EP), Operations, Engineering, Maintenance, and Instrumentation and Controls. The training plan development will be done in accordance with Callaway Plant procedures using the Systematic Approach to Training, and will be implemented to ensure that the required Callaway Plant staff is trained prior to implementation of FLEX. The training program will comply with the requirements outlined in Section 11.6 of NEI 12-06 (Reference 2)	
Describe Regional Response Center plan	*Discussion in this section may include the following information and will be further developed as the Regional Response Center development is completed.* • *Site-specific RRC plan* • *Identification of the primary and secondary RRC sites* • *Identification of any alternate equipment sites (i.e., another nearby site with compatible equipment that can be deployed)* • *Describe how delivery to the site is acceptable* • *Describe how all requirements in NEI 12-06 are identified*
The industry will establish two (2) Regional Response Centers (RRCs) to support utilities during a BDBEE scenario as outlined in NEI 12-06 (Reference 2). 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 Assembly Area, established by the Strategic Alliance for FLEX Emergency Response (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 within 24 hours from the initial request. Callaway Plant will negotiate and execute an automatically renewing contract with the vendor of the RRC to establish and maintain a facility which will meet the requirements of NEI 12-06, Section 12 (Reference 2).
Notes: None

Maintain Core Cooling & Heat Removal

Determine Baseline coping capability with installed coping[2] 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 Sections 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.

Core Cooling with Steam Generators Available:

During a station blackout (SBO), operator actions are currently governed by procedure ECA-0.0 (Reference 6.a). Per Callaway Plant IER 11-4 response (Reference 5), the site has evaluated core cooling, containment integrity, and spent fuel pool (SFP) inventory based on this current procedure and protected equipment. Analysis shows that approximately 660,000 gallons of secondary makeup water is required to maintain core cooling for a minimum of 72 hours (Reference 9). Based on the Technical Specification (TS) minimum CST volume of 281,000 gallons and Reference 9, the CST volume will be available for 17 hours. The seismically qualified alternate coolant source is the ultimate heat sink (UHS) retention pond with a volume of 38 acre feet (Reference 4, Section 9.2.5.3). Using a combination of the CST and UHS, there is sufficient seismically protected inventory to provide AFW for at least 72 hours after the BDBEE scenario as outlined in NEI 12-06 (Reference 2), assuming the CST is modified to be made seismically qualified and missile protected. Per Section 10.4.9.2.3 of Reference 4, the Turbine Driven Auxiliary Feedwater Pump (TDAFWP) will automatically start on a loss of offsite power signal. The current plant procedures provide for the capability to manually restart the TDAFWP within 50 minutes, if required (Reference 6.b, Attachment R).

The strategy in the current procedures (ECA-0.0; Reference 6.a) includes load shedding to conserve battery life, depressurizing to reduce potential RCS leakage through RCP seals, and removing heat through the steam generators using the atmospheric relief valves (ARVs) with the SGs being fed by the TDAFWP.

The CST is non-seismic and non-missile protected and, therefore, is not creditable for FLEX (Reference 9). The volume available in this CST is sufficient for core decay heat removal for 17 hours. The site has contracted an engineering firm to conduct a seismic and missile protection evaluation of the CST. Callaway Plant is also evaluating installation of a new, seismically qualified and hardened CST that will hold approximately 670,000 gallons of creditable volume. This volume would be sufficient for 72 hours of

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

coping.

The TDAFWP is a horizontal centrifugal pump. The pump bearings are cooled by the pumped fluid. The pump design capacity includes continuous minimum flow recirculation. Power for all controls, valve operators, and other support systems is independent from ac power sources. Steam supply is taken from two of the four main steam lines between the containment penetrations and the main steam isolation valves. Each of the steam supply lines to the turbine is equipped with a locked-open gate valve, normally closed air-operated globe valve with air-operated globe bypass to keep the line warm, and two non-return valves. Air-operated globe valves are equipped with dc-powered solenoid valves. Callaway Plant will be installing a secondary nitrogen source for these air-operated valves so they can be repositioned remotely or locally following the event. These steam supply lines join to form a header that leads to the turbine through a normally closed, dc motor-operated, mechanical trip and throttle valve. The steam lines contain provisions to prevent the accumulation of condensate. The turbine driver is designed to operate with steam inlet pressures ranging from 92 psia to 1,290 psia (Reference 4, Section 10.4.9.2.2).

The Auxiliary Feedwater System (AFS) is located in the Auxiliary Building, except for the TDAFWP exhaust pipe and the section of pump recirculation piping mentioned below. Exhaust steam from the turbine driver is routed from the Auxiliary Building wall through the Auxiliary Boiler Building, which is designed to UBC seismic requirements. If the Auxiliary Boiler Building were to catastrophically fail and the exhaust line were sheared off completely, the TDAFWP would operate properly (Section 10.4.9.3 of Reference 4).

This building is designed to withstand the effects of earthquakes, tornadoes, hurricanes, floods, external missiles, and other appropriate natural phenomena (Reference 4).

In Callaway Plant's IER 11-4 response (Reference 5) the site recognized that because the condensate storage tank (CST) was neither seismic or missile protected and the ESW (which is the safety grade backup) would be unavailable due to a simultaneous BDBEE scenario as outlined in NEI 12-06 (Reference 2) and ELAP, the site would be unable to establish auxiliary feed, and consequently, core damage was estimated to occur within 2.5 hours. Subsequent to the response, the site has contracted an engineering firm to conduct a seismic evaluation of the CST. Callaway Plant is also evaluating installation of a new, seismically qualified and hardened CST that will hold approximately 670,000 gallons of creditable volume. This volume would be sufficient for 72 hours of coping. All of the current AFW makeup strategies rely on the integrity of the CST. Should Callaway Plant install a new CST, the strategies will change to draw water from the new CST, but the discharge connection points and staging location will remain the same. A future action is required to resolve this issue (Open Item OI5).

To avoid pump damage due to overheating while operating with no delivered flow, the TDAFWP requires a minimum flow of 120 gpm (Reference 9). To satisfy this requirement, the TDAFWP has a recirculation line off the discharge line, AL-029-DBC-3" which becomes AL-045-DBC-3", that returns to the CST. The recirculation line transitions from safety-related to non-safety related/non-seismic at the AFS to CST pipe chase boundary, becoming line AL-046-DBD-3". The CST pipe chase and the CST are not seismically qualified. If a hazard (i.e., tornadoes, floods, missiles, pipe breaks, fires, and seismic events) resulted in the non-safety related portion of the recirculation header becoming crimped such that the recirculation flow was restricted in conjunction with an AFS actuation signal, the potential for pump damage would exist. Callaway Plant will evaluate options to analyze this piping or protect it. A future action is required to resolve this issue (Open Item OI5).

An assessment of room environmental conditions and effects on key equipment was also performed. Reference 5 documents that temperatures in the TDAFWP Room, equipment cabinets, and the control room are considered acceptable for 24 hours following a BDBEE scenario as outlined in NEI 12-06 (Reference 2). Callaway Plant will evaluate ventilation coping times beyond 24 hours. A future action is required to resolve this issue.

Per Reference 5, DC control power for the TDAFWP will be available for a minimum of 12 hours without load shedding. The Emergency Coordinator Supplemental Guidelines provide guidance to operate the TDAFWP and control flow manually without DC control power (Reference 6.b).

An atmospheric relief valve (ARV) is installed on the outlet piping from each steam generator. The four valves are installed to provide for controlled removal of reactor decay heat during normal reactor cooldown when the main steam isolation valves are closed or the turbine bypass system is not available. The total capacity of the four valves is 15 percent of rated main steam flow at steam generator no-load pressure. The maximum actual capacity of the relief valve at design pressure is limited to reduce the magnitude of a reactor transient if one valve would inadvertently open and remain open (Reference 4).

The ARVs are air-operated carbon steel, 8-inch 1,500-pound globe valves, supplied by a safety-related air supply (Section 9.3.1 of Reference 4), and controlled from Class 1E sources. A non-safety related air source is available during normal operating conditions. The capability for remote manual valve operation is provided in the main control room, the auxiliary shutdown panel, and locally at the valves for ABPV0002 and ABPV0003. The valves are opened by pneumatic pressure and closed by spring action. These valves are designed to withstand the effects of earthquakes, flooding, and a high wind/missile hazard (Reference 5). Future FLEX Support Guideline procedures will address specific actions for operating the ARVs in a BDBEE scenario as outlined in NEI 12-06 (Reference 2).

Callaway Plant is designing a modification that will supplement the existing backup nitrogen capacity. This modification will provide nitrogen for at least 72 hours (Reference 9). A future action is required to resolve this issue.

Core Cooling with Steam Generators not Available:

Reactor core cooling and heat removal with steam generators not available is provided during Phase 1 by heating up and boiling of the RCS coolant inventory. RCS inventory during Phase 1 may be maintained by gravity feed from the RWST. The ability of the RWST to provide gravity feed to the RCS is limited by the RWST fluid height, line losses through the gravity feed path, and pressure within the RCS.

If it is determined that gravity feed is not effective to cool the RCS and prevent fuel damage, Callaway Plant will take actions to proceduralize administrative controls to pre-stage FLEX equipment prior to entering a condition where the steam generators cannot provide adequate core cooling.

Details:

Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Station Blackout (SBO) Emergency Operating Procedure (EOP) ECA-0.0 addresses the standard CST alignment strategy. The strategies in ECA-0.0 must be tied to the appropriate FLEX Support Guideline (FSG) for this

	strategy when the FSG is developed.
Identify modifications	*List modifications* 1. In order to credit the CST, the tank and the attached valve house need to be seismically qualified and missile protected. Callaway Plant is also evaluating installation of a new, seismically qualified and hardened CST that will hold approximately 670,000 gallons of creditable volume. This volume would be sufficient for 72 hours of coping (Reference 9).
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. SG Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. AFW Flow indication (downstream of connection points) – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 3. SG Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 4. CST Level – Normal Power Source: Non-Class 1-E; a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) 5. RCS Hot Leg Temperature (if CETs not available)– Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 6. RCS Cold Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 7. Core Exit Thermocouple – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 8. RCS Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 9. Pressurizer Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Notes:

Core cooling strategies are provided for conditions where steam generators are available or where steam generators are not available but a sufficient RCS vent has been established to support core cooling. This assumption is per the guidance of NEI 12-06 FAQ 2012-19. Other configurations are not considered as these occur for short durations that are exempted per NEI 12-06 Table D.

After NK load shedding, only ABPV0001 and ABPV0002 will have DC power available for operation and the Control Room will only be able to remotely control AFW to SG A and SG D.

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.

Core Cooling with Steam Generators Available:

The transition into Phase 2 will be required once the operating conditions of the TDAFWP cannot be maintained. As the event proceeds, the decay heat will decrease and as a result the steam output from the SG will decrease. Eventually, the steam output will not be sufficient to run the TDAFWP. Prior to that point the transition to the Phase 2 strategy will occur. The primary and secondary strategies involve staging the FLEX Core Cooling Pump on the other side of Road J from the CST. The FLEX Core Cooling Pump will draw from the CST through the currently available hose connection downstream of APV0043 on the Plant South side of the tank. The FLEX Core Cooling Pump discharge will be connected with hose to a hard pipe connection in the CST valve house. Two intermediate pipes (one for either connection) will run from the CST valve house through the pipe chase into the Auxiliary Building where a flexible spool will be used in either Room 1330 or 1326 to make the final connection to the AFW system. For both strategies, suction will be taken from the CST. It is estimated that this source will be available for 17 hours. The next qualified source available is the UHS Retention Pond. There is a large amount of fuel available on site that should be sufficient for all Phase 2 strategies (Reference 9).

The ARVs continue to be used during Phase 2 and the details provided in the Phase 1 description apply in Phase 2. Should the AFW flow control valves need to be adjusted, the same details provided in the Phase 1 description apply in Phase 2.

Core Cooling with Steam Generators not Available:

For an event that occurs when the steam generators are not available to provide core cooling, the transition to Phase 2 strategies will be required as inventory is lost from the RCS. Reactor core cooling and heat removal with steam generators not available will be provided by using the FLEX Core Cooling Pump to inject water into the High Pressure Coolant Injection system. Existing piping will feed the RCS through normal safety injection paths into the cold legs.

A flushing flow of approximately 127 gpm at atmospheric conditions is required at 28 hours in order to preclude the RCS fluid from reaching the incipient boric acid precipitation point (Reference 9).

Suction will be taken from the RWST through a new connection. The FLEX Core Cooling Pump will be located in Staging Area 2 and will provide discharge through a mix of flexible hose and hard piping. The flexible hose will be run from the portable pump to the Tendon Gallery access hatch. A penetration just beside the hatch will allow external access to permanently installed hard piping which will run along the outer wall of the Tendon Gallery. This piping will terminate at the Tendon Gallery access door to the Auxiliary Building. For the primary connection, flexible hose will be run from this access door to the base of the installed hard pipe on the outer Plant South wall of the BIT Room. Flexible hose will then run the short distance to the Storz connection in the piping penetration room. For the secondary connection, the flexible

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
hose from the Tendon Gallery access door will run to a short piping penetration/sleeve on the Plant South wall of the BIT room. A flexible pipe will connect this pipe to the Storz connection in the BIT room. The proposed routes for these connections are shown in Figure A3-12 and Figure A3-13.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Procedures and guidance to support deployment and implementation including interfaces to EOPs, special event procedures, abnormal event procedures, and system operating procedures, will be developed in accordance with NEI 12-06, Section 11.4 (Reference 2). Further, the PWROG is developing generic and NSSS-specific FLEX Support FSGs via PA-PSC-0965. Callaway Plant will align with the PWROG guidance once the FSGs are developed.
Identify modifications	*List modifications* 1. In order to credit the CST, the tank and the attached valve house need to be seismically qualified and missile protected. Callaway Plant is also evaluating installation of a new, seismically qualified and hardened CST that will hold approximately 670,000 gallons of creditable volume. This volume would be sufficient for 72 hours of coping (Reference 9). 2. A reducing tee will be installed into the discharge line of the Non-Safety Auxiliary Feedwater Pump (NSAFWP) downstream of ALV0200 in Room 1330 for the primary connection and into the discharge of the A MDAFWP downstream of ALFV0042 in Room 1326 for the secondary connection. Both tees will have two isolation valves and terminate in a Storz connection. 3. Two intermediate runs of pipe will be installed from the CST valve house, through the pipe chase, and into the Auxiliary Building. The primary connection intermediate pipe will terminate in Room 1330; the secondary connection intermediate pipe will terminate in Room 1326.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. SG Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. AFW Flow indication (downstream of connection points) – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 3. SG Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
	4. CST Level – Normal Power Source: Non-Class 1E, a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) 5. RCS Hot Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 6. RCS Cold Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 7. Core Exit Thermocouple – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 8. RCS Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 9. Pressurizer Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Storage/Protection of Equipment:

Describe storage / protection plan or schedule to determine storage requirements

The maximum plant site flood level from any cause is elevation 840.16 ft mean sea level (Reference 9). The site sits at an elevation of about 840.5 ft mean sea level (Reference 9). The site is considered dry and thus none of the storage locations will be affected by a flood.

Two locations have been determined for storage of Callaway Plant FLEX equipment. These locations are shown in Attachment 3, Figure A3-1. The primary storage location will be a new FLEX storage bunker. The secondary storage location will be the Unit 2 ESW Pumphouse. Each of the buildings will have a common set of equipment capable of supporting each FLEX function/strategy. At this time it is estimated that the primary storage location will be approximately 6,000 ft^2 and will be sufficient to store the N set of FLEX equipment and any FLEX vehicles. A conceptual evaluation has been performed (Reference 9) and will be reevaluated once the equipment list is final. A future action is required to resolve this issue. The secondary storage location is significantly smaller but still expected to be capable of storing all of the N+1 FLEX equipment. If all of the N+1 equipment cannot fit in the secondary storage location, there will be sufficient space in the primary storage location to store it. Priority for storage of N+1 equipment in the secondary storage location will be given to equipment that might be staged at Staging Area 3.

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 2	
Seismic	*List how equipment is protected or schedule to protect* The storage locations will be designed or evaluated equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures*. Large portable FLEX equipment will be secured as appropriate during SSE and will be protected from seismic interactions with other components. No components will be stacked or at a raised elevation as to cause interference with the deployment of any of the FLEX equipment.
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List how equipment is protected or schedule to protect* The Callaway Plant is currently considered a "dry" site; however, Phase 2 equipment will be protected from flooding.
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* Portable equipment to implement FLEX strategies will be maintained in storage locations that are protected from high winds, i.e., hardened structures designed and built to ASCE 7-10.
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect* Portable equipment required to implement FLEX strategies will be maintained heated in storage locations.
High Temperatures	*List how equipment is protected or schedule to protect* All of the storage locations will be evaluated for high temperature effects and ventilation will be provided as required to assure no adverse effects on the FLEX equipment. Active cooling systems are not required as normal ventilation will be utilized.
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)** Figure A3-1 and Figure A3-32 in Attachment 3 show the staging paths from each of the storage locations to the staging locations. The staging strategies will utilize the roadway that travels the perimeter of the plant inside the PA to get from storage to staging. It is the intent for Callaway Plant FLEX coping strategies to have the shortest distance traveled from storage location to staging location. The four staging areas for Callaway Plant FLEX strategies are shown in Figure A3-1 and Figure A3-32 in	

Maintain Core Cooling & Heat Removal
PWR Portable Equipment Phase 2
Attachment 3. There is an abundance of space in each of these staging areas for FLEX equipment and space will not be a concern (Reference 9). Flooding is not a concern for the staging areas as the site is a “dry site.” Normal plant maintenance will mitigate deployment concerns in icy and/or snow conditions. Staging Areas 1 through 3 will be used for mechanical/fluid systems functions (Figure A3-1). Figure A3-32 shows the staging routes and staging location for electrical components, which is Staging Area 4. The distance from the primary storage area to Staging Area 1 is approximately 525 ft., following the green path shown in Figure A3-1 (Reference 9). Initially, the primary storage area will be outside the PA. Prior to FLEX implementation, the security fence will be moved and the primary storage area will be within the PA. The Plant Support Facility and Maintenance Storage Facility (950 and 952 in Figure A3-1) could be potential sources of debris due to both seismic and high wind events. All generated debris that impacts the FLEX strategy will be cleared with a Pettibone forklift or similar purposed vehicle. The distance from the secondary storage area to Staging Area 1 is approximately 1,550 ft., following the blue path shown in Figure A3-1 (Reference 9). This location is within the PA. The Outage Maintenance Facility and the Turbine Building (884 and 400 in Figure A3-1) could be potential sources of debris due to both seismic and high wind events. An alternate path to avoid the Turbine Building would follow the road between the Fuel Building and the Radwaste Building. The distance along this path would be slightly shorter, but security gates would have to be opened. All generated debris that impacts the FLEX strategy will be cleared with Pettibone forklift or similar purposed vehicle. All FLEX equipment will be trailer mounted or on wheels for ease of deployment. Vehicles with approximately 16,000lb towing capacity will be used to move the pumps and/or generators as well as the hoses and fittings needed for the connection point.

Core Cooling with Steam Generators Available		
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*
Primary Connection The FLEX Core Cooling Pump will be staged in Staging Area 1 (Figure A3-1). The suction connection on the CST is located on the Plant South side of the CST (approximately 2000’ elevation) and is 70 ft. from the staged pump	Primary Connection For this strategy to be successful the CST must be modified; the tank is a non-seismic and non-missile protected tank. The tank will need to be seismically qualified and missile protected to credit it for any plant strategies	Primary Connection The primary connection point is located in the Auxiliary Building, which is seismically qualified and missile protected. Access is available through the Tendon gallery, which is seismically qualified and protected from a

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
location. The suction piping will consist entirely of flexible hose. The discharge connection will be located in the CST valve house, 200 ft. from the staged FLEX Core Cooling Pump. The flexible hose will run from the FLEX Core Cooling Pump to this external discharge connection. About 150 ft. of piping will be run from inside the CST valve house through the piping chase at 1989'-6" into Room 1207 in the Auxiliary Building. From Room 1207 the pipe will be run up through a core drilled hole into Room 1330 near the primary connection point. The piping would be stubbed off here with a Storz connector and cap. When required, the final connection to the reducing tee would be made via a flexible spool piece. Figure A3-4 shows the pipe and hose routing for the primary AFW connection.	(Open Item OI5). The proposed routing also requires that the CST valve house be seismically qualified and confirmed to be missile protected. Callaway Plant is also evaluating installation of a new, seismically qualified and hardened CST that will hold approximately 670,000 gallons of creditable volume. This volume would be sufficient for 72 hours of coping. The reducing tee will be installed into the discharge line of the NSAFWP downstream of ALV0200 and upstream of ALV0198. The connection is located in Room 1330 and will be equipped with a Storz connection. This connection will be double isolated and new piping will be seismically qualified. This will be the primary connection point and can provide makeup to all four steam generators. An intermediate run of hard piping will be installed and will run directly into Room 1330 where the NSAFWP discharge pipe ties into the TDAFWP discharge piping and where the primary connection will be located. This intermediate piping will run from the CST valve house to Room 1330 and will terminate on either end with a Storz connection. A short flexible spool piece will connect the intermediate pipe in Room 1330 to the primary connection point.	high wind/missile hazard. The suction and makeup connections to the CST will be seismically qualified and missile protected. This includes seismically qualifying the CST valve house.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
Secondary Connection The FLEX Core Cooling Pump will be staged in Staging Area 1 (Figure A3-1). The suction connection on the CST is located on the Plant South side of the CST (approximately 2000' elevation) and is 70 ft. from the staged pump location. The suction piping will consist entirely of flexible hose. The discharge connection will be located in the CST valve house, 200 ft. from the staged FLEX Core Cooling Pump. The flexible hose will run from the FLEX Core Cooling Pump to this external discharge connection. About 155 ft. of piping will be run from inside the CST valve house through the piping chase at 1989'-6" into Room 1207 in the Auxiliary Building. From Room 1207 the pipe will be run up through a core drilled hole into Room 1326 near the secondary connection point. The piping would be stubbed off here with a Storz connector and cap. When required, the final connection to the reducing tee would be made via a flexible spool piece. Figure A3-5 shows the pipe and hose routing for the secondary AFW connection.	Secondary Connection For this strategy to be successful the CST must be modified; the tank is a non-seismic and non-missile protected tank. The tank will be seismically qualified and missile protected to credit it for any plant strategies (Open Item OI5). The proposed routing also requires that the CST valve house be seismically qualified and confirmed to be missile protected. Callaway Plant is also evaluating installation of a new, seismically qualified and hardened CST that will hold approximately 670,000 gallons of creditable volume. This volume would be sufficient for 72 hours of coping (Reference 9). The reducing tee will be installed into the discharge line of the A MDAFWP downstream of ALFV0042 and upstream of ALV0043. The connection is located in Room 1326 and will be equipped with a Storz connection. This connection will be double isolated and new piping will be seismically qualified. This will be the secondary connection point and can provide makeup to all four steam generators. An intermediate run of hard piping will be installed and will run directly into Room 1326 where the A MDAFWP is located and where the secondary connection will be located. This intermediate piping will run from the CST valve house to the secondary connection.	Secondary Connection The secondary connection point is located in the Auxiliary Building, which is seismically qualified and missile protected. Access is available through the Tendon gallery which is seismically qualified and protected from a high wind/missile hazard. The suction and makeup connections to the CST will be seismically qualified and missile protected. This includes seismically qualifying the CST valve house.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
	There will be a Storz connection that will be connected with the final spool piece.	
Core Cooling with Steam Generators not Available		
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*
Primary Connection The primary strategy for providing adequate cooling during Modes 5 and 6 will take suction from the new RWST connection on the RWST drain line. The FLEX Core Cooling Pump will be located in Staging Area 2 and will provide discharge through a mix of flexible hose and hard piping. The flexible hose will be run from the FLEX Core Cooling Pump to the Tendon Gallery access hatch. A Storz connector will be available exterior to the Tendon Gallery near the access hatch. The intermediate pipe will run down to an elevation of about 1980' and run along the outer wall of the Tendon Gallery to the Auxiliary Building access door. Flexible hose will be run from this access door to the base of the installed hard pipe on the Plant South exterior wall of the BIT Room. Flexible hose will connect this pipe to the Storz connector on the fabricated manifold in the A piping penetration room, Room	Primary Connection A short run of piping containing two isolation valves will be fabricated and installed on the existing blind flange in the A piping penetration room, Room 1323. This piping will be seismically qualified and supported. The primary makeup source will be the RWST, which is seismically qualified, but not missile protected. The RWST will be missile protected to credit its use in core cooling with SGs not available strategies (Open Item OI1). A tee will be installed on the RWST drain line with two isolation valves. This piping will be seismically supported and terminate in a Storz connection.	Primary Connection With the exception of the RWST suction connection which is inside the RWST valve house, all of the other connections are located within the Auxiliary Building or Tendon Gallery. Therefore, the connections are protected from all applicable BDBEE scenarios as outlined in NEI 12-06 (Reference 2). Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard. The suction connection point will be in the RWST valve house, which is seismically qualified and will be modified to be protected from a high wind/missile hazard. Access is available directly into the RWST valve house.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 2		
1323.		
Secondary Connection The secondary strategy for providing adequate cooling during Modes 5 and 6 will take suction from the new RWST connection on the RWST drain line. The FLEX Core Cooling Pump will be located in Staging Area 2 and will provide discharge through a mix of flexible hose and hard piping. The flexible hose will be run from the FLEX Core Cooling Pump to the Tendon Gallery access hatch. A Storz connector will be available exterior to the Tendon Gallery near the access hatch. The intermediate pipe will run down to an elevation of about 1980' and run along the outer wall of the Tendon Gallery to the Auxiliary Building access door. Flexible hose will be run from this access door to the Storz connector on the new hard pipe penetration through the Plant South wall of the BIT Room. A short length of hose will connect to this hard pipe from inside the BIT Room and to the Storz connection on the fabricated manifold.	Secondary Connection A short run of piping containing two manual isolation valves will be fabricated to provide the connections in the BIT Room. The piping will be seismically qualified and supported. The primary makeup source will be the RWST, which is seismically qualified, but not missile protected. The RWST will be missile protected to credit its use in core cooling with SGs not available strategies (Open Item OI1). A tee will be installed on the RWST drain line with two isolation valves. This piping will be seismically supported and terminate in a Storz connection.	Secondary Connection With the exception of the RWST suction connection which is inside the RWST valve house, all of the other connections are located within the Auxiliary Building or Tendon Gallery. Therefore, the connections are protected from all applicable BDBEE scenarios as outlined in NEI 12-06 (Reference 2). Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard. The suction connection point will be in the RWST valve house, which is seismically qualified and will be modified to be protected from a high wind/missile hazard. Access is available directly into the RWST valve house.
Notes: Core cooling strategies are provided for conditions where steam generators are available or where steam generators are not available but a sufficient RCS vent has been established to support core cooling. This assumption is per the guidance of NEI 12-06 FAQ 2012-19. Other configurations are not considered as these occur for short durations that are exempted per NEI 12-06 Table D.		

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.

For Phase 3, Callaway Plant will continue the Phase 2 coping strategies with additional assistance provided from offsite equipment/resources. Each of the Phase 3 strategies will utilize common connections to prevent any compatibility issues with offsite equipment. The pathways and areas utilized for Phase 2 deployment and staging will also be used for Phase 3. A list of equipment expected for Phase 3 is provided below in order of prioritization. For this equipment and the FLEX strategies, the specific timing is discussed in Attachment 1A.

In addition to the regional response centers (RRCs), Callaway Plant has established agreements and contracts with local, state, and federal government organizations and suppliers for mutual aid and support. Current procedures are also in place for assisting and interfacing with these offsite resources.

In Phase 3, core cooling is maintained through natural circulation heat removal from the RCS via the steam generators. Heat rejection through the steam generators is maintained via the TDAFWP or the FLEX Core Cooling Pump. Use of a non-condensate grade coolant in the SG cannot be maintained indefinitely. Phase 3 deployment of a unit capable of generating clean coolant for use in the SGs can extend the coping time. Indefinite coping is successfully established once a transition from SG cooling to residual heat removal (RHR) cooling is established. Phase 3 deployments of the alternate essential service water system for cooling the component cooling water (CCW) system and subsequently the RHR system establishes a portion of this capability. Callaway Plant is currently evaluating installing a new CST with an increased volume. The current coping time with the credited volume of the CST is 17 hours (Reference 9). Per Reference 9, approximately 660,000 gallons of CST volume is needed for 72 hours of coping time. The new CST being evaluated by Callaway Plant would have a minimum creditable volume of at least 670,000 gallons.

A backup to the Phase 2 equipment will be provided from the regional response centers and will allow all Phase 2 functions for coping to continue to be utilized in Phase 3, even when there is a failure of the onsite Phase 2 equipment during the indefinite coping period.

