FPL.

February 26, 2013
L-2013-061

U.S. Nuclear Regulatory Commission
ATTN: Document Control Desk
Washington, DC 20555-001

Turkey Point Units 3 and 4
Docket Nos. 50-250 and 50-251

Florida Power and Light Company's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

References:

1. NRC Order Number EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events dated March 12, 2012, Accession No. ML12056A045.
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, Accession No. ML12229A174.
3. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide," Revision 0, dated August, 2012, Accession No. ML12242A378.
4. Letter, L-2012-386, Florida Power and Light Company's 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 25, 2012, Accession No. ML12300A423.

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to Florida Power & Light Company (FPL). Reference 1 was immediately effective and directs FPL to develop, implement, and maintain guidance and strategies to maintain or restore core cooling, containment, and spent fuel pool cooling capabilities in the event of a beyond-design-basis external event. Specific requirements are outlined in Attachment 2 of Reference 1.

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Reference 1 requires submission of an Overall Integrated Plan by February 28, 2013. The NRC Interim Staff Guidance (ISG) (Reference 2) was issued August 29, 2012 which endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 3 provides direction regarding the content of this Overall Integrated Plan.

Reference 4 provided the FPL, Turkey Point Units 3 and 4, initial status report regarding mitigation strategies, as required by Reference 1.

The purpose of this letter is to provide the Overall Integrated Plan pursuant to Section IV, Condition C.1, of Reference 1. This letter confirms that FPL's Turkey Point Units 3 and 4 have received Reference 2 and have an Overall Integrated Plan developed in accordance with the guidance for defining and deploying strategies that will enhance the ability to cope with conditions resulting from beyond-design-basis external events.

The information in the enclosure provides the FPL, Turkey Point Units 3 and 4, Overall Integrated Plan for mitigation strategies pursuant to Reference 3. The enclosed Integrated Plan is based on conceptual design information that is current as of this letter. As design details and associated procedural guidance are finalized, additional information, as well as revisions to the information contained in the enclosure to this letter, will be communicated to the NRC in the 6-month Integrated Plan updates as required by Reference 1.

This letter contains no new regulatory commitments.

If there are any questions regarding this submittal, please contact Mr. Robert J. Tomonto, Licensing Manager at 305 246-7327.

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

Executed on February 26, 2013.

Sincerely,

Michael Kiley
Site Vice President
Turkey Point Nuclear Plant

Enclosure

cc: USNRC Regional Administrator, Region II
USNRC Project Manager, Turkey Point Nuclear Plant
USNRC Senior Resident Inspector, Turkey Point Nuclear Plant
USNRC Director, Office of Nuclear Reactor Regulation

L-2013-061

Enclosure

Florida Power and Light Company's Overall Integrated Plan in Response to March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events (Order Number EA-12-049)

Turkey Point Units 3 & 4

Overall Integrated Plan Submittal

General Integrated Plan Elements (PWR)

Determine Applicable Extreme External Hazard Ref: NEI 12-06 section 4.0 - 9.0 JLD-ISG-2012-01 section 1.0	The Turkey Point Nuclear Station (PTN) is located at latitude 25°-26'-04" North and 80°-19'52" West approximately 25 miles south of Miami, Florida. NEI 12-06 Sections 5.0-9.0 and Appendix B were used by PTN to evaluate applicable external hazards. The four classes of hazards determined to apply at PTN are: 1. Seismic 2. External Flooding 3. Severe Storms with High Winds including Wind Driven Missiles 4. Extreme High Temperature **External Hazards Applicability Considerations:** Seismic Hazard Assessment: The design criteria for the Turkey Point Units 3 and 4 accounts for two design basis earthquake spectra: Design Basis Earthquake and the Safe Shutdown Earthquake (Ref 6, Appendix A). The ground accelerations for these spectra are 0.05g and 0.15 g respectively. Structures, systems, and components (SSC's) important to safety are designed to withstand loads developed from these spectra. Provisions for this hazard will be included in the flexible and diverse strategy (FLEX) integrated plan. This includes qualification of installed equipment credited for the event and effects of the event on the FLEX strategies. A seismic re-evaluation of the PTN site required by the 10 CFR 50.54(f) letter of March 12, 2012 has not yet been completed. Once completed, insights from the re-evaluation will be included in the FLEX integrated plan. External Flooding Assessment: PTN is designed to withstand flooding events associated with external natural hazards (Ref. 6, Appendix 5G). The current licensing basis (CLB) for flooding is associated with hurricane surge conditions and is 18.3 ft above Mean Low Water (MLW).

	Flood protection for storm surge and wave run-up is provided by elevation of equipment and flood protection barriers. On the west side of the plant protection is provided to elevation 20 ft MLW and on the east side of the plant protection is provided to elevation 22 ft to account for wave run-up. PTN is not a "dry" site as defined in NEI 12-06 so temporary barriers are installed to protect equipment from storm surges during severe hurricanes. Provisions for this hazard will be included in the FLEX integrated plan. This includes qualification of installed equipment credited for the event and effects of the event on the FLEX strategies. A flooding re-evaluation is being performed as required by 10 CFR 50.54(f) letter of March 12, 2012 has not yet been completed. The re-evaluation will include an updated storm surge assessment, a local intense precipitation assessment, and the effects of Tsunami, and Seiche. Once completed, insights from the re-evaluation will be included in the FLEX integrated plan. <u>Snow, Ice and Extreme Cold Assessment:</u> PTN is located below the 35th parallel. Per review of Section 8 of the NEI 12-06 guidance, snow, ice, or extreme cold hazard conditions do not apply to PTN. Provisions for this hazard will not be included in the FLEX integrated plan. <u>Severe Storms with Winds Hazard Assessment:</u> Figure 7-1 of the NEI 12-06 guidance (Reference 2) was used for the determination to consider this hazard. The PTN site is within the region where winds are expected to exceed 130 mph so the high wind hazard is applicable. Review of Figure 7-2 determined that PTN is subject to tornadoes and within the region 2 locations therefore subject to winds of 170 mph. The design basis for Turkey Point includes requirements for safety related structures, systems and equipment to withstand hurricanes, tornadoes, and wind driven missiles (Ref. 6, Appendix 5A, 5E). The design wind speeds are 145 mph for hurricanes and 225 mph for tornadoes. Provisions for this hazard including high wind from hurricanes, tornadoes, and wind driven missiles will be included in the FLEX integrated plan. This includes qualification of installed equipment credited for the event and effects of the event on the FLEX strategies.

	Extreme High Temperature Assessment: PTN is located just south of Miami, Florida. Meteorological records for the area indicate that high temperatures approach 100 degrees F in Summer months but remain well below the threshold of 110 degrees F discussed in NEI 12-06. While such temperatures present a challenge to the grid when customer usage is high, there has been no recent history of off-site power loss or plant equipment affected by them. On this basis, it would not be expected that FLEX equipment and deployment would be affected. Nonetheless, temperature considerations will be made with respect to maintaining equipment within design ratings and for personnel habitability. Provisions for this hazard will be included in the development and implementation of the overall FLEX integrated plan. This includes qualification of installed equipment credited for the event and effects of the event on the FLEX strategies.
Key Site assumptions to implement NEI 12-06 strategies. **Ref: NEI 12-06 section 3.2.1**	The following assumptions and considerations were used in the development of the FLEX Strategies submitted herein: • This plan defines strategies capable of mitigating a simultaneous loss of all alternating current (ac) power and loss of normal access to the ultimate heat sink resulting from a beyond-design-basis event by providing adequate capability to maintain or restore core cooling, containment, and SFP cooling capabilities at all units on a site. Though specific strategies are being developed, due to the inability to anticipate all possible scenarios, the strategies are also diverse and flexible to encompass a wide range of possible conditions. These pre-planned strategies developed to protect the public health and safety will be incorporated into the unit emergency operating procedures in accordance with established EOP change processes, and their impact to the design basis capabilities of the unit evaluated under 10 CFR 50.59. The plant Technical Specifications contain the limiting conditions for normal unit operations to ensure that design safety features are available to respond to a design basis accident and direct the required actions to be taken when the limiting conditions are not met. The result of the beyond-design-basis event may place the plant in a condition where it cannot comply with certain Technical Specifications and/or with its Security Plan, and, as such, may warrant invocation of 10 CFR 50.54(x) and/or 10 CFR 73.55(p). • Flooding and seismic re-evaluations pursuant to the 10 CFR 50.54(f) letter of March 12, 2012 have not been completed. As the re-evaluations are completed, results will be provided as required by the 50.54(f) letter and appropriate issues will be entered into

	the corrective action system. The FLEX strategies and integrated plan will be adjusted to account for the re-evaluations results. • DC distribution systems and equipment designed to Class I requirements as defined in the Updated Safety Analysis Report (UFSAR) are available. Note that the UFSAR defines Class I SSC's as those that perform Safety Related functions and therefore designed to withstand the hazards previously described. • AC distribution systems and equipment designed to Class I requirements are available. • The initial response to the loss of AC power event is the same as a stations blackout (SBO). • Best estimate analysis and decay heat is used to establish critical actions. • There are no single failures of SSCs assumed. Therefore, the turbine driven auxiliary water pumps (AFW) will perform at the beginning of the event. Note that only 1 of 3 pumps is required to supply the steam generators for both units. FLEX Steam Generator (SG) pumps will be placed in service when steam supply to permanent AFW pumps reach a preset to be established by procedure (FSG's), or if the permanent AFW pumps become unavailable later in the event. • Both Condensate Storage Tanks (CST's) are rugged structures designed to withstand the design basis seismic and wind events. Both tanks are within vital areas and therefore enclosed within substantial structures designed as security barriers. The security barrier structures are also rugged and designed to withstand the design basis seismic and wind events. The structures would protect the tanks from most wind driven debris but are not designed to protect the tanks from the design basis tornado missiles. Therefore, they are not considered "robust" as defined in NEI 12-06 in that physical protection is not provided for the missile hazard. To address this condition, the current licensing basis considers one tank to be lost due to impact by a tornado missile with the other surviving since they are at opposite ends of the turbine building, separated by several hundred feet and numerous intervening structures. The assumption used in the FLEX integrated plan assessment is consistent with the licensing basis in that it assumes that one tank is lost and that the other is supplying the AFW pumps, which are in turn supplying both unit's steam generators.

	• The refueling water storage tanks (RWST's) are also rugged structures designed to withstand seismic and high wind events. They are exposed to impact from the design basis wind driven missiles. Similar to the CST's, the current licensing basis credits redundancy and separation to address the design basis wind driven missiles. Therefore, survival of one RWST is credited in the strategies. • Initial requested portable equipment is assumed to arrive at the site from the Regional Response Center (RRC) within 24 hours with the remainder of larger equipment arriving after 72 hours. • Spent fuel in dry cask storage is outside the scope of Order EA-12-049 and therefore not addressed in the response strategies described in this report.
Extent to which the guidance, JLD-ISG-2012-01 and NEI 12-06, are being followed. Identify any deviations to JLD-ISG-2012-01 and NEI 12-06. **Ref: JLD-ISG-2012-01 NEI 12-06 13.1**	The FLEX integrated plan will comply with the guidance provided by the Nuclear Regulatory Commission, JLD-ISG-2012-01, Rev 0, and by NEI 12-06, Revision 0. Interpretations jointly developed by NEI and the NRC will be followed.
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**	The sequence of events for high level actions is provided in Attachment 1. This timeline provides a summary of the key actions used in the strategies. These actions are categorized in Time Critical and Not Time Critical Actions. The justification and technical bases are outlined below: **Time Critical Actions:** **T+30 (min) - Operating Crew Declares ELAP :** The operating crew declares an extended loss of AC power (ELAP). This is considered time critical because it will start the deep load shedding activities that will preserve battery life until portable diesel generators are available to power the battery chargers and phase 2 equipment. Procedural guidance will be provided to allow for the operating crew to

	reach this decision from the Emergency Operations Procedures (EOP's) and enter the FLEX support guidelines (FSG's). **T+1 (hour) - Operating Crew Completes Deep Load Shedding** The operating crew completes deep load shedding once the ELAP is declared and before 1 hour has elapsed after the event. By completing the deep load shedding in 1 hour, run time on the batteries of 15.9 hours will be available providing sufficient time to install portable diesel generators (Ref. 29). Procedural guidance will be provided on the time critical nature of this activity and the loads to be shed. **T+8 (hours) - Portable Diesel Generators Available to Power Well Pumps** The portable diesel generators will be used to power wells pumps, which are credited by hour 9 and required to be making up to the CST at hour 12 (Ref 25). The station batteries provide the power for the critical instrumentation since AC power is initially lost. The strategies provide for backup power using portable diesel generators prior to their depletion. The batteries are expected to provide power for 15.9 hours. Even so, restoration of power to the battery chargers and other equipment on the load centers is highly desirable early in the scenario. Because of the low margin of time to power the well pumps, and the benefits of repowering the battery chargers and the other equipment, the installation of the portable diesel generators is considered time critical. **T+9 (hours) - CSTs Provide Make-up to SGs via AFW or SG FLEX Pumps** The CST(s) provide the makeup to the steam generators via the steam driven AFW pumps and, as a diverse means, through the SG FLEX pumps. The volume of a single CST will be depleted in 12 hours when feeding both units to remove decay heat (Ref. 25). Accordingly, makeup must be provided prior to that time. The CST makeup strategy involves use of well water and associated pumps. These will be new installations. The well pumps will be powered by the FLEX diesel generators. The FSG's will provide the direction to deploy the FLEX generators, power the pumps, connect hoses to the CST tie-in points, and makeup to the tanks. Because of the number of activities needed to set this strategy up, and the low margin of time available, this was considered to be time critical.

	Portable Equipment Refueling During Phases 2 and 3 Portable equipment will require refueling from the Turkey Point Unit 4 Emergency Diesel Generator (EDG) storage tanks in phase 2 and from the RRC provided equipment in phase 3. An analysis to determine the portable equipment refueling requirements is needed and will be developed as part of the equipment qualifications/specifications and the associated procedures. This is tracked as pending action 5 listed in Attachment 3. **Not Time Critical Actions:** **T+95 (sec) - Automatic Initiation of AFW Pumps** The AFW pumps are critical in the strategies as they provide the initial source of cooling to the steam generators and hence the core via natural circulation in the RCS. Although their function is critical, the timing of the pump start and initiation of flow was deemed to not be critical. This is because they receive an automatic start signal on loss of the steam generator feed pumps but can be manually started/throttled if needed. In addition, there is significant redundancy in the system (e.g. only one out of three pumps is need to supply both units) and there is sufficient volume in the SG's to cool the RCS for a period of time beyond the initiation time to manually line up the system. **T+1.5 (hours) – T+8 (hours) - Opening of Spent Fuel Doors** With a design basis heat load, the spent fuel pools would begin to boil 2.7 hours after the event because of the loss of cooling (Ref. 25). The SFP strategy includes venting of the pool area to manage the heat and condensation in the building. To do so, the doors of the building are opened. The timeline for opening of the doors is targeted to start at T+1.5 hours and completed prior to pool boiling. However, it is recognized that in an event such as a hurricane, this may not be possible. Accordingly, the timeline is carried through to T+8 hours. New SFP level instrumentation will be installed (in accordance with the requirements of EA-12-051 (Ref. 35) and it will be qualified for the environmental conditions including temperature, humidity, and radiation. This is the only equipment in the building that will be needed for the strategy. Since the equipment will be qualified to those conditions, and the structure itself would be able to sustain those conditions for an extended period of time (boiling is considered in the design and qualification of the new instrumentation and the structure), the timing for venting of the building was determined to not be time critical.

T+10 (hours) - Providing Make-up to SFP

Boiling of a spent fuel pool will occur 2.7 hours after the event if the pool has a design basis heat load. Uncovery of the fuel has been calculated to occur 33 hours after the event. Makeup to the pool will start 10 hours after the event which is less than 1/3 of the time to uncovery. Accordingly, this was not considered to be time critical

T+12 (hours) - Re-powering Containment Spray Pumps

Containment pressure and temperature could exceed design limits, especially in Modes 5 and 6. This is because the RCS would be open to the containment atmosphere and cooling would be established through feed from an RWST and boil-off through one of the designated openings in the system. Accordingly, the containment spray pumps are repowered at hour 12 to cool the containment if needed. T+12 was considered to be adequate to prevent exceeding design temperature and pressure. A confirmatory analysis is needed and is being tracked as pending action 1, listed in Attachment 3.

T+13 (hours) - RCS Depressurization and Cooldown

Initially, the main steam safety valves will be utilized for core cooling via natural circulation in the RCS to the steam generators. Once makeup to the CST(s) has been established, and power is available from the portable diesel generators, a controlled cooldown of the SG's and hence the RCS will be performed. This is to allow for injection of the accumulators that are needed for boration and makeup. The potential for re-criticality will not occur until approximately 21 hours (beginning of cycle) and 39 hours (end of cycle) after the event (Ref. 23). Since the target for the depressurization provides 8 hours of margin, this action was not considered to be time critical.

Also, at T+13, the SG Flex pump is available as a backup to the AFW pumps. Since this is a backup function for long term cooling, this was not considered to be time critical.

The generic WCAP guidance recommends that a site-specific evaluation be performed once the RCP low leakage seal design is completed to validate that the cooldown and depressurization time is supported. This is tracked as pending action number 9 in Attachment 3.

T+24 (hours) - Re-power Boric Acid Transfer Pumps and Charging Pumps

To provide for long term cooling, makeup and boration, the boric acid transfer pumps and charging pumps are repowered from a portable diesel generator. Based on the cooling strategy using AFW/SG FLEX pumps,

	installation of low leakage RCP seals, and injection of the accumulators, this was not considered to be time critical. **T+120 (hours) - Re-Power 4kV Busses** The final goal of the strategies is to repower the 4 kV busses, which will restore several key functions including residual heat removal (RHR), component cooling water (CCW), spent fuel pool cooling, and emergency containment cooling (ECC). Since the FLEX equipment credited in phases 1 and 2 can sustain the strategies up until the RRC equipment is available, this was not considered to be time critical. Note that the equipment is expected to be on-site at 72 hours, and 48 hours is added to connect the equipment and place it into service. Once the 4 kV busses are restored, the strategies will no longer rely on the portable 480 V generators and they can be removed from service. **Discharge of Accumulator Tanks in Mode 6 and Mode 5, without Steam Generators Available** Sufficient volume is available in the accumulators or RWST for makeup and cooling prior to core uncovery. Calculations will be completed to provide a definitive time for an action to open manual valves to inject the tanks or initiate gravity flow from the RWST's. This is being tracked as pending action 7 in Attachment 3. Based on preliminary calculations, these are not expected to be a time critical actions.
Identify how strategies will be deployed in all modes. **Ref: NEI 12-06 section 13.1.6**	The FLEX deployment strategies will be included within an administrative program. Additionally, guidance for deployment of phase 2 and 3 equipment will be provided in the Flex Support Guideline (FSG) procedures to be developed. The chosen location for the FLEX Storage Building will be in the protected area. The building elevation will be well above the surrounding land features with no significant barriers, foliage or overhead lines impeding access to the proposed staging areas. The protected area is built on compacted limerock fill that is not susceptible to liquefaction. The location and layout of the FLEX Storage Building will be meeting NEI 12-06 guidance for a single structure. FLEX Storage Building Location and Layout are shown in Attachment 5, Figures 1 and 2, respectively. A confirmatory analysis will be performed of the travel path, including review of barriers, obstructions, and liquefaction considerations, once the final building plans, routes, and staging areas are finalized. This action is

	being tracked as pending action 8, in Attachment 3. Equipment Travel Paths and Staging Locations are shown in Attachment 5, Figure 3. Transport vehicles necessary to haul the FLEX equipment to the staging areas will be stored in the same FLEX storage structure and therefore will be protected from all hazards. In order to keep deployment pathways clear, equipment will be available and actions will be taken to clear the pathways if they become obstructed. The identified deployment routes and deployment areas will be accessible during all modes of operation.
Identify how the programmatic controls will be met. **Ref: NEI 12-06 section 11 JLD-ISG-2012-01 section 6.0**	PTN will include the following programmatic controls in the development and implementation of FLEX strategies: • Quality attributes • Equipment design • Equipment storage • Procedure guidance • Maintenance and testing • Training • Staffing • Configuration control. A site FLEX program stipulating the required administrative controls will be implemented to meet these programmatic controls per NEI 12-06 guidelines. FLEX equipment will be procured as commercial equipment unless credited for other functions; then the quality attributes of the other functions apply. Specifications for equipment will be consistent with National Fire Protection Association requirements or equivalent. Design requirements and supporting analysis will be developed for portable equipment that directly performs a FLEX mitigation strategy for core cooling, containment pressure and temperature control, and SFP cooling that provides the inputs, assumptions, and documented analysis that the mitigation strategy and support equipment will perform as intended. Onsite equipment used during phase 2 of the FLEX coping strategies will be protected in accordance with the guidelines of NEI 12-06. As part of the coping strategies, FLEX equipment will be stored in a structure that meets the external hazard protection requirements of NEI 12-06. NEI 12-06 details guidance associated with the implementation of the FSGs. To provide guidance to deploy FLEX equipment and coping

	strategies, FSG will be generated which will provide available, pre-planned FLEX strategies for accomplishing specific tasks. The FSG will support the strategies described in the existing EOPs. Other procedures will be impacted due to FLEX. These procedures will include, but are not limited to, system operating procedures, valve lineups, preventive maintenance procedures, setpoint procedures, calibration procedures, and annunciator response procedures. Existing plant configuration control procedures will be modified to ensure that permanent and temporary changes to the plant design, physical plant layout, roads, buildings, and miscellaneous structures will not adversely impact the approved FLEX strategies. Existing plant maintenance programs and procedures will be used to identify and document maintenance and testing requirements. Preventative Maintenance work orders (PMs) will be established and testing procedures will be developed in accordance with the PM program. Testing and PM frequencies will be established based on type of equipment and considerations made within EPRI guidelines. The control and scheduling of the PMs will be administered under the existing site work control processes. Staffing requirements for the FLEX strategies will be completed in accordance with the guidance provided in NEI 12-01 as required by the request for information associated with SECY-11-0093 recommendation 9.3 (Ref. 36). PTN will assess the addition of program description into the UFSAR and other applicable licensing and design basis documents.
Describe training plan	The PTN training plan for the implementation of the FLEX strategies will follow the Systematic Approach to Training (SAT) to evaluate training requirements for station personnel for the changes to plant equipment, the FLEX portable equipment, and new or revised station procedures that result from implementation of the FLEX strategies. Training modules for Station and Emergency Response Organization (ERO) personnel that will be responsible for implementing the FLEX strategies will be developed to ensure personnel proficiency in the mitigation of beyond-design-basis external events. The training will be implemented and maintained per existing PTN training programs. The details, objectives, frequency, and success measures will follow the plant's SAT process.

