



Security-Related Information
Withhold From Public Disclosure Under 10 CFR 2.390
Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

10 CFR 50.4
10 CFR 50.54(f)
EA-12-049

LIC-16-0095
October 31, 2016

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

Fort Calhoun Station (FCS), Unit 1
Renewed Facility Operating License No. DPR-40
Docket No. 50-285

Subject: Omaha Public Power District's Revised Overall Integrated Plan for Fuel Permanently Removed from the Reactor Vessel to the Spent Fuel Pool in Response to Requirements for Mitigation Strategies for Beyond Design Basis External Events

References: See page 4

By letter dated August 12, 2016 (Reference 1), the Omaha Public Power District (OPPD) requested relaxation of the implementation date for compliance with Order EA-12-049 to August 31, 2017, based on plans to remove all fuel from the reactor pressure vessel (RPV) to the spent fuel pool (SFP) by December 31, 2016. The new Overall Integrated Plan (OIP) for Fuel Permanently Removed from RPV to SFP is enclosed as discussed in Reference 1. As stated in Reference 2, the OIP includes an assessment of the reevaluated flooding hazards applicable to FCS with all fuel in the SFP and the capability to mitigate these re-evaluated flooding hazards.

The following are key aspects of the OIP with all fuel in the SFP:

- The Seismic and Flooding External Hazards have been updated consistent with OPPD's responses to the 50.54(f) letter Reference (6).
- The Storms, Hurricanes, High Winds and Tornadoes External Hazard has been revised to be consistent with the Updated Final Safety Analysis Report (USAR) to reflect the changes made in Amendment 272.
- SFP temperature and boil off calculations use a decay heat level corresponding to 60 days after shutdown for fuel removed from the RPV to the SFP.
- Sequences of Events are provided for two limiting flooding scenarios in addition to the extended loss of alternating current (ac) power (ELAP) Sequence of Events.
- The bases for time constraints have been established.
- Guidance documents have been developed and validated.

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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

Open Items

The NRC staffs review of the FCS OIPs, as supplemented, and as augmented in the audit process (Reference 3), identified the items in Table 1 currently under NRC Staff review that require OPPD input. The following input is provided for each Audit Item.

CI 3.2.4.2.C

As discussed in the enclosed OIP, only the Spent Fuel Pool Instrument (SFPI) is used to monitor conditions in the mitigating strategies. The SFPI includes a stand-alone battery backup and the batteries housed in the battery room are no longer required to implement the mitigating strategies. Therefore, it is recommended this item be closed.

AQ.19

The FLEX safety injection refueling water tank pump is replaced with submersible pumps in the OIP mitigating strategies. Therefore, it is recommended this item be closed.

SE.14

As discussed in the attached OIP, no equipment in the containment is relied upon during an ELAP. Therefore, it is recommended this item be closed.

SE.17

The overall flooding strategy is discussed in the enclosed OIP. No open items are associated with the enclosed OIP.

Milestones

The following will be completed by December 31, 2016:

- Installation of the SFPI
- Installation of the standpipe between Rooms 81 and 69
- Training and issuance of procedures and guidelines
- Procurement of the diesel fuel oil transfer pumps
- FLEX equipment staged in either the safety-related plant structures or in the FLEX Storage Building.

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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

Staffing Assessment

OPPD provided the Fort Calhoun Station Phase 2 Staffing Assessment Report in Reference 4 showing that the minimum on-shift staffing necessary to implement the mitigating strategies. In accordance with Reference 5, the required on-shift staffing will be reduced from 13 people to 8 people with the plant in a permanently defueled condition. This reduced on-shift staffing is sufficient to perform the required emergency response functions and implement spent fuel pooling cooling requirements.

No commitments to the NRC are made in this letter. If you should have any questions regarding this submittal or require additional information, please contact Mr. Bradley H. Blome at 402-533-7270.


