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February 28, 2013

NL-13-042

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Overall Integrated Plan in Response to March 12, 2012, Commission Order to Modify Licenses With Regard To Requirements for Mitigation Strategies for Beyond-Design-Basis External Events
(Order Number EA-12-049)
Indian Point Unit Numbers 2 and 3
Docket Nos. 50-247 and 50-286
License Nos. DPR-26 and DPR-64

REFERENCES:

1. NRC Order Number EA-12-049, *Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, dated March 12, 2012 (RA-12-037)

2. NRC Interim Staff Guidance JLD-ISG-2012-01, *Compliance with Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events*, Revision 0, dated August 29, 2012 (ML12229A174)

3. Nuclear Energy Institute (NEI) 12-06, *Diverse and Flexible Coping Strategies (FLEX) Implementation Guide*, Revision 0, dated August 2012

4. Entergy letter to NRC (NL-12-144),*Initial Status Report in Response to March 12, 2012, Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)*, dated October 29, 2012

Dear Sir or Madam:

On March 12, 2012, the NRC issued an order (Reference 1) to Entergy Operations, Inc. (Entergy). Reference 1 was immediately effective and requires provisions for mitigating

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strategies for beyond-design-basis external events. Specific requirements are outlined in the Enclosure of Reference 1.

Reference 1 requires submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (Reference 2) was issued August 29, 2012, and endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions. Reference 3 provides direction regarding the content of this Overall Integrated Plan. The purpose of this letter is to provide that Overall Integrated Plan pursuant to Section IV, Condition C.1.a, of Reference 1.

Reference 3, Section 13, contains submittal guidance for the Overall Integrated Plan. The enclosure to this letter provides Indian Point Energy Center's (IPEC's) Overall Integrated Plan pursuant to Reference 3.

Reference 4 provided IPEC's initial status report regarding Mitigation Strategies for Beyond-Design-Basis External Events, as required by Reference 1. Entergy has not yet identified any impediments to compliance with the Order, i.e., within two refueling cycles after submittal of the integrated plan, or December 31, 2016, whichever comes first. Future status reports will be provided as required by Section IV, Condition C.2, of Reference 1.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact Mr. Robert Walpole, Manager, Licensing at (914) 254-6710.

I declare under penalty of perjury that the foregoing is true and correct; executed on February 28, 2013.

Sincerely,

Patrick W. Conway, acting for John A. Ventosa

JAV/sp

Enclosure: Indian Point Energy Center FLEX Overall Integrated Implementation Plan

cc: Mr. Douglas Pickett, Senior Project Manager, NRC NRR DORL
Mr. William M. Dean, Regional Administrator, NRC Region I
NRC Resident Inspector's Office Indian Point
Ms. Bridget Frymire, New York State Department of Public Service
Mr. Francis J. Murray, Jr., President and CEO, NYSERDA

ENCLOSURE TO NL-13-042

INDIAN POINT ENERGY CENTER

FLEX OVERALL INTEGRATED IMPLEMENTATION PLAN

ENTERGY NUCLEAR OPERATIONS, INC.
INDIAN POINT NUCLEAR GENERATING UNIT NOS. 2 and 3
DOCKET NOS. 50-247 and 50-286

General Integrated Plan Elements

Indian Point Energy Center

Determine Applicable Extreme External Hazard **Ref: NEI 12-06 Section 4.0 -9.0** **JLD-ISG-2012-01 Section 1.0**	*Input the hazards applicable to the site; seismic, external flood, high winds, snow, ice, cold, high temps. Describe how NEI 12-06 Sections 5 – 9 were applied and the basis for why the plant screened out for certain hazards.*

The Indian Point Energy Center (IPEC) site has been evaluated and the following applicable hazards have been identified:

- Seismic events
- External flooding
- Severe storms with high winds
- Snow, ice, and extreme cold
- Extreme heat

IPEC has reviewed the NEI FLEX guidance and determined the hazards that FLEX equipment should be protected from include seismic; external flooding; severe storms with high winds; snow, ice, and extreme cold; and extreme high temperatures. The IPEC has determined the functional threats from each of these hazards and identified the FLEX equipment that may be affected. The FLEX equipment is being purchased as commercial grade and the storage locations will provide the protection required from these hazards. The IPEC is also developing procedures and processes to further address plant strategies for responding to these various hazards.

Seismic:

Per NEI 12-06, seismic hazards must be considered for all nuclear sites. As a result, the credited FLEX equipment will be assessed based on the current IPEC seismic licensing basis to ensure that the equipment remains accessible and available after a BDBEE, 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 the IPEC will include documentation ensuring that any storage locations and deployment routes meet the FLEX seismic criteria.

External Flooding:

Per NEI 12-06 Section 6, a three pronged evaluation of external flooding was performed. The IPEC site is not considered a "dry" site and is therefore, susceptible to external flooding. Accordingly, FLEX strategies will be developed for consideration of external flooding hazards.

The types of events evaluated to determine the worst potential flood included (1) runoff generated by a probable maximum precipitation over the entire Hudson River drainage basin upstream of the site, (2) occurrence of any upstream dam failure concurrent with heavy runoff generated by a standard project flood, and (3) the occurrence of a probable maximum hurricane concurrent with a spring high tide in the Hudson River. The maximum flood level from any of the failures listed above was determined to be 15 ft, which would not flood the safety related buildings (References 4 and 5, Section 2.5).

High Wind:

Figures 7-1 and 7-2 from the NEI 12-06 were used for this assessment. The IPEC site is above the 35th parallel (Universal Transverse Mercator Coordinates Latitude 41°-16' North and Longitude 73°-57' West).

It was determined the IPEC site has the potential to experience coastal winds exceeding 130 mph. Figure 7-2 of NEI

12-06 indicates a maximum wind speed of 170 mph for the Region 2 plants, including the IPEC. Therefore, high-wind hazards are applicable to the IPEC site.

In summary, based on available local data and Figures 7-1 and 7-2 of NEI 12-06, the IPEC is susceptible to severe storms with high 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 states plants above the 35th parallel should provide the capability to address the impedances caused by extreme snow and cold. The IPEC site is above the 35th parallel (Universal Transverse Mercator Coordinates Latitude 41°-16' North and Longitude 73°-57' West); 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.

Applicability of ice storms:

The IPEC site is not a Level 1 or 2 region as defined by Figure 8-2 of the NEI FLEX Implementation Guide; therefore, the FLEX strategies must consider the impedances caused by ice storms.

In summary, based on the available local data and Figures 8-1 and 8-2 of NEI 12-6, the IPEC site does experience significant amounts of snow or ice, and extreme cold temperatures; therefore, the hazard is screened in.

Extreme Heat:

Per NEI 12-06, 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. Peekskill, New York has recorded a high temperature of 115°F and a low temperature of -15°F. Sites that should address high temperatures should consider the impacts of these conditions on the FLEX equipment and its deployment.

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

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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 (Reference 2). Analysis has been performed consisted with the recommendations contained within the Executive Summary of the PWROG Core Cooling Position Paper (OG-12-482) and the 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

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 offsite power system either throughout the grid or at the plant with no prospect for recovery of offsite power for an extended period. The LOOP is assumed to affect all units at a plant site.

A4.All installed sources of emergency onsite 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 UHS 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 the 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, which 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 back up dc power supplies, spare Batteries, and equipment for 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 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, remains 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 or fires.

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 the current station blackout coping capabilities is sufficient.

The following assumptions are specific to the IPEC site:

A25.IPEC will be able to declare an ELAP within 1 hour in order to enable actions which place the plant outside of the current design and licensing basis.

A26.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.

A27. This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the UHS 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 guidance. 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).

A28. 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 12-06, 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.

A29. The design hardened connections applicable to FLEX strategies are protected against external events or are established at multiple and diverse locations.

A30. Instrumentation on FLEX equipment will be used to confirm continual performance.

General Integrated Plan Elements Indian Point Energy Center	
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.*
Entergy plans to fully comply with the guidance in JLD-ISG-2012-01 or NEI 12-06 in implementing FLEX strategies for the IPEC site.	
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 Indian Point Energy Center Modes 1-4 strategies for FLEX Phases 1 through Phase 3 (Reference 10). See attached sequence events timeline (Attachment 1A) for a summary of this information.

1. Control Room Ventilation (Open Room/Cabinet Doors) – 0.5 hours
   - Indian Point Plant procedure ECA-0.0, Loss of All AC Power, directs opening control room doors and/or cabinet doors (References 7 and 8).
2. TDABFP Room Ventilation – 0.5 hours
   - Indian Point Plant procedure ECA-0.0, Loss of All AC Power, directs opening TDABFP room doors within 30 minutes of a loss of all ac power. The temperature in the TDABFP room will be less than 120°F for at least 72 hours if the door is open by the first hour after the event.
3. Declare ELAP – 1 hour
   - 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 10).

4. Deep Load Shed– 2 hours
   - Load shedding increases Battery life for duration of Phase 1 (8 hours). (Reference 10).
5. Perform Plant cooldown – 3 hours
   - Cooldown commences at 1 hour to minimize RCS leakage prior to capability to initiate RCS makeup as the FLEX RCS Makeup pump has a deployment time of ~2 hours. An assumed cooldown rate of 75 ± 5 °F will place the plant at target temperature of 400°F in ~2 hours (3 hours after LOAC) (Reference 10).
6. Debris Removal – 3 hours
   - Based on earliest need for deployment paths (Reference 10).
7. Perform Damage Assessment – 6 hours
   - Indian Point 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 10). This damage assessment will guide FLEX strategies and will be a future FSG requirement.
8. Control Room & Emergency Lighting – 8 hours
   - Phase 1 lighting is provided by emergency lighting Batteries, but beyond Phase 1 will require new strategies. Assume control room lighting after 8 hours is addressed per Phase 2 action. (Reference 10).
9. Energize Phase 2 480V Generator – 8 hours
   - This time constraint is dependent upon the earliest need for the generator based on providing power to the Plant Power System (Reference 10).
10. Deploy Miscellaneous Lighting and Ventilation – 8 hours
    - Additional lighting and ventilation is not easily powered from the 480V bus and will require use of Batteries and/or small portable generators as deemed necessary.
11. Deploy Battery Room Ventilation for Unit 3 – 8 hours
    - Unit 3 Battery room ventilation must occur shortly after Battery charging is initiated to vent hydrogen (Reference 10).
12. Initiate RCS Makeup from BAST – 8 hours
    - RCS makeup is required for inventory at 5.2 hours assuming cooldown is commenced at 1 hour. Assuming the FLEX RCS pump takes ~2 hours to deploy, the cooldown will be commenced at 1 hour (assumption). Therefore, 5.2 hours becomes the limiting time. However, further evaluation is expected to extend the current requirement for inventory to justify an eight hour requirement (Reference 10).
13. Establish SFP Area Vent – 8.04 hours
    - Establish SFP vent area such as opening the door. Need time based on SFP time to boil without a break. This time to boil is based on an initial SFP temperature of 140°F and assumes all pipe penetrating the SFP remains intact.
14. Deploy SFP Makeup Hose – 8.04 hours
    - Deploy the FLEX SFP discharge hose. Need time based on SFP time to boil without a break. This time to boil is based on an initial SFP temperature of 140°F and assumes all pipe penetrating the SFP remains intact.

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15. Switch RCS Makeup from BAST to RWST – 10.5 hours
    - This need time is based on the depletion of the BASTs and the need to maintain RCS inventory (Reference 10).
16. Establish FLEX Equipment Fuel Deployment – 13 hours
    - This is an assumption. Indian Point will provide a more exact basis once all FLEX equipment has been purchased and equipment specifications (fuel consumption rate) are known.
17. Stage FLEX SG Makeup pump – 24 hours
    - Stage as early as possible in event to provide defense in depth (Reference 10).
18. Large Debris Removal –24 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 10).
19. Initiate SFP Makeup – 27.83 hours
    - Per Reference 10, the time for the SFP to boil is 8.04 hours and time for the level to reach 15 ft. above the top of the racks is an additional 19.79 hours.
20. Align FLEX ACS Pump from Available ACS to CST – 32 hours
    - Based on current CST credited volume depleting in 32 hours (Reference 10). The UHS is the assured seismic alternate coolant source (ACS) (Reference 10).
21. Mobile Water Purification System –32 hours
    - The current credited CST volume will deplete in 32 hours. The volume of the UHS can be credited indefinitely. This mobile purification skid would be aligned as soon as possible to allow processing untreated water for makeup (Reference 10).
22. Phase 3 480V 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 10).
23. Align UHS Pump and Alternate Service Water – 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 10).
24. Establish Large Fuel Truck Delivery Service – 72 hours
    - Assumption regarding the depletion of on-site supply and supplying larger equipment. Indian Point will provide a more exact basis once all FLEX equipment has been purchased and equipment specifications are known (Reference 10).

To confirm the times given, IPEC 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.*

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Deployment of the FLEX equipment is described for each FLEX function in the subsequent sections below and covers all operating modes. The broad-spectrum deployment strategies do not change for the different operating modes. The deployment strategies from the storage areas to the staging areas are identical and include debris removal, equipment transport, fuel transport, and power sources and requirements. The only difference is the discharge connection location for the FLEX pumps. The primary and secondary connection locations for RCS inventory control when the steam generators are available to provide core cooling will also be the connection locations utilized providing coolant directly to the RCS when the steam generators are not available to provide core cooling. Each of these strategies and the associated connection points are described in detail in the subsequent sections. The electrical coping strategies are the same for all modes.

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

The dates specifically required by the order are obligated dates. Other dates are planned dates subject to change. Updates will be provided in the periodic (six month) status reports.

See attached milestone schedule in Attachment 2.

Identify how the programmatic controls will be met.	*Provide a description of the programmatic controls equipment protection, storage and deployment and equipment quality. See Section 11 in NEI 12-06.*

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Ref: NEI 12-06 Section 11 **JLD-ISG-2012-01 Section 6.0**	*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.*

Equipment associated with these strategies will be procured as commercial equipment with design, storage, maintenance, testing, and configuration control in accordance with NEI 12-06 Rev.0 Section 11.0 (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 Rev.0 Section 11.5 (Reference 2).

Programs and controls will be established to assure personnel proficiency in the mitigation of beyond-design-basis events is developed and maintained in accordance with NEI 12-06 Rev.0 Section 11.6 (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 Rev.0 Section 11.8 (Reference 2).

Procedure Guidance

The IPEC is a participant in the Pressurized Water Reactor Owners Group (PWROG) project PA-PSC-0965 and will implement the FLEX Support Guidelines (FSGs) in a timeline to support the implementation of FLEX by Spring 2015 (IP3) and Spring 2016 (IP2). The PWROG has generated these guidelines in order to assist utilities with the development of site-specific procedures to cope with an ELAP in compliance with the requirements of Reference 2.

The proposed implementation strategy aligns with the procedure hierarchy described in NEI 12-06 (Reference 2) in that actions that maneuver the plant are contained within the typical controlling procedure, and the FSGs are implemented as necessary to maintain the key safety functions of Core Cooling, Spent Fuel Cooling, and Containment in parallel with the controlling procedure actions. The overall approach is symptom-based, meaning that the controlling procedure actions and the FSGs are implemented based upon actual plant conditions.

The IPEC will continue participation in PA-PSC-0965 and will update plant procedures upon the completion of the PWROG program. It is expected that the following FSGs will be incorporated into existing plant procedures in order to develop the FSG interface:

- Alternate AFW Suction Source
- Alternate Low Pressure Feedwater
- ELAP DC Load Shed/Management
- Initial Assessment and FLEX Equipment Staging
- Alternate CST Makeup
- Loss of DC Power
- Alternate RCS Boration
- Long Term RCS Inventory and Temperature Control
- Passive RCS Injection Isolation
- Alternate SFP Makeup and Cooling

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- Alternate Containment Cooling
- Transition from FLEX Equipment

Maintenance and Testing

The IPEC intends to maintain and test the FLEX equipment consistent with the requirements of Fire Protection and SBO maintenance. Entergy will review the maintenance and testing template upon issuance by the Electric Power Research Institute (EPRI) to ensure alignment with their Fire Protection and SBO maintenance procedures. Additionally, the IPEC will ensure that their maintenance and testing procedures meet the FLEX guidelines established in Section 11.5 of Reference 2.

Staffing

The FLEX strategies documented in the event sequence analysis assume:

- Onsite staff are at administrative shift staffing levels
- No independent, concurrent events
- All personnel onsite are available to support site response

The IPEC will have to address staffing considerations in accordance with NEI 12-06 (Reference 2) to fully implement FLEX at the site.

Configuration Control

Per NEI 12-06 (Reference 2) and the Interim Staff Guidance (Reference 3), the FLEX strategies must be maintained to ensure future plant changes do not adversely impact the FLEX strategies.

Therefore, IPEC will need to maintain the FLEX strategies and basis in an overall program document and will modify existing plant configuration control procedures to ensure changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies.

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 ERO, Fire, Security, EP, Operations, Engineering, Mechanical Maintenance, and Electrical Maintenance. The training plan development will be done in accordance with the IPEC procedures using the Systematic Approach to Training, and will be implemented to ensure that the required IPEC staff is trained prior to implementation of FLEX.

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)*

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	•Describe how delivery to the site is acceptable *•Describe how all requirements in NEI 12-06 are identified*

The industry will establish two Regional Response Centers (RRC) to support utilities during beyond design basis events. Each RRC will hold five sets of equipment, four of which will be able to be fully deployed when requested; the fifth set will have equipment in a maintenance cycle. Equipment will be moved from an RRC to a local Assemble Area, established by the 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.

Entergy has signed a contract with SAFER to meet the requirements of NEI 12-06, Section 12.

Maintain Core Cooling & Heat Removal

Determine Baseline coping capability with installed coping[1] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:

- **AFW/EFW**
- **Depressurize SG for Makeup with Portable Injection Source**
- **Sustained Source of Water**

Ref: JLD-ISG-2012-01 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.

Unless otherwise noted, information in this section was obtained from Reference 10.

Core Cooling with Steam Generators Available:

During a SBO, operator actions are currently governed by procedure 2/3 ECA-0.0 for Units 2 and 3. The overall strategy is to isolate the Reactor Coolant System (RCS) to conserve inventory, start the Turbine Driven Auxiliary Boiler Feed Pump (TDABFP), and supply water to the Steam Generator(s) (SG) to remove decay heat and provide RCS cooling by depressurizing the SG(s) via the Atmospheric Dump Valve(s) (ADV), The only exits from this procedure are

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

Maintain Core Cooling & Heat Removal

the restoration of some source of ac Power or the eventual transition to the Severe Accident Management Guidelines (SAMGs) based on high core exit temperatures.

Installed TDABFP

Following event initiation, the decay heat removal and SG/RCS depressurization relies on the auxiliary feed water system (AFWS) to draw water from the Condensate Storage Tank (CST) to supply it to the SG(s) using the TDABFP and to depressurize the SG(s) using the ADV(s). Using the existing IPEC PRA/MAAP analyses which assume an available CST volume of 360,000 gallons at the start of the event, the SG(s) can be supplied with water for approximately 32 hours. With the above strategies and capabilities, the estimated Core Cooling coping time is in excess of 24 hours (Reference 6).

Ventilation

For the TDAFP room, procedure 2/3-ECA-0.0 already contains steps to open ventilation paths to maintain acceptable local temperatures while the pump is in service (References 7 and 8). The procedure background document indicates the doors on cabinets in the control room and the AFW pump room roll-up door are opened to dissipate heat. These actions must be accomplished within 30 minutes of the loss of all AC 480V power event

Establish Steam Generator Dump Relief Valves

The TDABFP supplies water to the Steam Generator(s) (SG) to remove decay heat and provide RCS cooling by depressurizing the SG(s) via the Atmospheric Dump Valve(s) (ADV). With respect to ADV operation, installed nitrogen supplies will support at least 30 hours of ADV operation (i.e., two ADVs for IP2 and one ADV for IP3) based on the licensing basis calculations that conservatively assume minimum required N2 bottle pressure and 35 full strokes of the ADV. Per Reference 6, the licensing basis calculation points out that this assumed number of strokes is conservatively high, since plant cool down requires minimal ADV manipulation in the field.

Core Cooling with Steam Generators not Available:

During Modes 5 and 6, core cooling is maintained through heat removal from the RCS via coolant boil-off. During Phase 1, the inventory is maintained in the vessel by ensuring adequate RCS makeup using gravity feed from the RWST. The rate of gravity feed depends upon the RWST fluid height, line losses through the gravity flow path, and developed pressure within the RCS. Pressure is maintained sufficiently low in the RCS by ensuring adequate venting is established prior to entering conditions wherein SG cooling is not available as a part of shutdown risk management.

Details:	
Provide a brief description of Procedures/Strategies/Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* Station Blackout (SBO) Emergency Operating Procedure (EOP) ECA-0.0 (Reference 7 and 8) 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.No modifications are necessary.

Maintain Core Cooling & Heat Removal

Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* Steam Generators Available 1.SG Wide Range Level or Narrow Range Level 2.AFW Flow indication 3.SG Pressure 4.CST Level (local level indication only) 5.Subcriticality Steam Generators Not Available 1.Core Exit Thermocouple (CET) Temperature 2.Reactor Vessel Level Indicating System IPEC 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.

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.

Unless otherwise noted, information in this section was obtained from Reference 10.

Core Cooling with Steam Generators Available:

The transition into Phase 2 will be required once the operating conditions of the TDABFP cannot be maintained. The primary strategy involves staging the portable pump outside the auxiliary building and running hose to a primary or secondary connection point to the auxiliary feedwater system. The storage locations, deployment paths, and staging locations for the FLEX equipment are provided in Figure A3-3, Figure A3-4 and Figure A3-15 through Figure A3-18 in Attachment 3. This strategy involves taking suction first from the CST and then from an alternate water source. The FLEX pump can be staged in an area near the CST as outlined in Figure A3-3 and Figure A3-4 in Attachment 3. The CST contains enough water to maintain core cooling for approximately 32 hours. After the CST is exhausted, a transition to increasingly impure water sources will occur. A line loss evaluation was performed which shows the expected line losses for both the primary and alternate configurations. The proposed hose routing for the primary AFW FLEX connection and the associated equipment can be seen in Figure A3-5 in Attachment 3. The diesel fuel supply for all FLEX equipment will be from the Emergency Diesel Generator Fuel Oil Storage Tanks.

The primary connection is preferred to be from a system tee at an accessible location. This is preferred because it will decrease the amount of setup time required for operators. Also, it will allow for pre-staging of hose, if a flood warning occurs. This connection will need to be protected from high winds, floods, and seismic events. This connection will be

Maintain Core Cooling & Heat Removal	
just downstream of the TDABFP discharge check valve BFD-31. This location allows for feed to all four steam generators (path to the steam generators shown with green arrows) with a FLEX pump using the same injection path as the previously running TDABFP. Check valves exist between the TDABFP and this connection, preventing flow back through the TDABFP. The Flow Control Valves BFD-FCV-405(A-D) separates this connection point from the steam generators and should be confirmed to be open. These valves may also be operated by their hand wheels. No other valves capable of closing are located downstream of this connection point. The secondary connections will feed all four steam generators through the 2" drain valves BFD-22 on the AFW system. The Condensate Storage Tank (CST) provides the makeup water cooling source to be used as feed water from the onset of the extended loss of all ac power (ELAP) until the CST is exhausted as a water source. For the IPEC, the minimum volume of the CST is exhausted after 32 hours into the event. Therefore, cooling water will need to be supplied by another source for the remainder of the ELAP event. An evaluation of each alternate coolant source (ACS) has being completed. In this evaluation each ACS is postulated to be used individually as the feedwater source for hours 18 through 72. The ACSs considered for use include: the Primary Water Storage Tanks (PWST), the City Water Tank (CWT), the Fire Water Storage Tanks (FWST), the Refueling Water Storage Tanks (RWST), and the Hudson River. As previously stated the IPEC would exhaust the available supply of water in the CST in approximately 32 hours. For the plant to cope for 72 hours would require approximately 600,000 gallons of water for each unit. To provide this volume of water, an additional 240,000 gallons of water would be needed for each to cope for 72 hours. Regardless of the event scenario, the required coolant to the steam generators, suction could be taken from the Hudson River. The Hudson River is the UHS for the IPEC. The river level may vary depending on the type of event experienced. This source is considered available for this FLEX function, but should be used only if the water sources above are no longer available. Hose will be run from the Hudson River to a booster pump, from the booster pump to the FLEX pump, and then to the CST. The hose will be run through the manway on top of the Unit 2 CST. The staging point for the FLEX pump should be as close to the water as possible to minimize the height difference between the pump and the river. Routing between the Hudson River and the Unit 2 CST is shown in Figure A3-53 with suction routing in green while red represents discharge. Routing between the Hudson River and the Unit 3 CST is shown in Figure A3-58 with suction routing in green while red represents discharge. **Core Cooling with Steam Generators not Available:** During Modes 5 and 6, core cooling is maintained through heat removal from the RCS via coolant boil-off. Since core cooling is ensured by maintaining adequate RCS coolant inventory, core cooling, inventory control and subcriticality issues for conditions where steam generators are not available are addressed in the RCS Inventory Control section of this report.	
Details:	
Provide a brief description of Procedures/Strategies/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, Revision 0, Section 11.4 (Reference 2). Further, the PWROG is developing generic and NSSS-specific FLEX Support FSGs via PA-PSC-0965. The FSGs developed for IPEC will align with the PWROG guidance.
Identify modifications	*List modifications*

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	A description of any modifications required to implement this connection point (per Unit) are documented below. This includes new piping, valves, or adapters. 1. Also, 3 inch or larger suction connection lines will need to be added. These connections will include a manual isolation valve and a 3"x4" reducer to accommodate a 4 inch STORZ hose connection 2. A tee will be added to the auxiliary feedwater line of both units for the primary connection point. Two isolation valves and a STORZ hose connection will also be added. 3. For the Unit 2 secondary connection, a tee will be added downstream of BFD-22. A 2"x4" reducer will be attached to the branch line along with a 2" manual isolation valve, and a connection for a 4 inch STORZ hose connection. In Unit 3, a threaded cap is installed at this location. This capped end will be replaced with a 2"x4" reducer along with a 4 inch STORZ hose connection.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* Steam Generators Available 1.SG Wide Range Level or Narrow Range Level 2.AFW Flow indication 3.SG Pressure 4.CST Level (local level indication only) Steam Generators Not Available 1.Core Exit Thermocouple (CET) Temperature 2.Reactor Vessel Level Indicating System 3.Neutron Flux IPEC 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 storage location of the IPEC's FLEX equipment is the existing Unit 1 Chemical Systems Building. This location is protected from wind, flood, and seismic events. Access to equipment is possible through multiple roll up doors.	
Seismic	*List how equipment is protected or schedule to protect* The storage location is designed equivalent to ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures*. Large portable FLEX equipment will be

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	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 storage location is located above the maximum flood level of 15 ft mean sea level.
Severe Storms with High Winds	*List how equipment is protected or schedule to protect* Portable equipment to implement the 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 the FLEX strategies will be maintained in storage locations that is 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 Design

(Attachment 3 contains Conceptual Sketches)

The storage locations, deployment paths, and staging locations for the FLEX equipment are provided in Figure A3-3, Figure A3-4 and Figure A3-15 through Figure A3-18 in Attachment 3. The existing Unit 1 Chemical Systems Building will be used as a storage location. This location is protected from wind, flood, and seismic events. Access to the equipment is possible through multiple roll up door. Deployment from the Unit 1 Chemical Systems Building would necessitate the use of trucks or forklifts capable of pulling the FLEX pumps. The deployment routes are shown in see Figure A3-15 and Figure A3-16. Structures that may present a debris source in a seismic event are shown in red. The paths to the staging locations next to the CSTs are above flood level and no security barriers exist along either path. The deployment paths to the secondary staging location are shown in Figure A3-15 and Figure A3-16 and the primary connection deployment discussion apply to the secondary staging area.

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*

Maintain Core Cooling & Heat Removal

The driveways next to each unit's CST provide a level staging location, well above flood level (~18'), and near the CST and the alternate water sources (PWST, RWST, FWST). They will be used for the primary connection point. The staging locations for the secondary connection point are located directly west of the Turbine Buildings between the river and each door access point shown on Figure A3-17 and Figure A3-18. Hose will be run to connect the SG FLEX pump suction to the CST and the pump discharge to the steam generator inlet piping. For both units, flexible hose must be run to connect the FLEX pump to one of the suction sources mentioned. Hose routings for the primary connection point are shown in Figure A3-5 in Attachment 3. The Flow Control Valves BFD-FCV-405(A-D) for Unit 3 separate this connection point from the steam generators and should be verified to be open. These valves may also be operated by their hand wheels. No other valves capable of closing are located downstream of this connection point. The proposed hose routing for the secondary AFW FLEX connection runs through the exit door for Unit 3 and through the rollup door on the northwest corner of the Unit 2 Turbine Building for Unit 2 as shown in Figure A3-19 and Figure A3-20 in Attachment 3. Valves BDF-22 for Units 2 and 3 should be verified to be open. These valves may be operated by their hand wheels. Items requiring fuel include, but are not limited to, debris removal equipment, diesel generators, diesel	The connection modifications listed in the previous table will be made.	These connections are located in buildings protected from high winds, floods, and seismic events. The roll up doors by the AFW primary connection location will be evaluated for missile protection. The secondary connections, which are on the 18' elevation of the turbine building, will be evaluated for susceptibility to flooding.

Maintain Core Cooling & Heat Removal		
pumps, and FLEX equipment transportation vehicles. The diesel fuel supply for all FLEX equipment will be from the Emergency Diesel Generator Fuel Oil Storage Tanks.		
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.

Unless otherwise noted, information in this section was obtained from Reference 10.

In Phase 3, core cooling is continued to be maintained through natural circulation heat removal from the RCS via the steam generators. Reactor level and subcriticality is adequately maintained via the Phase 2 strategy, however, borated water sources are limited to some extent. Phase 3 deployment of a unit capable of generating ultra-pure borated coolant can further extend coping times with respect to RCS inventory management. Heat rejection through the steam generators is continued to be maintained via either the TDABFP or the SG FLEX pump; however, use of non-standard coolant in the SG cannot be maintained indefinitely. Phase 3 deployment of a unit capable of generating ultra pure coolant for use in the SGs can extend the coping time further; however, indefinite coping is successfully established once a transition from SG cooling to residual heat removal (RHR) system cooling is established. If the generator power is sufficient to power the CCW system, the Phase 3 deployment of a pump to supply the Ultimate Heat Sink (Hudson River water) flow to the shell side of the CCW Heat Exchanger establishes a portion of this capability. This approach will however require modification to the piping feeding (and returning) cooling water to (and from) the CCW heat exchanger.

Large debris removal equipment will be the first priority. While the Phase 2 FLEX paths will be cleared by onsite debris removal equipment, the regional response center (RRC) could provide debris removal equipment capable of clearing other paths possibly blocked by larger debris.

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 if there is failure of the onsite Phase 2 equipment during the indefinite coping period.

A mobile water purification system would enable water sources such as the Hudson River to be purified. This unit would process the water source and discharge improved quality water which could be used as makeup to the CST, or other components that require non-borated water. This unit would have an internal pump and be self powered. A large diesel generator will also be pursued to repower equipment such as the HVAC, the SFP cooling, the RHR pump, and the CCW pump.

A mobile boration system would enable borated water to be produced using the non-borated water sources that are available at the IPEC. This unit would combine the non-borated water and boron with a mixing mechanism to discharge a desired concentration of borated water, which could be used at makeup to the BASTs or RWSTs. This unit would have an internal pump and be self powered.

Any offsite fuel being provided by the Regional Response Center will be transported to a designated drop-off point outside of the plant site. As a Phase 3 strategy, it is desired to have a fuel truck delivered by the regional response center with the capability to transfer fuel from the designated drop-off point for the regional response center to the onsite fuel storage tanks. A large diesel fuel truck would be an addition to the diesel fuel truck used in the fuel transfer strategies discussed in Phase 2.

Determination of the functional requirements for each of these strategies, equipment and components will be completed at a later time and will be provided in the sixth month updates to the February 28, 2013 submittal.

The IPEC's response to IER 11-4 (Reference 6), provides a summary of agreements and contracts for mutual aid and support to mitigate the consequences of a BDBEE. Each of these contracts should be reviewed to determine applicability and revisions required to incorporate FLEX strategies.

Maintain Core Cooling & Heat Removal	
Details:	
Provide a brief description of Procedures/Strategies/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. The Phase 3 deployment of a pump to supply the Ultimate Heat Sink (Hudson River water) flow to the shell side of the CCW heat exchanger will however require modification to the piping feeding (and returning) cooling water to (and from) the CCW heat exchanger.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* Steam Generators Available 1.SG Wide Range Level or Narrow Range Level 2.AFW Flow indication 3.SG Pressure 4.CST Level (local level indication only) 5.Subcriticality Steam Generators Not Available 1.Core Exit Thermocouple (CET) Temperature 2.Reactor Vessel Level Indicating System IPEC 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 deployment paths for equipment received from the regional response center will be developed after the IPEC and the RRC have agreed upon a location to receive equipment onto the site.

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	None	There are no connection points for this strategy. All equipment will be provided by offsite resources.

Maintain Core Cooling & Heat Removal		
could provide debris removal equipment capable of clearing other paths possibly blocked by larger debris.		
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 impoundment to be purified. This unit would process the water source and discharge improved quality water which could be used to make up the CST or other components, which require non-borated water. This unit would have an internal pump and be locally powered. A large diesel generator will also be pursued to repower equipment such as the HVAC, SFP cooling, the RHR pump, and the CCW pump.	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 connection to the UHS impoundment will simply be a hose dropped into the lake. 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.
A mobile boration system would enable borated water to be produced using the non-borated water sources that are available at the IPEC. 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 could be used as makeup to the BASTs or RWST. This unit would have an internal pump and be locally powered.	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 for RCS Inventory Control.
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[2] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:

- **Low Leak RCP Seals or RCS makeup required**
- **All Plants Provide Means to Provide Borated RCS Makeup**

PWR Installed Equipment Phase 1:

Provide a general description of the coping strategies using installed equipment including modifications that are proposed to maintain 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.

Unless otherwise noted, information in this section was obtained from Reference 10.

RCS Inventory Control and Sub-Criticality with SG Available

The Phase 1 activities involve the plant cooldown, passive injection of the accumulators, and isolation of the accumulators before full depletion. This is done to prevent nitrogen injection into the RCS. The loss of all RCP seal cooling will lead to RCS leakage through the seals into containment from all four RCPs (i.e., 21 gpm per RCP or 84 gpm total at full pressure). The IPEC initial coping strategy evaluation determined the following.

- Due to SG depressurization as directed by 2/3-ECA-0.0, the RCP seal leakage reduces.
- Based on SG depressurization and approximately 32 hours of AFWS cooling, core uncovery is not projected to occur until approximately 237 hours into the event assuming no outside makeup is added to the RCS.

Due to the potential significant RCP seal leakage during Loss of All Seal Cooling, RCS inventory is a significant concern for the ELAP scenario. The ELAP times when a FLEX pump would be required to conservatively ensure that single phase natural circulation or two phase natural circulation is maintained are provided in the table below. Also included is the time when the collapsed liquid level of the RCS volume would begin to drop below the Top of the Active Fuel (TOAF).

IPEC will initiate cooldown immediately upon declaring ELAP. The safety injection accumulators will provide the initial source of inventory in Phase 1. By performing an early cooldown, inventory losses are reduced and access to the inventory in the accumulators is established. These actions extend the time frame in which the RCS is maintained in a condition of single phase natural circulation cooling.

Flow Condition	IP2	IP3
Single-Phase Natural Circulation	5 hrs	4.5 hrs
Two-Phase Natural Circulation	9.2 hrs	9.1 hrs
Core Uncovery (Reflux Cooling)	17.6 hrs	17.5 hrs

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

Maintain RCS Inventory Control
<u>RCS Inventory Control and Sub-Criticality with SG Not Available</u> The main concern for an ELAP during shutdown conditions is to maintain RCS inventory such that core cooling is maintained. During Modes 5 and 6, core cooling is maintained through heat removal from the RCS via coolant boil-off. During Phase 1, the inventory is maintained in the vessel by ensuring adequate RCS makeup using gravity feed from the RWST. The rate of gravity feed depends upon the RWST fluid height, line losses through the gravity flow path, and developed pressure within the RCS. Pressure is maintained sufficiently low in the RCS by ensuring adequate venting is established prior to entering conditions wherein SG cooling is not available as a part of shutdown risk management.

Maintain RCS Inventory Control	
Details:	
Provide a brief description of Procedures/Strategies/Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* ECA 0.0 for Loss of All AC Power (References 7 and 8).
Identify modifications	*List modifications* No modifications are required.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1.Core Exit Thermocouple (CET) Temperature 2.RCS Wide Range Pressure 3.Reactor Vessel Level Indicating System / Pressurizer Level 4.Subcriticality. IPEC 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:

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.

Unless otherwise noted, information in this section was obtained from Reference 10.

RCS Inventory Control and Sub-Criticality with SG Available

The Phase 2 activities for RCS inventory control involve aligning a pump to provide borated coolant for RCS makeup and to maintain the reactor subcritical. The FLEX pump will be deployed at a time consistent with the loss of single phase natural circulation. This pump will provide core make-up such that a limited period of two phase natural circulation cooling occurs maintaining the respective flow conditions desired in order to provide adequate core cooling. Given the reactor coolant pump characteristics of the Model 93 seal configuration, including the limited leakage expected at reduced inventory conditions , it is reasonable to be in two phase natural circulation for a small period of time.

Without a letdown path, contraction of the RCS inventory during the plant cooldown and depressurization is the only means in which available space is made to borate the RCS. A letdown path can be provided, if required, by opening the head vent to allow for increased boration capabilities. To ensure that the core is maintained subcritical, borated injection into the RCS is provided from the installed, high concentration boric acid tanks via a FLEX pump. This injection also compensates for RCS leakage and contraction, enabling refill of the RCS, and eventually establishing level in the pressurizer.

For Unit 2, valves 7300 or 7302 will be used as a primary connection. For Unit 3, SI-105 will be used as the primary connection. The secondary connection for RCS injection will be through 1.5" vent valve C-11 for Unit 2 and 1.5" vent valve 102 for Unit 3. These valves are directly downstream from charging pump 22 for Unit 2 and charging pump 32 for Unit 3

The BASTs will be used as the primary source for makeup to the RCS through hookups to the newly added 2" source connection off each tank. These tanks are seismically qualified, missile protected (Unit 2 requires evaluation), and well above PMF level. Locations of these drain connections are shown in Figure A3-23 for Unit 2 and Figure A3-24 for Unit 3. Suction from the BASTs will be routed through flexible hose to a FLEX pump in the staging area outside of the PAB. Discharge hose from the FLEX pump will be routed back into the PAB where it will be connected to the primary connections.

The RWST borated inventory will be used as the secondary source for makeup to the RCS through direct hookups with hoses. The source connection points include the 2 inch drain lines. Locations of the connections to the RWST can be found on Figure A3-8 and Figure A3-12.

RCS Inventory Control and Sub-Criticality with SG Not Available

At some point initial coping strategies for RCS inventory control will no longer support the requirements and FLEX equipment will be deployed to provide this function. A Mode 5/6 RCS Makeup pump will be deployed to establish make-up for RCS boil-off and maintain RCS inventory. Eventually, due to continuous injection of borated coolant and boil-off, the RCS boric acid concentration will increase. The capability has been provided to increase the flow and establish a forward flushing flow path through the established hot leg vents which will preclude the RCS fluid from reaching the incipient boric acid precipitation point.

It is noted that a higher capacity pump is required for Modes 5 and 6.

Maintain RCS Inventory Control

Details:	
Provide a brief description of Procedures/Strategies/Guidelines	FSGs will be developed to dictate these actions during a FLEX event.
Identify modifications	*List modifications* A description of any modifications required to implement this connection point are documented below. This includes new piping, valves, or adapters. Unit 2 The BAST will require a 2" or greater suction source to be added. This connection will include a 2" or greater manual isolation valve, a 2"x4 " reducer and a connection for a 4" STORZ hose connection. A 2"x4 " reducer and a connection for a 4" STORZ hose connection will be added to the RWST. The 4" line just downstream of the 7300 valve will be equipped with an additional 4" manual isolation valve and a 4" STORZ hose connection. Unit 3 The BAST will require a 2" or greater suction source to be added. This connection will include a 2" or greater manual isolation valve, a 2"x4 " reducer, and a connection for a 4" STORZ hose connection. A 2"x4 " reducer, and a connection for a 4" STORZ hose connection will be added to the RWST. A 6x6x4 inch tee will be installed in the 6 inch line near valve SI-105. The 4-inch branch line will contain two 4-inch manual isolation valves and a 4-inch STORZ hose connection. For both units, the piping just downstream of the vent valve used for the secondary connection point will need to be modified to include a 1.5"x1.5"x.5" tee. The continuation of the vent line will be reattached to the 0.5" branch and include a 0.5" normally open isolation valve. A 1.5"x4 " reducer will be attached to the remaining 1.5" line. The 4" line will include a 4" manual isolation valve and a 4" STORZ hose connection.
Key Reactor Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1.Core Exit Thermocouple (CET) Temperature 2.RCS Wide Range Pressure 3.Reactor Vessel Level Indicating System / Pressurizer Level 4.Subcriticality. IPEC 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

Storage/Protection of Equipment: Describe storage/protection plan or schedule to determine storage requirements	
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 storage location is located above the maximum flood level of 15 ft mean sea level.
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 the 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.

Maintain RCS Inventory Control

Deployment Conceptual Modification

(Attachment 3 contains Conceptual Sketches)

The equipment storage locations for this connection point will include the Unit 1 hardened structure as specified for storage of the SG FLEX pump. Deployment from the Unit 1 storage area would necessitate the use of trucks or forklifts capable of pulling the FLEX pumps. Paths to each staging area are shown in green in Figure A3-36 in Attachment 3 of Appendix G. Structures that are possible sources of debris are shown in red. The entire path to each staging location is above flood level and no security barriers exist along either path.

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 staging locations for diesel-driven FLEX pumps is the pavement just south of the RWST in Unit 2, and the driveway leading to the SFP access doors in Unit 3 as shown in Figure A3-25 and Figure A3-26 in Attachment 3. These locations are well above the PMF level (≈15 ft) and are close to all outdoor tanks. The BASTs will be used as the primary source for makeup to the RCS through hookups to the newly added 2" source connection off each tank. These tanks are seismically qualified, missile protected (Unit 2 requires evaluation), and well above PMF level. Locations of these drain connections are shown in Figure A3-23 for Unit 2 and Figure A3-24 for Unit 3. Suction from the BASTs will be routed through flexible hose to a FLEX pump in the staging area outside of the PAB. Discharge hose from the FLEX pump will be routed back into the PAB where it will be connected to the primary connections The RWST borated inventory of will be used as the secondary source for makeup to the RCS through direct hookups with hoses. The source	Modifications for the connection locations are provided in the previous section.	The connections are located in a building which is protected from high winds, missiles, flooding and seismic events. The Unit 2 BAST requires evaluation for missile protection.

Maintain RCS Inventory Control		
connection points include the 2 inch drain lines. Locations of the connections to the RWST can be found on Figure A3-8 and Figure A3-12 Flexible piping routes are shown in Figure A3-27 through Figure A3-35 in Attachment 3 from each suction source to the staging locations for each unit. Red lines indicate discharge piping while green lines indicate suction piping. For Unit 2, the 4" valve 7300 or 7302 will need to be opened as well as the added isolation valve to allow flow to RCS. These valves may be operated by their hand wheels. Similarly, for Unit 3, valves SI-105 will need to be opened as well as the added isolation valve. The sources of coolant and staging locations for the secondary connection point will be identical to those specified for the primary RCS connection. Piping from both staging locations to the secondary connection points are similar to those in the primary connection. All routing outside of the PAB and the placement of the FLEX pump are the same. The only differences in routing occur between the entry point to the PAB and the charging rooms. Figure A3-37 and Figure A3-38 in Attachment 3 show the different routings. The isolation valve on the 0.5" vent line will need to be manually closed and the 4" and C-11/102 isolation valves will need to be manually opened. The source and movement of fuel for this alignment will be identical to the strategies identified in the Core Cooling Section.		

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.

Unless otherwise noted, the information in this section was obtained from Reference 10.

Reactor level and subcriticality is adequately maintained via the Phase 2 strategy; however, borated water sources are limited to some extent. The BASTs and the RWSTs will be used as the source of borated water for the FLEX strategies. An analysis was performed that determined that these sources will provide a sufficient supply of borated water until Phase 3 actions are initiated. The strategy for providing makeup to the borated water tanks is addressed as a Phase 3 action. Phase 3 deployment of a unit capable of generating ultra-pure borated coolant will further extend coping times with respect to the RCS inventory management. The specific strategy for providing borated coolant makeup will need to be determined during the detailed design phase.

