



February 27, 2015
RC-15-0030

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

Dear Sir / Madam:

Subject: VIRGIL C. SUMMER NUCLEAR STATION (VCSNS) UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12
SOUTH CAROLINA ELECTRIC & GAS COMPANY'S FOURTH SIX-MONTH
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) (TAC NO. MF2338)

- 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
 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
 3. NEI 12-06, Diverse and Flexible Coping Strategies (FLEX) Implementation Guide, Revision 0, dated August 2012
 4. South Carolina Electric & Gas 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 17, 2012
 5. South Carolina Electric & Gas Company's Overall Integrated Plan as Required by 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 February 28, 2013

On March 12, 2012, the Nuclear Regulatory Commission ("NRC" or "Commission") issued an order (Reference 1) to South Carolina Electric & Gas Company (SCE&G). Reference 1 was immediately effective and directed SCE&G 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 required submission of an initial status report 60 days following issuance of the final interim staff guidance (Reference 2) and an overall integrated plan pursuant to Section IV, Condition C. Reference 2 endorses industry guidance document NEI 12-06, Revision 0 (Reference 3) with clarifications and exceptions identified in Reference 2. Reference 4 provided the SCE&G initial status report regarding mitigation strategies. Reference 5 provided the SCE&G overall integrated plan.

Reference 1 requires submission of a status report at six-month intervals following submittal of the overall integrated plan. Reference 3 provides directions regarding the content of the status reports. The purpose of this letter is to provide the fourth six-month status report pursuant to Section IV, Condition C.2, of Reference 1, that delineates progress made in implementing the requirements of Reference 1. The attached report provides an update of milestone accomplishments since the last status report, including any changes to the compliance method, schedule, or need for relief and the basis, if any.

This letter contains no new regulatory commitments. If you have any questions regarding this report, please contact Bruce L. Thompson at (803) 931-5042.

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

2-27-2015
Executed on


Thomas D. Gatlin

TS/TDG/wm

Attachment I South Carolina Electric & Gas Company's Fourth Six-Month Status Report for the Implementation of Order EA-12-049, Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond-Design-Basis External Events

Attachment II Conceptual Sketches of Strategies

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**VIRGIL C. SUMMER NUCLEAR STATION UNIT 1
DOCKET NO. 50-395
OPERATING LICENSE NO. NPF-12**

ATTACHMENT I

**SOUTH CAROLINA ELECTRIC & GAS COMPANY'S FOURTH SIX-MONTH STATUS
REPORT FOR THE IMPLEMENTATION OF ORDER EA-12-049, ORDER MODIFYING
LICENSES WITH REGARD TO REQUIREMENTS FOR MITIGATION STRATEGIES
FOR BEYOND-DESIGN-BASIS EXTERNAL EVENTS**

1 Introduction

South Carolina Electric & Gas Company (SCE&G) developed an Overall Integrated Plan (Reference 1 in Section 8), first six-month status report (Reference 3 in Section 8), second six-month status report (Reference 4 in Section 8), and third six-month status report (Reference 6 in Section 8) documenting the diverse and flexible strategies (FLEX), in response to Reference 2. This attachment provides an update of milestone accomplishments since submittal of the Overall Integrated Plan, including any changes to the compliance method, schedule, or need for relief/relaxation and the basis, if any. This update also incorporates Virgil C. Summer Nuclear Station's (VCSNS) additional responses to NRC's Mitigating Strategies Regulatory Audit Questions and Interim Staff Evaluation (Reference 5 in Section 8).

2 Milestone Accomplishments

The following milestone(s) have been completed since the development of the Overall Integrated Plan (Reference 1), and are current as of February 16, 2015.

FLEX Modification Design Engineering Evaluations (Engineering Change Requests) have been completed for in-plant modifications.

3 Milestone Schedule Status

The following provides an update to Attachment 2 of the Overall Integrated Plan. It provides the activity status of each item, and whether the expected completion date has changed. The dates are planning dates subject to change as design and implementation details are developed.

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
Submit 60 Day Status Report	Oct 2012	Complete	
Submit Overall Integrated Plan	Feb 2013	Complete	
Submit 6 Month Updates:			
Update 1	Aug 2013	Complete	
Update 2	Feb 2014	Complete	
Update 3	Aug 2014	Complete	
Update 4	Feb 2015	Complete	
Update 5	Aug 2015	Not Started	
Update 6	Feb 2016	Not Started	
FLEX Strategy Evaluation	Aug 2013	Complete	
Walk-Throughs or Demonstrations	Aug 2015	Not Started	
Perform Staffing Analysis	Jul 2014	In Progress	July 2015
Modifications:			
Modifications Evaluation	Dec 2013	Complete	
Unit 1 Design Engineering Evaluation	Jan 2015	Complete	
Unit 1 Implementation Outage	Nov 2015	In Progress	
Storage:			
Design Storage Building	Jul 2014	In Progress	March 2015
Storage Implementation	Jul 2015	In Progress	Aug 2015