Strategy	Safety Function
Large Debris Removal	Safety Function Support
Mobile Water Purification System	Core Cooling, RCS Inventory & Reactivity
Mobile Boration Unit	Core Cooling, RCS Inventory & Reactivity
Backup to Phase 2 Equipment	All
Large Generator	Core Cooling, SFP Cooling
Align UHS to ESW	Core Cooling
Large Fuel Truck	Safety Function Support

Details:

Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 3	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FLEX Support Guidelines (FSGs) will be developed to support the Phase 3 strategies described for Core Cooling and Heat Removal.
Identify modifications	*List modifications* Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. SG Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. AFW Flow indication (downstream of connection points) – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 3. SG Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 4. CST Level – Normal Power Source: Non-Class 1E, a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) 5. RCS Hot Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 6. RCS Cold Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 7. Core Exit Thermocouple – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 8. RCS Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 9. Pressurizer Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)** The pathways and areas utilized for Phase 2 deployment and staging will also be used for Phase 3. The	

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
exception is the diesel-driven pump to restore flow to ESW, and along with a generator that will restart the CCW and RHR pumps, will restore decay heat removal through the RHR system. Booster pumps would feed an approximately 5,000 gpm diesel-driven pump that will discharge into the piping common to both ESW trains in the ESW Pumphouse. A connection point will be created on line 009-HBC-30" for this function. The PWR Portable Equipment Phase 3 section for Safety Functions Support provides more details regarding the generator and repowering the bus.		
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*
Large debris removal equipment will be the first priority. While the Phase 2 FLEX paths will be cleared by onsite debris removal equipment, the RRC could provide debris removal equipment capable of clearing other paths possibly blocked by larger debris.	N/A	There are no connection points for this strategy. All equipment will be provided by offsite resources.
A backup to the Phase 2 equipment will be provided from the regional response centers and will allow all Phase 2 functions for coping to continue to be utilized in Phase 3, even when there is a failure of the onsite Phase 2 equipment during the indefinite coping period.	Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.	This information is provided in the section for Phase 2.
A mobile water purification system would enable water from the UHS Retention Pond or other sources to be purified. This unit would process the water source and discharge improved quality water which could be used to makeup the CST or other components that require non-borated water. This unit would have an internal pump and be	Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.	The discharge connections will be identical to the ones used for Phase 2. The protection of those connection points is described in the section for Phase 2.

Maintain Core Cooling & Heat Removal		
PWR Portable Equipment Phase 3		
locally powered.		
The alternate essential service water system employs trailer mounted, diesel-driven pumps taking water from the UHS Retention Pond. Booster pumps would feed an approximately 5,000 gpm diesel-driven pump that will discharge into the piping common to both ESW trains in the ESW pumphouse. A connection point will be created on line 009-HBC-30” for this function. The generator will repower the CCW and RHR pumps to complete this strategy to provide cooling.	A connection point on piping common to both ESW trains (009-HBC-30”) in the ESW Pumphouse will be modified to create a connection point.	The connection will be in the ESW Pumphouse which is seismically qualified and missile protected. Access is available directly into the ESW pumphouse.

Notes:

Core cooling strategies are provided for conditions where steam generators are available or where steam generators are not available but a sufficient RCS vent has been established to support core cooling. This assumption is per the guidance of NEI 12-06 FAQ 2012-19. Other configurations are not considered as these occur for short durations that are exempted per NEI 12-06 Table D.

Maintain RCS Inventory Control

Determine Baseline coping capability with installed coping[3] 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 RCS inventory control. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time.

This section addresses RCS inventory control and subcriticality issues for conditions where steam generators are available. RCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the core cooling section of this report.

The Phase 1 activities involve the plant cooldown, passive injection of the accumulators, and isolation of the accumulators before full depletion to prevent nitrogen ingestion into the RCS. The method for isolating the accumulators has not been finalized. A future action is required to resolve this issue (Open Item OI6). Natural circulation is maintained by ensuring adequate RCS inventory.

Reference 5 currently indicates that the site will not require RCS makeup to compensate for RCP seal leakage during the 24 hour coping period. Callaway Plant will be installing low-leakage RCP seals that will reduce the potential seal leakage to less than or equal to 1 gpm per RCP (Reference 9). This installation will significantly extend the time before any RCS makeup may be required.

The assumptions and/or conditions that support WCAP-17601 (Reference 8) are valid for Callaway Plant. Utilizing WCAP-17601 methodology (Reference 8), Reference 9 documents the results of the calculation that investigates limiting plant-specific scenarios for RCS inventory control, shutdown margin, and Mode 5/Mode 6 boric acid precipitation control with respect to the guidelines set forth in NEI 12-06 (Reference 2). This calculation assumes the complete installation of the low-leakage RCP seals (SHIELD®) at Callaway Plant.

RCS inventory control is not a significant concern for the ELAP scenario due to the installation of the low-leakage RCP seals. As indicated below, a High Pressure Electric RCS Pump would be required after approximately 45 hours to ensure that single-phase or two-phase natural circulation or is maintained (Reference 9). Also included below is the time when the collapsed liquid level for the RCS volume would begin to drop below the top of the active fuel.

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

Maintain RCS Inventory Control

Flow Condition	Time when FLEX Pump is Needed (hr)
Single Phase Natural Circulation	45.1
Two Phase Natural Circulation	>72
Core Uncovery (Reflux Cooling)	>72

Details:

Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* ECA-0.0 for Loss of All AC Power
Identify modifications	*List modifications* Installation of low-leakage RCP seals
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Core Exit Thermocouple – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. RCS Hot Leg Temperature (if CETs not available)– Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 3. RCS Cold Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 4. RCS Wide Range Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 5. RCS Passive Injection Level Normal Power Source: Non-Class 1E, a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) 6. Pressurizer Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 7. Reactor Vessel Level Indicating System (Backup to Pressurizer Level) – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 8. Neutron Flux – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 9. RWST level – Normal Power Source: Class 1E; Long Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Maintain RCS Inventory Control
Notes: None

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 RCS inventory control. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time. This section addresses RCS inventory control and subcriticality issues for conditions where steam generators are available. RCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the core cooling section of this report. The Phase 2 activities for RCS inventory control involve aligning the High Pressure Electric RCS Pump to provide borated coolant for RCS makeup and to maintain the reactor subcritical. To ensure that the core is maintained subcritical, borated injection to the RCS is provided from the high concentration boric acid tanks via a motor-driven pump stored and staged in the Auxiliary Building. This injection also compensates for RCS leakage and contraction, enabling refill of the RCS and eventually establishing level in the pressurizer. The High Pressure Electric RCS Pump will be staged near the boric acid tanks and will discharge to the connections shown on the alignments provided in Figure A3-6 through Figure A3-9. The proposed hose routing for the primary and secondary connections and the associated equipment are shown in Figure A3-10 through Figure A3-13. The primary connection will be a high-pressure quick-disconnect fitting on a fabricated manifold permanently attached to the 4” blind flange on line 080-BCB-4”, in the A piping penetration room, Room 1323. The secondary connection will be a high-pressure quick-disconnect fitting on a fabricated manifold permanently attached to the 4” blind flange on line 079-BCB-4” in the BIT Room 1126.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FLEX Support Guidelines (FSGs) will be developed to support the Phase 2 strategies described for RCS inventory control.
Identify modifications	*List modifications* A short run of piping containing two manual isolation valves will be fabricated and installed on the existing blind flange in the A piping penetration room, Room 1323. A similar piping section will be fabricated to provide the connections in the BIT Room. The proposed design has two Class 2 isolation valves for each connection point as part of this manifold for a total of three valves (one valve is common to both connections). The piping will be

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 2:	
	seismically qualified and supported. The primary makeup source will be the Boric Acid Tanks (BATs) which are seismically qualified and protected from a high wind/missile hazard. A NPT to Storz adaptor will be added to both A and B tank drain valves (BGV0503 and BGV0511). The secondary makeup source will be the RWST, which is seismically qualified but not missile protected. The RWST is being evaluated for missile protection to credit its use in the RCS inventory control and subcriticality strategies (Open Item OI1). A tee will be installed in the residual heat removal (RHR) pump miniflow line downstream of the flow restricting orifice with two manual isolation valves. This piping will be seismically supported, double isolated, and terminated with a Storz connection. This allows for suction to be taken from the RWST in the Auxiliary Building. Permanent intermediate piping will be run from the RHR Pump room to the general floor area on the 1974' elevation. Permanent electrical conduit will be routed from the Tendon Gallery access hatch (2000' elevation) to the Tendon Gallery access door to the Auxiliary Building (1978' elevation). This conduit will be seismically supported and terminated at each end with a commonly available generator outlet. The connection point at the Tendon Gallery access hatch will be located next to the hatch and will require a penetration in order to be accessible from outside. Permanent intermediate piping will be run about 36 ft. from the 1974' elevation up to the 2000' elevation on the Plant East Wall of the A BAT Room 1117. The piping will be run through the Plant East Wall of the A BAT Room on the 2000' elevation and into Corridor Number 4.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Core Exit Thermocouple – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. RCS Hot Leg Temperature (if CETs not available)– Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 3. RCS Cold Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 4. RCS Wide Range Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 2:	
	5. RCS Passive Injection Level Normal Power Source: Non-Class 1E, a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) 6. Pressurizer Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 7. Reactor Vessel Level Indicating System (Backup to Pressurizer Level) – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 8. Neutron Flux – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 9. RWST level – Normal Power Source: Class 1E; Long Term Power Source: Temporary DG 10. BAT Level – Normal Power Source: Class 1E; Long Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Storage/Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List how equipment is protected or schedule to protect* Equipment for RCS Inventory Control will be stored in the Auxiliary Building, which is seismically qualified. **Generator Only:** The primary and alternate storage locations will be designed or evaluated equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures*. Large portable FLEX equipment will be secured as appropriate during SSE and will be protected from seismic interactions with other components. No components will be stacked or at a raised elevation as to cause interference with the deployment of any of the FLEX equipment.
Flooding Note: if stored below current flood level, then ensure procedures exist to move	*List how equipment is protected or schedule to protect* The Callaway Plant is currently considered a “dry” site. It is not necessary

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 2:	
equipment prior to exceeding flood level.	to protect Phase 2 equipment from flooding.
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* Portable equipment to implement FLEX strategies will be maintained in the Auxiliary Building, which is protected from high winds. **Generator Only:** Portable equipment to implement FLEX strategies will be maintained in storage locations that are protected from high winds; i.e., hardened structures design and built to ASCE 7-10.
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect* The Auxiliary Building is climate controlled. **Generator Only:** Portable equipment required to implement FLEX strategies will be maintained in storage locations that will be climate controlled.
High Temperatures	*List how equipment is protected or schedule to protect* All of the storage locations will be evaluated for high temperature effects, and ventilation will be provided as required to assure no adverse effects on the FLEX equipment. Active cooling systems are not required as normal ventilation will be utilized.

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*
Primary Connection To provide RCS inventory control and boration through the	Primary Connection A short run of piping containing two isolation valves will be	Primary Connection The primary connection point is located in the Auxiliary Building,

<table>
<tr><th colspan="3">Maintain RCS Inventory Control</th></tr>
<tr><th colspan="3">PWR Portable Equipment Phase 2:</th></tr>
<tr>
<td>primary connection, suction will be taken from either of the BATs. A suction hose of about 30 ft. will connect the High Pressure Electric RCS Pump to the BAT drain line (BGV0503 or BGV0511). Approximately 30 ft. of discharge hose will connect the High Pressure Electric RCS Pump to a run of about 36 ft. of hard piping that will be run from the 1974’ elevation up to the 2000’ elevation on the Plant East wall of the A BAT Room 1117. The piping will be run through the Plant East wall of the A BAT Room on the 2000’ elevation and into Corridor Number 4. From the corridor a 100 ft. hose will run into the piping penetration Room 1323 and connected to the high-pressure quick-connect fitting. Figure A3-10 shows the routing for this connection.

Suction will be taken from BAT A to reduce the overall hose length; however, a NPT to Storz adaptor will be added to both the A and B tank drain valves (BGV0503 and BGV0511). The rooms are open to each other above the 1980’ elevation; if necessary, the B tank is accessible by either placing a hose through one of the existing penetrations alongside existing piping or by routing the hose over the wall.

The High Pressure Electric RCS Pump, similar to a pressure</td>
<td>fabricated and installed on the existing blind flange in the A piping penetration room, Room 1323. This piping will be seismically qualified and supported.

The initial makeup source will be the Boric Acid Tanks (BATs). A NPT to Storz adaptor will be added to both A and B tank drain valves (BGV0503 and BGV0511).

The secondary makeup source (to be used once the BATs are depleted) will be the refueling water storage tank (RWST), which is seismically qualified but not missile protected. The RWST is being evaluated for missile protection to credit its use in RCS inventory control and subcriticality strategies (Open Item OI1).

A tee will be installed in the residual heat removal (RHR) pump miniflow line downstream of the flow restricting orifice with two manual isolation valves. This piping will be seismically supported, double isolated, and terminated with a Storz connection. This allows for suction to be taken from the RWST in the Auxiliary Building.

Permanent intermediate piping will be run from the RHR Pump room to the general floor area on the 1974’ elevation.

Permanent electrical conduit will be routed from the Tendon Gallery</td>
<td>which is seismically qualified and missile protected. Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard.

The suction connections to the BATs are located in the Auxiliary Building which is seismically qualified and missile protected. Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard.</td>
</tr>
</table>

<table>
<tr><th colspan="3">Maintain RCS Inventory Control</th></tr>
<tr><th colspan="3">PWR Portable Equipment Phase 2:</th></tr>
<tr><td>washer, will be staged at the base of the new piping run and will provide makeup to the RCS. The BAT will provide sufficient NPSH for the low flow rate required. The pump will be powered by a small generator that will be staged in a suitable location and the power will be run to the BAT Room 1117.

When the BATs deplete, the High Pressure Electric RCS Pump suction will be aligned to the RWST through a new intermediate pipe that will be connected to the RHR pump miniflow with a short spool piece (Figure A3-14).</td><td>access hatch (2000’ elevation) to the Tendon Gallery access door to the Auxiliary Building (1978’ elevation). This conduit will be seismically supported and terminated at each end with a commonly available generator outlet. The connection point at the Tendon Gallery access hatch will be located next to the hatch and will require a penetration in order to be accessible from outside.

Permanent intermediate piping will be run about 36 ft. from the 1974’ elevation up to the 2000’ elevation on the Plant East Wall of the A BAT Room 1117. The piping will be run through the Plant East Wall of the A BAT Room on the 2000’ elevation and into Corridor Number 4.</td><td></td></tr>
<tr><td><u>Secondary Connection</u>

To provide RCS inventory control and boration through the secondary connection, suction will be taken from either BAT. Due to the proximity to the BIT Room, no hard piping is required for this connection.

Suction will be taken from BAT A to reduce the hose piping length; however, a NPT to Storz adaptor will be added to both the A and B tank drain valves (BGV0503 and BGV0511). The rooms are open to each other above the 1980’ elevation; if necessary, the B tank is accessible by either placing a hose through one of the existing</td><td><u>Secondary Connection</u>

A short run of piping containing two manual isolation valves will be fabricated to provide the connections in the BIT Room. The piping will be seismically qualified and supported.

The initial makeup source will be the Boric Acid Tanks (BATs). A NPT to Storz adaptor will be added to both A and B tank drain valves (BGV0503 and BGV0511).

The secondary makeup source (to be used once the BATs are depleted) will be the RWST, which is seismically qualified, but not missile protected. The RWST is being evaluated for missile</td><td><u>Secondary Connection</u>

The secondary connection point is located in the Auxiliary Building, which is seismically qualified and missile protected. Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard.

The suction connections to the BATs are located in the Auxiliary Building which is seismically qualified and missile protected. Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard.</td></tr>
</table>

Maintain RCS Inventory Control		
PWR Portable Equipment Phase 2:		
penetrations alongside existing piping or by routing the hose over the wall. The suction hose will be ran approximately 30 ft. to the High Pressure Electric RCS Pump. The discharge hose will be approximately 75 ft. to the connection point in the BIT Room. Figure A3-11 shows the routing for this connection. The High Pressure Electric RCS Pump, similar to a pressure washer, will be staged at the base of the new piping run and will provide makeup to the RCS. The BAT will provide sufficient NPSH for the low flow rate required. The High Pressure Electric RCS Pump will be powered by a small generator staged in a suitable location and the power will be run to the BAT Room 1117. When the BATs deplete, the High Pressure Electric RCS Pump suction will be aligned to the RWST through a new intermediate pipe that will be connected to the RHR pump miniflow with a short spool piece (Figure A3-15).	protection to credit its use in the RCS inventory control and subcriticality strategies (Open Item OI1). A tee will be installed in the residual heat removal (RHR) pump miniflow line downstream of the flow restricting orifice with two manual isolation valves. This piping will be seismically supported, double isolated, and terminated with a Storz connection. This allows for suction to be taken from the RWST in the Auxiliary Building. Permanent intermediate piping will be run from the RHR Pump room to the general floor area on the 1974' elevation. Permanent electrical conduit will be routed from the Tendon Gallery access hatch (2000' elevation) to the Tendon Gallery access door to the Auxiliary Building (1978' elevation). This conduit will be seismically supported and terminated at each end with a commonly available generator outlet. The connection point at the Tendon Gallery access hatch will be located next to the hatch and will require a penetration in order to be accessible from outside.	
Notes: None		

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 RCS inventory control. Identify methods (Low Leak RCP Seals and/or borated high pressure RCS makeup) and strategy(ies) utilized to achieve this coping time. This section addresses RCS inventory control and subcriticality issues for conditions where steam generators are available. RCS inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the core cooling section of this report. Reactor coolant inventory level and subcriticality is adequately maintained via the Phase 2 strategy; however, borated water sources are limited. Phase 3 deployment of a unit capable of generating pure water and then borating the pure water can further extend coping times with respect to RCS inventory management. A mobile boration system would enable borated water to be produced using the non-borated water sources that are available at Callaway Plant. This unit would combine the purified non-borated water from the mobile water purification system and boron with a mixing mechanism to discharge a desired concentration of borated water which would be used to makeup to the RWST.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FSGs will be developed to support the Phase 3 RCS inventory control strategies.
Identify modifications	*List modifications* Each of the Phase 3 strategies will utilize common connections as described for the Phase 2 connections to prevent any compatibility issues with the offsite equipment.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Core Exit Thermocouple – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. RCS Hot Leg Temperature (if CETs not available)– Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 3. RCS Cold Leg Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 4. RCS Wide Range Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 5. RCS Passive Injection Level Normal Power Source: Non-Class 1E, a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4)

Maintain RCS Inventory Control	
PWR Portable Equipment Phase 3:	
	6. Pressurizer Level – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 7. Reactor Vessel Level Indicating System (Backup to Pressurizer Level) – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 8. Neutron Flux – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 9. RWST level – Normal Power Source: Class 1E; Long Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

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*
Reactor coolant inventory level and subcriticality is adequately maintained via the Phase 2 strategy; however, borated sources are limited. Phase 3 deployment of a unit capable of generating pure water and then borating the pure water can further extend coping times with respect to RCS inventory management.	The discharge of the mobile boration unit will be directed to refill the RWST. A connection on the drain line will be modified with a check valve to allow makeup to the tank.	The connection point will be in the RWST valve house, which is seismically qualified and will be modified to be protected from a high wind/missile hazard. Access is available directly into the RWST valve house.

Maintain RCS Inventory Control
PWR Portable Equipment Phase 3:
Notes: This strategy will be confirmed once equipment and equipment specifications coming from the RRC are finalized.

Maintain Containment	
Determine Baseline coping capability with installed coping[4] 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. Containment pressure and temperature are expected to increase during an ELAP due to loss of containment cooling and RCS leakage into containment. With the installation of the low leakage RCP shutdown seals at Callaway Plant, the pressure and temperature are not expected to rise to levels which could challenge the containment structure. Containment evaluation, using GOTHIC, will be performed based on the boundary conditions described in Section 2 of NEI 12-06 (Reference 2) (Open Item OI2). Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed. Actions are provided in ECA-0.0 (Reference 6.a) to support isolation of containment without available ac power. This procedure should be used to provide containment isolation in support of FLEX strategies to ensure containment integrity is maintained during Phase 1.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* N/A
Identify modifications	*List modifications* N/A
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Containment Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. Containment Temperature – Normal Power Source: Class 1E; Long-

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

Maintain Containment	
	Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Notes: None	

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. Containment pressure and temperature are expected to increase during an ELAP due to loss of containment cooling and RCS leakage into containment. With the installation of the low leakage RCP shutdown seals at Callaway Plant, the pressure and temperature are not expected to rise to levels which could challenge the containment structure. Containment evaluation, using GOTHIC, will be performed based on the boundary conditions described in Section 2 of NEI 12-06 (Reference 2) (Open Item OI2). Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed. Actions are provided in ECA-0.0 (Reference 6.a) to support isolation of containment without available ac power. This procedure should be used to provide containment isolation in support of FLEX strategies to ensure containment integrity is maintained during Phase 2.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Analysis will demonstrate that containment spray is not required.
Identify modifications	*List modifications* N/A
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Containment Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. Containment Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Storage/Protection of Equipment:	

Maintain Containment		
Describe storage / protection plan or schedule to determine storage requirements		
Seismic	*List how equipment is protected or schedule to protect* N/A	
Flooding	*List how equipment is protected or schedule to protect* N/A	
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* N/A	
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect* N/A	
High Temperatures	*List how equipment is protected or schedule to protect* N/A	
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*
N/A	N/A	N/A
Notes: None		

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. Containment pressure and temperature are expected to increase during an ELAP due to loss of containment cooling and RCS leakage into containment. With the installation of the low leakage RCP shutdown seals at Callaway Plant, the pressure and temperature are not expected to rise to levels which could challenge the containment structure. Containment evaluation, using GOTHIC, will be performed based on the boundary conditions described in Section 2 of NEI 12-06 (Reference 2) (Open Item OI2). Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed. Actions are provided in ECA-0.0 (Reference 6.a) to support isolation of containment without available ac power. This procedure should be used to provide containment isolation in support of FLEX strategies to ensure containment integrity is maintained during Phase 3.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* N/A
Identify modifications	*List modifications* N/A
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1. Containment Pressure – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG 2. Containment Temperature – Normal Power Source: Class 1E; Long-Term Power Source: Temporary DG Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Maintain Containment		
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*
N/A	N/A	N/A
Notes: None		

Maintain Spent Fuel Pool Cooling

Determine Baseline coping capability with installed coping[5] 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.

Operating, Pre-fuel Transfer, or Post-Fuel Transfer

In Reference 9, results of calculations were documented to quantify the amount of water that would be sloshed out of the SFP during a seismic event. For the Callaway Plant SFP, for a North/South seismic event, it was calculated that 176.15 ft^3 of water will be sloshed out. This corresponds to a water level loss of 0.12 ft. For an East/West seismic event, it was determined that 214.13 ft^3 of water will be sloshed out of the SFP. This corresponds to a water level loss of 0.15 ft. These cases were analyzed assuming a critical damping value of 1.0%. This level of critical damping does not take into account any of the submerged structures. Using a more realistic critical damping value of 2.0%, as opposed to 1.0% damping, results in a loss in pool level of 0.07 ft for a North/South seismic event and 0.06 ft for an East/West seismic event.

Assuming no reduction in coolant inventory other than due to sloshing, a time to boil of 8.73 hours for a seismic event in either the North/South or East/West direction was calculated assuming the most conservative critical damping and an initial bulk temperature in the pool of 100°F. This value was calculated using the normal operating decay heat load.

Spent Fuel Pool cooling is not challenged early in the event (Reference 9); however, access to the SFP area as part of Phase 2 response could be challenged due to environmental conditions local to the pool. Consequently, action is required to establish ventilation in this area and establish any equipment local to the spent fuel pool as required to accomplish coping strategies. For these reasons, most of the actions required for Phase 2 occur outside the Fuel Building. The SFP vent will be established by opening the large roll-up door on the Plant East side of the building. Callaway Plant is scheduled to install the Westinghouse Spent Fuel Pool Instrumentation System which utilizes guided wave radar sensors. This system will provide operators with the ability to monitor the SFP level following an external hazard.

Fuel in Transfer or Full Core Off-Load

In Reference 9, results of calculations were documented to quantify the amount of water that would be sloshed out of the SFP during a seismic event. For the Callaway Plant SFP, for a North/South seismic event,

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

it was calculated that 176.15 ft^3 of water will be sloshed out. This corresponds to a water level loss of 0.12 ft. For an East/West seismic event, it was determined that 214.13 ft^3 of water will be sloshed out of the SFP. This corresponds to a water level loss of 0.15 ft. These cases were analyzed assuming a critical damping value of 1.0%. This level of critical damping does not take into account any of the submerged structures. Using a more realistic critical damping value of 2.0%, as opposed to 1.0% damping, results in a loss in pool level of 0.07 ft for a North/South seismic event and 0.06 ft for an East/West seismic event. Assuming no reduction in coolant inventory other than due to sloshing, a time to boil of 2.34 hours for a seismic event in either the North/South or East/West direction was calculated assuming the maximum credible heat load and an initial temperature in the pool of 140°F. Spent Fuel Pool cooling is not challenged early in the event (Reference 9); however, access to the SFP area as part of Phase 2 response could be challenged due to environmental conditions local to the pool. Consequently, action is required to establish ventilation in this area and establish any equipment local to the spent fuel pool as required to accomplish coping strategies. For these reasons, most of the actions required for Phase 2 occur outside the Fuel Building. The SFP vent will be established by opening the large roll-up door on the Plant East side of the building. Callaway Plant is scheduled to install the Westinghouse Spent Fuel Pool Instrumentation System which utilizes guided wave radar sensors. This system will provide operators with the ability to monitor the SFP level following an external hazard.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Callaway Plant is scheduled to install the Westinghouse Spent Fuel Pool Level Instrumentation System, which utilizes guided wave radar sensors. This system will provide operators with the ability to monitor the SFP level following a BDBEE scenario as outlined in NEI 12-06 (Reference 2). FSGs will be developed to dictate these actions during a FLEX event.
Identify modifications	*List modifications* N/A
Key SFP Parameter	*List instrumentation credited or recovered for this coping evaluation.* 1. SFP Level – Callaway Plant will be installing the Westinghouse Wave Guided Radar level measurement system 2. SFP Temperature – Normal Power Source: Non-Class 1E; a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) Callaway Plant will develop procedures to read this instrumentation

	locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Notes:

Analysis will need to be performed to prove acceptable SFP vent capabilities with the roll-up door opened.

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. **Operating, Pre-Fuel Transfer, or Post-Fuel Transfer** Phase 2 strategies will provide makeup to the SFP through the use of the SFP Pump. For a normal decay heat load, the inventory in the pool is lost to boiling and the SFP Pump will provide a required makeup of about 57 gpm (Reference 9). **Fuel in Transfer of Full Core Off-Load** Phase 2 strategies will provide makeup to the SFP through the use of the SFP Pump. For a maximum decay heat load, the inventory in the pool is lost to boiling and the SFP Pump will provide makeup of about 133 gpm (Reference 9). **Makeup for Boil-Off Applicable to all Conditions** The primary connection point will be a Storz connector on the exterior of the Fuel Building near the Plant North side of the roll-up door on the Plant East side of the Fuel Building. Hard pipe will be installed from this connection up to the pool level so that the pipe terminates and empties into the pool. The secondary connection point will be a Storz connector on the exterior of the Fuel Building near the Plant North side of the roll-up door on the Plant East side of the Fuel Building. Hard pipe will be installed from this connection up to the 2026' elevation so that a flexible spool piece can connect this intermediate pipe to a pool drain connection. A third connection point will be a Storz connector on the exterior of the Fuel Building near the Plant South side of the roll-up door on the Plant East side of the Fuel Building. Hard pipe will be installed from this connection up to the pool level so that the pipe terminates with a monitor nozzle to spray into the pool for spray function. The Fuel Building is protected from all applicable hazards; piping for these connections within the Fuel Building will be seismically qualified and protected. The exterior connection points will need to be missile protected or the connection points will need to be located indoors as an alternative if missile protection is not possible.
Details:

Maintain Spent Fuel Pool Cooling	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FSGs will be developed to support the Phase 2 Spent Fuel Pool Cooling strategies.
Identify modifications	*Confirm that procedure/guidance exists or will be developed to support implementation.* A reducing tee and isolation valve will be installed into the RWST drain line. This tee will have two Class 2 isolation valves and terminate in a Storz connection for suction. The RWST is seismically qualified but not missile protected. The RWST is being evaluated for missile protection to credit its use in the SFP cooling strategies (Open Item OI1). To run flexible suction hose from the RWST to Staging Area 2, the fence will need to have a provision for placing the hose through it. Options include a “mini gate,” a sleeve, or bolt cutters for the operators to cut through the fence. For the primary connection, hard piping will be run through the Plant East wall of the Fuel Building adjacent to Column F5/FA on the 2000’ elevation and up through a floor penetration on the 2047’-6” elevation. The pipe will be routed up and over Column F3/FA and will allow for discharge coolant to pour into the pool next to Column F3/FA. A Storz connection will be provided on the exterior of the Fuel Building. For the secondary connection, hard piping will be run through the Plant East wall of the Fuel Building adjacent to Column F5/FA on the 2000’ elevation and up to the 2026 ft. elevation. The piping will run into Room 6202. The drain connection downstream of ECV0001 will be modified with an isolation valve and a Storz connector. For the spray function, hard piping will be run through the Plant East wall of the Fuel Building adjacent to Column F6/FA on the 2000’ elevation and up to the 2047’-6” elevation. The pipe will be routed up and over to Column F2/FA, and terminate in a monitor nozzle that will perform the spray function.

Maintain Spent Fuel Pool Cooling	
Key SFP Parameter	*List instrumentation credited or recovered for this coping evaluation.* 1. SFP Level – Callaway Plant will be installing the Westinghouse Wave Guided Radar level measurement system 2. SFP Temperature – Normal Power Source: Non-Class 1E; a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Storage/Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.
Flooding	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.
High Temperatures	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.