In Phase 3 with the steam generators unavailable, core cooling continues to be maintained through boil-off and is therefore, an inventory issue, while boron concentration is maintained by continued provision of adequate flushing flow. Phase 3 deployment of a unit that is capable of generating ultra-pure borated coolant can further extend coping times with respect to the RCS inventory management. Indefinite coping is successfully established once a transition from SG cooling to residual heat removal (RHR) system cooling is established.

Details:

Provide a brief description of Procedures/Strategies/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 (CET) Temperature 2.RCS Wide Range Pressure 3.Reactor Vessel Level Indicating System / Pressurizer Level 4.Subcriticality IPEC 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

Deployment Conceptual Modification

(Attachment 3 contains Conceptual Sketches)

The deployment paths for equipment received from the regional response center will be developed after the IPEC and the RRC have agreed upon a location to receive equipment onto the site.

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 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 the coping times with respect to RCS inventory management. This is discussed in detail with the other FLEX Phase 3 strategies in the section on maintaining core cooling and heat removal.	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 connection points are located in buildings which are seismically qualified and missile protected.

Note:

1. This strategy will be finalized once equipment and equipment specifications coming from the RRC are finalized.

Maintain Containment

Determine Baseline coping capability with the installed coping[3] modifications, not including FLEX modifications, and utilizing the 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. By performing an early cooldown, the rate of leakage and heat rejection to containment are reduced and the pressure and temperature are not expected to rise to levels which could challenge the containment structure.

Containment evaluation will be performed based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed.

Details:

Provide a brief description of Procedures/Strategies/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 IPEC 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:

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

Maintain Containment

PWR Portable Equipment Phase 2:	
Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain containment. Identify methods (containment spray/hydrogen igniters) and strategy(ies) utilized to achieve this coping time. Containment evaluation will be performed based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed. The monitoring of containment conditions will still occur. FSGs will be developed for containment monitoring during a FLEX event.	
Details:	
Provide a brief description of Procedures/Strategies/Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FSGs will be developed to dictate these actions during a FLEX event.
Identify modifications	*List modifications* None
Key Containment Parameters	*List instrumentation credited or recovered for this coping evaluation.* 1.Containment Pressure IPEC 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* N/A
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* 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:

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 evaluation will be performed based on the boundary conditions described in Section 2 of NEI 12-06. Based on the results of this evaluation, required actions to ensure maintenance of containment integrity and required instrument function will be developed. Monitoring of containment conditions will still occur. FSGs will be developed for containment monitoring during a FLEX event. Action taken to support containment integrity may include establishing RHR. Once RHR is realigned, and decay heat is being removed through that system, the containment temperature and pressure will begin to decrease.

Details:	
Provide a brief description of Procedures/Strategies/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.* 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:

<table>
<tr><th colspan="2"><h1>Maintain Spent Fuel Pool Cooling</h1></th></tr>
<tr><td colspan="2">Determine Baseline coping capability with installed coping[4] modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:
•Makeup with Portable Injection Source</td></tr>
<tr><td colspan="2">PWR Installed Equipment Phase 1:</td></tr>
<tr><td colspan="2">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.

Unless otherwise indicated, the information in this section was obtained from Reference 10.
Spent Fuel Pool cooling is not challenged early in the event; however, access to the SFP area as part of Phase 2 response could be challenged due to environmental conditions local to the pool, so action is required to establish ventilation in this area and establish any equipment local to the spent fuel pool required to accomplish coping strategies. For these reasons, most of the actions required for Phase 2 occur outside of the Fuel Building. The SFP vent will be established by opening a large roll up door.</td></tr>
<tr><td colspan="2">Details:</td></tr>
<tr><td>Provide a brief description of Procedures/Strategies/Guidelines</td><td>Confirm that procedure/guidance exists or will be developed to support implementation.

FSGs will be developed to dictate these actions during a FLEX event.</td></tr>
<tr><td>Identify modifications</td><td>List modifications

N/A</td></tr>
<tr><td>Key SFP Parameter</td><td>List instrumentation credited or recovered for this coping evaluation.

1.SFP Level
IPEC 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.</td></tr>
</table>

Notes:

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

Maintain Spent Fuel Pool Cooling

PWR Portable Equipment Phase 2:

Provide a general description of the coping strategies using on-site portable equipment including modifications that are proposed to maintain spent fuel pool cooling. Identify methods (makeup via portable injection source) and strategy(ies) utilized to achieve this coping time.

Unless otherwise noted, information in this section was obtained from Reference 10.

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

The Spent Fuel Pool (SFP) sloshing and time-to-boil evaluation determined the volume lost from the SFP due to sloshing to be 2313.15 ft^3 which corresponds to a 2.42 ft loss in the SFP level. Assuming no other reduction in coolant inventory other than the sloshing, results in a time to boil of 12.6 hours for a seismic event in either the North/South or East/West direction assuming the most conservative critical damping and an initial bulk water temperature in the pool of 100°F. This value was calculated using the normal operating decay heat load.

Fuel in Transfer or Full Core Off-Load

The Spent Fuel Pool (SFP) sloshing and time-to-boil evaluation determined the volume lost from the SFP due to sloshing to be 2313.15 ft^3 which corresponds to a 2.42 ft loss in the SFP level. Assuming no other reduction in coolant inventory other than the sloshing, results in a time to boil of 4.04 hours for a seismic event in either the North/South or East/West direction assuming the most conservative critical damping and an initial bulk water temperature in the pool of 140°F. This value was calculated using the maximum credible heat load.

Makeup for Boil-Off Applicable to all Conditions

An analysis was performed to determine the pump requirements for supplying SFP makeup. A flow rate of 114 gpm is conservative. In addition, all sites that have spent fuel pools that are capable of being drained must have provisions for SFP spray.

For the primary SFP makeup connection, a hose will be routed from the RWST suction source to the FLEX pump on the staging area outside the SFP building. The discharge hose will be routed through the side door of the SFP building and up to the floor of the SFP. This connection will need to be anchored to keep the hose stationary once deployed. The CST will be used as a secondary source of makeup for the SFP with a similar routing.

A secondary connection on the outlet piping from the SFP heat exchanger is required for both units. For both units, a tee will be installed in the 8"-#328 line.

For events occurring with the steam generators available and during a full core offload the RWST is the primary makeup source for the SFP FLEX pump. For events occurring when the steam generators are not available the CST is the primary makeup source for the SFP FLEX pump. This is dictated by the timing and deployment evaluation.

An analysis was performed indicating NPSH concerns when using the 2" drain line as a source connection for this strategy for both units. This analysis shows that a 3" drain line would allow for sufficient NPSH. Therefore, IPEC will modify the RWSTs to include a 3" connection.

A secondary source of coolant is coolant is the CST. The CSTs for both plants will also be modified to include a 3" or greater suction source connection.

A device to anchor the hose at the edge of the SFP must be installed to keep the hose stationary once deployed.

All sites that do not have spent fuel pools that are capable of being drained must have provisions for SFP spray. This means that in addition to the provision for 114 gpm makeup to the SFP discussed above, a 250 gpm SFP spray capability will be required as part of FLEX. The connection point, staging area, and hose routing are almost identical to

Maintain Spent Fuel Pool Cooling	
those described for SFP Cooling above. The exception being that the discharge hose will not be placed in the pool, but attached to a nozzle placed on the walkways surrounding the pool. An oscillating nozzle monitor would need to be stored along with the discharge hose for this alignment. The monitor has a 2.5" hose inlet requiring a 4"x 2.5" reducing fitting for the discharge hose.	
Details:	
Provide a brief description of Procedures/Strategies/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	*List modifications* IPEC will modify the RWSTs to include a 3" connection. This 3" drain connection will include a manual isolation valve, a 3"x4" reducer, and a 4" STORZ hose connection. A secondary source of coolant is the CST. The CSTs for both plants will also be modified to include a 3" or greater suction source connection. This 3" drain connection will include a manual isolation valve, a 3"x4" reducer, and a 4" STORZ hose connection. An 8"x8"x4" tee will be added to 8"-#328 line for both units for the secondary connection point. Two manual isolation valves and a 4" STORZ hose connection will be added to the end of the piping. A device to anchor the hose at the edge of the SFP must be installed to keep the hose stationary once deployed.
Key SFP Parameter	*List instrumentation credited or recovered for this coping evaluation.* 1.SFP Level IPEC 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.

Maintain Spent Fuel Pool Cooling	
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)

The equipment storage locations for this connection point will include the Unit 1 hardened structure as specified for storage of the SG FLEX pump. Deployment from the Unit 1 Storage area would necessitate the use of trucks or forklifts capable of pulling the FLEX pumps. The entire path to each staging location is above flood level and no security barriers exist along either path. Deployment paths are shown in Figure A3-46 and Figure A3-47 in Attachment 3. Paths to each staging area are shown in green. Structures that are possible sources of debris are shown in red.

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*
Staging locations for the SFP cooling will be the driveways to the SFP Building garage doors. These are shown in Figure A3-39 and Figure A3-40. For events occurring with the steam generators available (Modes 1-4) and during a full core offload the RWST is the primary makeup source for the SFP FLEX pump. For events occurring when the steam generators are not available (Modes 5-6) the CST is the primary makeup source for the SFP FLEX pump. This is dictated by the timing and deployment evaluation. For this connection, a hose will be routed from the RWST 3" source connection.	Modifications for the connection points are described in the previous section.	The connections are located in buildings that are protected against missiles, floods, high winds, and seismic events or are established at multiple and diverse locations.

Maintain Spent Fuel Pool Cooling

The CST inventory may also be used for makeup to the spent fuel pool by drawing suction through a hose connected to a 3" or greater suction source connection. Suction hose will be run from the RWST (or the CST if the RWST is not available) to the staging areas outside the SFP buildings. Discharge hose will be run from the staging areas in the driveways to the SFP building through the side door and up to the SFP floor level. Routings are shown in Figure A3-41 through Figure A3-45 in Attachment 3. There are no valve manipulations required in the existing plant system to align this FLEX strategy. For the secondary connection, hose will be run from the staging areas in the driveways to the SFP building where it will be attached to the connections outside of the building. The hard piping and tee connections are shown in purple in Figure A3-48 and Figure A3-49 in Attachment 3. The four isolation valves need to be opened during the event to allow for coolant to pass to SFP. The source and movement of fuel for this alignment will be identical to the strategies identical to those identified for the Core Cooling Section.		

Notes:

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. In Phase 3, the spent fuel pool is initially cooled via continued boil-off and makeup or via spray. Alignment of a portable SFP cooling system from the RRC (backup to Phase 2 equipment) provides indefinite coping capability following the event.

Details:	
Provide a brief description of Procedures/Strategies/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 IPEC 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 deployment paths for equipment received from the regional response center will be developed after the IPEC and the RRC have agreed upon a location to receive equipment onto the site.

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 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.	None	Connections will be made either inside of the Fuel Building or on the exterior of the wall.

Notes:

Safety Functions Support

Determine Baseline coping capability with installed coping[5] 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.

Unless otherwise noted, the information in this section was obtained from Reference 10.

All essential instrumentation required to monitor core, containment, and spent fuel parameters is powered from the Station batteries 21/31, 22/32, 23/33, and 24/34 via the 125 Vdc buses for Units 2/3. The Loss of All AC Procedure (References 7 and 8) directs operators to shed dc loads in Steps 15/17 for Units 2/3. This strategy will extend Battery life into the 2.4/3.8 to 5.2/5.8 hour range depending on the Battery bank for Units 2/3 (Reference 6).

Once the ELAP is announced, the operators will establish a deeper dc load shed. These actions will extend the life of the Batteries for the remainder of the Phase 1 coping period. These further dc loads to shed will be identified and included in the FLEX procedures. Additional actions include opening control room cabinet doors on a loss of ventilation (Step 5 of Loss of All AC Procedure) to provide cooling to control room and its components.

Onsite portable equipment must be deployed, staged, and able to power essential instrumentation before Battery depletion. Given the IPEC's existing calculations for Battery life on an ELAP, the time to establish temporary power is very short. Additional measures may need to be implemented to ensure vital indication and dc loads are available until the Battery chargers can be restored in Phase 2.

Details:

Provide a brief description of Procedures/Strategies/Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* 2/3-ECA-0.0 – Loss of All AC Power (References 7 and 8) directs operators at Step 15/17 (U2/U3) to strip dc loads per 2/3-AOP-DC-1 and 2/3-AOP-IB-1. A requirement to begin load shedding, if power will not be restored to the 480 V vital buses by 30 minutes after the event start should be added. A similar requirement to begin deep load shedding should be added, if power will not be restored by 45 minutes after the event start. Additionally, 2-ECA-0.0 should include a notice to provide temporary control room ventilation within 30 minutes by opening doors similar to Step 7 and Attachment 2 of 3-ECA-0.0.
Identify modifications	*List modifications* None
Key Parameters	*List instrumentation credited for this coping evaluation phase.*

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

Safety Functions Support	
	The dc bus voltage is required so the operators can ensure that the dc bus voltage remains above 105 volts. IPEC 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

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.

Unless otherwise noted, the information in the section was obtained from Reference 10.

Electrical Safety Function Support

The electrical portion of the Units 2/3 Phase 2 coping strategy has the main goal of repowering the vital 480 Vac buses 2A, 3A, 5A, and 6A. This will be achieved through spare breaker connection points in Bus 2A or 6A. After repowering from one of these locations, buses may be cross-tied through operator manipulation of breakers to allow powering of any Battery charger or other loads as discussed below. A single FLEX generator will be designated to achieve this goal.

Repowering essential instrumentation will be achieved by repowering Battery chargers 21/31, 22/32, 23/33 and 24/34 for Units 2/3. These chargers are connected to the 480 Vac vital buses through the MCCs as shown in the following tables. The 480 Vac buses are also necessary to power fuel oil transfer pumps (FOTPs) and Battery rooms exhaust fans.

The FLEX generator will power Bus 2A or 6A via flexible cable to be run from either of the staging locations. The ends of the cable will have male connections that can be quickly connected to the generator on one end and the bus on the other end. Four cables must be run (three phases and ground) the entire route shown in the conduit /cable routing description below. On the bus end, the cables will plug into a modified breaker with quick-connect contacts on the face, installed in a spare breaker slot, or be connected to a junction box with similar quick-connect contacts. This breaker will be normally open, and then closed once the FLEX generator has been started. Spare Breaker 23A/31B (U2/U3) on Bus 2A was identified as a preferred spare to be permanently replaced with the modified breaker, as shown in Figure A3-60/101 (U2/U3) in Attachment 3. A secondary option for the installation of a modified breaker is by replacing the EDG Breaker 13C/15B,C (U2/U3) on Bus 6A once entering an ELAP as shown in Figure A3-61/102 (U2/U3) in Attachment 3.

The use of this modified breaker allows for an easy cable connection to the bus. By utilizing color-coded cables and connectors, operators would be able to perform this action without requiring additional personnel, such as an electrician.

For Unit 3, several of the Battery room fans may not survive all events due to their location on non-vital bus panels. Portable fans and generators to exhaust the Unit 3 Battery rooms will be used.

Additional equipment may be required to be powered during this event such as portable lighting and ventilation fans. These are not conveniently powered via the FLEX generator. Small portable generators are available onsite if this additional lighting and ventilation is deemed necessary. Small Battery packs for these items are also a possibility.

Alternate Coolant Source Safety Function Support

The following coolant sources may be available for makeup to the CST:

The City Water Tank is currently capable of supplying coolant to the AFW system. The CWT is not missile protected, and the piping for this coolant supply is not seismically qualified. Therefore, it cannot be relied upon. However, if the CWT is available, and the piping is capable of supplying coolant, this source would be the preferred choice and could supply the required inventory needed for removing decay heat.

The PWST and the FWST are seismically qualified, but not missile protected. Therefore, they may not be available to supply makeup. If they are available, they would be the 2nd and 3rd choices and could supply the remaining volume needed to reach 72 hours.

This tank would be the 4th choice, since it is a borated source, which would have a negative impact on the AFW system.

Safety Functions Support

Also, the RWST is used for other FLEX strategies and may not have enough inventory when needed.

The Unit 2/3 PWST is a potential makeup source to the Unit 2 CST. Each tank provides 165,000 gallons of water. The tank is not missile protected. Hose will be run from the PWST to a booster pump, from the booster pump to the FLEX pump, and then to the CST. The hose will be run through the manway on top of the CST. The routing between the Unit 2 PWST and Unit 2 CST is shown in Figure A3-52 in Attachment 3 with suction routing in green while red represents discharge. The booster pump should be placed within 50 ft of the PWST. The routing between the Unit 3 PWST and Unit 3 CST is shown in Figure A3-57 with suction routing in green while red represents discharge. The booster pump should be placed within 50 ft of the PWST.

The Units 2/3 FWST is a potential makeup source to the Unit 2 CST. Each tank (U2 FWST, U3 FWST31, and U3 FWST32) provides 300,000 gallons of water. The tank is not missile protected and is not seismically qualified. Hose will be run from the FWST to a booster pump, from the booster pump to the FLEX pump, and then to the CST. The hose will be run through the manway on top of the CST. Routing between the Unit 2 FWST and Unit 2 CST is shown in Figure A3-51 with suction routing in green while red represents discharge. The booster pump should be placed within 50 ft of the FWST. Routing between the Unit FWST31 and Unit 3 CST is shown in Figure A3-55 with suction routing in green while red represents discharge. Routing between the Unit FWST32 and Unit 3 CST is shown in Figure A3-56 with suction routing in green while red represents discharge. The booster pump should be placed within 50 ft of the source tank.

The Unit 2/3 RWST is a potential makeup source to the Unit 2 CST. Each tank provides 345,000 gallons of borated water. Hose will be run from the RWST to a booster pump, from the booster pump to the FLEX pump, and then to the CST. The hose will be run through the manway on top of the CST. Routing between the Unit 2 RWST and Unit 2 CST is shown in Figure A3-50 with suction routing in green while red represents discharge. The booster pump should be placed within 50 ft of the RWST. The routing between the Unit 3 RWST and Unit 3 CST is shown in Figure A3-54 with suction routing in green while red represents discharge. The booster pump should be placed within 50 ft of the RWST.

The condenser hotwell was evaluated as a potential alternate water source; however, it is not seismically designed.

Details:	
Provide a brief description of Procedures/Strategies/Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* FLEX Generator Deployment: •Deploy the generator to the staging area and connect •Align switchgear to Battery chargers Restoring Normal Power to the Class 1E 480V Buses. This guideline will be required when the FLEX generator is connected or a normal power sources is restored and is not time-critical. New Procedures/Guidelines: •Plant personnel must be trained on all new procedures •Aligning Buses 2A, 3A, 5A, and 6A and associated MCCs for FLEX Generator – 2 operators to operate ~50 breakers, no special skills, 0.5 hours. This would include opening all breakers and breakers on the downstream MCCs that will be repowered for FLEX strategies; specifically MCCs 24A, 26B, 26C, 27A, and 29A (Unit 2) and MCCs 32, 36C, 36D, 36E, 37, and 39 (Unit 3).

Safety Functions Support

Identify modifications	*List modifications* Phase 2 electrical design requires the following modifications: •Installation of modified breaker, connection through a tie breaker and test breaker or equivalent in Bus 2A, replacing the spare breaker 23A/31B (U2/U3) in an ELAP •Installation of a housing for two temporary modified breakers or equivalent near Bus 6A, for replacement of the EDG Breaker 13C/15B,C (U2/U3) in an ELAP •Modification to the EDG intake grating and louvers or the EDG exhaust fan screen to allow for a cable to be routed from the roof to elevation 15' of the EDG building in an ELAP (U3). Phase 2 alternate coolant source requires the following modifications; •One 4 inch STORZ connection (suction) will be added to the PWST of each unit along with two isolation valves. •One 4 inch STORZ connection (suction) and two isolation valves will be added to the Unit 2 FWST and to the Unit 3 FWST31 and FWST32. •One 4 inch STORZ connection (suction) and two isolation valves will be added to the RWST of each unit.
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. IPEC 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 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.

Safety Functions Support	
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)

Onsite portable equipment will be deployed from the FLEX equipment storage location, staged in the designated staging areas, connected to the applicable cables (electrical) or hoses (coolant), and begin performing the FLEX functions.

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*
Electrical From the Primary and Secondary Staging Locations are shown in Figure A3-59. Unit 2 Primary Staging Location Cable Routing From the Primary Staging location cables will be routed around the northern wall of the Unit 2 Containment, through the Transformer Yard, and into the 480V Switchgear Room. This route is illustrated in Figure A3-62 and Figure A3-63 in Attachment 3.	Modifications are described in previous section.	The connections will be located in buildings that are protected from external hazards.

Routing down the slope from the Unit 2 CST to the Unit 2 Transformer Yard should be done in a cautious manner by two operators. The length of cable needed for this routing is 1075 ft.

Unit 2 Secondary Staging Location Cable Routing

From the secondary staging location for Unit 2 cables will be run from the generator, past the Unit 2 EDG Building and into the Unit 2 Control Building at elevation 72'. This is illustrated in Figure A3-64 in Attachment 3. The length of cable needed for this routing is 700 ft.

The cables will enter the Unit 2 Control Building at elevation 72' and then travel down Stair #4 to elevation 15'. This path is shown in Figure A3-65 through Figure A3-68.

Unit 3 Primary Staging Location Staging Routing

From the Primary Staging Location shown in Figure A3-59, cables will be routed along the northern wall of the Unit 3 containment using the stairs on the steep side or the gentler slope to the north. The cables will then be taken through the Unit 3 Transformer Yard and into the 480V Switchgear Room. This route is illustrated in Figure A3-73 and Figure A3-74 in Attachment 3.

Unit 3 Secondary Staging Location Routing

From the secondary staging location for Unit 3 as shown in Figure A3-59, cables will be run southwest from the generator to the grated roof over the Unit 3 EDG Rooms. Cables will be dropped to the floor of the EDG Rooms, through one of the EDG exhaust fans, or through the EDG room air intakes. Both options have louvers and screens that may need to

Safety Functions Support		
be modified to feed cable through the opening. Once at the 15' level of the EDG Rooms, the 480V Switchgear is accessed through a door in the room containing EDG 31. This path is illustrated in Figure A3-75 through Figure A3-80 in Attachment 3. Coolant The storage locations, deployment paths, and staging locations for the FLEX equipment are provided in Figure A3-3, Figure A3-4 and Figure A3-15 through Figure A3-18 in Attachment 3. The existing Unit 1 Chemical Systems Building will be used as a storage location. The deployment routes are shown in see Figure A3-15 and Figure A3-16. The deployment paths to the secondary staging location are shown in Figure A3-15 and Figure A3-16 and the primary connection deployment discussion apply to the secondary staging area.		

Notes:

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. Unless otherwise noted, the information in this section was obtained from Reference 10. The electrical portion of the Phase 3 coping strategy has the main goal of repowering the 480 Vac equipment to aid in cooling down the plant to a stable, Mode 5 condition. This will be achieved through the same spare breaker connection points in Bus 2A or 6A as presented for Phase 2. However, new breakers with a larger amp capacity rating will need to be used in the same breaker slot. After repowering from one of these locations, buses may be cross-tied through operator manipulation of breakers to allow powering of any of the RHR or CCW pumps in addition to the Phase 2 loads. A single, large generator deployed from the Regional Response Center will be placed in the Unit 2 staging area shown in order to achieve this goal. Repowering the RHR and the CCW pumps will be achieved by powering the 480 Vac vital buses. Locations to tie into will be identical to those shown in Figure A3-60 and Figure A3-61 in Attachment 3.

Details:	
Provide a brief description of Procedures/Strategies/Guidelines	*Confirm that procedure/guidance exists or will be developed to support implementation.* The IPEC will utilize industry developed guidance from the PWROG, EPRI, and NEI to develop site-specific guidelines for the deployment and implementation of the FLEX strategies, as well as the interfaces for the FLEX strategies with existing plant procedures. This strategy will require procedures to deploy and connect the 480V diesel generator, and restore power to the required vital buses.
Identify modifications	*List modifications* Phase 3 electrical design requires the following modifications: •Installation of a housing for two modified breakers, connection through a tie breaker and test breaker, connection through a tie breaker and test breaker or the equivalent near Bus 2A, for replacement of spare breaker 23A/31B (U2/U3) in an ELAP •Installation of a housing for two temporary modified breakers, connection through a tie breaker and test breaker or the equivalent near Bus 6A, for replacement of EDG Breaker 13C/15B, C (U2/U3) in an ELAP.
Key Parameters	*List instrumentation credited for this coping evaluation phase.* No instrumentation is required to support the Phase 3 electrical coping strategies.

Safety Functions Support

Deployment Conceptual Design

(Attachment 3 contains Conceptual Sketches)

The deployment paths for equipment received from the regional response center will be developed after the IPEC and the RRC have agreed upon a location to receive equipment onto the site.

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 cable route for Phase 3 will be identical to the routing chosen in Phase 2. However, new larger cables will need to be run along this identical route.	Modifications for connections are identified in the previous section.	The connections are located in buildings which are protected from external hazards.

Notes:

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**
Three (3) AFW/Modes 5&6 Pumps	X					327 gpm, 1180.3 ft	Will follow EPRI template requirements
Three (3) RCS Pumps	X					40 gpm, 3537 ft	Will follow EPRI template requirements
Three (3) SI Pumps	X					137 gpm, 898.8 ft	Will follow EPRI template requirements
Three (3) SFP Pumps			X			114 gpm, 75.6 ft	Will follow EPRI template requirements
Three (3) SFP Spray Pumps			X			250 gpm, 1067.4 ft	Will follow EPRI template requirements
Three (3) 480 Vac Generators				X	X	300 kW	Will follow EPRI template requirements
Debris Removal Equipment					X		Will follow EPRI template requirements
Pickup Trucks or forklifts	X		X	X	X		Will follow EPRI template requirements
Small Generators and Portable Fans					X		Will follow EPRI template requirements
Fuel Transportation Equipment	X		X	X	X		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**
Hose	X		X				Will follow EPRI template requirements
Cable				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			
Two (2) UHS Pumps	X		X			4000 gpm, 139 ft	Will follow EPRI template requirements
AFW Back Pump	X		X			327 gpm, 1432 ft	Will follow EPRI template requirements
Water Transfer Pump	X					327 gpm, 400 ft	Will follow EPRI template requirements
Booster Pump	X					327 gpm, 55 ft	Will follow EPRI template requirements
RCS Backup Pump	X					40 gpm, 4004 ft	Will follow EPRI template requirements
SFP Backup Pump			X			250 gpm, 1218 ft	Will follow EPRI template requirements
Two (2) 480 Vac Generators	X	X	X	X	X	2 MW	Will follow EPRI template requirements
Mobile Boration Unit	X		X				Will follow EPRI template requirements
Mobile Water Purification Unit	X						Will follow EPRI template requirements
Mobile Heat Exchanger Unit			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			
Mobile Chiller Unit		X						Will follow EPRI template requirements
Diesel-Driven Air Compressor	X	X	X					Will follow EPRI template requirements
Large Fuel Trucks	X	X	X	X	X			Will follow EPRI template requirements
Large Debris Removal Equipment					X			Will follow EPRI template requirements
Hose	X	X	X					Will follow EPRI template requirements
Cable	X	X	X	X	X			Will follow EPRI template requirements

Phase 3 Response Equipment/Commodities	
Item	**Notes**
Radiation Protection Equipment • Survey instruments • Dosimetry • Offsite monitoring/sampling • Radiological counting equipment • Radiation protection supplies • Equipment decontamination supplies • Respiratory protection	
Commodities • Food o Meals ready to eat (MREs) o Microwavable meals • Potable water	
Fuel Requirements • #2 Diesel fuel • Diesel fuel bladders	
Heavy Equipment • Transportation equipment o 4WD tow vehicle • Debris clearing equipment	
Communications Equipment • Satellite phones • Portable radios	
Portable Lighting • Flashlights • Headlamps • Batteries • Exterior light units with diesel generators	

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 ML12056A045]

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. IPEC Report, "Indian Point 2 UFSAR," Revision 22, 2010.

5. IPEC Report, "Indian Point 3 UFSAR," Revision 4, 2011.

6. Indian Point Report CR-IP2-2011-3909, "IER 11-4 Near Term Actions to Address the Effects of an Extended Loss of All AC Power in Response to the Fukushima Daiichi Event," October 27, 2011.

7. 2-ECA-0.0, Revision 12, "Loss of All AC Power."

8. 3-ECA-0.0, Revision 8, "Loss of All AC Power."

9. IPEC Drawings

   a. 502450 Rev. 1 Sh. 1: Indian Point Energy Center Overall Plot Plan Civil (Sht. 1)

   b. A208088 Rev. 44: One Line Diag. of 480 VAC. SWGRS. 21 & 22. Bus 2A, 3A, 5A & 6A – UFSAR Figure No. 8.2-6

   c. A249955, Rev. 21: One Line Diagram 480V AC MCC 29 & 29A

   d. 9321-F-3005, Rev. 110: One Line Diagram 480V Motor Control Center 27 & 27A

   e. A249956, Rev. 18: One Line Diagram 480V MCC 24 & 24A

   f. B248513, Rev. 12: Single Line Diagram 480V MCC 26C & CCR Vent. Dist. Panel 21

   g. 9321-01-20346, Rev. 6: Condensate Storage Tank. General Plan

   h. 9321-f-1381, Rev. 25: Control Building Floor Plans & Sections

   i. PFP-251, Rev. 8: IPEC Pre-Fire Plans

   j. A216386, Rev. 2: Indian Point 1 & 2 300,000 Gal Water Storage Tank and Foundation for Backup Fire Protection. Sections, Plans, and Details

   k. PFP-156, Rev. 13: IPEC Pre-Fire Plans

l. PFP-253, Rev. 13: IPEC Pre-Fire Plans

m. PFP-252, Rev. 11: IPEC Pre-Fire Plans

n. 617F644, Rev. 33: 480V One Line Diagram

o. 9321-F-30063 Sh1, Rev. 77: Single Line Diagram 480V Motor Control Center No.'s 36A, 36B & 36C

p. 9321-F-30063 Sh2, Rev. 10: Single Line Diagram 480V Motor Control Center No.'s 36D & 36E

q. 9321-F-30053, Rev. 72: Single Line Diagram 480V Motor Control Centers 37, 38, 39 & 311

r. 9321-F-30043 Sh2, Rev. 20: Single Line Diagram 480V Motor Control Centers No's 32 & 35

s. IP3V-91-0058, Rev. 3: General Plan (Condensate Storage Tank)

t. 9321-f-10543, Rev. 10: Control and Diesel Generator Buildings Concrete Plan El. 15'-0"

u. PFP-351, Rev. 5: IPEC Pre-Fire Plans

v. IP3V-91-14.6-0085, Rev. 2: Unit 3 General Plan 30'-0 DIA x 35'-3 High Dome Roof Tank – Primary Water Storage Tank

w. 9321-F-40483, Rev. 9: Diesel Generator Building Heating & Ventilation Plan & Sections

x. PFP-354A, Rev. 0: IPEC Pre-Fire Plans

y. PFP-354, Rev. 0: IPEC Pre-Fire Plans

z. 9321-F-2019-116, Rev. 116: Flow Diagram Boiler Feedwater – UFSAR Figure No. 10.2-7

aa. 9321-F-20193, Rev. 60: Flow Diagram Boiler Feedwater

bb. 9321-2018-140, Rev. 140: Flow Diagram Condensate & Boiler Feed Pump Suction – UFSAR Figure No. 10.2-5 (Sht. 1)

cc. 9321-F-20183, Rev. 58: Flow Diagram Condensate & Boiler Feed Pump Suction (Sht. 1)

dd. B216214-5 Rev. 5: Unit 2 FWST Drawing

ee. 9321-01 20339-4 Rev. 1: Unit 2 RWST Drawing

ff. 9321-01 20352-1 Rev. 2: Unit 2 PWST Drawing

gg. IP3V-0245-0002 Rev. 3: Unit 3 FWST Drawing

hh. IP3V-0091-0068 Rev. 2: Unit 3 RWST Drawing

ii. IP3V-91-14.6-0085 Rev. 2: Unit 3 PWST Drawing

jj. 9321-F-2735, Rev. 140: Flow Diagram Safety Injection System – UFSAR Figure No. 6.2-1 (Sht. 1)

kk. 9321-F-27503, Rev. 53: Flow Diagram Safety Injection System Sheet No. 2

ll. 9321-F-2736, Rev. 129 Sh.1: Flow Diagram Chemical and Volume Control System Unit-2

mm. 9321-F-27363, Rev. 51: Flow Diagram Chemical and Volume Control System Unit-3

nn. PFP-308 Rev. 5: IPEC Pre-Fire Plans Unit 3

oo. PFP-211 Rev. 11: IPEC Pre-Fire Plans Unit

pp. PFP-113 Rev. 5: IPEC Pre-Fire Plans Unit

qq. PFP-207 Rev. 0: IPEC Pre-Fire Plans Unit

rr. PFP-212 Rev. 11: IPEC Pre-Fire Plans Unit

ss. PFP-318 Rev. 12: IPEC Pre-Fire Plans Unit

tt. PFP-307 Rev. 12: IPEC Pre-Fire Plans Unit

uu. PFP-305 Rev. 0: IPEC Pre-Fire Plans Unit

vv. PFP-217 Rev. 12: IPEC Pre-Fire Plans Unit

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xx. PFP-316 Rev. 12: IPEC Pre-Fire Plans Unit

10. TR-FSE-13-11, Revision 0, "Indian Point FLEX Integrated Plan," February 2013.

11. 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.

List of Acronyms

ac	alternating current
ACS	alternate coolant source
ADV	atmospheric dump valve
AFW	auxiliary feedwater
AOP	abnormal operating procedure
ASCE	American Society of Civil Engineers
BAST	boric acid storage tank
BDB	beyond-design-basis
BDBEE	beyond-design-basis external events
CCW	component cooling water
CET	core exit thermocouple
CFR	Code of Federal Regulations
CST	condensate storage tank
CWT	city water tank
dc	direct current
DG	diesel generator
EDG	emergency diesel generator
ELAP	extended loss of ac power
EOP	emergency operating procedure
EPRI	Electric Power Research Institute
FLEX	Flexible and Diverse Coping Mitigation Strategies
FOTP	fuel oil transfer pump
FSG	FLEX support guideline
FWST	fire water storage tank
HVAC	heating, ventilation, and air conditioning
IER	Industry Event Report
INPO	Institute of Nuclear Power Operations
IPEC	Indian Point Energy Center
ISG	Interim Staff Guidance
LOOP	loss of offsite power
LUHS	loss of normal access to the ultimate heat sink
MAAP	modular accident analysis program
NEI	Nuclear Energy Institute
NPSH	net positive suction head
NRC	Nuclear Regulatory Commission
NSSS	nuclear steam supply system
PORV	power operated relief valve
PMF	probable maximum flood
PMH	probable maximum hurricane
PORV	power operated relief valve
PRA	probabilistic risk assessment
PWR	pressurized water reactor

PWROG	Pressurized Water Reactor Owners Group
PWST	primary water storage tank
RCP	reactor coolant pump
RCS	reactor coolant system
RHR	residual heat removal
RRC	Regional Response Center
RWST	refueling water storage tank
SAFER	Strategic Alliance for FLEX Emergency Response
SAMG	severe accident management guideline
SBO	station blackout
SSCs	systems, structures and components
SFP	spent fuel pool
SG	steam generator
S/RV	safety/relief valve
SSC	systems, structures and components
SSE	safe shutdown earthquake
TDABF	turbine driven auxiliary boiler feed
UFSAR	updated final safety analysis report
UHS	ultimate heat sink

Attachment 1A
Sequence of Events Timeline

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	0.5	Control Room Ventilation (Open Room/Cabinet Doors)	Y	0.5	Ventilation is created by opening control room door(s). Evaluation should be performed to determine if this action is adequate for the duration of ELAP . Currently, for Unit 2 only the control room cabinet doors are opened with no time specified; and for Unit 3 both control room doors and cabinets are opened within 30 minutes. **(Current SBO Procedure Guidance).**
2	0.5	Ensure TDAFW Pump Room Door Open for Ventilation	Y	0.5	When the temperature in the TDAFW pump room is above 120°F, the reliability of the pump may be affected. This occurs 32 hours after the start of the event if the door to the TDAFW pump room remains shut. The temperature in the TDAFW pump room will be less than 120°F for at least 72 hours if the door is left open by the first hour after the event. Currently required within 30 minutes of loss of power for IP3. **(Current SBO Procedure Guidance).**
3	1	Declare ELAP	Y	1	ELAP Declaration Time Line (IPEC assumption).
4	2	Deep Load Shed	Y	2	Load shedding increases Battery life for duration of Phase 1 (8 hours). This requires verification.

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
5	3	Complete Plant cooldown	Y	3	This analysis assumes cooldown commences at 1 hour to minimize RCS leakage prior to capability to initiate RCS makeup as the FLEX RCS Makeup pump has a deployment time of ~2 hours. A cooldown from 547°F to 400 °F at an assumed cooldown rate of 75 ± 5°F; will be completed in ~2 hours (3 hours after LOAC).
6	6	Perform Damage Assessment	Y	6	Future FSG Requirement
7	8	Control Room & Emergency Lighting	Y	8	Phase 1 lighting is provided by emergency lighting Batteries, but beyond Phase 1 will require new strategies. Assume control room lighting after 8 hours is addressed per Phase 2, Item 3.
8	8.04	Establish SFP Area Vent	Y	8.04	Establish SFP vent area such as opening the door. Need time based on SFP time to boil without a break. This time to boil is based on an initial SFP temperature of 140°F and assumes pipe penetrating the SFP remains intact.
9	3	Debris Removal (Access)	Y	3	Earliest need for FLEX equipment or deployment paths. This is needed to deploy the RCS Makeup pump.
10	8	Deploy Phase 2 Generator	Y	8	Earliest need for a 300 kW 480 Vac generator based on Battery capacity of 8 hours. Deployment includes staging, making connections, starting & repowering equipment. Deployment of sandbags or other flood mitigation system must be pre-staged prior to flood conditions to protect the entrances to the 480V Switchgear Room. Assumes the results from future load shed calculations will result in 8 hour Battery life. This requires verification.

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
11	8	Deploy Misc. Lighting & Ventilation (small portable generators)	Y	8	Additional lighting and ventilation is not easily powered from the 480V bus and will require use of Batteries and/or small portable generators as deemed necessary. New strategies will need to be developed. Assumed 1 man-hour to setup adequate portable equipment (e.g., portable generators, fans, lights).
12	8	Deploy Battery Room Ventilation for Unit 3	Y	8	For U2, Battery room exhaust fans and fuel oil transfer pumps are powered from the 480V re-powered bus. Time and manpower for U2 is included in Item 1. For U3 fuel oil transfer pumps are powered from the 480V re-powered bus but the Battery room exhaust fans are not. An evaluation of hydrogen buildup without ventilation (except open door) is required for Unit 3 to determine if portable ventilation equipment needs to be staged. Time and manpower for U3 portable Battery room ventilation equipment is included in Item 3.
13	8	Align FLEX RCS Makeup Pump from BAST	Y	8	RCS boration is required for shutdown margin at 23.3 hours (i.e., 1785/40/60). RCS makeup is required for inventory at 5.2 hours assuming cooldown is commenced at 1 hour or 2.5 hours assuming cooldown is commenced at 2 hours. Since the FLEX RCS pump takes ~2 hours to deploy, the cooldown will be commenced at 1 hour (assumption). Therefore, 5.2 hours becomes the limiting time. However, further evaluation is expected to extend the current requirement for inventory. It is assumed the accumulators are isolated. Controlling the RCS makeup pump is a continuous action. The BAST may require heat tracing due to high boric acid concentration (requires evaluation).

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
14	8.04	Deploy SFP Makeup Hose	Y	8.04	Deployment of FLEX SFP pump discharge hose to SFP needs to occur before boiling. This time to boil is based on an initial SFP temperature of 140°F and assumes all pipe penetrating the SFP remains intact.
15	10.5	Align FLEX RCS Boration/Makeup Pump from RWST	Y	10.5	Based on a BAST volume of 6000 gallons (IPEC U2 TRM 3.1.B.1) and 6100 gallons (IPEC U3 TRM TRS 3.1.C.1.4) starting at 8 hours and a flow rate of 40 gpm, the BAST will become depleted after 2.5 hours for a total elapsed time of 10.5 hours. The RWST may be used for makeup following depletion of the BAST. Switching the FLEX RCS pump suction source from the BAST to the RWST involves re-routing the pump suction hose from the BAST to the RWST (time assumed is the same as for the BAST suction hose deployment (18 minutes) using the same 2 Plant Operators as for the BAST.
16	13	Establish Alternate Fuel Supply	Y	13	Depletion of FLEX fuel supplies (10 hours of on-board fuel tank assumed + equipment deployment time). A detailed fuel strategy has not yet been developed. This is considered a continuous action to support periodic re-fueling of all FLEX equipment.
17	24	Stage FLEX SG Makeup Pump	Y	24	Steam pressure will not be decreased enough to compromise TDABFP performance; however, back-up should be staged as soon resources allow in the event of TDABFP failure. Coping time of the TDABFP is expected past 24 hours. Controlling the SG makeup pump is a continuous action.
18	27.83	Align FLEX SFP Makeup Pump	Y	27.83	Supporting evaluations demonstrate a time to makeup of 27.83 hr (Reference 10).

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
19	32	Align FLEX ACS Pump From Available ACS to the CST	Y	32	Depletion of previous source (360,000 gal CST) based Reference 10. Use of CST inventory for SFP makeup occurs after 32 hours when the CST makeup is aligned from the UHS. Assumes the TDABFP recirculation line returning to the CST is intact. Other preferred water sources may be used prior to using the UHS as a source if available; however, the UHS is used here as the limiting scenario since this source will be available during all seismic and natural phenomena events. It is noted that the same manpower resources will be available regardless of the selection of ACSs to move from source to source. The sources that may be available after CST depletion include CWT, PWST, FWST, Hotwell.
20	24	Perform Large Debris Removal	Y	24	The earliest need time to support deployment of Phase 3 equipment. The earliest expected arrival of RRC equipment at the site is 24 hours (NEI 12-06).
21	32	Align Mobile Water Purification System	Y	32	Time is based on supporting makeup to the CST and/or RWST (via mobile boration system) when other ultra-pure sources are depleted or not available; thus avoiding use of Hudson River water (UHS). The CST inventory is expected to be depleted after 32 hours. The RWST inventory is expected to be depleted after 93.9 hours for U3 and 93.3 hours for U2. If IPEC would like makeup sources to the CST and/or RWST, this water source should be made available.

Action Item	Elapsed Time (hours)[1]	Action	New ELAP Time Constraint (Y/N)[2]	Time Constraint (hours)[3]	Remarks / Applicability
22	72	Deploy Phase 3 Generator	Y	72	A 2 MW 480 Vac generator from the RRC will be brought in to support powering a 480 Vac bus to supply power for one RHR pump, one CCW pump RHR and the Phase 2 loads. This will provide capability to place plant in cold shutdown for indefinite coping (Reference 10). Deployment includes stopping running generator, opening breakers, staging, making connections, starting & repowering equipment (closing breakers).
23	72	Align UHS Pump / Alternate Service Water	Y	72	UHS pump will be needed to move from SG cooling to RHR for achieving/maintaining cold shutdown.
24	72	Establish Large Fuel Truck Delivery Service	Y	72	Three 7700 gallon tanks of diesel fuel capable of withstanding seismic, flood and wind events are available at each site. This supply represents an allowable usage of 320 gallons/hour for the 72 hour ELAP duration. Therefore, on-site fuel supplies are expected to last >72 hours. IPEC should coordinate replenishment of diesel fuel at that time.

Notes:
(1) Elapsed time is defined as estimated time required to complete action. Following completion of staffing studies (A28), 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 10. Additional refinements may be provided in subsequent updates.

Attachment 1B
NSSS Significant Reference Analysis Deviation Table

Entergy has evaluated WCAP-17601 (Reference 11) considering IPEC 2 and 3 site-specific parameters and determined that the conclusions of that document are applicable to IPEC 2 and 3. Entergy has performed analysis consistent with recommendations of the core cooling position paper, provided as an attachment to LTR-PCSA-12-92. The following deviations were identified as part of this evaluation and justification is provided based on the direction contained in NEI 12-06. No other deviations have been identified with respect to the PWROG recommendations for the FLEX program.