Milestone	Target Completion Date	Activity Status	Revised Target Completion Date
FLEX Equipment:			
Procure On-Site Equipment	Oct 2014	In Progress	June 2015
Develop Strategies with RRC	Nov 2014	Complete	
Install Off-Site Delivery Station (if Necessary)	Aug 2013	Complete	
Procedures:			
PWROG issues NSSS-specific guidelines	May 2013	Complete	
Create Site-Specific FSGs	Feb 2014	In Progress	October 2015
Create Maintenance Procedures	Oct 2014	In Progress	October 2015
Training:			
Develop Training Plan	Jan 2015	In Progress	March 2015
Training Complete	Jul 2015	In Progress	November 2015
Unit 1 FLEX Implementation	Nov 2015	Not Started	
Submit Completion Report	Jan 2016	Not Started	

4 Changes to Compliance Method

This section describes and documents changes to the information provided in the SCE&G Overall Integrated Implementation Plan that meet NEI 12-06 compliance methods and addresses the Mitigating Strategies Regulatory Audit Questions and the Interim Staff Evaluation. Each change is listed with the justification provided.

In Section 4: Sequence of Events and Technical Basis:

4A. Subsection “General:” paragraph 1 was revised to clarify the cooldown will occur within 2-4 hours to promote long term survivability of the reactor coolant pump (RCP) seals and allow use of FLEX equipment at lower Reactor Coolant System (RCS) and steam generator (SG) pressures.

Justification: This change clarifies the time and basis for plant cooldown.

4B. Subsection “General:” paragraph 2 was revised to change the setpoint for which boration must be complete from 300 psig to 260 psig steam pressure.

Justification: This change reflects revised analysis completed (revised Reference 47).

4C. Subsection “General:” paragraph 3 was revised to increase the time available to initiate DC load shedding from 2 hours to 3 hours.

Justification: This change reflects revised analysis completed (revised Reference 28).

4D. Subsection “*General:*” paragraph 14 was re-written to indicate the change in strategy to always have FLEX breakers for XSW1DA and XSW1DB racked up to maintain the seismic qualification of the breakers.

Justification: This change reflects a revised strategy for FLEX breaker position based on additional analysis.

4E. Subsection “*Discussion of time constraints identified in Attachment 1A*” paragraph “Table Item 7 - Entry into ELAP:” was revised to increase the ELAP entry time from 1 hour to 2 hours.

Justification: This change reflects new analysis completed on battery life (see item 4C above).

4F. Subsection “*Discussion of time constraints identified in Attachment 1A*” paragraph “Table Item 8, 12 - Complete DC Load shed:” was revised to increase the time to complete DC load shedding from 3 hours to 4 hours, resulting in a reduced estimated battery life from 20 hours to 15 hours respectively.

Justification: This change reflects new analysis completed on battery life (see item 4C above).

4G. Subsection “*Discussion of time constraints identified in Attachment 1A*” paragraph “Table Item 13 – Start Cooldown:” was revised to remove the need for plant specific analysis if cooldown is delayed.

Justification: This change reflects commitment and strategy to not purposefully delay cooldown (see item 4A above).

4H. Subsection “*Discussion of time constraints identified in Attachment 1A*” paragraph “Table Item 19 - Complete Damage Assessment Walkdowns:” was revised to indicate that damage assessment walkdowns will be incorporated into plant procedures.

Justification: This change reflects incorporation into plant procedures.

In Section 5: Strategy Deployment

5A. The second to the last paragraph was revised to clarify that deployment timeframes for spent fuel pool makeup strategies are different in Mode 6.

Justification: This change acknowledges the reduced timeframe for spent fuel pool makeup when in Mode 6.

In Section 10: Maintain Core Cooling & Heat Removal:

10A. The third paragraph in subsection “*Maintain Core Cooling & Heat Removal: Phase 1*” was revised to remove specificity of using plant electrician to perform FLEX diesel generator alignment.

Justification: This change was a result of the preliminary FLEX staffing analysis.

10B. The last paragraph in subsection “*Maintain Core Cooling & Heat Removal: Phase 1*” was revised to reflect initial cooldown in 2-4 hours to 260 psig.

Justification: This change reflects commitment and strategy to not purposefully delay cooldown (see item 4A above).

10C. Subsection “*Maintain Core Cooling & Heat Removal: PWR Portable Equipment Phase 2, Primary Strategy*” was re-written to identify the use of the Turbine Driven Emergency Feedwater (TDEFW) pump as the primary strategy for core cooling. Repowering a Motor Driven Emergency Feedwater (MDEFW) pump with a portable generator is now an alternate strategy (see item 10D below).

Justification: This change reflects industry's and NRC's acceptance of installed equipment being credited for FLEX.