Maintain Spent Fuel Pool Cooling		
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*
Primary Connection For the primary SFP connection, suction will be taken from the RWST through the new connection upstream of BNV0017, and flexible hose will be run to the SFP Pump. The SFP Pump will be located in Staging Area 2, and flexible hose will run to the Storz connector on the Plant East wall of the Fuel Building. Hard piping will penetrate the Fuel Building exterior wall and run up to the 2047'-6" elevation along Column F5/FA and over Column F4/FA to provide makeup into the SFP along Column F3/FA. Figure A3-17 shows the routing for this connection.	Primary Connection A reducing tee and isolation valve will be installed into the RWST drain line. This tee will have two Class 2 isolation valves and terminate in a Storz connection for suction. The RWST is seismically qualified but not missile protected. The RWST is being evaluated for missile protection to credit its use in the SFP cooling strategies (Open Item OI1). In order to run flexible suction hose from the RWST to Staging Area 2, the fence will have a provision for placing the hose through it. Options include a "mini gate," a sleeve, or bolt cutters for the operators to cut through the fence. Hard piping will be run through the Plant East wall of the Fuel Building adjacent to Column F5/FA on the 2000' elevation and up through a floor penetration on the 2047'-6" elevation. The pipe will be routed up and over Column F3/FA and will allow for discharge	Primary Connection The connection point is on the exterior of the Fuel Building, which is seismically qualified and missile protected. There are no sources of debris immediately near the location of the connection point. Debris removal will be required if debris exists in this location. The connection itself will be missile protected. The suction connection point will be in the RWST valve house, which is seismically qualified and will be modified to be protected from a high wind/missile hazard. Access is available directly into the RWST valve house.

Maintain Spent Fuel Pool Cooling		
	coolant to pour into the pool next to Column F3/FA. A Storz connection will be provided on the exterior of the Fuel Building.	
<u>Secondary Connection</u> For the secondary connection, suction will be taken from the RWST through the new connection upstream of BNV0017 and flexible hose will be run to the SFP Pump. The SFP Pump will be located in Staging Area 2, and flexible hose will run to the Storz connector on the Plant East wall of the Fuel Building. Hard piping will penetrate the Fuel Building exterior wall and run up to the 2026' elevation and into Room 6202 where it will terminate with a Storz connector. A short flexible spool piece will connect this pipe to the Storz connector off the SFP drain connection. Figure A3-16 and Figure A3-18 show the routing for this connection.	<u>Secondary Connection</u> A reducing tee and isolation valve will be installed into the RWST drain line. This tee will have two Class 2 isolation valves and terminate in a Storz connection for suction. The RWST is seismically qualified but not missile protected. The RWST is being evaluated for missile protection to credit its use in the SFP cooling strategies (Open Item OI1). In order to run flexible suction hose from the RWST to Staging Area 2, the fence will have a provision for placing the hose through it. Options include a "mini gate," a sleeve, or bolt cutters for the operators to cut through the fence. Hard piping will be run through the Plant East wall of the Fuel Building adjacent to Column F5/FA on the 2000' elevation and up to the 2026 ft. elevation. The piping will run into Room 6202. The drain connection downstream of ECV0001 will need to be modified with an isolation valve and a Storz connector.	<u>Secondary Connection</u> The connection point is on the exterior of the Fuel Building, which is seismically qualified and missile protected. There are no sources of debris immediately near the location of the connection point. Debris removal will be required if debris exists in this location. The connection itself will be missile protected. The connection point will be in the RWST valve house, which is seismically qualified and will be modified to be protected from a high wind/missile hazard. Access is available directly into the RWST valve house.

Maintain Spent Fuel Pool Cooling		
<u>Spray Connection</u> For the spray function connection, suction will be taken from the RWST through the new connection upstream of BNV0017, and flexible hose will be run to the SFP Pump. The SFP Pump will be located in Staging Area 2, and flexible hose will run to the Storz connector on the Plant East wall of the Fuel Building. Hard piping will penetrate the Fuel Building exterior wall, run up to the 2047'-6" elevation along Column F6/FA and over Column F2/FA to provide spray into the SFP. Figure A3-17 shows the routing for this connection.	<u>Spray Connection</u> A reducing tee and isolation valve will be installed into the RWST drain line. This tee will have two Class 2 isolation valves and terminate in a Storz connection for suction. The RWST is seismically qualified but not missile protected. The RWST is being evaluated for missile protection to credit its use in SFP cooling strategies (Open Item OI1). In order to run flexible suction hose from the RWST to Staging Area 2, the fence will have a provision for placing the hose through it. Options include a "mini gate," a sleeve, or bolt cutters for the operators to cut through the fence. Hard piping will be run through the Plant East wall of the Fuel Building adjacent to Column F6/FA on the 2000' elevation and up to the 2047'-6" elevation. The pipe will be routed up and over to Column F2/FA, and terminate in a monitor nozzle that will perform the spray function.	<u>Spray Connection</u> The connection point is on the exterior of the Fuel Building, which is seismically qualified and missile protected. There are no sources of debris immediately near the location of the connection point. Debris removal will be required if debris exists in this location. The connection itself will be missile protected. The connection point will be in the RWST valve house, which is seismically qualified and will be modified to be protected from a high wind/missile hazard. Access is available directly into the RWST valve house.
Notes: None		

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. **Makeup for Boil-Off Applicable to all Conditions** In Phase 2, the spent fuel pool is cooled via continued boil-off and makeup. During Phase 3, a transition will be made to either using a portable SFP cooling system from the RRC or utilizing the fuel pool cooling system. Callaway Plant's preference is to re-energize or provide flow to the ESW system and the pumps for the SFP cooling system (Open Item OI7). Analysis is required to demonstrate that sufficient NPSH will be available to the fuel pool cooling pumps with the SFP in boil-off (Open Item OI3).	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FSGs will be developed for implementation of the Phase 3 FLEX strategies.
Identify modifications	*List modifications* None
Key SFP Parameter	*List instrumentation credited or recovered for this coping evaluation.* 1. SFP Level – Callaway Plant will be installing the Westinghouse Wave Guided Radar level measurement system 2. SFP Temperature – Normal Power Source: Non-Class 1E; a temporary battery will be used to repower the non-Class 1E racks (Open Item OI4) Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Deployment Conceptual Design (Attachment 3 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of Connections**

Maintain Spent Fuel Pool Cooling		
Identify Strategy including how the equipment will be deployed to the point of use.	*Identify modifications*	*Identify how the connection is protected*
SFP cooling system pumps will be repowered using a larger generator from the RRC or a mobile heat exchanger system from the RRC will be used to reestablish SFP cooling (Open Item OI7).	None	The connection points are in the Fuel Building, which is seismically qualified and missile protected. There are no sources of debris immediately near the entry point to the Fuel Building. Debris removal will be required if debris exists in this location.
Notes: None		

Safety Functions Support	
Determine Baseline coping capability with installed coping[6] modifications not including FLEX modifications.	
PWR Installed Equipment Phase 1	
Provide a general description of the coping strategies using installed equipment including station modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times. Callaway Plant Class 1E DC NK battery system provides DC electrical power to Class 1E DC loads and NK instrumentation (Reference 9). The system consists of four batteries (NK11, NK12, NK13, and NK14) separated into two load groups. Each battery has sufficient stored energy to operate all the necessary emergency loads for 8 hours after loss of AC power or charger failure without load shedding (Reference 9). Load shedding will begin 45 minutes after the event and be completed within 15 minutes in accordance with Reference 9. Per Reference 9, battery run time can be extended to 14 hours with the implementation of load shedding. Calculations have been completed by Westinghouse to confirm that the batteries can provide adequate coping during an ELAP (Reference 9). Per Reference 9, strategies are being developed for temporary ventilation. The strategies will include propping open doors.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* A FSG will be developed to incorporate the latest load shedding convention. Deploying Control Room and Battery Room FLEX Ventilation.
Identify modifications	*List modifications* None
Key Parameters	*List instrumentation credited for this coping evaluation phase.* DC bus voltage is required so operators can ensure that the DC bus voltage

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

	remains above 105 volts. The DC Bus voltage parameter is measured using power from the respective battery bank. Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Notes: None	

Safety Functions Support

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 and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.

The primary electrical need during Phase 2 is DC power for critical instrumentation. This will be accomplished in one of two ways. The primary strategy is to repower the battery chargers directly through a dedicated circuit from a portable 480V FLEX generator. The alternate strategy is to backfeed the Class 1E 480V buses through switchgear and selectively power the battery charger circuits.

Two 350 kW/437.5 kVA, 480V FLEX generators will be stored on site, as required for N+1. One will be stored in the primary storage location; the second will be stored in the alternate FLEX storage location (see Figure A3-32). As soon as possible after battery load shedding is completed for Phase 1 but no later than 6 hours after the BDBEE scenario as outlined in NEI 12-06 (Reference 2), one of the two generators will be deployed to the staging area outside the south wall of the diesel generator building or outside the west wall of the control building (see Figure A3-30 and Figure A3-31). The staging paths are shown in Figure A3-32. 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 connected to the battery chargers through the FLEX connection panel mounted in corridor 1301 or to the Class 1E 480V switchgear via a FLEX connection panel mounted on the west wall of the control building. Figure A3-30 and Figure A3-31 show the overview of these connection strategies. Panel 1, as shown in Figure A3-30, is the primary connection location to ensure that a dedicated power connection to the battery chargers is available. Panel 2, as shown in Figure A3-31, provides an alternate connection point to NK battery chargers if the primary connection is unavailable.

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 connection point will include a neutral and a ground conductor. When the system is aligned to accept power from the FLEX generator, it will no longer have a bonded neutral. To ensure proper operation of protective relaying and protection of personnel, the neutral will be bonded to ground at the generator connection panel using the jumper.

The generator connection to the alternate connection point will include a neutral and a ground conductor because the NG bus is a three-phase four-wire system. When the system is aligned to accept power from the FLEX generator, the NG bus will maintain a bonded neutral. The neutral and ground at the FLEX generator will not be bonded in this case.

Panel 1 will be permanently connected via a breaker panel to the battery chargers NK21, NK22, NK23, and NK24. Panel 2 will be permanently connected to Train A switchgear NG01 and Train B switchgear NG02 via spare breaker locations. The modifications will be installed in accordance with all Class 1E requirements, including seismic, to ensure that this equipment is available during a BDBEE scenario as outlined in NEI 12-

Safety Functions Support	
PWR Portable Equipment Phase 2	
06 (Reference 2). **Primary Strategy Alignment:** Prior to energizing the FLEX generator, breakers on newly installed FLEX battery charger breaker panels will be opened. Fused disconnects installed on permanent feeds from the Class 1E switchgear to battery chargers will be opened to prevent backfeed. After the generator is running and the chargers are disconnected from the switchgear, the breakers on the FLEX breaker panel will be reclosed. **Alternate Strategy Alignment:** **Train A:** Prior to energizing the FLEX generators, all breakers will be opened on bus NG01 from breaker 52NG0101 to breaker 52NG0116 (12 breakers), and on bus NG03 from breaker 52NG0301 to breaker 52NG0313 (nine breakers). This will isolate all loads so that the FLEX generator does not fail due to overload. When the generator is running, breakers 52NG0112, 52NG0116, 52NG0103, and 52NG0303 will be reclosed to energize battery chargers NK21 and NK23 (see Figure A3-33). **Train B:** Prior to energizing the FLEX generators, all breakers will be opened on bus NG02 from breaker 52NG0201 to breaker 52NG0216 (10 breakers), and on bus NG04 from breaker 52NG0401 to breaker 52NG0413 (11 breakers). This will isolate all loads so that the FLEX generator does not fail due to overload. When the generator is running, breakers 52NG0212, 52NG0216, 52NG0203, and 52NG0403 will be closed to energize battery chargers NK22 and NK24 (see Figure A3-34). Per Reference 9, strategies are being developed for temporary ventilation and lighting. The strategies will include possibly using small generators to power up fans. Control room lighting will remain powered by the NK batteries and may be augmented with additional portable lighting equipment. Existing plant ventilation, lighting, and communication circuits will not be directly repowered using the 480V FLEX generators.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* A FSG will be developed to incorporate deployment and alignment of the FLEX generators.
Identify modifications	*List modifications* To facilitate FLEX generator connections, a primary and an alternate FLEX connection panel will be installed and permanently connected to the battery chargers and 480V Class 1E switchgear respectively. FLEX connection panels will be installed in corridor 1301 and the west wall of the control building. Permanent sealed penetrations with grommets will be made in the walls of these buildings to provide access to the FLEX panels. To accommodate the required connection, these panels will be

Safety Functions Support	
PWR Portable Equipment Phase 2	
	approximately 45x30x16 inches. Adequate space is available on the walls. A new circuit will be installed in corridor 1301 connecting FLEX panel 1 to the new breaker panel in corridor 3412 (Figure A3-30). This circuit will consist of six 350-kcmil phase-conductors, two 350-kcmil neutral, and one #1 AWG ground conductor. From the breaker panel in room 3412, new circuits to rooms 3404, 3408, 3410, and 3414 will be installed to power the NK battery chargers. These circuits will consist of three #2 AWG phase-conductors, one #2 AWG neutral, and one #8 AWG ground conductor. All circuits will be installed in cable trays. The raceway supports will be seismic-rated in accordance with Callaway Plant standard requirements. New circuits will be installed in switchgear rooms 3301 and 3302 from FLEX connection panel 2 to switchgear for NG01 and NG02. Each circuit will consist of six 350-kcmil phase-conductors, two 350-kcmil neutral, and one #1 AWG ground conductor. Each circuit will be installed in a cable tray. The raceway supports will be seismic-rated in accordance with Callaway Plant standard requirements. All terminations will be made in accordance with the station standard procedures and specifications. The exact routing of the circuits will be completed during the detailed design phase. 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. The general location for a ground test well is shown in Figure A3-30. 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.
Key Parameters	*List instrumentation credited for this coping evaluation phase.* DC bus voltage is required so operators can ensure that the DC bus voltage remains above 105 volts. Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.

Safety Functions Support		
PWR Portable Equipment Phase 2		
Storage/Protection of Equipment : **Describe storage / protection plan or schedule to determine storage requirements**		
Seismic	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.	
Flooding Note: if stored below current flood level, then ensure procedures exist to move equipment prior to exceeding flood level.	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.	
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.	
Snow, Ice, and Extreme Cold	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.	
High Temperatures	*List how equipment is protected or schedule to protect* This information is identical to what is provided for Core Cooling and Heat Removal.	
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*
The primary strategy is to connect the 480V FLEX generator directly	A new sealed penetration will be installed on the south wall of the	The system will be designed as Class 1E since it will be

Safety Functions Support		
PWR Portable Equipment Phase 2		
to a breaker panel that is connected to battery chargers NK21, NK22, NK23, and NK24.	diesel generator building. A new FLEX connection panel will be installed indoors in corridor 1301 to accept the generator cables from the penetration. Permanent cables will be routed to a new breaker panel in room 3412. Permanent cables will be routed from there to each battery charger.	permanently connected to Class 1E equipment. The system will be located in the Auxiliary Building and Control Building, which are seismically qualified and missile protected. Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard.
The alternate strategy is to connect the 480V FLEX generator to a panel that is connected to switchgears NG01 and NG02, which can be used to energize the battery chargers through their normal circuits.	A new sealed penetration will be installed on the west wall of the control building. A new FLEX connection panel will be mounted indoors inside room 3301. Cables will be permanently routed and connected to spare breakers in switchgears NG01 and NG02.	The system will be designed as Class 1E since it will be permanently connected to Class 1E equipment. The system will be located in the Auxiliary Building and Control Building, which are seismically qualified and missile protected. Access is available through the Tendon Gallery which is seismically qualified and protected from a high wind/missile hazard.
Notes: None		

Safety Functions Support

PWR Portable Equipment Phase 3

Provide a general description of the coping strategies using phase 3 equipment including modifications that are proposed to maintain and/or support safety functions. Identify methods and strategy(ies) utilized to achieve coping times.

During Phase 3, the RCS will be cooled down. At that time one RHR and one CCW pump will be required. Note that a diesel-driven pump will be used to provide UHS water to the CCW system. A generator will provide power for the CCW (700 hp) pump, the RHR (500 hp pump), and required 480V loads. A 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 4160V generator is expected to arrive on site between 24 and 72 hours. When the generator and enough personnel are available, one train of the Class 1E 4160V switchgear will be energized.

The FLEX generator will be deployed to the staging area outside the west wall of the control building (see Figure A3-35). A set of FLEX cables will be stored in both the primary and alternate FLEX storage locations to facilitate connecting the generator to the switchgear. Two rack-in backfeed adapters will also be stored in Room 3301.

The FLEX generator cables will be routed into the NB01 switchgear room through a new sealed penetration in the west control building wall. Inside the NB01 switchgear room, the cables will be routed to either the NB01 (primary) or NB02 (alternate) switchgear. The cables will be connected to a portable breaker and racked into a vacated switchgear cubicle. Note that an existing breaker will be racked out of the switchgear to create a vacant slot.

The 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. Note that the test well installed for the 480V FLEX generator will also be used for the 4160V FLEX generator.

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 generator connection box will be placed near the generator and jumper cables installed from the generator terminals to the FLEX connection box.

The generator connection to the primary and alternate connection points will not require a neutral and a ground conductor because the MV 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.

Train A Alignment: Prior to energizing the FLEX generator, all breakers will be opened on bus NB01 from breaker 152NB0101 to breaker 152NB0116 (16 breakers). This will isolate all loads so that the FLEX generator does not fail because of overload. When the generator is running, breakers 152NB0101, 152NB0107, 152NB0109, and 152NB0113 will be closed to energize RHR pump DPEJ01A, CCW pump DPEG01A, and 480V bus NG01 (see Figure A3-36).

Train B Alignment: Prior to energizing the FLEX generator, all breakers will be opened on bus NB02 from

Safety Functions Support	
PWR Portable Equipment Phase 3	
breaker 152NB0201 to breaker 152NB0216 (16 breakers). This will isolate all loads so that the FLEX generator does not fail because of overload. When the generator is running, breakers 152NB0204, 152NB0206, 152NB0209, and 152NB0213 will be closed to energize RHR pump DPEJ01B, CCW pump DPEG01B, and 480V bus NG02 (see Figure A3-37). During Phase 3, Additional 480V loads will be required, specifically motor-operated valves. The required 480V buses can be energized from the FLEX generator. Details of the required loads and the guidelines to energize those loads will be provided in the detailed design phase. The FLEX generator deployment is not time-critical but is expected to be complete by T+72 hours.	
Details:	
Provide a brief description of procedures, strategies, and guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FSGs will be developed to support deployment of the FLEX Generator, aligning NB switchgear to pumps and miscellaneous loads, and restoring normal power to the NK buses.
Identify modifications	*List modifications* To facilitate connection of the generator cables to the Class 1E 4160V switchgear, two new sealed penetrations will be installed in the west wall of the control building. 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	*List instrumentation credited for this coping evaluation phase.* No instrumentation is required to support the Phase 3 electrical coping strategies. Callaway Plant will develop procedures to read this instrumentation locally, where applicable, using a portable instrument, as required by Section 5.3.3 of NEI 12-06.
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**	

Safety Functions Support		
PWR Portable Equipment Phase 3		
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*
The primary strategy is to connect the FLEX generator to switchgear NB01 and energize RHR pump DPEJ01A (500 hp) and CCW pump DPEG01A (700 hp).	A new sealed penetration will be installed in the west wall of the control building to allow pulling the generator cables inside the switchgear rooms.	The connection will be located in the Control Building, which is seismically qualified and missile protected. Access is available through the Auxiliary Building which is seismically qualified and protected from a high wind/missile hazard.
The alternate strategy is to connect the FLEX generator to switchgear NB02 and energize RHR pump DPEJ01B (500 hp) and CCW pump DPEG01B (700 hp).	The same penetration will be used for both strategies	The connection will be located in the Control Building, which is seismically qualified and missile protected. Access is available through the Auxiliary Building which is seismically qualified and protected from a high wind/missile hazard.
Notes: None		

Safety Functions Support		
Non-Borated Coolant Sources		
Source	**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*
Condensate Storage Tank (Figure A3-21) The CST will be the primary source of water volume for Core Cooling and Heat Removal in Modes 1-4. A minimum of 281,000 gallons of volume is available in the non-seismic and not missile protected CST (Reference 9). The CST is normally aligned to the TDAFWP and the TDAFWP is normally aligned to all four SGs without any required valve alignments. Per Section 10.4.9.2.3 of Reference 4, the TDAFWP will automatically start on a loss of offsite power signal. The only delay for feedwater to the SGs is the TDAFWP start time and ramping up to speed. No deployment time or actions are required unless the TDAFWP fails to start. In this case, an operator would procedurally be required to manually start the pump per Step 4 of Reference 6.a. Callaway Plant is evaluating seismically qualifying this tank or installation of a 670,000 gallon seismically qualified and missile protected CST.	1. The tank needs to be seismically qualified and missile protected. Callaway Plant is also evaluating installation of a new seismically qualified and missile protected CST. Makeup Modifications: 1. Installation of isolation valve and Storz connector on blind flange upstream of APV0005 or APV0006 2. The CST valve house will be seismically qualified and confirmed to be missile protected.	The CST valve house will be made seismically qualified and missile protected, which will protect the connections internal to the CST valve house.

Safety Functions Support		
Non-Borated Coolant Sources		
Reactor Makeup Water Storage Tank (Figure A3-22) The RMWST is not seismically qualified and has a minimum volume of 126,000 gallons (Reference 4, Section 9.2.7.2.2). It is located in the Plant Southwest corner of the Powerblock near the RWST. The connection point is located in the Auxiliary Building near the Reactor Makeup Water Transfer Pumps.	1. Spool piece upstream of either Reactor Makeup Water Transfer Pump (in the Auxiliary Building) will be replaced with a tee, isolation valves, and Storz connector 2. An intermediate hard pipe will be installed through Tendon Gallery	This connection will be protected from a seismic or high wind/missile hazard. The tank is not protected from a seismic or high wind/missile hazard. A damage assessment will be performed after the event to determine if this source can be utilized.
Demineralized Water Storage Tank (Figure A3-23) The DWST is not seismically qualified and has a minimum volume of 50,000 gallons (Reference 4, Section 9.2.3.2.2). It is located just Plant North of the CST. The connection point is located on the Plant North side of the tank. A direct connection can be made between the two tanks for makeup, or a Water Transfer Pump could be utilized.	1. A Storz connector is needed downstream of ANV0003	The connection point is downstream of ANV0003 which is on the Plant North side of the tank and is not protected from a seismic or high wind/missile hazard. A damage assessment will be performed after the event to determine if this source can be utilized.
Fire Protection Storage Tanks (Figure A3-24) The FPSTs are not seismically qualified and hold a minimum volume of 260,000 gallons (Reference 9). The connection points are located on the Plant East side of the tanks. The tanks are located Plant South of the power block and have readily available hose connections.	N/A	The connection points are located on the Plant East side of the tanks and are not protected from a seismic or high wind/missile hazard. A damage assessment will be performed after the event to determine if this source can be utilized.

Safety Functions Support		
Non-Borated Coolant Sources		
Demineralized System Clearwell (Figure A3-25) The Demineralized System Clearwell is not seismically qualified and holds a minimum volume of 50,274 gallons (Reference 9). The connection point is located on the Plant North side of the tank. The tank is located Plant Southwest of the Powerblock.	1. A Storz connector is needed to be installed downstream of VAN1054	The connection point is located on the Plant North side of the tank and is not protected from a seismic or high wind/missile hazard. A damage assessment will be performed after the event to determine if this source can be utilized.
Potable Water Tank (Figure A3-26, Figure A3-27) The potable water tank is not seismically qualified and has a minimum volume of 23,000 gallons (Reference 4, Section 9.2.4.2.1). It is located in the Demineralized Potable Water Building. A connection can be made either off the tank drain line downstream of VKD1007 or in the Turbine Building downstream of KDV0004 or at the spool piece upstream of KDV0004. Both connection options are acceptable and a determination will be made in the detailed design.	1. Drain line is being evaluated to allow hose connection with a Storz connector 2. A connection point is being evaluated downstream of KDV0004, this line will have to be modified with a Storz connector 3. If the spool piece upstream of KDV0004 is used as the connection point, the spool will have to be replaced with a tee and the tee must have an isolation valve and a Storz connector	The connection point and the source are in a building that is not protected from seismic or high wind/missile hazard. A damage assessment will be performed after the event to determine if this source can be utilized.
Ultimate Heat Sink The UHS Retention Pond is seismically qualified and protected from a high wind/missile hazard. The minimum volume is 38 acre-ft (Reference 4, Section 9.2.5.3). The UHS Retention Pond will be drafted from via a non-collapsible hose.	N/A	The connection point and source are protected from a seismic event and high wind/missile hazard. A damage assessment will be performed prior to using the UHS Retention Pond.

Safety Functions Support		
Non-Borated Coolant Sources		
Cooling Tower Basin The Cooling Tower Basin is not seismically qualified or protected from a high wind/missile hazard. The Cooling Tower Basin is located Plant South of the Powerblock. Circulating Water may be accessed via manways near the Turbine Building.	1. Manway is being evaluated to allow a quick connection with a hose	The source and piping are not seismically qualified or protected from a high wind/missile hazard. The manways are located near the Turbine Building, which is not protected. Debris may have to be cleared prior to using this connection.
Mobile Bulk Liquid Carrier Water can be delivered to the site using fire equipment from local fire districts	N/A	N/A
Water Treatment Plant Clarifiers The Water Treatment Plant clarifiers are not seismically qualified and have a minimum volume of 13 acre-ft (Reference 4, Section 9.2.5.3). The clarifiers are located Plant West of the Powerblock and can gravity drain to the UHS Retention Pond.	N/A	N/A
Water Treatment Plant Clearwell The Water Treatment Plant clearwell is not seismically qualified and has a minimum volume of 451,214 acre-ft (Reference 9). The clearwell is located Plant West of the Powerblock and can gravity drain to the UHS Retention Pond.	N/A	N/A

Safety Functions Support		
Borated Coolant Sources		
Source	**Modifications**	**Protection of Connections**
Refueling Water Storage Tank (Figure A3-28, Figure A3-29) The RWST is located Plant South of the Auxiliary Building and has a volume of 394,000 gallons (Reference 4, Section 6.2.2.1.3). It is seismically qualified but not protected from a high wind/missile hazard. The connection will be upstream of drain valve BNV0017.	1. The RWST is being evaluated for missile protection 2. A reducing tee will be installed upstream of drain valve BNV0017. The tee will have Class 2 isolation valves and a Storz connector. A separate connection on this tee will have a check valve and be used for makeup.	The source and piping are seismically qualified; however, the source is not protected from a high wind/missile hazard. The RWST will be modified to be protected from a high wind/missile hazard.
Boric Acid Tanks The BATs are located on the 1974' elevation of the Auxiliary Building. The tanks combined have a minimum volume of 17,658 gallons and a boron concentration between 7,000 and 7,700 ppm (Reference 4, Section 16.1.2.6). The BATs are seismically qualified and protected from a high wind/missile hazard.	1. NPT to Storz adaptors will be installed to both A and B BAT drain valves (BGV0503 and BGV0511).	The source and piping are seismically qualified and protected from a high wind/missile hazard.

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
a) Two (2) FLEX Core Cooling Pumps	X					365 gpm 906 ft. TDH (Reference 9)	Will follow EPRI template requirements
b) Two (2) High Pressure Electric RCS Pumps	X					10 gpm 3629 ft. TDH (Reference 9)	Will follow EPRI template requirements
c) Two (2) SFP Pumps			X			250 gpm 117 ft. TDH (Reference 9)	Will follow EPRI template requirements
d) Two (2) Water Transfer Pumps	X		X			365 gpm 213 ft. TDH (Reference 9)	Will follow EPRI template requirements
e) Two (2) 350 kW Generators				X		480V 520A (Reference 9)	Will follow EPRI template requirements

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
f) Pettibone All-Terrain Fork-Lift (or Similar)					X		Will follow EPRI template requirements
g) Pickup Truck	X		X		X		Will follow EPRI template requirements
h) Fuel Tanker	X		X				Will follow EPRI template requirements

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
FLEX Core Cooling Pump	X					365 gpm 906 ft. TDH (Reference 9)	
HP Electrical RCS Backup Pump	X					10 gpm 3629 ft. TDH (Reference 9)	
SFP Backup Pump			X			250 gpm 117 ft. TDH (Reference 9)	
Water Transfer Backup Pump	X		X			365 gpm 213 ft. TDH (Reference 9)	
ESW Makeup Pump	X	X				5000 gpm 107 ft. TDH (Reference 9)	
Generator	X	X	X	X			
Large Fuel Truck	X	X	X		X		

PWR Portable Equipment Phase 3							
Use and (potential / flexibility) diverse uses						*Performance Criteria*	*Notes*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility		
Pettibone (or similar)					X		
Pettibone (or similar)					X		
Fire Truck					X		
Mobile Boration Unit	X		X				This item to be developed in detailed design.
Mobile Water Purification System	X	X	X				This item to be developed in detailed design.
Large Diesel Generator	X	X	X				This item to be developed in detailed design.