Item	Parameter of Interest	WCAP Value (WCAP-17601-P January 2013 Rev. 1)	WCAP Page	Plant Applied Value	Gap and Discussion
1	Time initiating cooldown	2 hours	Table 5.2.2-1	1 hour	The earlier cooldown time reduces reactor coolant pump seal leakage which improves the plant response relative to Reference 11; it will be incorporated into plant procedures for loss of all AC power events. This approach is consistent with Reference 11 and represents an acceptable deviation to the generic approach.

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 six month status reports.

Indian Point Milestone Schedule		
Activity	**Original Target Completion Date**	**Status (Will be updated every 6 months)**
Submit Overall Integrated Implementation Plan	**February-2013**	
6 Month Status Updates		
Update 1	*August-2013*	
Update 2	*February-2014*	
Update 3	*August-2014*	
Update 4	*February-2015*	
Update 5	*August-2015*	
Update 6	*February-2016*	
Update 7	*August-2016*	
Perform Staffing Analysis	**December-2013**	
Modifications		
Engineering and Implementation		
N-1 Walkdown (Unit 2)	*Spring-2014*	
Design Engineering	*December-2014*	
Unit 2 Implementation Outage	*April-2016*	
Unit 3 Implementation Outage	*April-2015*	
On-site FLEX Equipment		
Purchase	*June-2013*	
Procure	*December-2013*	
Off-site FLEX Equipment		
Develop Strategies with RRC	*November-2013*	
Procedures		
PWROG issues NSSS-specific guidelines	*June-2013*	
Create Indian Point FSG	*October-2014*	
Create Maintenance Procedures	*October-2014*	
Training		
Develop Training Plan	*May-2015*	
Implement Training	*November-2015*	
Submit Completion Report	**June-2016**	

Attachment 3
Conceptual Sketches

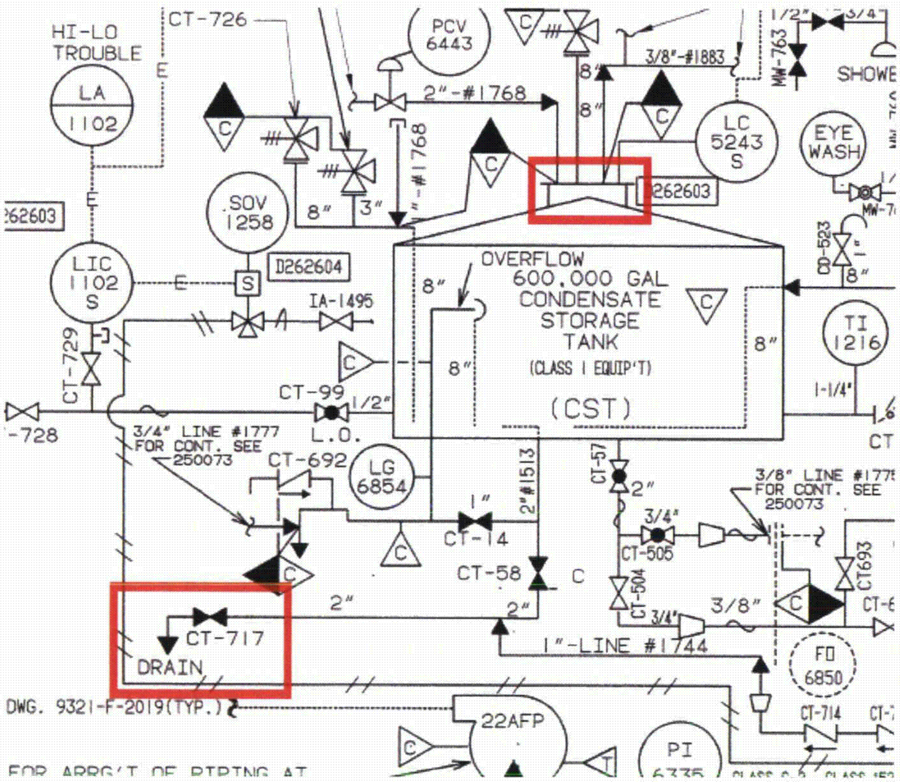

Figure A3-1: Unit 2 CST Connections (Reference 9-bb)

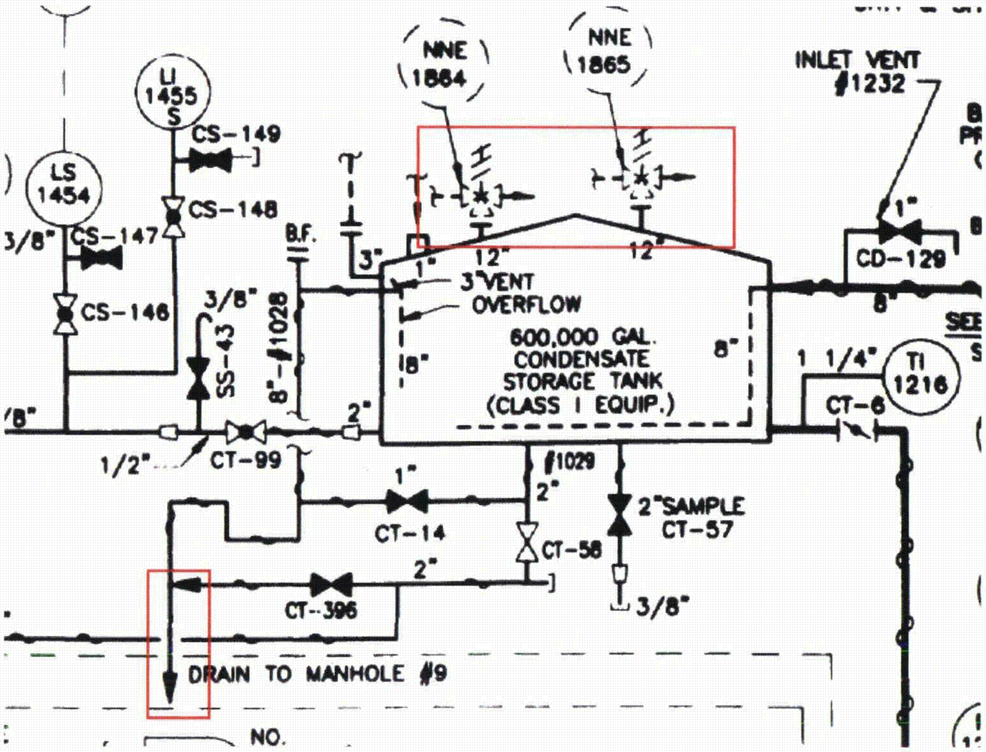

Figure A3-2: Unit 3 CST Connections (Reference 9-cc)

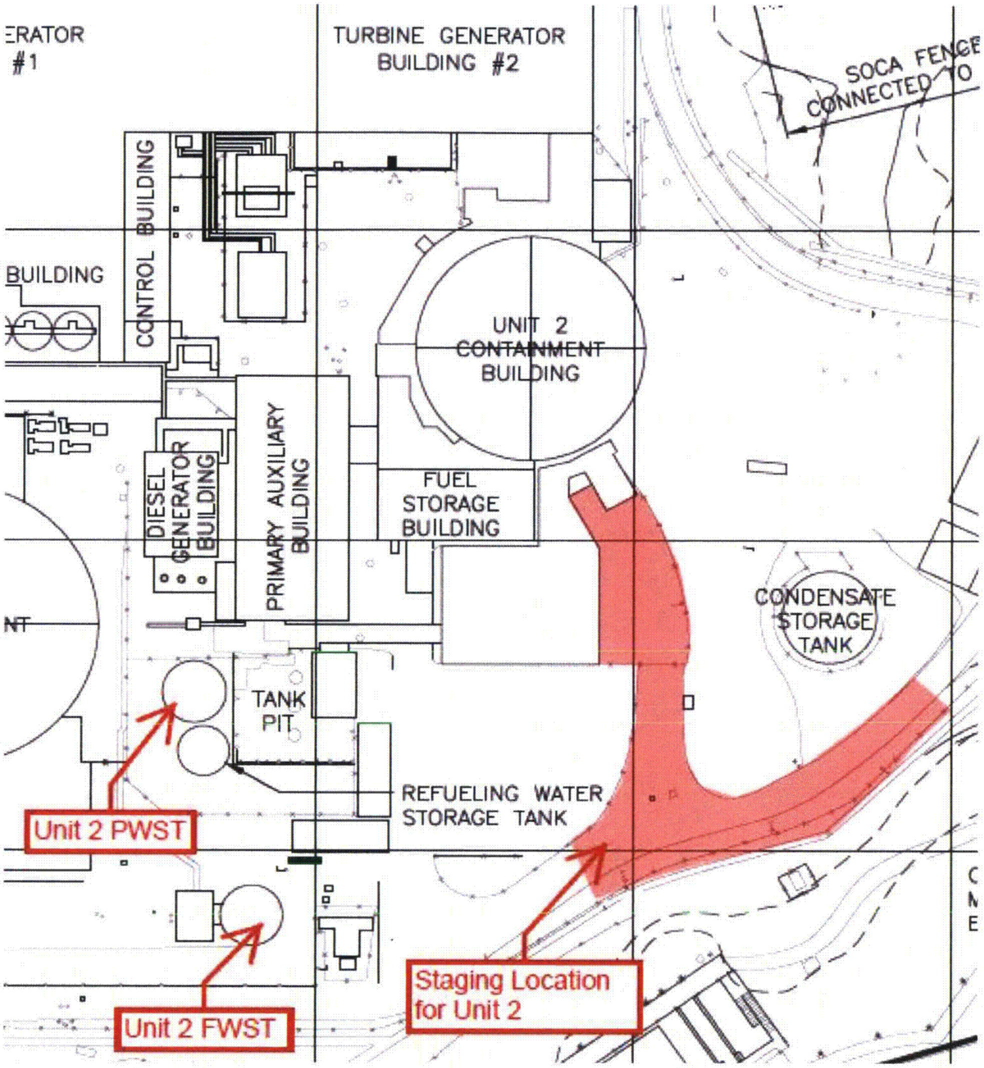

Figure A3-3: Staging Area Unit 2 (Reference 9-a)

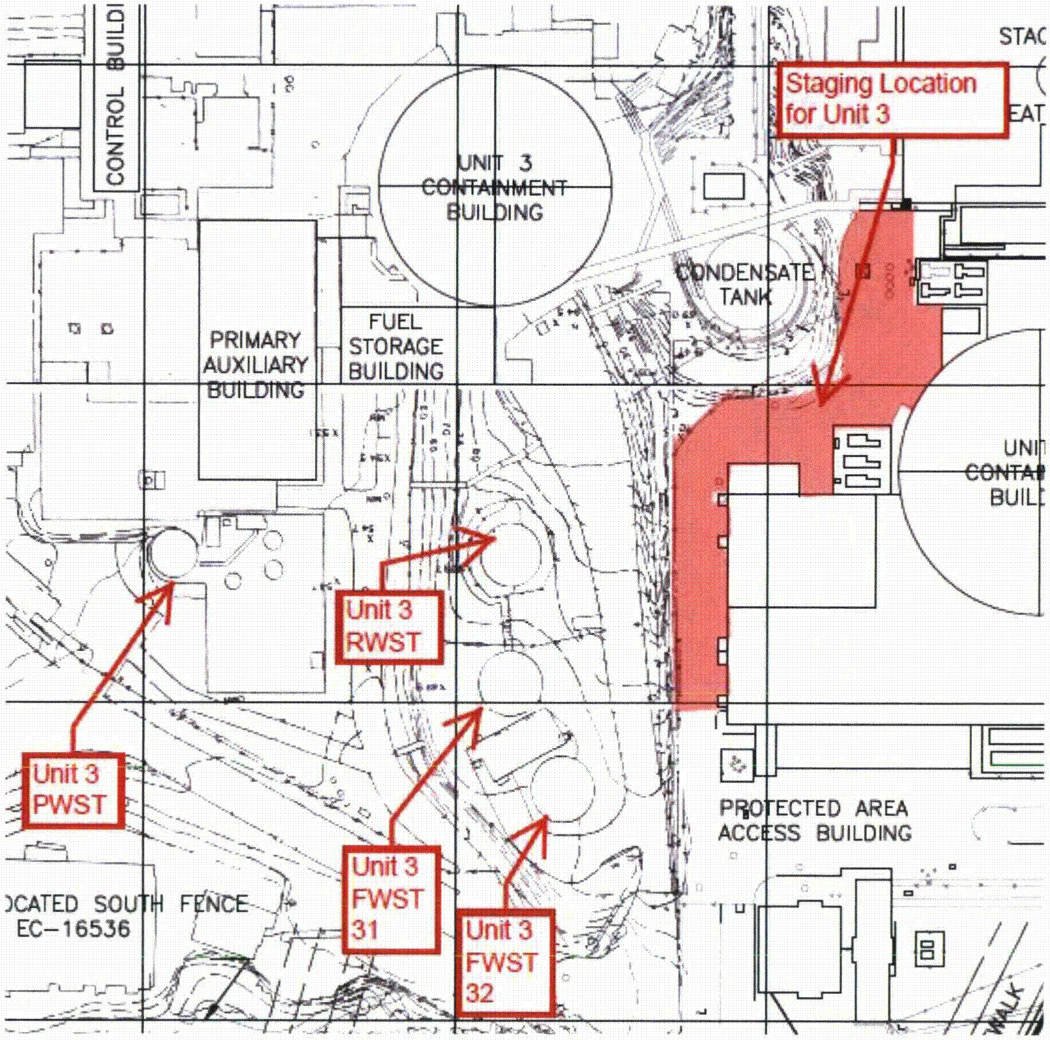

Figure A3-4: Staging Area Unit 3 (Reference 9-a)

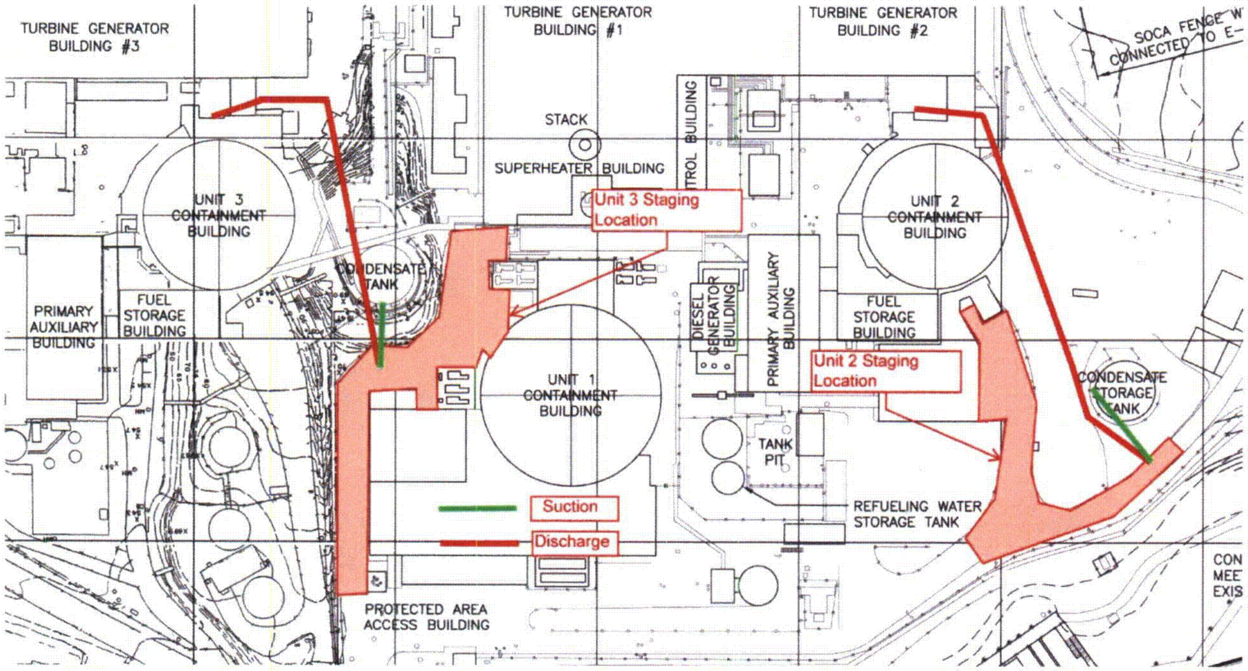

Figure A3-5: Primary AFW Routing for Unit 2 & Unit 3 (Reference 9-a)

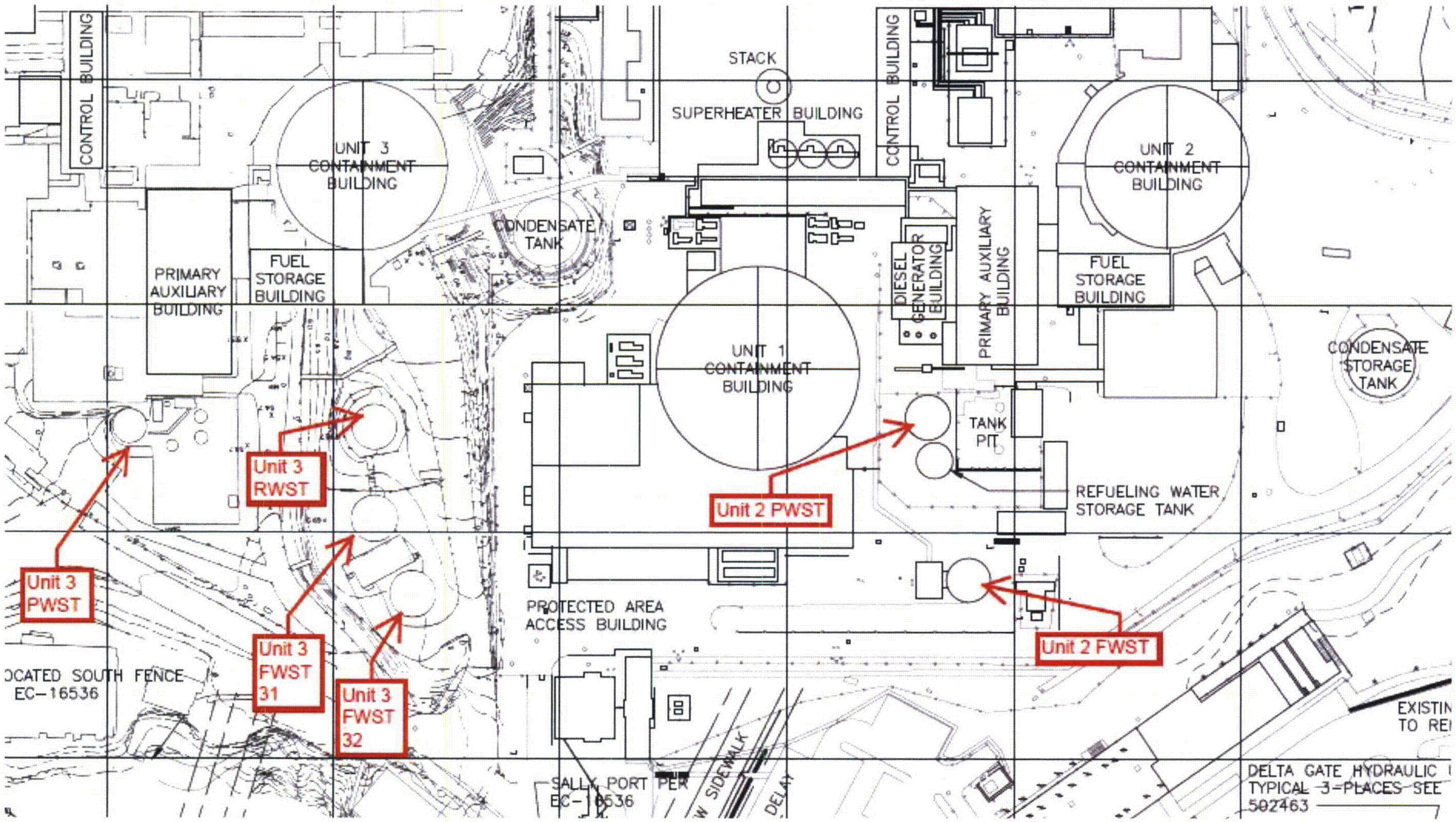

Figure A3-6: Site Plan with Tanks (Reference 9-a)

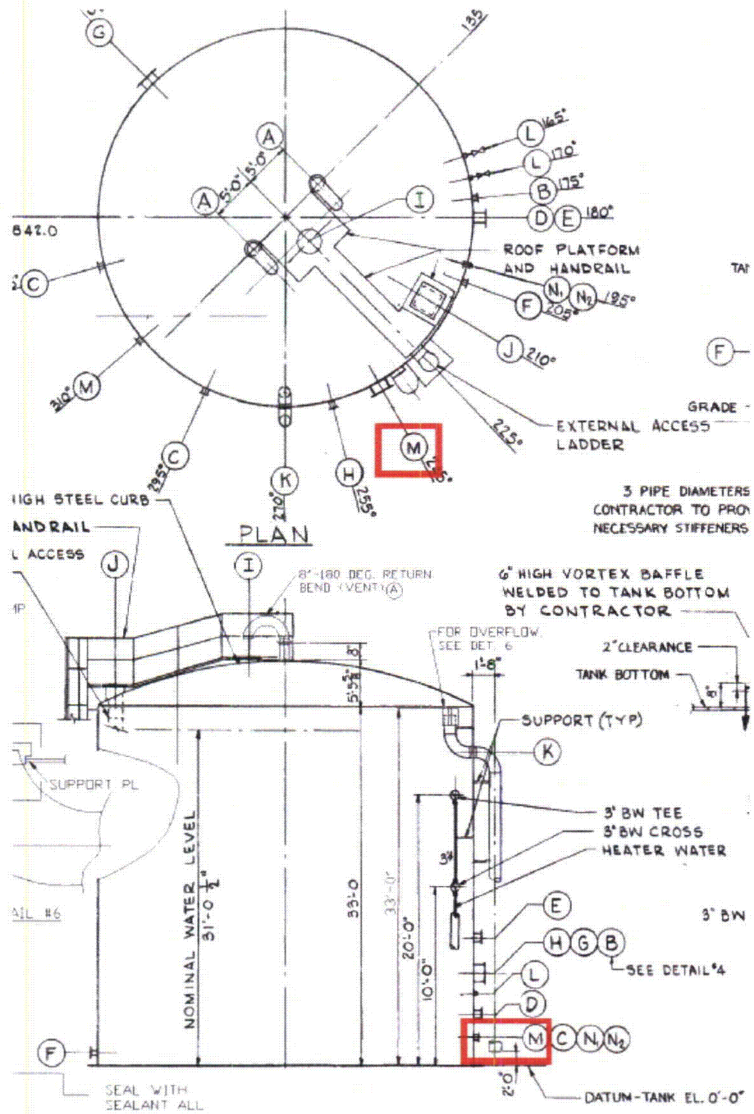

Figure A3-7: Unit 2 FWST (Reference 9-dd)

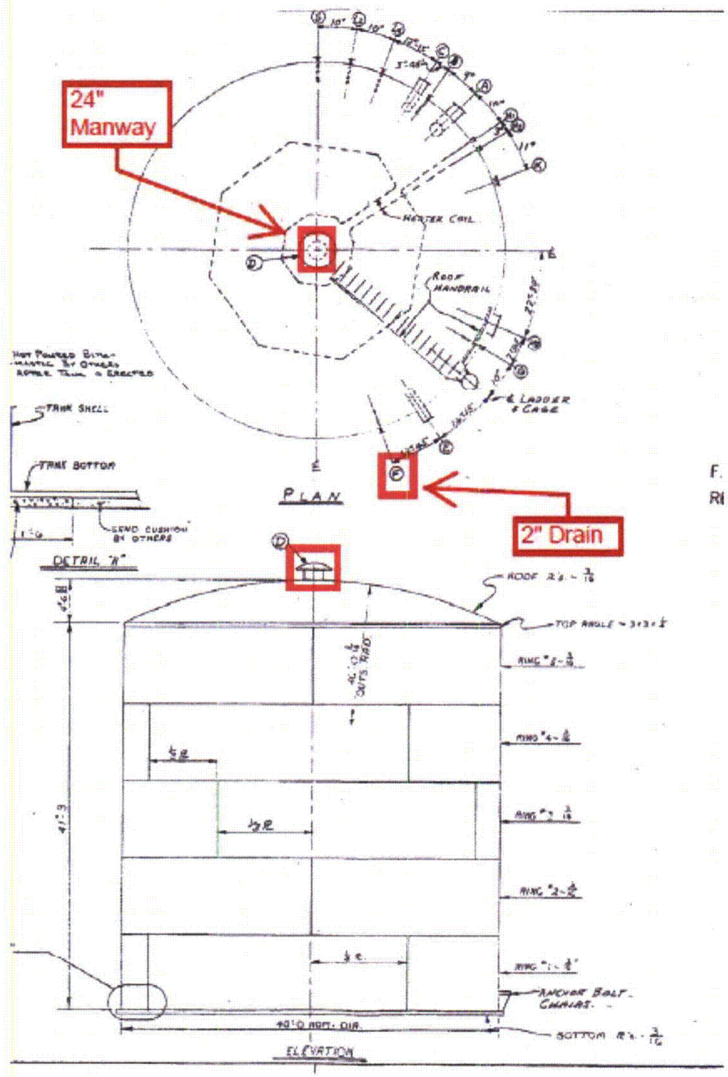

Figure A3-8: Unit 2 RWST Connections (Reference 9-ee)

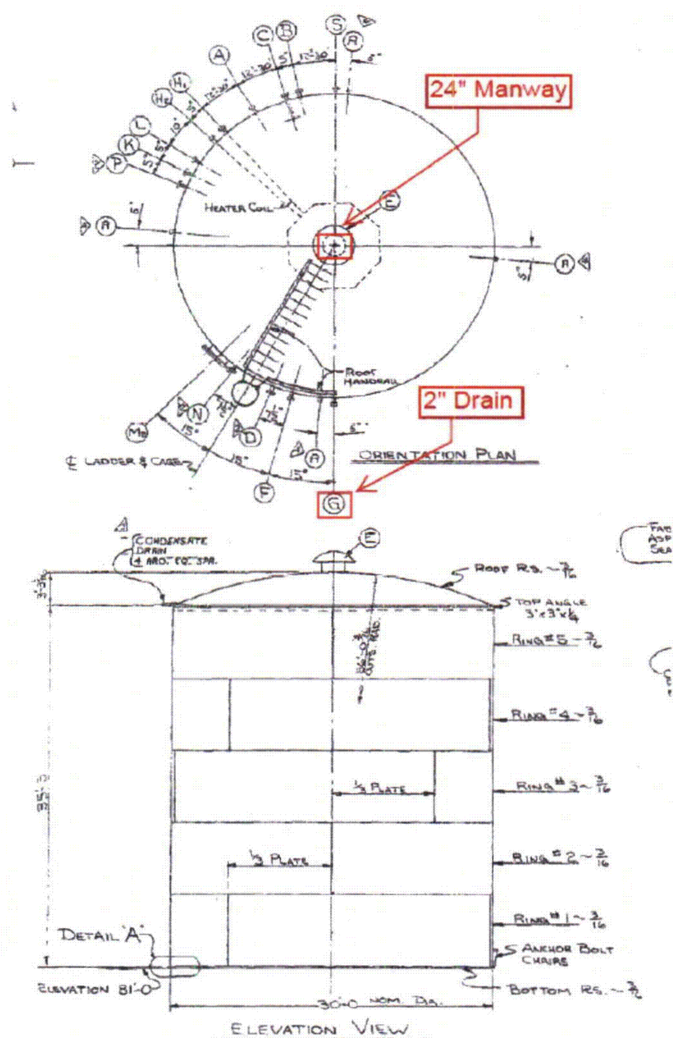

Figure A3-9: Unit 2 PWST Connection Locations (Reference 9-ff)

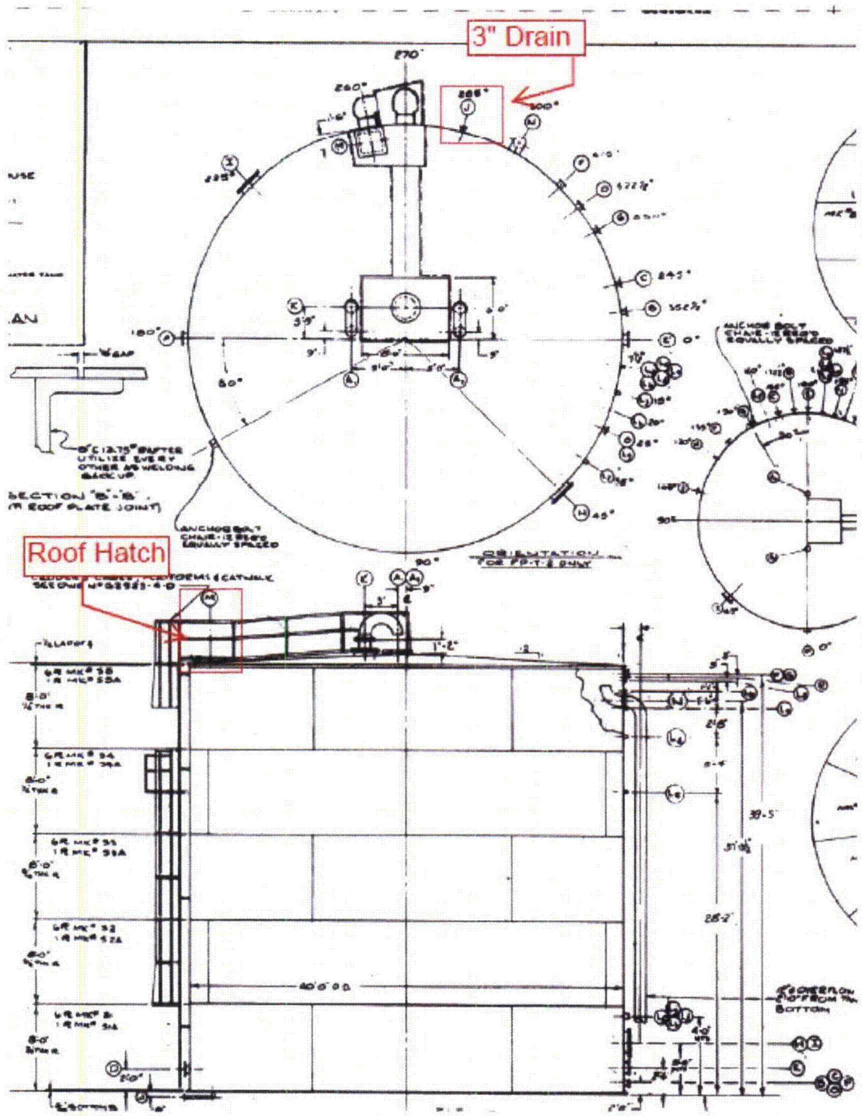

Figure A3-10: Unit 3 FWST 32 (Reference 9-gg)

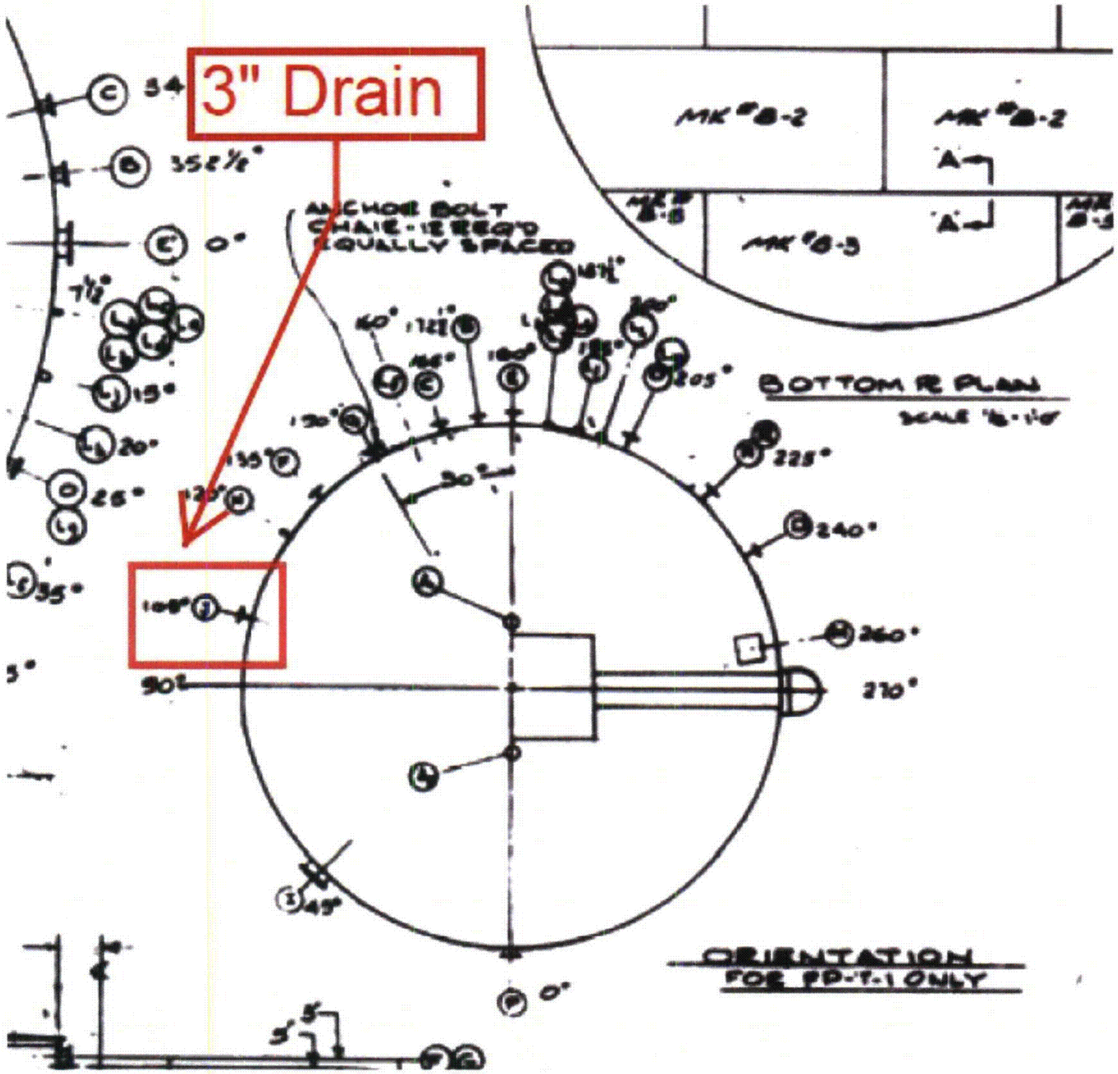

Figure A3-11: Unit 3 FWST 31 (Reference 9-gg)

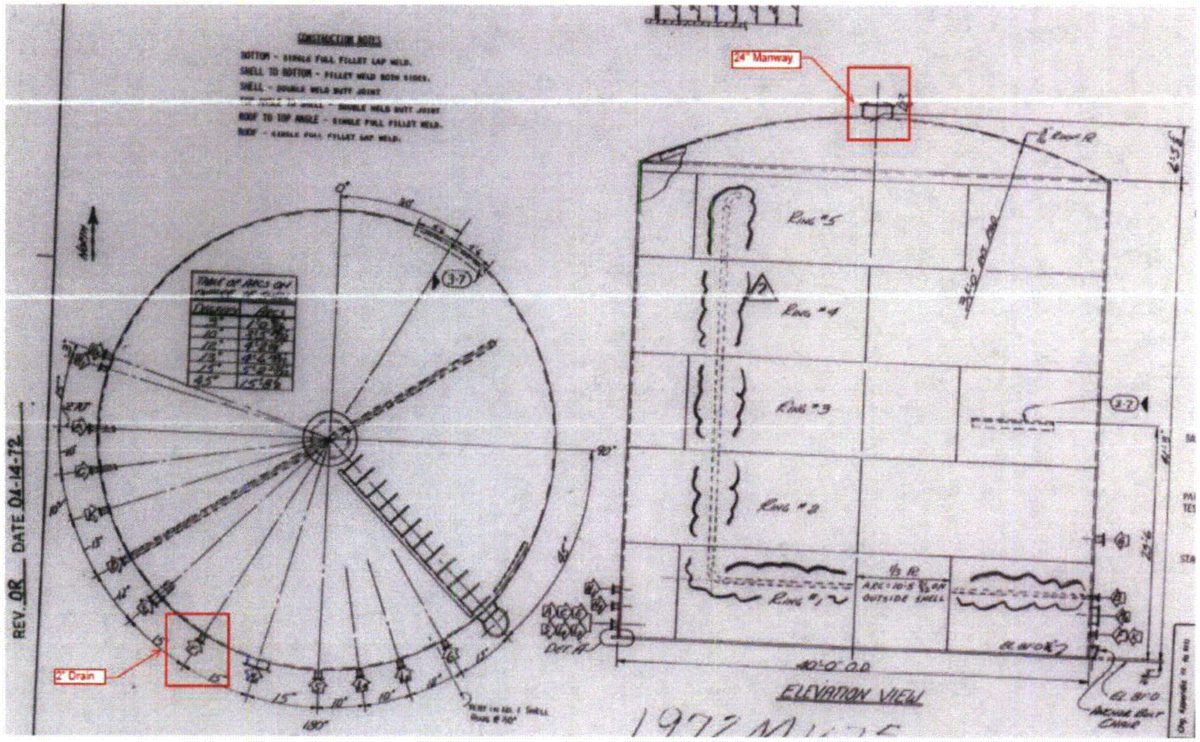

Figure A3-12: Unit 3 RWST (Reference 9-hh)

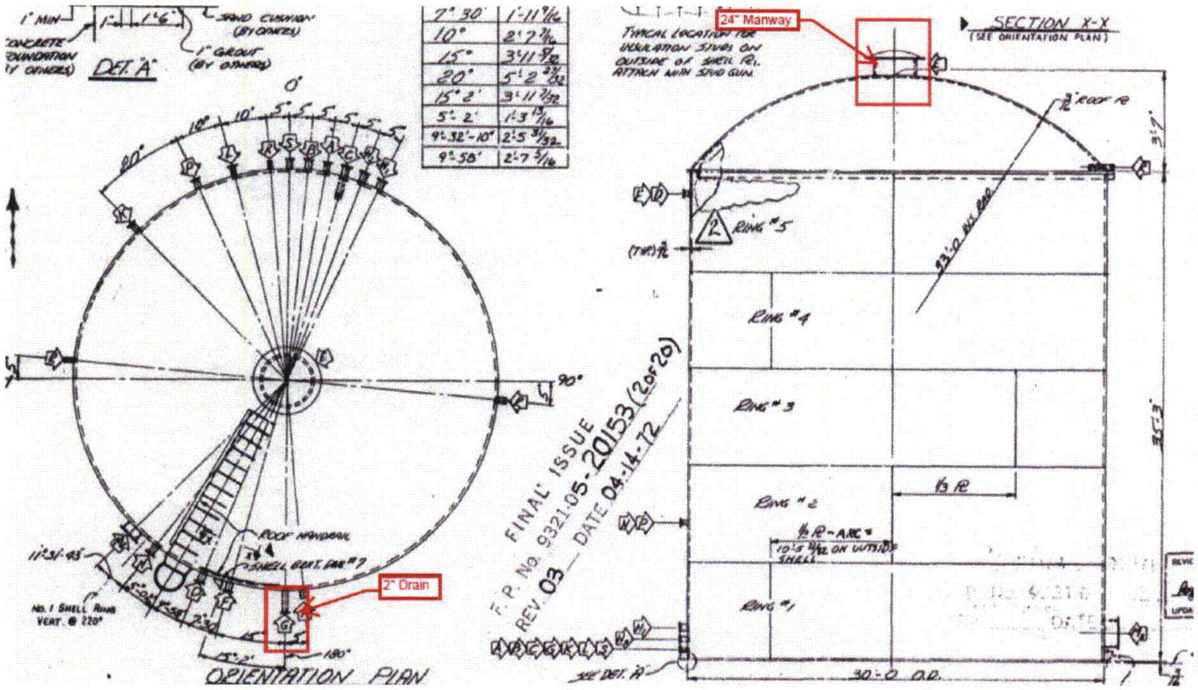

Figure A3-13: Unit 3 PWST (Reference 9-ii)

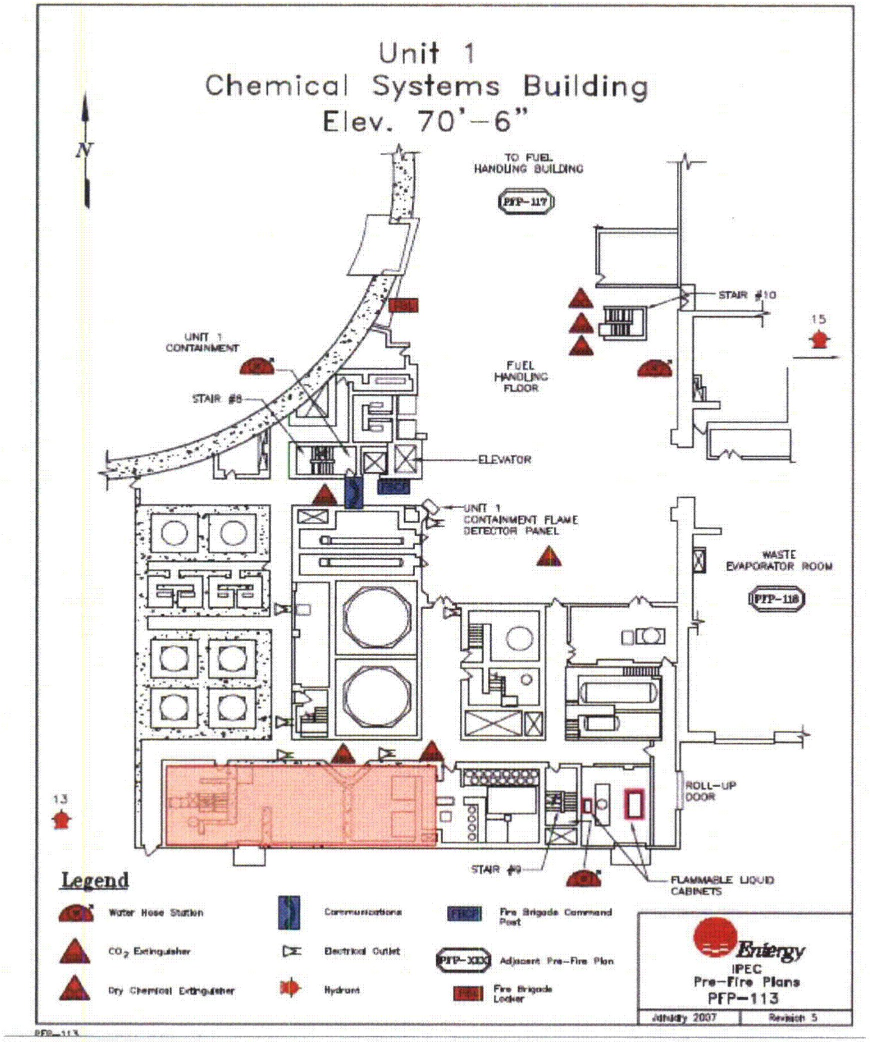

Figure A3-14: Proposed Equipment Storage Location (Reference 9-pp)