10D. Subsection “*Maintain Core Cooling & Heat Removal: PWR Portable Equipment Phase 2, Alternate Strategies*” was re-written to identify the use of the MDEFW pump as an alternate strategy for core cooling. Use of the portable FLEX SG Feed pump is retained as an alternate strategy. Use of the TDEFW pump is now the primary strategy (see item 10C above).

Justification: This change reflects industry's and NRC's acceptance of installed equipment being credited for FLEX.

10E. In Subsection “*Maintain Core Cooling & Heat Removal: PWR Portable Equipment Phase 2, Alternate Strategies*,” the references to the FLEX Feed Header were re-defined (throughout the section) to clarify that this is not a header but a set of parallel hoses strategically stored and protected in the plant. The use of the EAST FLEX Feed Manifold to improve makeup strategies for the east side of the plant was also clarified.

Justification: This change clarifies the location and use of hoses for SG makeup using the FLEX SG Feed pump.

10F. In Subsection “*Maintain Core Cooling & Heat Removal: PWR Portable Equipment Phase 2, Alternate Strategies*,” the last paragraph was clarified to identify the water sources available, after Condensate Storage Tank (CST) depletion, to provide flow directly to the FLEX SG Feed pump.

Justification: This change clarifies water sources availability after CST depletion.

In Section 11: Maintain RCS Inventory Control:

11A. In Subsection “*Maintain RCS Inventory Control: PWR Installed Equipment Phase 1*,” the first paragraph has been enhanced to clarify that the needs for makeup to the RCS are driven by the need to maintain subcriticality, rather than to maintain RCS inventory.

Justification: This change reflects revised analysis completed (revised Reference 47).

11B. In Subsection “*Maintain RCS Inventory Control: PWR Installed Equipment Phase 1*,” the third paragraph has been enhanced to include a discussion of cooldown effects on RCP

seals and changes the subsequent cooldown temperature to 409 degrees Fahrenheit from 425 degrees Fahrenheit.

Justification: This change reflects revised analysis completed (revised Reference 47).

11C. Subsection “Maintain RCS Inventory Control: PWR Portable Equipment Phase 2,” has been revised to incorporate recent analysis indicating a letdown path is not necessary to accommodate Phase 2 boration and preclude RCS overflow.

Justification: This change reflects revised analysis completed (revised Reference 47).

11D. In Subsection “Maintain RCS Inventory Control: PWR Portable Equipment Phase 2,” the second to last paragraph has been enhanced to indicate that procedures already exist to dilute the BAT in cases of cold weather.

Justification: This change clarifies existing procedures exist to mitigate effects of cold on boron precipitation.

In Section 14: Safety Function Support:

14A. Subsection “Safety Function Support: PWR Installed Equipment Phase 1: Station 125VDC Batteries supplying DC and 120VAC vital AC” has been revised to increase the time to complete DC load shedding from 3 hours to 4 hours, resulting in a reduced estimated battery life from 20 hours to 15 hours respectively (see item 4F above).

Justification: This change reflects revised analysis completed (revised Reference 28).

14B. Subsection “Safety Function Support: PWR Installed Equipment Phase 1: Primary Strategy for Extending DC Power Availability” has been revised to identify repowering the batteries using 480V DC generators in the Electric Building (EB) or Auxiliary Electric Building (AEB) through FLEX battery chargers in the EEB connecting to the existing plant DC distribution via portable cables.

Justification: This change reflects a change in primary strategy for charging batteries following the preliminary FLEX staffing analysis.

14C. Subsection “Safety Function Support: PWR Installed Equipment Phase 1: Alternate Strategy for Extending DC Power Availability” has been added to include the previously identified primary strategy for charging station batteries by repowering AC bus and existing station battery chargers from FLEX combustion turbine generators (CTGs) (see item 14B above).

Justification: This change reflects a change in primary strategy for charging batteries following the preliminary FLEX staffing analysis.

14D. Subsection “Safety Function Support: PWR Installed Equipment Phase 1: Backup Strategy for Extending DC Power Availability” has been revised to increase the time to complete DC load shedding from 3 hours to 4 hours, resulting in a reduced estimated battery life from 20 hours to 15 hours respectively (see item 4F above).

Justification: This change reflects revised analysis completed (revised Reference 28).

14E. Subsection "*Safety Function Support: PWR Installed Equipment Phase 1: Alternate Strategy for Extending DC Power Availability*" has been removed.

Justification: This method to defeat the interlock on the swing chargers was not necessary for FLEX coping.

In References:

The following references were revised:

28. VCSNS Calculation DC08320-019 (Rev 1), EOP-6/BDMG Ultimate Battery Life Under Load Shedding
47. VCSNS Calculation DC00080-003 (Rev 2)

In Attachment 1A: Sequence of Events Timeline

Action Items 1 and 2 were interchanged to reflect the correct sequence for Station Blackout.

Action Item 3 for operators to take manual control of steam power operated relief valves was delayed/re-sequenced until cooldown is started.

Action Item 4 was added to deploy portable communications tower.