Shane M. Marik
Site Vice President and CNO

SMM/epm

Enclosure 1: Fort Calhoun Station Decommissioning Coping Strategies Overall
Integrated Plan

Appendix A: External Flood Hazard Assessment

C:
K. M. Kennedy, NRC Regional Administrator, Region IV
P. J. Bamford, NRC Senior Project Manager
C. F. Lyon, NRC Senior Project Manager
S. M. Schneider, NRC Senior Resident Inspector
T. V. Govan, NRC Project Manger

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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

References:

1. OPPD letter (S. Marik) to USNRC (Document Control Desk), Request for Relaxation of March 12, 2012 Commission Order Modifying Licenses with Regard to Requirements for Mitigation Strategies for Beyond Design Basis External Events and Reliable Spent Fuel Pool Instrumentation (Order Number EA-12-049 and EA-12-051), dated August 12, 2016 (LIC-16-0048) (ML16225A539)
2. OPPD letter (S. Marik) to USNRC (Document Control Desk), Revision to Response to Request for Information Regarding Flooding Aspects of Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident- Fort Calhoun Station Flood Hazard Reevaluation Report, dated September 14, 2016 (LIC-16-0078) (ML16258A364)
3. NRC Letter (P. Bamford) to OPPD (S. Marik), Plan for the Onsite Audit Regarding Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC NOs. MF0969 and MF0968), dated March 8, 2016 (ML16064A077)(NRC-16-0024)
4. OPPD letter (S. Marik) to USNRC (Document Control Desk), Response to March 12, 2012, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, Enclosure 5, Recommendation 9.3, Emergency Preparedness- Staffing, Requested Information Items 1, 2, and 6 - Phase 2 Staffing Assessment, dated May 27, 2016 (LIC-16-0041) (ML16146A545)
5. OPPD letter (S. Marik) to USNRC (Document Control Desk), License Amendment Request (LAR) 16-02: Revise the Fort Calhoun Station Emergency Plan to Address the Permanently Defueled Condition, dated September 2, 2016 (LIC-16-0076) (ML16246A321)
6. NRC letter, Request for Information Pursuant to Title 10 of the Code of Federal Regulations 50.54(f) Regarding Recommendations 2.1, 2.3, and 9.3, of the Near-Term Task Force Review of Insights from the Fukushima Dai-ichi Accident, dated March 12, 2012 (ML12053A340) (NRC-12-0021)

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Table 1
Mitigation Strategies/Spent Fuel Pool Instrumentation Safety Evaluation Audit Items:
Audit Items Currently Under NRC Staff Review and Requiring Licensee Input

Audit Item Reference	Item Summary Description	Licensee Input Needed
CI 3.2.4.2.C	Equipment Cooling (Ventilation) - Confirm the acceptability of the battery room temperatures (extreme hot or extreme cold) on battery performance.	Provide an analysis of the battery rooms to show that the batteries will not be adversely affected as a result of loss of ventilation in extreme hot (loss of ventilation) and extreme cold (loss of heating) conditions. The analysis should address maintaining temperature below/above the design limit for an indefinite coping.
AQ.19	Portable Pump capability	Provide a procedural control mechanism for minimum Safety Injection and Refueling Water Tank (SIRWT) level to maintain consistency with the hydraulic analysis for the FLEX SIRWT pump
SE.14	Provide a discussion/analysis on the ability of electrical equipment (i.e., valve solenoids, instruments, relays, etc.) located within containment and other areas of the plant (i.e., ADV rooms, switchgear rooms, etc.) that is relied upon during an ELAP to function in the expected environmental conditions for the duration of the ELAP event (i.e., indefinitely).	Provide a discussion/analysis on the ability of electrical equipment (i.e., valve solenoids, instruments, relays, etc.) located within containment and other areas of the plant (i.e., ADV rooms, switchgear rooms, etc.) that is relied upon during an ELAP to function in the expected environmental conditions for the duration of the ELAP event (i.e., indefinitely).
SE.17	Provide a description of where/when equipment needed to support Phase 2 and Phase 3 operations will be deployed, staged and connected to plant systems during flood levels up to and including the design-basis flood.	Provide an overall flooding strategy that includes the requested detail.