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Off-site monitoring/sampling • Radiological counting equipment • Radiation protect supplies • Equipment decontamination supplies • Respiratory protection	

Commodities
• Food
    o MRE
    o Microwavable meals
• Potable water	

Fuel Requirements • #2 Diesel Fuel • Diesel fuel bladders	
Heavy Equipment • Transportation equipment (tow vehicle) • Debris clearing equipment (Pettibone or similar)	
Portable Interior Lighting • Flashlights • Headlamps • Batteries	
Portable Exterior Lighting • Light units with diesel generator	

References

1. NRC EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," March 12, 2012. [ADAMS Accession Number ML12054A735]
2. NEI 12-06, Revision 0, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," August 2012.
3. NRC JLD-ISG-2012-01, Revision 0, "Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events," August 2012.
4. Callaway FSAR, Revision OL-19a, "Callaway Final Safety Analysis Report (FSAR)," July 12, 2012.
5. VP 12-0002, "Callaway's Response to INPO IER L1-11-4, Near Term Actions to Address the Effects of an Extended Loss of All AC Power in Response to the Fukushima Daiichi Event," 01/27/2012.
6. Callaway Procedures:
    a. ECA-0.0, Revision 16, "Loss of All AC Power"
    b. "Emergency Coordinator Supplemental Guideline," Revision 011.
7. Callaway Documents:
    a. 8600-X-88100, Revision 63, "Property-site Layout Owner Controlled Area and Surrounding Area."
    b. 8600-X-89633, Revision 15, "Piping & Instrumentation Diagram Firewater Makeup Pump PKC1004 & Stor. Tanks TKC1001A & B Fire Protection System."
    c. 8600-X-89767, Revision 11, "Piping & Instrumentation Diagram Inlet, Storage & Chlorination System Potable Water System."
    d. 8600-X-89783, Revision 8, "Piping & Instrumentation Diagram Clearwell Tank, Activated Carbon Filter Backwash & Service Pumps Demineralized Water System."
    e. A-2301, Revision 5, "Auxiliary and Reactor Building Floor Plan, El. 1974' 0"."
    f. A-2302, Revision 15, "Auxiliary and Reactor Bldg Elevation 2000'-0"."
    g. A-2319, Revision 1, "Fuel Bldg Floor Plan El. 2000'-0" & 2026'-0"."
    h. A-2320, Revision 5, "Fuel Bldg Floor Plan El. 2047'-6" & Roof Plan."
    i. M-22AE02, Revision 29, "Piping and Instrumentation Diagram Feedwater System."
    j. M-22AL01, Revision 37, "Piping & Instrumentation Diagram Auxiliary Feedwater System."
    k. M-22AN01, Revision 40, "Piping & Instrumentation Diagram Demineralized Water Storage and Transfer System."

l. M-22AP01, Revision 28, “Piping and Instrumentation Diagram Condensate Storage and Transfer System.”

m. M-22BG01, Revision 32, “Piping and Instrumentation Diagram Chemical and Volume Control System.”

n. M-22BG03, Revision 55, “Piping and Instrumentation Diagram Chemical and Volume Control System.”

o. M-22BG05, Revision 25, “Piping and Instrumentation Diagram Chemical and Volume Control System.”

p. M-22BL01, Revision 26, “Piping and Instrumentation Diagram Reactor Make-up Water System.”

q. M-22BN01, Revision 25, “Piping and Instrumentation Diagram Borated Refueling Water Storage System.”

r. M-22EC01, Revision 24, “Piping and Instrumentation Diagram Fuel Pool Cooling and Clean-up System.”

s. M-22EM02, Revision 20, “Piping & Instrumentation Diagram High Pressure Coolant Injection System.”

t. M-22KD01, Revision 19, “Piping & Instrumentation Diagram Domestic Water System.”

8. WCAP-17601-P, Revision 1, “Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering and Babcock & Wilcox NSSS Designs,” January 2013.

9. TR-FSE-13-4, “Callaway Plant FLEX Integrated Plan,” February 2013, Revision 0.

10. OG-12-482, Revision 0, “Transmittal of LTR-PCSA-12-78, “Transmittal of PA-PCSA-0965 Core Team PWROG Core Cooling Management Interim Position Paper, PA-PSC-0965,” November 15, 2012.

11. Task Interface Agreement (TIA) 2004-04, “Acceptability of Proceduralized Departures from Technical Specifications (TSs) Requirements at the Surry Power Station,” TAC Nos. MC4331 and MC4332).” September 12, 2006 (Accession No. ML060590273).

Open Items

OI1. The RWST will need to be missile protected to credit its use in FLEX strategies.

OI2. GOTHIC analysis needs to be performed to demonstrate that Containment pressure and temperature remain at acceptable levels and that instrumentation EQ requirements will be maintained.

OI3. An analysis will need to be performed to demonstrate acceptable SFP cooling pump performance with the SFP in boil-off.

OI4. For non-Class 1E instrumentation that will be repowered using a temporary battery, an analysis will need to be performed to determine battery life and frequency of replacing battery.

OI5. The current CST and CST pipe chase are non-seismic. Callaway may pursue the construction of a new seismically qualified and missile protected CST. Current FLEX strategies rely on the existing CST tank. Future evaluation is required to determine the impact on FLEX strategies should the new CST be constructed.

OI6. Method for isolating accumulators during RCS inventory control has not been finalized.

OI7. The method for repowering the SFP cooling pumps has not been finalized.

Acronyms

ac	alternating coolant
ACS	alternate coolant source
AFS	Auxiliary Feedwater System
AFW	Auxiliary Feedwater
ASCE	American Society of Civil Engineers
BAT	Boric Acid Tank
BDBEE	beyond-design-basis external events
BIT	Boron Injection Tank
CCW	component cooling water
CFR	Code of Federal Regulations
CST	Condensate Storage Tank
DWST	Demineralized Water Storage Tank
EFW	Emergency Feedwater
ELAP	extended loss of ac power
EOP	Emergency Operating Procedure
EPRI	Electric Power Research Institute
EQ	Environmental Qualifications
ERO	emergency response organization
ESW	Essential Service Water
FPST	Fire Protection Storage Tank
FSAR	Final Safety Analysis Report
IER	Industry Event Report
INPO	Institute of Nuclear Power Operations
ISG	Interim Staff Guidance
LOOP	loss of off-site power
LUHS	loss of ultimate heat sink
MDAFWP	Motor Driven Auxiliary Feedwater Pump
MSL	mean sea level
NEI	Nuclear Energy Institute
NPSH	net positive suction head
NRC	Nuclear Regulatory Commission
NSAFWP	Non-safety Auxiliary Feedwater Pump
NSSS	nuclear steam supply system
OBE	operating basis earthquake
PA	protected area
PMF	probable maximum flood
PMP	probable maximum precipitation
PWR	pressurized water reactor
PWROG	Pressurized Water Reactor Owners Group
PWST	Potable Water Storage Tank
RCP	Reactor Coolant Pump
RCS	Reactor Coolant System
RHR	residual heat removal
RMWST	Reactor Makeup Water Storage Tank
RRC	Regional Response Center
RWST	Refueling Water Storage Tank

SAFER	Strategic Alliance for FLEX Emergency Response
SBO	station blackout
SFP	Spent Fuel Pool
SG	steam generator
SSE	safe shutdown earthquake
TDAFWP	Turbine Driven Auxiliary Feedwater Pump
UBC	Uniform Building Code
UHS	Ultimate Heat Sink

Attachment 1A

Sequence of Events Timeline

The sequence of events timeline for Callaway Plant Modes 1-4 FLEX strategies is provided in the tables below. Elapsed time is the time following the occurrence of the BDBEE scenario as outlined in NEI 12-06 (Reference 2).

Table A1-1: Actions Related to Extension of Phase 1 Coping on Installed Plant Equipment

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
0	N/A	Event Starts	N/A	N/A	Plant at 100% Power
0	N/A	Perform SBO Coping Action	N/A	N/A	SBO actions are proceduralized SBO Procedures ECA 0.0
1	0.75	Declare ELAP	Y	0.75	**Time sensitive** – required to allow taking actions which place the plant SSCs outside License Basis alignments
2	0.75	Control Room Lighting	Y	0.75	Maintained by NK Power batteries until load shed, then portable lighting will be utilized through Phase 2
3	0.75	Control Room Ventilation	Y	0.75	Callaway Plant procedure, ECA-0.0, Loss of All AC Power (Reference 6.a), directs opening control room cabinet doors. Temporary ventilation will be utilized through Phase 2
4	1	NK Power Load Shed	Y	1	**Time sensitive -** Initiate load shed no later than 45 minutes to complete no later than 1 hour.
5	5.4	Vent SFP Area	Y	5.4	Need time based on SFP time to boil

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
					assuming SFP sloshing & initial SFP temperature 140 °F.
6	6	Perform Damage Assessment	Y	6	Informs FLEX strategies. Future FSG Requirement. Assume 4 to 6 hours to complete.
7	7	Debris Removal	Y	7	Earliest need for FLEX equipment and deployment paths based on deploying Phase 2 generator or FLEX Core Cooling Pump
8	9	Deploy FLEX SG Makeup Pump (FLEX Core Cooling Pump) (Standby)	Y	9	Stage as early as possible in event to provide defense in depth.
9	12	Perform Plant Cooldown	Y	12	Lesser of 8 hours + cooldown duration or (24 hours - boron injection / injection rate / 60)- Cooldown duration **8 hr + ((557°F - 415°F) / 100F/hr) = 9.42 hrs** 24hrs - (4177gal/10gpm/60min) = 17.03 hrs 12 hours utilized in timeline due to complexity of action.
10	14	Energize NK Power 480V Generator	Y	14	**Time sensitive** - Earliest need for generator based on providing power for NK Power System.
11	14.5	Establish Battery Room Ventilation	Y	14.5	Callaway Plant will establish self powered battery room ventilation when battery charging is in progress.

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
12	17	Align CST Makeup from the UHS	Y	17	**Time sensitive** – Depletion of CST. The UHS is the preferred seismic ACS.
13	17	Initiate RCS Makeup (boration) from BAT	Y	17	**Time sensitive** 24 hours – boron injection / injection rate / 60 24hrs – (4177gal/10gpm/60min) = 17.03 hrs
14	18	FLEX Fuel Deployment	Y	18	Assume 10 hours + equipment deployment time.
15	24	TDAFWP Room Ventilation	Y	24	Reference 5 states in part temperatures in the TDAFWP Room, equipment cabinets, and the control room are considered acceptable for 24 hours following a beyond design basis external event (BDBEE)
16	33	Initiate SFP Makeup	Y	33	**Time sensitive** – time for SFP water level to reduce to 15 ft above the SFP racks assuming sloshing level, 140°F initial temperature, and normal heat load
17	46	Switch RCS Makeup from BATs to RWST	Y	46	Need time is based on depletion of the BATs and the need to maintain RCS inventory
18	72	Large Debris Removal	Y	72	Earliest RRC equipment can reach the plant site based on NEI 12-06 (Reference 2)
19	72	Mobile Water Purification System	Y	72	Need time is based on depletion of alternate coolant sources
20	72	Ultimate Heat Sink	Y	72	Need time based on eventual loss of

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
		Pump			capability to support SG feed strategy.
21	72	4160V generator	Y	72	Need time is based on eventual loss of capability to support SG feed strategy
22	72	Mobile Boration Unit	Y	72	Need time based on depletion of borated water sources.
23	72	Establish Large Fuel Truck Service	Y	72	Need time is based on depletion of on-site supplies and supplying larger equipment

Notes:
(1) Following completion of staffing studies (A27), operator action times will be provided for each time sensitive action. All actions will be completed prior to time constraint.
(2) Instructions: Provide justification if No or NA is selected in the remark column. If yes include technical basis discussion as required by NEI 12-06 Section 3.2.1.7 (Reference 2).
(3) Time constraints based on Reference 9. Additional refinements may be provided in subsequent updates.

Attachment 1B - NSSS Significant Reference Analysis Reconciliation Table

No deviations from WCAP-17601-P, Revision 1, January 2013.

Attachment 2

Milestone Schedule

The following milestone schedule is provided. The dates are planning dates subject to change as design and implementation details are developed. Any changes to the following target dates will be reflected in the subsequent 6 month status reports.

Callaway Milestone Schedule		
Activity	**Original Target Date**	**Status (Will be updated every 6 months)**
Submit Overall Integrated Implementation Plan	**February-2013**	
6 Month Status Updates	**February-2015**	
Update 1	*August-2013*	
Update 2	*February-2014*	
Update 3	*August-2014*	
Update 4	*February-2015*	
FLEX Strategy Evaluation	**April-2013**	
Perform Staffing Analysis	**December-2013**	
Modifications	**November-2014**	
Modifications Evaluation	*April-2013*	
Engineering and Implementation	*November-2014*	
N-1 Walkdown	*April-2013*	
Design Engineering	*March-2014*	
Unit 1 Implementation Outage	*November-2014*	
On-site FLEX Equipment	**December-2013**	
Purchase	*June-2013*	
Procure	*December-2013*	
Off-site FLEX Equipment	**September-2014**	
Develop Strategies with RRC	*November-2013*	
Install Off-site Delivery Station (if necessary)	*September-2014*	
Procedures	**June-2014**	
PWROG issues NSSS-specific guidelines	*June-2013*	
Create Callaway FSG	*April-2014*	
Create Maintenance Procedures	*June-2014*	
Training	**November-2014**	
Develop Training Plan	*April-2014*	
Implement Training	*May-2014*	
Submit Completion Report	**November-2014**	

Attachment 3

Conceptual Sketches

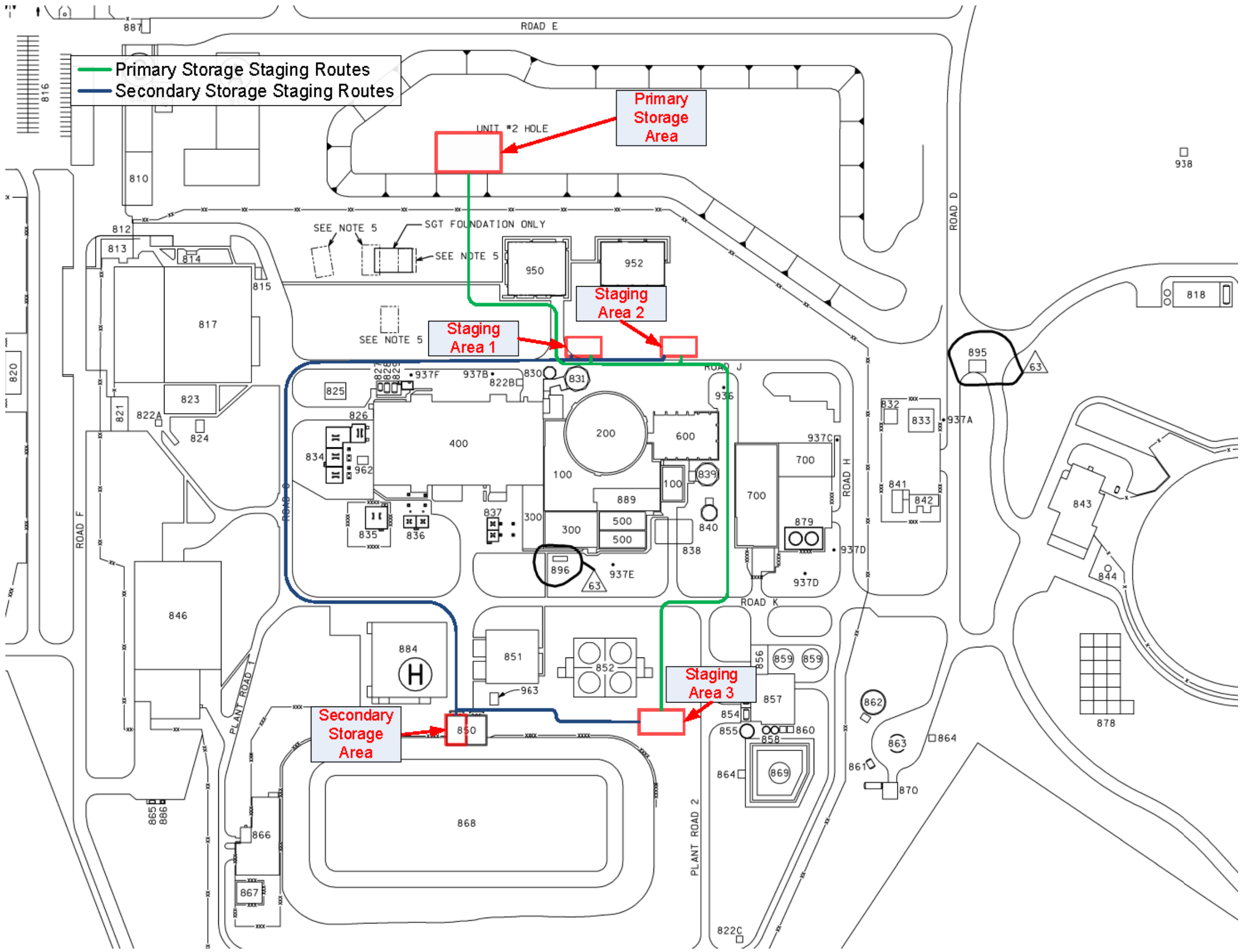

Figure A3-1: Primary and Secondary Storage Locations and Mechanical Staging Routes (Drawing 8600-X-88100, Reference 7.a)

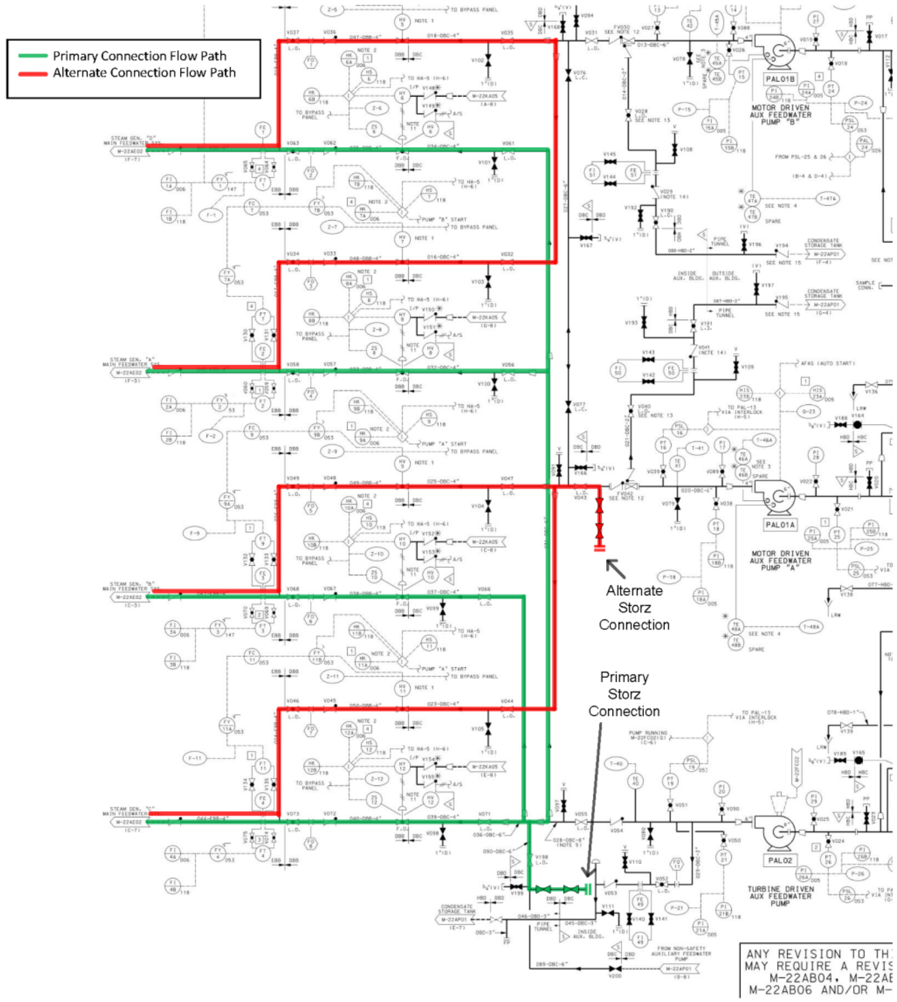

Figure A3-2: Modified M-22AL01 (Reference 7.j) Showing Primary and Secondary AFW Connection Alignment

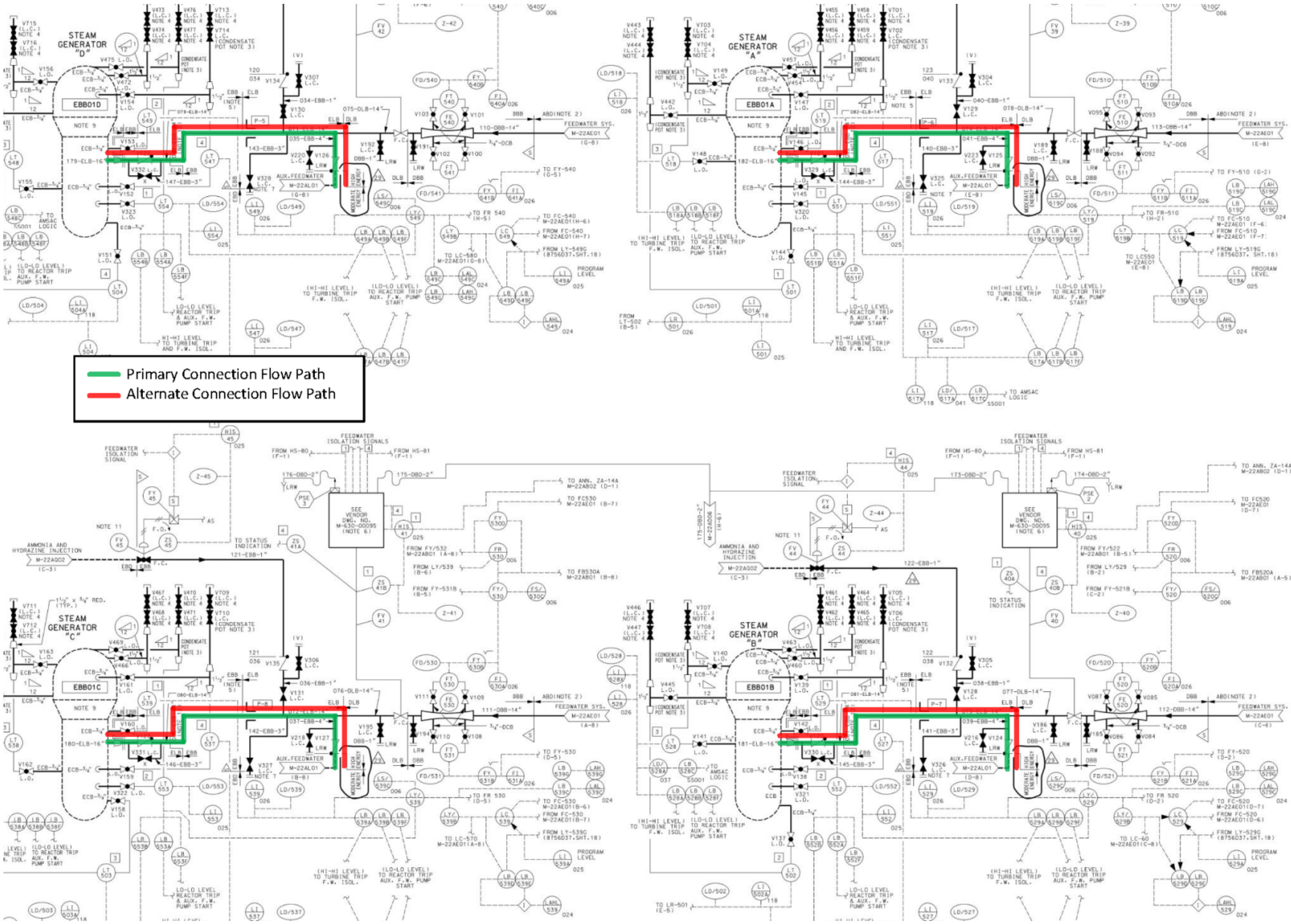

Figure A3-3: Modified M-22AE02 (Reference 7.i) Showing Primary and Secondary AFW Connection Alignment

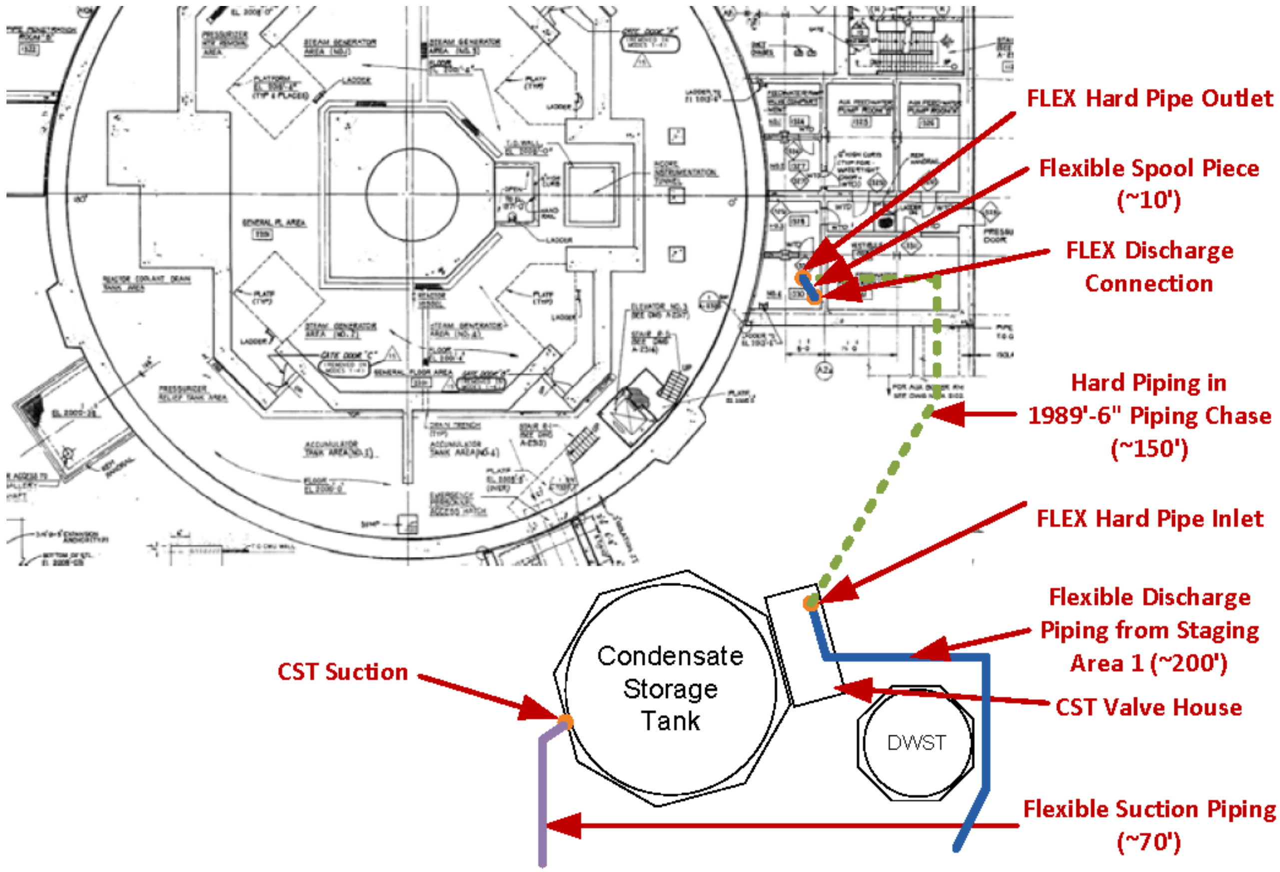

Figure A3-4: Pipe/Hose Routing for Primary AFW Connection (Drawing A-2302, Reference 7.f)

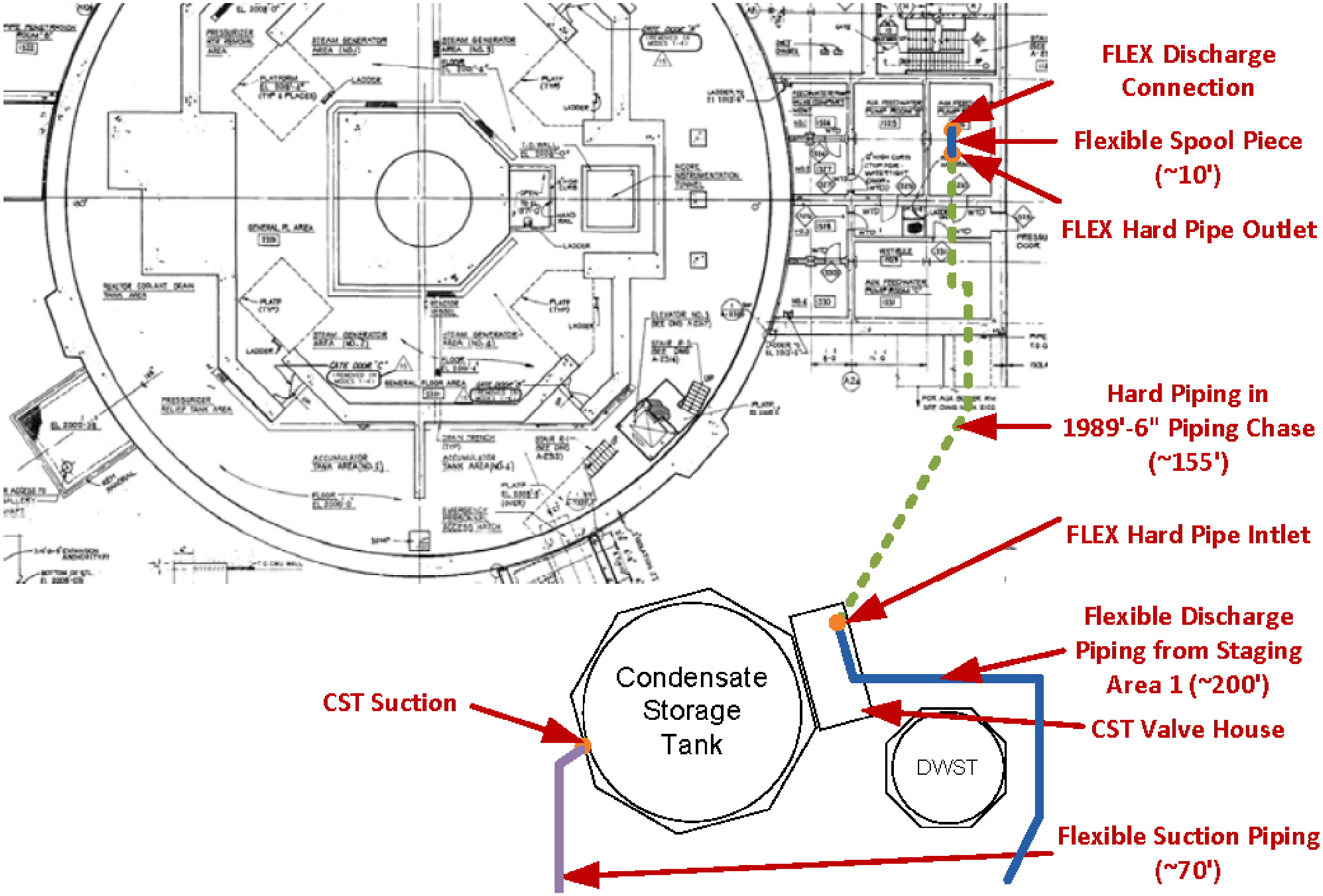

Figure A3-5: Pipe/Hose Routing for Secondary AFW Connection (Drawing A-2302, Reference 7.f)