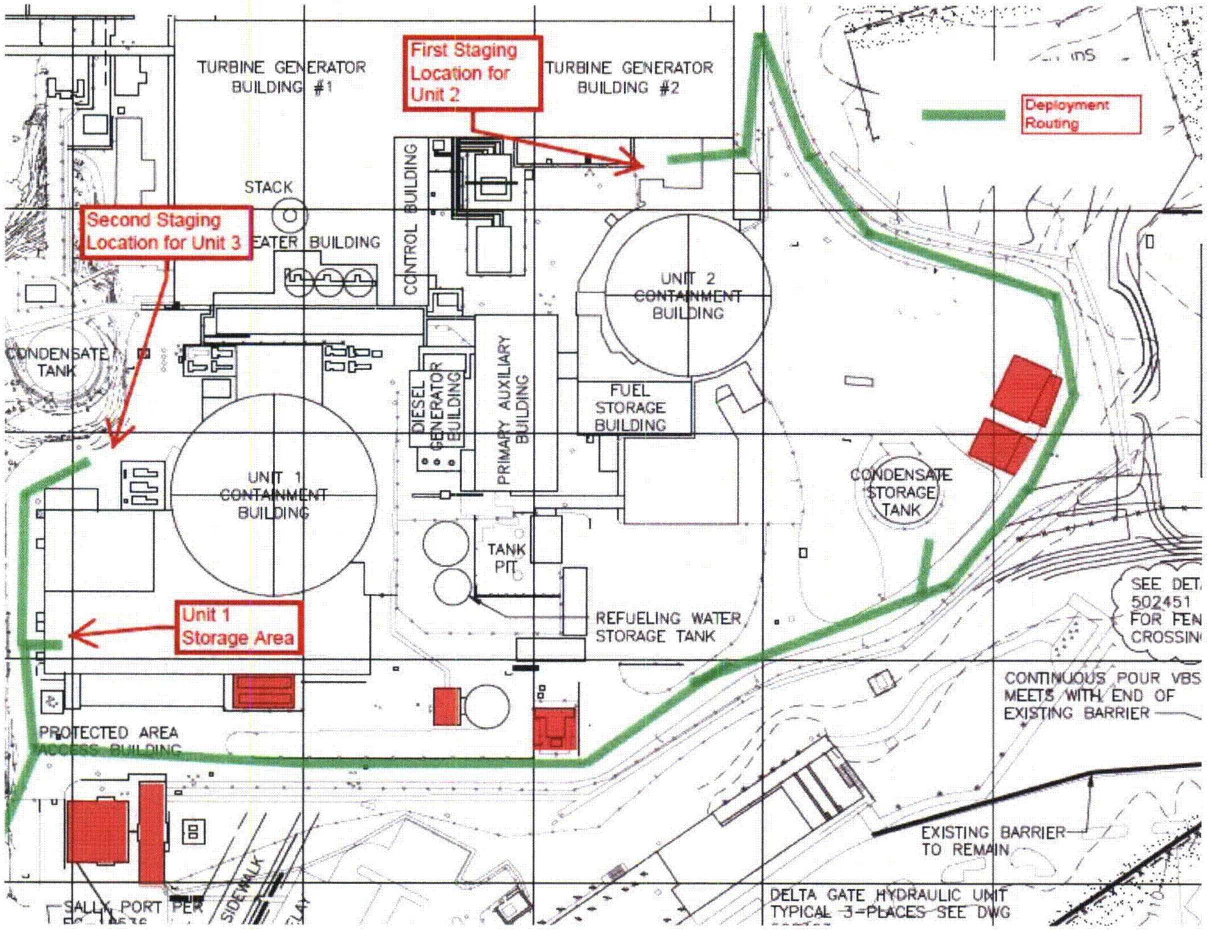

Figure A3-15: Unit 2 Deployment Path (Reference 9-a)

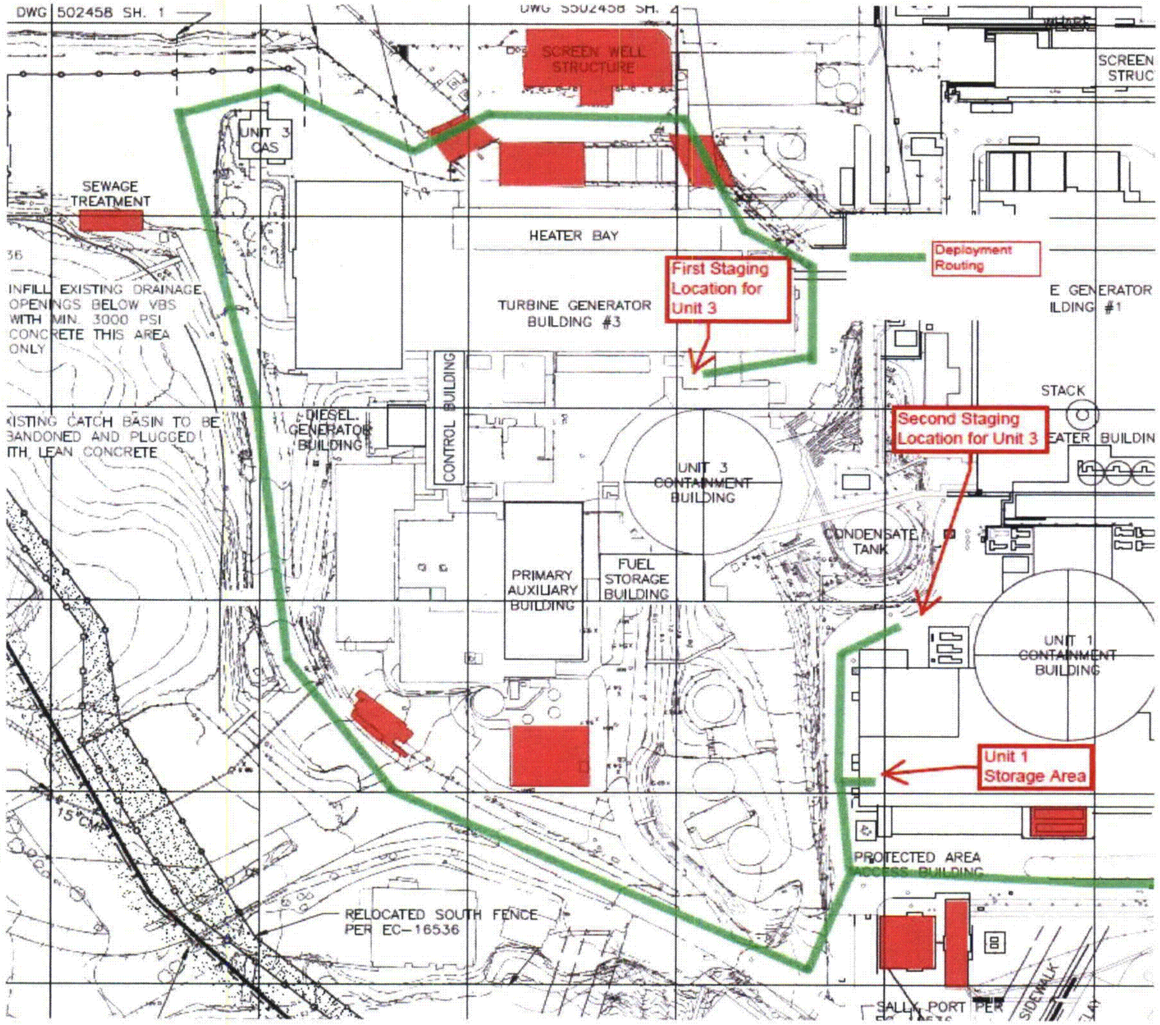

Figure A3-16: Unit 3 Deployment Path (Reference 9-a)

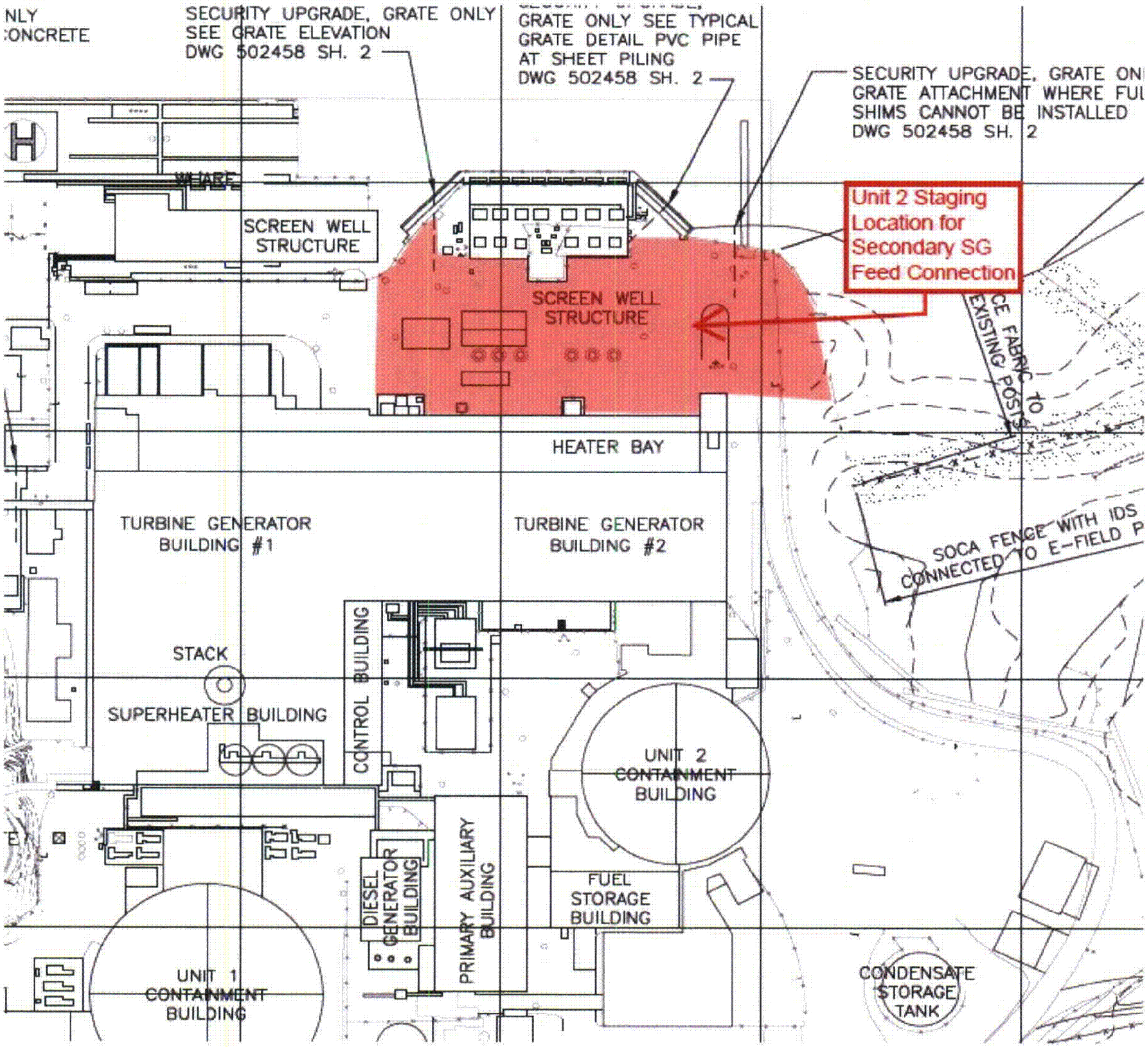

Figure A3-17: Unit 2 Secondary AFW Staging (Reference 9-a)

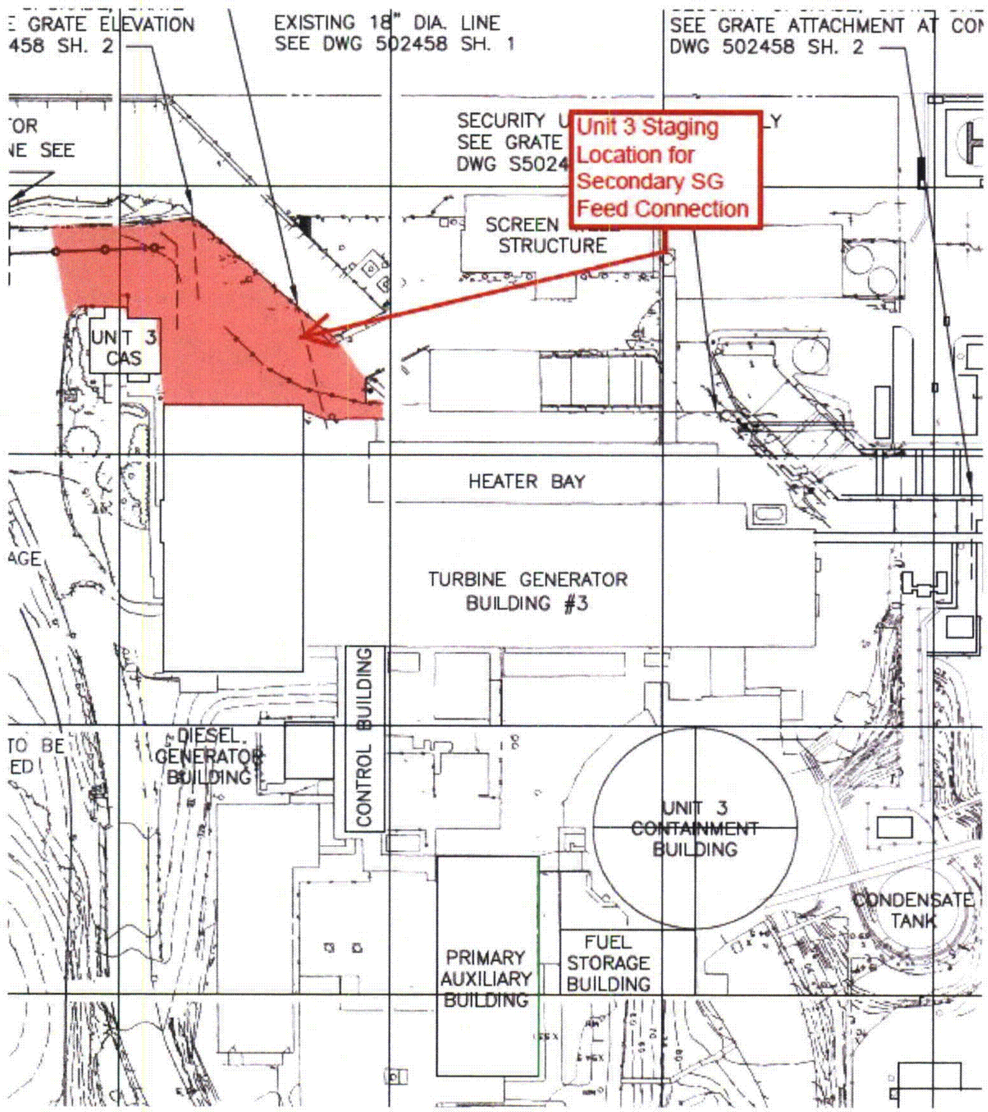

Figure A3-18: Unit 3 Secondary AFW Staging (Reference 9-a)

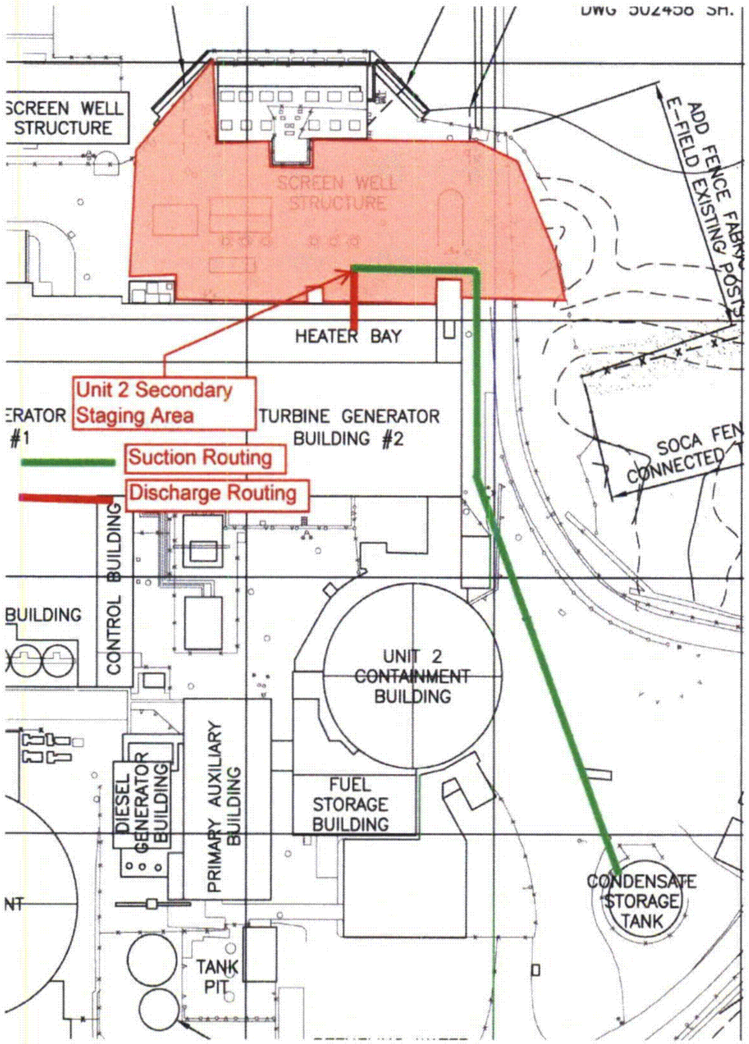

Figure A3-19: Unit 2 Secondary AFW Connection Routing (Reference 9-a)

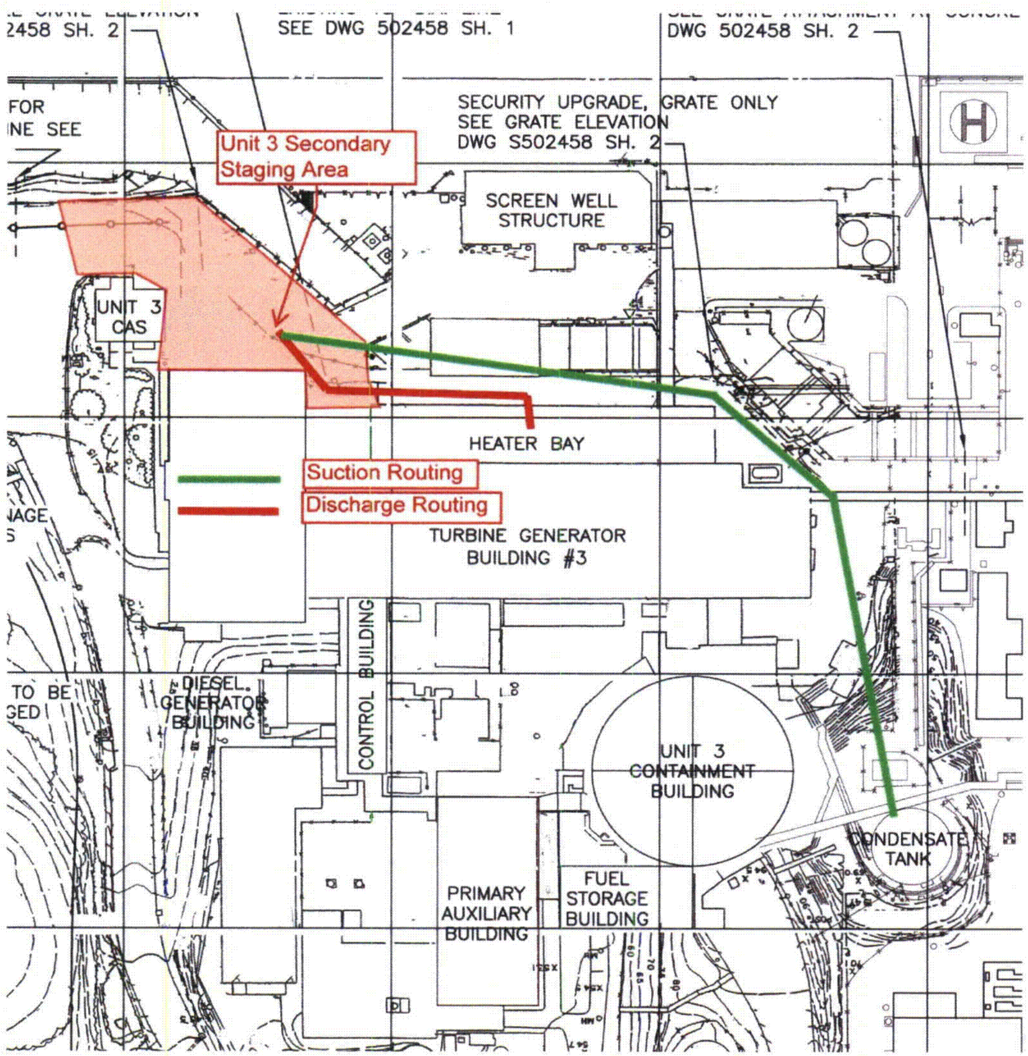

Figure A3-20: Unit 3 Secondary AFW Connection Routing (Reference 9-a)

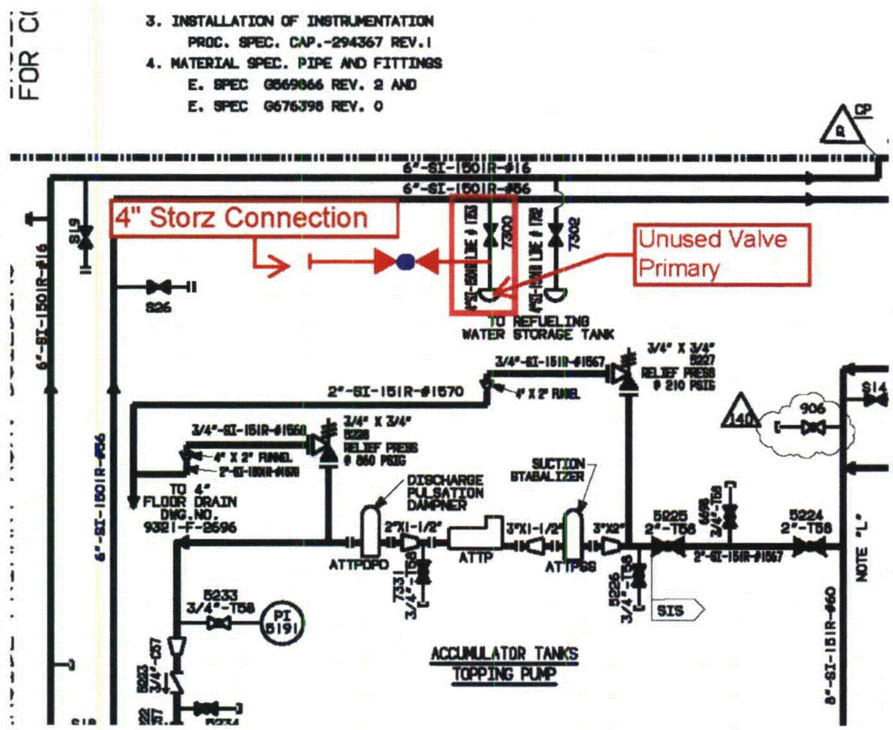

Figure A3-21: Unit 2 Primary RCS Inventory Connections (Reference 9-jj)

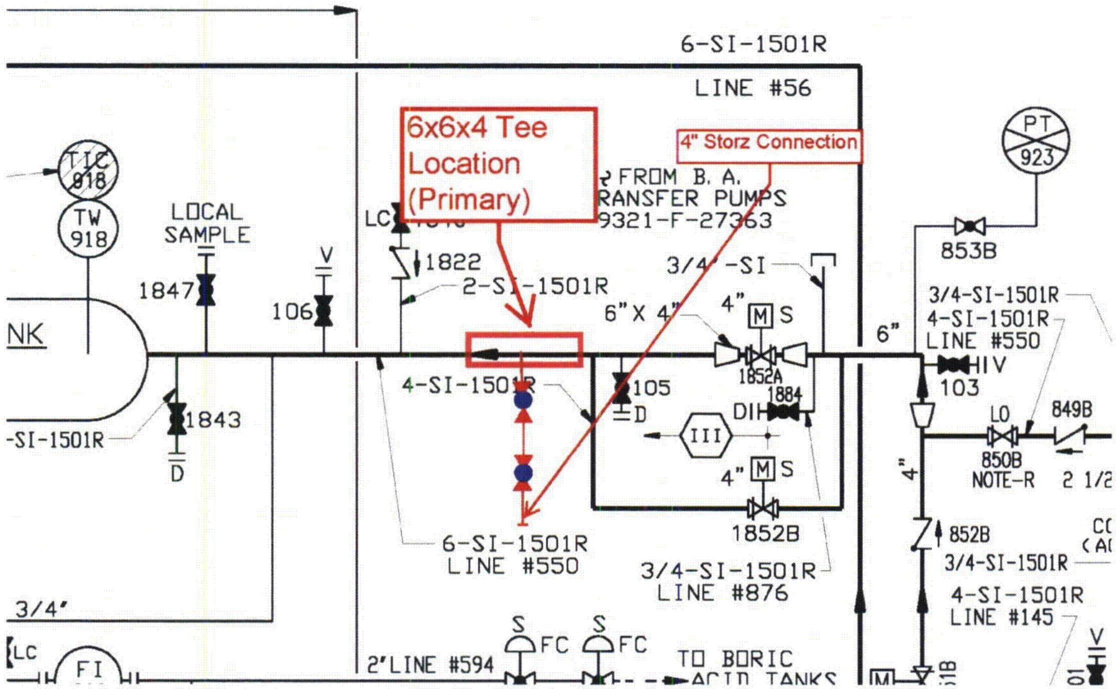

Figure A3-22: Unit 3 Primary RCS Inventory Connections (Reference 9-kk)

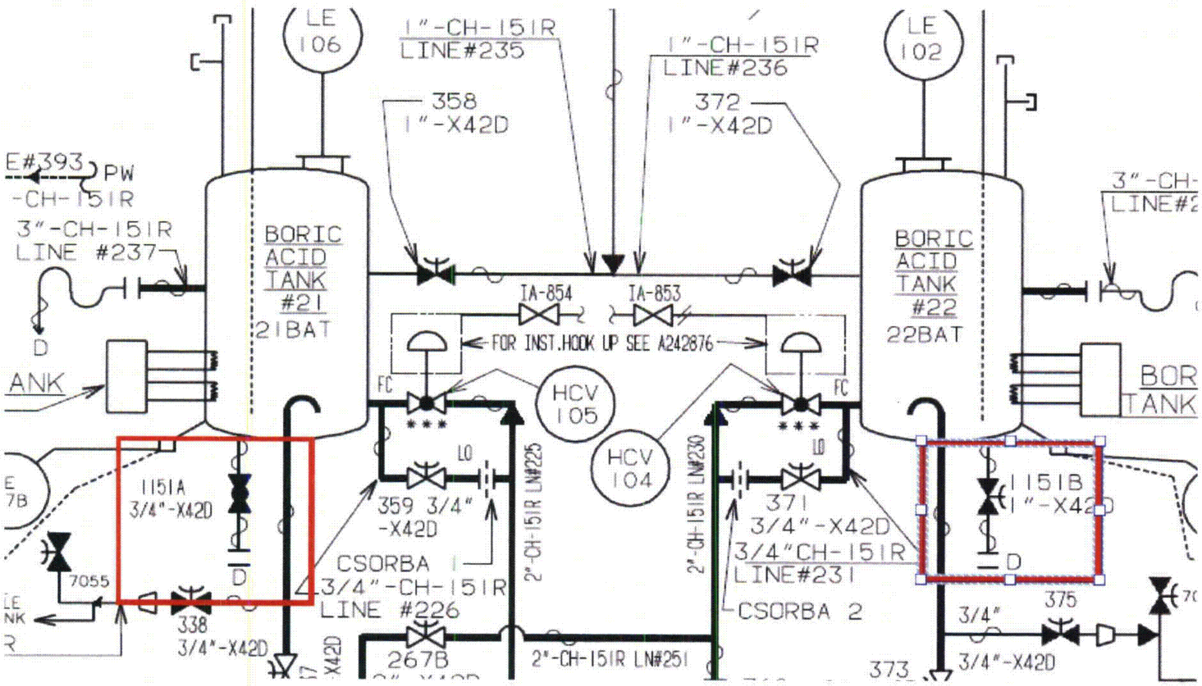

Figure A3-23: Unit 2 BAST Connections (Reference 9-ll)

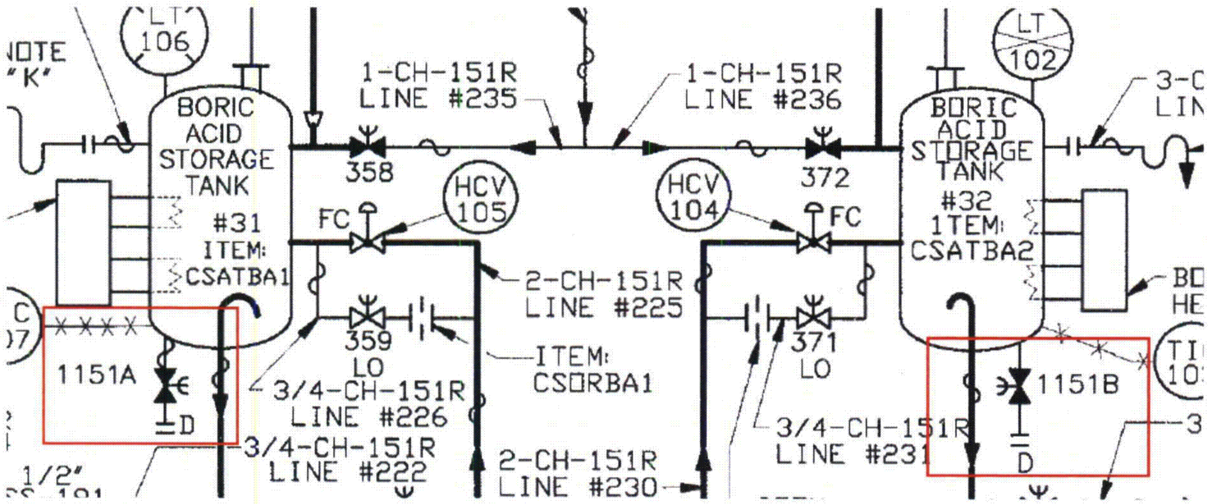

Figure A3-24: Unit 3 BAST Connections (Reference 9-mm)

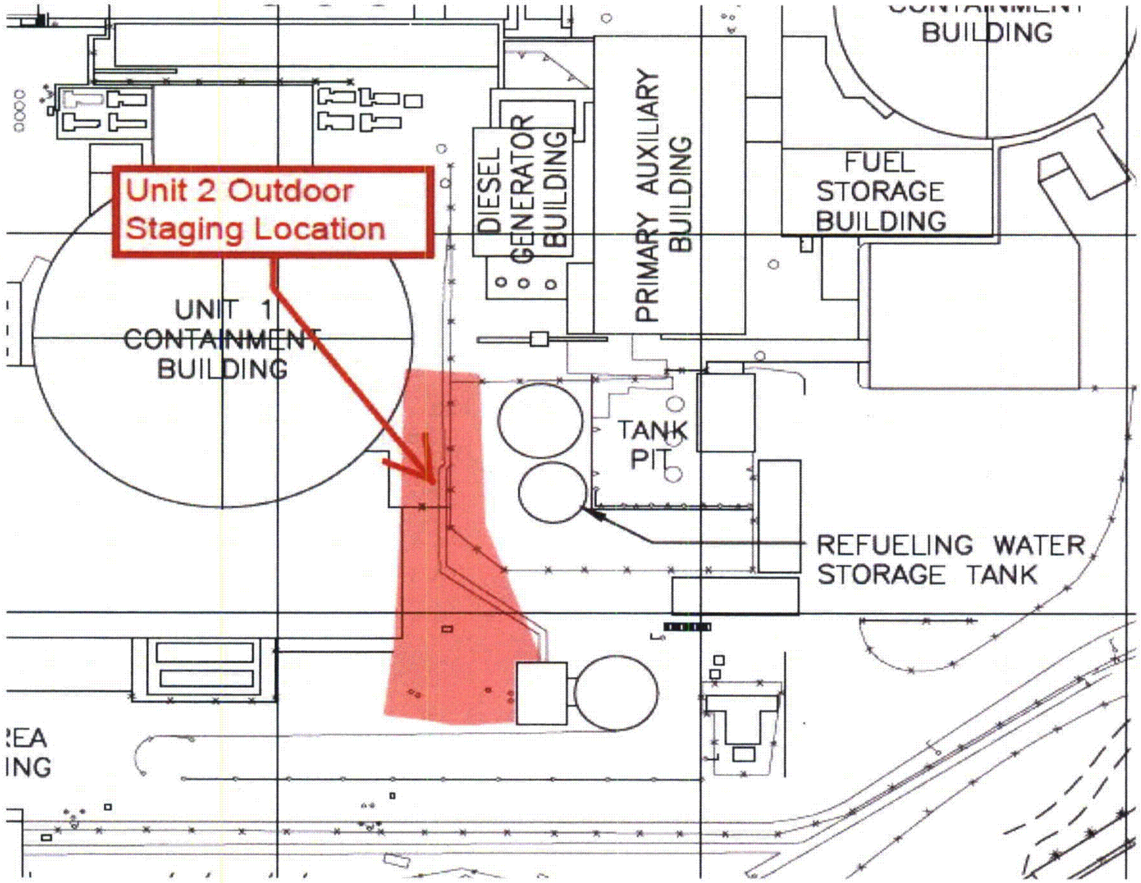

Figure A3-25: Unit 2 RCS Staging Location (Reference 9-a)

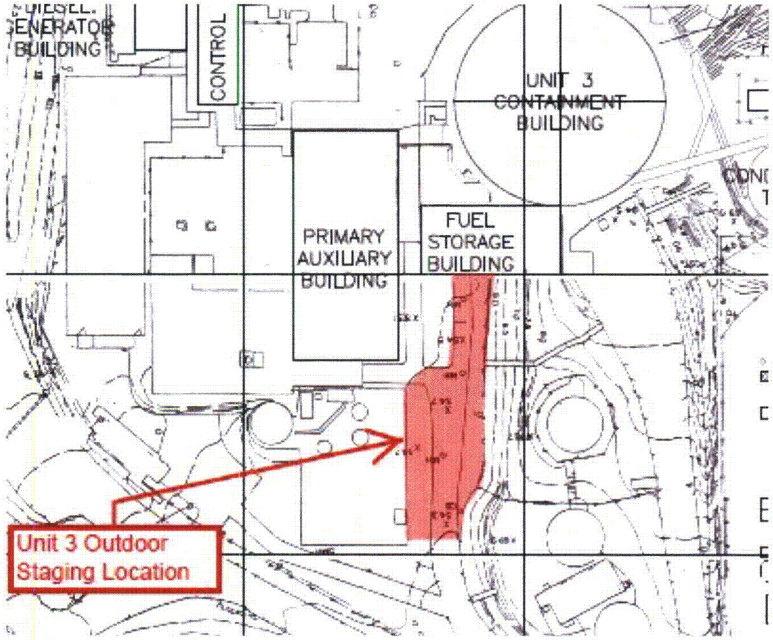

Figure A3-26: Unit 3 RCS Staging Location (Reference 9-a)

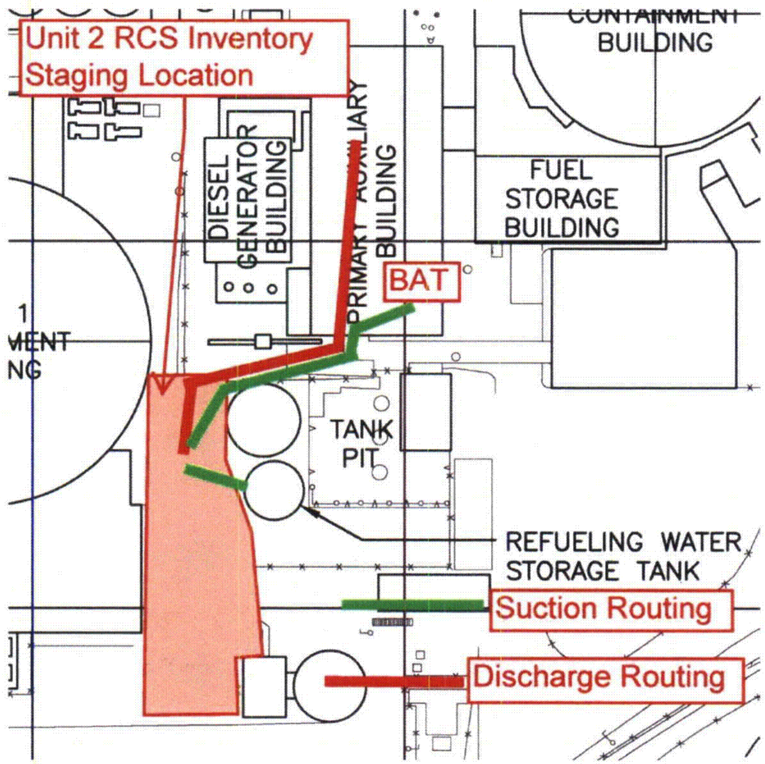

Figure A3-27: Unit 2 RCS Inventory Routing-1 (Reference 9-a)

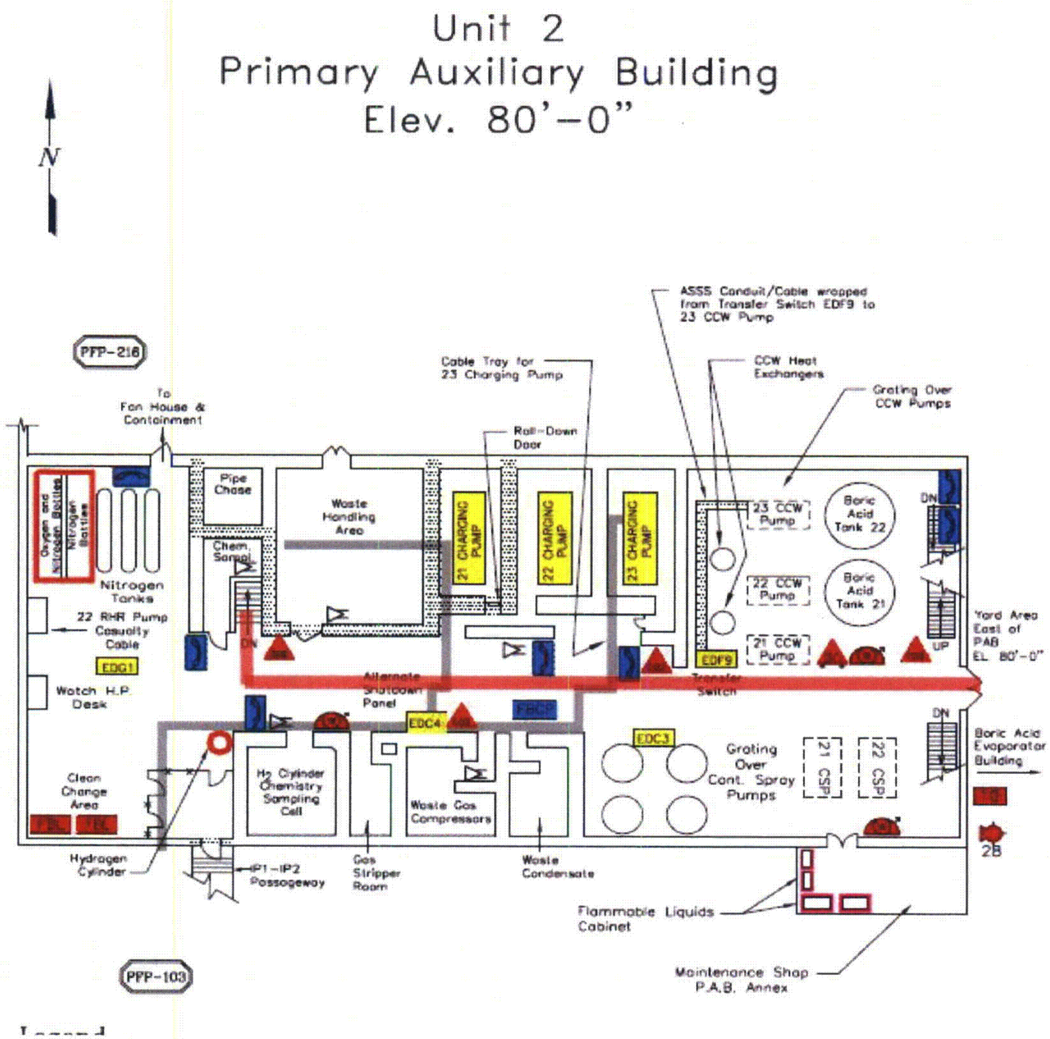

Figure A3-28: Unit 2 RCS Inventory Routing-2 (Reference 9-oo)

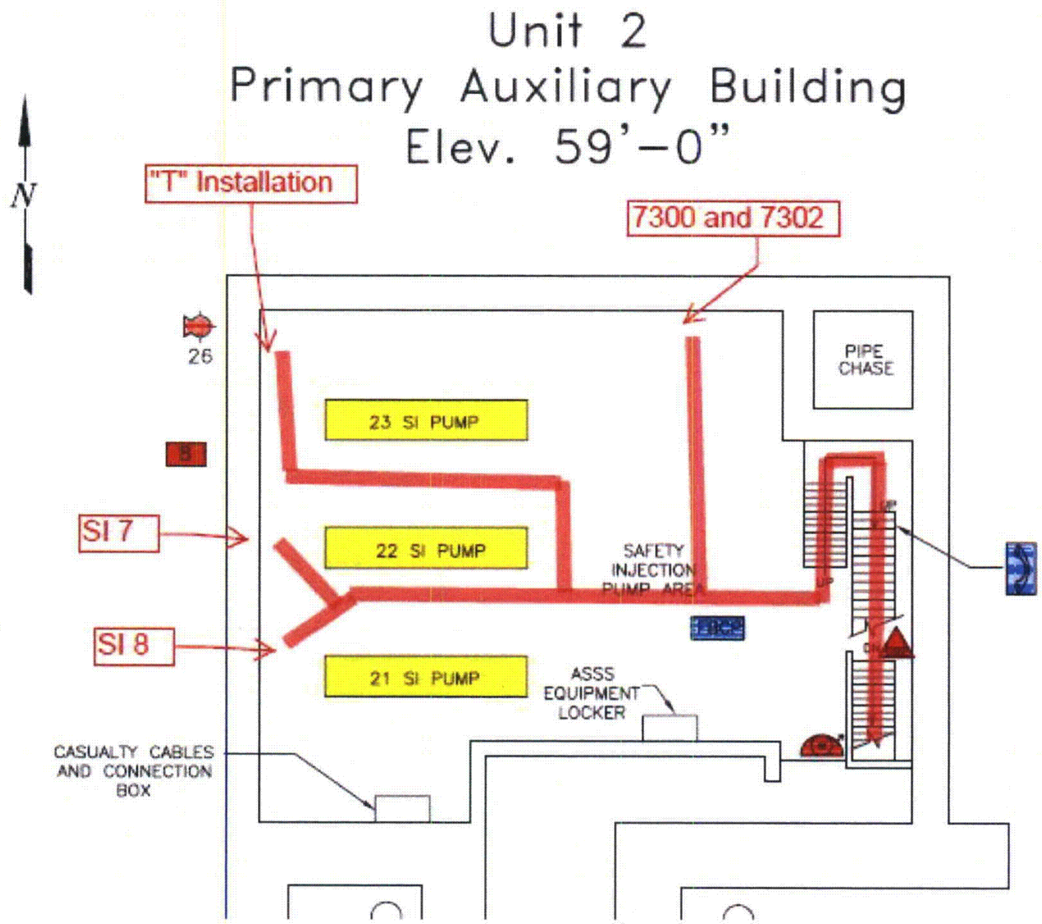

Figure A3-29: Unit 2 RCS Inventory Routing-3 (Reference 9-qq)

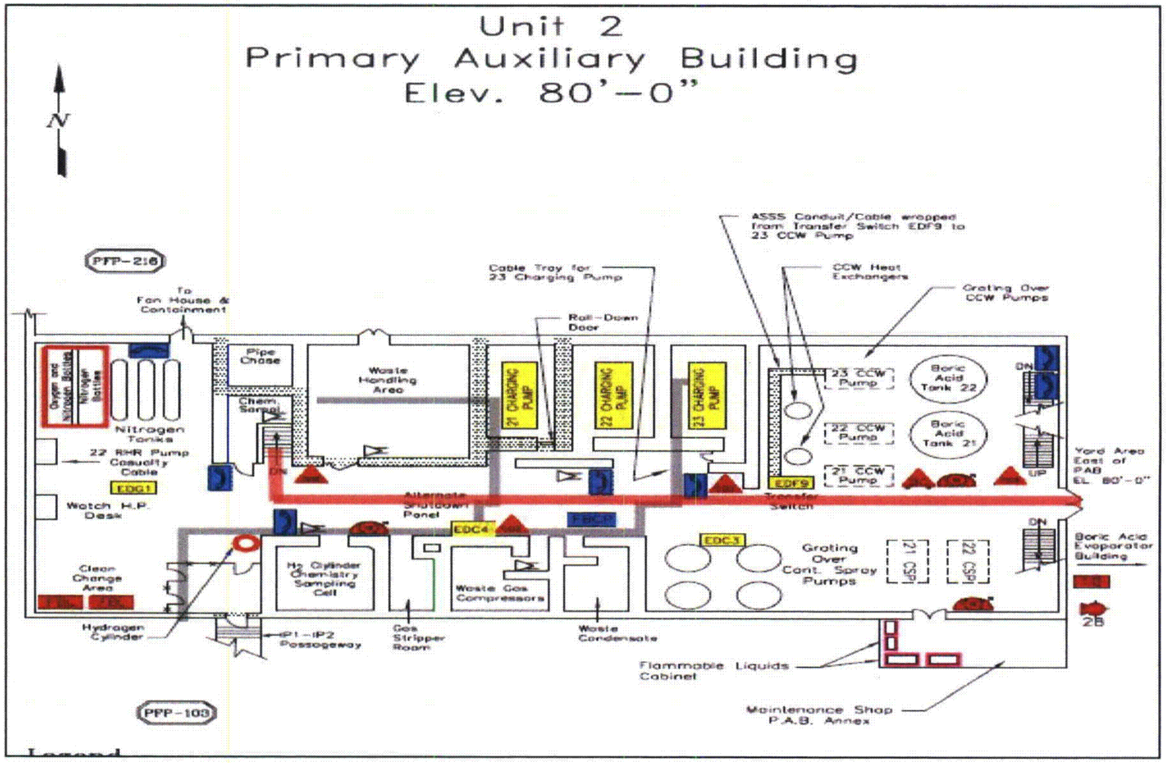

Figure A3-30: Unit 2 RCS Inventory Routing-2 (Reference 9-oo)