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Omaha Public Power District (OPPD)

**Fort Calhoun Station Decommissioning Coping Strategies
Overall Integrated Plan**

October 2016

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

General Integrated Plan Elements (Ft. Calhoun Station)

Applicable Extreme External Hazard

The applicable extreme external hazards for Fort Calhoun Station (FCS) with all fuel stored in the Spent Fuel Pool (SFP) are seismic, external flood, high winds, snow, ice, cold temperatures and high temperature as detailed below:

Seismic Hazard Assessment

The FCS design basis seismic hazard is described in Reference 1. In response to Omaha Public Power District (OPPD) submittals, the NRC determined (Reference 2) that FCS screens out of conducting a seismic risk evaluation because the Individual Plant Examination for External Events (IPEEE) demonstrates plant seismic capacity to levels higher than the ground motion response spectra (GMRS) in the 1-10 Hertz (Hz) range. NRC concurred OPPD demonstrated that the IPEEE-related screening criteria in the NRC-approved industry guidance was met (Reference 2). The NRC staff determined that OPPD provided the necessary information requested in Enclosure 1, Items (1) - (7) of the 50.54(f) letter (Reference 3). Further the NRC concluded:

Contingent upon the NRC staff's review and acceptance of OPPD's spent fuel pool evaluation (i.e., Item (9) of the 50.54(f) letter) and the full - scope Individual Plant Examination of External Events (IPEEE) relay chatter review (requested to meet the criteria for using an IPEEE program) to demonstrate that a seismic risk evaluation (Item 8) is not merited for FCS, the Seismic Hazard Evaluation identified in Enclosure 1 of the 50.54(f) letter will be completed.

The NRC concluded OPPD's implementation of the SFP integrity evaluation (Reference 4) met the SFP Evaluation Guidance for Fort Calhoun and therefore, OPPD responded appropriately to Item 9 in Enclosure 1 of the NRC's 50.54(f) letter.

By letter dated August 25, 2016 (Reference 5), OPPD provided formal notification to the U.S. Nuclear Regulatory Commission (NRC) pursuant to 10 CFR 50.4(b)(8) and 10 CFR 50.82(a)(1)(i) certifying that it plans to permanently cease power operations at FCS on October 24, 2016. FCS plans to remove all fuel from the reactor pressure vessel (RPV) to the SFP by December 31, 2016. Because Ft. Calhoun will be ceasing operation and based on the seismic hazard discussion in SECY-15-0081, OPPD is not proceeding with IPEEE relay chatter review. OPPD concludes the FCS site screens in using the design basis seismic hazard.

External Flood Hazard Assessment

See Appendix A

Storms, Hurricanes, High Winds and Tornadoes

The following information is per USAR [Ref. 8, Chapter 2.5]:

The physical design parameters of tornado protection systems are such that designated SSCs are able to maintain their necessary capabilities in the event of a Design Basis Tornado (DBT). Amendment 272 revised the DBT and associated tornado missiles for Fort Calhoun Station (FCS) to that defined in Regulatory Guide (RG) 1.76, Revision 1.

The spectrum of hypothetical missiles used for the design basis analysis are [Ref. 8, Table 5.8-2]:

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Item	Weight (lbs)	Horizontal Velocity, fps
Sched 40 Pipe (6.625" dia x 15' lg)	287	135
Automobile (16.4'x6.6'x4.3')	4000	135
Solid Steel Sphere (1" dia.)	0.147	26

Thus the FCS site screens in for an assessment storms, high winds and tornadoes. The FCS site screens out for hurricanes because it is located several hundred miles from the nearest sea coast.

Snow, Ice Storms and Cold

The hazard remains the same as assessed, audited and described in References 1, 6, and 7. Per USAR [Ref. 8, Table 2.5-4], the maximum snow and ice accumulation in and around FCS in any 24-hour period was 18.3 inches. The lowest recorded temperature from National Weather Service data in Omaha is -32 °F. Thus the FCS site screens in for snow, ice storms and cold.

Extreme Heat

The hazard remains the same as assessed, audited and described in References 1, 6, and 7. The extreme temperature recorded at the site is 114°F, per USAR [Ref. 8, Table 2.5-5]. Thus the FCS site screens in for extreme heat.