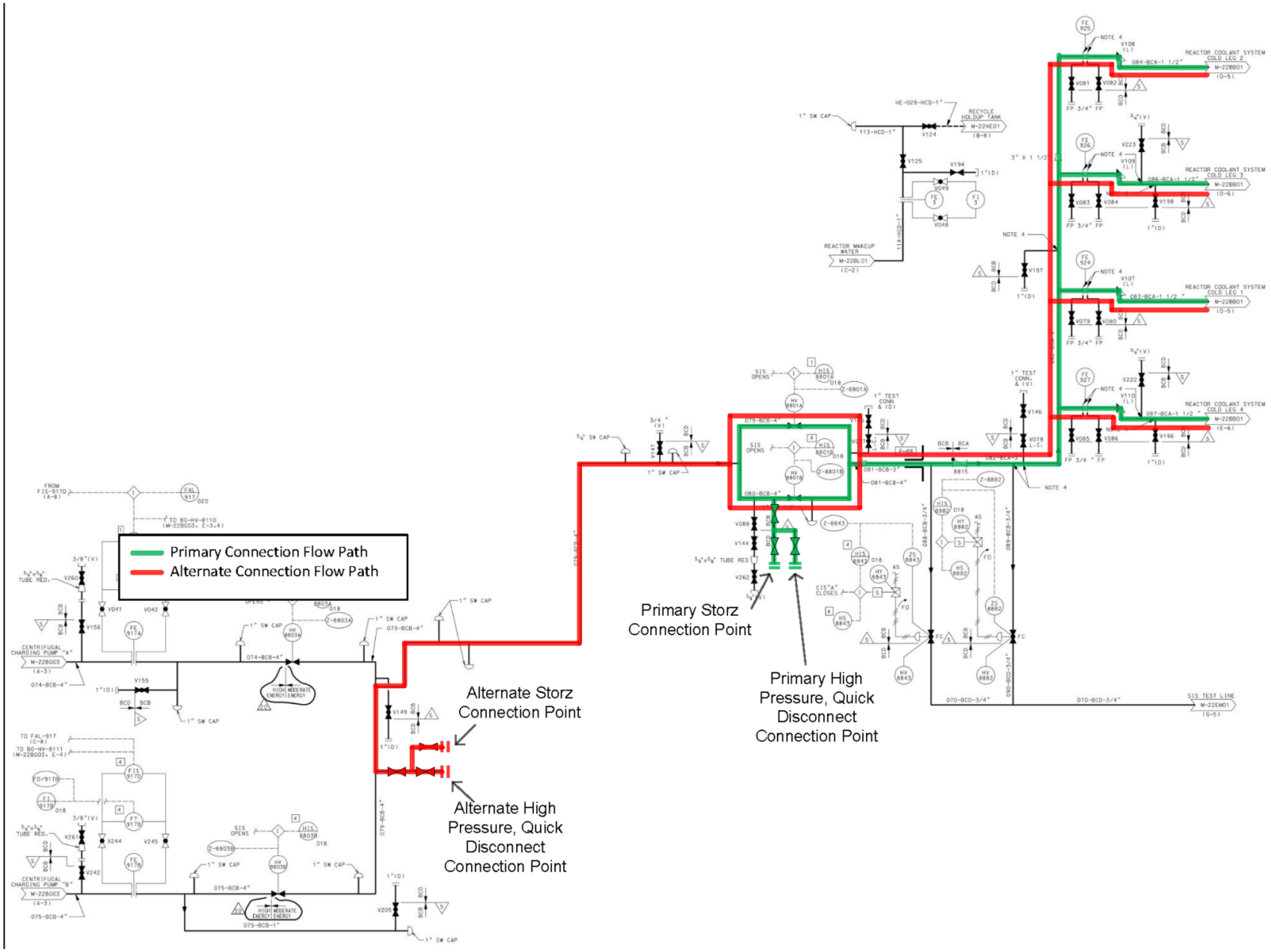

Figure A3-6: Modified M-22EM02 (Reference 7.s) Showing Primary and Secondary RCS Connection Alignment (EMHV8801A and EMHV8801B Open)

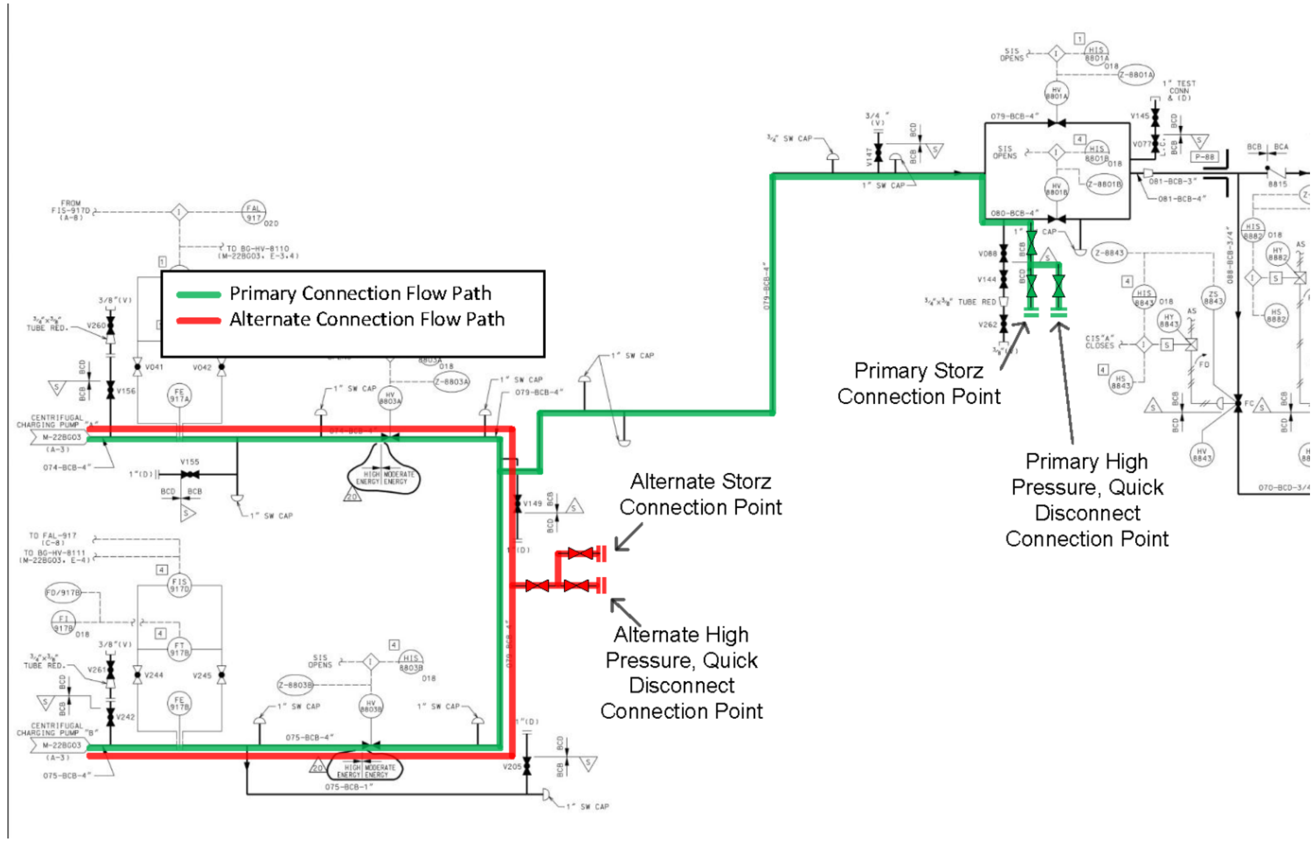

Figure A3-7: Modified M-22EM02 (Reference 7.s) Showing Primary and Secondary RCS Connection Alignment (EMHV8803A and EMHV8803B Open)

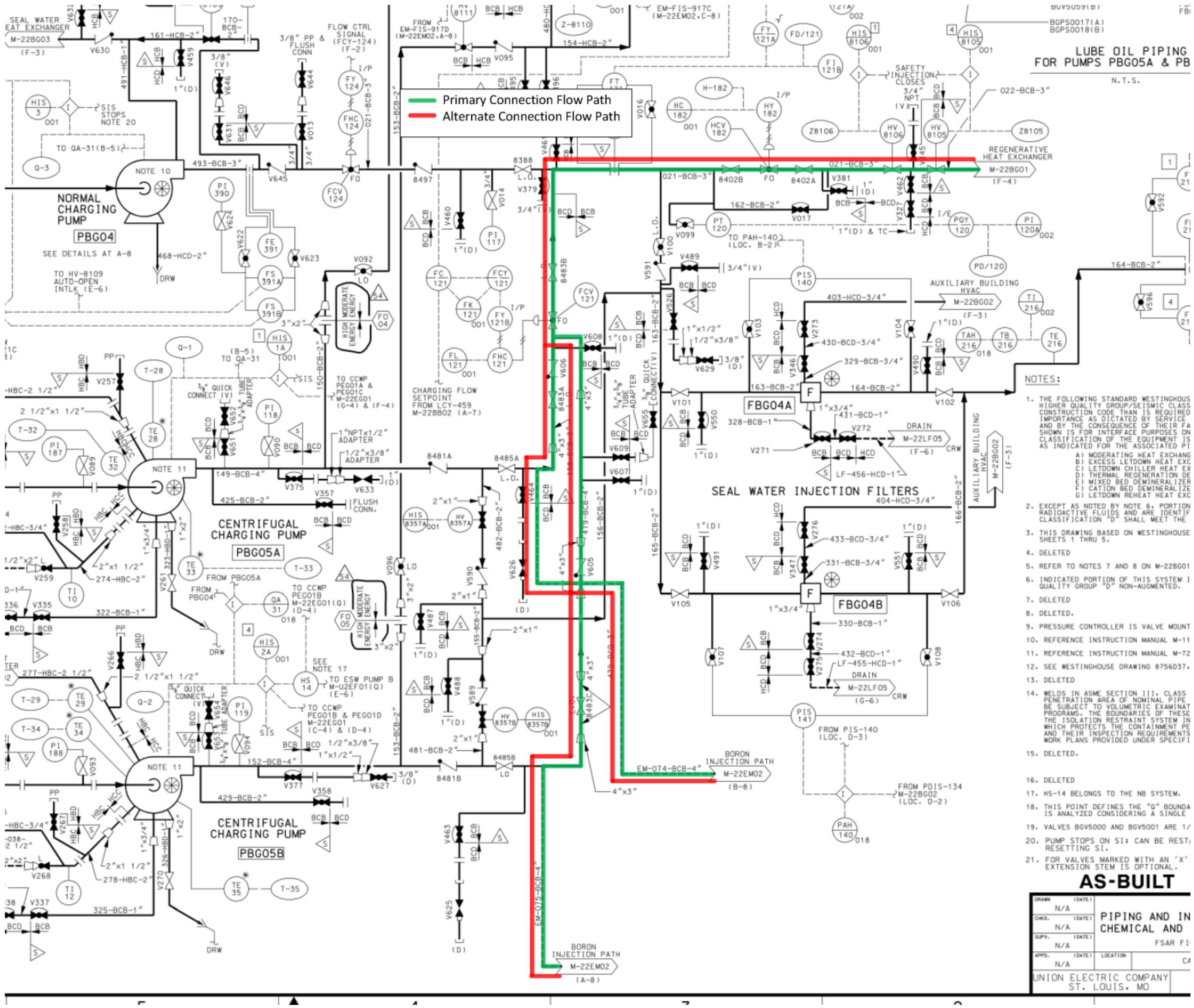

Figure A3-8: Modified M-22BG03 (Reference 7.n) Showing Primary and Secondary RCS Connection Alignment (EMHV8803A and EMHV8803B Open)

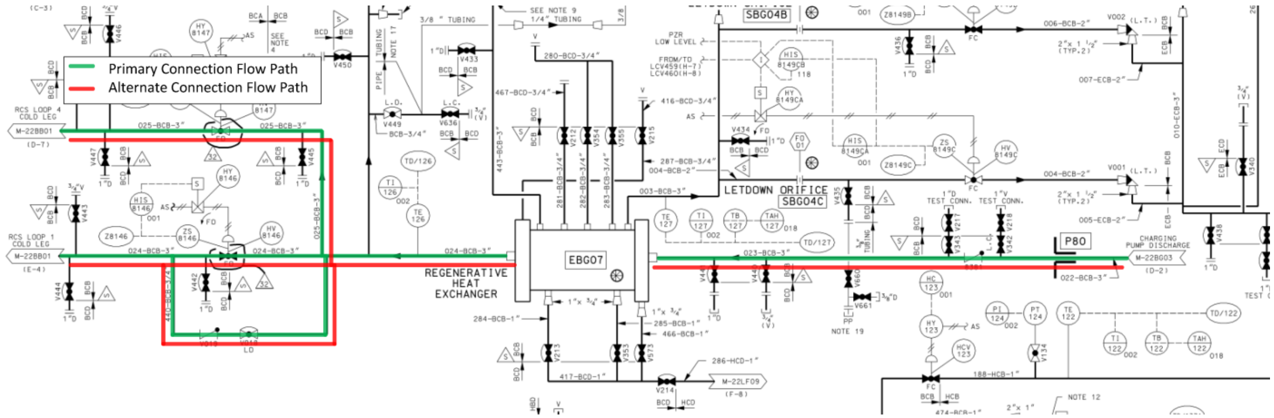

Figure A3-9: Modified M-22BG01 (Reference 7.m) Showing Primary and Secondary RCS Connection Alignment (EMHV8803A and EMHV8803B Open)

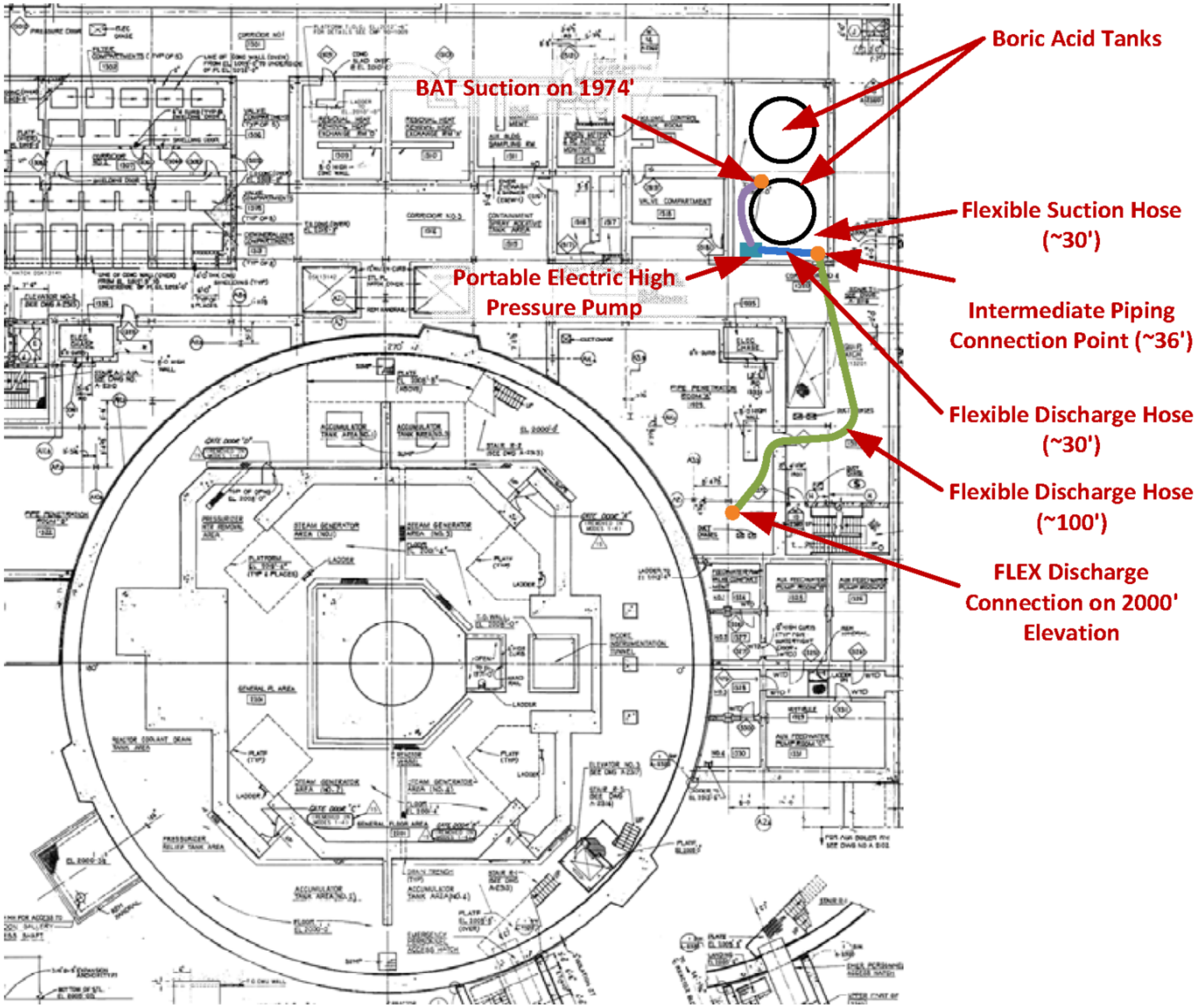

Figure A3-10: Pipe/Hose Routing for Primary RCS Connection from BATs (Drawing A-2302, Reference 7.f)

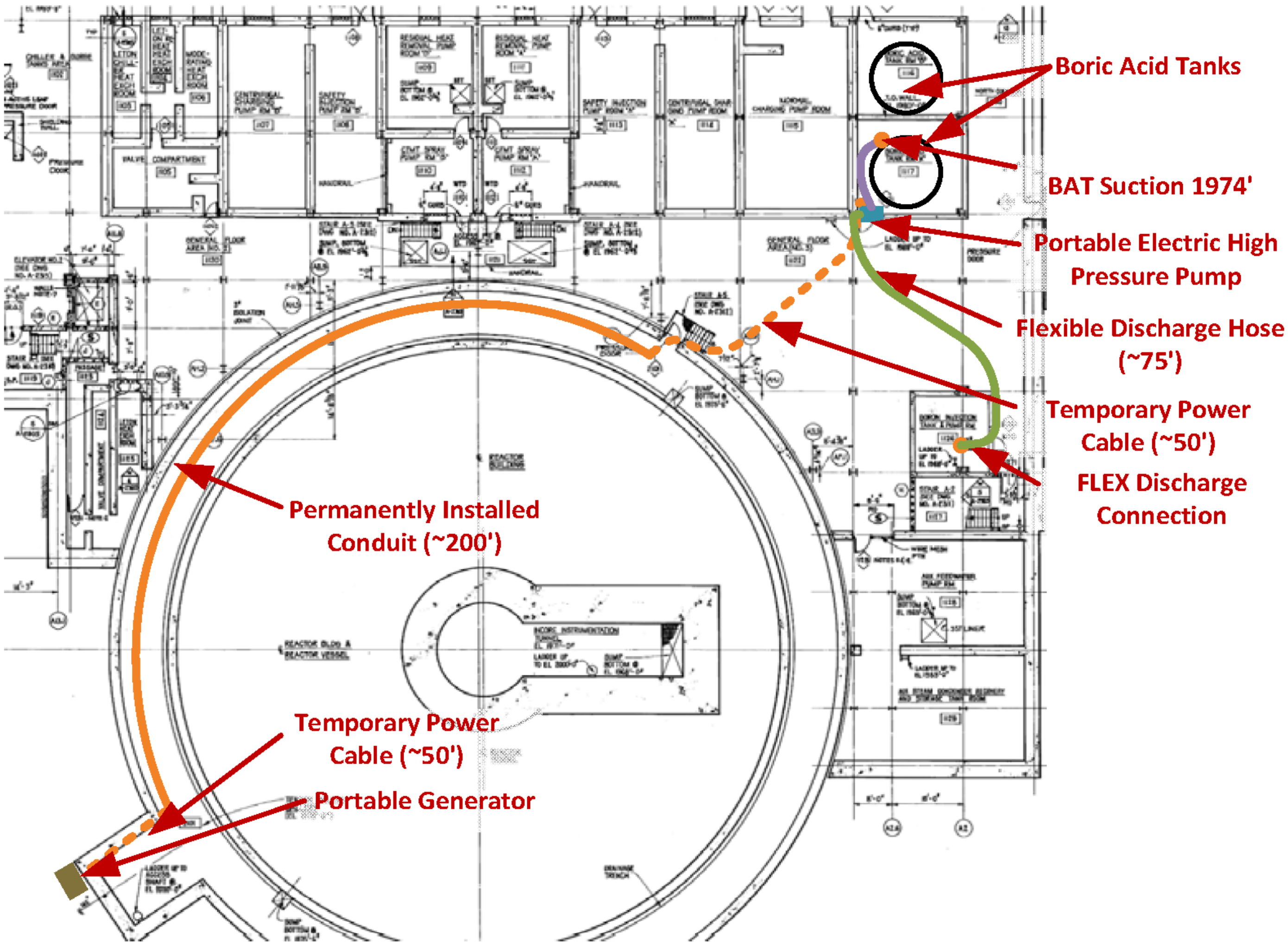

Figure A3-11: Pipe/Hose Routing for Secondary RCS Connection from BATs (Drawing A-2301, Reference 7.e)

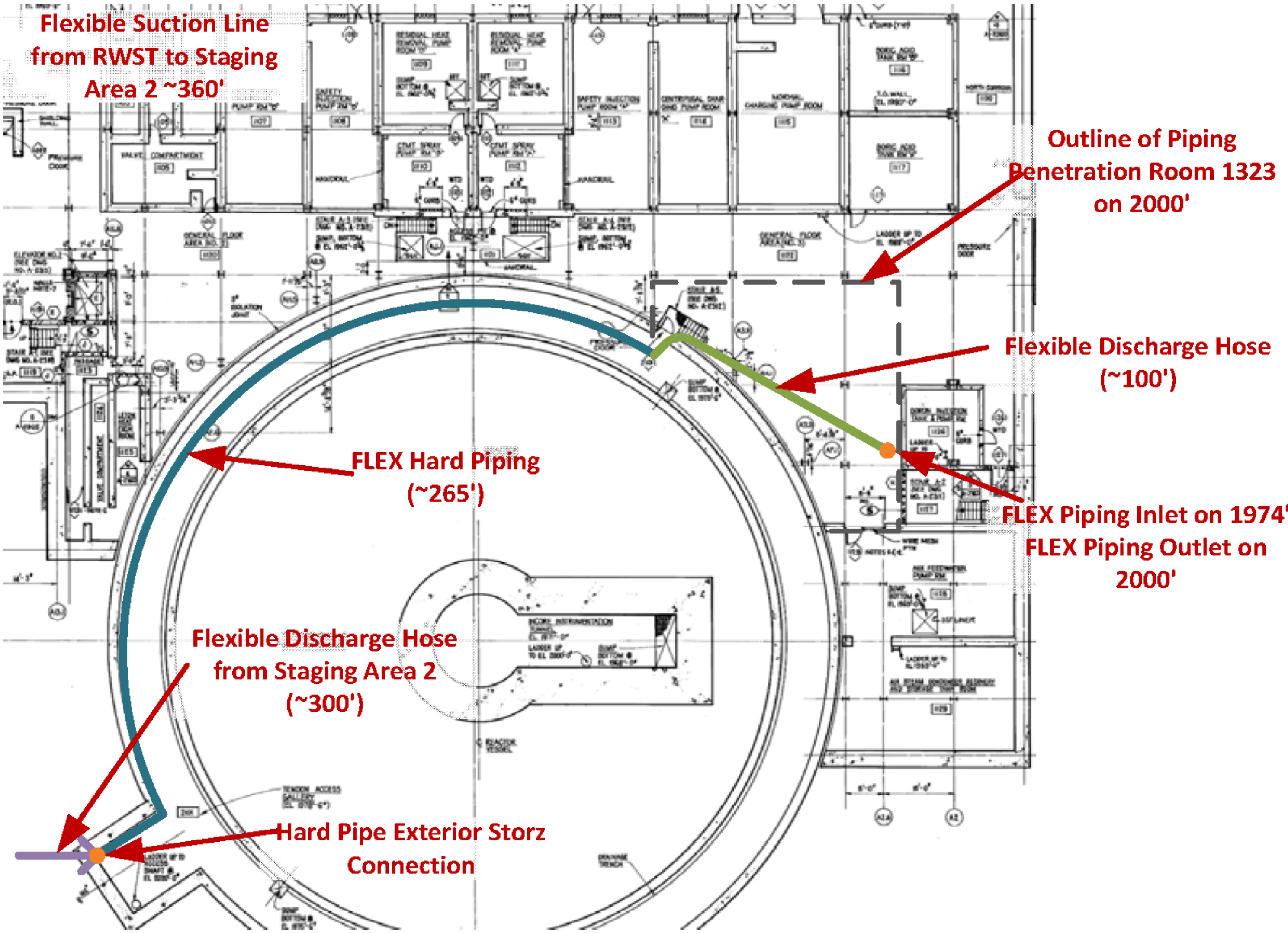

Figure A3-12: Pipe/Hose Routing for Primary RCS Connection from RWST (Modes 5 and 6) (Drawing A-2301, Reference 7.e)

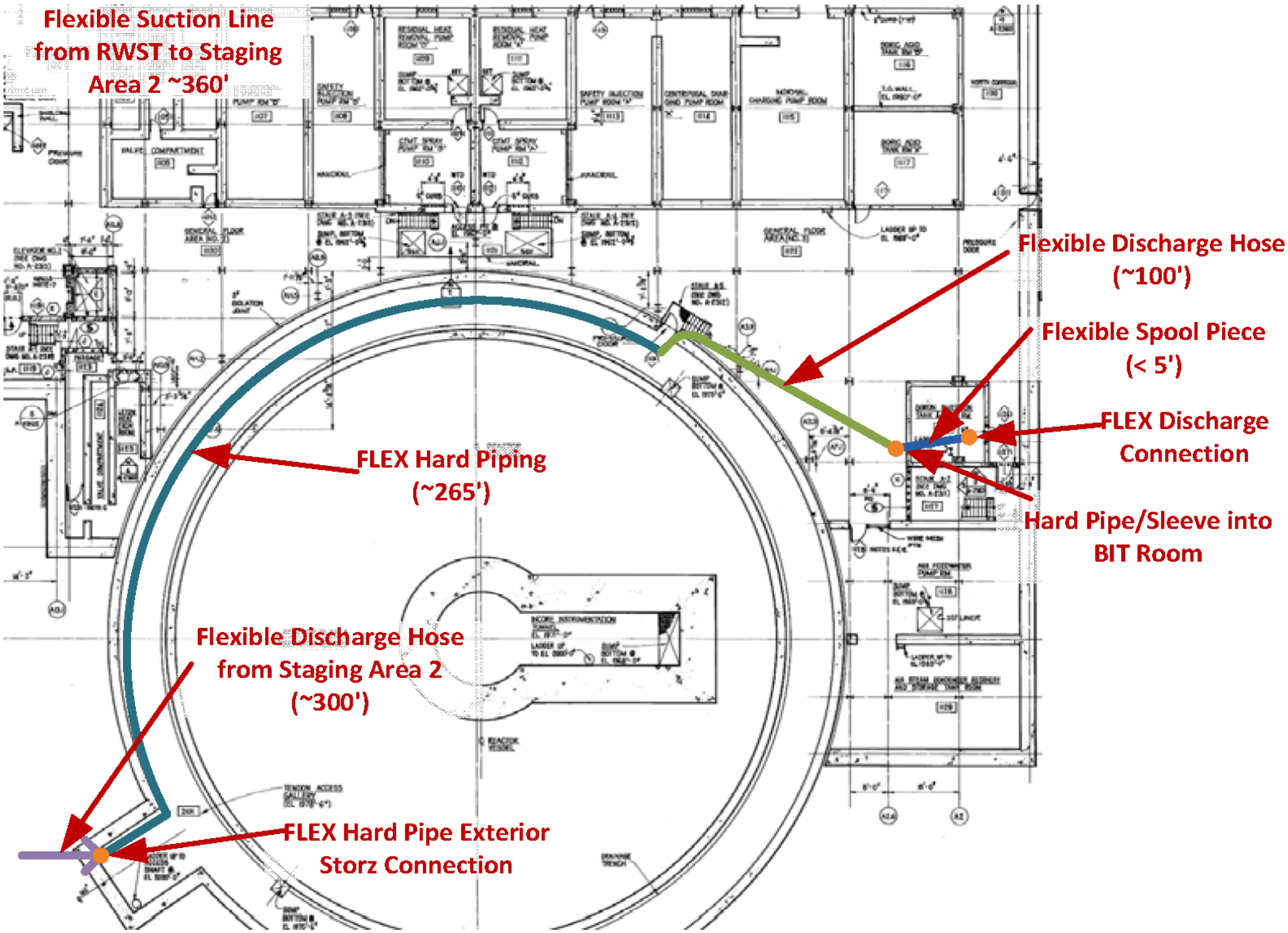

Figure A3-13: Pipe/Hose Routing for Secondary RCS Connection from RWST (Modes 5 and 6) (Drawing A-2301, Reference 7.e)