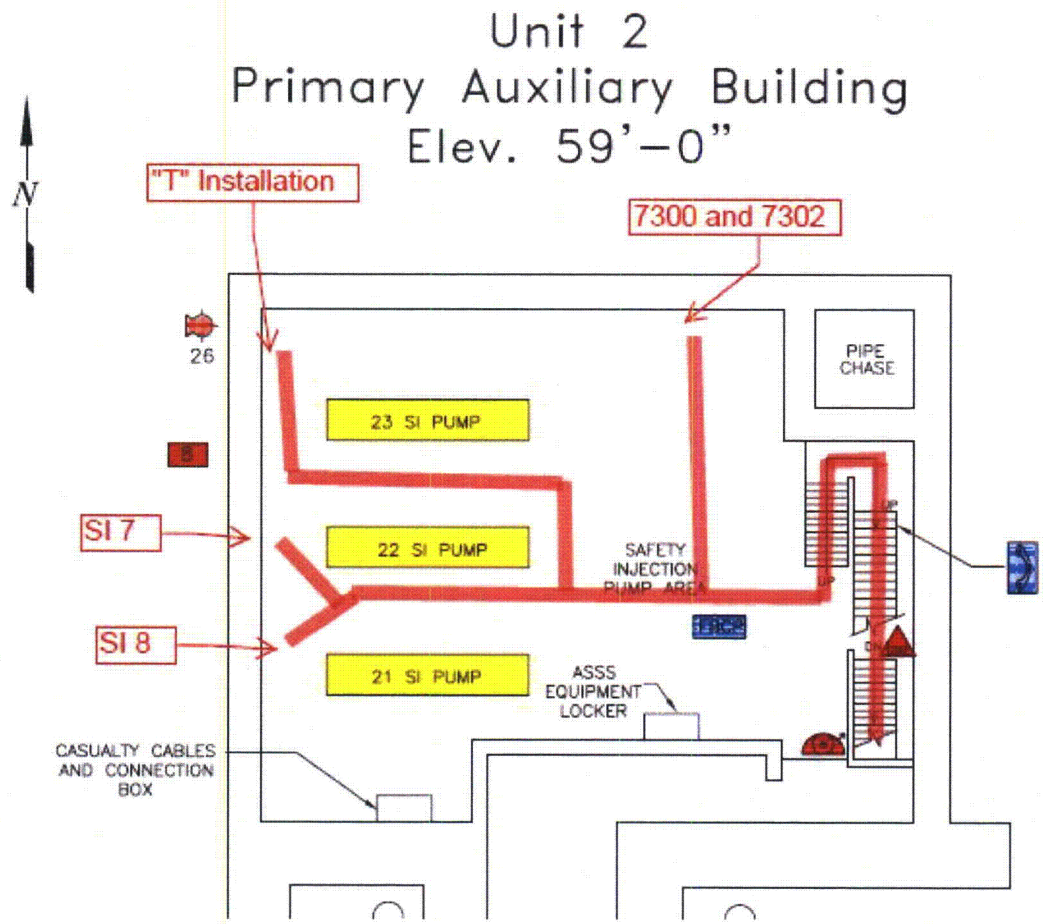

Figure A3-31: Unit 2 RCS Inventory Routing-3 (Reference 9-qq)

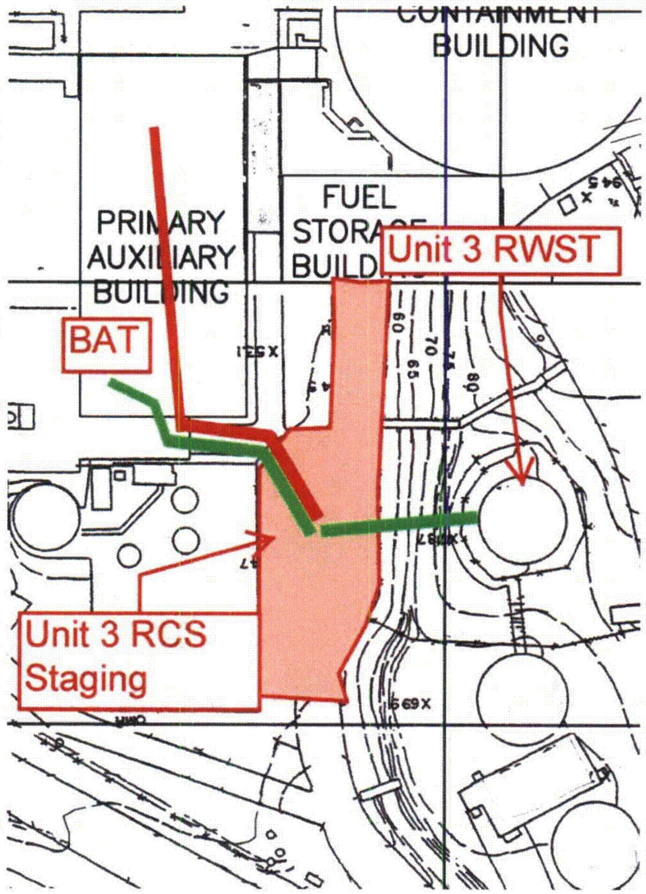

Figure A3-32: Unit 3 RCS Inventory Routing-1 (Reference 9-a)

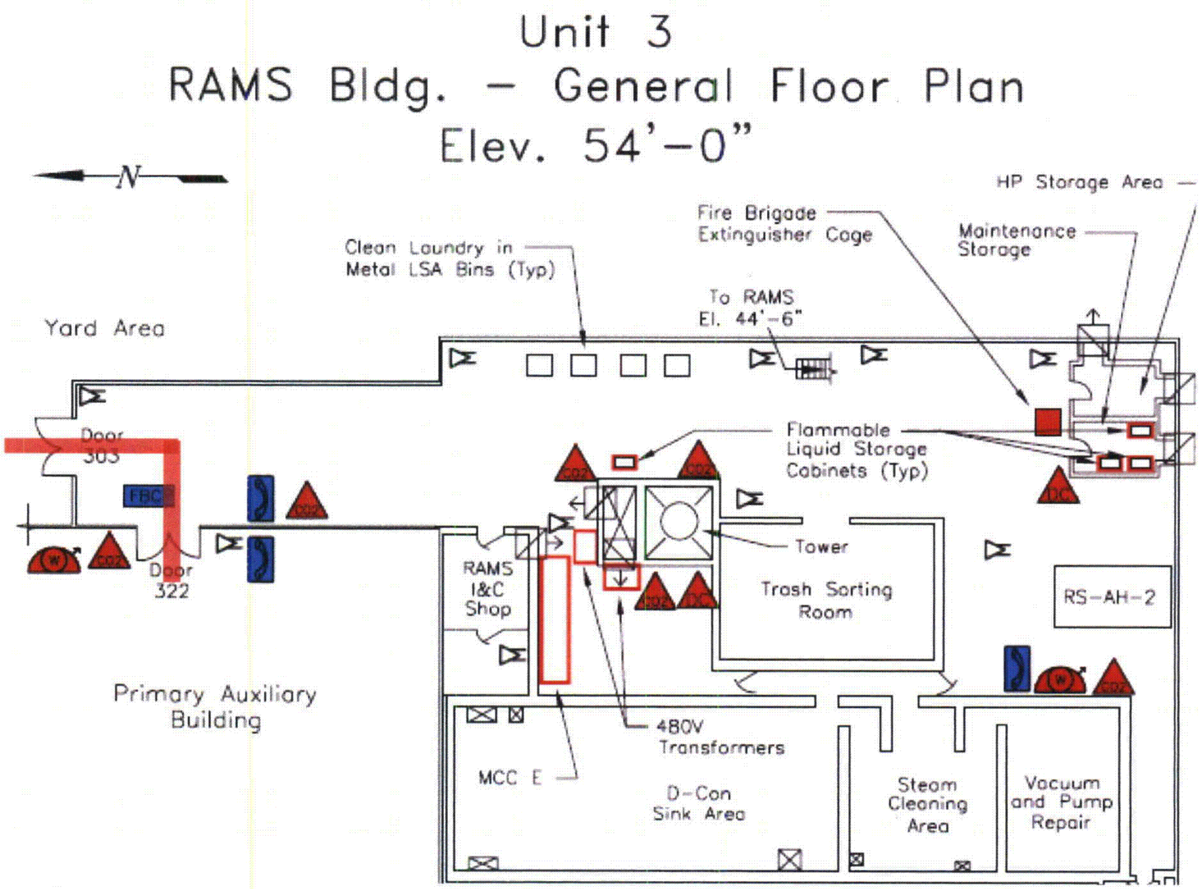

Figure A3-33: Unit 3 RCS Inventory Routing-2 (Reference 9-ss)

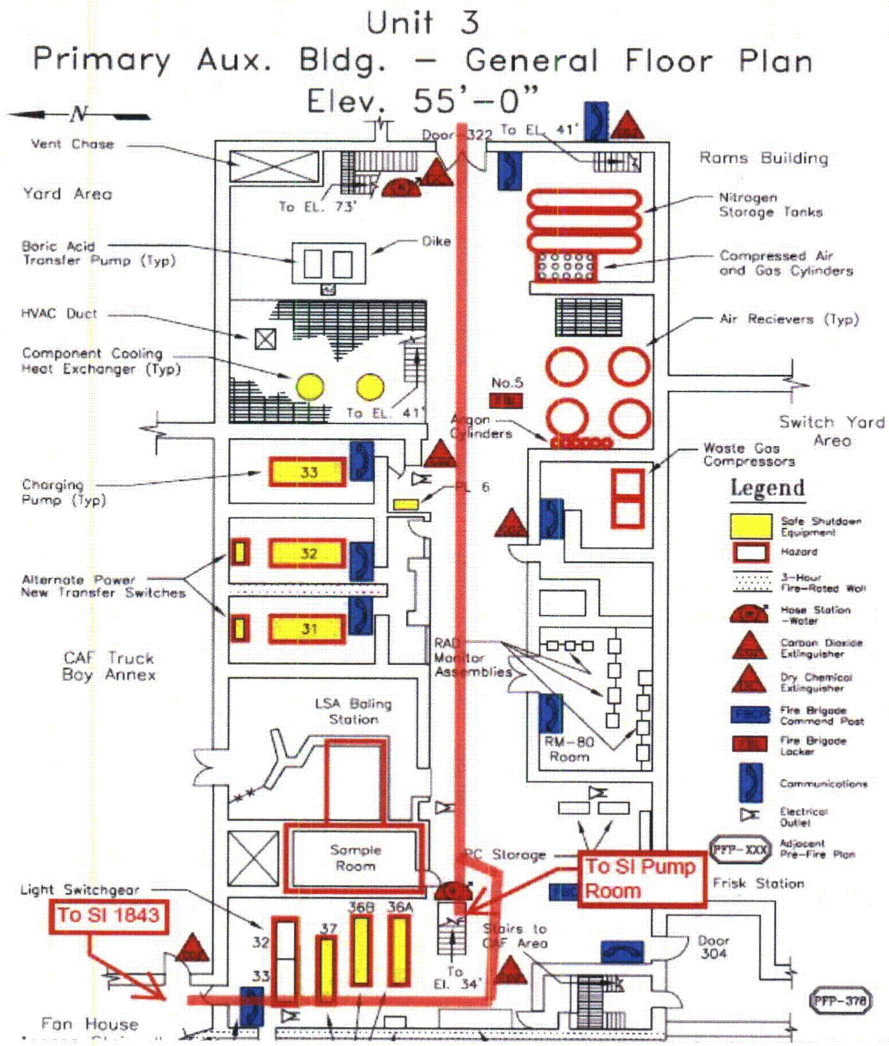

Figure A3-34: Unit 3 RCS Inventory Routing-3 (Reference 9-tt)

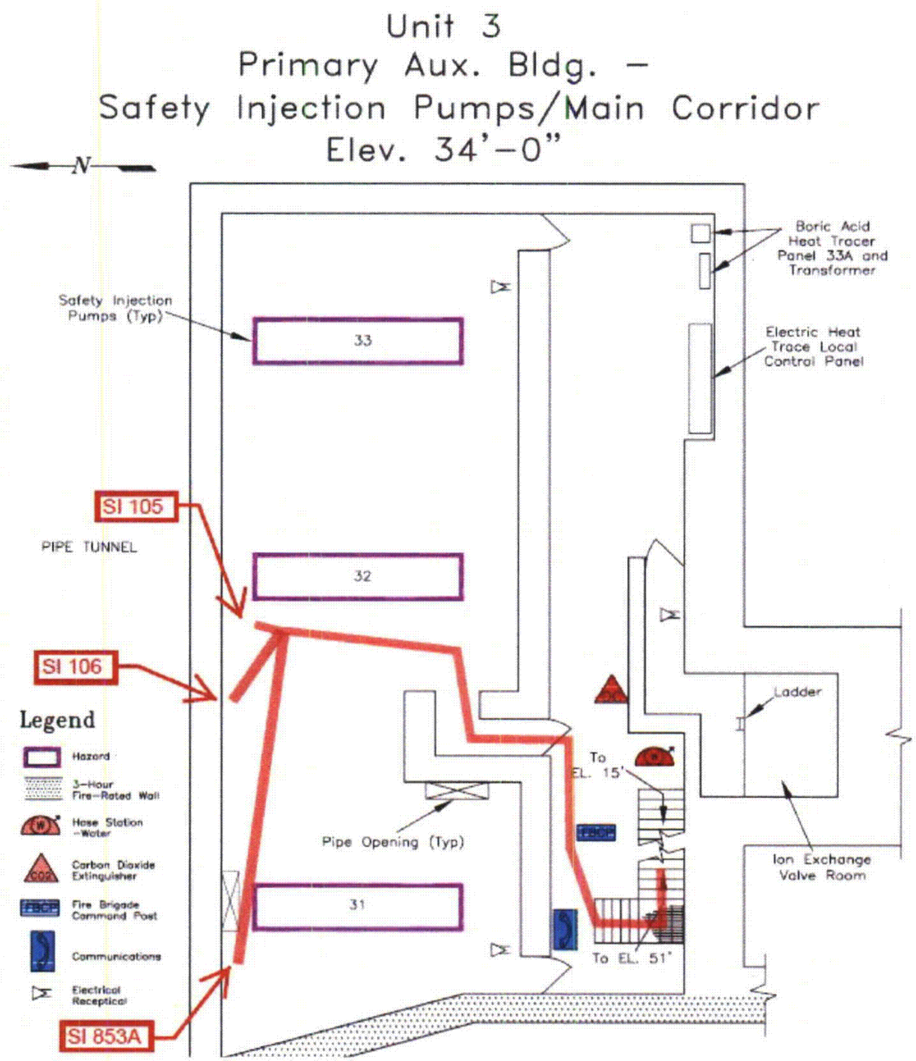

Figure A3-35: Unit 3 RCS Inventory Routing-4 (Reference 9-uu)

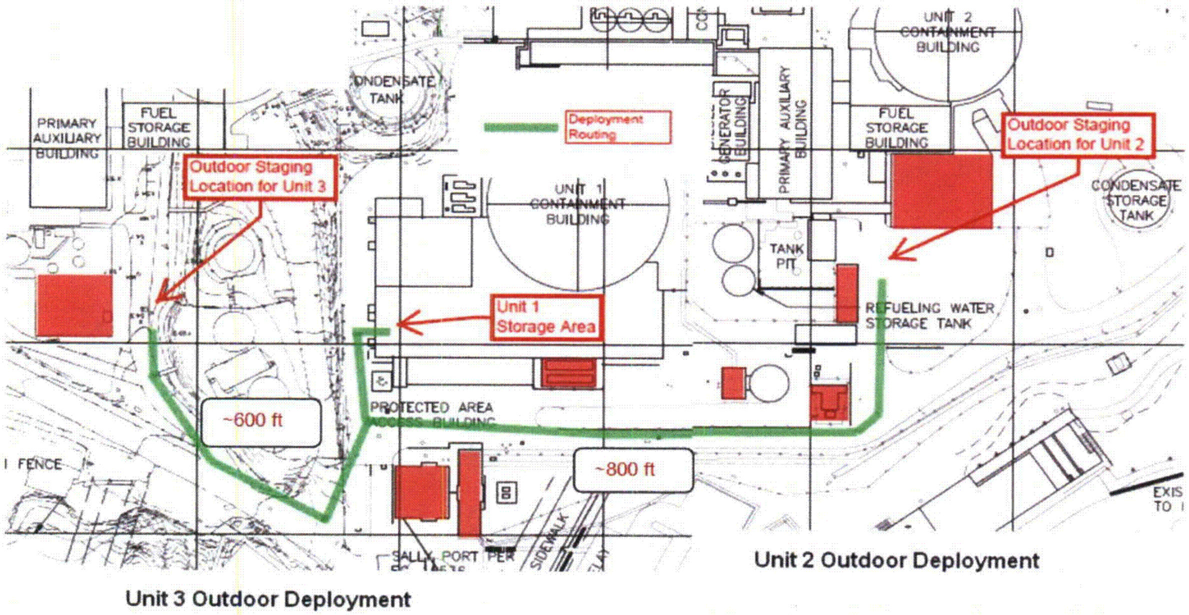

Figure A3-36: Units 2 & 3 RCS Inventory Deployment (Reference 9-a)

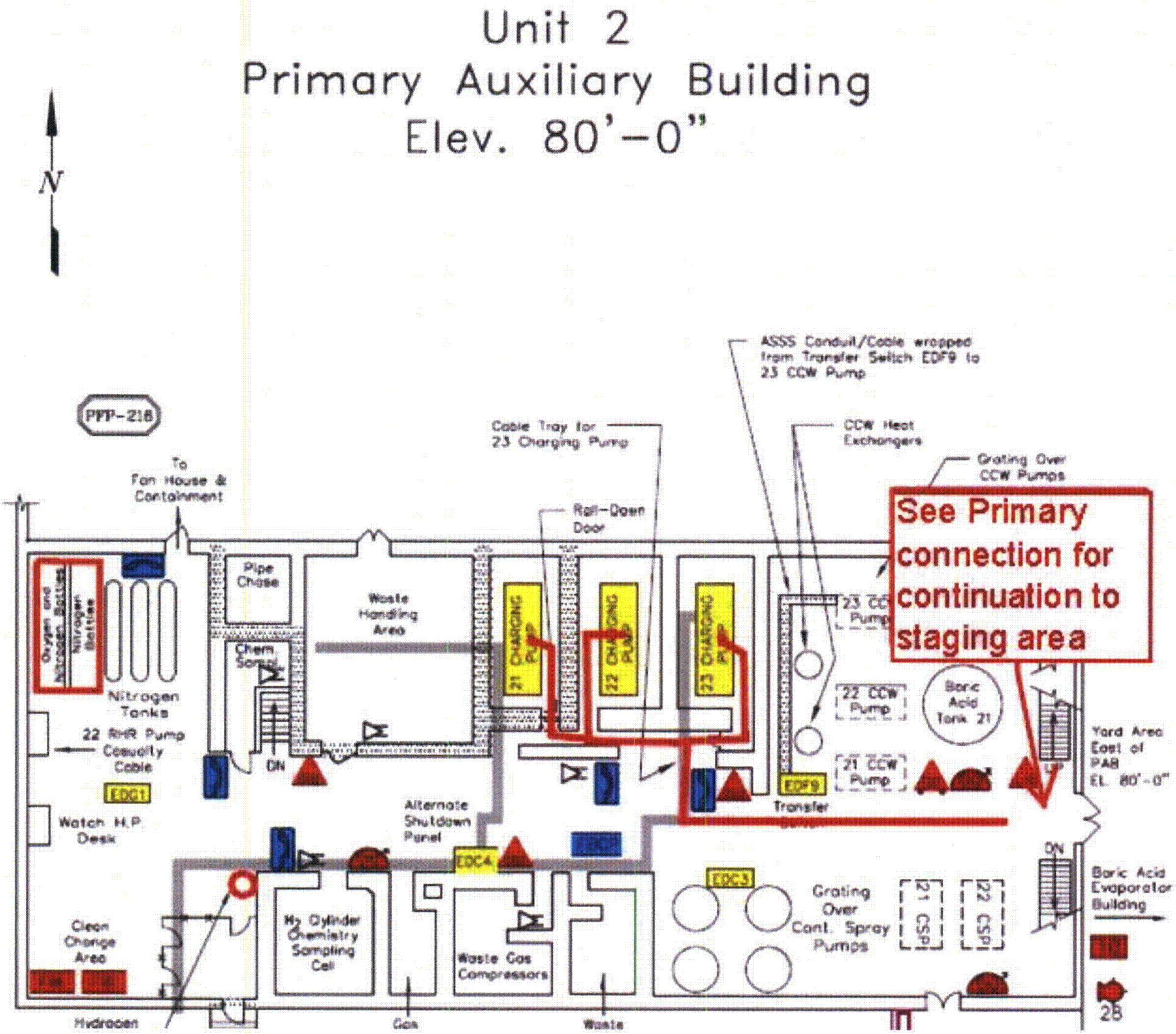

Figure A3-37: Unit 2 Secondary RCS Routing (Reference 9-oo)

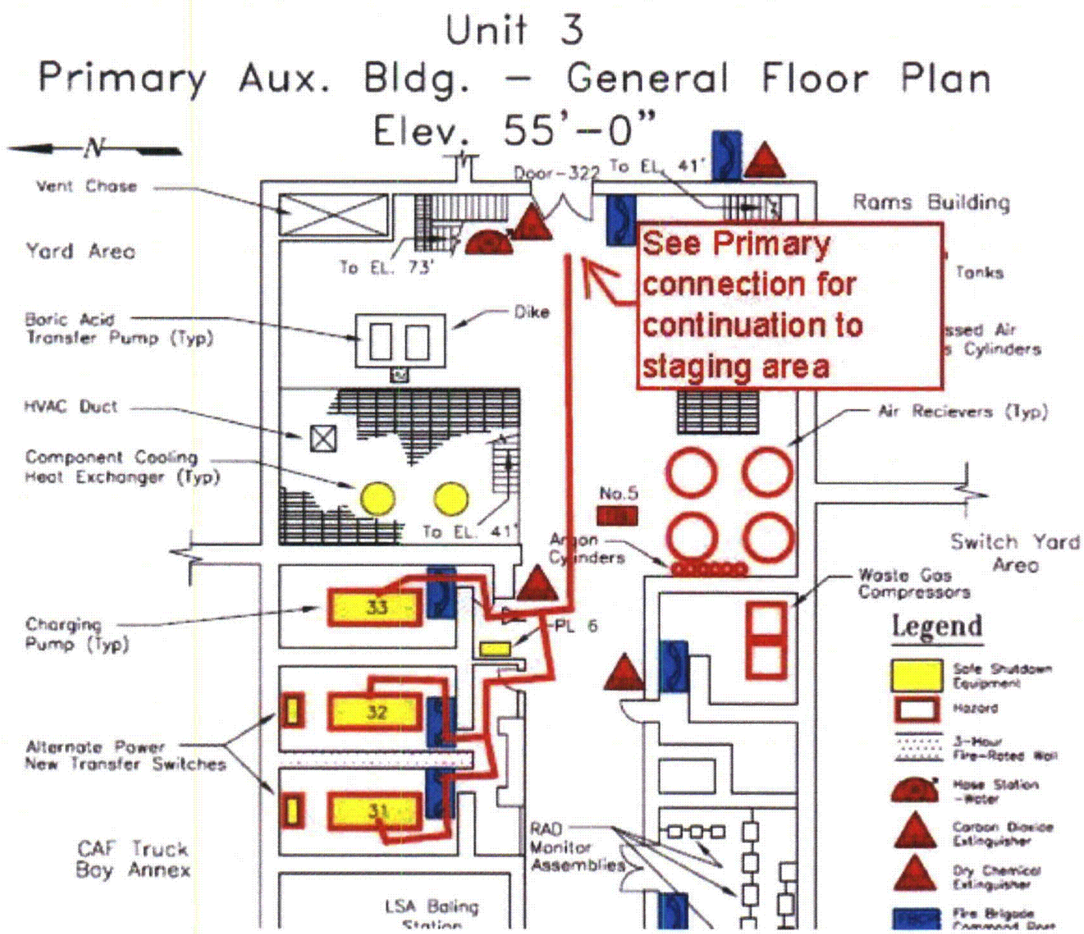

Figure A3-38: Unit 3 Secondary RCS Inventory Routing (Reference 9-tt)

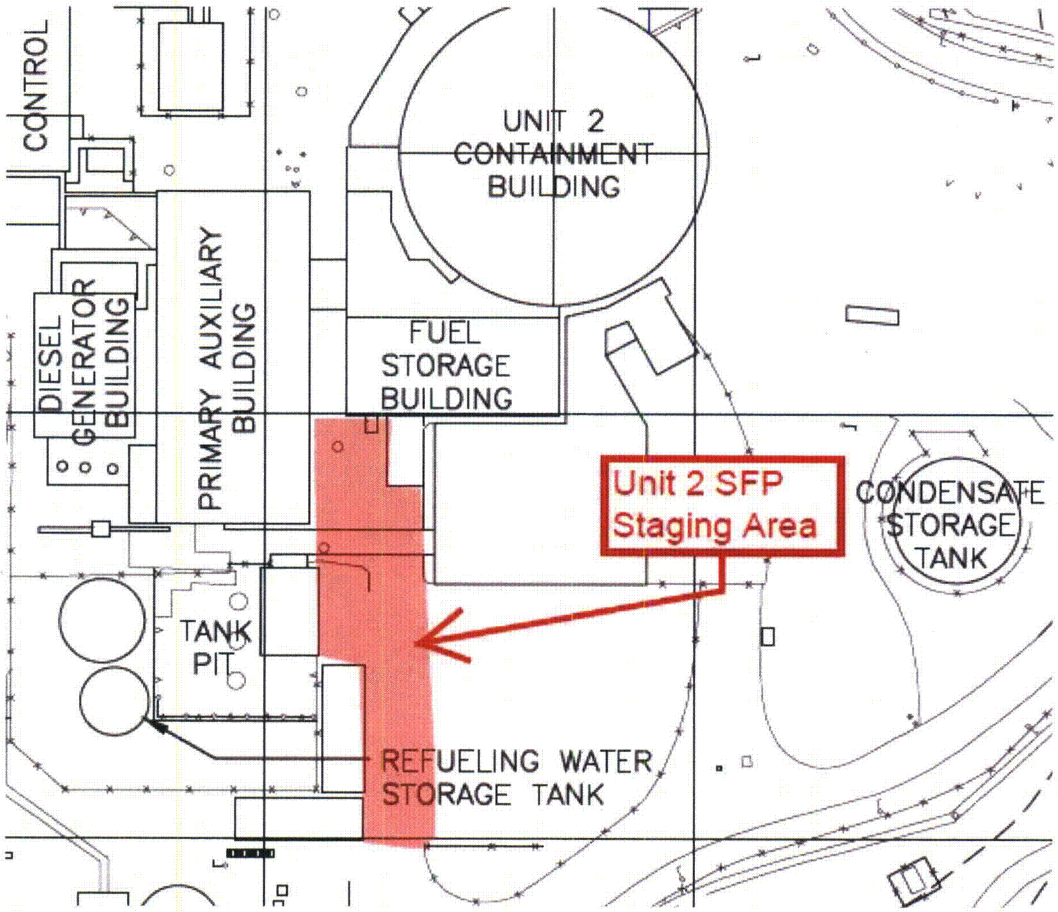

Figure A3-39: Unit 2 SFP Staging (Reference 9-a)

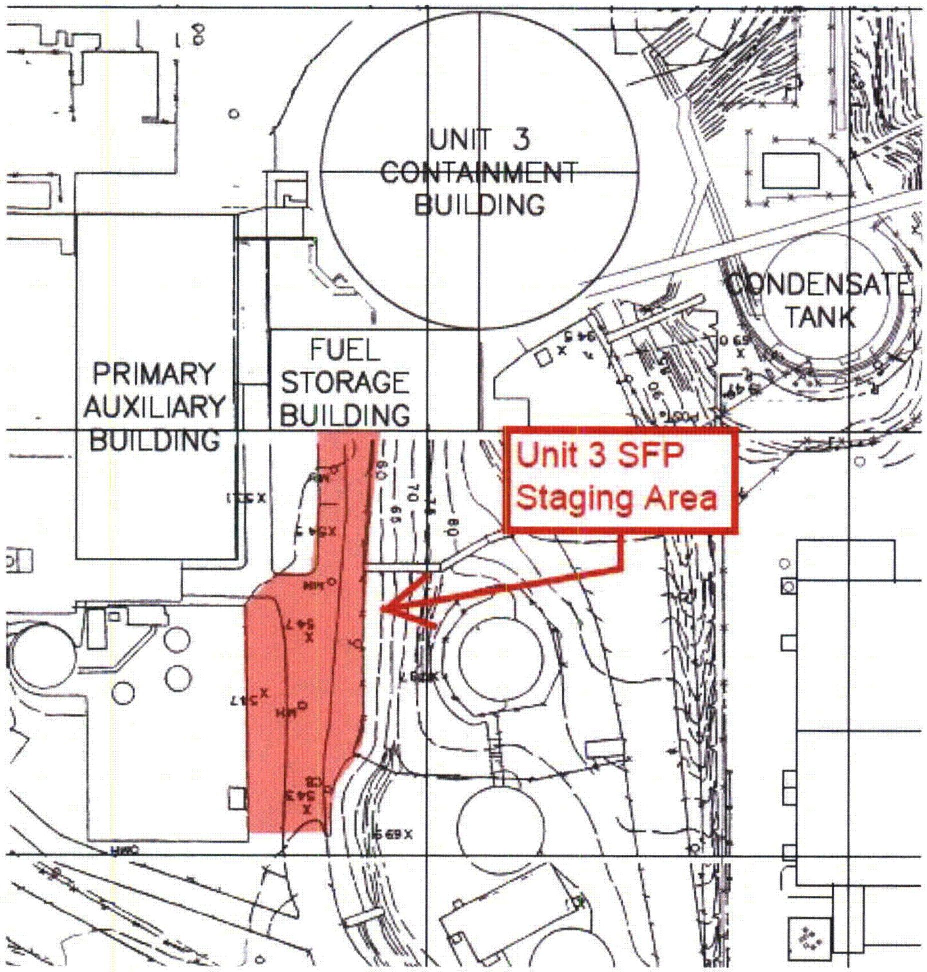

Figure A3-40: Unit 3 SFP Staging (Reference 9-a)

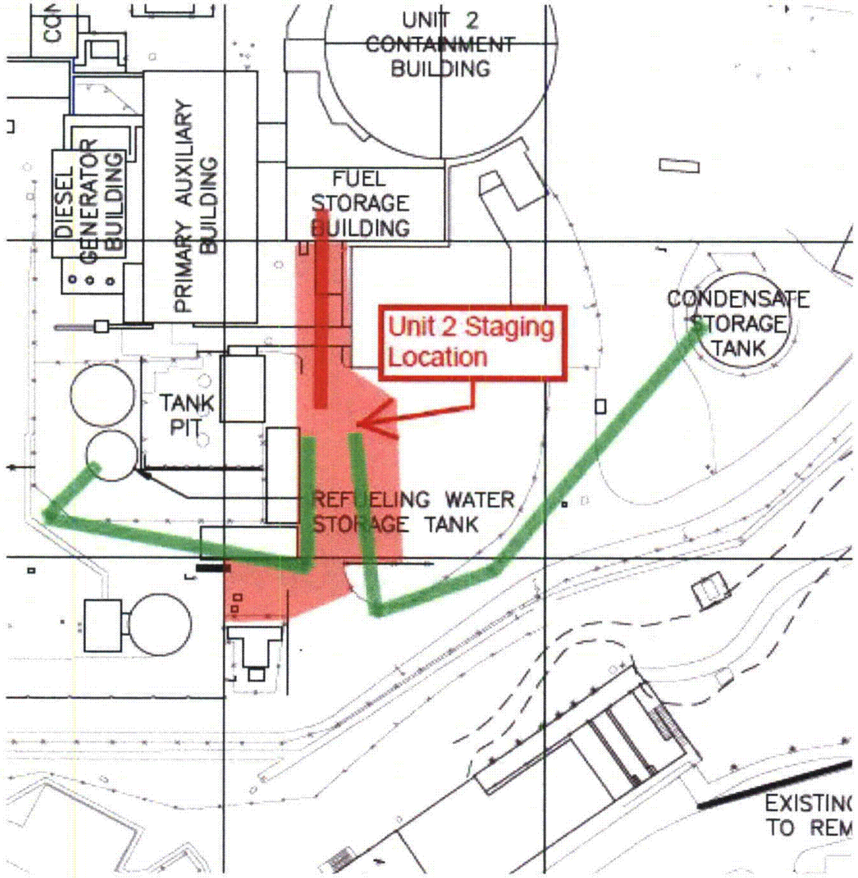

Figure A3-41: Unit 2 SFP Routing (Reference 9-a)

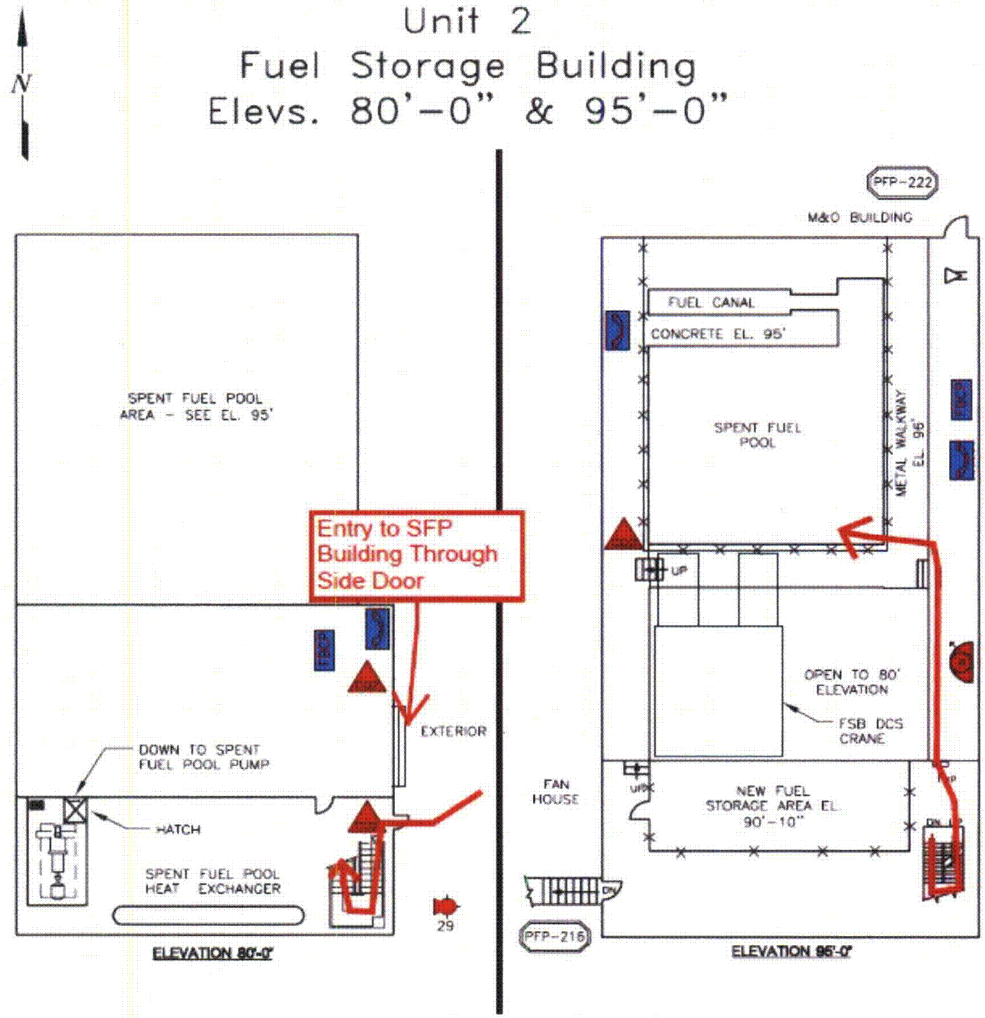

Figure A3-42: Unit-2 SFP Primary Routing (Reference 9-vv)

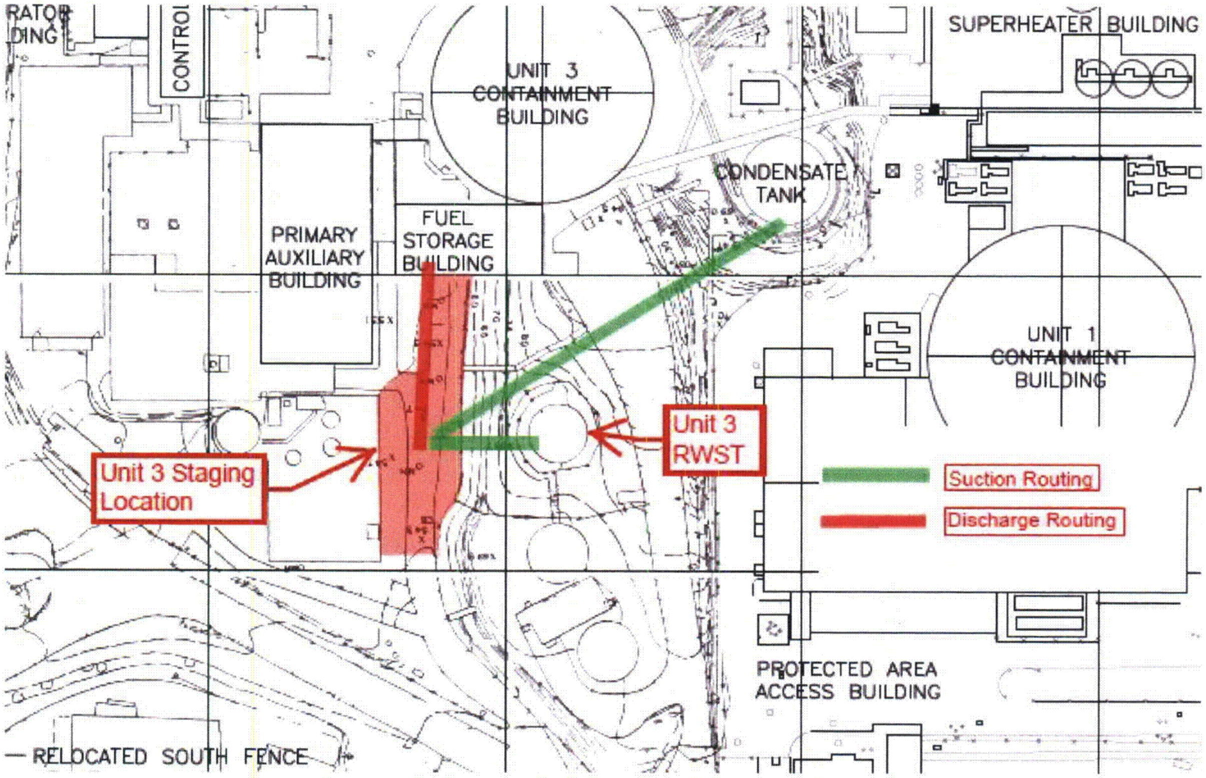

Figure A3-43: Unit 3 SFP Routing (Reference 9-a)

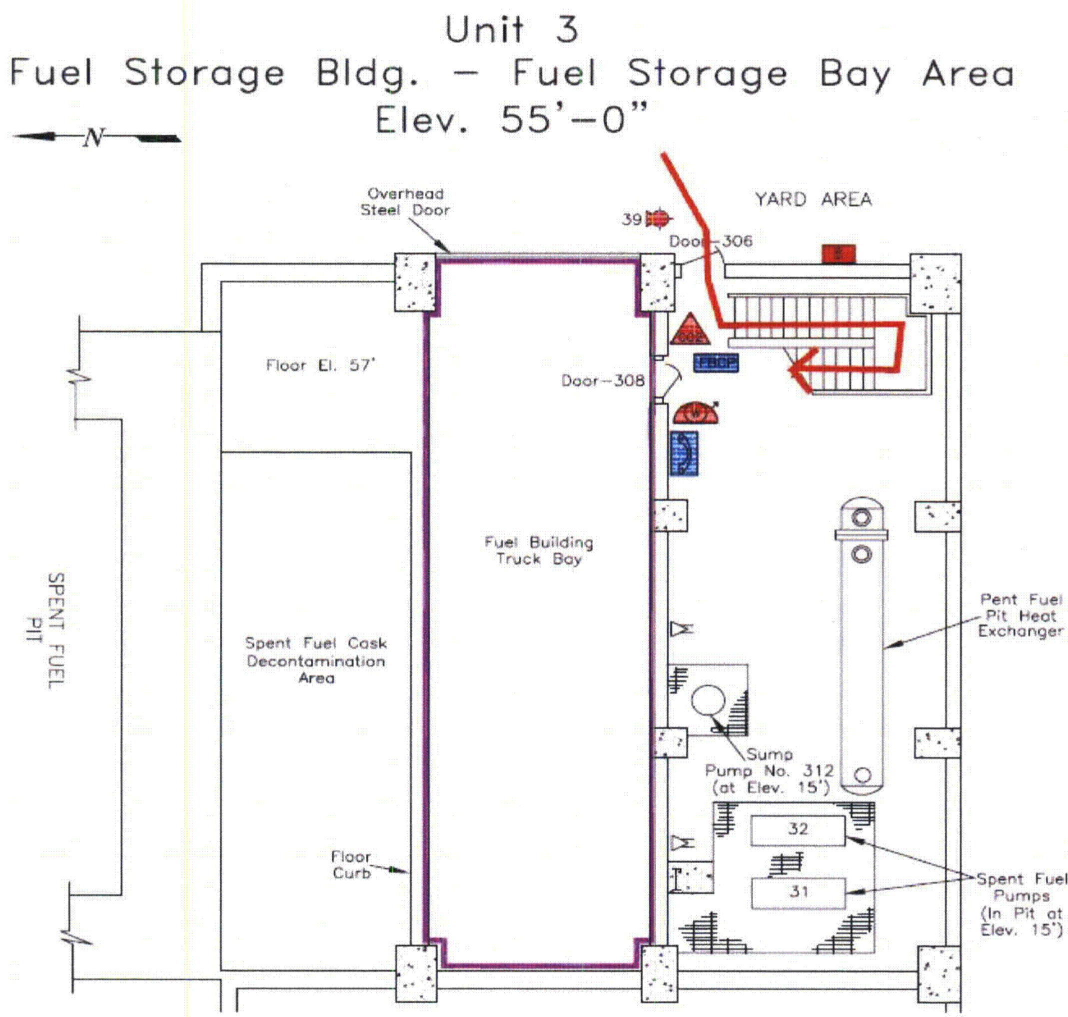

Figure A3-44: Unit-3 SFP Primary Routing (Reference 9-ww)