References:

1. Letter from OPPD (L. Cortopassi) to NRC (Document Control Desk), "Omaha Public Power District'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 (ML 13064A298) (LIC-13-0019).
2. NRC Letter (D. Dorman) to OPPD (L. Cortopassi), Fort Calhoun Station, Unit 1 - Screening and Prioritization Results of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, dated September 22, 2014 (ML14224A526).
3. NRC Letter (F. Vega) to OPPD (L. Cortopassi), Fort Calhoun Station, Unit 1 - Staff Assessment of Information Provided Pursuant to Title 10 of the Code of Federal Regulations Part 50, Section 50.54(f), Seismic Hazard Reevaluations for Recommendation 2.1 of the Near-Term Task Force Review of Insights from the Fukushima Dai-Ichi Accident, dated December 8, 2015 (ML15329A181).
4. NRC Letter (F. Vega) to OPPD (S. Marik), Fort Calhoun Station, Unit 1 - Staff Review of Spent Fuel Pool Evaluation Associated with Seismic Hazard Implementing Near-Term Task Force Recommendation 2.1, dated August 4, 2016 (ML16182A361).

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5. OPPD letter (T. Burke) to USNRC (Document Control Desk), "Certification of Permanent Cessation of Power Operations," dated August 25, 2016 (LIC-16-0067)(ML 16242A 127)
6. NRC Letter (P. Bamford) to OPPD (S. Marik), Plan for the Onsite Audit Regarding Implementation of Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC NOS. MF0969 AND MF0968), dated March 8, 2016 (ML16064A077)(NRC-16-0024)
7. NRC Letter (P. Bamford) to OPPD (S. Marik), Plan for the Onsite Audit Regarding Implementation of Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC NOS. MF0969 AND MF0968), dated March 8, 2016 (ML16064A077)
8. Fort Calhoun Station Updated Safety Analysis Report (USAR)

Key Site assumptions

- The fuel is permanently removed from the RPV and containment to the SFP
- SFP temperature and boil off calculations are based a decay heat level corresponding to 60 days after shutdown for fuel removed from the RPV to the SFP. To minimize the response time available, conservatively high values were selected for decay heat and conservatively low values were selected for initial pool and tank levels. The only SFP heat losses assumed were from the latent heat of evaporation.
- Initial conditions assumed for events other than beyond design basis flooding are consistent with References 1 and 2 with the following exception
 1. Because the fuel is removed from the RPV and containment to the SFP there is no secondary cooling.

References:

1. Letter from OPPD (L. Cortopassi) to NRC (Document Control Desk), "Omaha Public Power District'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 (ML 13064A298) (LIC-13-0019).
2. NRC Letter (P. Bamford) to OPPD (S. Marik), Plan for the Onsite Audit Regarding Implementation of Implementation of Mitigating Strategies and Reliable Spent Fuel Pool Instrumentation Related to Orders EA-12-049 and EA-12-051 (CAC NOS. MF0969 AND MF0968), dated March 8, 2016 (ML16064A077)

Extent to which the guidance, JLD-ISG-2012-01 Revision 1 and NEI 12- 06 Revision 2, are being followed. Identify any deviations to JLD-ISG-2012-01 Revision 1 and NEI 12-06 Revision 1.

The guidance of JLD-ISG-2012-01 Revision 1 and NEI 12- 06 Revision 2 is followed for developing the mitigating actions and is limited to the impact of the extended loss of alternating current (ac) power (ELAP) event on the fuel in the SFP.

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Sequence of events and time constraint required for success including the technical basis for the time constraint.	Sequence of events are provided for three scenarios <ol style="list-style-type: none"> 1. ELAP not associated with beyond design basis flooding. 2. ELAP due to beyond design basis flooding with no antecedent conditions 3. ELAP due to beyond design basis flooding with antecedent conditions
Sequence of Events for ELAP not associated with beyond design basis flooding	
<p>The following sequence of events is applicable to ELAP due to causes other than a Beyond Design Basis flood. The time constraints identified discussed are based on site specific calculations.</p> <ul style="list-style-type: none"> • A timeline is provided in Attachment 1. • The technical bases for the time constraints listed in this section and Attachment 1 are provided in this section. <p>Deployment strategies for actions have been validated in accordance with the guidance provided in NEI 12-06 Revision 2.</p> <p>T=0 Initiation of Station Blackout (SBO).</p> <p>T+1 min: 125 VDC/120VAC buses powered from station batteries. Operators enter abnormal operating procedures (AOPs), transitioning to SBO procedure. Key actions within procedures include:</p> <ul style="list-style-type: none"> - Verification of system response to ensure safety functions is satisfied. - Attempting alternate methods of starting/loading station Emergency Diesel Generators (EDG) <p>T+15 min: Initial shedding of non-vital loads to extend battery life.</p> <p>T+1 hr: Initial actions taken under AOP direction complete. Operations personnel survey plant for damage and evaluate likelihood of EDG recovery within 4 hours</p> <p>T+2 hr: Assessment of EDG status indicates recovery not likely within 4 hours. ELAP declared. Operators implement FLEX support guideline (FSG).</p> <p>T+6 hr: Operators open door in roof of Auxiliary Building to establish path to vent steam and water vapor from the Auxiliary Building. (Time Constraint from GOTHIC analysis of Auxiliary Building environment.)</p> <p>T+8 hr: Operators open door between the Radwaste Building and the Auxiliary Building to establish air inlet flow path to vent steam and water vapor from the Auxiliary Building. GOTHIC analysis demonstrates that with this ventilation path, operator access to mitigating equipment is maintained throughout the event.</p>	