Action Item 5 was revised to clarify that FLEX generators will be prepared but not be physically connected until extended loss of alternate current power (ELAP) is declared.

Action item 6 was revised to clarify TDEFW pump room doors will also be opened for ventilation.

Action Item 7 was revised to reflect that ELAP declaration must be made by 2 hours.

Action Item 8 was added to identify contacting the National SAFER Response Center (NSRC) following ELAP declaration.

Action Item 9 was added to identify the need to connect generators to repower battery chargers after ELAP is declared.

Action Item 10 was renumbered and revised to clarify that DC load stripping would start at 3 hours if the station batteries are not on a charge by that time.

Action Item 13 "to open relay room doors" was removed as it was a duplicate action.

Action Item 14 was renumbered to 13 and revised to clarify DC load stripping was required to be complete by 4 hours.

Action Item 14 was revised to clarify the new cooldown target of 260 psig steam.

Action Item 15 for safety injection accumulators injecting was removed since no credit is taken for accumulator injection.

Action Item 16 was revised to clarify the new cooldown target of 260 psig steam.

Action Item 20 was revised to clarify that CST refill was required by T+11 hours to allow for continued TDEFW pump operation.

Action Item 24 was revised to reflect that station batteries are depleted in T+15 hours if DC load stripping is completed at T+4 hours and no battery charging occurs.

Justification: These changes revise and clarify the correct sequence of events timeline based on additional analysis and the preliminary FLEX staffing study.

Figures

Figure 1 – Conceptual Phase 1&2 Coping for SG Feed Makeup was revised and reissued in Attachment II of this submittal. The pumps for taking suction from the Lake were revised to include the FLEX UHS Pump.

Figure 2 – Conceptual Diverse Strategy for Supplying FLEX SG Makeup was revised and reissued in Attachment II of this submittal. The location and configuration of the FLEX Booster/Transfer Pump was revised to reflect its purpose to provide net positive suction head (NPSH) to the North FLEX SG Makeup pump.

Figure 3 – Conceptual Phase 2 Coping for Refilling of CST was revised and reissued in Attachment II of this submittal. The pumps for taking suction from the Lake were revised to include the FLEX UHS Pump and the Booster pump was renamed the BSTR/XFR Pump.

Figure 8 – Conceptual FLEX Feed Header Layout was renamed **Conceptual FLEX Feed Hose Layout** and reissued in Attachment II of this submittal.

Figure 11 – FLEX Strategy Conceptual Mechanical Diagram was revised to identify RCS Makeup methods for Modes 1-4 and Modes 5-6.

Figure 14 – FLEX Storage and Deployment Site Plan was revised and reissued in Attachment II of this submittal. The revised figure reflects the new location of the FLEX Storage Building outside the Protected Area, approximately 700 feet southeast from its original proposed location, and revised the Equipment Matrix.

5 Need for Relief/Relaxation and Basis for the Relief/Relaxation

SCE&G expects to comply with the order implementation date, and no relief/relaxation is required at this time.

6 Open Items from Overall Integrated Plan and Draft Safety Evaluation

The following generic concerns have been addressed by NEI, accepted by the NRC, and incorporated into the appropriate section of the Overall Integrated Plan:

- Position Paper: Shutdown/Refueling Modes – endorsed by NRC in September 30, 2013 letter to NEI was incorporated into Section 5: Strategy Deployment.
- EPRI Report 3002000623 entitled “Nuclear Maintenance Applications Center: Preventive Maintenance Basis for FLEX Equipment” – endorsed by NRC in October 7, 2013 letter to NEI was incorporated into Section 7: Programmatic Controls.
- Westinghouse position paper entitled “Westinghouse Response to NRC Generic Request for Additional Information (RAI) on Boron Mixing in Support of the Pressurized Water Reactor Owners Group (PWROG),” – endorsed by NRC in January 8, 2014 letter to NEI was incorporated into Section 11: Maintain RCS Inventory Control.
- Battery Life Issue White Paper – endorsed by NRC in September 16, 2013 letter to NEI was incorporated into Section 14: Safety Function Support.

7 Potential Draft Safety Evaluation Impacts

There are no potential impacts to the Draft Safety Evaluation identified at this time.

8 References

The following references support the updates to the Overall Integrated Plan described in this attachment.

1. SCE&G'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), dated February 28, 2013.
2. 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.
3. SCE&G's First Six-Month 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 August 28, 2013.
4. SCE&G's Second Six-Month 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 February 27, 2014.
5. NRC letter to SCE&G “Virgil C. Summer Nuclear Station Unit 1 – Interim Staff Evaluation Related to Overall Integrated Plan in Response to Order EA-12-049 (Mitigation Strategies),” dated February 21, 2014.
6. SCE&G's Third Six-Month 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 August 28, 2014.