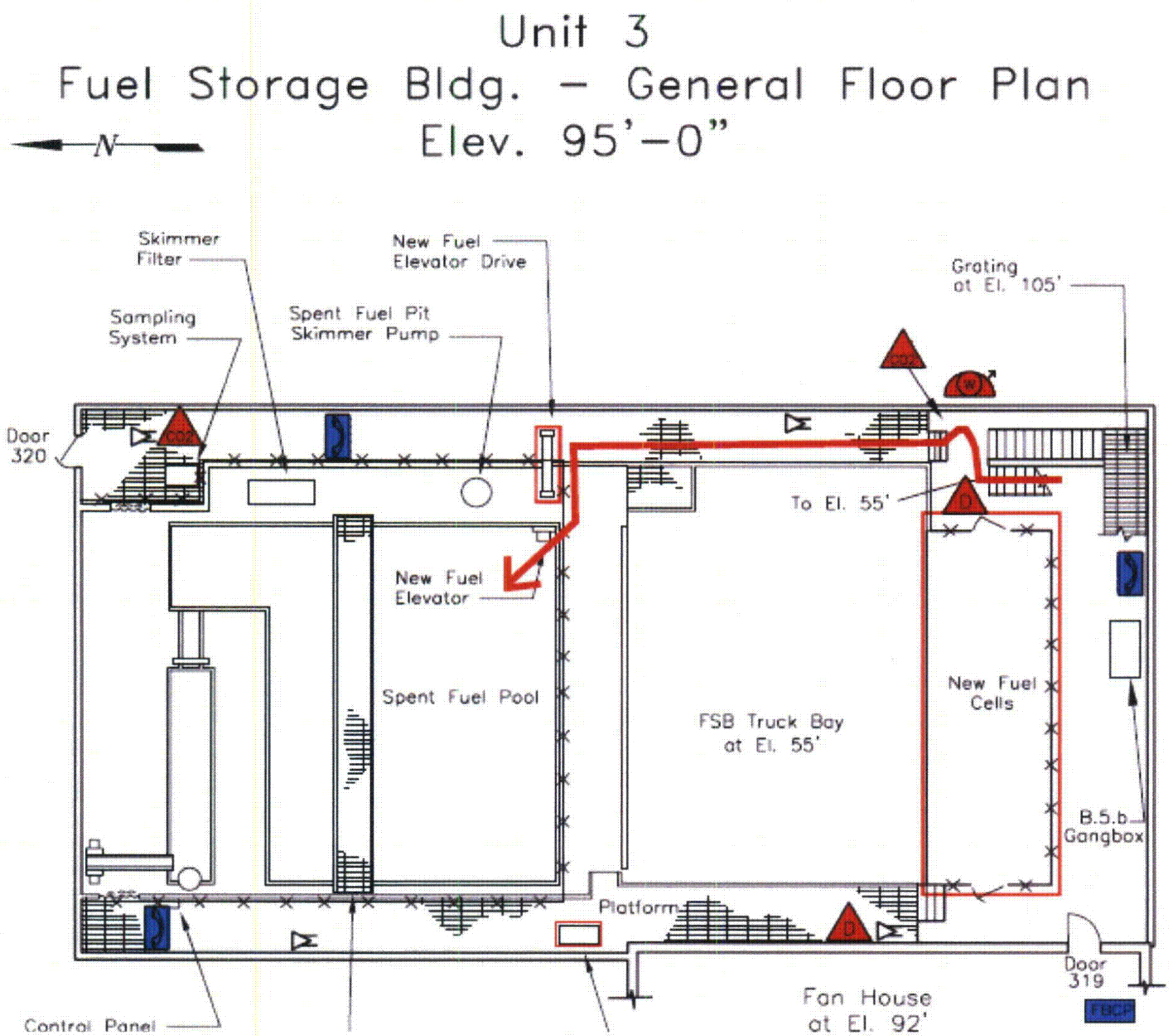

Figure A3-45: Unit-3 SFP Primary Routing (Reference 9-xx)

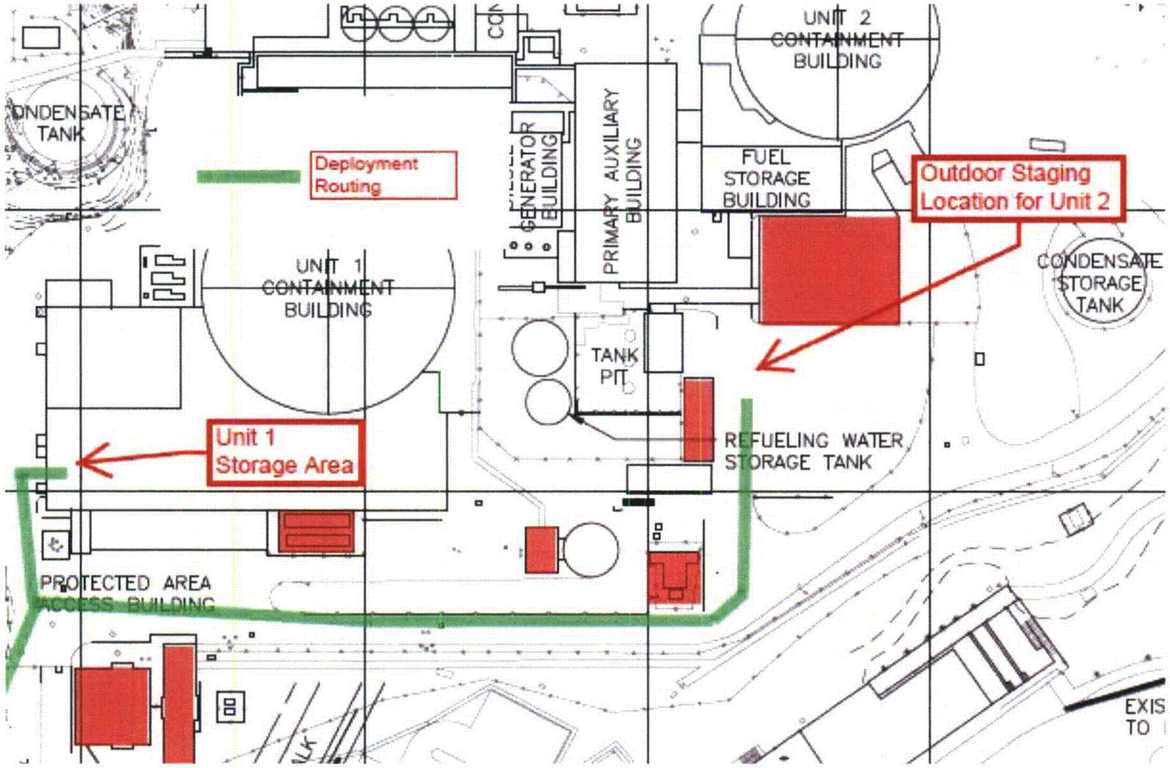

Figure A3-46: Unit-2 Outdoor SFP Deployment (Reference 9-a)

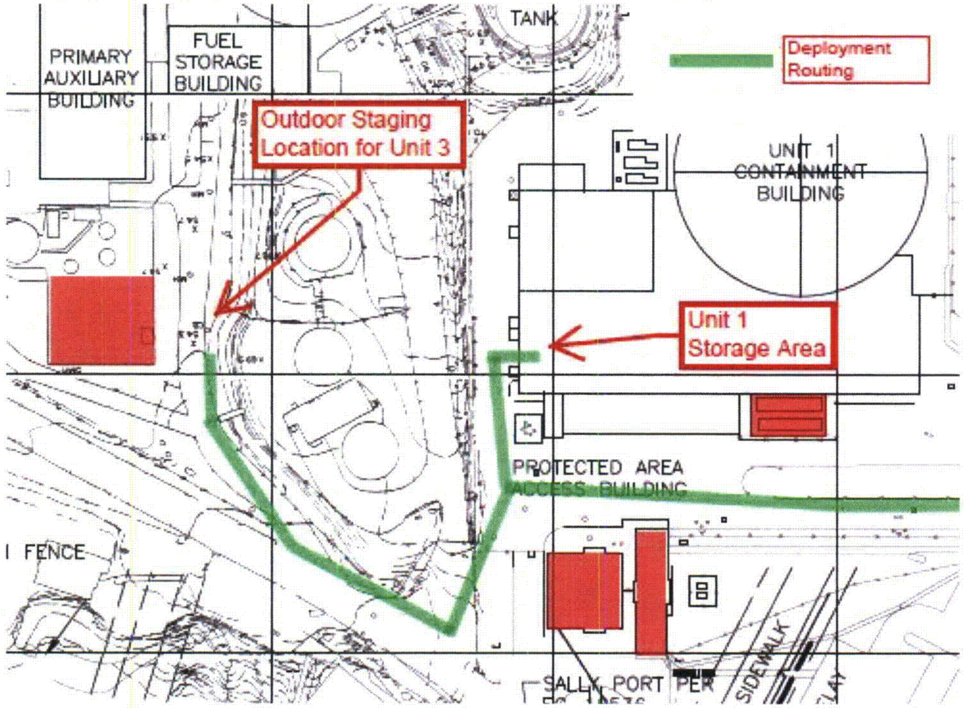

Figure A3-47: Unit-3 Outdoor SFP Deployment (Reference 9-a)

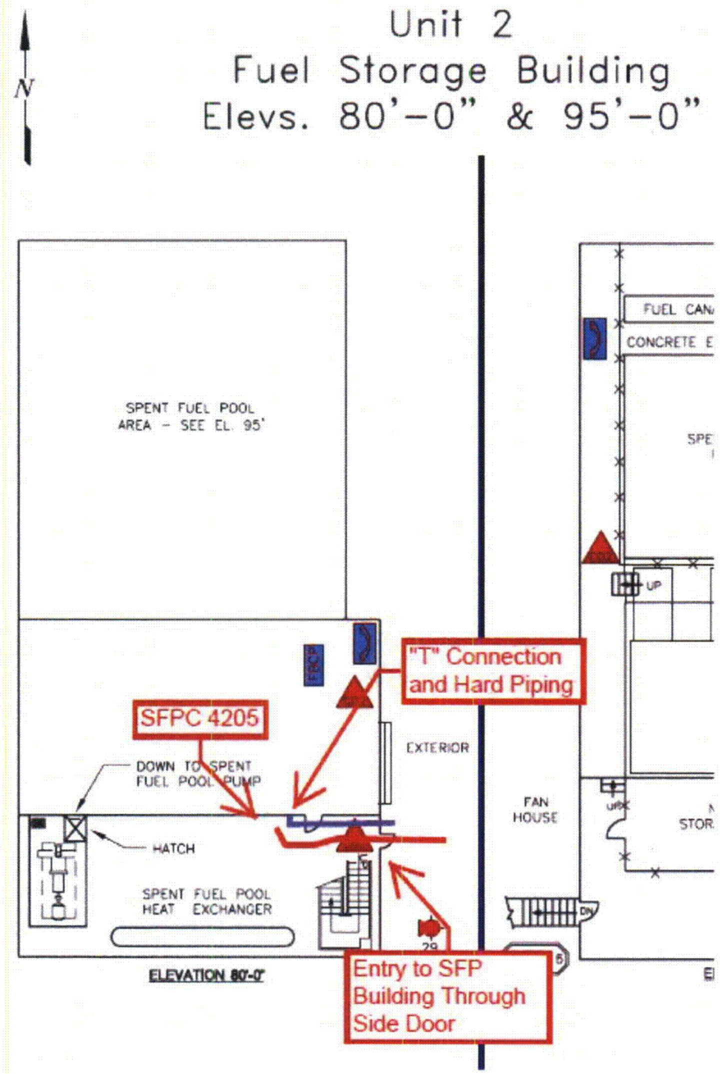

Figure A3-48: Unit 2 SFP Secondary Routing (Reference 9-vv)

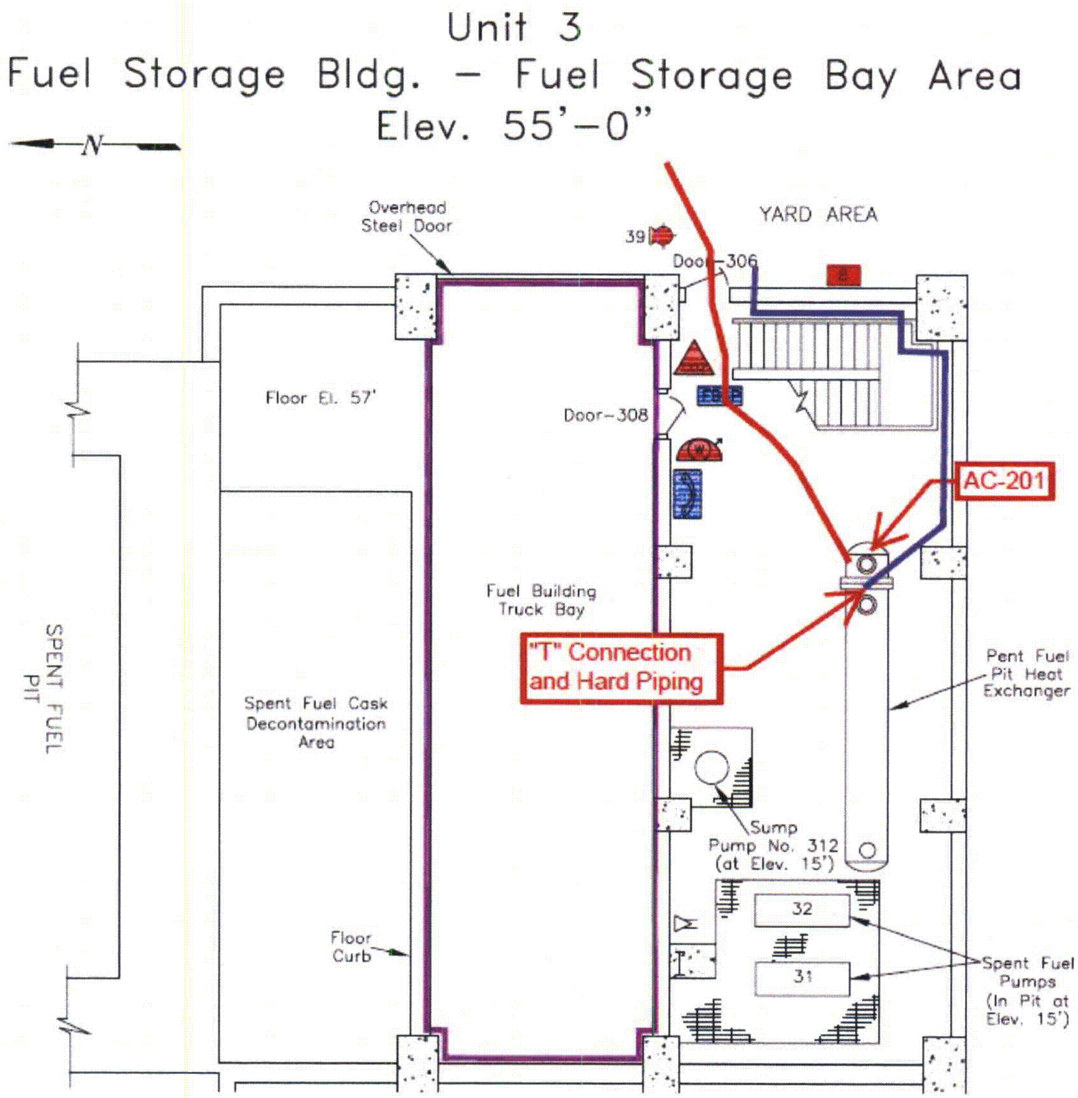

Figure A3-49: Unit 3 SFP Secondary Routing 55' (Reference 9-ww)

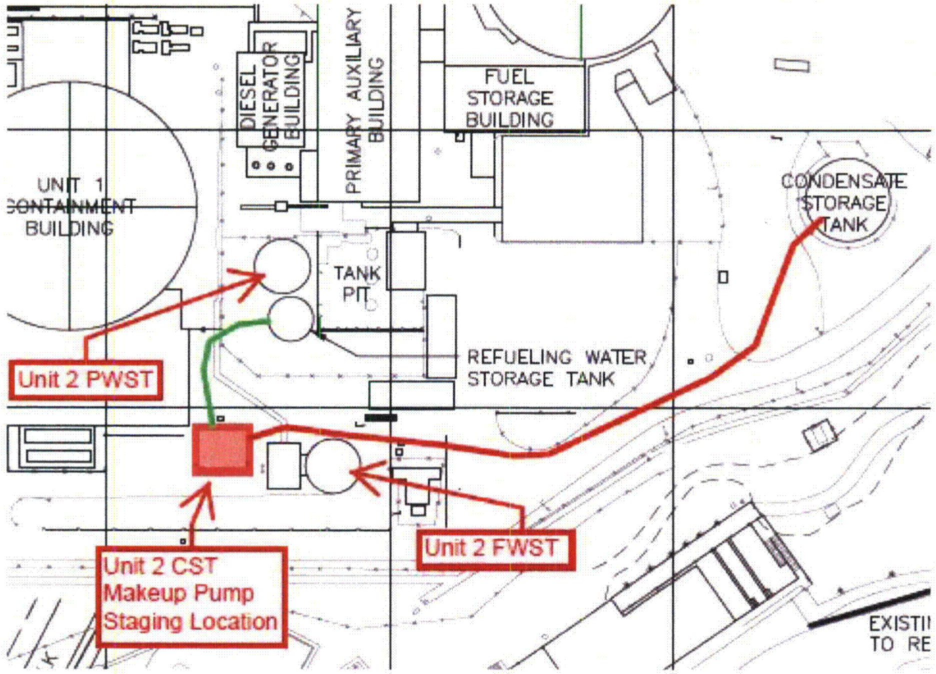

Figure A3-50: Unit 2 RWST to CST Makeup (Reference 9-a)

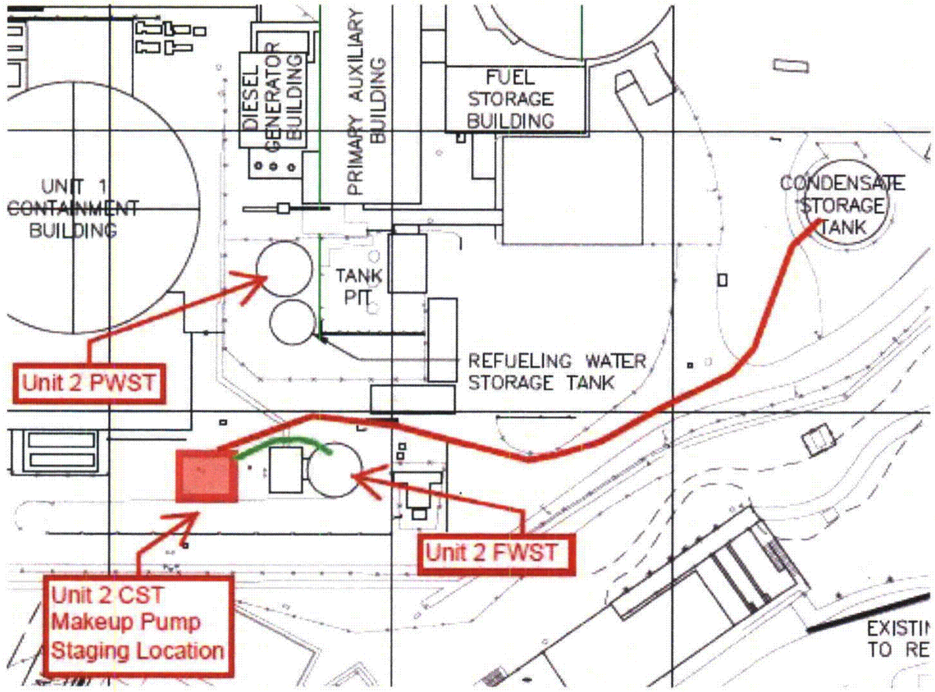

Figure A3-51: Unit 2 FWST to CST Makeup (Reference 9-a)

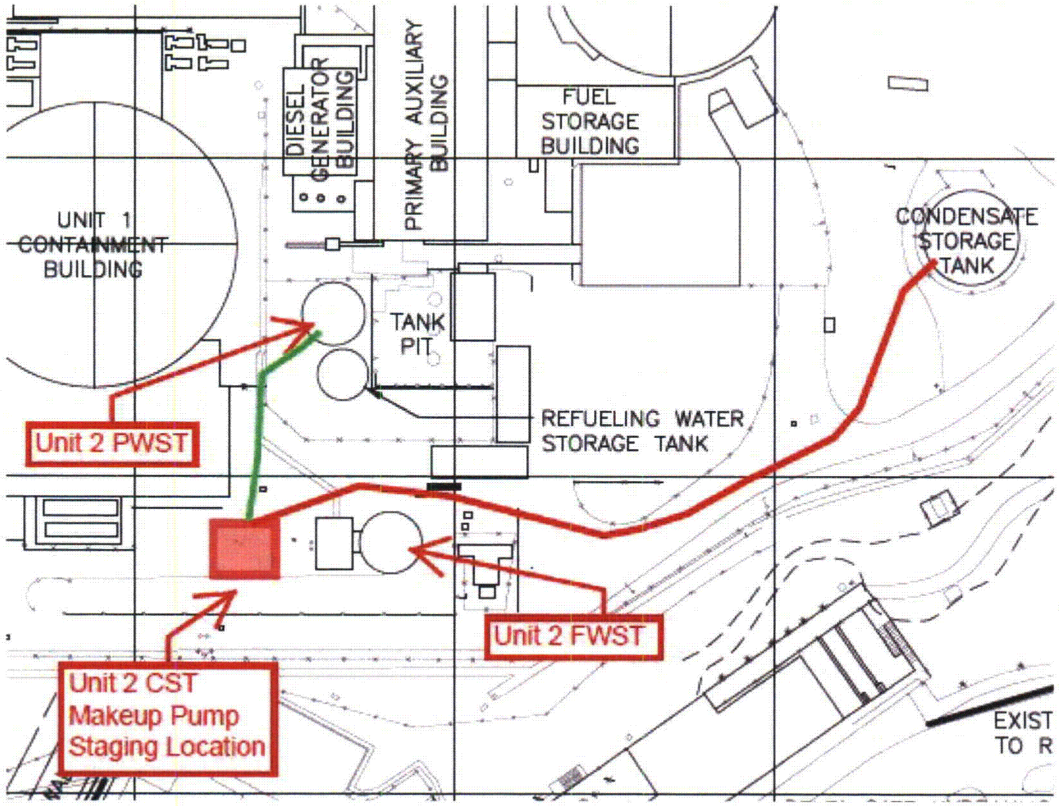

Figure A3-52: Unit 2 PWST to CST Makeup (Reference 9-a)

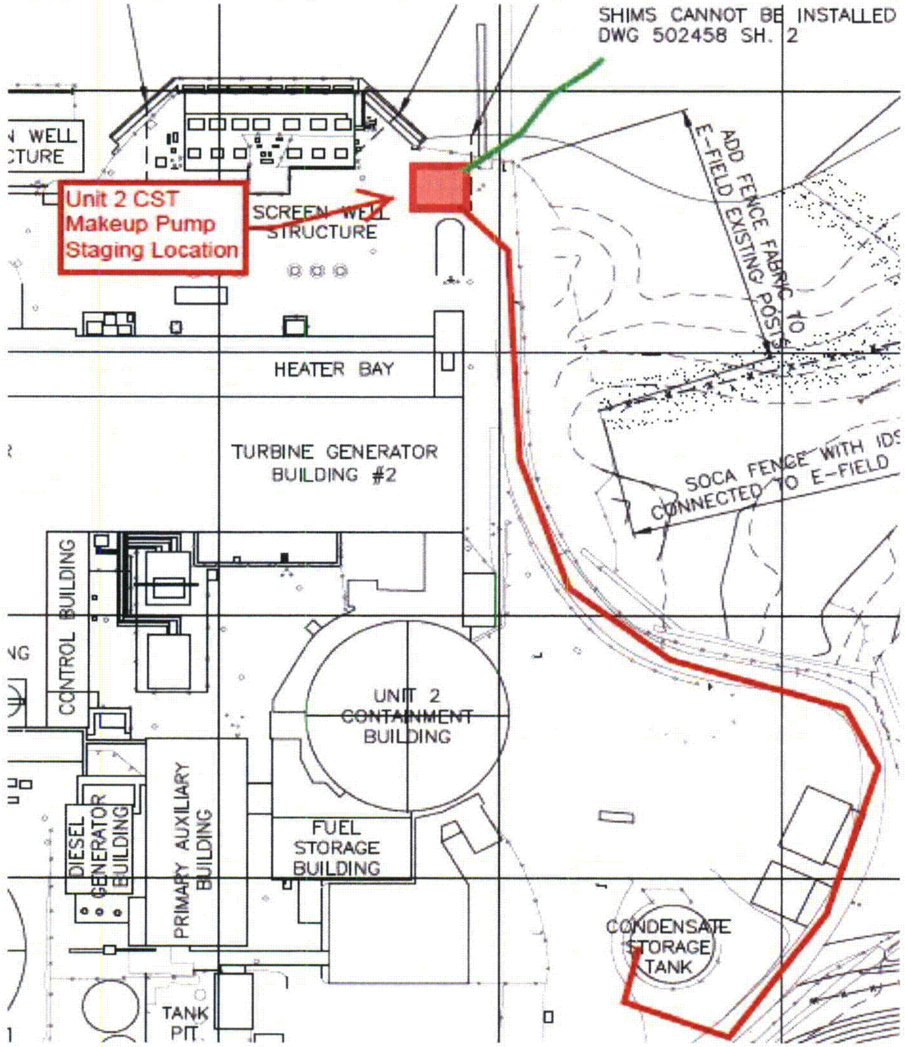

Figure A3-53: Hudson River to Unit 2 CST (Reference 9-a)

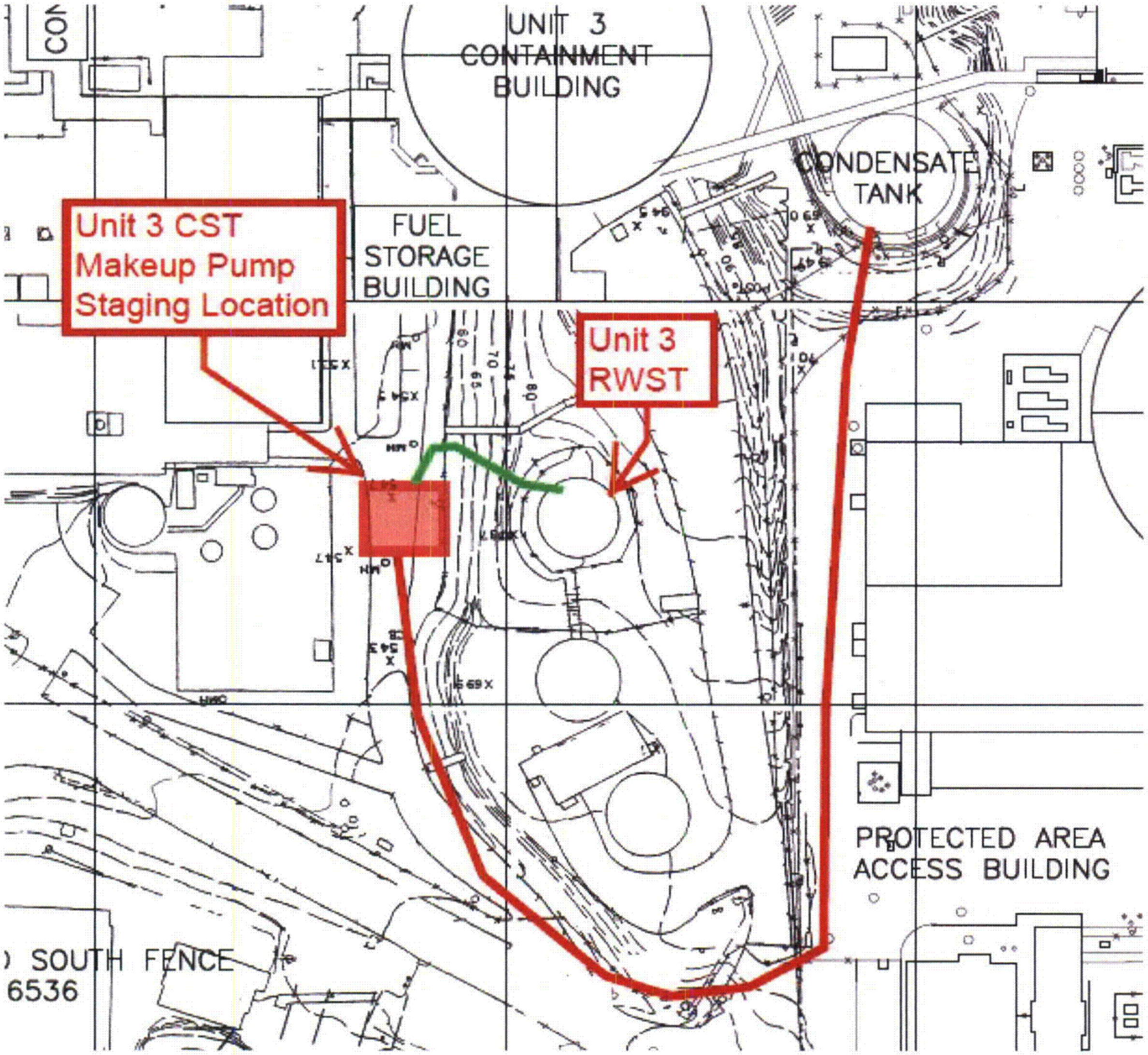

Figure A3-54: Unit 3 RWST to CST Makeup (Reference 9-a)

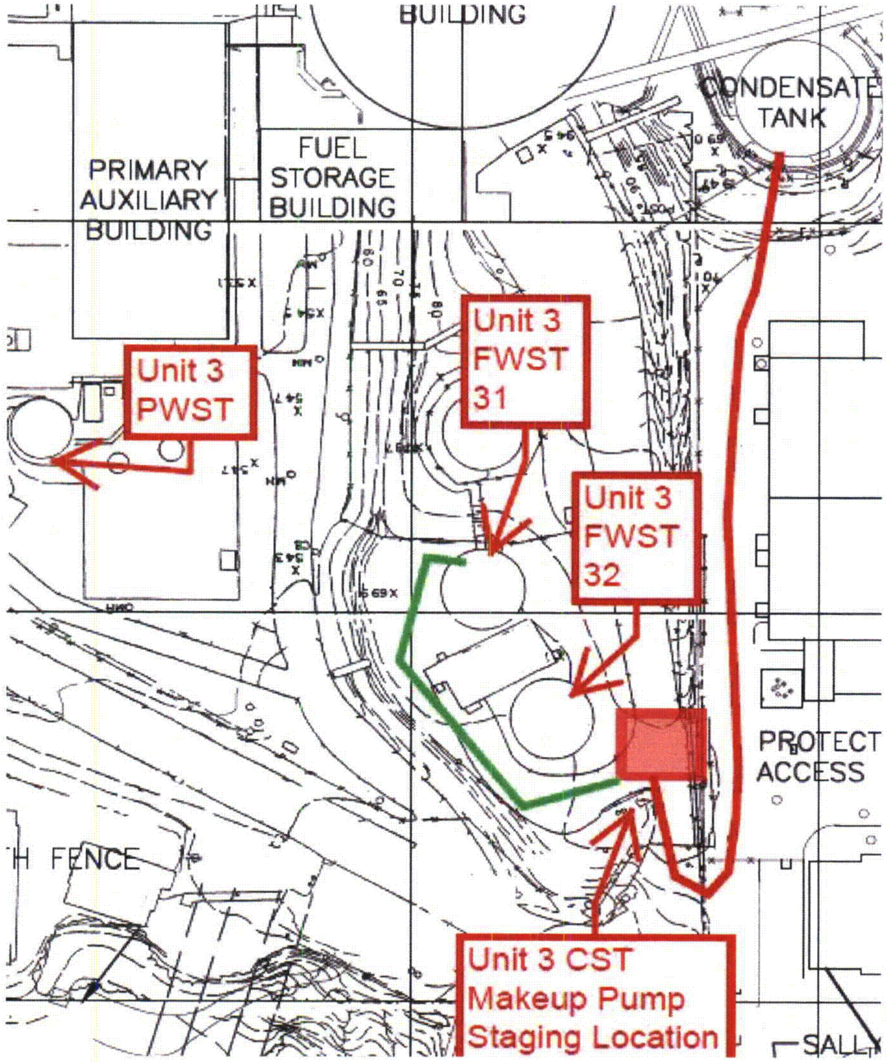

Figure A3-55: Unit 3 FWST31 to CST Makeup (Reference 9-a)

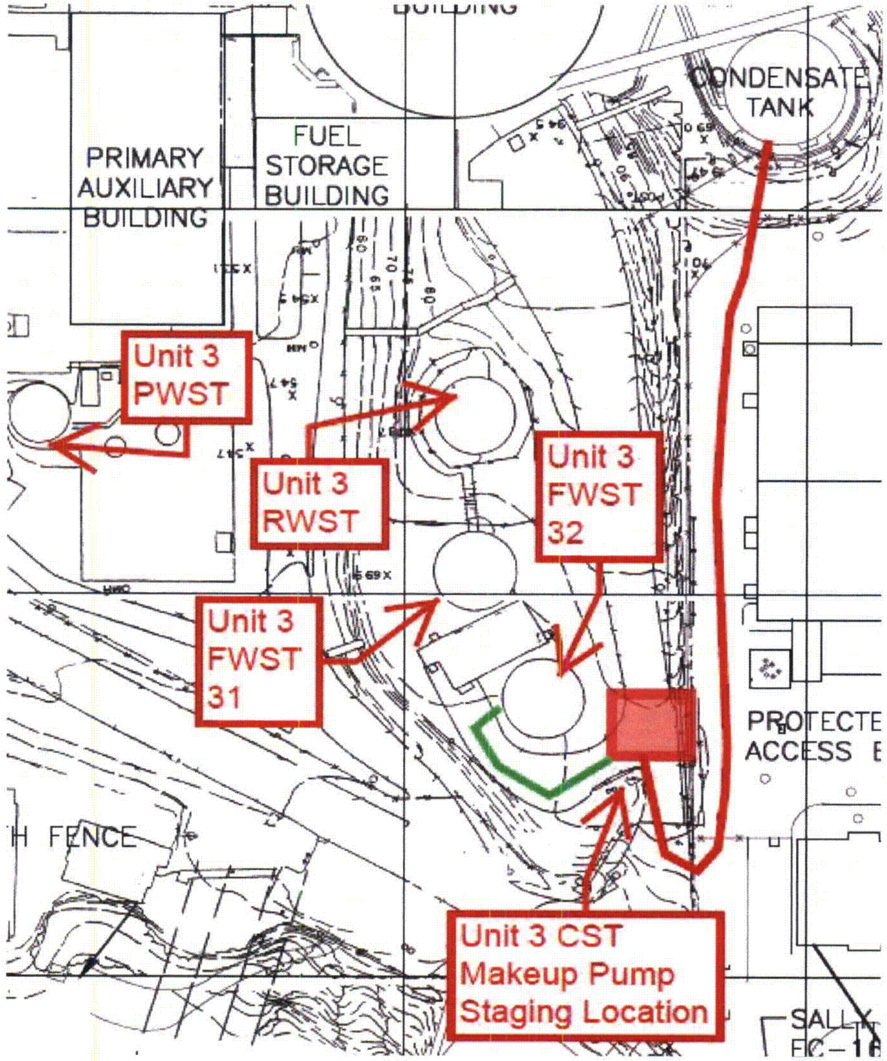

Figure A3-56: Unit 3 FWST32 to CST Makeup (Reference 9-a)

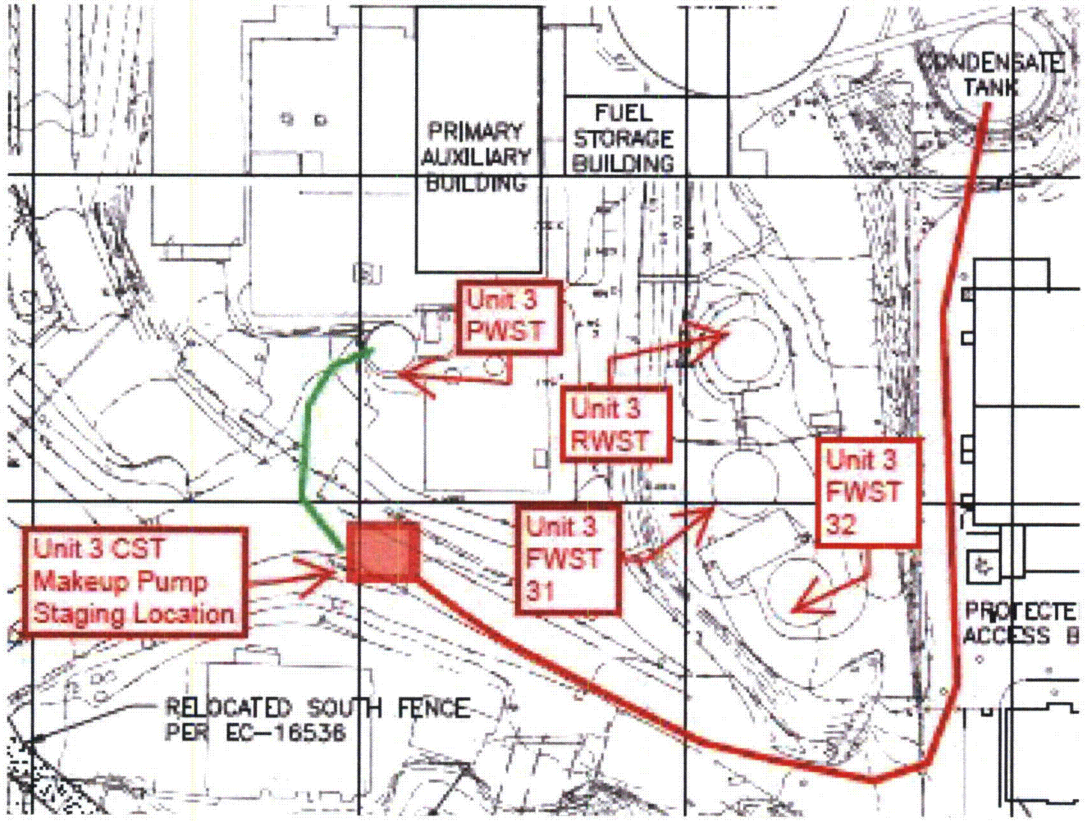

Figure A3-57: Unit 3 PWST to CST Makeup (Reference 9-a)

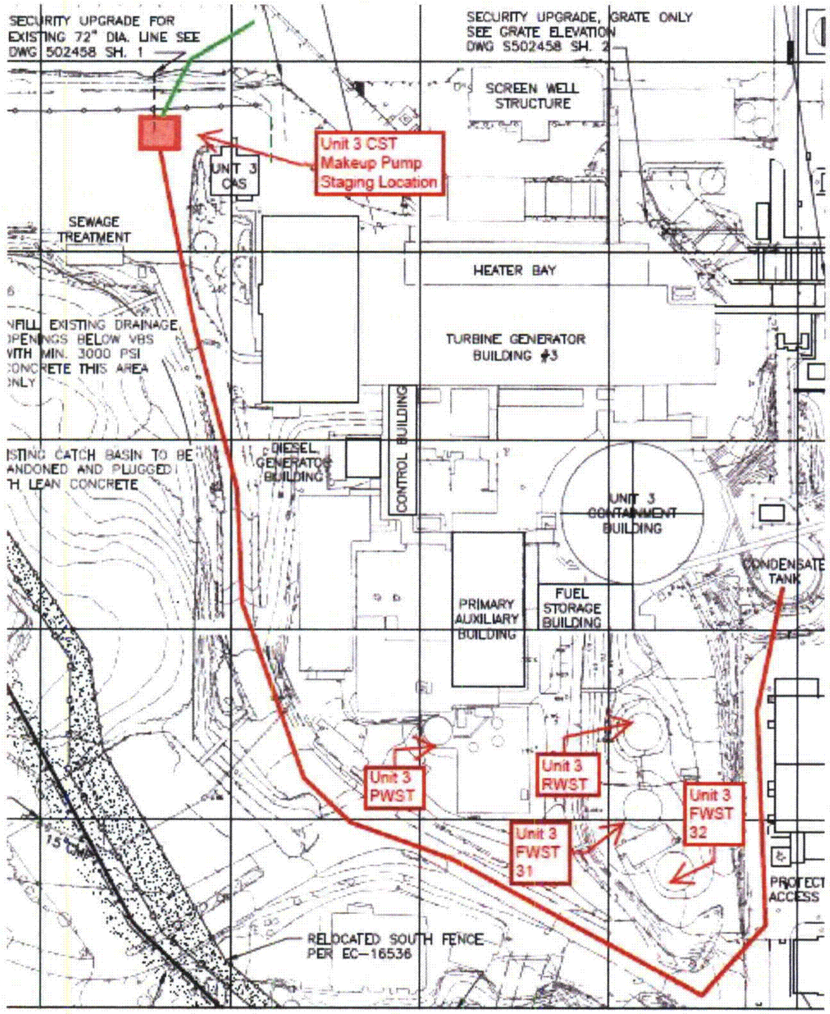

Figure A3-58: Hudson River to Unit 3 CST Makeup (Reference 9-a)

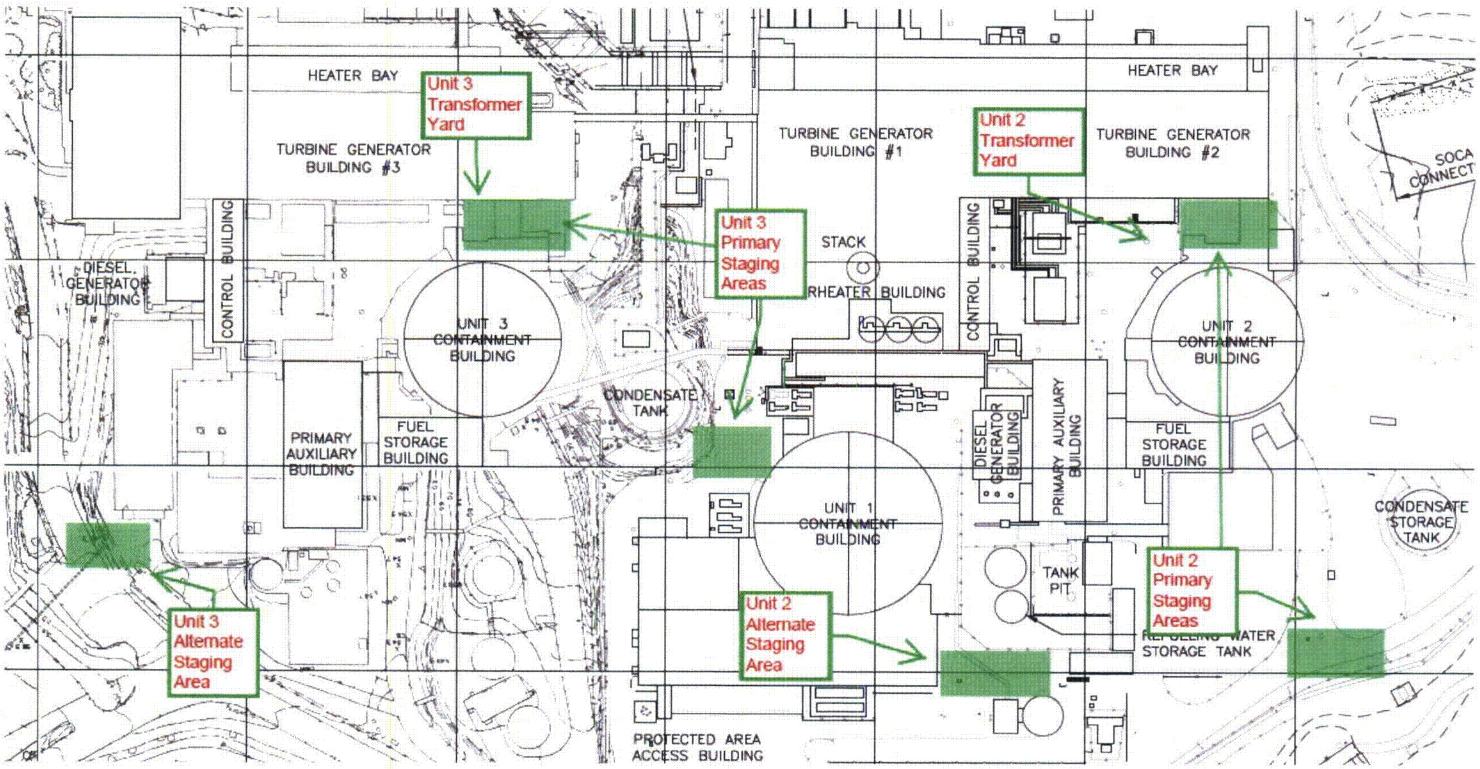

Figure A3-59: Staging Locations for Electrical Equipment (Reference 9-a)