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T+24 hr:	Establish Spent Fuel Pool (SFP) cooling by starting SFP makeup. Assuming ELAP initiation 60 days after shutdown, the SFP reaches 200 °F in approximately 15 hours and boiling will start. The water level would reach 12'-6" above the top of the active fuel in 76 hours. Additional boil off from SFP will result in SFP level reduction to top of active fuel in approximately 129 hours. Makeup flow rate will be established to maintain SFP level within the desired band. Makeup flow rates of approximately 20 gpm, assuming ELAP initiation 60 days after shutdown, are needed to maintain the SFP level. The strategy ensures that makeup flow, in excess of the boil off rate, is initiated prior to reaching Level 2 (well within 76 hours). Using only the SIRWT as the source for makeup water, there is adequate inventory to maintain the SFP water level above Level 2 for more than 12 days.
T+ 5 days	Establish makeup to Safety Injection Refueling Water Tank (SIRWT) from an alternate source of water (ultimate heat sink - Missouri River). Based on makeup needs to the SFP, using only the SIRWT as the source for makeup water, and using conservative assumptions for available water from the SIRWT, the SIRWT will be depleted in approximately 12 days.
Sequence of Events for ELAP caused by a Beyond Design Basis flood with no antecedent conditions	
The following sequence of events is applicable to ELAP caused by a Beyond Design Basis flood in which the timeline begins with the dam break. This sequence of events is for the Oahe Sunny Day dam failure as discussed Appendix A. As will be discussed next, hydraulic dam failures involve antecedent conditions that initiate actions. A timeline is provided in Attachment 1. No time constraints are identified for this scenario.	
Deployment actions have been validated in accordance with the guidance provided in NEI 12-06 Revision 2.	
T-72 hr	River level at FCS is forecasted to stay below elevation 1004' and current river level is less than 1000'.
T-71.5 hr.	Dam break occurs at Oahe.
T-71 hr.	The U.S. Army Corps of Engineers notifies OPPD that an upstream dam or dams have failed with flooding expected in the Fort Calhoun area.
T-70 hr.	Operations enters AOP-01, "Acts of Nature," and begins flooding preparations
T-60 hr.	River level is predicted to exceed 1014 feet and FSG-04, "Response to Beyond Design Basis Flooding" is implemented. Operations deploys pumps, portable FLEX Diesel Generators (DGs), valves, hoses and portable SFP level indicator per FSG-04.
T-48 hr.	Equipment deployment complete and Operations ventilates the Auxiliary Building per FSG-04.