	FLEX training will ensure that personnel assigned to direct the execution of mitigation strategies for BDBEEs will achieve the requisite familiarity with the associated tasks and mitigating strategy time constraints considering available job aids and instructions. Training will be completed prior to full implementation of the requirements of this order as presented in the milestone schedule, Attachment 3.
Describe Regional Response Center plan	Two Regional Response Centers (RRC) are being established to support utilities during beyond design basis events. Contracts are in place to develop the facilities, purchase equipment, support of the FLEX strategies, and maintenance of the equipment. 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 assembly area established by the Strategic Alliance for FLEX Emergency Response (SAFER) team and the utility. Communications will be established between the affected nuclear site and the SAFER team and required equipment moved to the site as needed. First arriving equipment, as established during development of the nuclear site's "playbook", which is the site's plan and equipment needs for FLEX strategies, will be delivered to the site within 24 hours from the initial request. Large equipment needed for long term coping will be delivered within 72 hours from the initial request. A preliminary list of equipment is presented in Attachment 6.

Safety Function: Maintain Core Cooling & Heat Removal

PWR Installed Equipment Phase 1

Determine baseline coping capability with installed coping modifications, not including FLEX portable equipment, 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

Coping strategies have been developed to prevent damage to the fuel in the reactor due to an ELAP and loss of ultimate heat sink (LUHS) event. The systems, structures and components (SSCs) of Units 3 and 4 associated with reactor core cooling following an ELAP and LUHS event are essentially identical, therefore, the three phase strategy developed is the same for both units.

Reactor core cooling requires baseline capabilities for several safety functions. These safety functions include reactor core cooling and heat removal (with the steam generators available), RCS inventory and long-term sub-criticality, and core cooling and heat removal for Modes 6 and Mode 5 (with steam generators not available to remove decay heat).

Initial (Phase 1) Coping Strategy

(Modes 1 through 4, and Mode 5 with Steam Generators Available – Non-Hurricane Scenario)

Immediately following the event, reactor core cooling is accomplished by natural circulation of the RCS through the steam generators. The steam generators are supplied by the AFW system and steam pressure is controlled either by the Steam Dumps to Atmosphere (SDTAs) or Main Steam Safety Valves (MSSVs). The main active components associated with this strategy are the three turbine-driven AFW pumps. Two of the three pumps have DC powered valves and controls that are automatically actuated on a loss of AC power to provide feedwater for the removal of reactor core decay heat following a loss of main feedwater (Ref. 7).

Each AFW pump can supply 100% of the required flow to all three steam generators for both units through individual air-operated flow control valves (FCVs). Control of the FCVs from the control room uses the safety related and seismically installed backup nitrogen supply bottles. Supply lasts a minimum of 2 hours per AFW train (Ref.7). Additional installed nitrogen capacity (available by "valving in" normally isolated nitrogen bottles) extends FCV control from the main control room out to approximately 7 hours (Ref. 7). After the nitrogen bottles are exhausted, manual operation of the FCVs via handwheels will be required until phase 2 equipment is available. In addition, the AFW turbine steam admission valves will remain open even if power is lost to their DC motors should power from the station batteries not be available. This operation of the AFW system maintains SG level in the narrow range, preventing any loss of the steam generators as a heat sink.

Suction to the AFW pumps is from either of the two Class I Condensate Storage Tanks. Each CST is nominally a 250,000 gallon tank. Each CST has a minimum of 199,100 gallons available for use (Ref.7). For tornado events, only one CST at minimum inventory is assumed to survive. For seismic and other non-missile events, both CSTs are assumed available with this minimum inventory available in each. From these scenarios, the tornado event is the most limiting BDBEE with respect to the core cooling function for Modes 1-4.

A decay heat calculation was performed to analyze the length of time a single CST could supply flow to the steam generators for both units assuming each unit is at 100% power (Ref. 25). The calculation shows that the volume of water required to cool down the plant (i.e., remove sensible heat as well as decay heat) is significantly greater than that required to maintain plant temperatures (i.e., only remove decay heat). By only removing decay heat (i.e., no cooldown), the minimum CST volume (Ref.7) is capable of providing approximately 12 hours of feedwater with one CSTs inventory split between both units. If plant cooldown commenced between 2 and 4 hours after the ELAP and LUHS event, the CST would be depleted in approximately 8 hours. To preserve the CST inventory, the plant cooldown will occur when a CST makeup source has been established At this point, cooldown may proceed without the risk of drying out the steam generators because the CST(s) is being replenished at a rate greater than the demand.

Delaying the plant cooldown until phase 2 supports the FLEX coping strategies in 3 ways: (1) extends the time in which initial CST inventory is available, thereby delaying the time before which CST makeup is required; (2) allows for a controlled plant cooldown using SDTAs supplemented with FLEX equipment and existing plant procedures; and (3) ensuring 480V AC is available to close the Safety Injection (SI) Accumulator isolation valves to prevent injecting nitrogen as the RCS depressurizes. The SDTAs at PTN are supported by a backup nitrogen system. The backup nitrogen system is capable of supplying nitrogen to the SDTAs for both units for a minimum of 2 hours (Ref. 7). If the nitrogen for SDTA operation is depleted prior to access to additional phase 2 nitrogen replacement bottles or is unavailable as a result of the BDBEE, then plant pressure and temperature will be maintained using the MSSVs. For this reason, the use of the MSSVs is the credited strategy for maintaining plant pressure and temperature during phase 1. The MSSVs will maintain RCS temperature close to normal no-load values, which in turn eliminates the need for Pressurizer PORVs or safety reliefs to operate. The plant may be cooled down as soon as CST makeup has been established and phase 2 equipment is in place to permit local SDTA operations.

Safety Function: Maintain Core Cooling & Heat Removal

PWR Installed Equipment Phase 1

The Pressurized Water Reactor Owner's Group (PWROG) guidance given in WCAP-17601-P (Ref. 4) recommends cooling down the plant approximately 4-8 hours after the ELAP and LUHS event has occurred. This guidance does not consider CST inventory limitations which apply to PTN. One of the primary drivers in the WCAP for cooling down this early is to minimize RCS inventory loss due to RCP seal leakage. This issue is a larger concern for plants without "shutdown" (low leakage) RCP seal packages. PTN plans to install RCP low leakage seals which will reduce RCP seal leakage at normal operating pressure and temperature to a maximum of 1 gpm per RCP. Because of this, RCS inventory losses will not be as critical and the cooldown can be delayed. A site-specific evaluation will be performed once the seal design is completed to validate that the cooldown and depressurization time is supported. This is tracked as pending action number 9, Attachment 3.

(Modes 1 through 4, and Mode 5 with Steam Generators Available – Hurricane Scenario)

PTN has substantial defense-in-depth preparation plans for the hazards posed by hurricanes and tropical storms due to the plant's geographic location. PTN has procedural guidance to mitigate potential impacts due to such storms. Current severe weather plant procedures direct the operating crew to cool down the plant to Mode 4 or Mode 5 at least 2 hours prior to the arrival of hurricane force winds, as well as pre-stage small gas/diesel generators, gas/diesel powered dewatering pumps, and fill the major water tanks to maximum level (Ref. 13). Therefore, actions taken in response to hurricane events will be different from other events due to the state of the plant, the volume of water available, and limited access to plant areas due to high winds. For this reason, the strategy developed to cope with an ELAP and LUHS event initiated by a hurricane has different initial conditions and slightly different timelines compared to the other initiating events.

For hurricane events, only one CST is assumed to survive (Ref. 6, App. 5E) with the surviving CST filled to the nominal capacity per plant severe weather preparation procedures (Ref. 13). With the plants cooled down to Mode 5 in preparation for the hurricane, decay heat calculations (Ref. 25) show that the inventory from a single, filled CST will last for approximately 24 hours when providing the SG makeup needs of both units. The initial coping strategy for this scenario would be to feed the SGs using the AFW pumps and the surviving CST until phase 2 FLEX equipment becomes available. As part of the preparations for the hurricane, 0-ONOP-103.3 (Ref. 13), directs operators to establish a fixed steam demand in the turbine building and set the required flow rate to the SGs by positioning the AFW FCVs using their manual handwheels. This ensures that feed flow to the SGs is maintained regardless of any losses of power or instrument air which may be experienced because of the hurricane.

If the plant is cooled down to Mode 5 in preparation for the hurricane, the RHR system would be used for cooling when the ELAP and LUHS event occurred. Upon loss of RHR where the RCS is intact and at least 2 SGs are available, procedure 3/4-ONOP-050 (Ref. 15) directs the operator to establish SG makeup. The means of providing this makeup in the loss of RHR procedure specifies the use of either the standby steam generator feedwater pumps (SSGFP), condensate pumps or condensate transfer pumps. These pumps cannot be considered available following the ELAP and LUHS event. For this scenario, PTN would allow the RCS to heat back up until sufficient steam could be produced in the steam generators to operate the AFW pumps. Analyses and procedural guidance will be performed to support heat up from Mode 5. This is tracked as pending action 3, in Attachment 3. Alternatively, the SG FLEX pumps would be used when available. This is the strategy for all ELAP and LUHS events which occur while the plant is in Mode 5 with its SGs available.

Because the A and C AFW pumps' steam supply valves are DC powered and both trains of AFW have their own nitrogen bottles for flow control, remote operation and control of AFW could be maintained for at least 4 hours (2 hours on each train's nitrogen tanks) without any local manual actions required. This time will be increased significantly by:

1. Valving in the additional nitrogen bottles for each train prior to the event (i.e., if the plant intends to shut down to Mode 5 in preparation for a hurricane, then the procedures should direct the operators to open the valves for all nitrogen bottles).
2. Operating the AFW flow control valves in manual rather than in automatic. Operating experience has demonstrated that this method of operation typically results in a slower depletion of the nitrogen supply because less valve hunting occurs.

If additional nitrogen supplies are valved in prior to the event, remote operation of the AFW FCVs would be available for a minimum of 7 hours. Alternatively, the plant could open the AFW FCVs using the handwheels prior to landfall of the hurricane. SG level could then be controlled by the starting and stopping of the AFW pumps using their steam admission or trip and throttle valves which are DC valves powered off the station batteries. Both methods will be included in the procedural guidance to be developed for the FLEX scenarios.

(Mode 6 and Mode 5 without Steam Generators Available)

Several configurations for Mode 6 and Mode 5 without SGs available were considered in developing FLEX coping strategies. These configurations were: (1) RCS depressurized and sufficiently vented; (2) RCS filled and pressurized but not yet vented following an extended outage; (3) RCS filled and pressurized but not yet vented following a short maintenance outage; and (4) RCS depressurized and vented where the vent path(s) are insufficient to prevent pressurization following a loss of RHR. With the Steam Generators unavailable in Mode 5 and Mode 6, readily available sources of makeup to the RCS for core cooling are borated water in the accumulators and the RWST. Since FLEX equipment is not required to access this water, makeup to the RCS with either of the sources could begin early in phase 1. Manually opening the accumulator isolation valves would supply a significant volume of borated water to the RCS. Ensuring a large enough vent path in the RCS has been established will allow for gravity draining of the RWST into the RCS. If the RWST is used, gravity feed should begin in the first hour of the event to prevent pressurization that could impede flow. If pressure cannot be overcome by the head in the tank, then the accumulator isolation valves can be opened to provide the required cooling and makeup. Calculations will be completed to establish a definitive timeline for each option (pending action 7 of Attachment 3).

1. In the initial phase without the steam generators available and with the RCS sufficiently vented, manual action is required to provide makeup to the RCS via gravity feed from the Refueling Water Storage Tank (RWST). Each RWST contains a borated water inventory of a Technical Specifications minimum of 320,000 gallons (Ref.5, Section 3.5.4). Current plant design basis ensures that at least one RWST will survive the postulated ELAP and LUHS initiating event. A normally isolated cross connect line between the two RWSTs will allow the surviving RWST to supply borated makeup to either unit as required. Gravity feed is available with the RWST at Technical Specifications minimum level until the height of water in the RCS equals the height of water in the RWST and is accomplished via manual valve operation. This is currently accomplished at PTN by Procedure 3/4-ONOP-041.8 (Ref. 14). Given the assumed initial conditions of the plant in Modes 5 and 6 (shutdown for 72 hours) with the RCS adequately vented to prevent pressurization, the required makeup flow rate from the RWST is approximately 62 gpm (Ref. 26). A calculation has been performed which demonstrates that, even with gravity feed through the RWST cross connect valves (from opposite unit RWST), there is more than enough flow from the RWST to make up for boil off when reactor vessel level is low such that the core would not become uncovered during phase 1 (Ref. 26). This calculation assumed that the RCS was depressurized and was sufficiently vented to prevent re-pressurization upon loss of RHR. Boron concentration is not expected to reach the solubility limit in the reactor vessel in phase 1, such that increased flow is not required for boron flushing (Ref. 28). Actions to allow gravity feed from the RWST, or manual opening of the accumulator isolation valves as an alternative if available, will be the strategies credited for phase 1 for RCS inventory makeup. Such actions should be completed as soon as possible after the ELAP and LUHS event to provide RCS makeup. Once the RCS FLEX pump is available, it will be used to control flow such that adequate coolant level is maintained in the RCS.

Safety Function: Maintain Core Cooling & Heat Removal

PWR Installed Equipment Phase 1

2. With the RCS filled and pressurized but not yet vented following an extended outage, gravity drain from the RWST would not be possible. In this scenario, the decay heat in the core will be low (due to the extended outage and any new fuel which may have been loaded), the RCS will be filled, and the pressurizer will have some level in it such that RCS makeup would likely not be required in the initial coping phase. Manual opening of the accumulator isolation valves to the RCS will be the strategy credited for phase 1 for this plant configuration. Such actions should be completed as soon as possible after the ELAP and LUHS event to provide RCS makeup. Flow can be restored in phase 2 once the RCS FLEX pump or a Charging pump becomes available.

3. The more restrictive scenario of the RCS filled and pressurized but not yet vented following a short maintenance outage results in a higher decay heat rate than scenario 2 above. With the RCS filled and pressurized, a significant inventory must be boiled off before core uncovery would occur. Manual opening of the accumulator isolation valves to the RCS will be the strategy credited for phase 1 for this plant configuration. Subsequently, the top priority of all available personnel would be to establish makeup from the RWST via the RCS FLEX pump or Charging pump as outlined in phase 2. Such actions should be completed as soon as possible after the ELAP and LUHS event to provide RCS makeup. The guidance of NEI 12-06 (Ref. 1) states, "there may be short periods of time during Modes 5 and 6 where plant configuration may preclude use of this strategy" (i.e., the ability to provide borated makeup to the RCS may not be possible). Due to the infrequency of this plant configuration, the actions stipulated are considered adequate.

4. There is a short period of time following shutdown with the RCS depressurized and vented where the vent path(s) are insufficient to prevent pressurization following a loss of RHR (Ref. 15). This period of time depends on the time after shutdown and the size of the vent path in use. In this scenario cooling of the RCS can be accomplished by having sufficient inventory and level in the SG's. Manual opening of the Accumulator isolation valves or RWST gravity feed will be the credits strategies to provide the inventory need. The SG's are normally in wet layup so that a heat sink is available. Procedural guidance will be provided to ensure that is the case in this condition or an adequate vent path will be provided. Due to the infrequency of this plant configuration, the actions stipulated are considered adequate.

<table>
<tr><th colspan="2">Safety Function: Maintain Core Cooling & Heat Removal

PWR Installed Equipment Phase 1</th></tr>
<tr><th colspan="2">Details:</th></tr>
<tr><td>Provide a brief description of Procedures / Strategies / Guidelines</td><td>Procedural guidance will be revised and/or created to support implementation of these strategies. PWROG recommended procedure changes as well as the new draft FLEX guidelines will be used to inform the procedure changes.

Existing plant procedures:
0-ONOP-103.3, Severe Weather Preparations. - Modes 1-4, for CAT 5 hurricane, cooldown (CD) to mode 5, throttles AFW Train 1 FCV(s) prior to the event to maintain RCS at 300F using "A" AFW Pp and natural circulation IF RHR is lost. Maximizes RCS inventory by performing CD with PZR level at 90%. Mode 5 CAT 5 hurricane with no SGs: Directs immediate actions to restore SG and RCS integrity, THEN fill and vent RCS simultaneously fill SGs
EPIP-20101, Duties and Responsibilities of the Emergency Coordinator - provides guidance on unit shutdown based on hurricane severity
3/4-EOP-E-0, Reactor Trip or Safety Injection – provides actions to verify proper response of systems following an automatic or manual reactor trip. Plant conditions are assessed to determine the appropriate recovery procedure
3/4-EOP-ECA-0.0, Loss of All AC Power – provides actions to respond to loss of all AC power and perform a natural circulation cooldown
3/4-ONOP-004, Loss of Offsite Power - provides actions to respond to loss of all AC power when EOP(s) are not in effect
3/4-ONOP-305, Natural Circulation Cooldown provides actions to perform a natural circulation CD when EOP(s) not in effect
3/4-ONOP-041.8, Shutdown LOCA (Mode 5 or 6) - Provides actions to maintain core cooling using RWST gravity fill with no RHR cooling and no SGs. Provides RCS vent requirements and restoration of at least two SGs to maintain RWST gravity fill</td></tr>
</table>

	To be developed: • FSG - Inspect & Determine Condition of Plant SSC(s) • FSG - ELAP DC Load Shedding & Periodic Channel Checks • FSG – Heatup from Mode 5 to restore cooling from AFW pumps • FSG – Establishing flow from RWST or Accumulators in Modes 5 and 6
Identify modifications	• Install RCP shutdown seals capable of providing negligible leakage during phase 1 FLEX response.
Key Reactor Parameters	• AFW pump flow • CST level • Steam generator water level (narrow range) • Steam generator pressure • Reactor coolant system pressure (wide range) • Reactor coolant system pressurizer level • Reactor coolant system hot and cold leg temperatures • Core exit thermocouples • Reactor vessel level • Neutron flux

Notes:

1. Analyses and procedural guidance will be performed to support heat up from Mode 5 to restore AFW function. This is tracked as pending action 3 in Attachment 3.

2. The generic WCAP guidance recommends that a site-specific evaluation be performed once the RCP low leakage seal design is completed to validate that the cooldown and depressurization time is supported. This is tracked as pending action number 9 in Attachment 3.