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ATTACHMENT II

CONCEPTUAL SKETCHES OF STRATEGIES

Figure 1 – Conceptual Phase 1&2 Coping for SG Feed Makeup

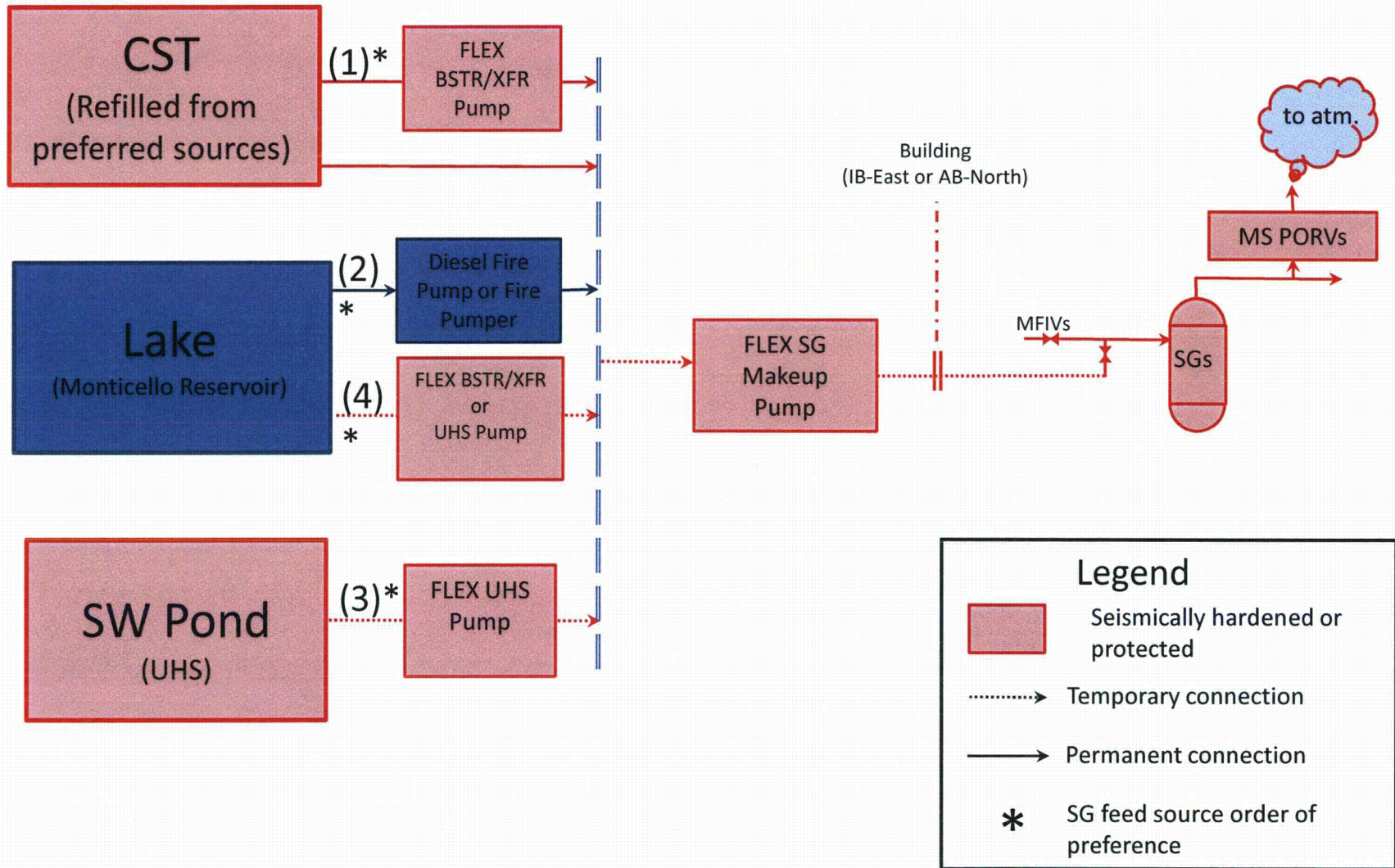


Figure 2 – Conceptual Diverse Strategy for Supplying FLEX SG Makeup Pump

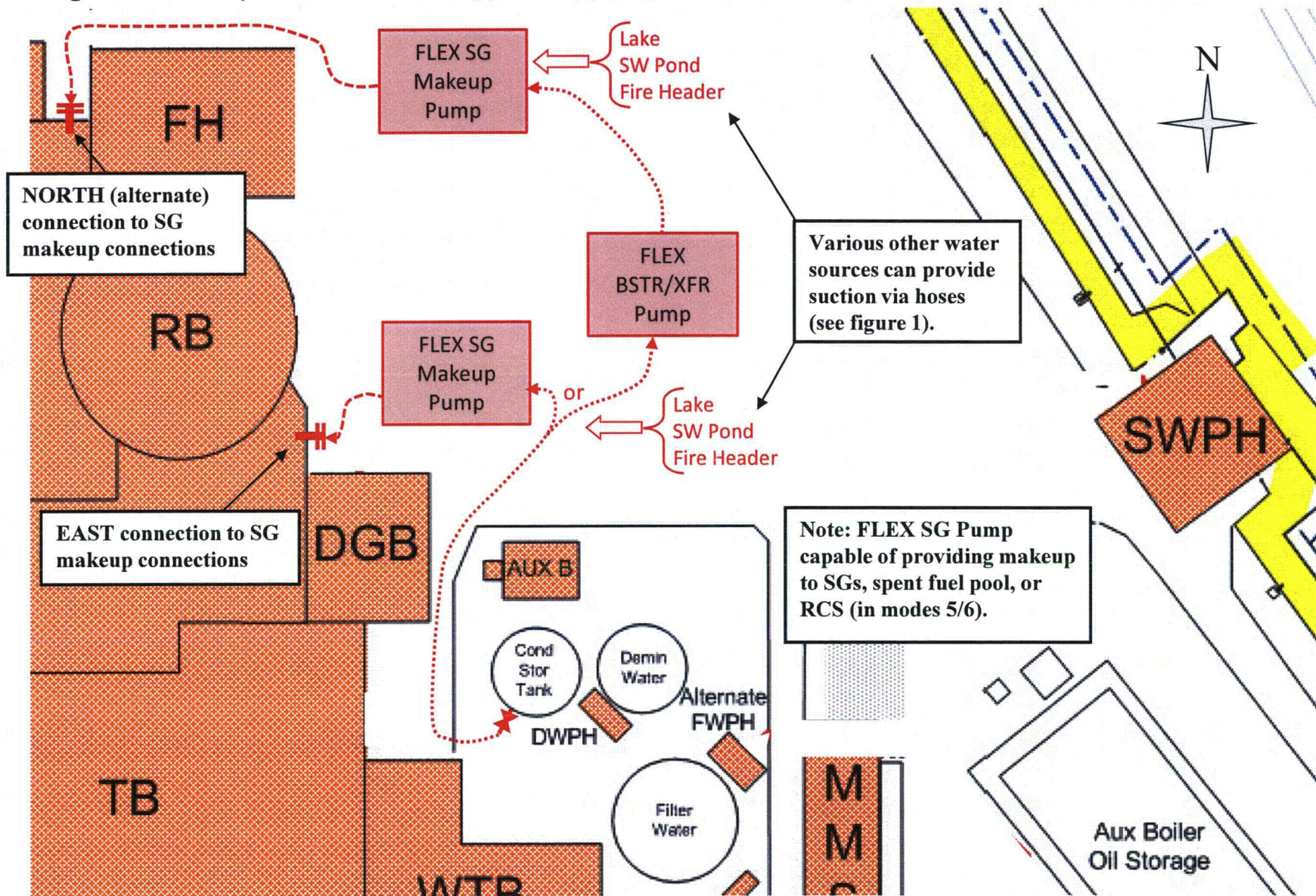