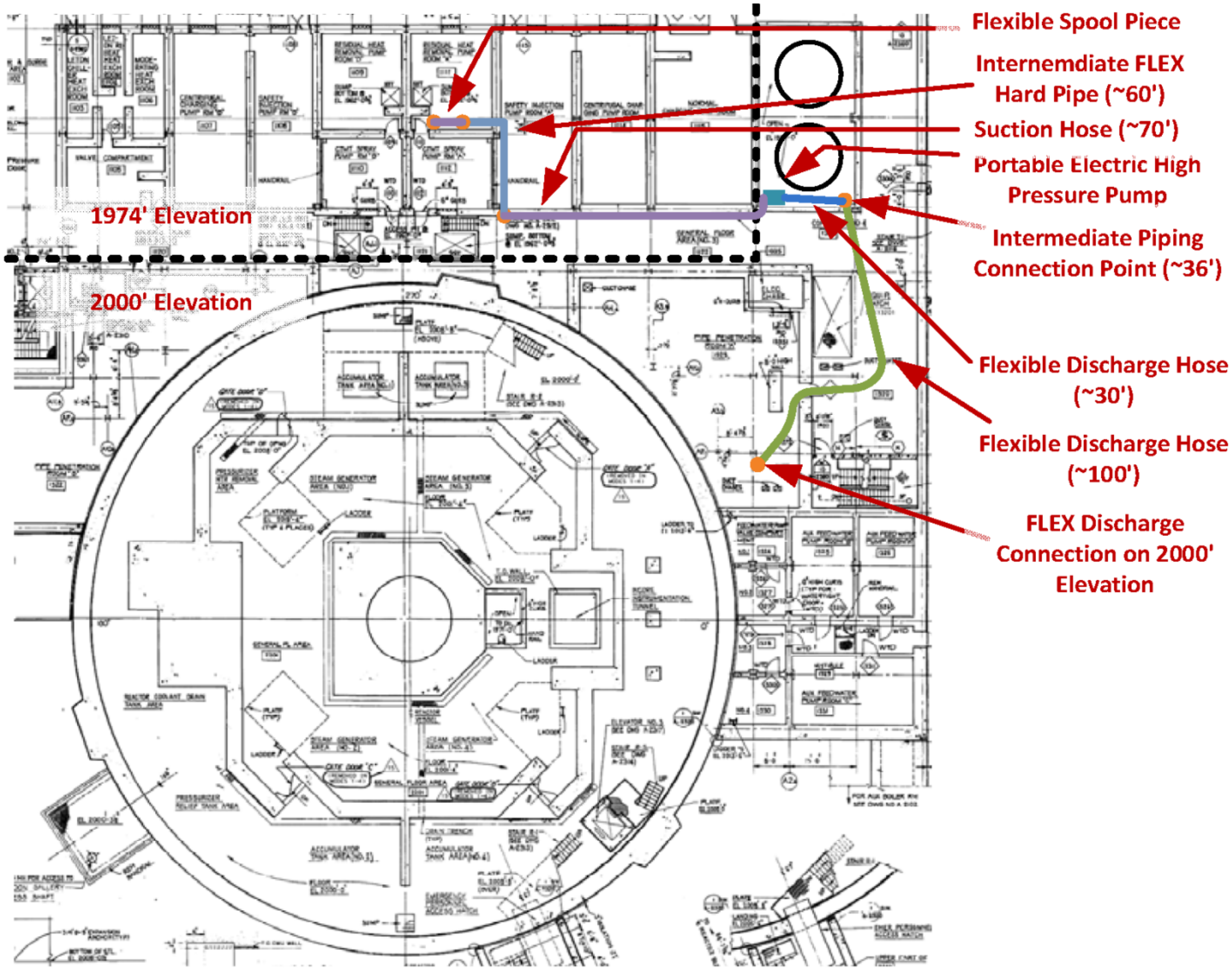

Figure A3-14: Pipe/Hose Routing for Primary RCS Connection from RWST (Modes 1-4) (Drawing A-2301, Reference 7.e)

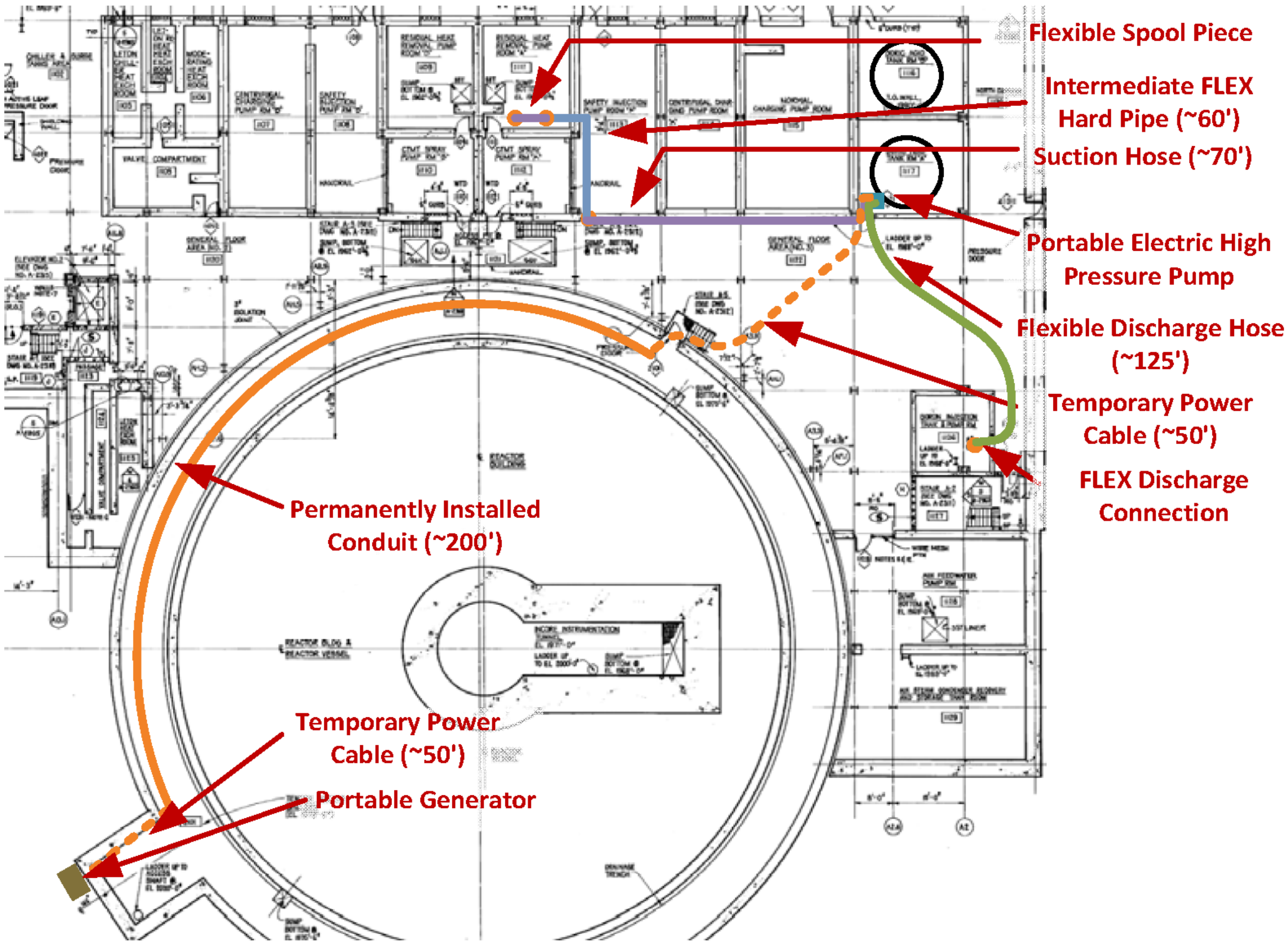

Figure A3-15: Pipe/Hose Routing for Secondary RCS Connection from RWST (Modes 1-4) (Drawing A-2301, Reference 7.e)

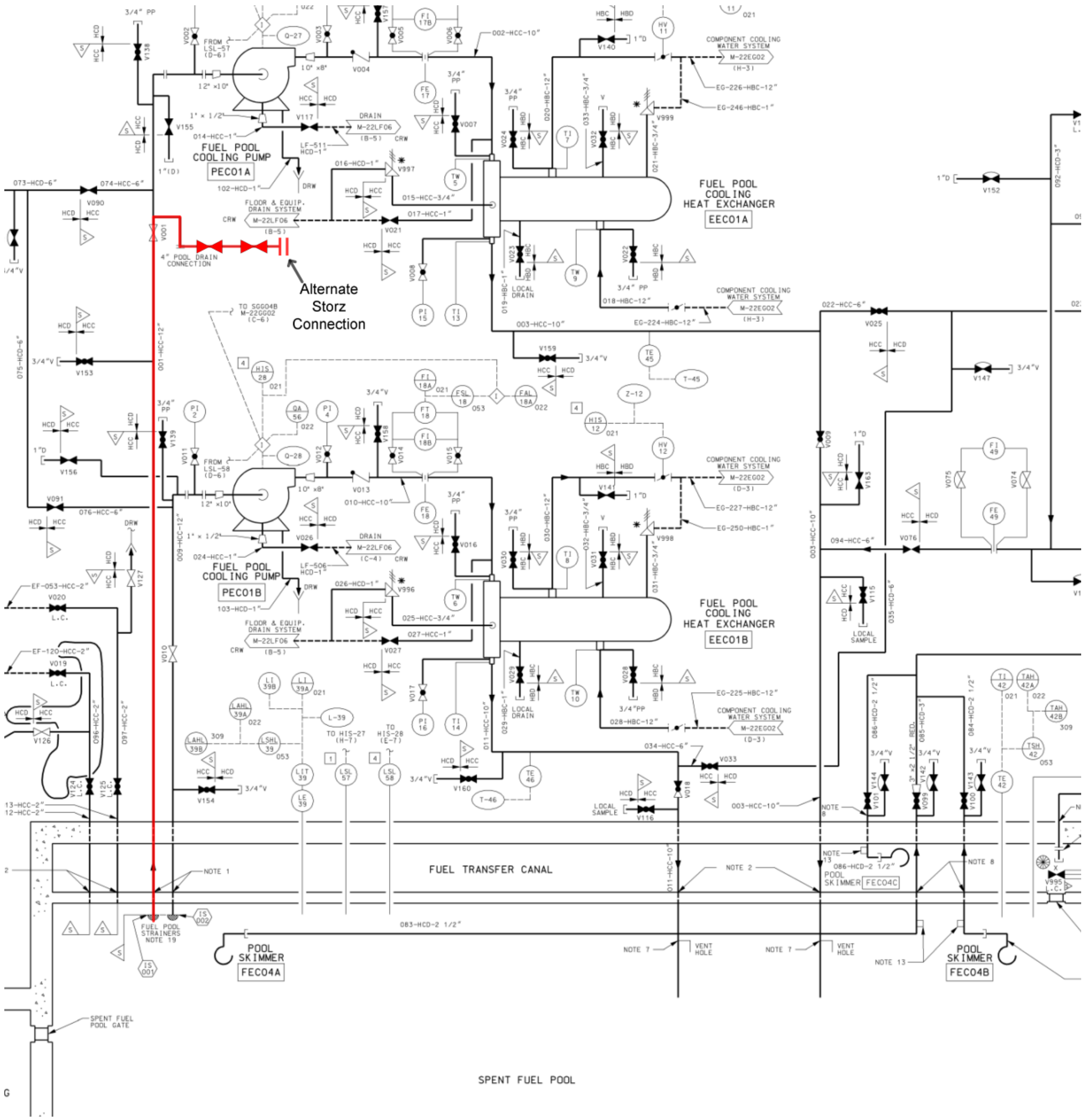

Figure A3-16: Modified M-22EC01 (Reference 7.r) Showing Secondary SFP Connection Alignment

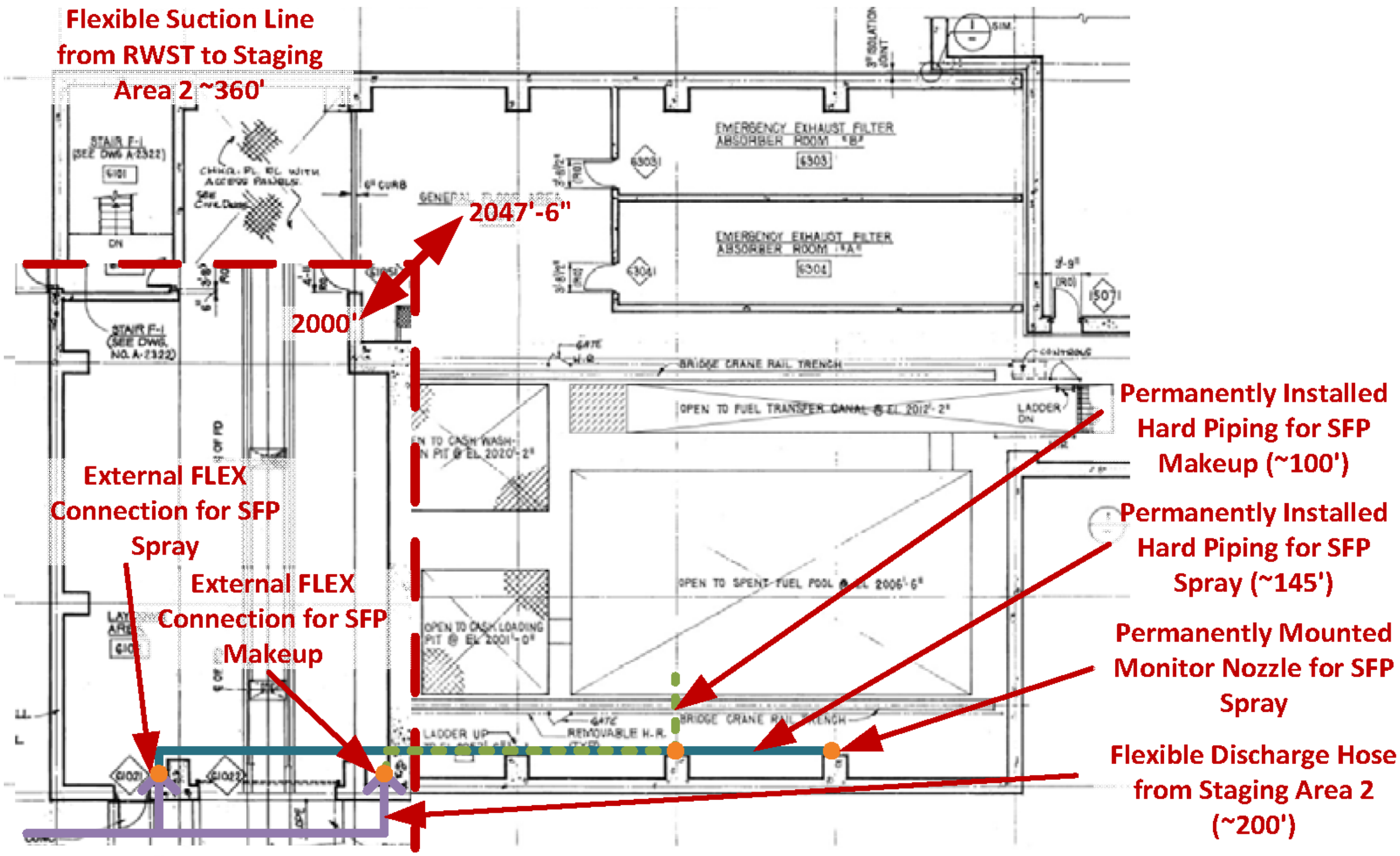

Figure A3-17: Pipe/Hose Routing for Primary SFP Connection and SFP Spray (Drawings A-2319 & A-2320, Reference 7.g and Reference 7.h)

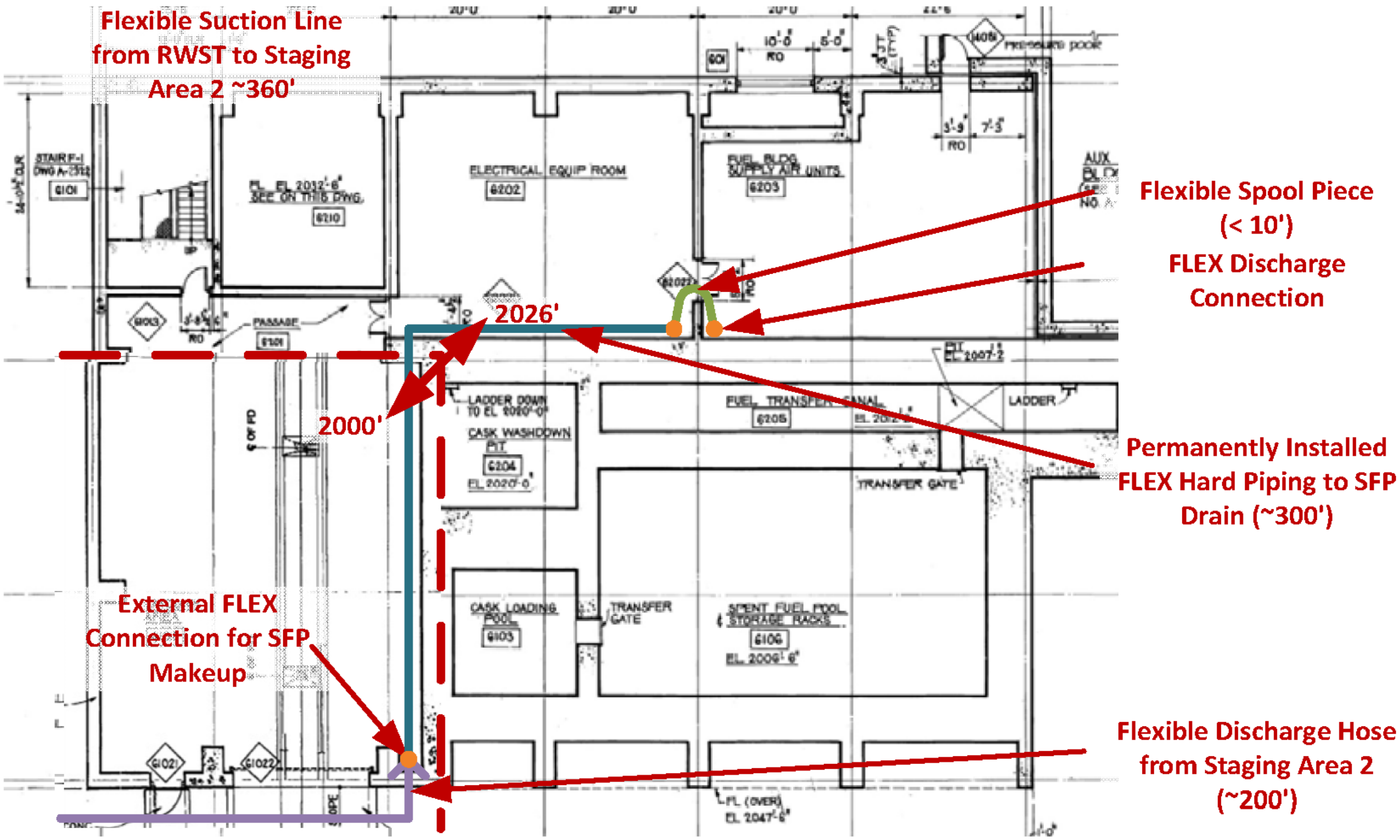

Figure A3-18: Pipe/Hose Routing for Secondary SFP Connection (Drawings A-2319 Reference 7.g)

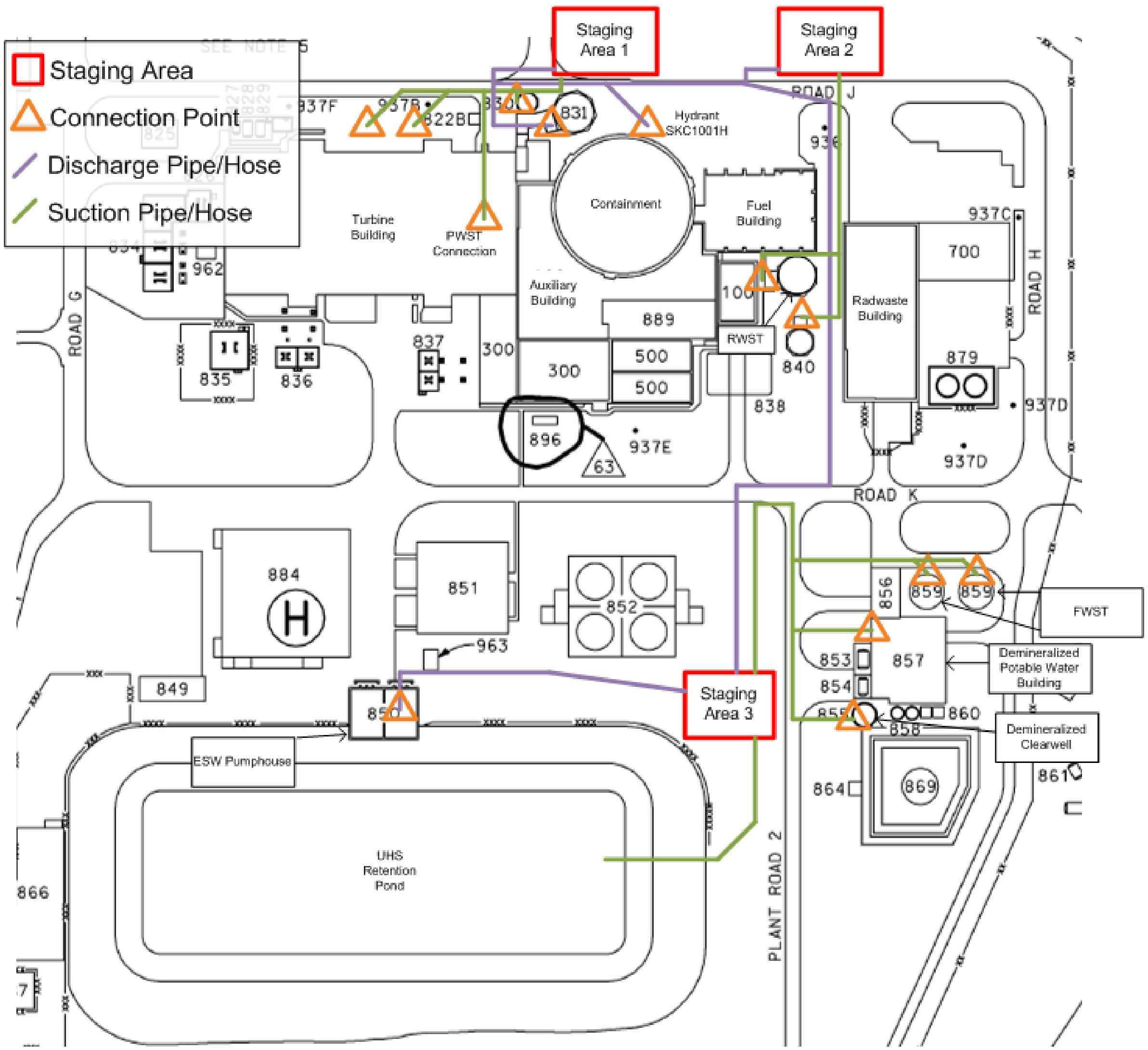

Figure A3-19: Hose Routing for CST Makeup from Various Sources (Drawing 8600-X-88100, Reference 7.a)

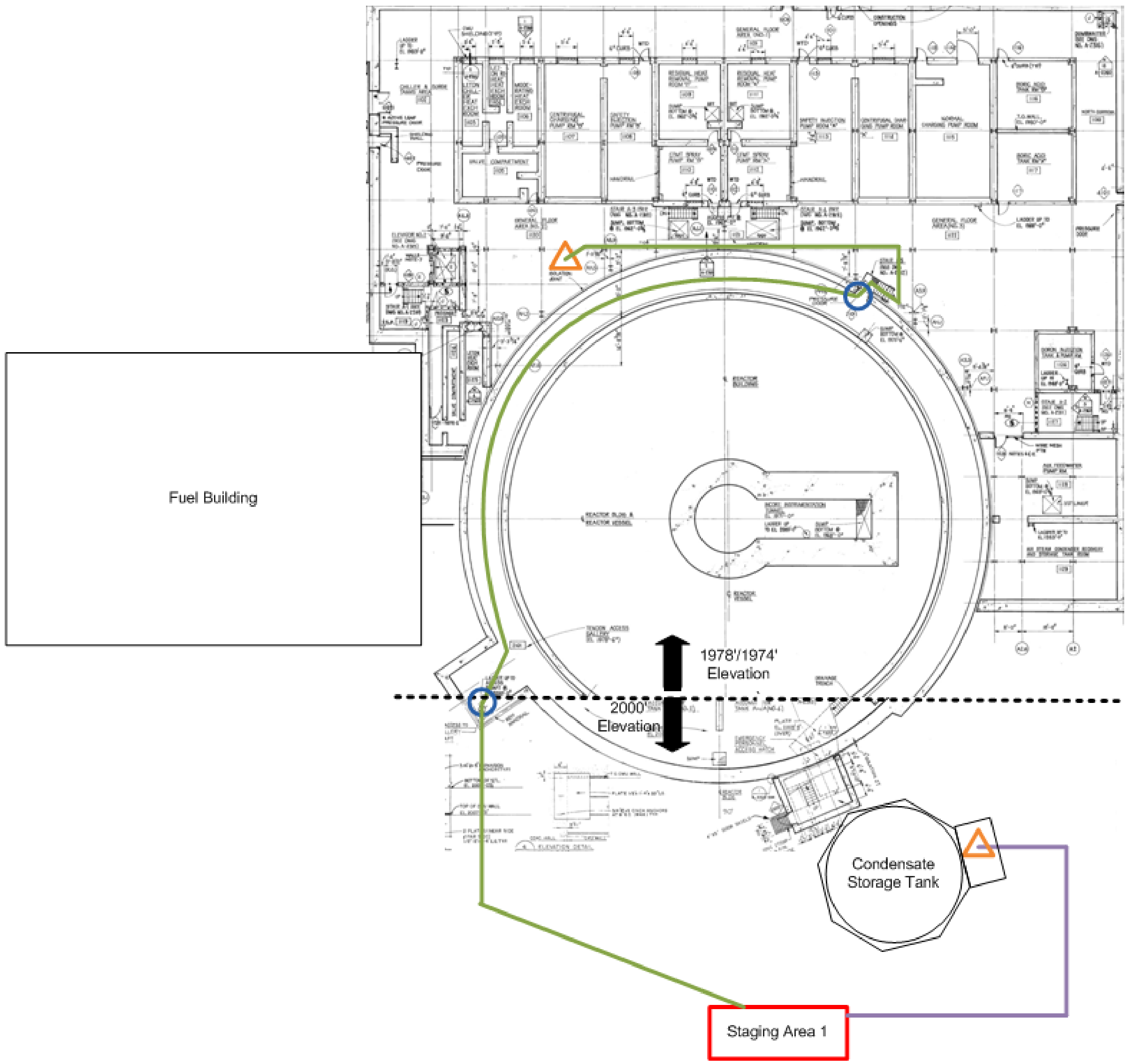

Figure A3-20: Hose/Pipe Routing for Makeup to CST from RMWST (Drawing A-2302 and A-2301, Reference 7.f and Reference 7.e)