Safety Function: Maintain Core Cooling & Heat Removal PWR Portable Equipment Phase 2
Intermediate Term (Phase 2) Coping Strategy
(Modes 1 through 4, and Mode 5 with Steam Generators Available – Non-Hurricane Scenario) Several actions are required during phase 2 following the event for reactor core cooling. The main strategy is dependent upon the continual operation of the AFW pumps, which are only capable of feeding the steam generators as long as there is sufficient steam pressure to drive the AFW pump turbines. The new well pumps will be used to refill the surviving CST(s) for the duration of the phase 2 coping time. Each well pump will be capable of supplying 600 gpm to ensure that the inventory requirements in phase 2 will be met based on WCAP-17601-P (Ref.4). Per guidance of NEI 12-06, phase 2 also requires a baseline capability for reactor core cooling to connect an onsite, portable pump (SG FLEX pump) for injection into the steam generators in the event that the AFW pumps fail or when sufficient steam pressure is no longer available to drive the turbines. The method to implement this capability is to depressurize the steam generators to allow for makeup with the portable diesel driven FLEX pumps. To achieve the baseline capability of providing a portable pump for the phase 2 strategy of core cooling, deployment of the portable pump will be completed so that they are available for operation 13 hours following the event to coincide with the SG depressurization. A single CST is capable of providing a minimum of 12 hours of water for steam generator injection (applicable to AFW or SG FLEX pump injection to both units). Prior to depletion, the CSTs will be provided makeup from the wells. Therefore, well water will be the ultimate method of maintaining inventory for SG injection until phase 3 equipment is available. This source of "non-nuclear grade" water was evaluated to ensure the effects of the well water chemistry, over the time it would be used, would not make SG heat transfer unacceptable (Ref. 27). At 12 hours following the event, the decay heat calculation shows that the flow rate required to remove decay heat is equal to 98.1 gpm (Ref.25). To remove sensible heat from the RCS using a 75°F per hour cooldown rate requires approximately 325 gpm per unit of additional feed. This cool down will not be started until makeup to the CST is available and local nitrogen bottles and manual loaders are available for SDTA operation. The capacity of the well pumps and SG FLEX pumps will be 300 gpm per unit which was based on the recommendations of WCAP-17601-P (Ref. 4). The cooldown rate and time will be monitored and adjusted to ensure that sufficient volume is maintained in the CST. Depressurization of the steam generators will require deploying nuclear plant operators (NPOs) to locally complete this

activity. The NPOs will depressurize the steam generators via the SDTAs to a pressure of approximately 170 psig (Ref. 12).

To meet the recommendation of WCAP-17601-P (Ref. 4), the portable pump designated for steam generator injection, or SG FLEX pump, must be rated for a minimum flow rate of 300 gpm at a discharge pressure equal to the steam generator pressure in addition to any line losses associated with its connecting equipment (300 psig per the WCAP). For injection using the SG FLEX pump, the pump would normally be staged at a location near the CST. The normal supply for the SG FLEX pump is the CSTs (note that this strategy assumes that the AFW pumps are no longer available and therefore supplying water makeup from the CSTs to the SG FLEX pump is acceptable).

At the end of phase 2, it is expected that either one of the AFW pumps or the SG FLEX pump will be in operation with suction from the surviving CST and injection to the steam generators. The well pumps will maintain CST level. The SG FLEX pump requires a higher discharge pressure than the well pump due to operating pressure of the steam generators.

(Modes 1 through 4, and Mode 5 with Steam Generators Available – Hurricane Scenario)

The coping strategy for a hurricane induced ELAP and LUHS event would be to: shutdown and cooldown prior to hurricane landfall; fill both CSTs to maximum level (prior to landfall); lock in the steam supply for the AFW FCVs (prior to landfall); after landfall and after high winds have subsided to allow full plant access, manually operate the AFW FCVs as necessary; establish CST makeup from the well; and establish a secondary SG injection path (SGWLU). As long as current plant procedures to cool down to Mode 4 or Mode 5 a minimum 2 hours prior to hurricane force winds are maintained, the inventory of a single CST will be sufficient to cope with an ELAP/LUHS event for approximately 24 hours, at which point AC power, CST makeup, secondary SG makeup, RCS makeup, and SFP makeup will have been established (Ref.25).

Modes 5 and 6 without Steam Generators Available

The primary method for making up for the boil off from the RCS in Modes 5 and 6 is repowering the Charging pump from the FLEX DG to supply water from the surviving RWST. The alternate method is to use the RCS FLEX pump to inject water from the RWST to the RCS. Suction for the RCS FLEX pump would come from a connection in the RWST manway and its discharge would be to the drain valve off the Charging pump drain line. Additional inventory (if necessary) from the accumulators could also be made available by repowering the isolation valves from the FLEX DG as described in the Modes 1-4 phase 2 strategy above (assuming the accumulators were not vented for maintenance). If additional RCS makeup beyond what is

Safety Function: Maintain Core Cooling & Heat Removal PWR Portable Equipment Phase 2	
available in the RWST is required (e.g., due to inventory losses other than boil off like containment spray), then use of makeup water from the wells can be provided via hoses to the Boric Acid Batching Tank. This will prevent the need to inject non-borated water into the RCS, which could challenge shutdown reactivity.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedural guidance will be revised and/or created to support implementation of this strategy. Existing plant procedures: • 3/4-ONOP-041.8, Shutdown LOCA (Mode 5 or 6) - Provides actions to maintain core cooling using RWST gravity fill with no RHR cooling and no SGs. Provides RCS vent requirements and restoration of at least two SGs to maintain RWST gravity fill To be developed: • FSG - Deploy Phase 2 Flex Pumps (CST make-up, SG inject, SFP, RCS) • FSG – Deploy air compressor and tie-in for AFW flow control valves to restore remote operation • FSG - Restore SG function • FSG - Restore Core Cooling Function
Identify modifications	• Provide secure storage for SDTA nitrogen bottles and manual loaders and provide additional manual loaders • Install Isolation Valve and Hose Connections on previously capped connection off AFW Suction Header Lines for Each Condensate Storage Tank (CST). • Replace Existing CST Manhole Covers With

Safety Function: Maintain Core Cooling & Heat Removal PWR Portable Equipment Phase 2	
	Modified Manhole Covers That Include Isolation Valves and Hose Connections. • Install Isolation Valve and Hose Connection at Abandoned Level Transmitter Locations to Allow Fill of CST • Install isolation valve and hose connections at the Steam Generator Wet Layup (SGWLU) spectacle flanges for each individual SG. • Electrical Power – provide connections for 480 V portable diesel generators. Attachment 4 provides additional details.
Key Reactor Parameters	Installed instrumentation • AFW pump flow • CST level • Steam generator water level (narrow range) • Steam generator pressure • Reactor coolant system pressure (wide range) • Reactor coolant system pressurizer level • Reactor coolant system hot and cold leg temperatures • Core exit thermocouples • Reactor vessel level • Neutron flux Portable equipment instrumentation • Pressure and flow for well pumps • Pressure, flow and fuel for FLEX SG pumps • Voltage, current, and fuel for FLEX diesel generators providing power to well pumps

Safety Function: Maintain Core Cooling & Heat Removal PWR Portable Equipment Phase 2	
Storage / Protection of Equipment : **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include seismic considerations. Temporary strategic locations will be used until building construction completion.
Flooding	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include flooding considerations. Temporary strategic locations will be used until building construction completion. (Note: if stored below current flood level, procedures will address the move equipment prior to exceeding flood level).
Severe Storms with High Winds	The storage facility will be constructed in accordance with the NEI 12-06 guidelines, which include severe wind and wind driven missile considerations. Temporary strategic locations will be used until building construction completion.
High Temperatures	The climate at PTN is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 100°F which is below the threshold or 110° F discussed in NEI 12-06 guidance. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability. Storage of FLEX equipment in the FLEX Equipment Storage Building (FESB) will include ventilation to maintain temperatures within the manufacturer's recommendations.

Safety Function: Maintain Core Cooling & Heat Removal PWR Portable Equipment Phase 2		
Deployment Conceptual Design **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and protected from the applicable hazards.
Notes: 1. Fuel consumption analysis is pending for all temporary equipment. This will be completed as part of the equipment order and develop of the procedures for their use. This is tracked as pending action 5 in Attachment 3.		

Safety Function: Maintain Core Cooling & Heat Removal
PWR Portable Equipment Phase 3

Modes 1 through 5 with Steam Generators Available

Based on WCAP-17601-P (Ref. 4, page 5-2), reactor decay heat will sustain AFW operation for at least 5 days after shutdown. Use of the SG FLEX pump will provide a backup to the AFW pumps in case of unavailability and can extend the use of the SGs beyond 5 days for decay heat removal if necessary. Long term core cooling would be provided by recovering the RHR and Component Cooling Water (CCW) systems.

All Modes

The primary phase 3 strategy requires portable diesel powered pumps capable of removing heat from the reactor core in addition to other loads, including the SFP. The flow paths for decay heat removal are to utilize piping in the RHR system and CCW system. The RHR system would require repowering the RHR pump via an offsite diesel generator to establish circulation in the RCS. Heat removal would be through the RHR heat exchangers which are cooled by establishing flow through the CCW system. The CCW pumps are also powered by the offsite diesel generator. The CCW heat exchangers would transfer the heat from this and other loads to canal water which is supplied by a pump provided by the RRC. The CCW system can provide cooling to not only the RHR heat exchangers but the SFP heat exchangers, the RHR pump seal coolers, and the Emergency Containment Coolers (ECCs) as well. The pump would be sized to provide the flow required to remove all decay heat from irradiated fuel located in the reactor cores and SFPs as well as the heat that has been rejected to the containment atmosphere. The pump would connect to the existing Intake Cooling Water (ICW) piping at the basket strainer flush piping. Valves in the ICW system will be aligned to maximize pump flow to the operating CCW/ICW heat exchanger(s).

Safety Function: Maintain Core Cooling & Heat Removal	
PWR Portable Equipment Phase 3	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedural guidance will be revised and/or created to support implementation of these strategies. PWROG recommended procedure changes as well as the new draft FLEX guidelines will be used to inform the procedure changes. Existing plant procedures: • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response • To be developed: • FSG - Restore 4160V power in FLEX Phase 3 • FSG - Transition FLEX Phase 2 to FLEX Phase 3 • FSG - Transition FLEX Phase 3 to EOP(s)
Identify modifications	• Electrical Power – provide connections for 4160 V portable diesel generators. • Install isolation valve and hose connections in intake cooling water system in strainer back flush piping. See Attachment 4 for details.

<table>
<tr><th colspan="2">Safety Function: Maintain Core Cooling & Heat Removal</th></tr>
<tr><th colspan="2">PWR Portable Equipment Phase 3</th></tr>
<tr><td></td><td></td></tr>
<tr><td>Key Reactor Parameters</td><td>Installed instrumentation:

• AFW pump flow
• CST level
• Steam generator water level (narrow range)
• Steam generator pressure
• Reactor coolant system pressure (wide range)
• Reactor coolant system pressurizer level
• Reactor coolant system hot and cold leg temperatures
• Core exit thermocouples
• Reactor vessel level
• Neutron flux

Portable equipment instrumentation:
• Pressure, flow, and fuel for the RRC-provided cooling pumps.
• Voltage, current, and fuel for 4160 V FLEX diesel generators.</td></tr>
</table>

Deployment Conceptual Design (Attachment 4 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the phase 3 equipment will be the same as the phase 2 equipment in the protected area. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and protected from the applicable hazards.
Notes: 1. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed. This is being tracked as pending action 6 in Attachment 3.		

Safety Function: Maintain RCS Inventory Control PWR Installed Equipment Phase 1	
Determine Baseline coping capability with installed coping 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**	
Modes 1 through 5 with Steam Generators Available In order to maintain sufficient reactor coolant inventory, an evaluation of BDBEEs resulting in an ELAP and LUHS has concluded that PTN will maintain sufficient RCS inventory for greater than 120 hours following event initiation with no reliance on onsite or offsite FLEX equipment (Ref. 2). This analysis was based on the proposed safe shutdown/low leakage reactor coolant pump (RCP) seal modification (with total RCS leakage of 4 gpm – 1 gpm seal leakage from each of 3 reactor coolant pumps plus 1 gpm from unidentified RCS sources – Ref. 4, Table 4.1.1.1-2) and the availability of the accumulators. Thus, reactor coolant makeup strategies are not required until phase 2. *(Modes 6 and 5 without Steam Generators Available)* The primary method for making up for the boil-off from the RCS in modes 5 and 6 without steam generators available is gravity feeding from the surviving RWST (Ref. 11, 12, 13, and 14) or discharging the accumulators as described in phase 1 Core Cooling.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • 3/4-EOP-ECA-0.0, Loss of All AC Power – provides actions to respond to loss of all AC power and perform a natural circulation cooldown. To be developed: • FSG - Inspect & Determine Condition of Plant SSC(s). • FSG - Maintain RCS & SG Conditions

Safety Function: Maintain RCS Inventory Control PWR Installed Equipment Phase 1	
Identify modifications	• Install RCP shutdown seals capable of providing minimal leakage during phase 1 FLEX response. Installation of low leakage RCP seals to decrease seal leakage and increase the time to core uncovery.
Key Reactor Parameters	• Reactor coolant system pressure (wide range) • Reactor coolant system pressurizer level • Reactor coolant system hot and cold leg temperatures • Core exit thermocouples • Reactor vessel level • Neutron flux • Containment temperature

Safety Function: Maintain RCS Inventory Control PWR Portable Equipment Phase 2
<u>Modes 1 through 5 with Steam Generators Available</u> For RCS inventory control and long term sub-criticality in phase 2, the credited action will be to cooldown and depressurize the RCS for injection of boron and coolant inventory from the accumulators. This will be done after make-up has been established to the CST's. Depressurizing the RCS to inject the accumulators occurs when the steam generators are depressurized to 170 psig per EOP-ECA-0.0 (Ref. 12). The heat removed by depressurizing the steam generators also cools and depressurizes the RCS. The primary method for accomplishing RCS makeup in phase 2 is the use of the accumulators to make up for losses from the RCP Low Leakage Seals and for contraction of the primary due to cooldown. Alternate strategies involve the use of Boric Acid Storage Tank (BAST) or RWST inventories through installed Charging and Boric Acid Transfer pumps or onsite portable RCS FLEX pump. Following injection of sufficient accumulator volume, the accumulators are isolated to avoid nitrogen injection into the RCS. Per (Ref. 12), accumulator isolation must occur prior to depressurizing below 80 psig. This isolation is done by repowering the 480V AC accumulator isolation valves (MOV-865A, MOV-865B, and MOV-865C) using the FLEX Diesel Generator (DG). These valves also have their breakers at their associated MCCs locked open during normal operations. These breakers would need to be closed after power is restored to the MCCs. The restoration of power to the accumulator isolation valves should be done prior to plant cooldown if possible to mitigate the potential for nitrogen injection into the RCS. This is a basis for delaying the cooldown and depressurization until phase 2 because 480V AC power would not be available until the FLEX DG is operational. The other method of stopping accumulator injection, the accumulator vents, is air operated. Instrument air is assumed to not survive the event. Delaying the cooldown allows for additional support personnel being available to assist with the cooldown evolution and also extends available CST inventory by only removing decay heat and not sensible heat. Due to the low leakage RCP seals associated with the Phase 1 core cooling strategy, it is not expected that additional makeup beyond that of the accumulators will be required for the RCS until phase 3. However, per Technical Specifications (Ref. 5), 21,750 gallons (for 5245 ppm boric acid, 13,750 gallons for 6993 ppm boric acid) of highly borated water is available between the 3 BASTs with both units operating and 13,775 gallons (for 5245 ppm boric acid, 9,775 gallons for 6993 ppm boric acid) with a single unit operating. The Technical Specification minimum of 320,000 gallons of borated water inventory will remain available in the surviving RWST for RCS injection into both units as needed. The method of injecting this water into the RCS would either be to repower a Charging pump and Boric Acid Transfer pump from the FLEX DG or to connect the RCS FLEX pump to allow pumping of RWST water into the RCS. Operation of the Charging pump must be done at full speed because cooling to the hydraulic coupling oil cooler from CCW is not available (Ref.21). Suction for the RCS FLEX pump would come from a connection in the RWST manway and its discharge would be to the drain lines off each Charging pump's discharge.

Safety Function: Maintain RCS Inventory Control PWR Portable Equipment Phase 2	
The methods for injecting borated water into the RCS will also provide sufficient negative reactivity to ensure that shutdown margin is maintained following cooldown and xenon decay. Injection for reactivity control is required at approximately 21 hours to ensure adequate boric acid concentration is provided to the RCS (Ref. 23). The primary method for reactivity control in phase 2 is the use of the accumulators and BAST. The alternate strategy involves the use of RWST inventory through the onsite portable RCS FLEX pump. _(Modes 6 and 5 without Steam Generators Available)_ The primary method for making up for the boil-off from the RCS in modes 5 and 6 without steam generators available is gravity feeding from the surviving RWST (Ref. 11, 12, 13, and 14) or discharging the accumulators as described in phase 1 Core Cooling. Additional inventory or flow may be provided by re-powering the charging pump from the FLEX DG to supply water from the surviving RWST. The alternate method is to use the RCS FLEX pump to inject water from the RWST to the RCS. Suction for the RCS FLEX pump would come from a connection in the RWST manway and its discharge would be to the drain valve off the charging pump drain line.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • 3/4-EOP-ECA-0.0, Loss of All AC Power – provides actions to respond to loss of all AC power and perform a natural circulation cooldown. • 3/4-ONOP-004, Loss of Offsite Power - provides actions to respond to loss of all AC power when EOP(s) are not in effect. • 3/4-ONOP-305, Natural Circulation Cooldown provides actions to perform a natural circulation CD when EOP(s) not in effect. • 3/4-ONOP-041.8, Shutdown LOCA (Mode 5 or 6) - Provides actions to maintain core cooling using RWST gravity fill with no RHR cooling and no SGs. Provides RCS vent requirements and restoration of at least two SGs to maintain RWST gravity fill.

Safety Function: Maintain RCS Inventory Control PWR Portable Equipment Phase 2	
	To be developed: • FSG - Deploy Phase 2 Flex Pumps (CST make-up, SG injection, SFP make-up, RCS injection) • FSG - Restore SG function • FSG - Restore Core Cooling Function • FSG - Restore SFP Cooling Function • FSG - Restore 480V power • FSG - FLEX Borate RCS to CSD Concentration • FSG - Time Critical Action - Modify EOP Guidance for Natural Circ Cooldown to Inject Accumulators
Identify modifications	• Electrical Power – provide connections for 480 V portable diesel generators (power boric acid transfer pumps and charging pumps for this strategy) • Install isolation valve and hose connections in Refueling Water Storage Tank (RWST) Manhole covers. See Attachment 4 for details
Key Reactor Parameters	Installed instrumentation • Accumulator Tank Level • Pressurizer Pressure • Steam Generator Pressure • Reactor Vessel Level Indicating System • RCS WR T hot • RCS WR T cold • Reactor Vessel Level Indicating System • Pressurizer Level • RWST Level Portable equipment instrumentation • Pressure, flow, and fuel for well pumps and FLEX RCS pumps • Voltage, current, and fuel for FLEX DG

Safety Function: Maintain RCS Inventory Control PWR Portable Equipment Phase 2	
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include seismic considerations. Temporary strategic locations will be used until building construction completion.
Flooding	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include flooding considerations. Temporary strategic locations will be used until building construction completion. (Note: if stored below current flood level, procedures will address the move equipment prior to exceeding flood level).
Severe Storms with High Winds	The storage facility will be constructed in accordance with the NEI 12-06 guidelines, which include severe wind and wind driven missile considerations. Temporary strategic locations will be used until building construction completion.
High Temperatures	The climate at PTN is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 100°F which is below the threshold or 110° F discussed in NEI 12-06 guidance. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability. Storage of FLEX equipment in the FESB will include natural ventilation to maintain temperatures within the manufacturer's recommendations.

Deployment Conceptual Modification (Attachment 4 contains Conceptual Sketches)		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the phase 3 equipment will be the same as the phase 2 equipment in the protected area. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and be protected from the site applicable hazards.

Safety Function: Maintain RCS Inventory Control PWR Portable Equipment Phase 3	
The primary phase 3 strategy requires an offsite pump and pumping system capable of removing heat from the reactor core in addition to other loads, including the SFP. Ideal flow paths for decay heat removal are to utilize piping in the RHR system and Component Cooling Water (CCW) system. The RHR system would require re-powering the RHR pump via an offsite diesel generator to establish circulation in the RCS. Heat removal would be through the RHR heat exchangers. The RHR heat exchangers are cooled by establishing flow through the CCW system (also powered by the offsite diesel generator). The CCW heat exchangers would transfer the heat from this and other loads to the canals with canal water provided by a pump from the RRC. The CCW system can provide cooling to not only the RHR heat exchangers but the SFP heat exchangers, the RHR pump seal coolers, and the Emergency Containment Coolers (ECCs) as well. The offsite pump would be sized to provide the flow required to remove all decay heat from irradiated fuel located in the reactor cores and SFPs as well as the heat that has been rejected to the containment atmosphere. For RCS injection in phase 3, boron mixing equipment will be brought in. The water will be processed by offsite water purification and demineralizing plant provided by the RRC prior to boric acid batching and subsequent injection into the RCS.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response To be developed: • FSG - Transition FLEX Phase 2 to FLEX Phase 3 • FSG – Provide makeup using RCC Boric Acid Batching Equipment • FSG - Transition FLEX Phase 3 to EOP(s)
Identify modifications	• Modifications for Core Cooling and phase 2 RCS Inventory Control will be used in this phase. No additional modifications are required.
Key Reactor Parameters	• Pressurizer Level • Reactor Vessel Level Indication System • RWST Level

Safety Function: Maintain RCS Inventory Control PWR Portable Equipment Phase 3		
Deployment Conceptual Modification **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the phase 3 equipment will be the same as the phase 2 equipment. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and be protected from the site applicable hazards.