Figure 3 – Conceptual Phase 2 Coping for Refilling of CST

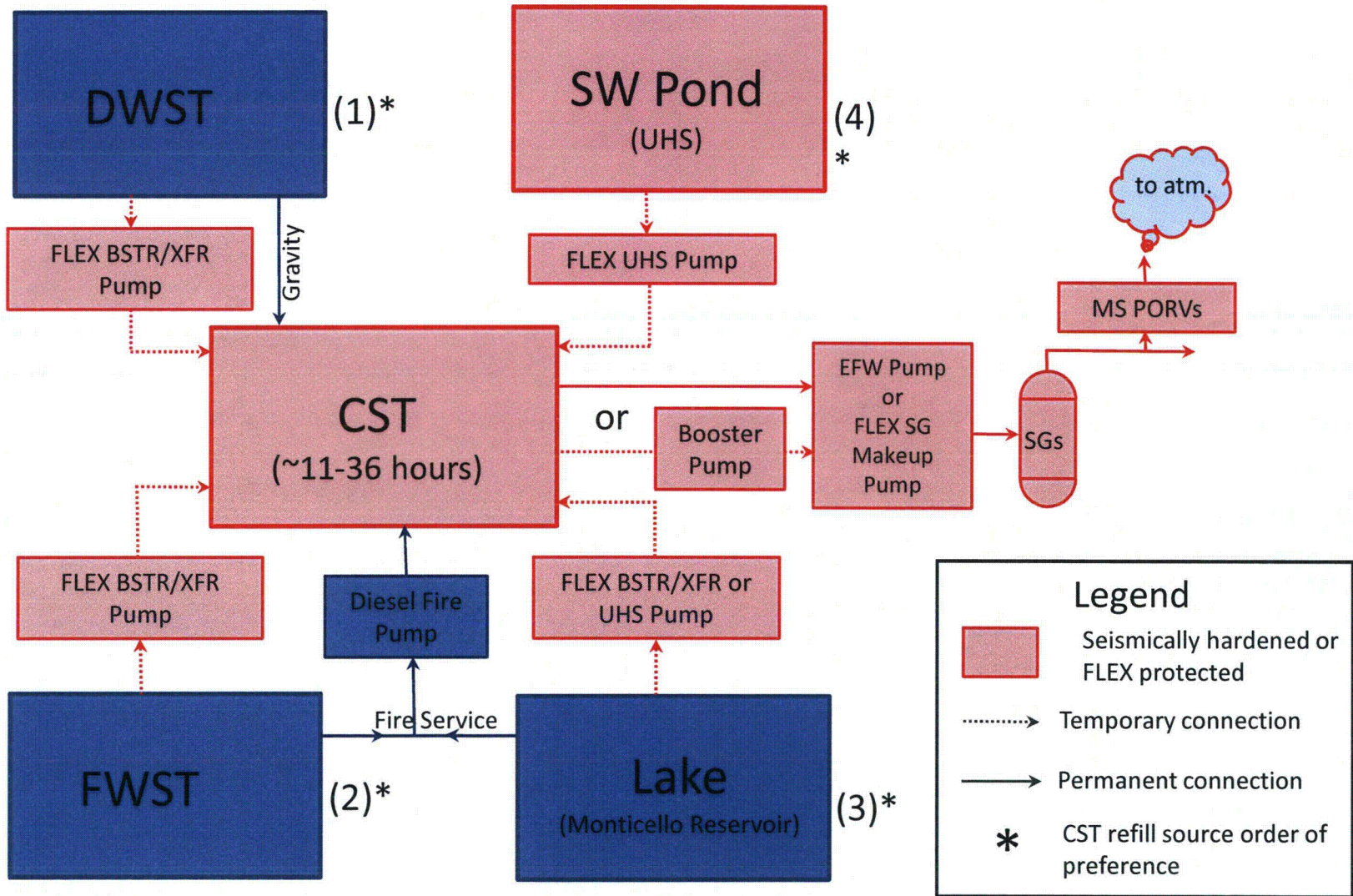


Figure 8 – Conceptual FLEX Feed Hose Layout

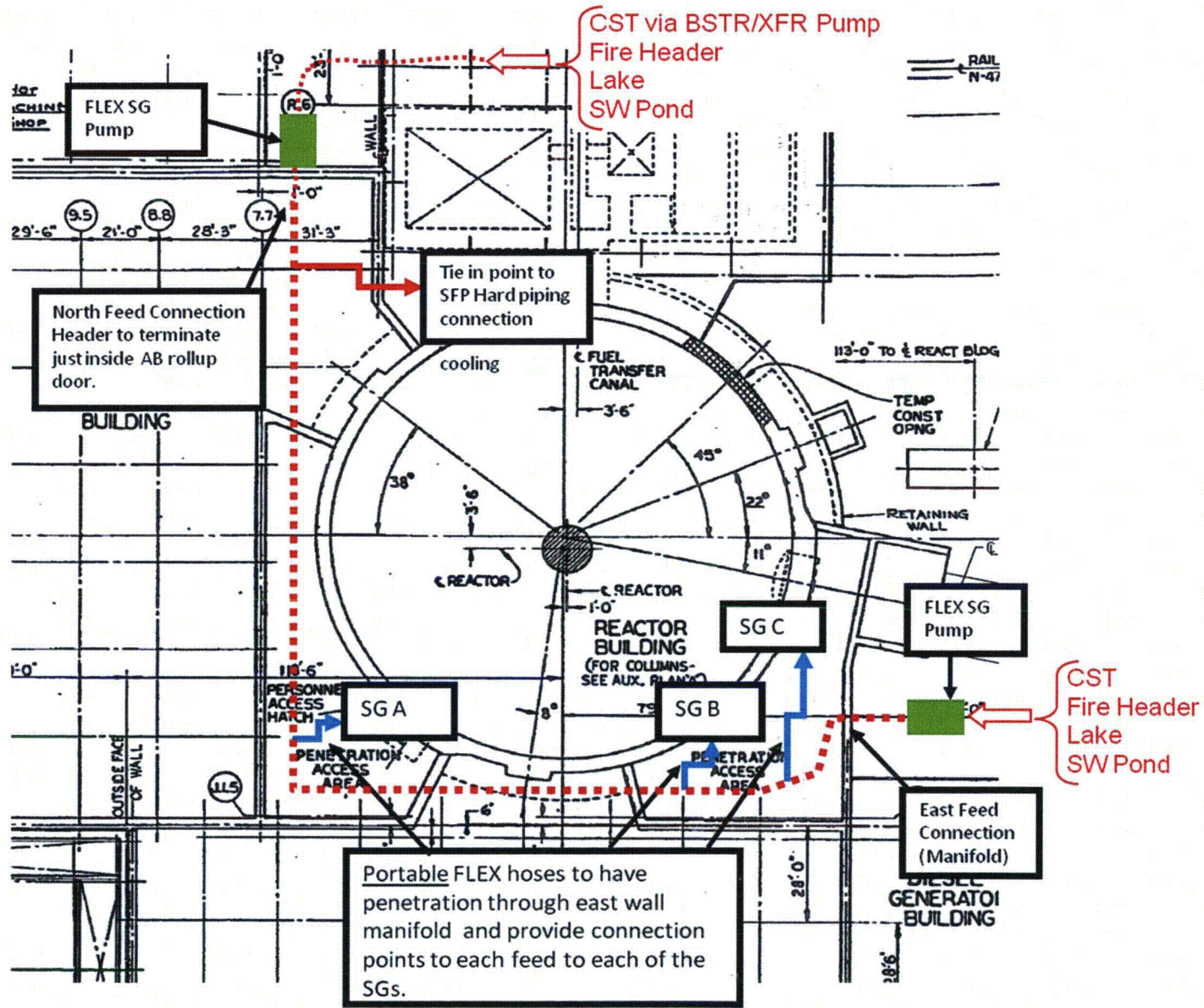