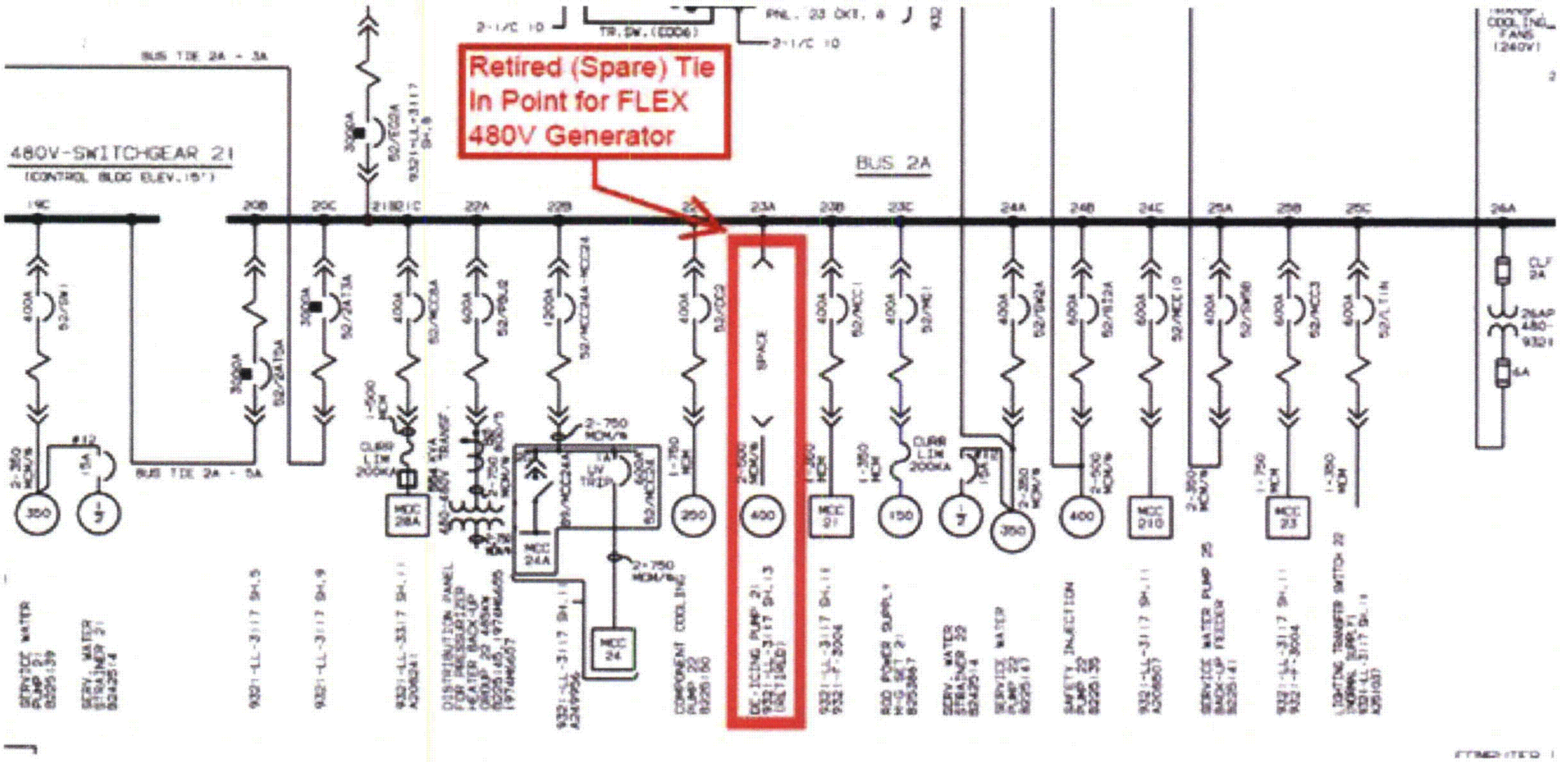

Figure A3-60: Spare breaker 23A on Bus 2A (Reference 9-b)

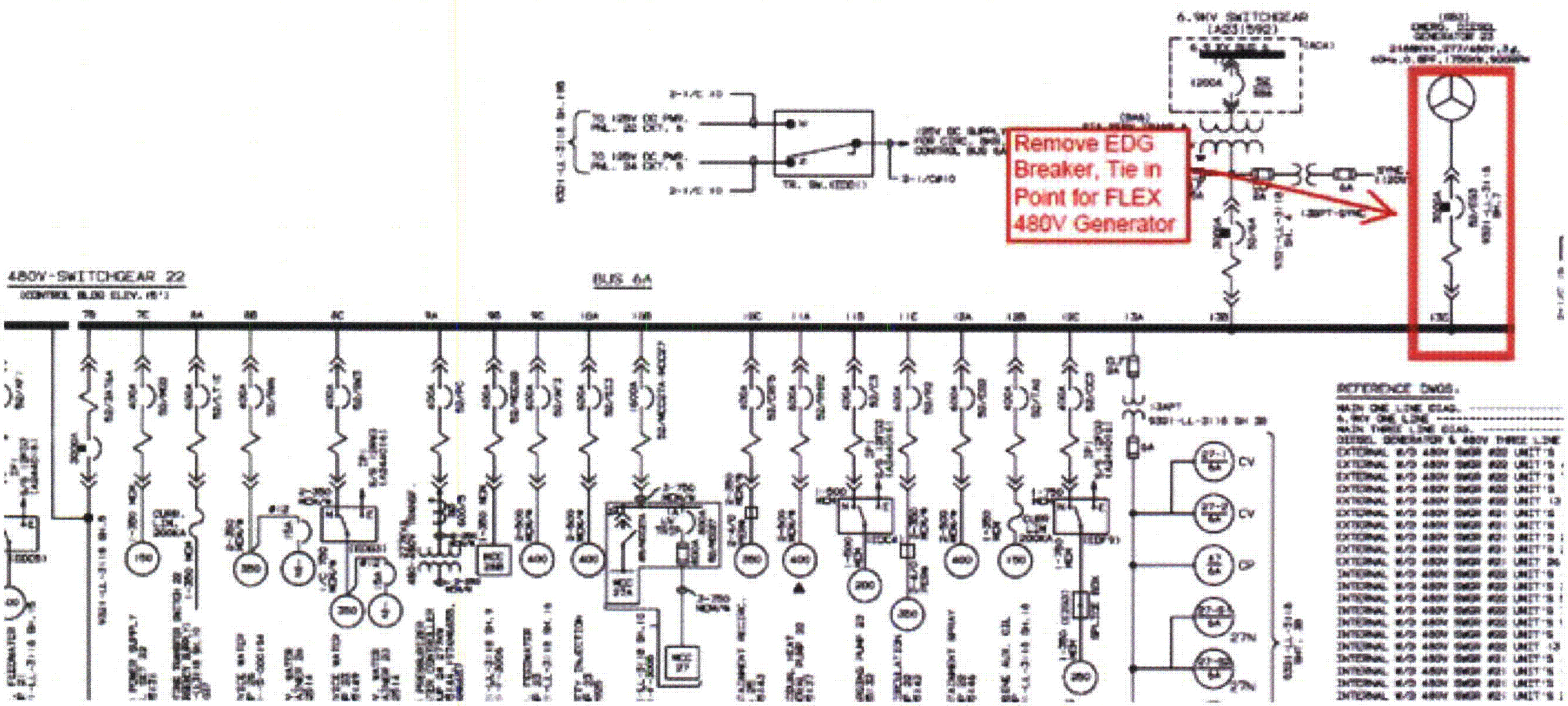

Figure A3-61: Replace Breaker 13C on Bus 6A (Reference 9-b)

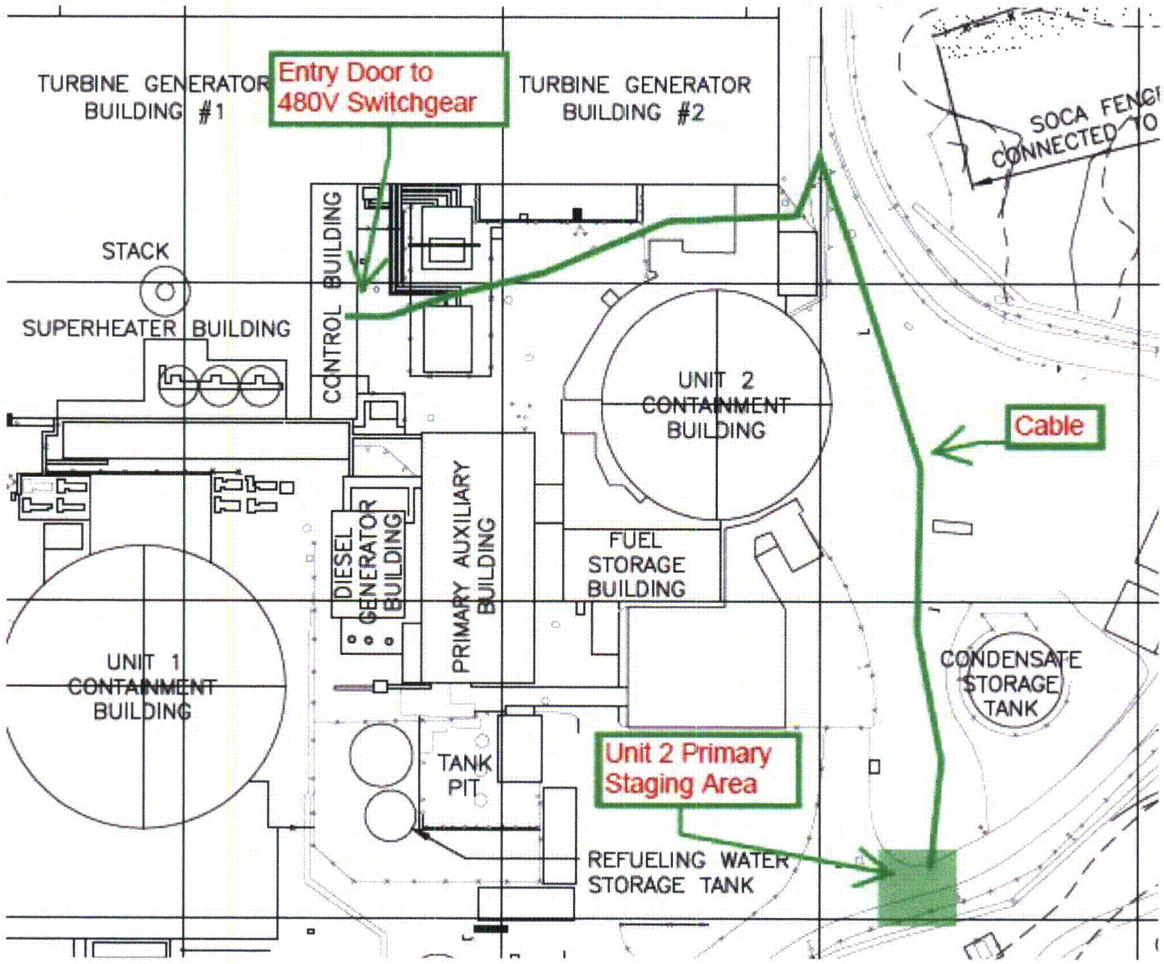

Figure A3-62: Unit 2 Primary Electrical Routing Outdoors (Reference 9-a)

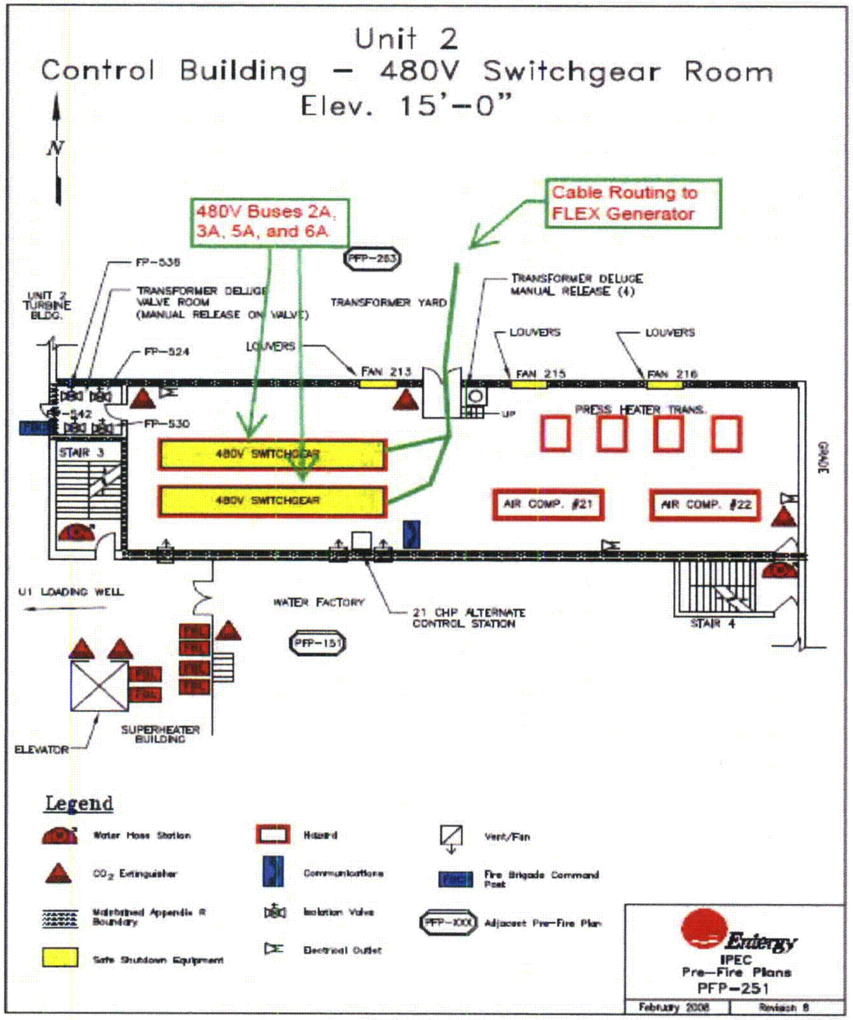

Figure A3-63: Unit 2 Primary Routing in 15' 480V Switchgear Room (Reference 9-i)

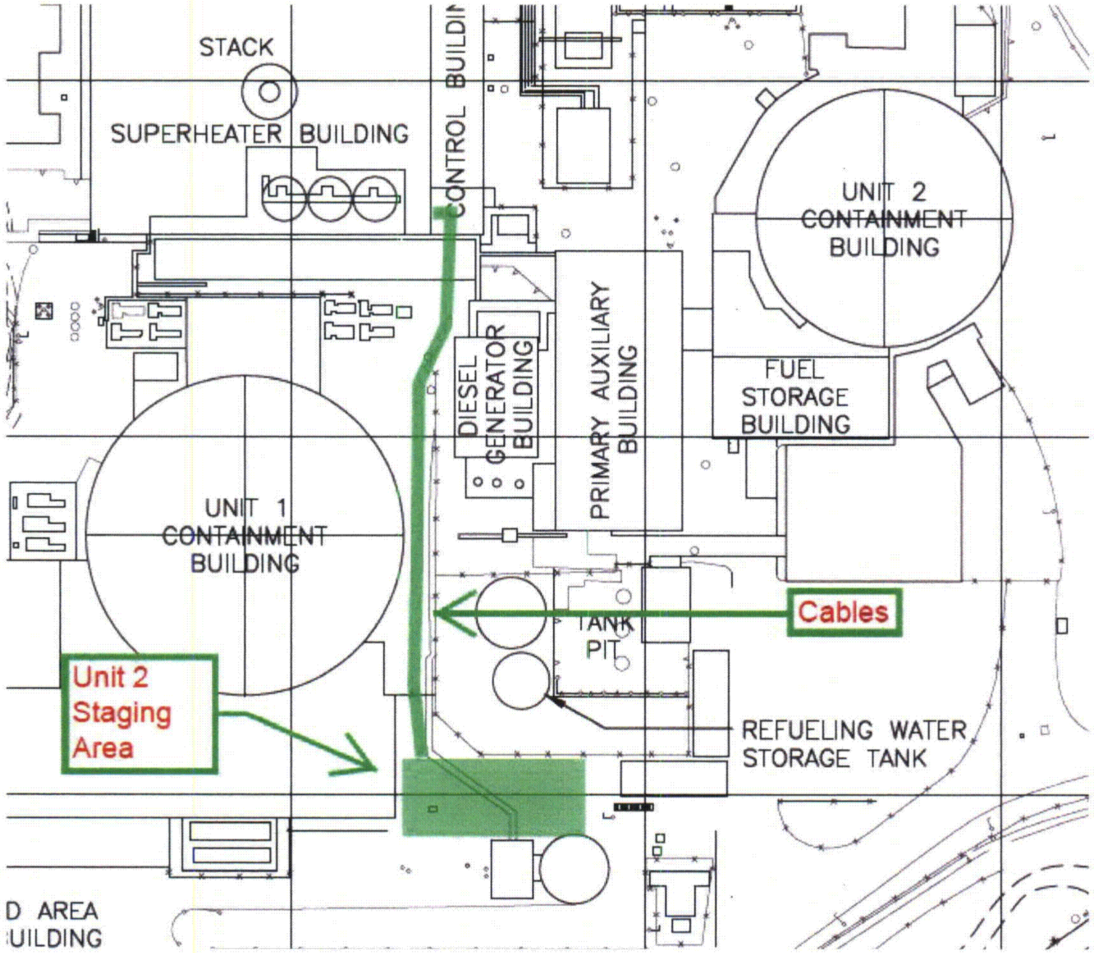

Figure A3-64: Unit 2 Secondary Outdoor Cable Route (Reference 9-a)

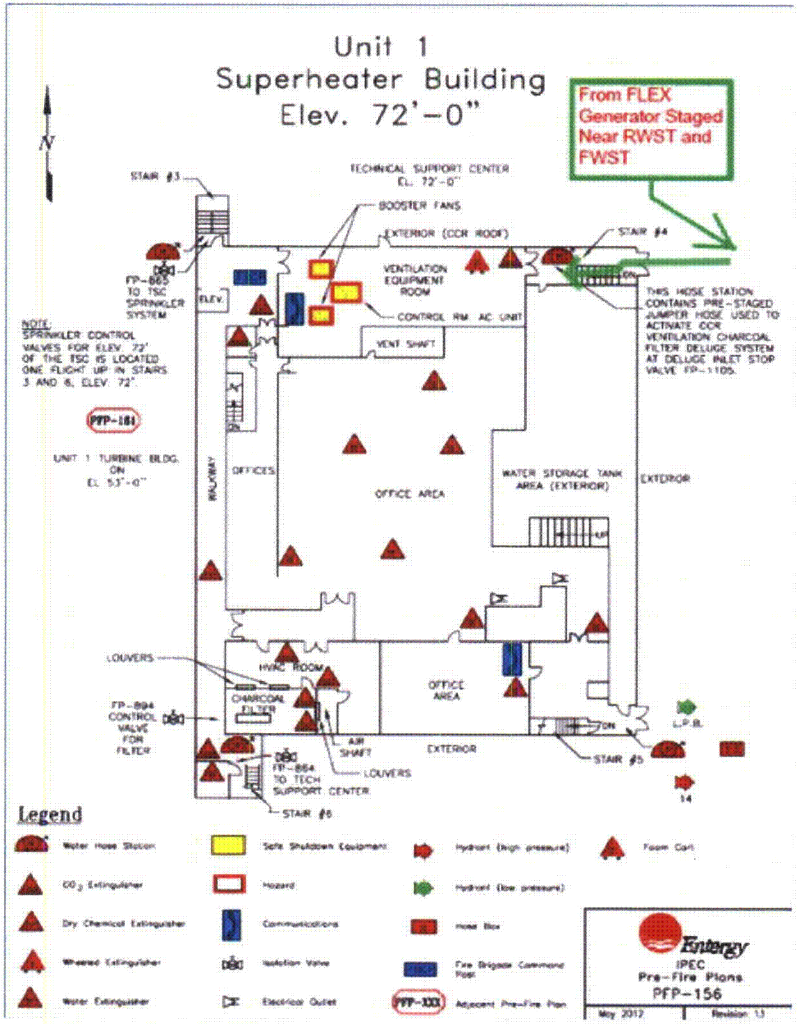

Figure A3-65: Unit 2 Secondary Cable Routing at 72' (Reference 9-k)

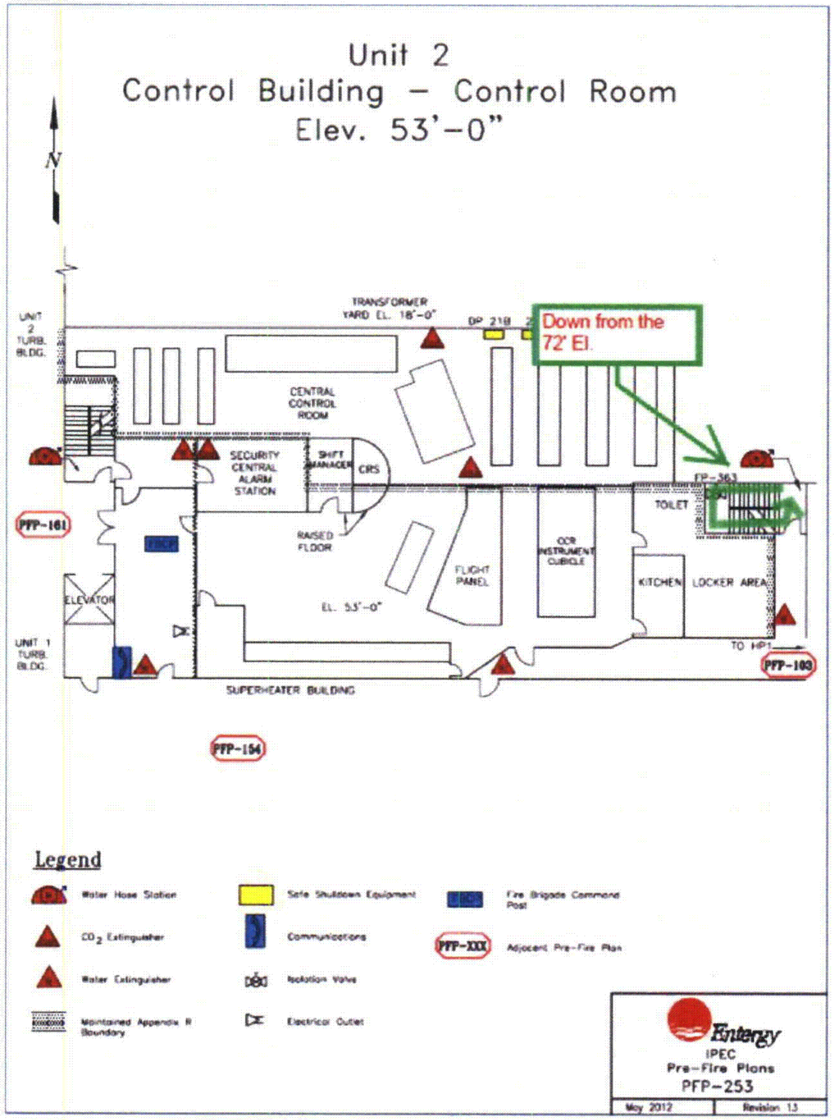

Figure A3-66: Unit 2 Secondary Cable Routing at 53' (Reference 9-l)

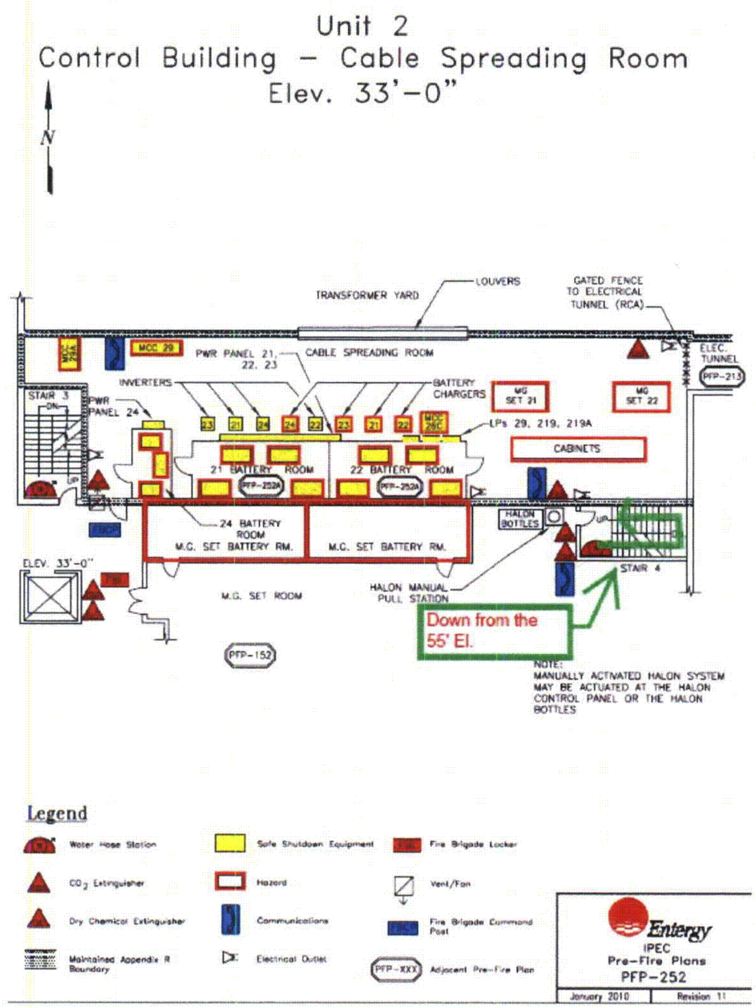

Figure A3-67: Unit 2 Secondary Cable Routing at 33' (Reference 9-m)

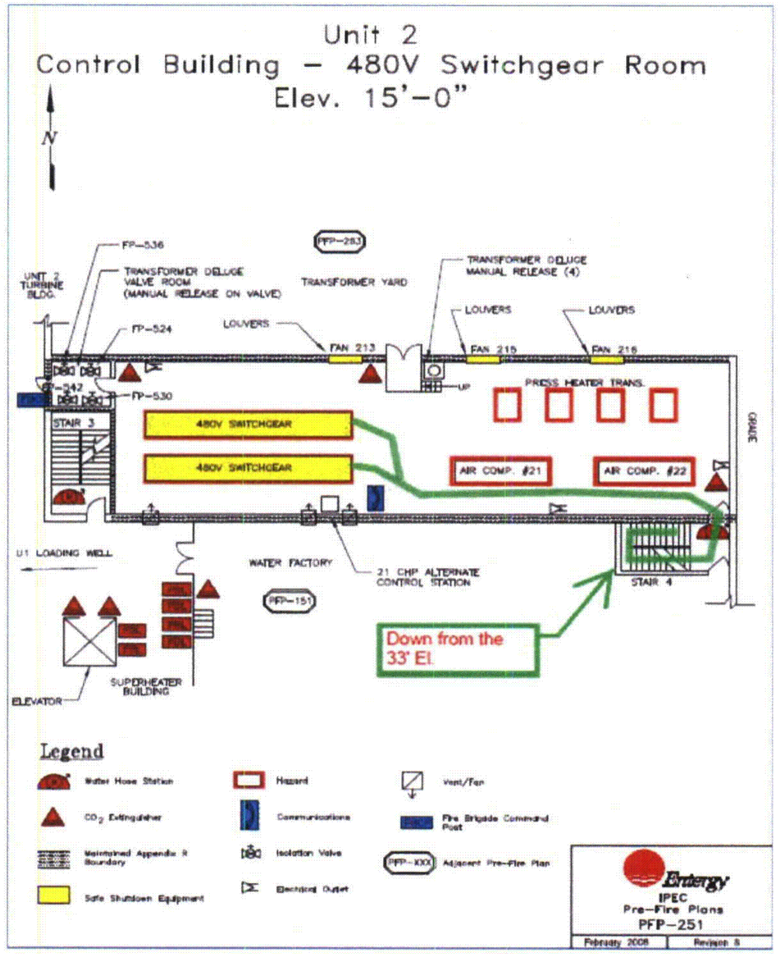

Figure A3-68: Unit 2 Secondary Cable Routing at 15' (Reference 9-i)

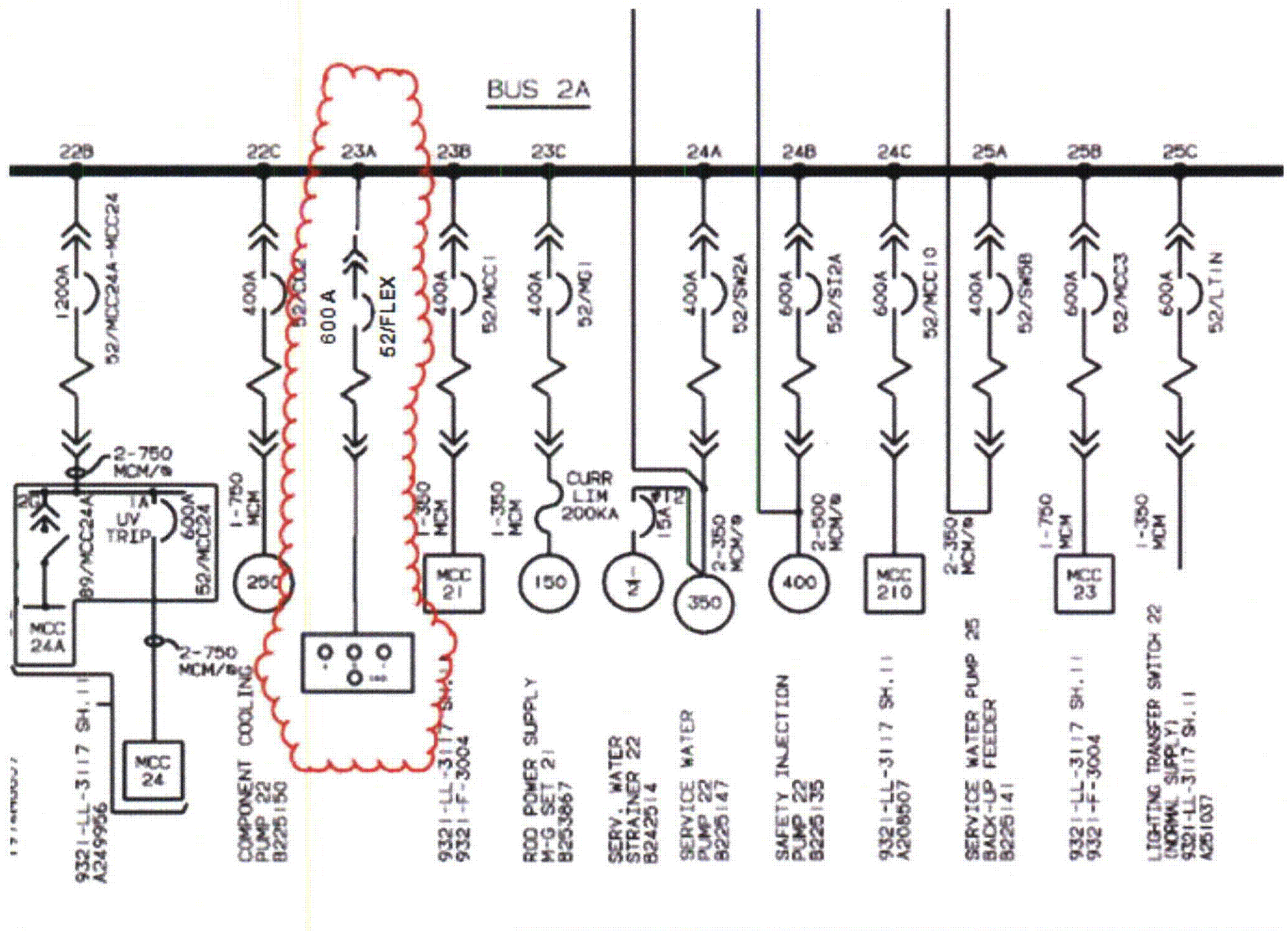

Figure A3-69: Unit 2 Phase 2 Bus 2A Replacement Breaker (Reference 9-b)

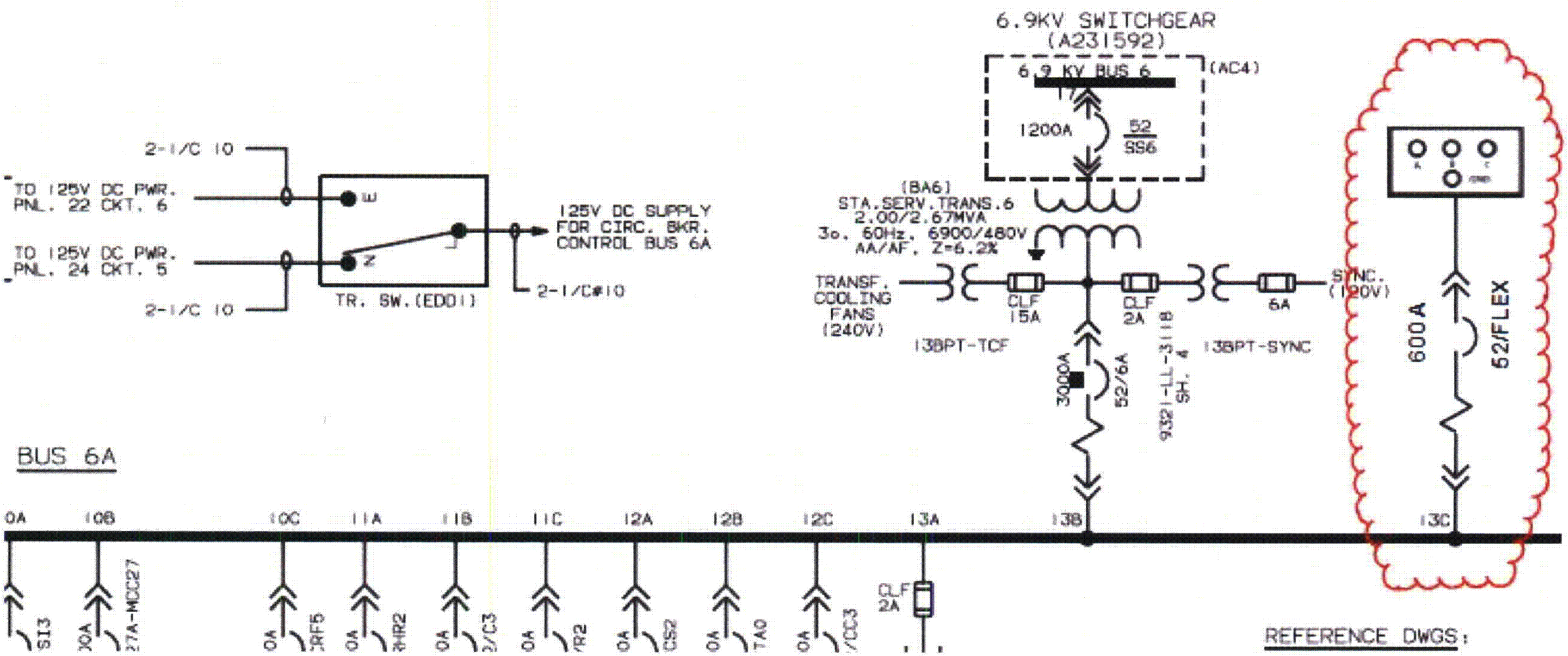

Figure A3-70: Unit 2 Phase 2 6A Replacement Breaker (Reference 9-b)

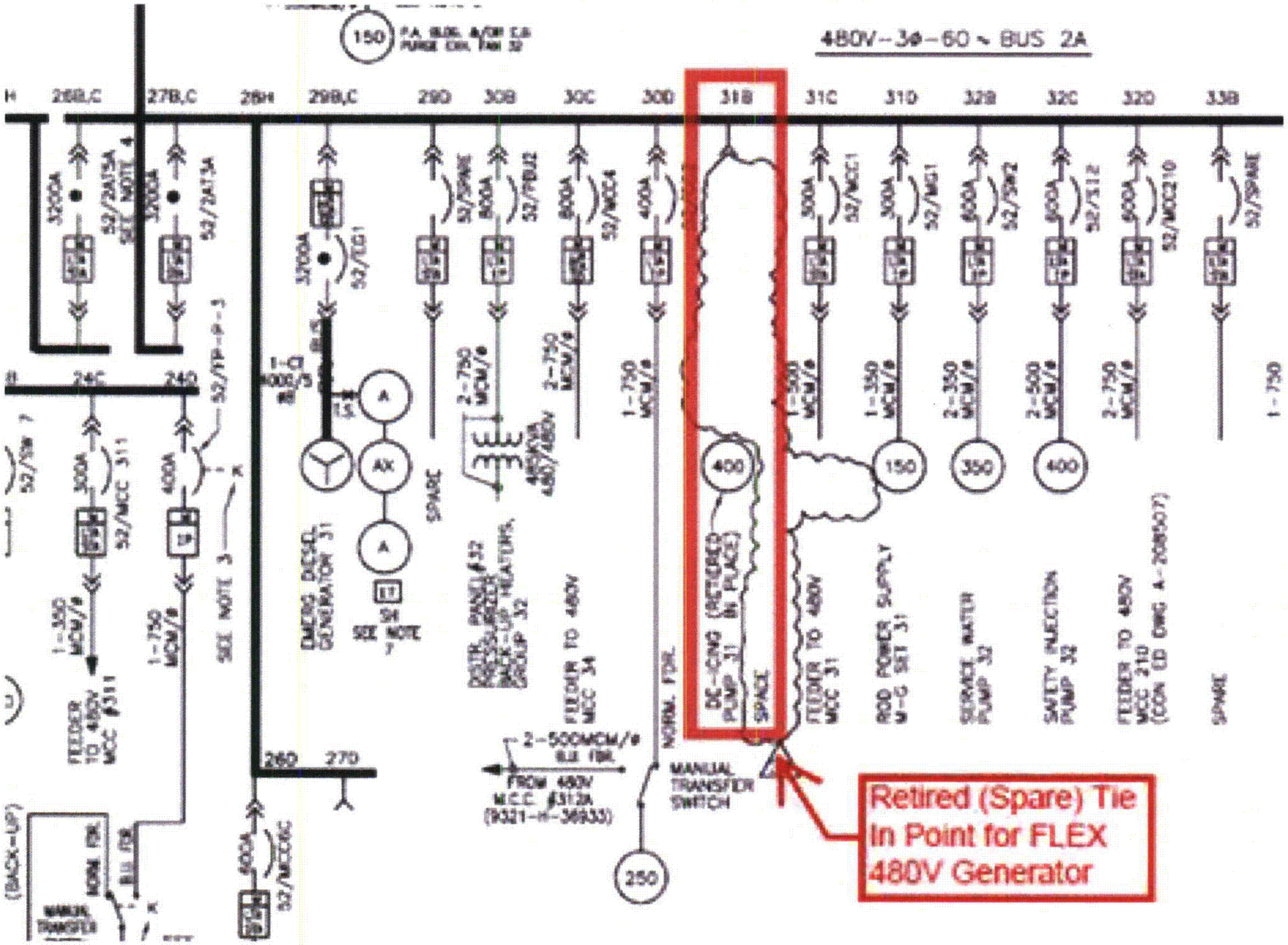

Figure A3-71: Spare breaker 31B on Bus 2A (Reference 9-n)

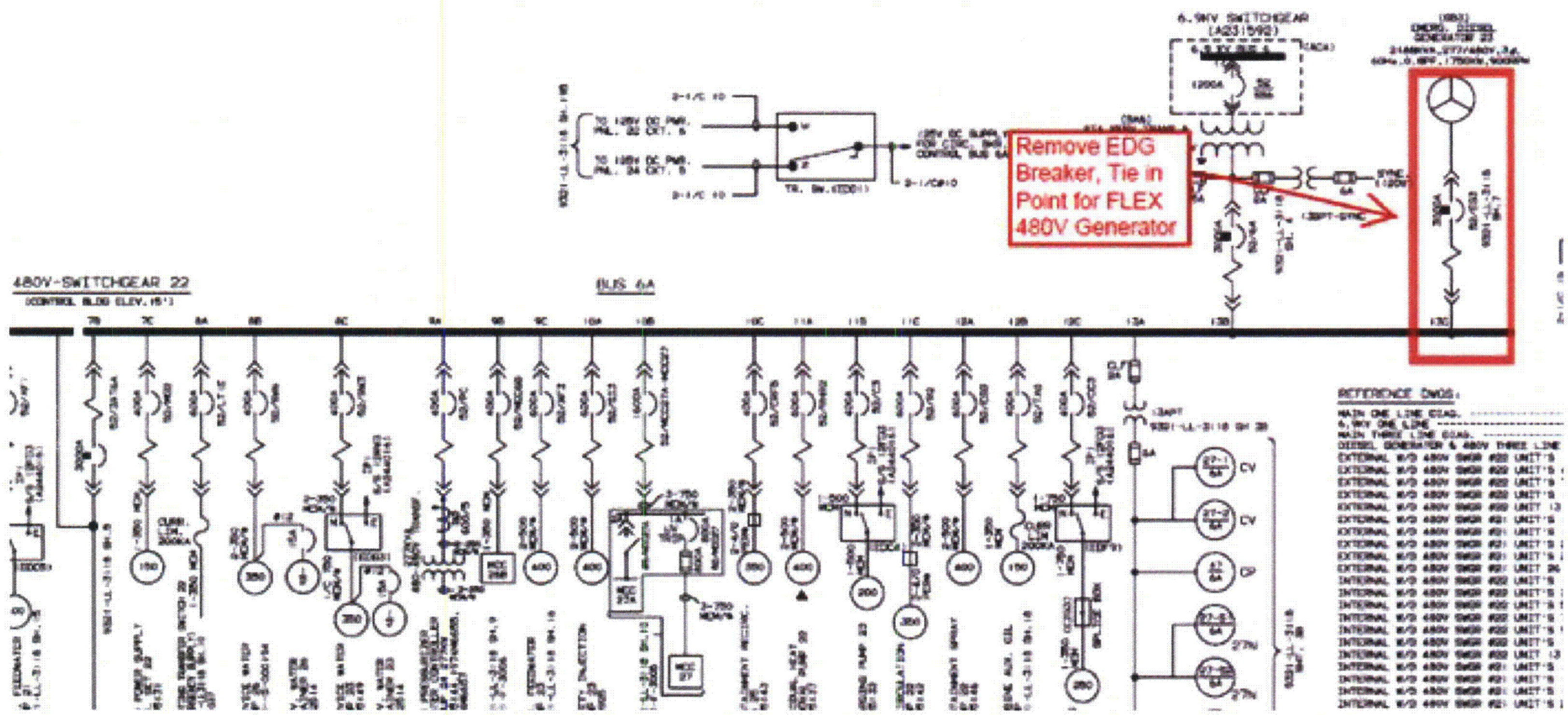

Figure A3-72: Replace Breaker 15B, C on Bus 6A (Reference 9-n)

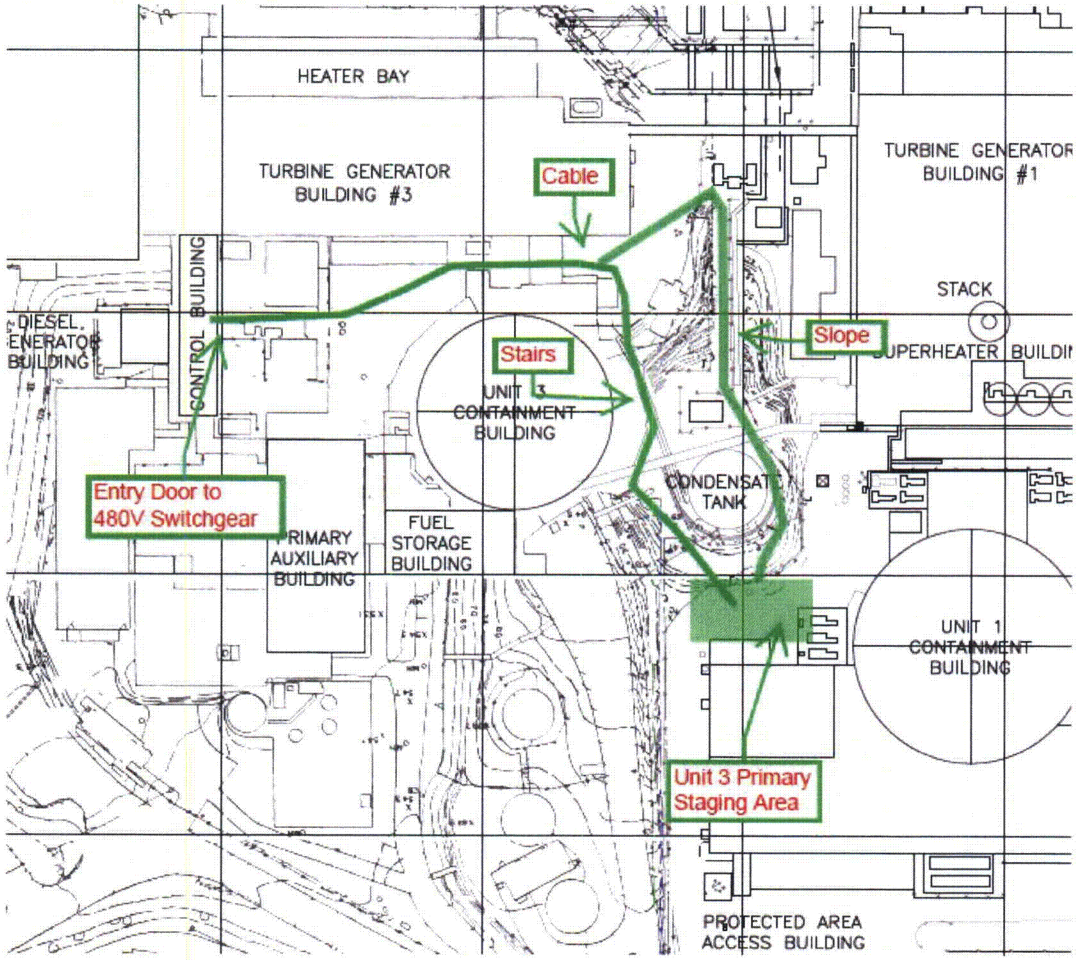

Figure A3-73: Unit 3 Primary Routing Outdoors (Reference 9-a)