Safety Function: Maintain Containment Pressure Control/Heat Removal PWR Installed Equipment Phase 1	
Determine Baseline coping capability with installed coping modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:	
The containment design pressure is 55 psig and the design temperature limit for the containment atmosphere is 283°F (Ref. 6). Analysis has been completed and it has been determined that containment response following a postulated ELAP and LUHS event not exceed design parameters (Ref. 31). As such, there are no coping strategies required for maintaining containment integrity during phase 1 in Modes 1-4. The only action necessary is to monitor containment pressure and temperature to ensure that RCS leakage is minimal. These monitoring parameters will be available via normal plant instrumentation. In Modes 5-6, containment temperature and pressure could be challenged. See phase 2 for additional discussion.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • 3/4-EOP-ECA-0.0, Loss of All AC Power • 3/4-ONOP-305, Natural Circulation Cooldown provides actions to perform a natural circulation CD when EOP(s) not in effect. • 3/4-NOP-057,Containment Normal Ventilation and Cooling System To be developed: • None
Identify modifications	• No modifications other than the RCP low leakage seals are required to meet phase 1 requirements.
Key Containment Parameters	• Containment pressure • Containment temperature

Safety Function: Maintain Containment Pressure Control/Heat Removal PWR Installed Equipment Phase 1	

Notes:

1. A confirmatory analysis is needed and will be performed for the containment temperature and pressure responses throughout all phases of the event. This is tracked as pending action 1 in Attachment 3.

Safety Function: Maintain Containment Pressure Control/Heat Removal

PWR Portable Equipment Phase 2

Containment Integrity

Typical containment analyses for pressurized water reactors (PWRs) with shutdown RCP seals indicate that containment temperature and pressure will not be challenged during phase 2 FLEX timeline so long as decay heat removal is maintained. As such, the primary strategy for containment integrity in phase 2 is to monitor containment temperature and pressure and maintain decay heat removal.

In Modes 6 and 5 without steam generators available, temperature and pressure increases may challenge containment integrity (Ref. 31). Therefore, the phase 2 coping strategy will be to commence containment spray (CS) to reduce temperature and pressure to acceptable levels. The means of commencing containment spray would be by restoration of power to the CS pumps. The CS pumps are 200 horsepower, 480V AC pumps capable of supplying up to 1340 gpm against 50 psig in containment, approximately 458 feet developed head (Ref. 11).

The power requirements of the pump are within the capacity of the 600 kW FLEX DG proposed for phase 2 (though stopping of other loads on the FLEX DG may be required prior to the starting of this pump). The pump suction can be aligned to either RWST if needed. Use of RWST water for containment spray may require replenishment from a non-nuclear source of water (e.g., well water, intake water) before the completion of phase 2 if one of the units was in Mode 6 or in Mode 5 without SG available when the ELAP and LUHS event occurs.

Safety Function: Maintain Containment Pressure Control/Heat Removal PWR Portable Equipment Phase 2	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Procedural guidance will be revised and/or created to support implementation of these strategies. PWROG recommended procedure changes as well as the new draft FLEX guidelines will be used to inform the procedure changes. Existing: • 3/4-EOP-ECA-0.0, Loss of All AC Power • 3/4-ONOP-305, Natural Circulation Cooldown provides actions to perform a natural circulation CD when EOP(s) not in effect. • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response • 3/4-NOP-Component Cooling Water System • 3/4-NOP-Intake Cooling Water System • 3/4-NOP-057, Normal Containment Coolers To be developed: • FSG - Restore 480V power • FSG - Inspect Containment SSCs & Support Systems • FSG – Use Containment Spray Pumps to maintain Containment Temperature and Pressure
Identify modifications	• Electrical Power – provide connections for 480 V portable diesel generators (repower containment spray pumps for this strategy) See Attachment 4 for details

Safety Function: Maintain Containment Pressure Control/Heat Removal **PWR Portable Equipment Phase 2**	
Key Containment Parameters	Installed equipment • Containment pressure • Containment temperature Portable equipment • Voltage, current, and fuel for FLEX diesel generators providing power to the spray pumps

Storage / Protection of Equipment: Describe storage / protection plan or schedule to determine storage requirements	
Seismic	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include seismic considerations. Temporary strategic locations will be used until building construction completion.
Flooding	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include flooding considerations. Temporary strategic locations will be used until building construction completion. (Note: if stored below current flood level, procedures will address the move equipment prior to exceeding flood level).
Severe Storms with High Winds	The storage facility will be constructed in accordance with the NEI 12-06 guidelines, which include severe wind and wind driven missile considerations. Temporary strategic locations will be used until building construction completion.
High Temperatures	The climate at PTN is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 100°F which is below the threshold or 110° F discussed in NEI 12-06 guidance. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability. Storage of FLEX equipment in the FESB will include natural ventilation to maintain temperatures within the manufacturer's recommendations.

Safety Function: Maintain Containment Pressure Control/Heat Removal PWR Portable Equipment Phase 2		
Deployment Conceptual Modification **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and be protected from the site applicable hazards.
Notes: 1. A confirmatory analysis is needed and will be performed for the containment temperature and pressure responses throughout all phases of the event. This is tracked as pending action 1 in Attachment 3.		

Safety Function: Maintain Containment Pressure Control/Heat Removal PWR Portable Equipment Phase 3	
The strategy for containment integrity is to repower emergency containment cooling fans and restore component cooling water flow to the ECC heat exchangers from the RRC diesel generators. Cooling water flow through the containment coolers will be provided by repowering the CCW pumps from the RRC 4160 V diesel generator. Heat will be removed from the CCW system by portable diesel powered pumps from the RRC connected to the ICW / CCW heat exchangers.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • 3/4-EOP-ECA-0.0, Loss of All AC Power – provides actions to respond to loss of all AC power and perform a natural circulation cooldown. • 3/4-ONOP-004, Loss of Offsite Power - provides actions to respond to loss of all AC power when EOP(s) are not in effect. • 3/4-ONOP-305, Natural Circulation Cooldown provides actions to perform a natural circulation CD when EOP(s) not in effect. • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response • 3/4-NOP-Component Cooling Water System • 3/4-NOP-Intake Cooling Water System To be developed: • FSG - Restore 4160V power in FLEX Phase 3 • FSG - Restore Ultimate Heat Sink Function • FSG - Restore Containment Cooling Function • FSG - Transition FLEX Phase 2 to FLEX Phase 3 • FSG - Transition FLEX Phase 3 to EOP(s)

Safety Function: Maintain Containment Pressure Control/Heat Removal **PWR Portable Equipment Phase 3**	
Identify modifications	• Electrical Power – provide connections for 4160 V portable diesel generators. • Install isolation valve and hose connections in intake cooling water system in strainer back flush piping. See Attachment 4 for details.
Key Containment Parameters	Installed equipment • Containment pressure • Containment temperature Portable equipment • Voltage, current and fuel for FLEX diesel generators providing power to 4160 V busses

Deployment Conceptual Modification **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the phase 3 equipment will be the same as phase 2 in the protected area. A determination of the "drop off" location from the RRC is pending. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and be protected from the site applicable hazards.

Safety Function: Maintain Spent Fuel Pool Cooling PWR Installed Equipment Phase 1
Determine Baseline coping capability with installed coping modifications not including FLEX modifications, utilizing methods described in Table 3-2 of NEI 12-06:
The initial phase of the FLEX SFP cooling strategy is reliant upon onsite personnel actions. The timing for these actions is dependent on SFP conditions at the time of the ELAP and LUHS event. Actions would need to be taken very early in the event if an emergency full core discharge (worst case design basis heat load) had just taken place. If the plant is late in the cycle, then these actions can be delayed. Therefore, the phase 2 strategy is listed under phase 1 discussion because actions may be initiated early for the worst case design basis heat load in the SFP. Onsite personnel actions include propping open doors to the spent fuel pool room and running hoses and spray monitors for portable makeup or spray from the SFP FLEX pump staging area. Propping open these doors provides a ventilation pathway to maintain room habitability by venting steam created by pool boil off in addition to a pathway for laying hoses. Using the design basis heat load and worst case fuel offload timing, the pool will start boiling at 2.7 hours after cooling is lost (Ref. 25). The 2.7 hours occurs only for the case of an emergency core offload, in which case core cooling and containment integrity should not be required functions for that unit. Prior to boiling in the pool (i.e., before 2.7 hours for the emergency offload), SFP makeup and spray hoses should be connected and run outside of the refueling building through the propped open door. This would preclude the need to re-enter the refueling floor after boiling has occurred, when environmental conditions may prevent access. Remaining hose runs from the SFP hose pumps to the refuel floor door may be connected later as resources become available. In the event that access to the refuel floor is not available, makeup to the SFP can be established using the alternate means (hose connection to SFP system in the SFP pump room). It is recognized that following an emergency core offload, that there would be few things of higher priority for that unit than restoring cooling / makeup to the SFP. However, given that fuel in the SFP would not become uncovered until 33 hours after the event (Ref. 25), and the availability to provide makeup to the SFP without entering the SFP deck, actions to provide ventilation and makeup to the SFP may be postponed such that resources can be focused on the other unit and it's time critical actions. These actions may also be precluded by environmental effects resulting from the ELAP and

Safety Function: Maintain Spent Fuel Pool Cooling PWR Installed Equipment Phase 1
LUHS event (e.g., sustained high winds from a hurricane). In which case, these actions should be performed as soon as is safe and in accordance with the above, not-to-interfere strategy. Should this delay preclude access to the refuel floor, the alternate makeup strategy via the SFP system would remain available to maintain level in the SFP. The SFP Cooling strategy will require makeup or spray via hoses from a portable pump that will take suction from the intake canal. Early positioning of equipment for the transition phase of the SFP cooling strategy consists of deploying separate hoses for hose makeup and hose spray. The hose can either be laid to discharge directly into the pool, or hooked up to a hose connection at the discharge of a SFP cooling pumps in the adjacent room. The spray makeup strategy also consists of early deployment of separate hoses for each SFP. Therefore, based on the need in the transition phase, personnel may choose makeup or spray and simply connect the necessary hose to the SFP FLEX pump(s). Should the refueling floor not be accessible, then the alternate tie-in location described in phase 2 would be used. Using the design basis heat load and worst case fuel offload timing, the pool will start boiling at 2.7 hours after cooling is lost (Ref. 25). A minimum of 99 gpm makeup will be required (Ref. 25) for the makeup strategy and at least 250 gpm of spray will be required for the spray strategy (Ref. 1). The minimum flow rate for the SFP FLEX pump is 250 gpm to each unit's pool in the event of leaks to both pools. Borated water is not required to maintain sub-criticality.

Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response • 3/4-NOP-Spent Fuel Pit (SFP) Cooling • 3/4-ONOP-Spent Fuel Pit Cooling System Malfunction To be developed: • FSG - Inspect SFP SSCs • FSG - Restore SFP Cooling Function

Safety Function: Maintain Spent Fuel Pool Cooling PWR Installed Equipment Phase 1	
Identify modifications	• Install new spent fuel pool level instrumentation per NRC Order EA-12-051.
Key SFP Parameter	• Spent fuel pool level

Safety Function: Maintain Spent Fuel Pool Cooling

PWR Portable Equipment Phase 2

The baseline capabilities required for SFP Cooling are makeup via hoses on the refuel floor, makeup via connection to SFP cooling piping or other alternate location, vent pathway for steam from the SFP, and spray capability via monitor nozzles from refueling floor using a portable pump. The vent pathway for steam is discussed above. The recommended strategy is opening the personnel doors and providing makeup via the portable SFP FLEX pump. As stated above, early deployment of hoses with makeup and spray connections will prevent personnel from having to access the SFP area in the event of extensive loss of pool level. Note that, with the exception of the plant having undergone an emergency core offload or a rupture of the pool itself, all actions for SFP cooling should be done on a not-to-interfere with other, higher priority FLEX strategies and actions.

Makeup to the SFP without accessing the refueling floor will be accomplished by using the existing SFP cooling piping which discharges into the pool. A small section of piping just downstream of the SFP Cooling Water pump B or Emergency SFP Cooling Water pump will be modified to install an isolation valve and a hose connection. The pumps are located at the 18 foot elevation in the SFP Pump and Heat Exchanger room. Portable hoses from the FLEX storage facility will be connected from the SFP FLEX pump to the hose connections to provide the required makeup without accessing the refueling floor. Suction to the SFP FLEX pumps will be from the intake canal.

In the unlikely event that additional ventilation to the SFP room is required; the L-shaped missile barrier door could be opened. Opening this door would require re-powering the small motor located at the base of the door. In addition to increasing ventilation in the room, opening this large missile barrier door would provide a path to spray into the pool without entering the refueling floor.

Opening the SFP doors to provide ventilation early after the ELAP and LUHS event would not be possible during a hurricane event due to the high winds. However, a calculation that assumed an emergency core offload has just occurred determined that the fuel in the SFP would not become uncovered until 33 hours after the ELAP and LUHS event. Even for hurricane scenarios, there is sufficient time after the event before actions would be required to provide makeup to the SFP.

Safety Function: Maintain Spent Fuel Pool Cooling PWR Portable Equipment Phase 2	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response • 3/4-NOP-Spent Fuel Pit Cooling • 3/4-ONOP-Spent Fuel Pit Cooling System Malfunction To be developed: • FSG - Venting SFP and restoring Cooling Function
Identify modifications	• Install piping connection at SFP system for hoses to be connected from SFP FLEX Pump. See Attachment 4 for details
Key SFP Parameter	• Spent fuel pool level

Safety Function: Maintain Spent Fuel Pool Cooling PWR Portable Equipment Phase 2	
Storage / Protection of Equipment: **Describe storage / protection plan or schedule to determine storage requirements**	
Seismic	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include seismic considerations. Temporary strategic locations will be used until building construction completion.
Flooding	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include flooding considerations. Temporary strategic locations will be used until building construction completion. (Note: if stored below current flood level, procedures will address the move equipment prior to exceeding flood level).
Severe Storms with High Winds	The storage facility will be constructed in accordance with the NEI 12-06 guidelines, which include severe wind and wind driven missile considerations. Temporary strategic locations will be used until building construction completion.
High Temperatures	The climate at PTN is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 100°F which is below the threshold or 110° F discussed in NEI 12-06 guidance. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability. Storage of FLEX equipment in the FESB will include natural ventilation to maintain temperatures within the manufacturer's recommendations.

Safety Function: Maintain Spent Fuel Pool Cooling PWR Portable Equipment Phase 2		
Deployment Conceptual Design **(Attachment 3 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas.	Proposed plant modifications for phase 3 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and be protected from the site applicable hazards. Connections will be tying into either or both safety related 4160 V busses.

Safety Function: Maintain Spent Fuel Pool Cooling PWR Portable Equipment Phase 3	
The long-term phase of the FLEX cooling strategy is reliant on moving from makeup/boiloff to making use of the flow through the SFP heat exchanger after the CCW system has been reestablished. The SFP cooling pump will be powered to provide the motive force for the water through the SFP Heat Exchanger and can be used to cool the SFP indefinitely.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response • 3/4-NOP-Spent Fuel Pit Cooling • 3/4-ONOP-Spent Fuel Pit Cooling System Malfunction To be developed: • FSG – Restore SFP Cooling Function • FSG - Transition FLEX Phase 2 to FLEX Phase 3 • FSG - Transition FLEX Phase 3 to ONOP(s)
Identify modifications	• Electrical modifications to re-power pumps/valves/etc. for the SFP and CCW systems from 4160 V portable diesel generators supplied by the RRC. See Attachment 4 for details

Safety Function: Maintain Spent Fuel Pool Cooling PWR Portable Equipment Phase 3		
Deployment Conceptual Design **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the phase 3 equipment will be the same as phase 2 in the protected area. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and be protected from the site applicable hazards.

Safety Functions Support PWR Installed Equipment Phase 1
Determine Baseline coping capability with installed coping modifications not including FLEX modifications.

Electrical Distribution, Instrumentation, Communications, and Lighting

Essential instrumentation and control functions will be maintained by the 125V DC Class 1E batteries that are designed to power the safety related instrumentation for a minimum of 2 hours. To extend this coping period, non-essential loads will be shed as early as possible (within 1 hour per Ref. 12). This extended load shed will be proceduralized and involves the opening of 27 to 33 (depending on inverters in standby) breakers in 4 rooms (all located in the control building, each within 1 minute traveling time from the control room). This extended load shed will de-energize the DC backed Main Control Room (MCR) lighting, which will be supplemented by portable lanterns prior to the load shed. This extended load shedding will extend the battery powered monitoring function for one train of the following essential parameters until the FLEX DG is available to supply all required instrument loads:

- Steam generator water level (narrow range)
- Steam generator pressure
- Reactor coolant system pressure (wide range)
- Reactor coolant system pressurizer level
- Reactor coolant system hot and cold leg temperatures
- Containment pressure
- Spent fuel pool level
- Containment temperature
- Core exit thermocouples
- Reactor vessel level
- Neutron flux
- DC bus voltage
- AFW pump flow
- CST level
- RWST Level
- Accumulator pressure

The instruments providing the monitoring of the above parameters are described in Attachment 6.

The strategy for phase 1 of an ELAP and LUHS event is to perform extensive load shedding actions – beyond those outlined in Procedure EOP-ECA-0.0 (Ref. 12). For example, train B batteries will continue to power one channel of their required instruments while train A batteries will have most, if not all, loads stripped. When the train B batteries' voltages get too low (indicating that they are near depletion), the one channel's instruments off the train A batteries will be repowered and the train B batteries will have their loads minimized. Occasionally and before the initial load shed, a second channel of instruments will be repowered to perform a channel check on the instruments to ensure accurate readings. Additionally, all DC lighting will be de-energized (i.e., DP-312 and DP-412 will be completely de-energized) as opposed to just the portion identified in EOP-ECA-0.0 (Ref. 30). After the A and Batteries are depleted, the spare batter will be aligned to the DC busses. Alignment and use of the spare battery for this scenario will be included in the FSG's. These alignments are required to extend the time in which the batteries are available to supply minimum instrumentation until the Phase 2 coping strategy can be implemented. Alternate means and procedures for taking measurements locally of critical instruments using hand-held devices will be developed in the next phase of the FLEX initiative. Temperatures in the DC equipment rooms and control room (the only locations in the plant with a significant heat load and sensitive equipment required to support the FLEX strategy) have been analyzed and determined to remain within satisfactory ranges throughout phase 1 (Ref. 24). Communications will be through diverse equipment including sound powered phones, radios and the plant paging system. The plant paging system is powered from the Class 1E station battery and will not be load shed. Additional equipment which includes on-site communications is being addressed through the PTN Post-Fukushima communications initiative.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • 3/4-EOP-ECA-0.0, Loss of All AC Power – provides actions to respond to loss of all AC power and perform a natural circulation cooldown. • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response To be developed: • FSG - Inspect & Determine Condition of Plant Electrical Distribution System. • FSG – Load Shedding and use of Spare Battery • FSG- Lighting and Communications during an ELAP • FSG – Use of Local Instrument Readings

Identify modifications	• None for phase 1.
Key Parameters	• Steam generator water level (narrow range) • Steam generator pressure • Reactor coolant system pressure (wide range) • Reactor coolant system pressurizer level • Reactor coolant system hot and cold leg temperatures • Containment pressure • Spent fuel pool level • Containment temperature • Core exit thermocouples • Reactor vessel level • Neutron flux • DC bus voltage • AFW pump flow • CST level • RWST Level • Accumulator pressure See Attachment 6 for instrument tag numbers and power sources
Notes: 1. Procedural guidance for use of local instrument readings will be provided and included in the procedures milestone in Attachment 3.	

Safety Functions Support

PWR Portable Equipment Phase 2

The phase 2 coping strategy following an ELAP and LUHS event is to stage and connect a 480 V AC diesel generator to power select loads. The loads which may be powered by the phase 2 FLEX Diesel Generator include the battery chargers that supply the Class 1E 125V DC Switchgear. Additional guidance will be added to 0-ONOP-103.3, Attachment 2 (Ref. 13) to have the portable generators and transformers installed and connected prior to loss of all DC power. When power from the FLEX DG is restored to the Class 1E Load Centers, all interlocks and protective features for the loads will be preserved, assuming that power remains available to associated components (e.g., relays, actuation logics) and that the BDBEE did not cause a fault in electrical distribution system protective circuits (e.g., faults to under-voltage relays and over-current relays). The diverse means will be to power the loads directly by connecting the FLEX Diesel Generator to the load's power cables via portable switchgear. Procedures for these scenarios will be provided.

Refueling for phase 2 equipment will be from the Unit 4 Emergency Diesel Storage Tanks. These tanks are containment within Class I structures. A fuel truck will be located in the FLEX Storage Building and used for that purpose. Fuel consumption analysis is pending for all temporary equipment. This will be completed as part of the equipment order and develop of the procedures for their use. This is tracked as pending action 5 in Attachment 3.