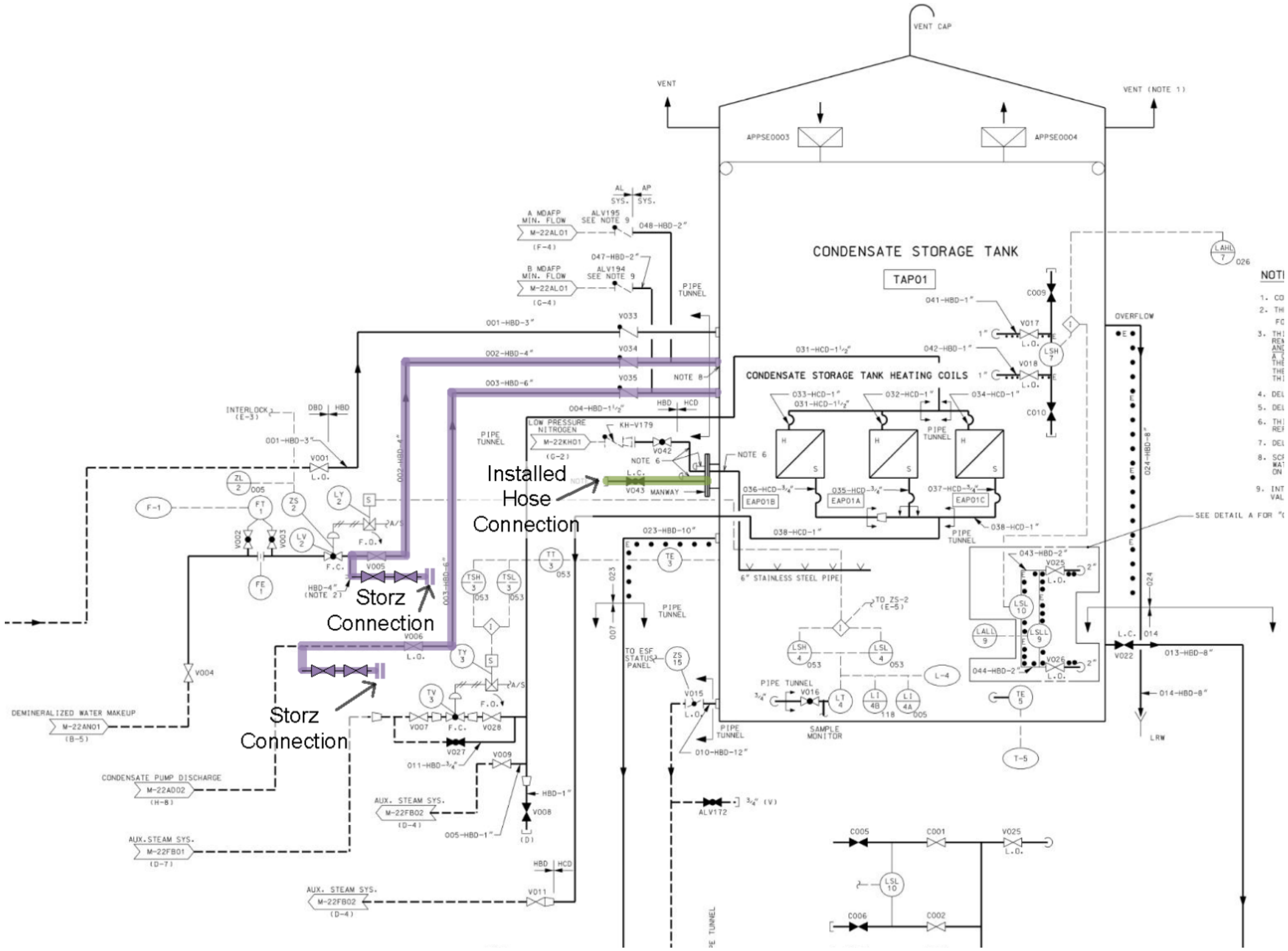

Figure A3-21: CST Suction and Makeup Connections (Drawing M-22AP01, Reference 7.l)

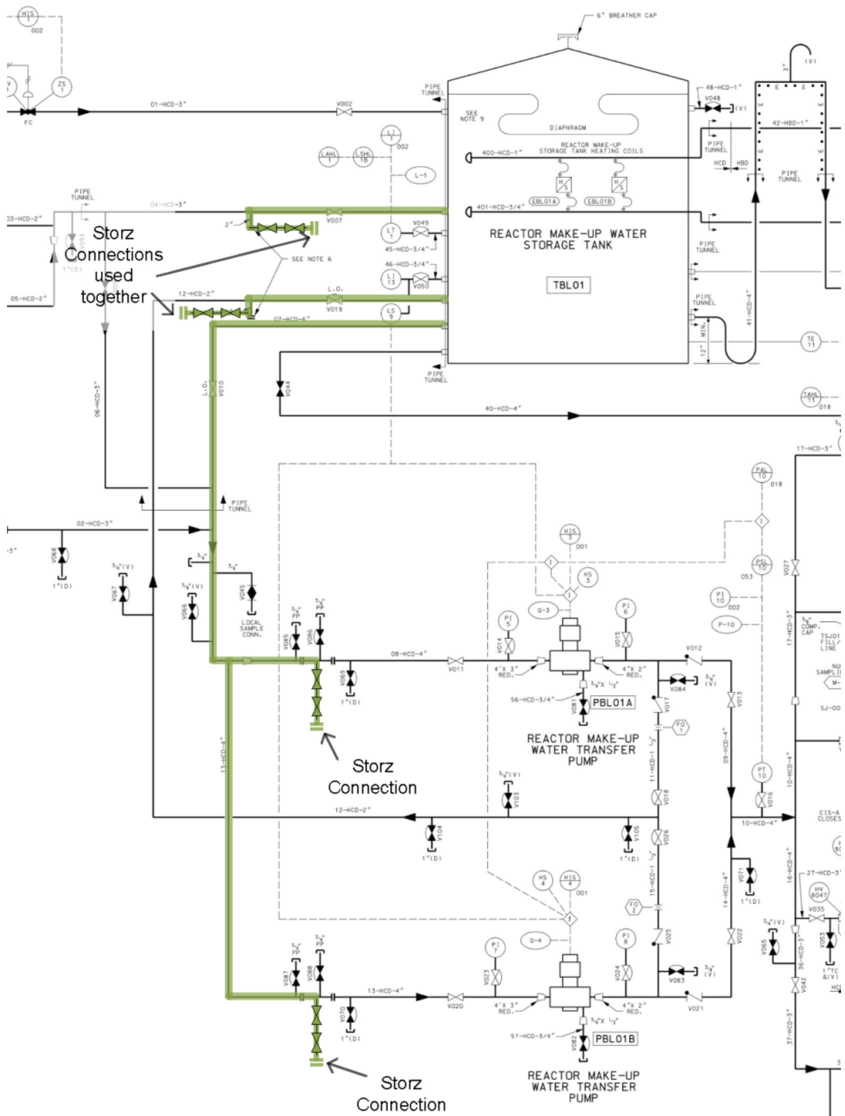

Figure A3-22: RMWST Connections for CST Makeup (Drawing M-22BL01, Reference 7.p)

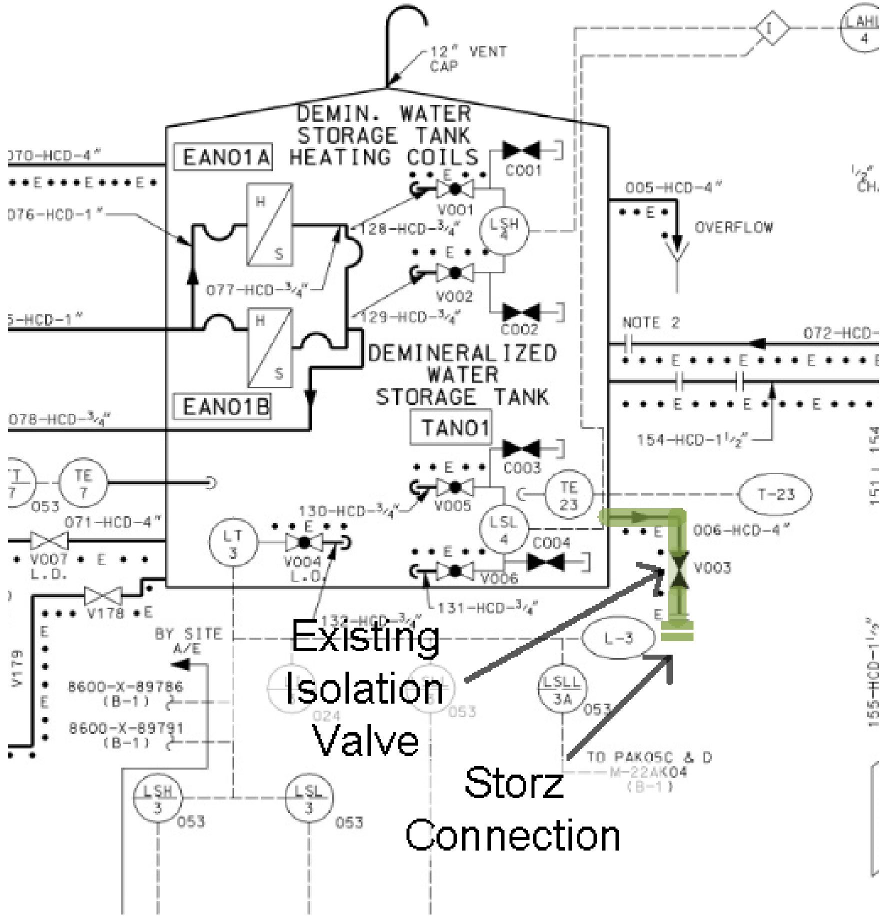

Figure A3-23: DWST Connection for CST Makeup (Drawing M-22AN01, Reference 7.k)

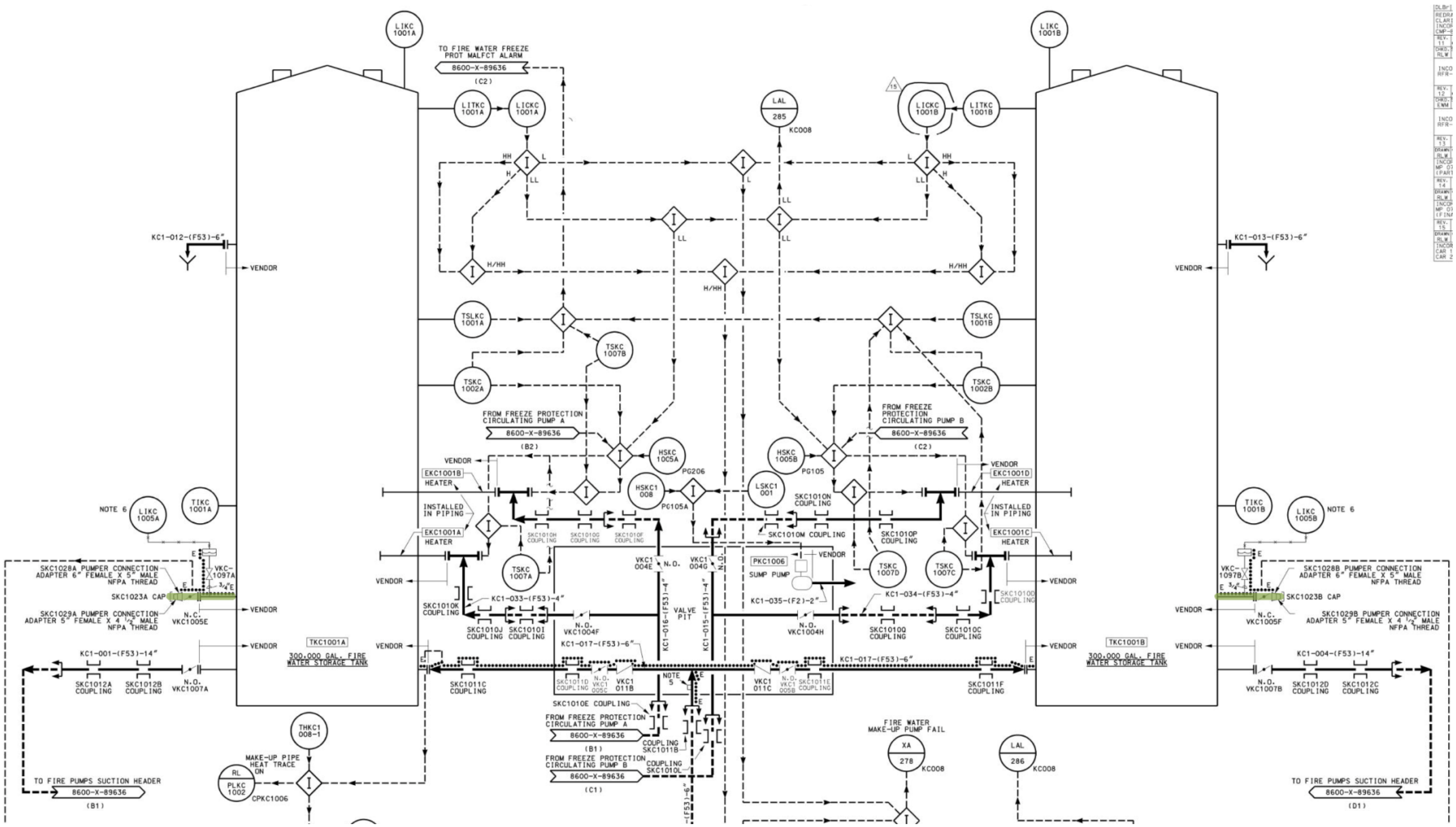

Figure A3-24: FPST Connections for CST Makeup (Drawing 8600-X-89633, Reference 7.b)

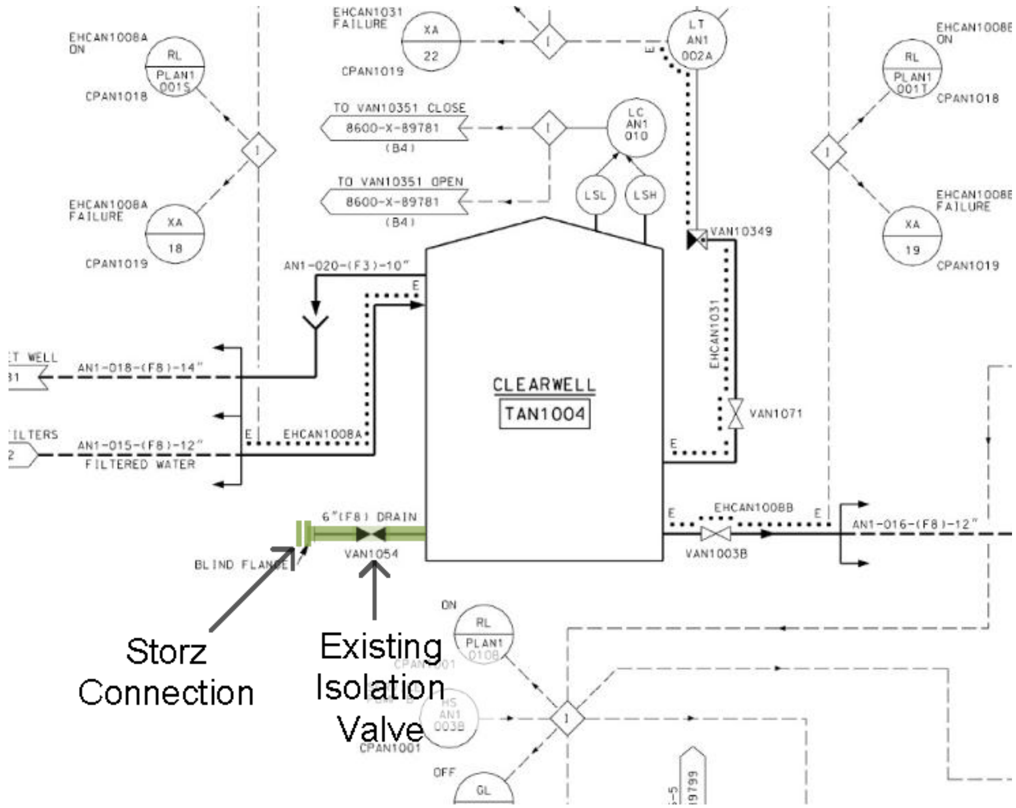

Figure A3-25: Demineralized System Clearwell Connection for CST Makeup (Drawing 8600-X-89783, Reference 7.d)

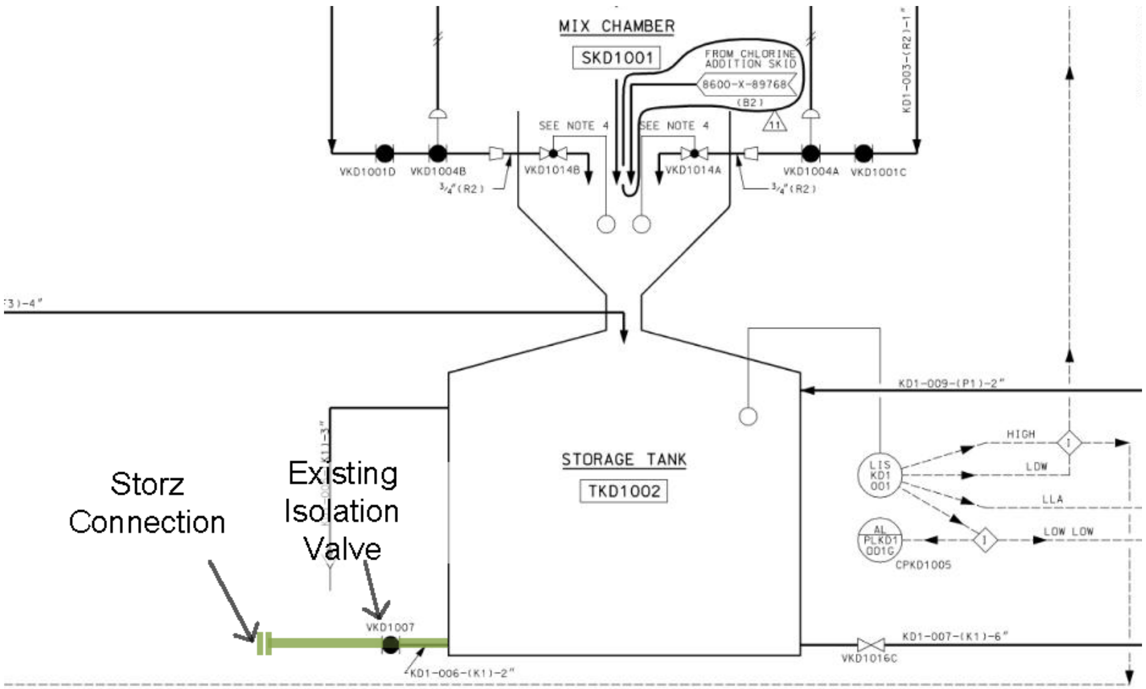

Figure A3-26: PWST Connection for CST Makeup (Drawing 8600-X-89767, Reference 7.c)

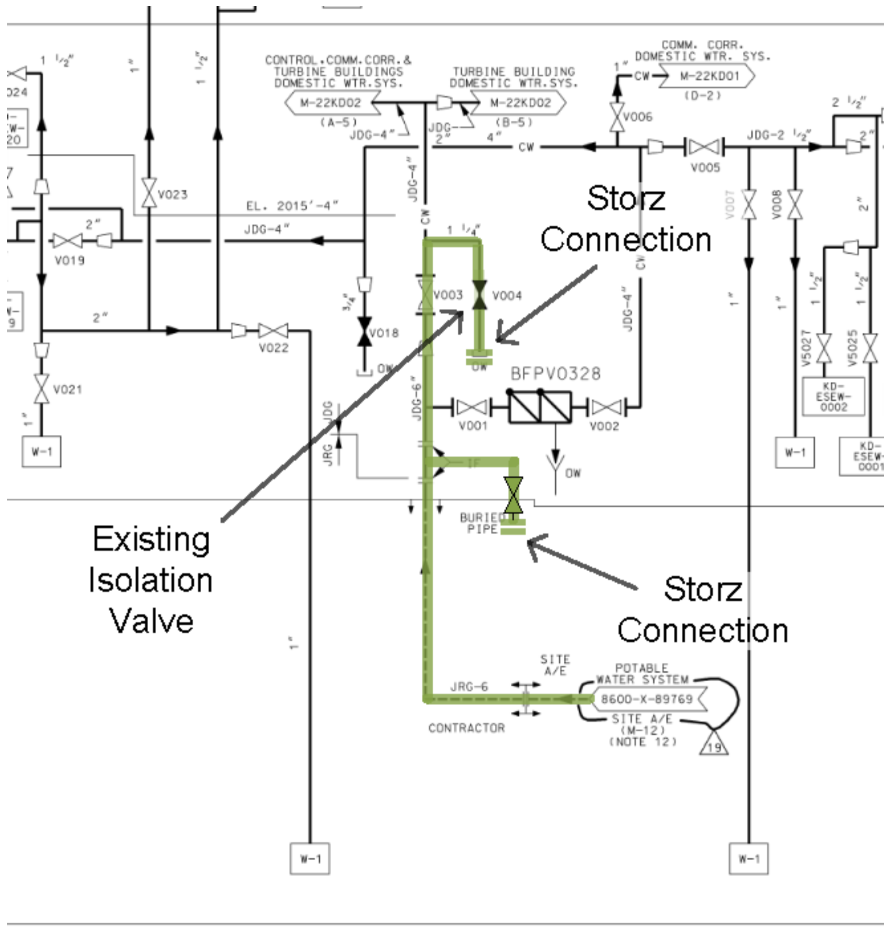

Figure A3-27: PWST Connections (From Turbine Building) for CST Makeup (Drawing M-22KD01, Reference 7.t)

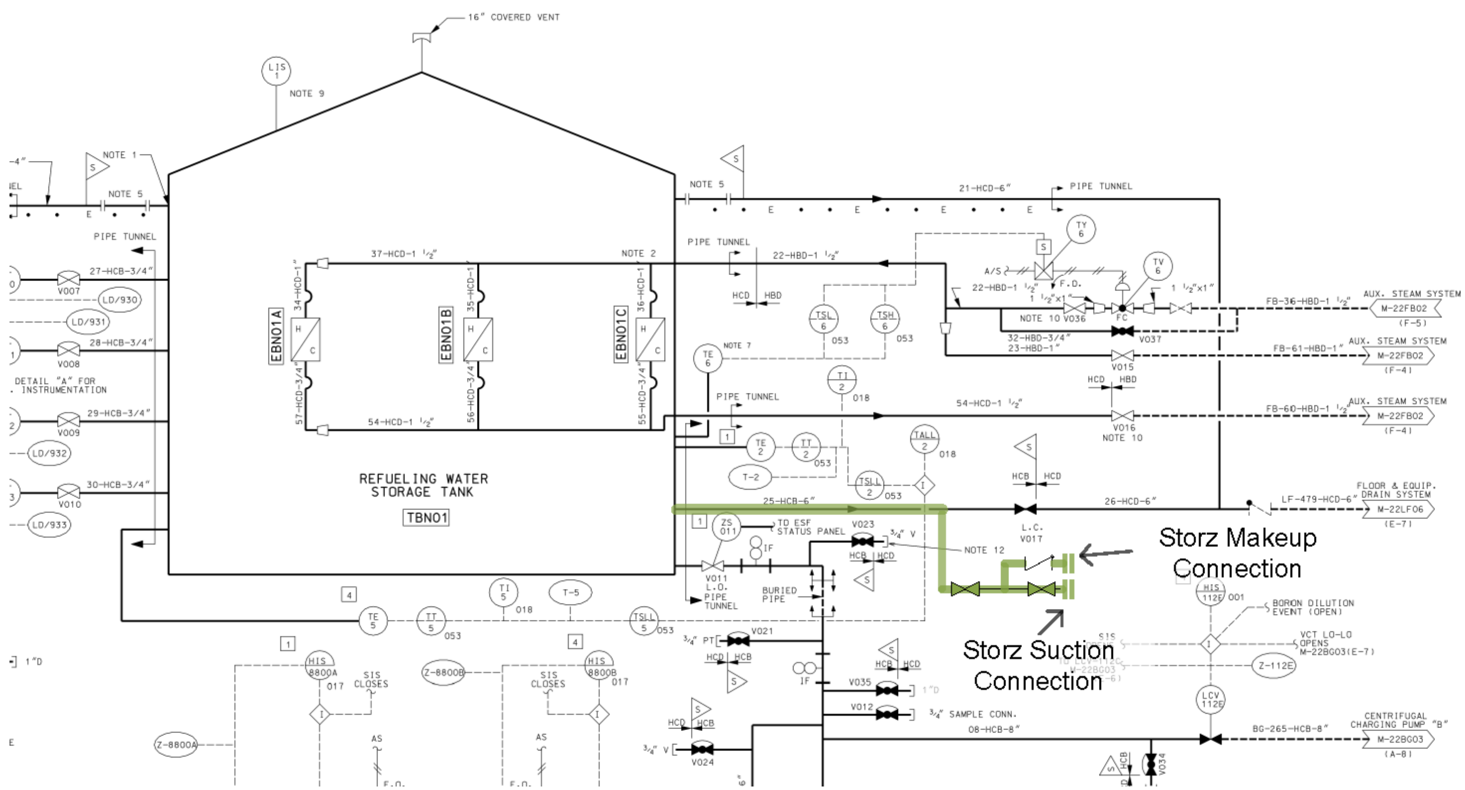

Figure A3-28: RWST Connection for CST Makeup or RCS Inventory Control and Boration (Drawing M-22BN01, Reference 7.q)

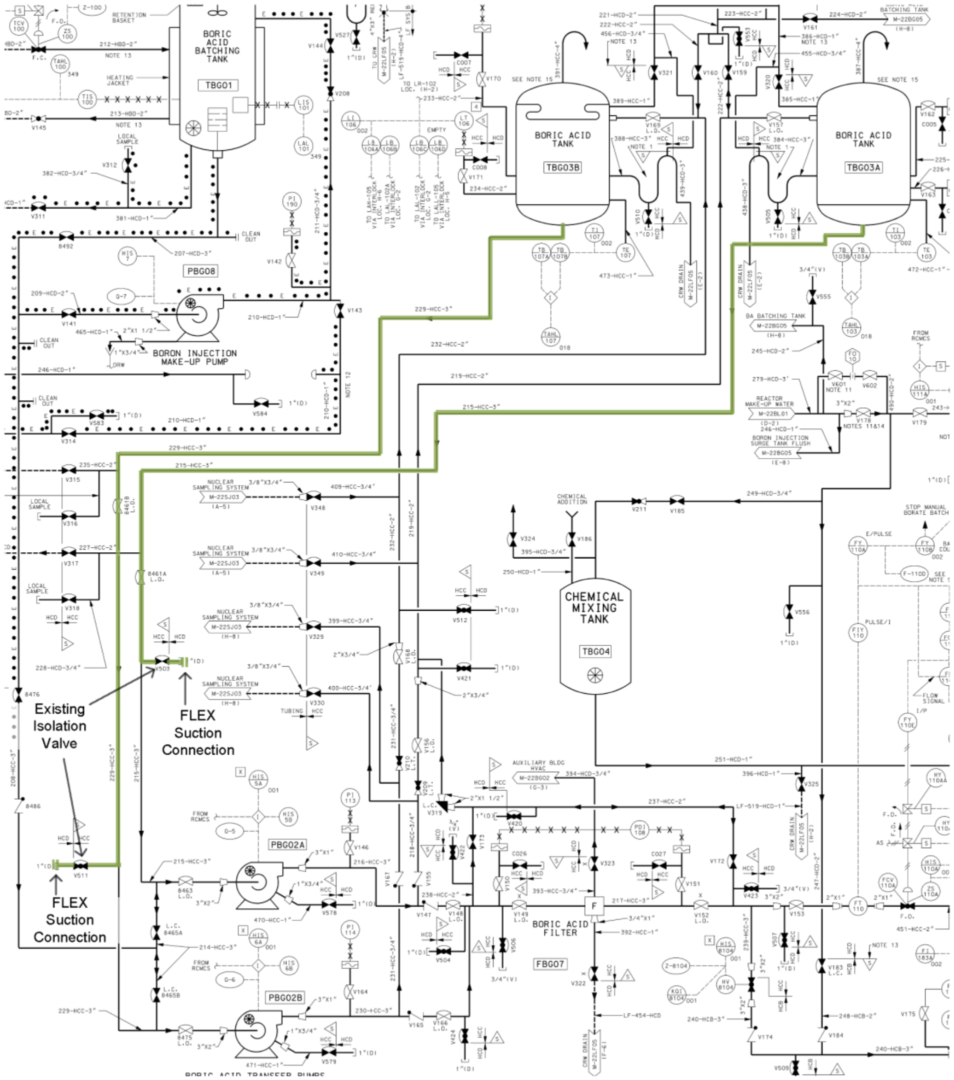

Figure A3-29: BAT Connections for RCS Boration (Drawing M-22BG05, Reference 7.o)