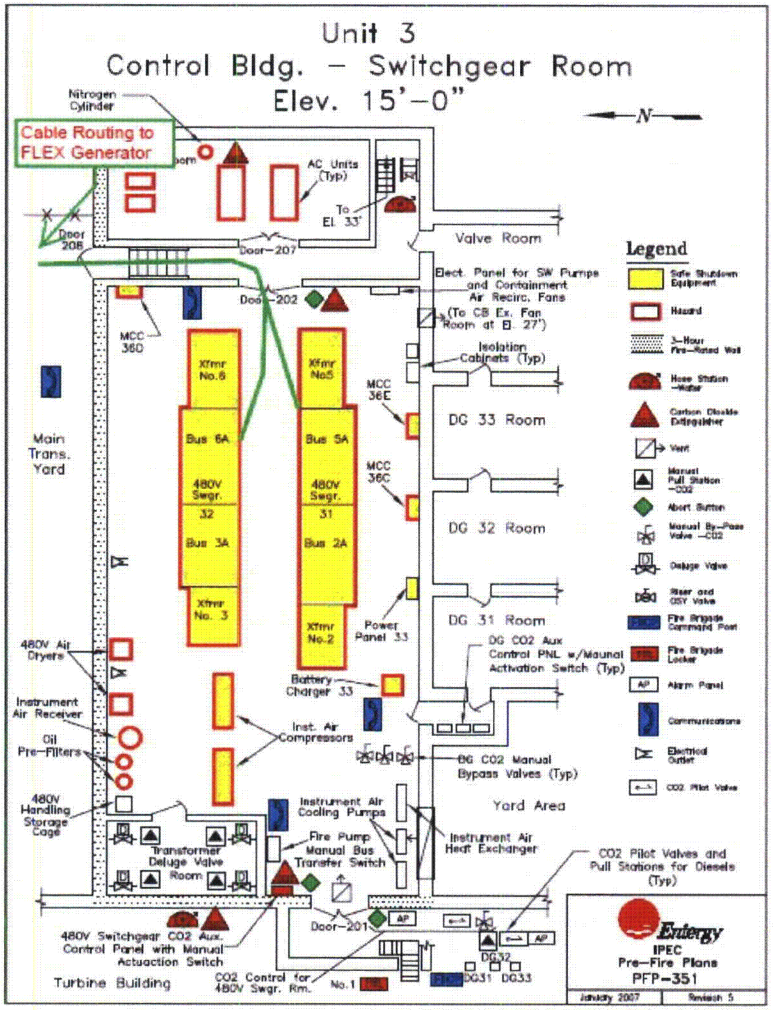

Figure A3-74: Unit 3 Primary Routing in 15' 480V Switchgear Room (Reference 9-u)

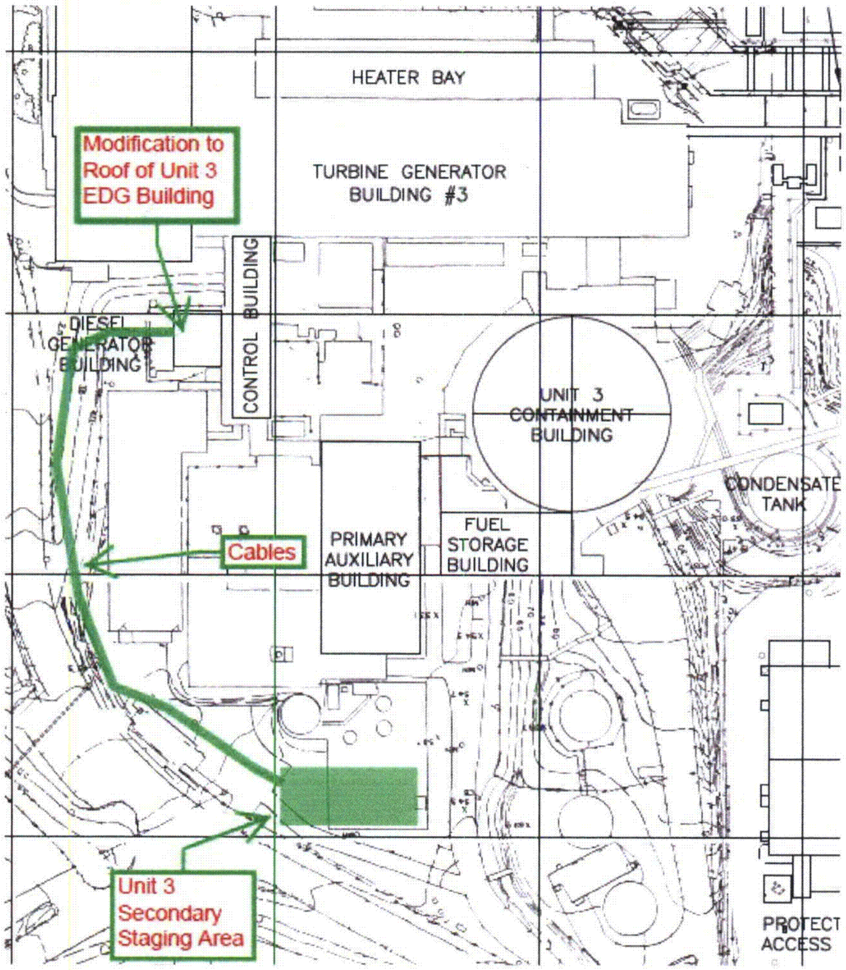

Figure A3-75: Unit 3 Secondary Routing Outside (Reference 9-a)

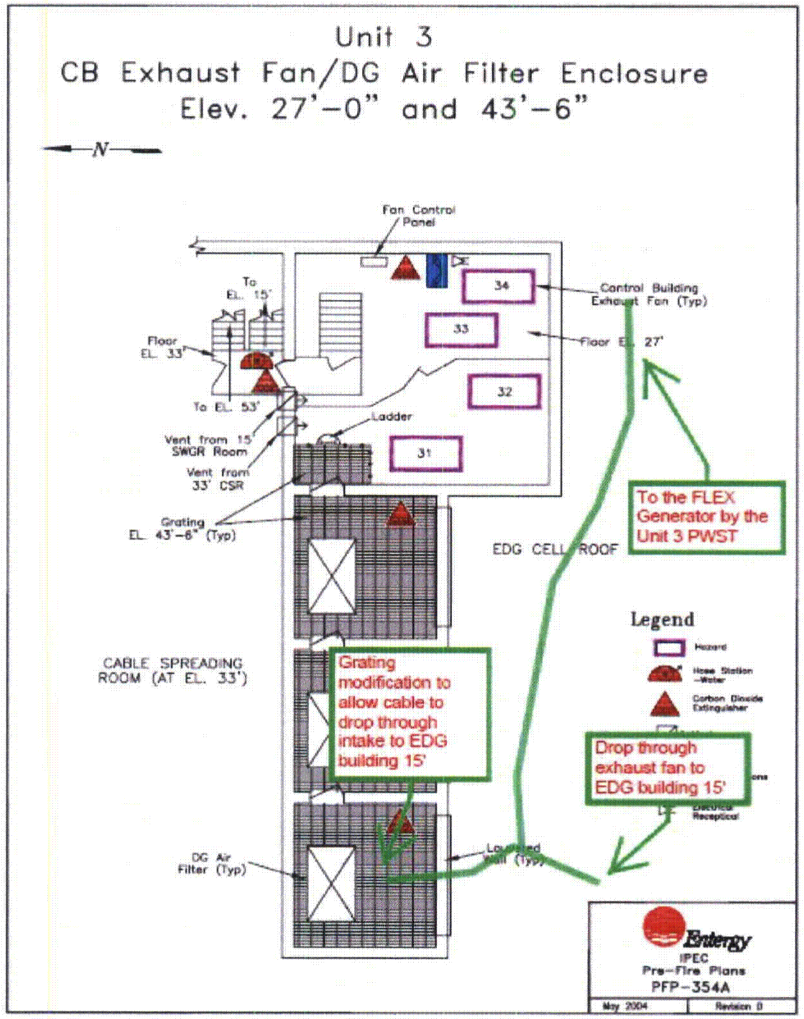

Figure A3-76: Unit 3 Secondary Routing EDG Building Roof (Reference 9-x)

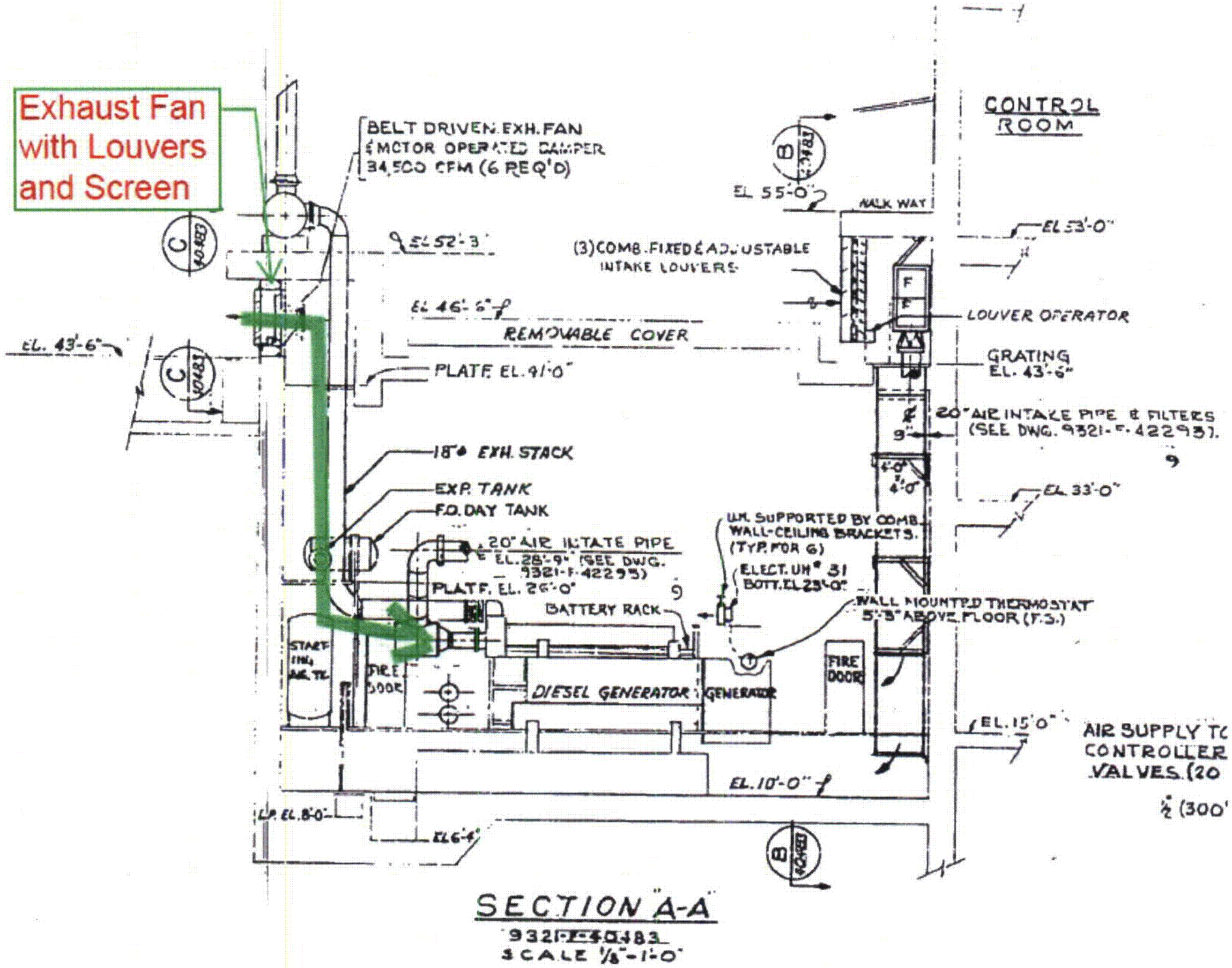

Figure A3-77: Unit 3 Secondary Routing EDG Exhaust Fan Access (Reference 9-w)

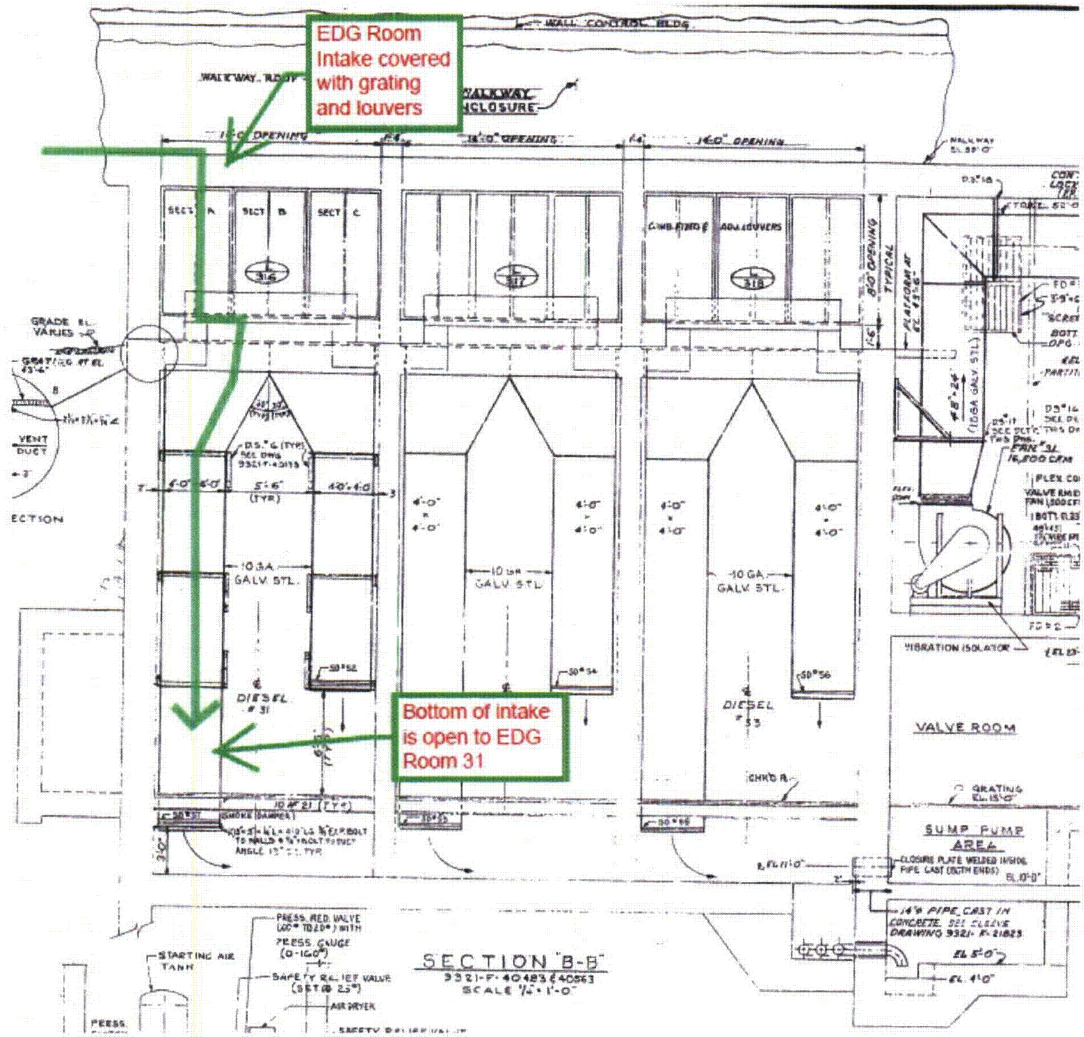

Figure A3-78: Unit 3 Secondary Routing EDG Intake Access (Reference 9-w)

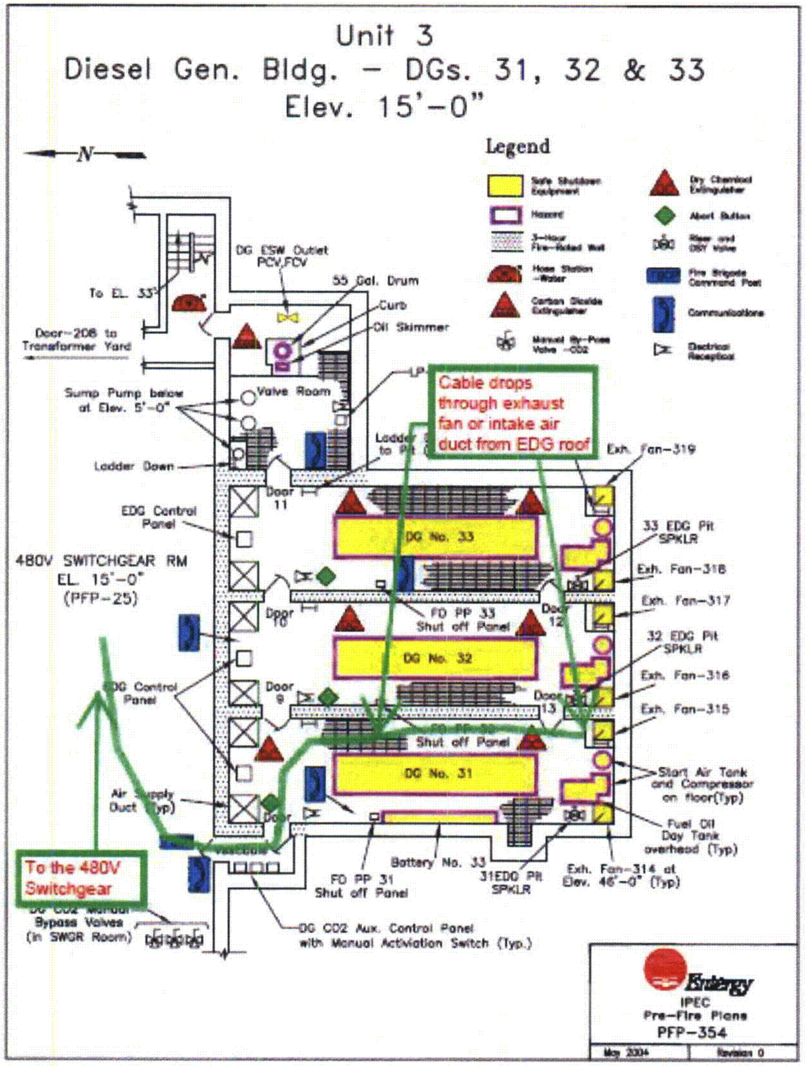

Figure A3-79: Unit 3 Secondary Routing EDG Building 15' (Reference 9-y)

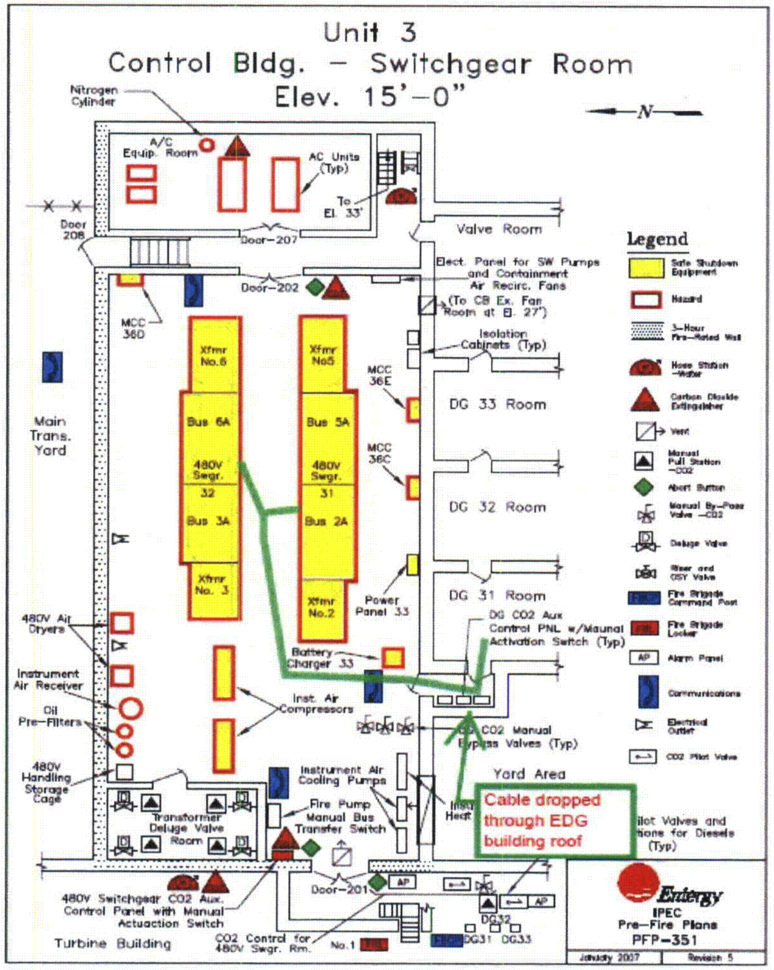

Figure A3-80: Unit 3 Secondary Routing 480V Switchgear Room (Reference 9-u)

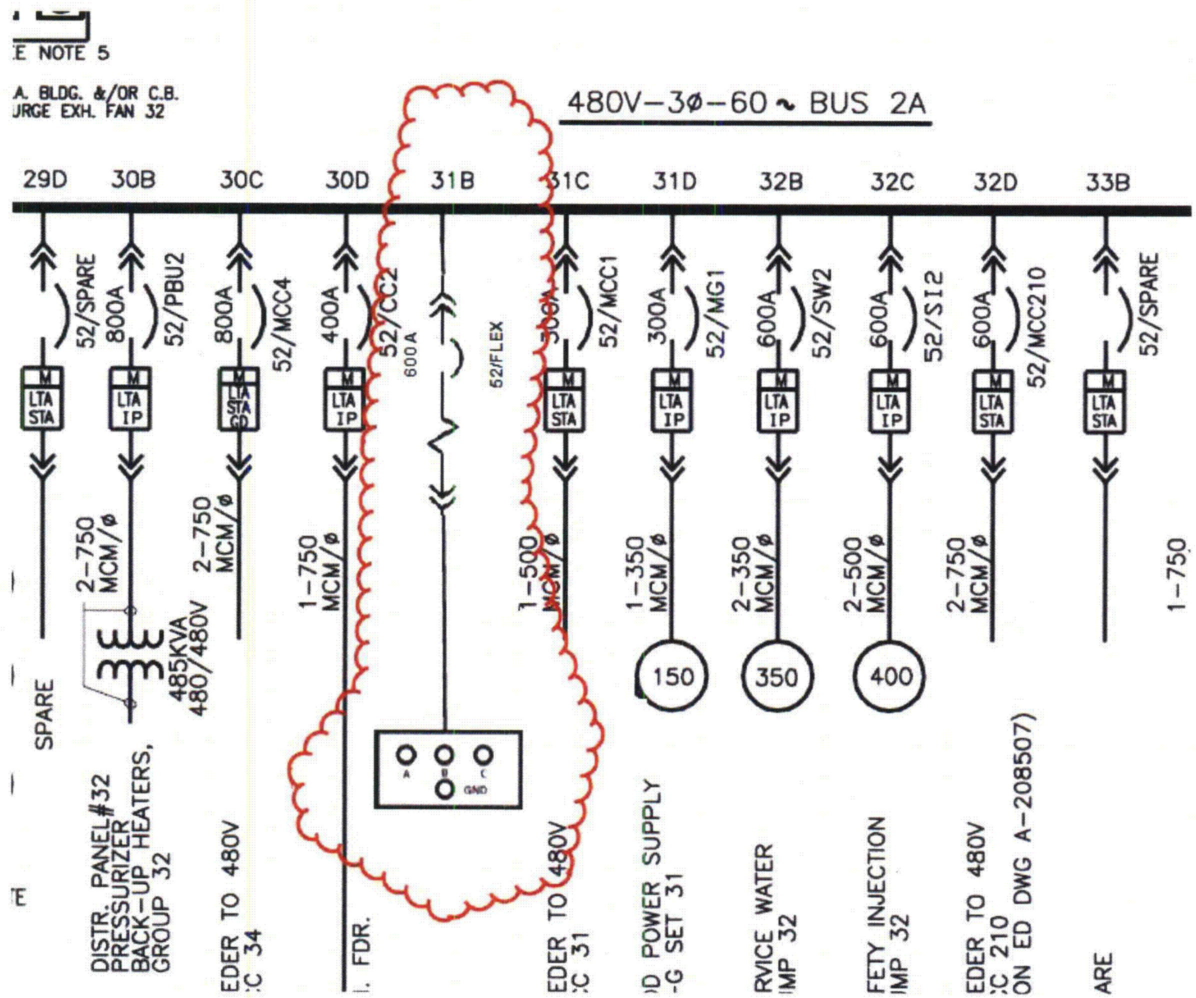

Figure A3-81: Unit 3 Phase 2 Bus 2A Replacement Breaker (Reference 9-n)

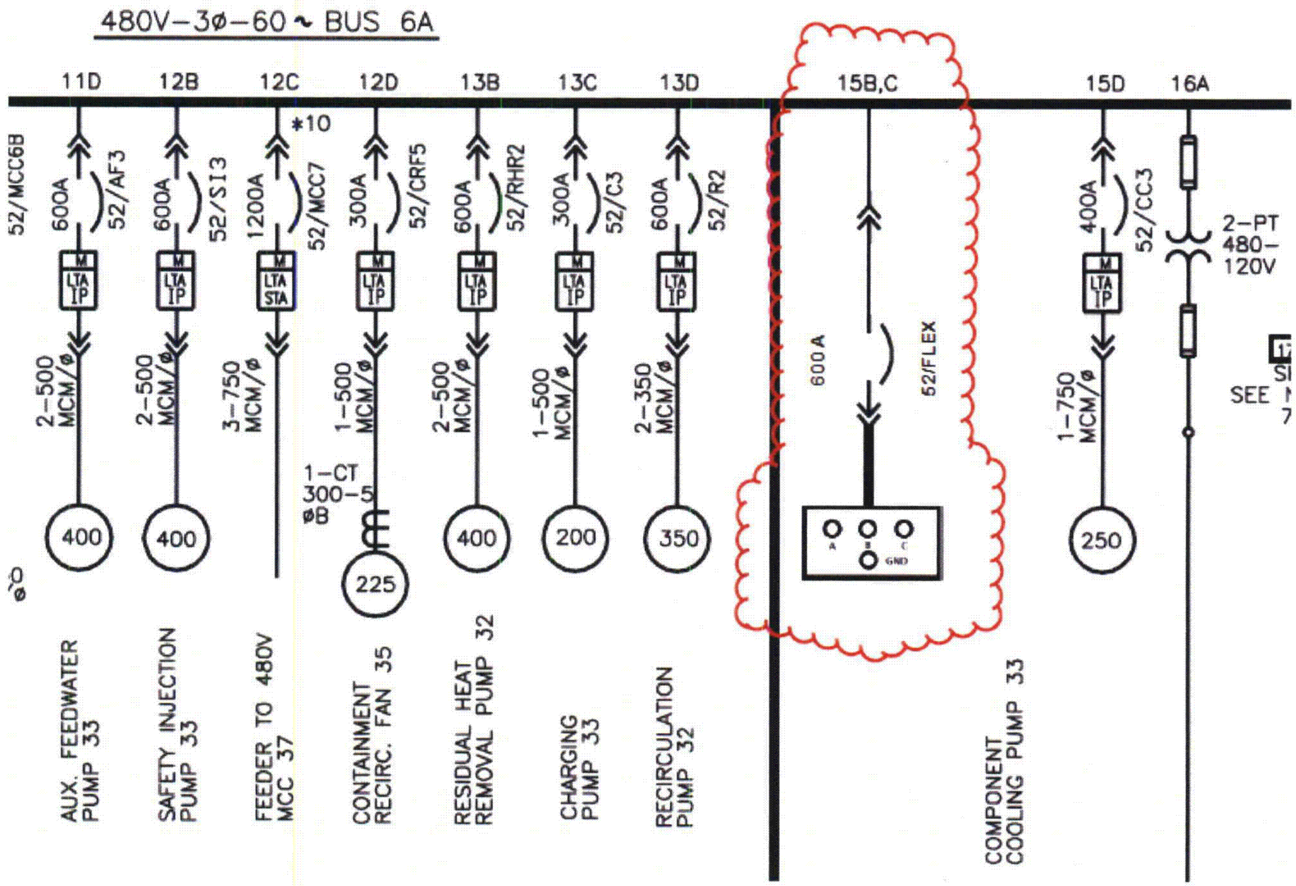

Figure A3-82: Unit 3 Phase 2 Bus 6A Replacement Breaker (Reference 9-n)

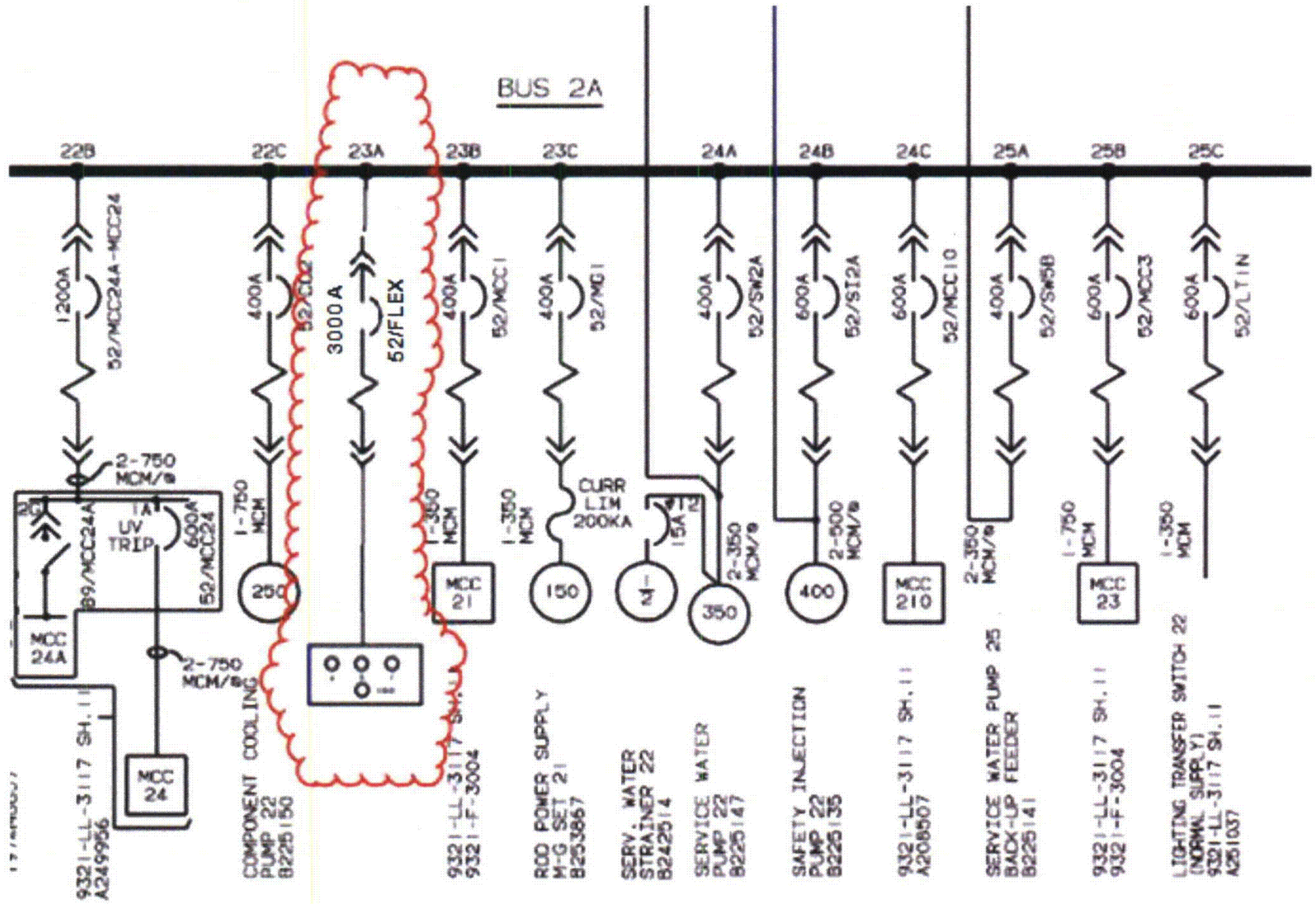

Figure A3-83: Unit 2 Phase 3 Bus 2A Replacement Breaker (Reference 9-b)

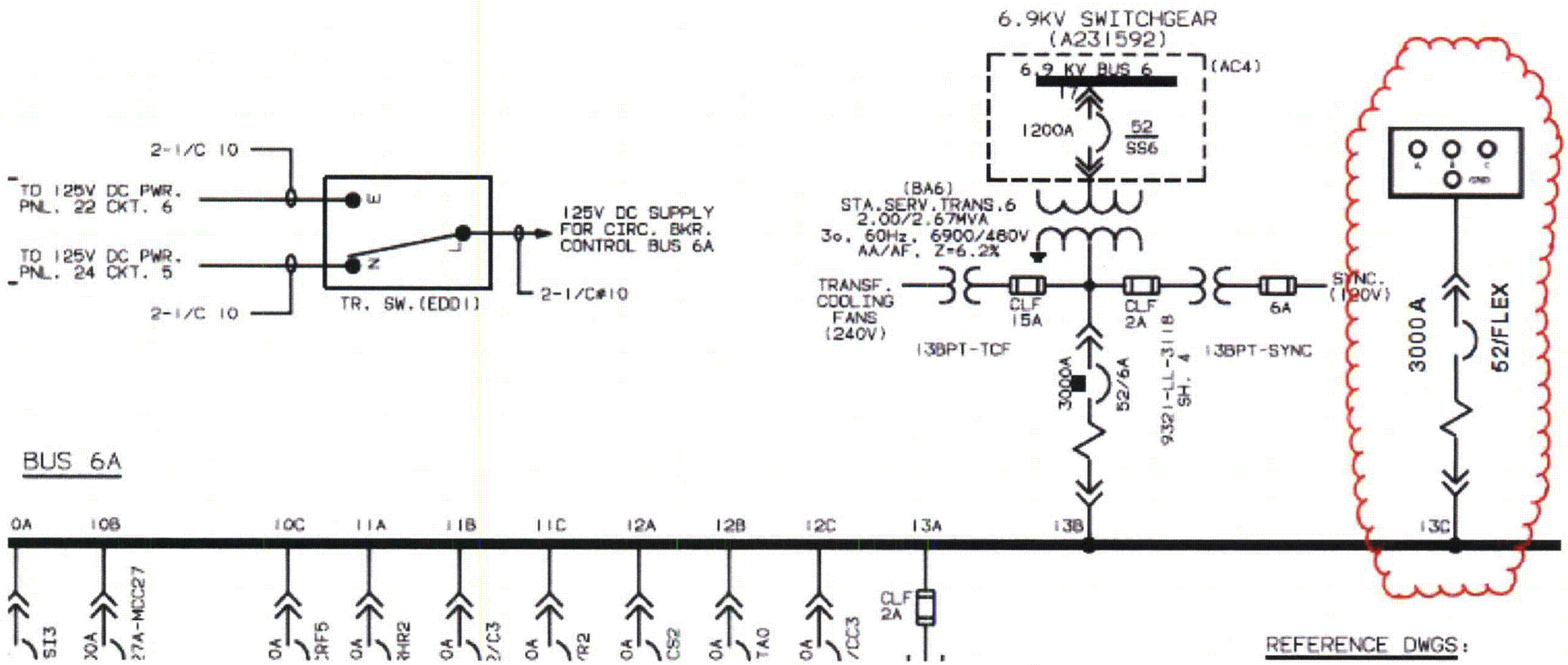

Figure A3-84: Unit 2 Phase 3 Bus 6A Replacement Breaker (Reference 9-b)

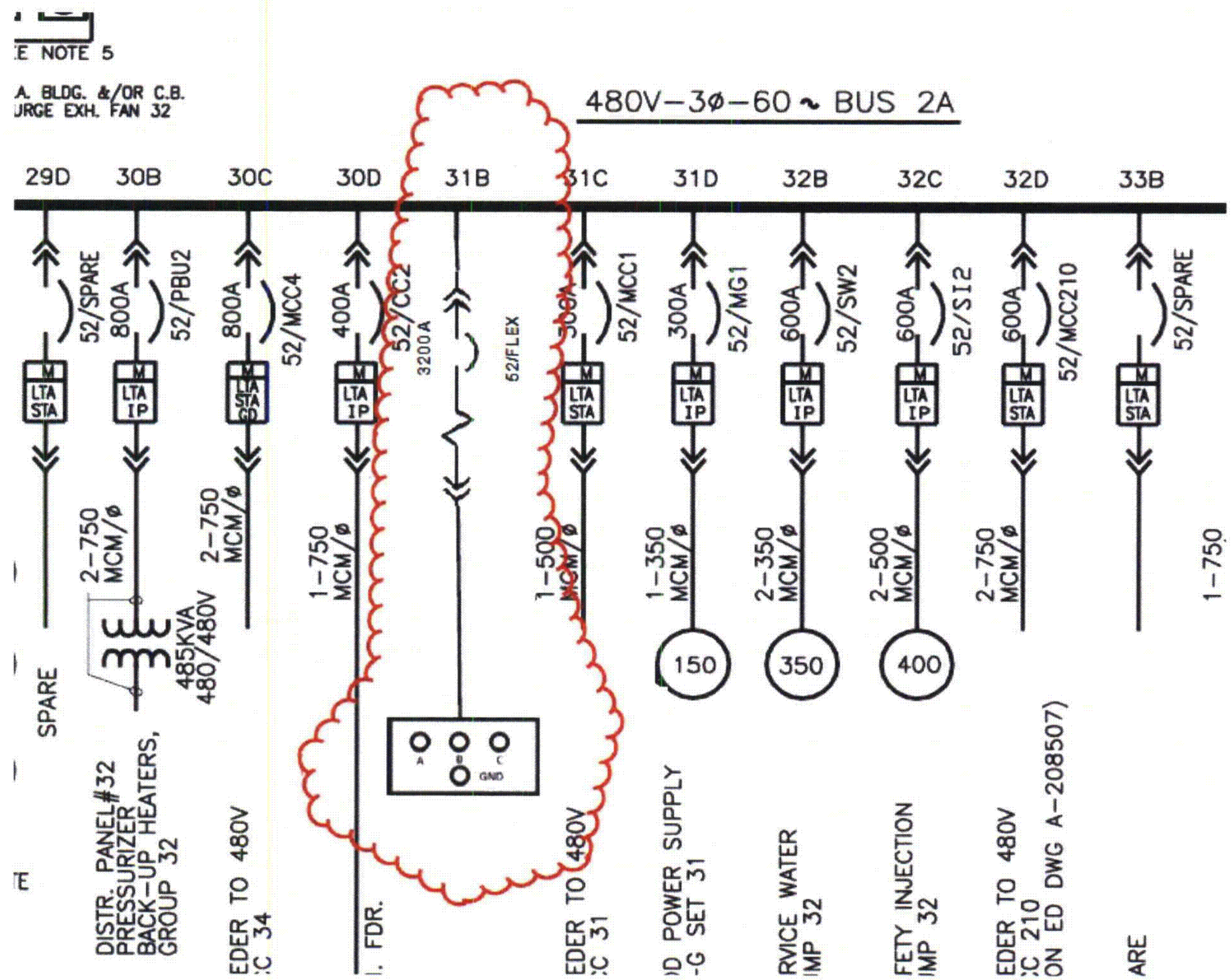

Figure A3-85: Unit 3 Phase 3 Bus 2A Replacement Breaker (Reference 9-n)

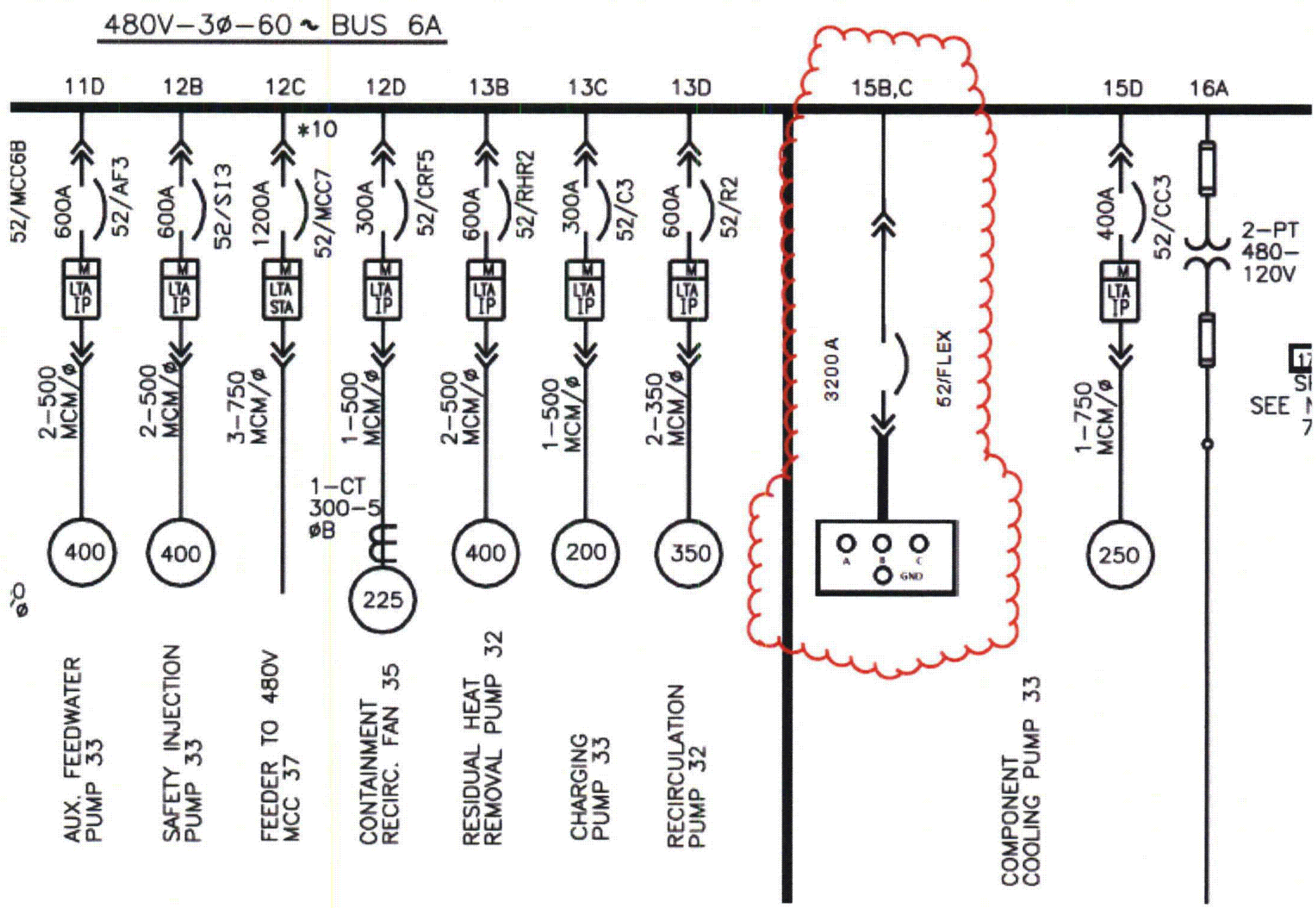

Figure A3-86: Unit 3 Phase 3 Bus 6A Replacement Breaker (Reference 9-n)