Safety Functions Support PWR Portable Equipment Phase 2	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	Existing: • EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones • EDMG-2 Major Loss of Plant Control Systems - Initial Response To be developed: • FSG - Inspect & Determine Condition of Plant Electrical Distribution System. • FSG - Restore 480 V power in FLEX Phase 2 • FSG- Refueling of portable equipment during an ELAP
Identify modifications	• Electrical modifications to re-power 480 V load centers • Electrical modifications to re-power individual pieces of equipment, e.g. MCC's, Charging Pumps, etc. See Attachment 4 for details.
Key Parameters	• Steam generator water level (narrow range) • Steam generator pressure • Reactor coolant system pressure (wide range) • Reactor coolant system pressurizer level • Reactor coolant system hot and cold leg temperatures • Containment pressure • Spent fuel pool level • Containment temperature • Core exit thermocouples • Reactor vessel level • Neutron flux • DC bus voltage • AFW pump flow • CST level • RWST Level • Accumulator pressure See Attachment 6 for instrument tag numbers and power sources.

Safety Functions Support PWR Portable Equipment Phase 2	
Storage / Protection of Equipment :	
Seismic	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include seismic considerations. Temporary strategic locations will be used until building construction completion.
Flooding	The storage facility will be constructed in accordance with NEI 12-06 guidelines, which include flooding considerations. Temporary strategic locations will be used until building construction completion. (Note: if stored below current flood level, procedures will address the move equipment prior to exceeding flood level).
Severe Storms with High Winds	The storage facility will be constructed in accordance with the NEI 12-06 guidelines, which include severe wind and wind driven missile considerations. Temporary strategic locations will be used until building construction completion.
High Temperatures	The climate at PTN is typical of that in southern Florida, being hot and humid in the summer and mild in the winter. FLEX equipment (i.e., pumps, diesel generators, etc.) shall be capable of operating in hot weather in excess of the site extreme maximum of 100°F which is below the threshold or 110° F discussed in NEI 12-06 guidance. It is not expected that FLEX equipment and deployment would be affected by high temperatures. Nonetheless, temperature considerations will be made with respect to procuring and maintaining equipment within design ratings and for personnel habitability. Storage of FLEX equipment in the FESB will include natural ventilation to maintain temperatures within the manufacturer's recommendations.

Safety Functions Support PWR Portable Equipment Phase 2		
Deployment Conceptual Design **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas.	Proposed plant modifications for phase 2 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and protected from the applicable hazards.

Safety Functions Support

PWR Portable Equipment Phase 3

Phase 3 strategies involve the use of large 4 kV diesel generators from the Regional Response Center. This strategy would restore power to most of the electrical distribution system, lighting, and communications loads which are not damaged from the ELAP and LUHS event via installed electrical distribution systems or through manually routed cables to the individual loads. Major loads which will be repowered with this DG are the CCW pumps, RHR pumps, and ECCs. The RRC DG will also have the capability of restoring power to other 480V AC loads that were repowered from the FLEX DG in phase 2 if needed and any non-safety related loads (such as the RHR sump pumps) if required. When power from the RRC DG is restored to the switchgear, all interlocks and protective features (except for switchgear lockout related trips) for the loads should be preserved, assuming that power remains available to associated components (e.g., relays, actuation logics) and that the BDBEE did not cause a fault in electrical distribution system protective circuits (e.g., faults to under-voltage relays and over-current relays). The diverse means will be to power the loads directly by connecting the FLEX Diesel Generator to the load's power cables via portable switchgear. Procedures for these scenarios will be provided

Details:

Provide a brief description of Procedures / Strategies / Guidelines

Existing:

- EDMG-1 Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones
- EDMG-2 Major Loss of Plant Control Systems - Initial Response

To be developed:

- FSG - Inspect & Determine Condition of Plant Electrical Distribution System.
- FSG - Restore 4160V power in FLEX Phase 3
- FSG - Transition FLEX Phase 2 to FLEX Phase 3
- FSG - Transition FLEX Phase 3 to ONOP(s)
- FSG- Refueling of portable equipment during an ELAP

Safety Functions Support PWR Portable Equipment Phase 3	
Identify modifications	• Electrical modifications to re-power 4160 V switchgear • Electrical modifications to re-power individual pieces of equipment, e.g. RHR pumps See Attachment 4 for details.
Key Parameters	• Steam generator water level (narrow range) • Steam generator pressure • Reactor coolant system pressure (wide range) • Reactor coolant system pressurizer level • Reactor coolant system hot and cold leg temperatures • Containment pressure • Spent fuel pool level • Containment temperature • Core exit thermocouples • Reactor vessel level • Neutron flux • DC bus voltage • AFW pump flow • CST level • RWST Level • Accumulator pressure See Attachment 6 for instrument tag numbers and power sources

Safety Functions Support PWR Portable Equipment Phase 3		
Deployment Conceptual Design **(Attachment 4 contains Conceptual Sketches)**		
Strategy	**Modifications**	**Protection of connections**
Strategies are as described above. Attachment 5 identifies the proposed deployment paths onsite for the transportation of FLEX equipment. For this function a clear deployment path has been shown from the identified roads in to power block to the staging areas. Note that the path and deployment of the phase 3 equipment will be the same as the phase 2 equipment. A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Proposed plant modifications for phase 3 FLEX equipment including diverse means are identified above. Sketches are provided in Attachment 4 of this report.	All connections for the FLEX equipment will be designed to withstand and protected from the applicable hazards.

References

1. NEI 12-06, "Diverse and Flexible Coping Strategies (FLEX) Implementation Guide", Rev. 0, August 2012
2. Westinghouse PWROG analysis "Reactor Coolant System Response for Extended Station Blackout", PWROG Project Authorization ASC-0916, LTR-LIS-11-595
3. INPO Event Report (IER) 11-04, "Near-Term Actions to Address the Effects of an Extended Loss of All AC Power in Response to the Fukushima Dai-ichi Event"
4. WCAP-17601-P, "Reactor Coolant System Response to the Extended Loss of AC Power Event for Westinghouse, Combustion Engineering, and Babcock & Wilcox NSSS Designs"
5. "PTN Units 3 and 4 Technical Specifications", Amendment No 256 (Unit 3) and Amendment No 245 (Unit 4) - Docketed
6. PTN Nuclear Plant Unit 3 & 4 "Updated Final Safety Analysis Report" (FSAR), 02/08/12 - Docketed
7. 5610-075-DB-001 "Auxiliary Feedwater System Design Basis Document", 07/11/11
8. Turkey Point Units 6 & 7 COLA "Final Safety Analysis Report", Rev. 3, 12/16/11
9. 5610-068-DB-001 "Containment Spray System Design Basis Document", Rev. 11
10. ASCE 7-10, "Minimum Design Loads of Buildings and Other Structures"

<u>Procedures</u>

11. 0-ADM-116 "Hurricane Season Readiness", Rev. 6A, 03/03/12
12. 3/4-EOP-ECA-0.0 "Loss of AC EOP", Rev. 3/2
13. 0-ONOP-103.3, "Severe Weather Preparations", Rev. 6, 08/04/12
14. 3/4-ONOP-041.8, "Shutdown LOCA [Mode 5 or 6]", Rev. 2
15. 3/4-ONOP-050, "Loss of RHR", Rev. 2/2
16. 3/4-ONOP-033.1, "Spent Fuel Pit (SFP) Cooling System Malfunction", Rev. 9/7
17. EDMG-1, "Guideline for Responding to Large Area Fire or Explosion Involving Multiple Fire Zones", Rev. 1, 4/13/11
18. SAG-1, "Inject into the Steam Generators", Rev. 4, 7/27/12
19. SAG-4, "Inject into Containment", Rev. 3, 8/24/12
20. SAG-8, "Flood Containment", Rev. 3A, 11/15/11
21. 3/4-ONOP-030, "Component Cooling Water Malfunction", Rev. 4/4

Calculations

22. FPL065-CALC-001, "SI Accumulator Volume Injected During Cooldown", Rev. 1, 2/26/2013

23. FPL065-CALC-002, "Turkey Point Reactivity Balance", Rev. 1, 2/27/2013

24. FPL065-CALC-003, "Turkey Point NGS Control Building Heatup for Extended Loss of AC Power", Rev. 0

25. FPL065-CALC-004, "Turkey Point Extended Loss of AC Power Decay Heat and Makeup Requirements", Rev. 0, 1/23/13

26. FPL065-CALC-005, "Turkey Point ELAP RWST Gravity Drain and Inventory Depletion", Rev. 0, 1/28/13

27. FPL065-CALC-006, "Well Water Qualification as a Source of Cooling Water for Steam Generators following a Beyond-Design-Basis External Event at Turkey Point", Rev. 1, 2/25/13

28. FPL065-CALC-007, "Boric Acid Solubility in the Reactor Pressure Vessel as part of the FLEX Strategy for Turkey Point", Rev. 0, 1/25/13

29. FPL065-CALC-009, "Turkey Point Battery Discharge Capacity During Extended Loss of AC Power", Rev. 1, 02/22/2013

30. PTN-BFJE-94-002, "Battery Size and Voltage Drop Calculation for Stationary Batteries 3A, 3B, 4A, 4B, and Spare", Rev. 8

31. FPL065-CALC-010, "MAAP Containment Analysis for Plant Turkey Point Units 3 and 4", Rev. 0

32. Enercon Report FPL 065-PR-01 Revision 1, "PTN Nuclear Plant Response to NRC Order EA-12-049 Mitigation Strategies for Beyond-Design-Basis External Events", dated 2/28/2013

NRC Document References

33. Order EA-12-049, "Issuance of Order to Modify Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design Basis External Events", 3/12/2012

34. 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, 8/31/2012

35. Order EA-12-051, "Issuance of Order to Modify Licenses with Regard to Reliable Spent Fuel Pool Instrumentation", 3/12/2012

36. SECY-11-0093, "Near-Term Report and Recommendations for Agency Actions Following Events in Japan", Recommendation 9.3.

Attachment 1 - Sequence of Events Timeline Sequence of Events Timeline

Action item	Elapsed Time	Action	Time Constraint Y/N	Remarks / Applicability
	0	Event initiated with plant at 100% power after 100 days of EFP operation or shutdown in Mode 3 per plant procedures	NA	NEI 12-06 assumption
1	95 sec	AFW pump(s) starts and flow begins to all SG's	N	Automatic function, Ref. 7
2	2 min	Both EDGs fail to start	NA	ELAP condition
3	5 min	Operating crew enters ECA-0.0	N	Driven by EOP's
4	30 min	Operating crew declares ELAP	Y	Action to be specified in ECA-0.0
5	1 hour	Operating crew completes deep load shedding on DC busses	Y	Needed to ensure longevity of batteries before DG's power the load centers
6	1.5 – 8 hours	SFP doorways opened and hoses staged	N	Alternate injection method available if hoses can't be installed
7	8 hours	FLEX DG's powering Load Centers	Y	Needed for the well pumps, battery chargers, and other equipment
8	9 hours	Well pumps powered and providing water to surviving CST	Y	Needed to makeup before CST(s) deplete with subsequent dryout of steam generators

Attachment 1 - Sequence of Events Timeline Sequence of Events

Action item	Elapsed Time	Action	Time Constraint Y/N	Remarks / Applicability
9	10 hours	FLEX SFP Pump makeup to SFP	N	Boiling at 2.7 hours, core uncover 33 hours (ref. 25)
10	12 hours	Containment Spray pumps repowered	N	Updated MAAP analysis needed. Pending action.
11	13 hours	Depressurize SG's using the SDTA's to <170 psig	N	Pressure target per Ref. 2 to inject SI tanks
12	13 hours	FLEX SG Pumps and hoses installed to backup AFW pumps	N	Backup to AFW
13	24 hours	Repower boric acid transfer pumps and charging pumps for RCS makeup, boration, and long term cooling	N	Backup to SI tank boration and for long term cooling
14	120 hours	RRC DG power 4 kV busses (RHR, CCW, SFP, ECC in service)	N	Long term coping

Attachment 2
NSSS Significant Reference Analysis Deviation Table

Item	Parameter of interest	WCAP value (WCAP-17601-P August 2012 Revision 0)	WCAP page	Plant applied value	Gap and discussion
1	RCS cooldown start time	4-8 hours	Page 5-6, Table 5.2.2-1	13 hours	Page 60
2	RCS cooldown pressure	300 psia	Page 5-6, Table 5.2.2-1	170 psig	Page 60

Attachment 3
Milestone Schedule

Original Target Date	Activity	Status
Oct. 2012	Submit 60 Day Status Report	Complete
Feb. 2013	Submit Overall Integrated Implementation Plan	Complete
June 2013	Order Equipment Phase 1	
Aug 2013	Submit 6 Month Status Report	
Nov 2013	Develop Strategies (Playbook) with RRC	
Dec 2013	Receive Equipment Phase 1	
Feb. 2014	Submit 6 Month Status Report	
June 2014	Order Equipment Phases 2/3	
June 2014	Issue Modification Packages for Unit 3	
Aug. 2014	Submit 6 Month Status Report	
Sep 2014	Issue Operations Procedure Changes including FSGs	
Sep 2014	Operations Procedure Changes Training Material Complete	
Oct 2014	Develop Training Plan	
Dec 2014	Create Maintenance Procedures	
Dec 2014	Receive Equipment Phase 2	
Jan 2015	Complete Staffing Analysis (Phase 2)	
Feb 2015	Submit 6 Month Status Report	
Feb 2015	Training Complete	
Mar 2015	FLEX Storage Building Completed	
Apr 2015	Receive Equipment Phase 3	
May 2015	Unit 3 Implementation Complete	
Jun 2015	Issue Modification Packages for Unit 4	
Aug 2015	Submit 6 Month Status Report	
Feb. 2016	Submit 6 Month Status Report	
May 2016	Unit 4 Implementation Complete	
Aug. 2016	Submit 6 Month Status Report	
Dec 2016	Submit Completion Report	

Attachment 3
Pending Actions

(Note: Summary of Pending Actions does not include modifications, procedures and training shown in the milestone schedule)

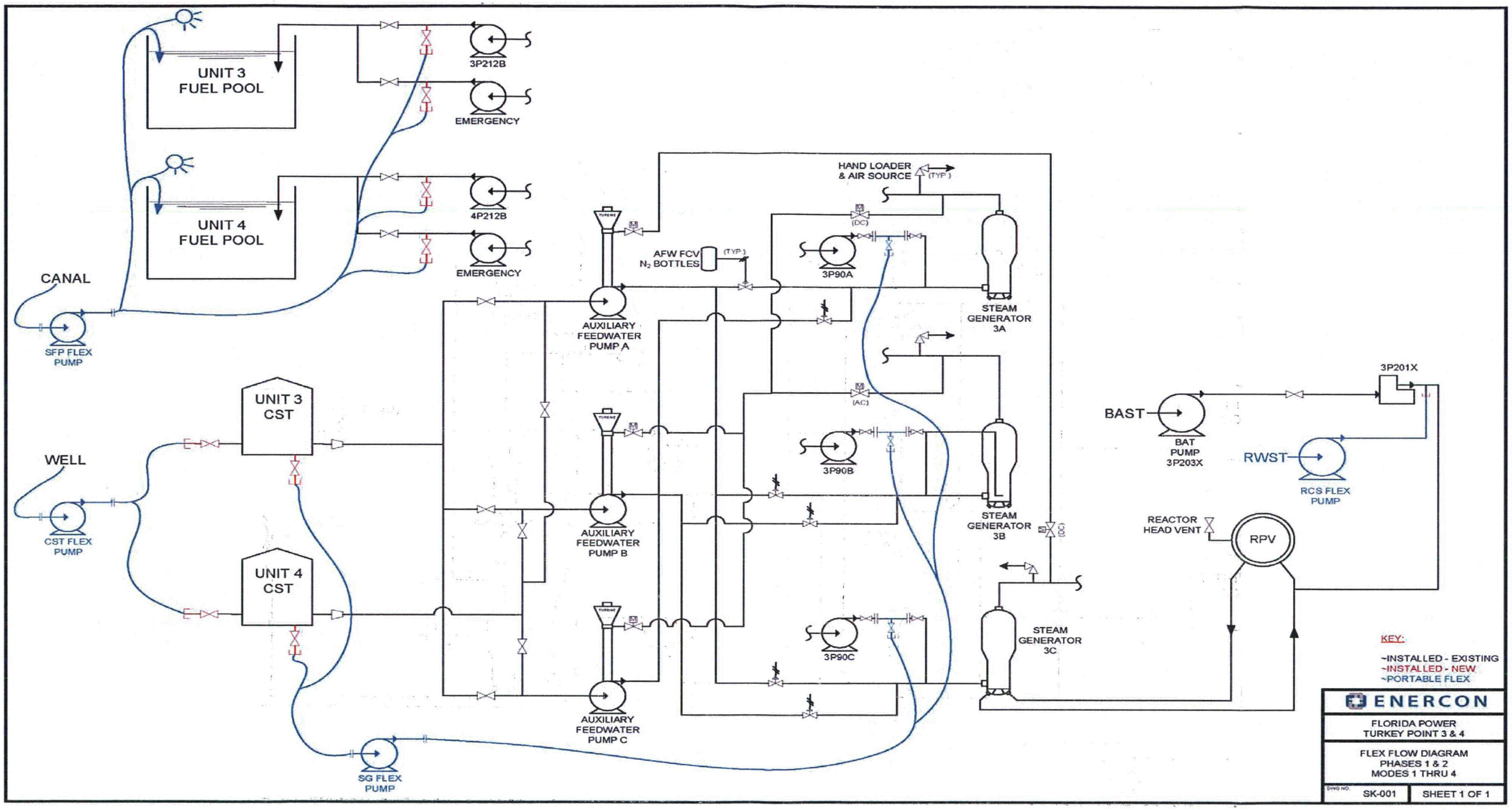
No.	Action	To be completed:
1	Perform a revised analysis of the containment structure once the detailed performance parameters for the shutdown seals are obtained and using more realistic heat input parameters.	Jun 2014
2	A hydraulic analysis will be performed to determine the minimum requirements of the portable FLEX pumps and connection point sizes. The outputs of this analysis will include a minimum flow and discharge pressure for each pump.	Jun 2014
3	A hydraulic analysis will be performed to support the ability to heat up from Mode 5 to a condition where the AFW pumps are removing decay heat via the SGs.	Jun 2014
4	Heat loads will be removed via the SFP Cooling heat exchangers, RHR heat exchangers, and Containment Coolers. Analysis will be required to determine the minimum requirements for UHS RRC pump.	Jun 2014
5	Analysis will be required to determine fuel requirements of FLEX equipment. This analysis will determine requirements and capabilities of onsite FLEX portable pumps and diesel generators for phase 2.	Jun 2014
6	A determination of the "drop off" location from the RRC is pending. Once selected, the path to the site will be reviewed.	Nov 2013
7	An analysis will be performed to establish the timeline for SI or RWST injection for Modes 5 & 6	Jun 2014
8	Complete a final assessment of haul paths and staging areas to confirm access including review for soil liquefaction	Sep 2014
9	The generic WCAP guidance recommends that a site-specific evaluation be performed once the seal design is completed to validate that the cooldown and depressurization time is supported.	Jun 2014