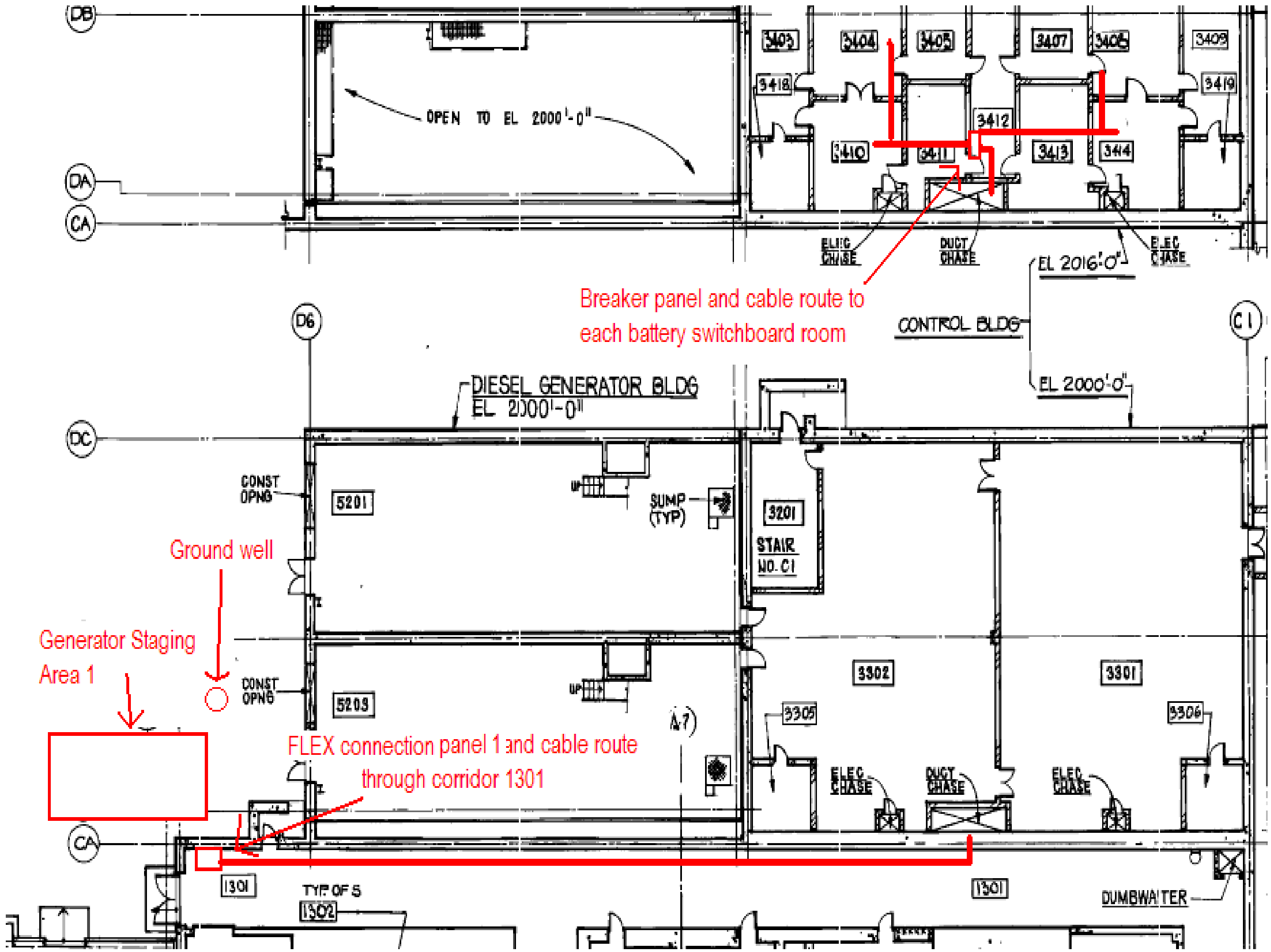

Figure A3-30: 480V FLEX Primary Connection Strategy

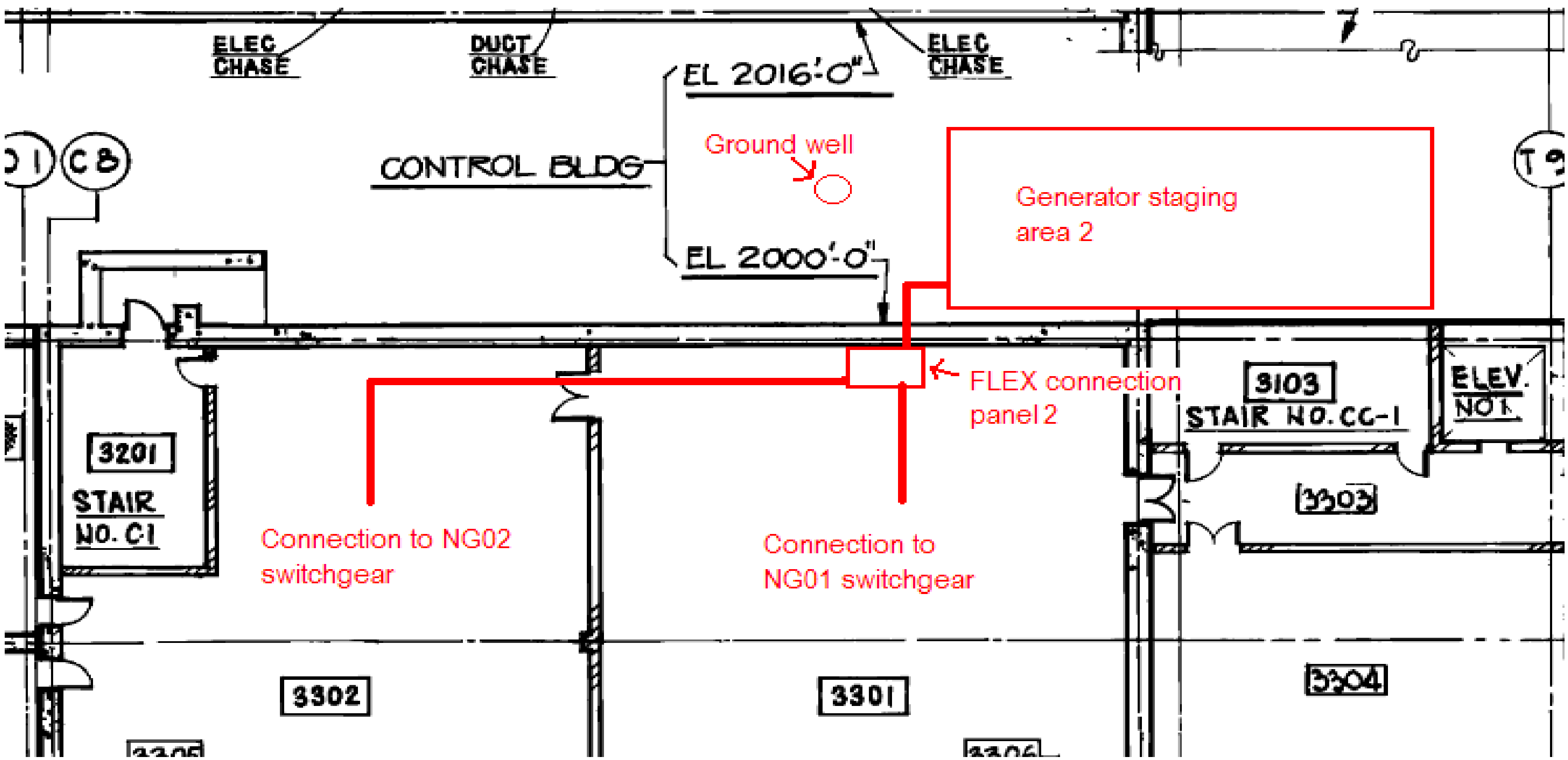

Figure A3-31: 480V FLEX Alternate Connection Strategy

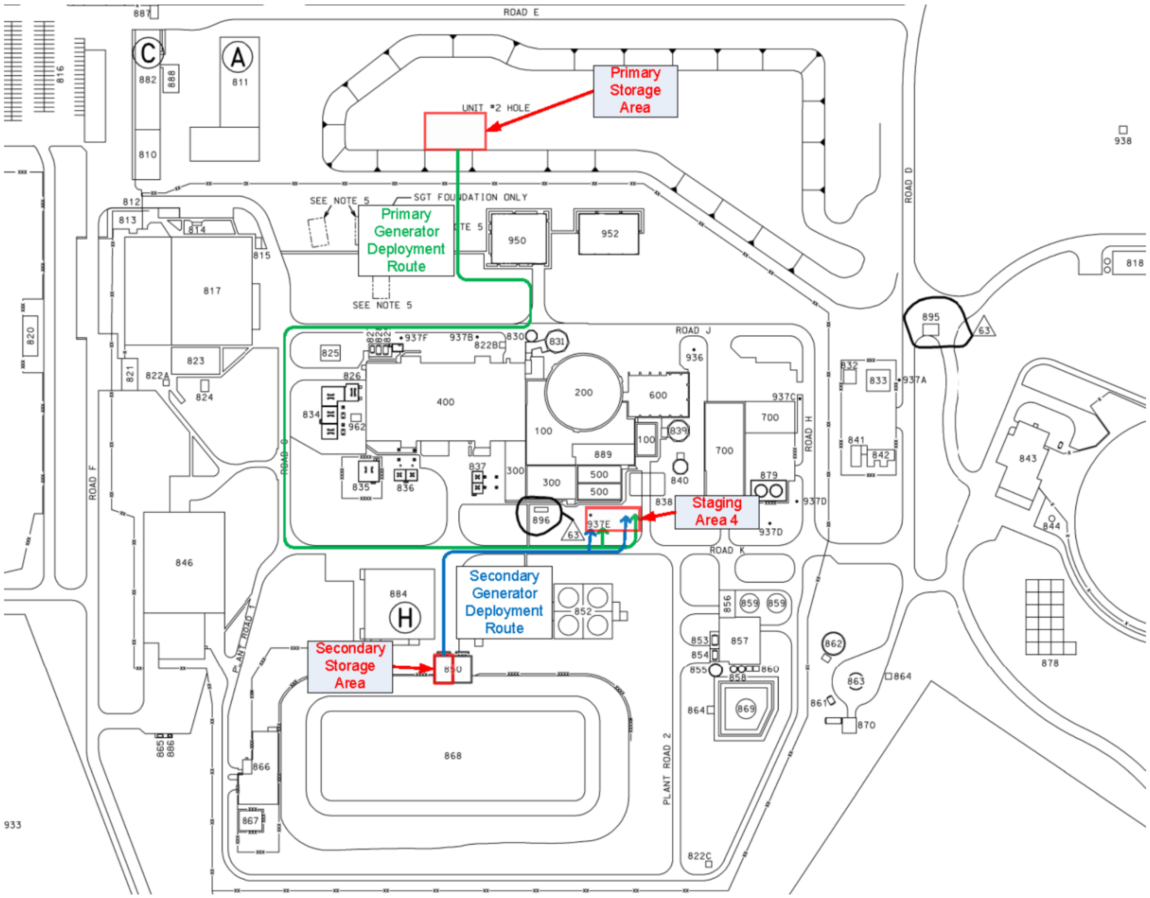

Figure A3-32: Primary and Alternate Generator Staging Routes and Staging Location

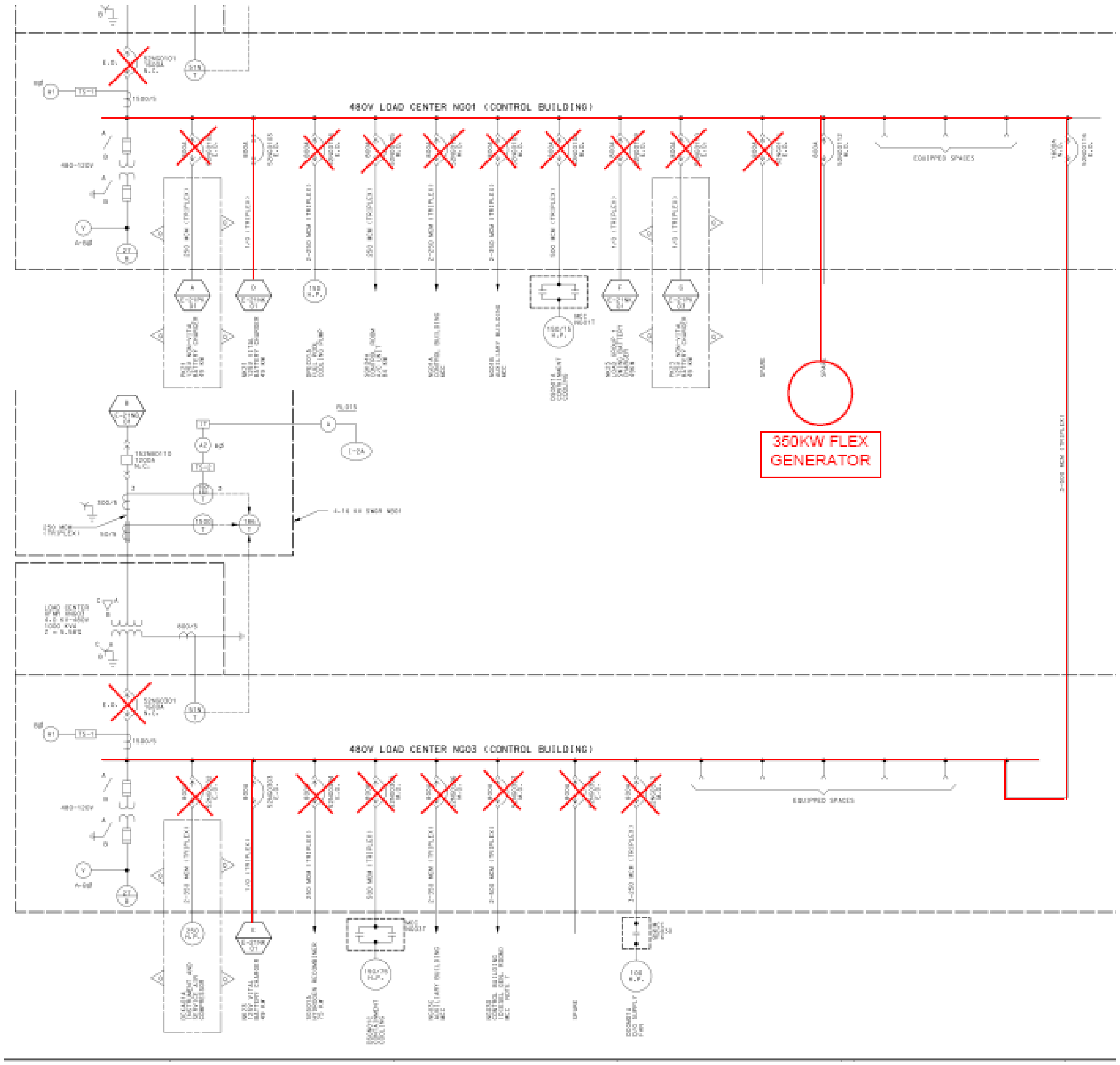

Figure A3-33: NG01 & NG03 FLEX Generator Connection and Alignment

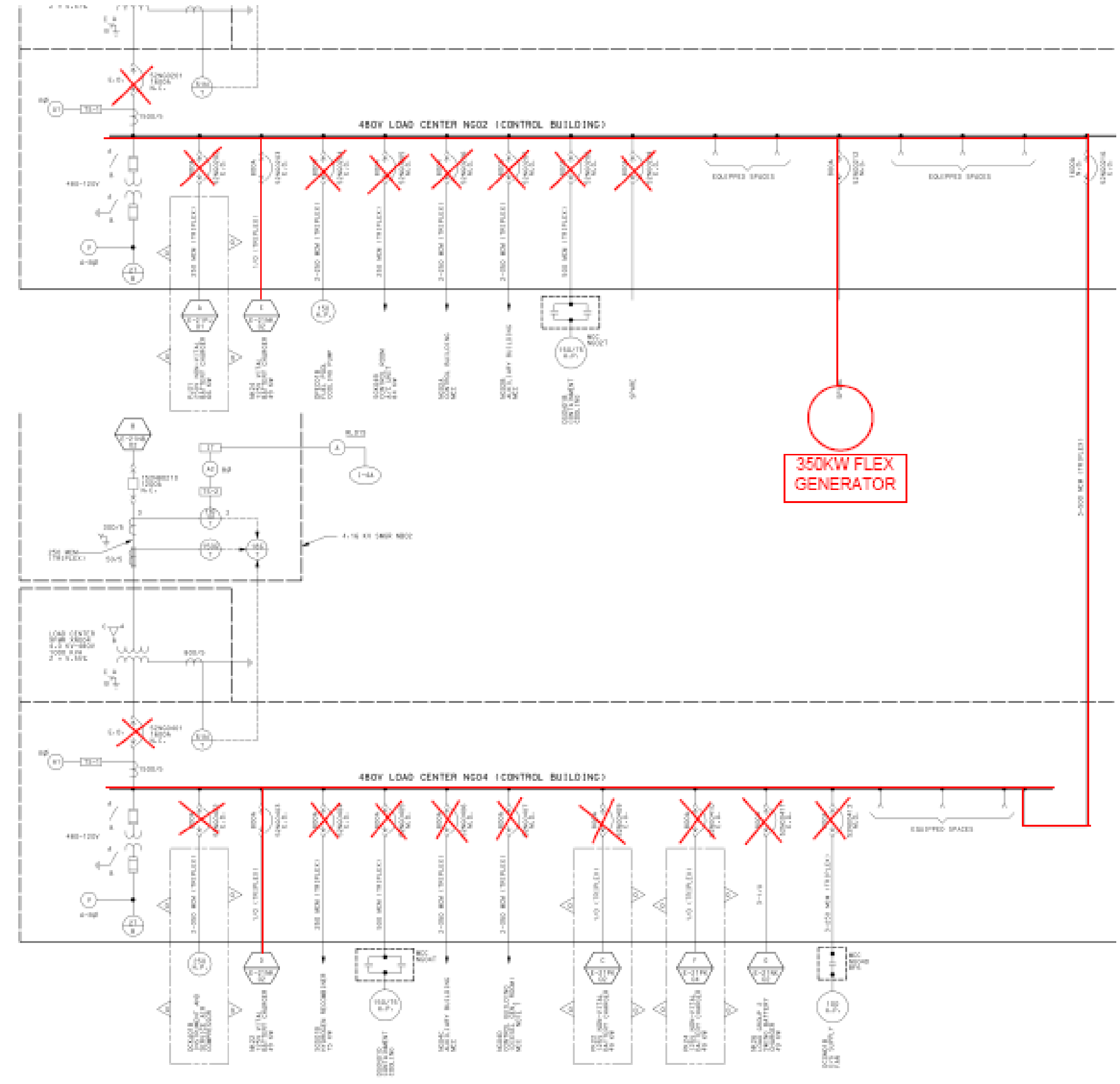

Figure A3-34: NG02 & NG04 FLEX Generator Connection and Alignment

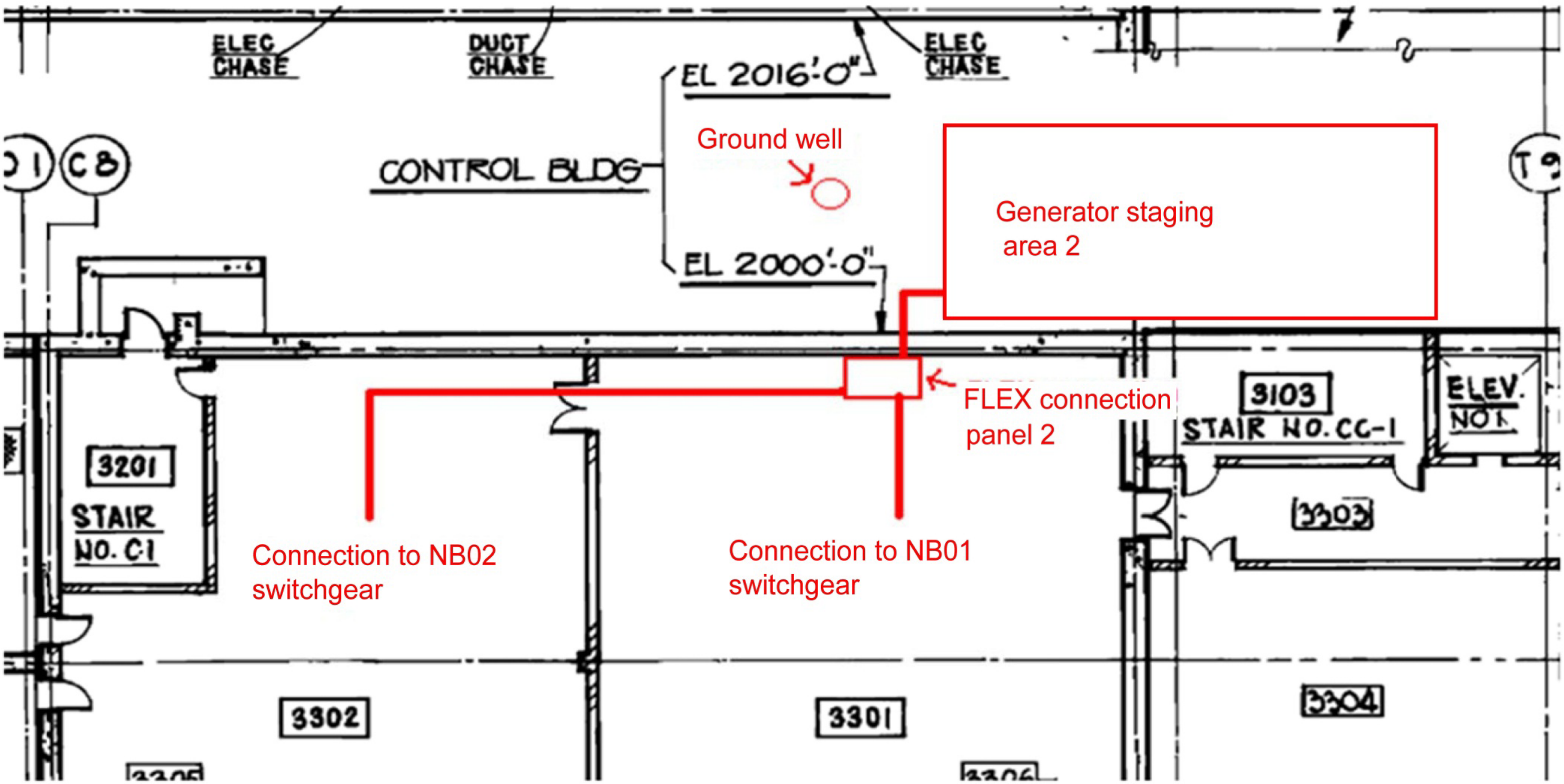

Figure A3-35: 4160V FLEX Connection Strategy

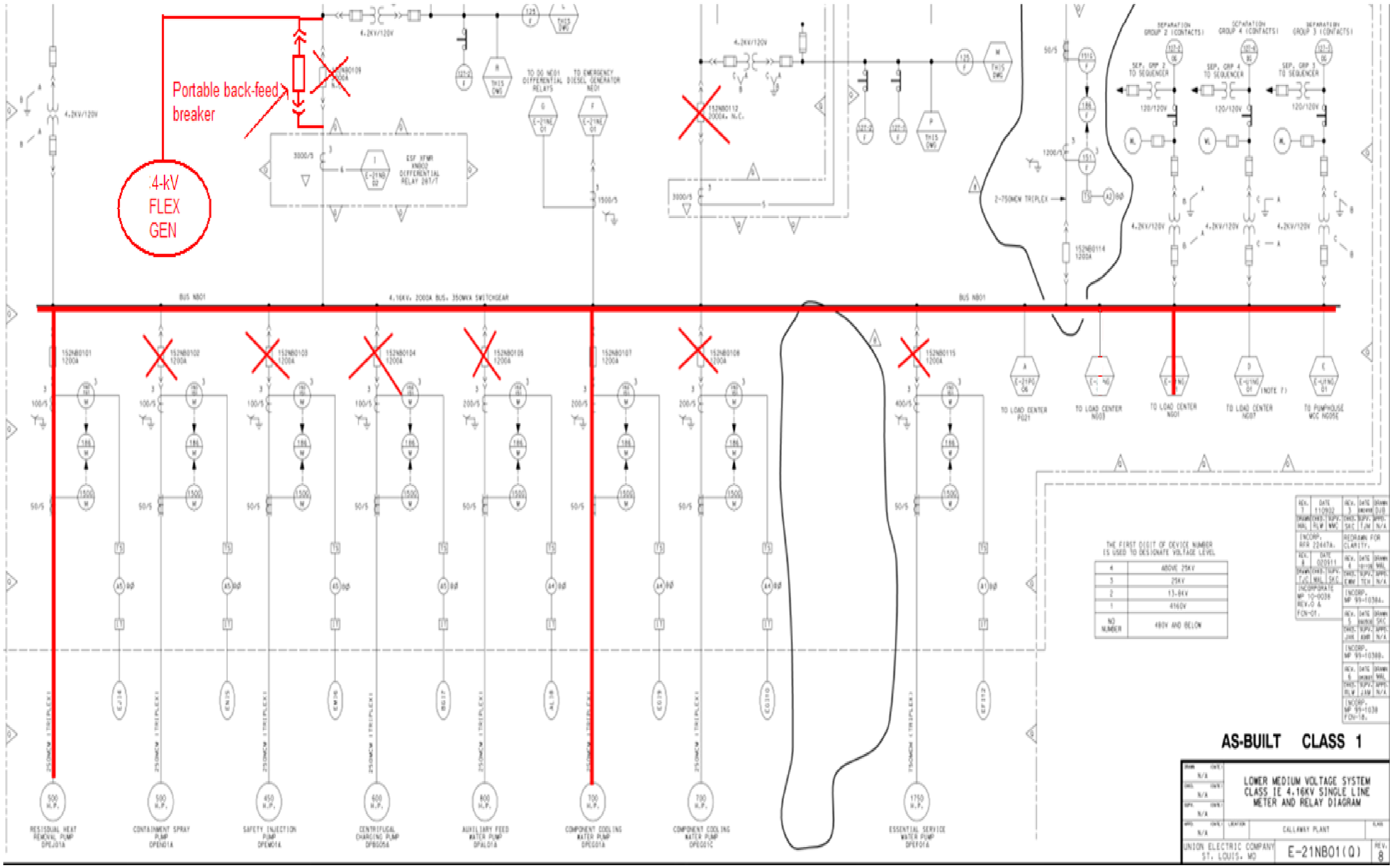

Figure A3-36: NB01 Alignment

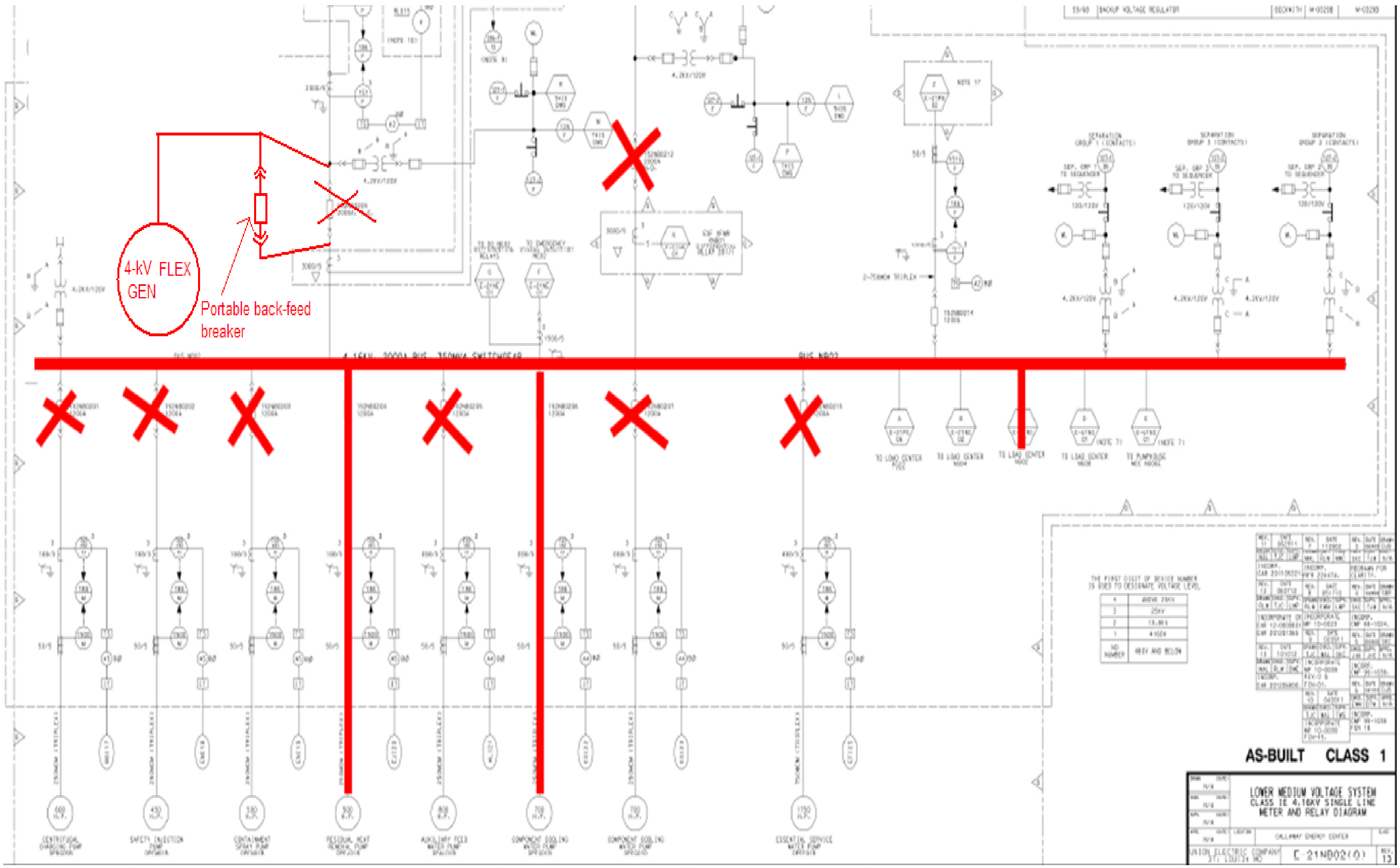

Figure A3-37: NB02 Alignment