Figure 11 – FLEX Strategy Conceptual Mechanical Diagram

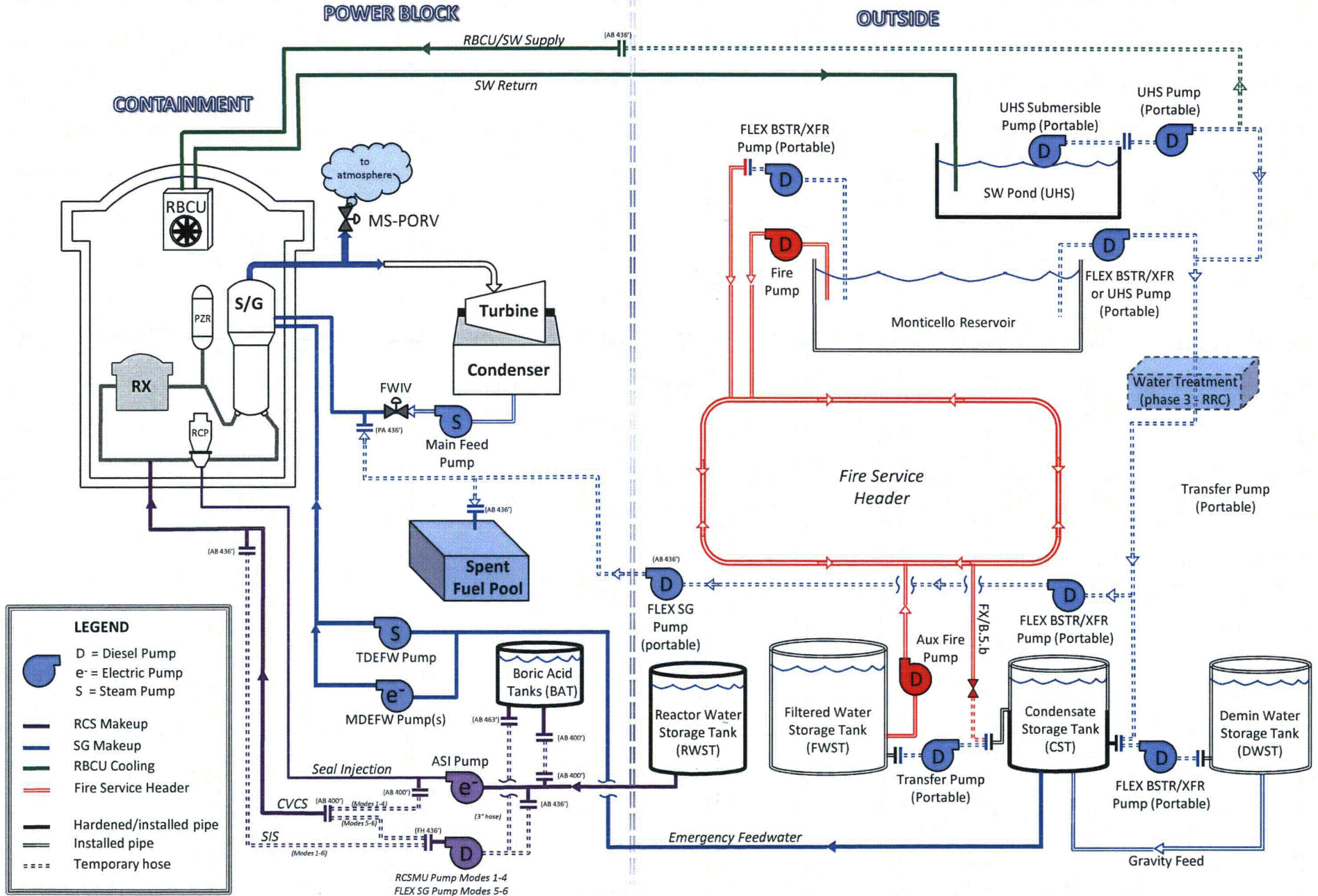


Figure 14 –FLEX Storage and Deployment Site Plan