Attachment 4
Modifications and Sketches

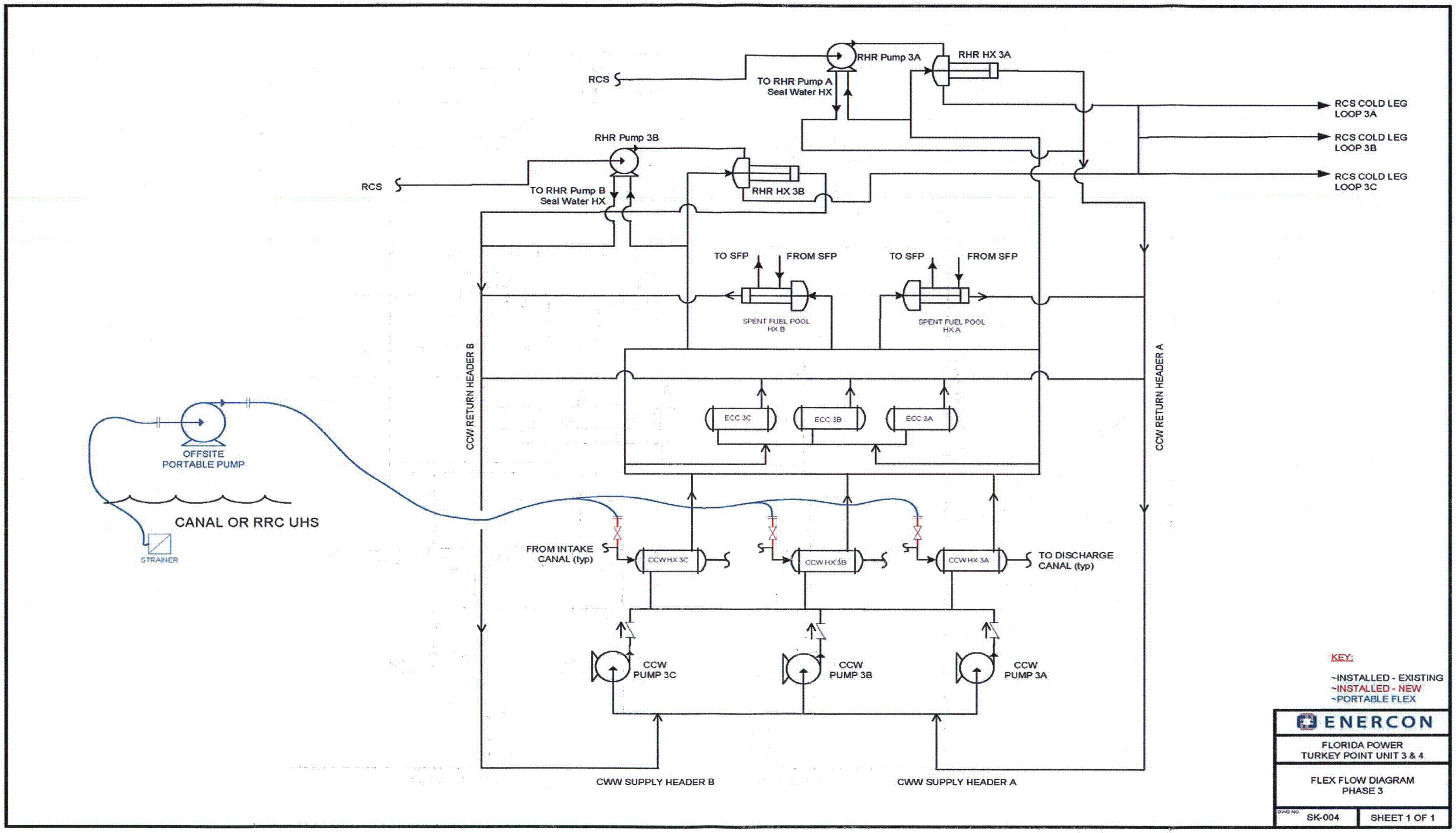
Modification Summary		
No.	Description	Purpose
1	Provide secure storage for SDTA nitrogen bottles and manual loaders and provide additional manual loaders	Allows operations of the SDTAs under FLEX conditions due to failure of the installed instrument air piping to the ADVs.
2	Install Isolation Valve and Hose Connections on previously capped connection off AFW Suction Header Lines for Each Condensate Storage Tank (CST).	Provides ability to replenish inventory of coolant used during phase 2 coping strategy.
3	Replace Existing CST Manhole Covers With Modified Manhole Covers That Include Isolation Valves and Hose Connections.	Provides ability to replenish inventory of coolant used during phase 2 coping strategy or provide suction to SG FLEX pump.
4	Install Isolation Valve and Hose Connection at Abandoned Level Transmitter Locations to Allow Fill of CST	Provides ability to replenish inventory of coolant used during phase 2 coping strategy.
5	Install isolation valve and hose connections at the Steam Generator Wet Layup (SGWLU) spectacle flanges for each individual SG.	Provides ability to inject cooling media into the SG's during phase 2 coping strategy.
6	Install isolation valve and hose connections in Refueling Water Storage Tank (RWST) Manhole covers.	Provides ability to replenish inventory of RWST borated water.
7	Install isolation valve and hose connections in intake cooling water system in strainer back flush piping	Provides ability to provide cooling water to the Intake cooling water system.

Modification Summary		
No.	Description	Purpose
8	Install isolation valve and hose connections in train B SFP Cooling Pump Discharge	Makes up for SFP water inventory lost due to boiling.
9	Electrical Power – provide connections for 480 V and 4160 V portable diesel generators	Power battery chargers, lighting, room coolers, MOVs, etc. to provide instrumentation and capability to maintain the plant in a safe condition until normal power is restored.
10	FLEX Equipment Storage Building	The FLEX storage buildings shall be designed such that the protected FLEX equipment can be maintained and that implementation of deployment strategies would be feasible.
11	Install low leakage RCP seals. Cost includes replacement of entire seal package. (No sketch)	Critical part of the FLEX strategies to allow for delay of cooldown, minimize need for RCS makeup, and minimizes challenges to containment
12	FLEX Shallow Wells for Potable Water (No sketch)	The FLEX shallow wells will provide a minimum of 600 gpm of potable water.

Attachment 4
Conceptual Sketches and Modifications

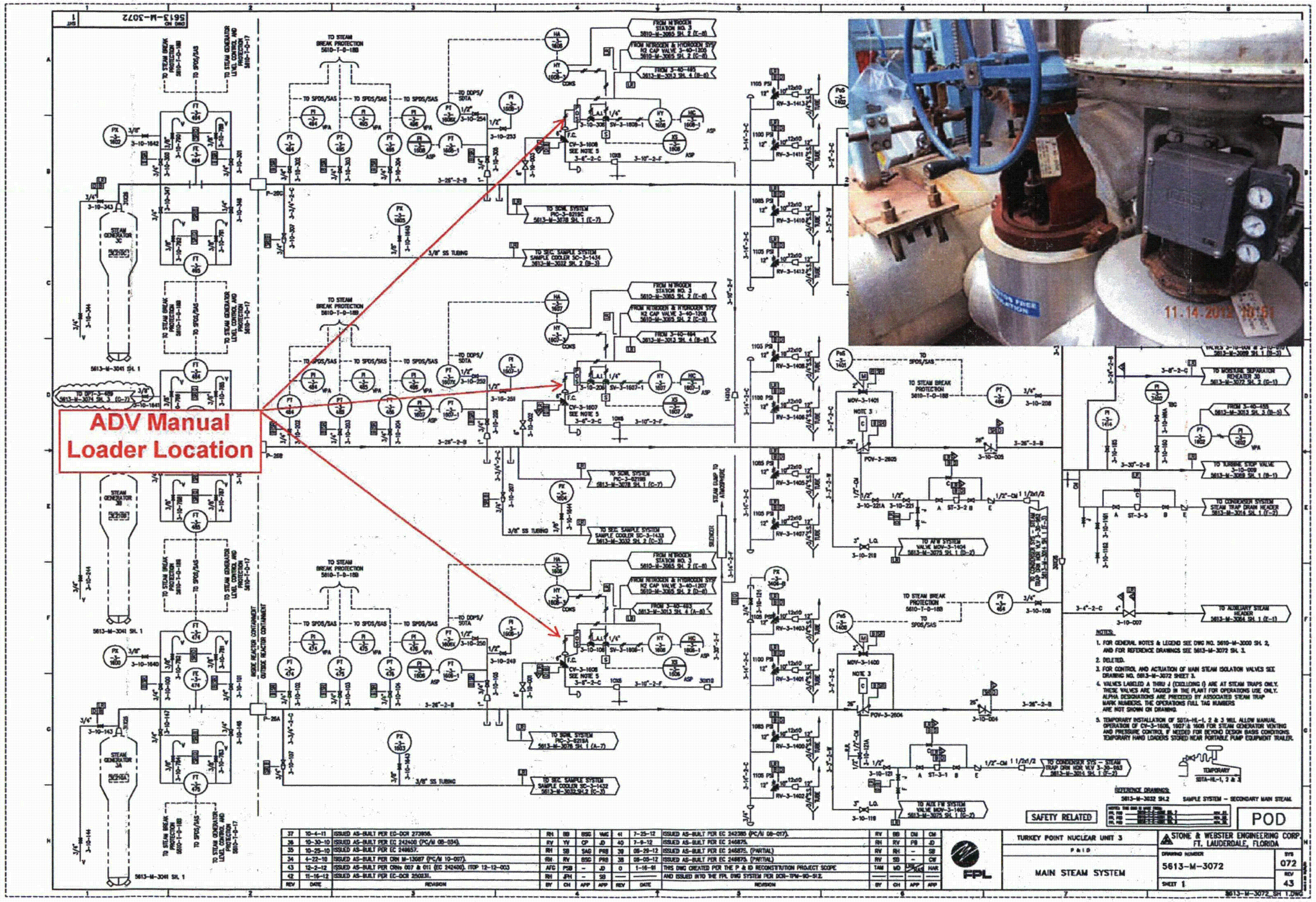


Attachment 4
Conceptual Sketches and Modifications



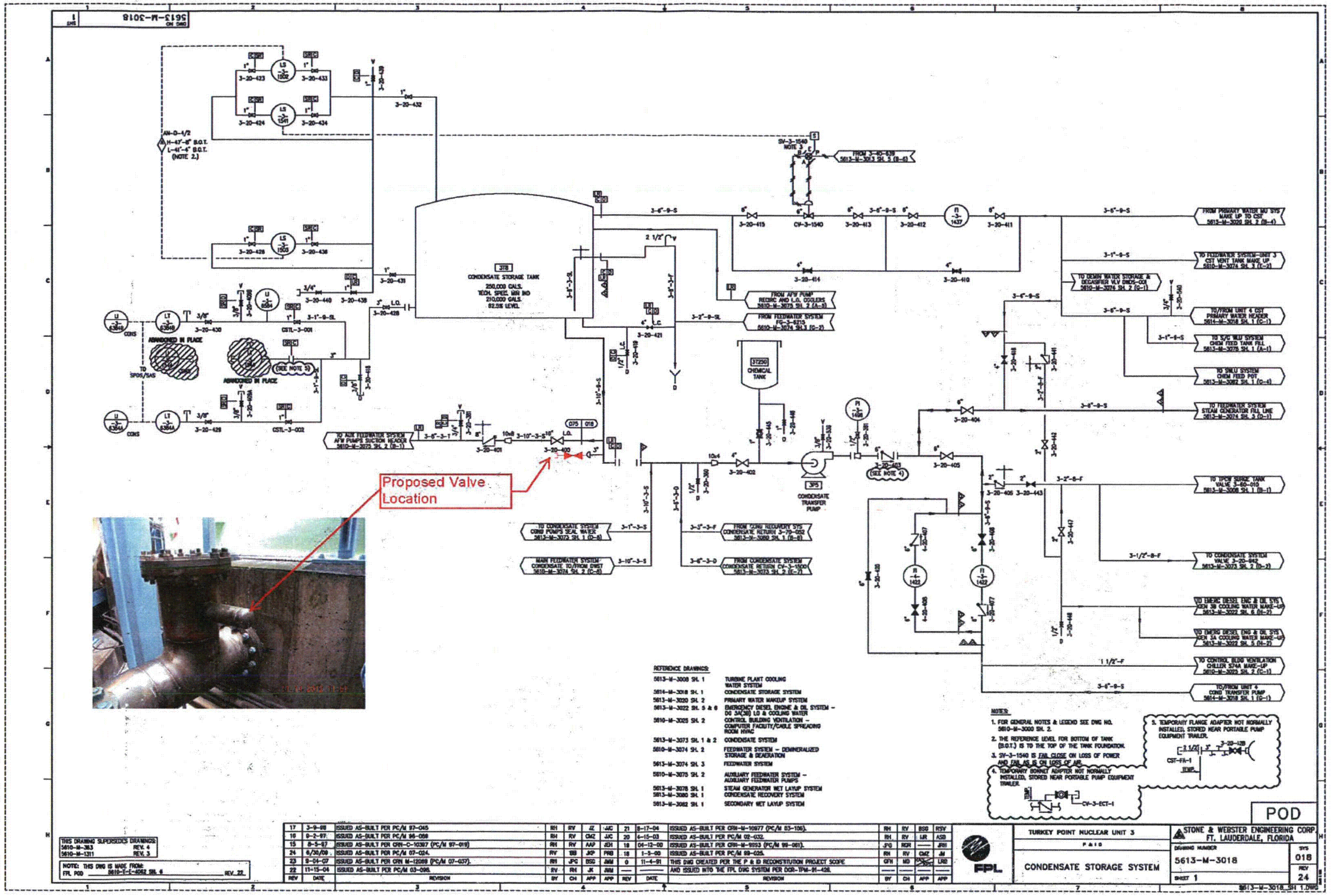
Attachment 4
Conceptual Sketches and Modifications

Modification No. 1 (Unit 3 Shown, Unit 4 similar)



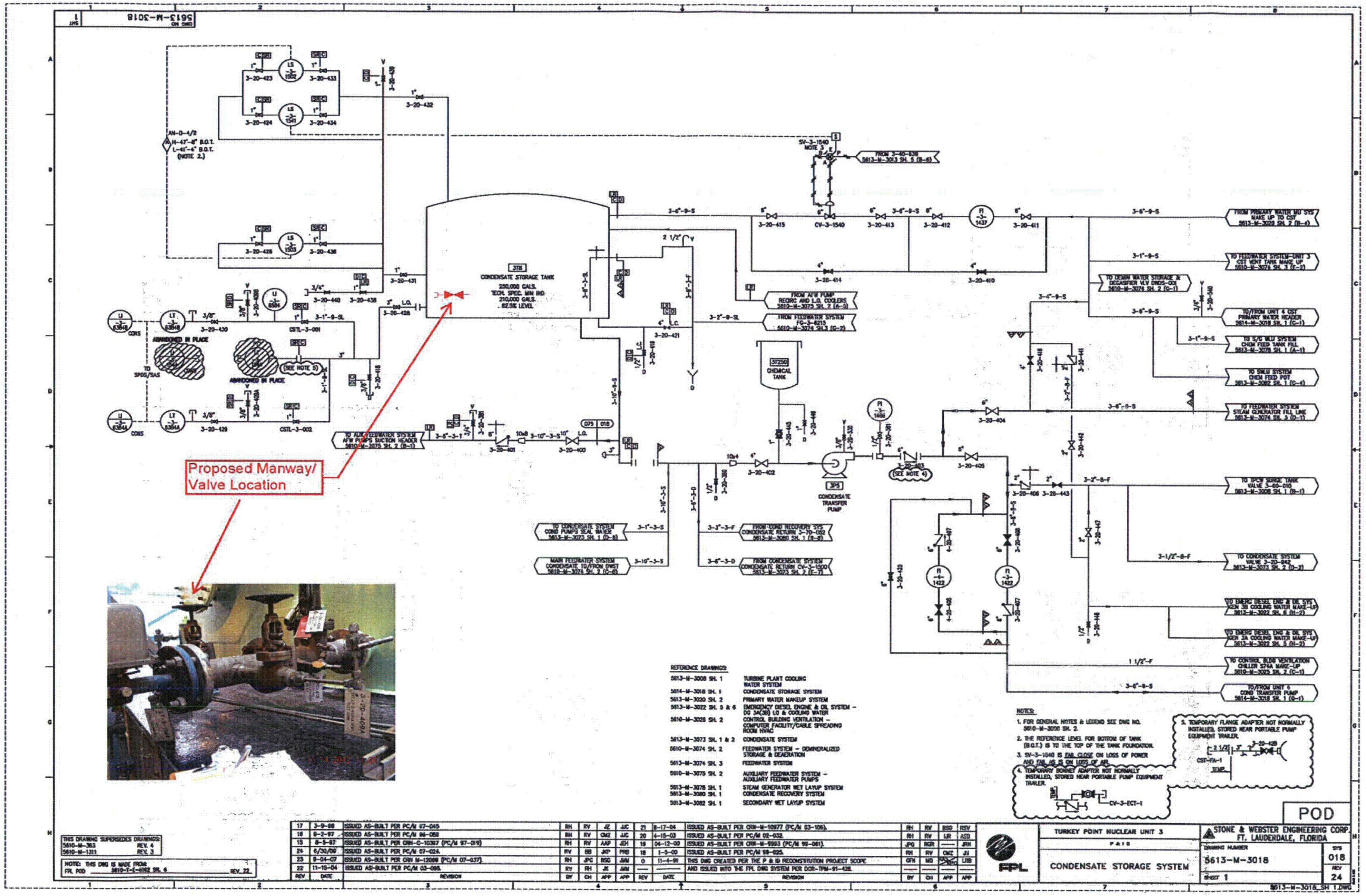
Attachment 4
Conceptual Sketches and Modifications

Modification No. 2 (Unit 3 Shown, Unit 4 similar)



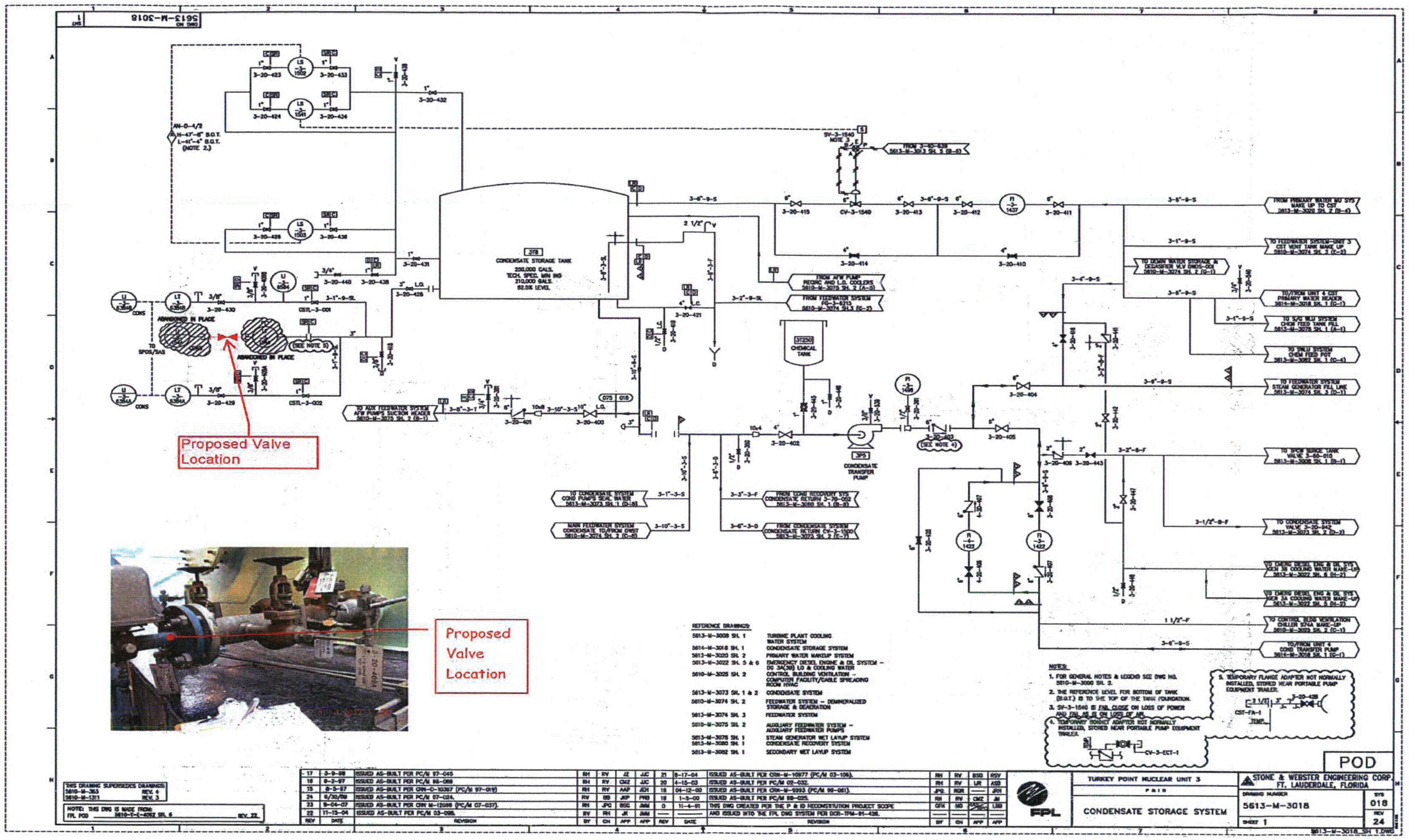
Attachment 4
Conceptual Sketches and Modifications

Modification No. 3 (Unit 3 Shown, Unit 4 similar)



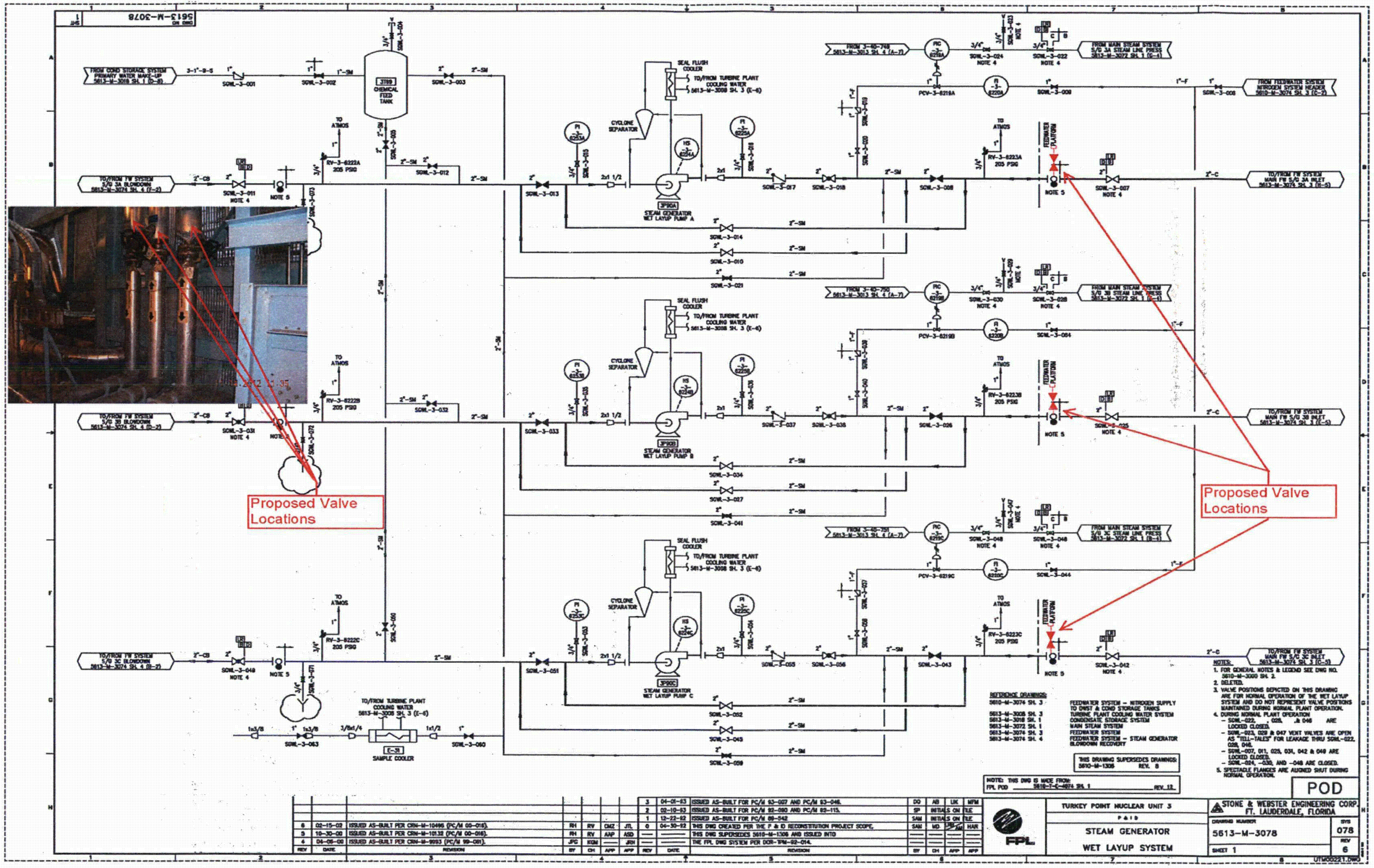
Attachment 4
Conceptual Sketches and Modifications

Modification No. 4 (Unit 3 Shown, Unit 4 similar)



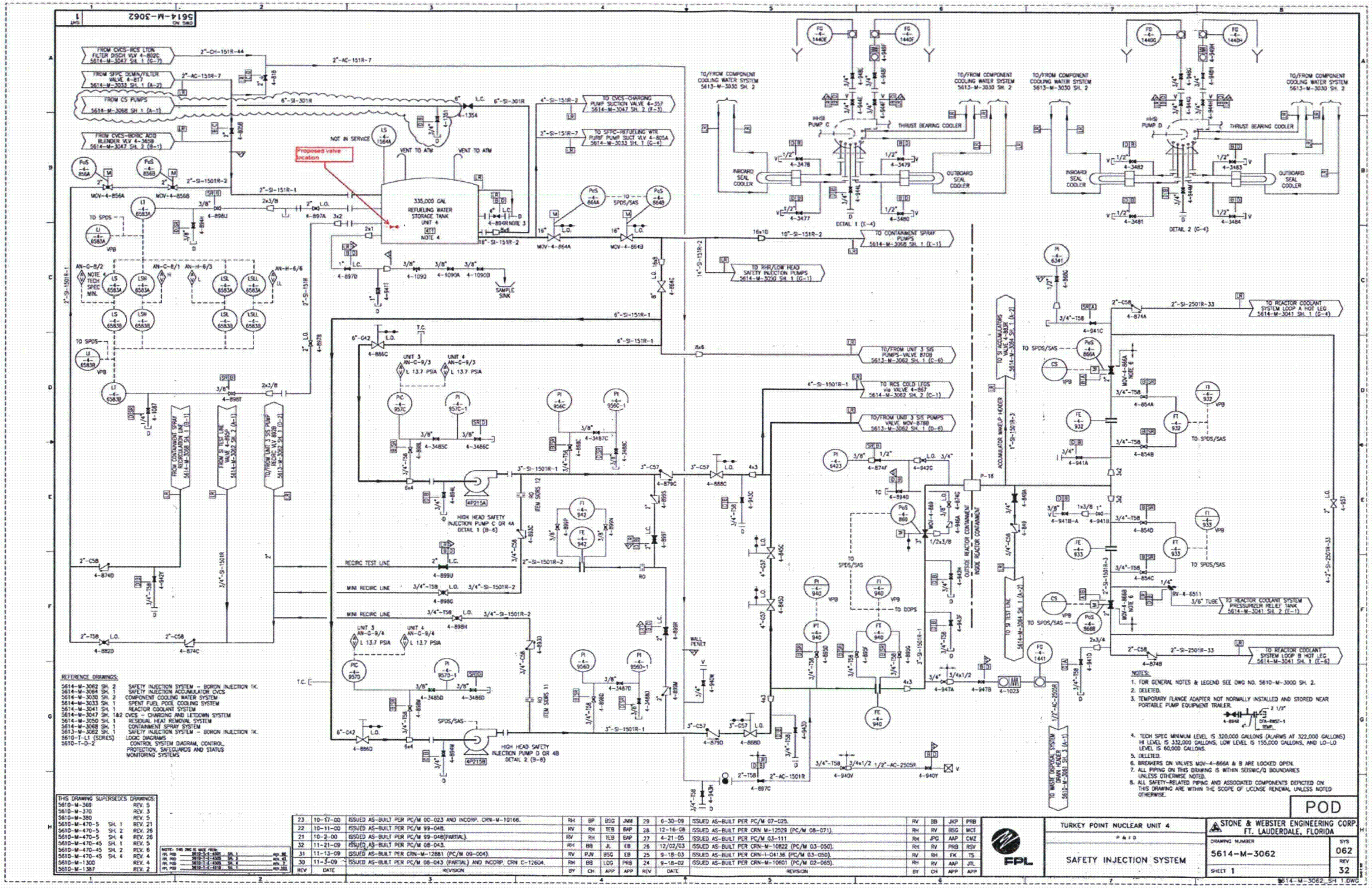
Attachment 4
Conceptual Sketches and Modifications

Modification No. 5 (Unit 3 Shown, Unit 4 similar)



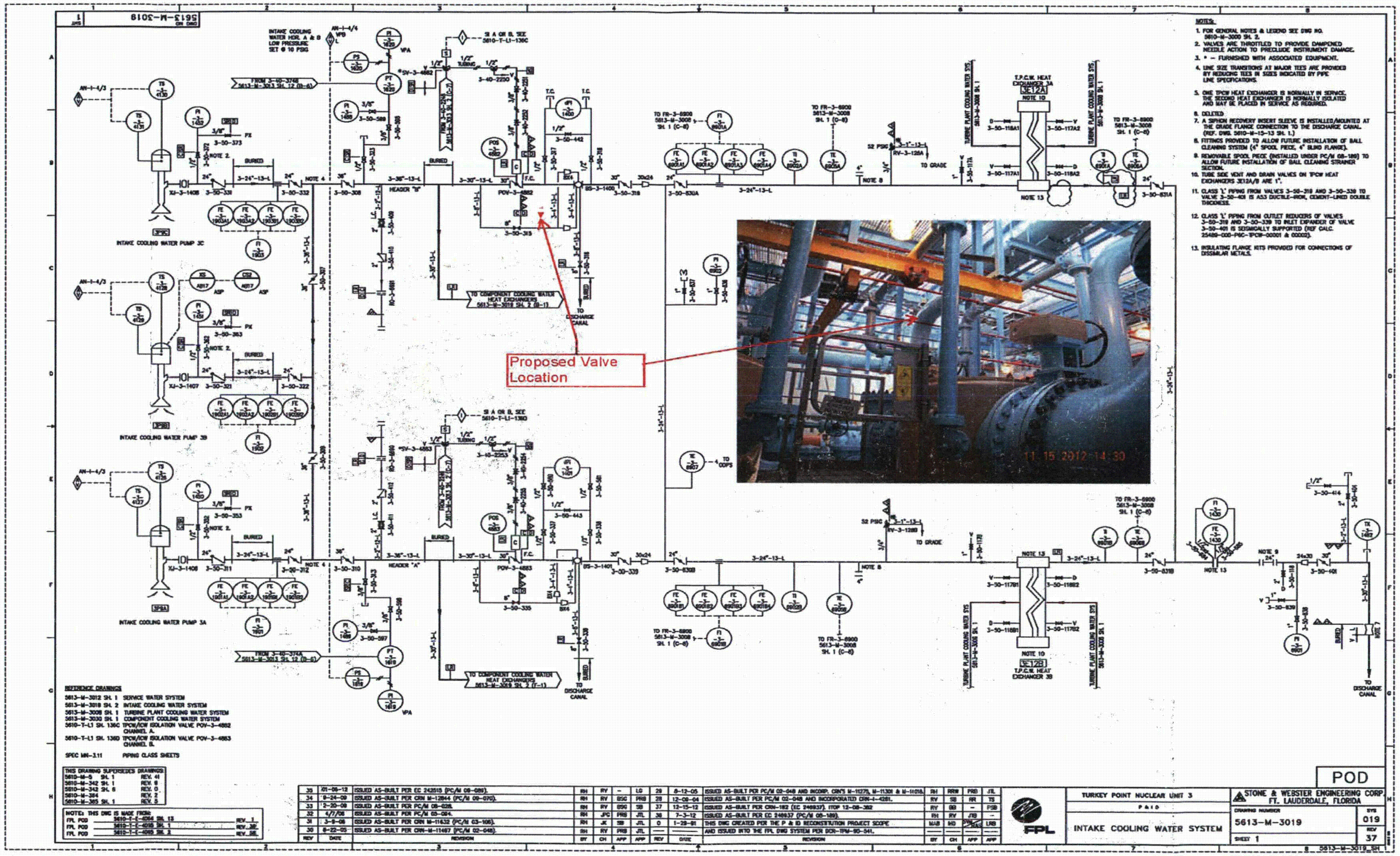
Attachment 4
Conceptual Sketches and Modifications

Modification No. 6 (Unit 3 Shown, Unit 4 similar)



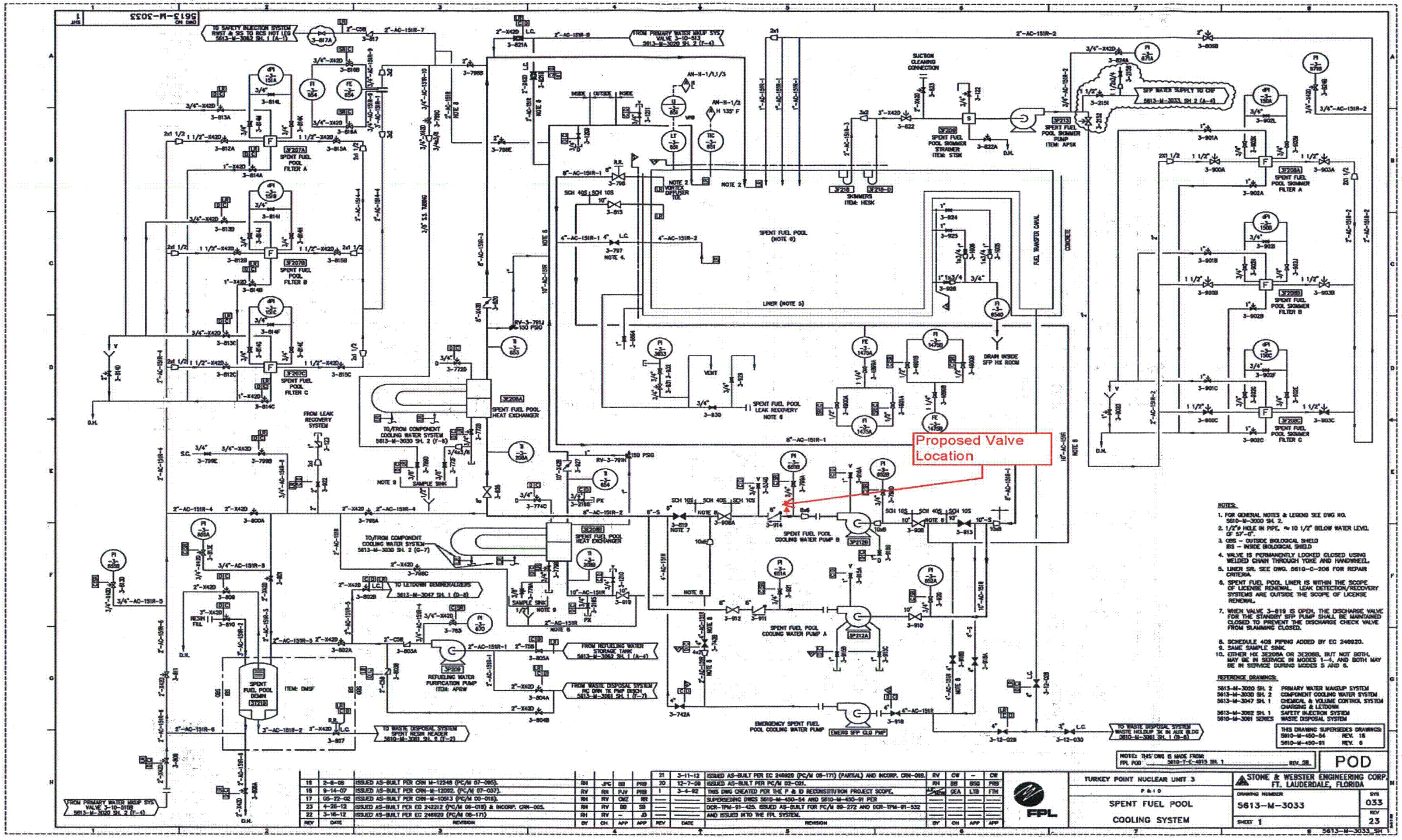
Attachment 4
Conceptual Sketches and Modifications

Modification No. 7 (Unit 3 Shown, Unit 4 similar)



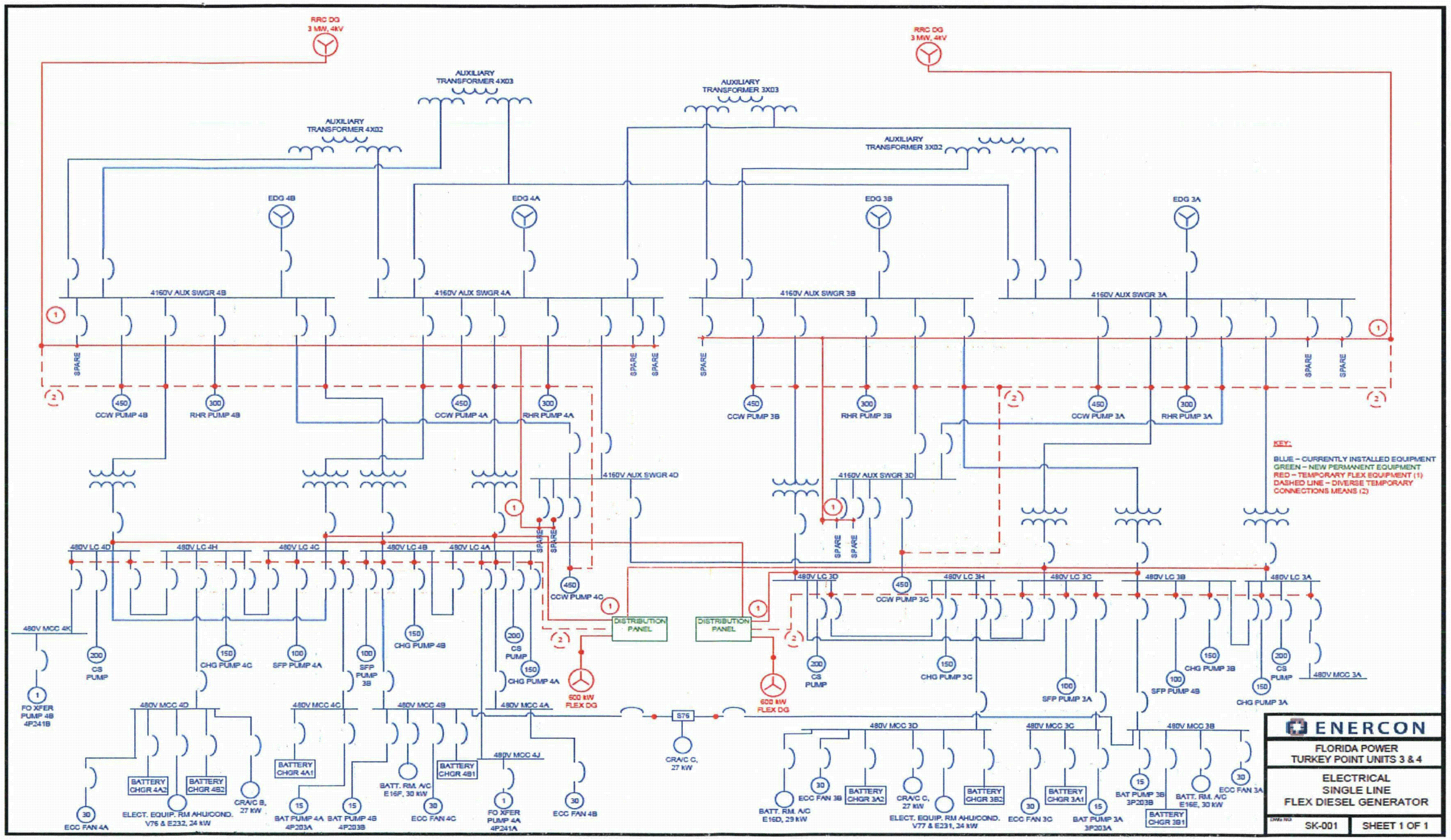
Attachment 4
Conceptual Sketches and Modifications

Modification No. 8 (Unit 3 Shown, Unit 4 similar)

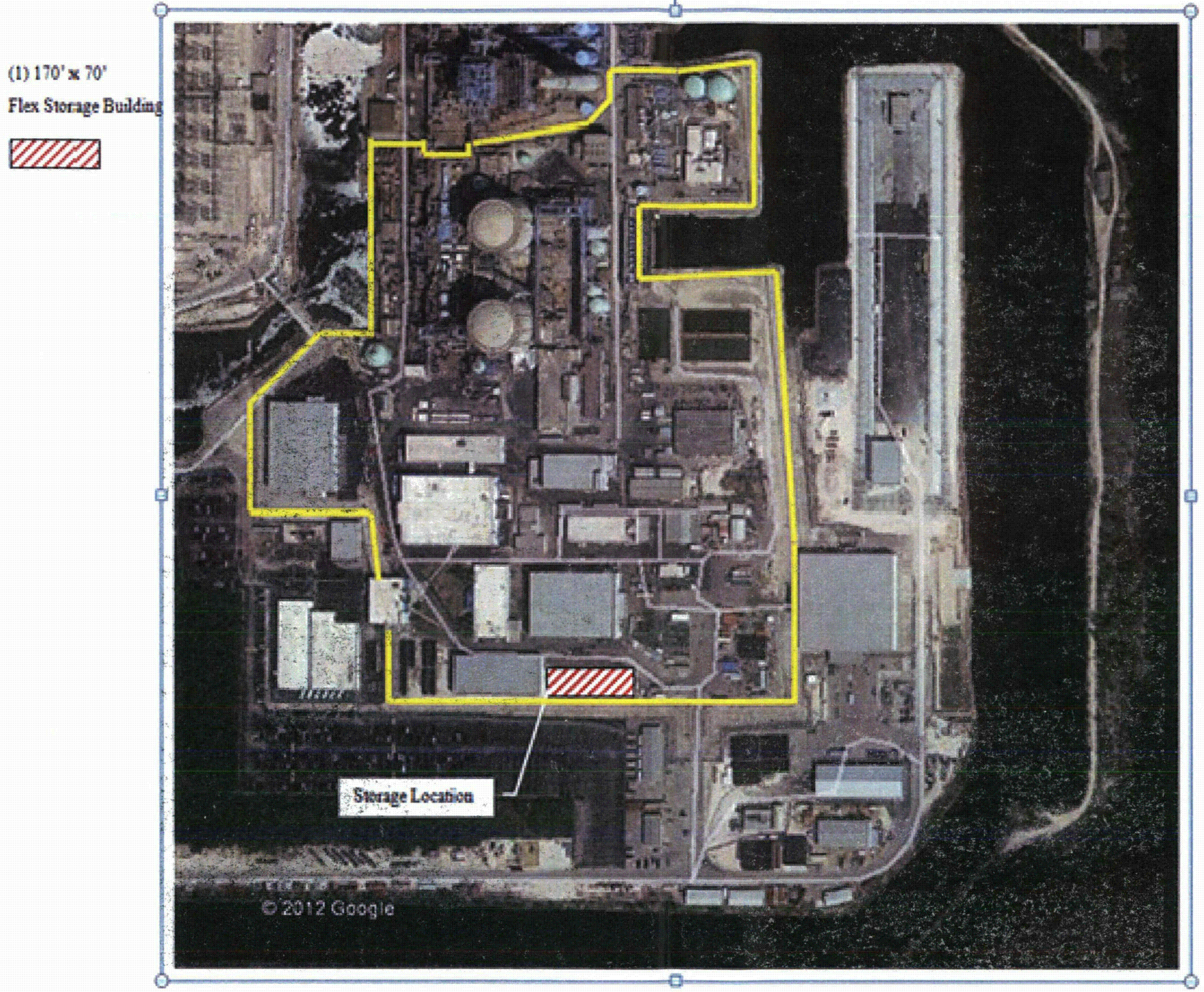


Attachment 4
Conceptual Sketches and Modifications

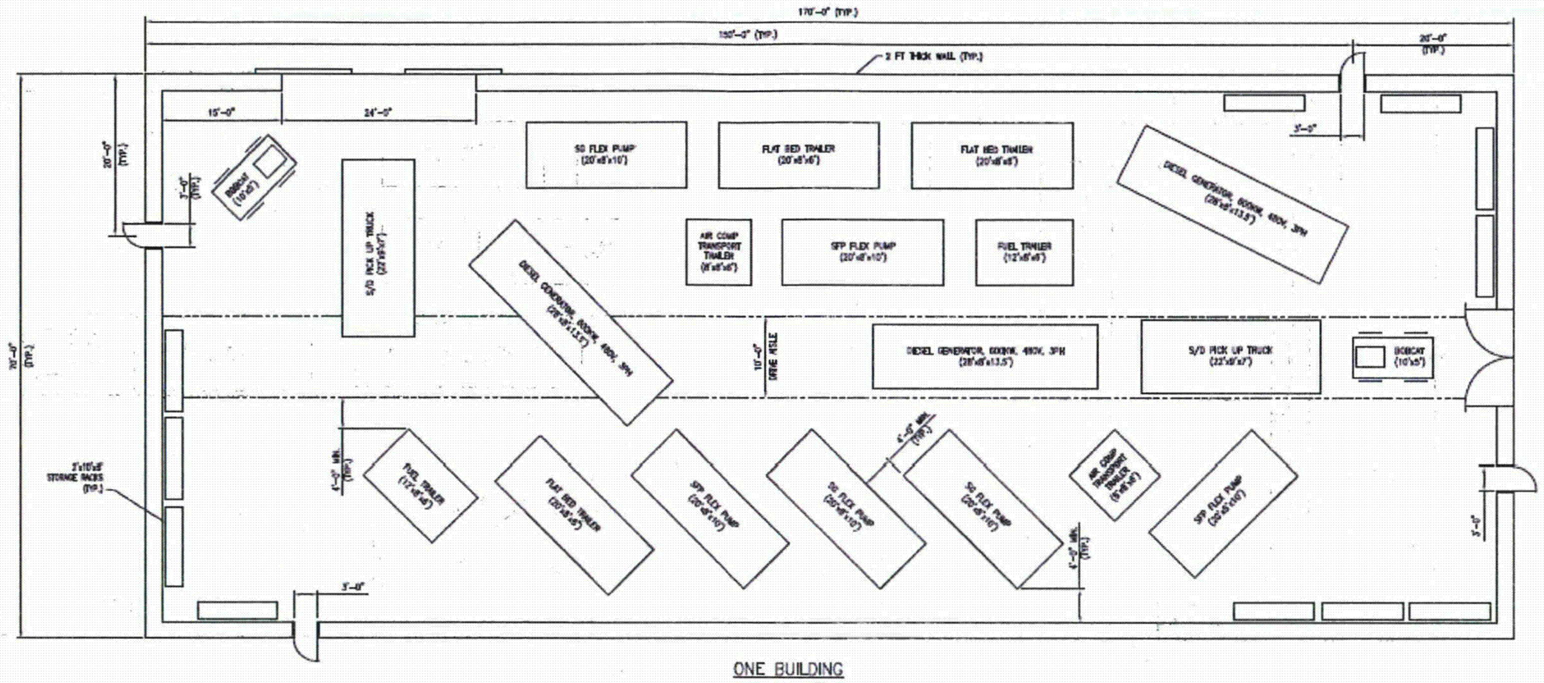
Modification No. 9 (Electrical Power)



Attachment 5 – Figure 1   PTN FLEX Storage Building Location



Attachment 5 – Figure 2 PTN FLEX Storage Building Layout



EQUIPMENT DESCRIPTION	QUANTITY REQUIRED (n+1)	FOOTPRINT (L x W x H)
SG FLEX PUMP	3	20' x 8' x 10'
SFP FLEX PUMP	3	20' x 8' x 10'
AIR COMPRESSOR TRANSPORT TRAILER	2	8' x 8' x 8'
DIESEL GENERATOR (800KW, 480V, 3PH)	3	28' x 8' x 13.5'
BOBCAT	2	10' x 5'
SUPER DUTY TRUCK W/ 5TH WHEEL TOWING	2	22' x 8' x 7'
TRAILER (FLATBED)	3	20' x 8' x 6'
TRAILER W/ FUEL TANK (200 GAL)	2	12' x 8' x 8'

STORAGE BUILDING DESIGN CRITERIA:

FLEX EQUIPMENT STORAGE BUILDINGS WILL BE DESIGNED PER NEI 12-06 REV 0 (AUGUST 2012) FOR THE APPLICABLE SEISMIC, FLOOD, MISSILES, HIGH WINDS, SNOW, ICE AND COLD, AND EXTREME HEAT CONDITIONS.

1. SEISMIC:
   ONE BLDG.: MAXIMUM OF PLANT DESIGN BASIS SEISMIC LOADS (DETERMINED BY CLIENT) AND ASCE 7-10 (MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES)
2. FLOODING: BUILDING FINISHED FLOOR LEVEL ABOVE PLANT DESIGN BASIS FLOOD LEVEL, AND/OR SHALL BE WATERTIGHT AND ABLE TO WITHSTAND FLOOD FORCES.
3. HIGH WINDS:
   ONE BLDG.: MAXIMUM OF PLANT DESIGN BASIS FOR HIGH WINDS HAZARDS AND HURRICANE WIND SPEEDS.
4. SNOW, ICE AND EXTREME COLD: N/A, SUFFICIENT PORTABLE HEATERS SHALL BE PROVIDED TO KEEP TEMPERATURE ABOVE THE MINIMUM TEMPERATURE SPECIFIED BY THE EQUIPMENT MANUFACTURERS.
5. EXTREME HEAT: N/A, EQUIPMENT IN BUILDINGS ARE DESIGNED TO OPERATE IN EXTREME HEAT TEMPERATURES.

REV	DESCRIPTION	DRN	CHK	REV	APP	DATE
0	INITIAL ISSUE					

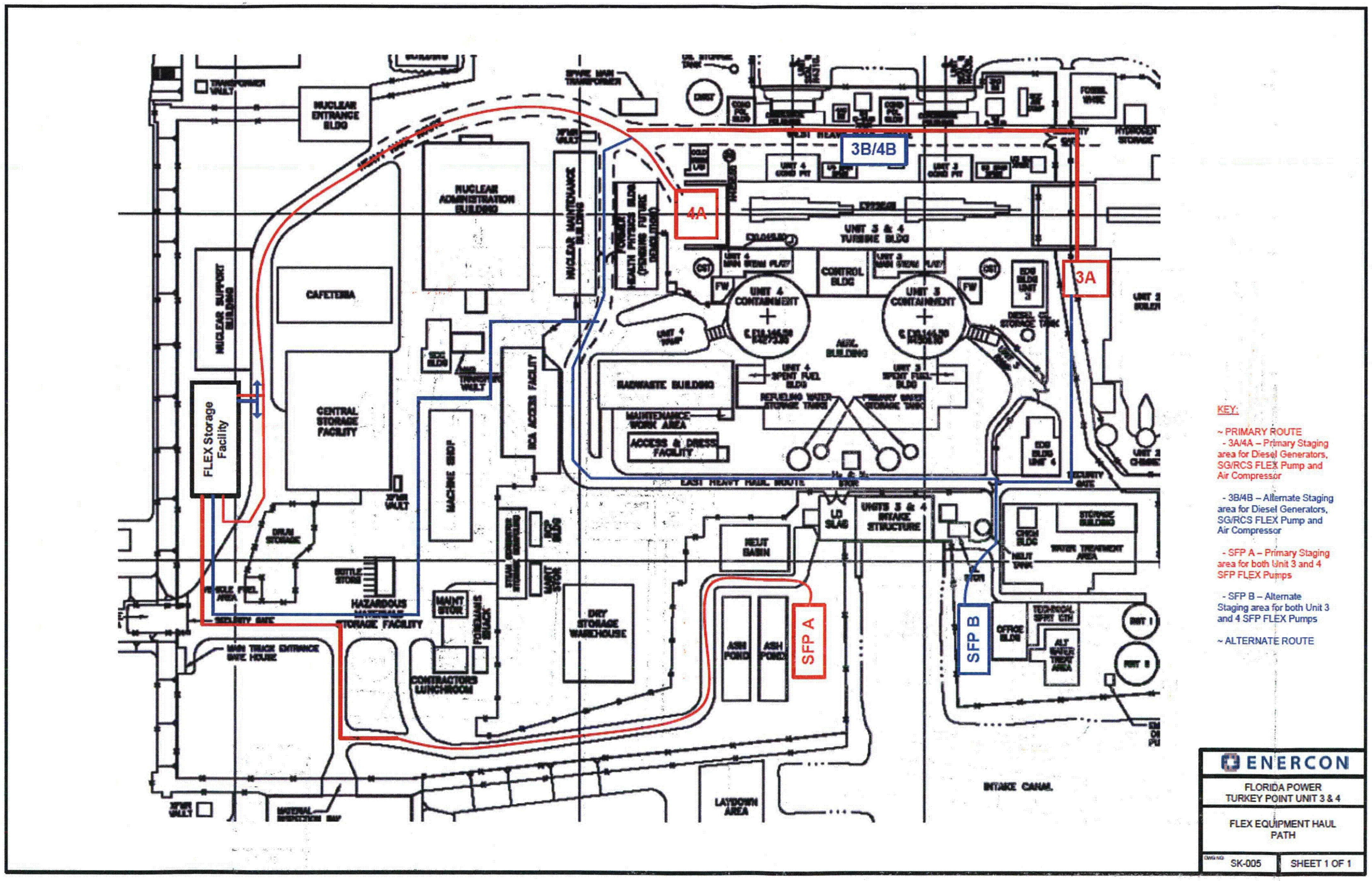
ENERCON
Kennesaw, GA 30144

FLORIDA POWER AND LIGHT
TURKEY POINT UNITS #3 & #4

FLEX PROJECT
OUTDOOR CONCRETE EQUIPMENT STORAGE BUILDING
FLOOR PLAN

SIZE: D | DWG NO.: SK-FPLTP080-C-001 | REV: 0
SCALE: NONE | SHEET 1 of 1

Attachment 5 – Figure 3 PTN FLEX Equipment Travel Paths and Staging Locations



Attachment 6
Figure 1 Instrumentation

Instrumentation					
Parameter	**Transmitter**	**Short term Power**	**Long Term Power**	**Available Alternative Method**	**Essential Function**
S/G-3A(4A) Pressure	PT-474/475/476	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Portable test equipment at instrument racks per 0-ONOP-103.3	Core Cooling
S/G-3B(4B) Pressure	PT-484/485/486				Core Cooling
S/G-3C(4C) Pressure	PT-494/495/496				Core Cooling
S/G-3A(4A) Narrow Range Level	LT-474/475/476	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Portable test equipment at instrument racks per 0-ONOP-103.3	Core Cooling
S/G-3B(4B) Narrow Range Level	LT-484/485/486				Core Cooling
S/G-3C(4C) Narrow Range Level	LT-494/495/496				Core Cooling
AFW flows	FT-1401A/B, 1457A/B, 1458A/B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Local indications	Core Cooling
Unit 3(4) CST Level	LT-6384A/B LI-6584	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Local indications	Core Cooling

Attachment 6
Figure 1 Instrumentation

Instrumentation					
Parameter	**Transmitter**	**Short term Power**	**Long Term Power**	**Available Alternative Method**	**Essential Function**
RCS WR T-Cold	QSPDS A QSPDS B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	SG pressures and steam tables, CETC temperatures, Portable test equipment at instrument racks per 0-ONOP-103.3	Core Cooling
RCS WR T-Hot					Core Cooling
Neutron Flux	ND-6649A ND-6949B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Portable test equipment at instrument racks per 0-ONOP-103.3	Core Cooling
Core Exit Thermocouple (CETC) temperature	TE-1 to TE-51, QSPDS A QSPDS B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Portable test equipment at instrument racks per 0-ONOP-103.3	Core Cooling
Pressurizer level	LT-459 LT-460 LT-461	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Portable test equipment at instrument racks per 0-ONOP-103.3	Core Cooling
Reactor Vessel level (RVLIS), ICCS RVL	QSPDS A QSPDS B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	None; heated junction must be powered through existing panel	Core Cooling
RCS WR Pressure	PT-404 PT-406	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	SG pressures (while RCS is at saturation)	Core Cooling

Attachment 6
Figure 1 Instrumentation

Instrumentation					
Parameter	**Transmitter**	**Short term Power**	**Long Term Power**	**Available Alternative Method**	**Essential Function**
Cold Leg Accumulator (CLA) wide range level	Not required by current strategies, less than maximum use made of accumulator inventory			CLA pressure (PT-921, -923, -925, -927, -929, -931)	Core Cooling
CTMT Pressure	PT-6306A PT-6306B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Local gauge at 3/4-2063 or -2059 vent	Containment
CTMT Temperature	TE-6700/6701/ 6702	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Portable test equipment at instrument racks per 0-ONOP-103.3	Containment
SFP Level	New modification being developed per EA-12-051			Local visual	SFP Level
DC bus voltage	Local meters	Battery	Battery	Local meters	Battery Capacity
RWST level	LI-6583A/6583B	Battery to inverter to 120V vital AC power panels	Portable AC generator to battery chargers	Local pressure gauges PIC-957A/957B, and PI-1596A/1596B	Core Cooling, Containment

Attachment 6

Credited Equipment

Permanent (Installed) Equipment

Permanent (installed) equipment to be utilized in the overall FLEX coping strategies includes equipment in the following systems:

AFW System and CST

Refueling Water Storage Tank (RWST)

RHR System

CCW System

SFP Cooling System

Containment Heat Removal System

Steam Generator Wet Layup and Blowdown

Safety Injection System (Accumulators)

For permanent equipment to be credited for FLEX actions, the equipment must be rated as ASME SC 3 or better or listed as Safety Related by PTN. Equipment not rated to AMSE SC 3 or better is not credited in the overall coping strategies detailed in previous sections. However, if some of this equipment is available following a ELAP and LUHS event, it should be used to mitigate any potential adverse consequences due to the ELAP and LUHS event.

Onsite FLEX Equipment

The overall coping strategies rely on providing active onsite equipment to provide flow and power. This equipment is required to be stored in structures that meet the external hazards requirements of NEI 12-06. Other equipment will be required to be in the qualified storage structure(s) as part of the overall coping strategies and includes hoses, hose to piping adapters, fans, electrical cables, communications equipment, portable lighting, diesel fuel transfer tank, and debris removal equipment.

Attachment 6

Credited Equipment

Offsite FLEX Equipment

Offsite FLEX equipment will be provided by the Regional Response Center (RRC). This equipment must be rated for the minimum requirements of the phase 3 strategies detailed above. Major equipment expected to be available from the RRC includes additional diesel powered pumps, large diesel generators, large diesel fuel supply, water purifying equipment, and boron mixing equipment. Other items include additional hoses, radiation protection equipment, personnel commodities, and portable lighting.

The following Attachment 6 Tables 1 and 2 describe the onsite and offsite phase 2 and phase 3 FLEX Credited Equipment respectively:

Attachment 6
Credited Equipment

Table 1							
PWR Portable Equipment Phase 2							
							Maintenance
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility	*Performance Criteria*	*Maintenance / PM requirements*
Three (3) Diesel Generators	X	X	X	X	X	600 kW, 480V	Will follow EPRI template requirements
Four (4) Electrical Cables	X	X	X	X	X	800 feet, 480V cables with quick connect fittings, 750 Amps continuously	Will follow EPRI template requirements
Three (3) SG/RCS Pump	X					300 gpm, 300 psi (min)	Will follow EPRI template requirements
Three (3) Discharge Hoses for SG/RCS Pump	X					500 feet each	Will follow EPRI template requirements
Three (3) Suction Hoses for SG/RCS Pump	X					50 feet each	Will follow EPRI template requirements
Three (3) SFP Makeup Pumps			X			250 gpm, 150 psi (min), 200 psi (max)	Will follow EPRI template requirements
Three (3) Discharge Hoses for SFP Pump			X			2000 feet	Will follow EPRI template requirements
Three (3) Suction Hoses for SFP Pump			X			50 feet with Suction Strainer	Will follow EPRI template requirements
Two (2) Diesel Air Compressor	X					750 scfm, 80 psi (min), 200 psi (max)	Will follow EPRI template requirements
Two (2) Air Hoses	X					800 feet, 3/8 inch connection	Will follow EPRI template requirements

Attachment 6
Credited Equipment

Table 1							
PWR Portable Equipment Phase 2							
							Maintenance
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility	*Performance Criteria*	*Maintenance / PM requirements*
Hand Loader and Nitrogen Bottles for SDTA operation	X					80 psi (min), 200 psi (max)	Will follow EPRI template requirements
Fuel Trailer						With Installed Fuel Transfer Pump	Will follow EPRI template requirements

Attachment 6
Credited Equipment

Table 2							
PWR Equipment Phase 3							
Use and (potential / flexibility) diverse uses							*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility	*Performance Criteria*	*Maintenance / PM requirements*
Two (2) Large Load Diesel Generators	X	X	X	X	X	4160V, 3750 kVA, 150 Amps, 2 connection points	To be addressed by RRC
One (1) Medium Diesel Generators	X	X	X	X	X	480V, 700 kVA, 600 Amps, 10 connection points	To be addressed by RRC
Electrical Cables	X	X	X	X	X	800 feet, 480V cables with quick connect fittings, 750 Amps continuously	To be addressed by RRC
Two (2) UHS Pumps	X	X	X			9000 gpm, 8" connection	To be addressed by RRC
Two (2) UHS Pump Hoses	X	X	X			500 feet each	To be addressed by RRC
Two (2) SG/RCS Pump	X					300 gpm, 300 psi (min), 150 feet from suction	To be addressed by RRC

Attachment 6
Credited Equipment

Table 2								
PWR Equipment Phase 3								
	Use and (potential / flexibility) diverse uses							*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility	*Performance Criteria*		*Maintenance / PM requirements*
Two (2) Discharge Hoses for SG/RCS Pump	X					500 feet each		To be addressed by RRC
Two (2) Suction Hoses for SG/RCS Pump	X					50 feet each		To be addressed by RRC
Boric Acid	X					4000 lbs (25 lb bags)		To be addressed by RRC
Two (2) SFP Makeup Pumps			X			250 gpm, 150 psi (min), 200 psi (max)		To be addressed by RRC
Two (2) Discharge Hoses for SFP Pump			X			2000 feet		To be addressed by RRC
Two (2) Suction Hoses for SFP Pump			X			50 feet with Suction Strainer		To be addressed by RRC
Diesel Air Compressor	X					750 scfm, 80 psi (min), 200 psi (max)		To be addressed by RRC
Air Hoses	X					800 feet, 3/8 inch connection		To be addressed by RRC

Attachment 6
Credited Equipment

Table 2								
PWR Equipment Phase 3								
Use and (potential / flexibility) diverse uses							*Performance Criteria*	*Maintenance*
List portable equipment	Core	Containment	SFP	Instrumentation	Accessibility			*Maintenance / PM requirements*
Two (2) Skid Mounted Demineralizer Units	X		X				Capable of providing 150 gpm of nuclear grade water each	To be addressed by RRC
Two (2) Skid Mounted Reverse Osmosis Units	X		X				Capable of providing 150 gpm of Grade A water each	To be addressed by RRC
Bulk Diesel Fuel	X	X	X	X	X			To be addressed by RRC