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T-36 hr.	Ventilation of the Auxiliary Building per FSG-04 complete.
T-4 hr.	Based on Missouri River gauge data and forecasts the Missouri River level is expected to exceed El. 1014' within 4 hours. Operations induces Dark Plant Condition per FSG-04. (Dark Plant Condition is defined as no installed AC or DC power available to the site.)
T-2 hr.	Dark Plant Conditions established. Operations maintains the SFP level within the desired band and filling the SFP as required per FSG-04.
T=0	Missouri River level exceeds El. 1014'.
T+ 5 days	Operations maintains the SFP level within the desired band and filling the SFP as required per FSG-04. When the river level exceeds El. 1014, the SIRWT remains full for the duration of the flood until water level recedes to <1014; no SIRWT makeup is needed during this period.
Sequence of Events for ELAP caused by a Beyond Design Basis flood with antecedent conditions	
<p>The following sequence of events is applicable to ELAP caused by a Beyond Design Basis flood in which the timeline begins with the identification of conditions in the Upper Missouri Reservoirs such that if a dam break were to occur the storage locations for portable equipment could be flooded. This sequence of events is for the Oahe Hydrologic dam failure as discussed Appendix A. A timeline is provided in Attachment 1. No time constraints are identified for this scenario.</p> <p>Deployment actions have been validated in accordance with the guidance provided in NEI 12-06 Revision 2.</p>	
T-14 days	The National Weather Service or the U.S. Army Corps of Engineers forecasts that river level will exceed 1004 feet. Operations enters AOP-1 and implements Flood Protection Actions.
T-13.5 days	Operations enters FSG-04 based either <ul style="list-style-type: none"> • The pool level at either Ft. Peck or Garrison is greater than the maximum operating pool elevation or <ul style="list-style-type: none"> • The river flow out of Oahe is sufficient that road access to the plant could be lost due to flooding when this flow reaches FCS in approximately 3 days as reported by the U.S. Army Corps of Engineers Daily River Bulletin
T-11.5 days	One DG and the valve skid are moved to the Auxiliary Building roof (Elevation 1057') and tested per FSG-04.
T-61 hr.	The U.S. Army Corps of Engineers notifies OPPD that an upstream dam or dams have failed with flooding expected in the Fort Calhoun area.

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T-60 hr.	River level is predicted to exceed 1014 feet and FSG-04, "Response to Beyond Design Basis Flooding," is implemented. Operations deploys pumps, DGs, valves, hoses and portable SFP level indicator per FSG-04.
T-48 hr.	Equipment deployment complete and Operations ventilates the Auxiliary Building per FSG-04.
T-36 hr.	Ventilation of the Auxiliary Building per FSG-04 complete.
T-4 hr.	Based on Missouri River gauge data and forecasts the Missouri River level is expected to exceed El. 1014' within 4 hours. Operations induces Dark Plant Condition per FSG-04. (Dark Plant Condition is defined as no installed AC or DC power available to the site.)
T-2 hr.	Dark Plant Conditions established. Operations maintains the SFP level within the desired band and filling the SFP as required per FSG-04.
T=0	Missouri River level exceeds El. 1014'.
T+ 5 days	Operations maintains the SFP level within the desired band and filling the SFP as required per FSG-04. When the river level exceeds El. 1014, the SIRWT remains full for the duration of the flood until water level recedes to <1014; no SIRWT makeup is needed during this period.
Identify how strategies will be deployed with plant in decommissioning status	
FCS has defined the storage and deployment locations of FLEX equipment. Deployment paths have been identified and are illustrated in Attachment 3. To ensure deployment can be achieved within the time constraints for strategies, FLEX equipment necessary to accomplish those strategies will be stored in a robust structure (Auxiliary Building) within the plant power block. Equipment stored within the power block is depicted on the drawings in Attachment 3.	
Milestone Schedule	
See attached milestone schedule Attachment 2.	

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

Programmatic Controls
FCS has implemented an administrative program for FLEX to establish responsibilities, and testing and maintenance requirements. A plant system designation is assigned to FLEX. This establishes responsibilities, maintenance and testing requirements for all components associated with FLEX. Unique identification numbers are assigned to all FLEX components included in the system. Equipment associated with these strategies is procured as commercial equipment with design, storage, maintenance, testing, and configuration control as outlined in JLD-ISG-2012-01, Revision 1, Section 6 and NEI 12-06, Revision 2, Section 11. Installed structures, systems and components pursuant to 10 CFR 50.63(a) will continue to meet the augmented quality guidelines of Regulatory Guide 1.155, Station Blackout. Standard industry PMs have been developed to establish maintenance and testing frequencies based on type of equipment using the EPRI guidelines. There are some exceptions to the EPRI guidelines consistent with the length of time available to implement the FLEX strategy for a permanently shutdown plant.
Training
Training materials for FLEX have been developed for all station staff involved in implementing FLEX strategies. These programs and controls are implemented in accordance with the Systematic Approach to Training. The first rotation of training is complete and a second rotation will be completed prior to December 31, 2016.
Regional Response Center
The FLEX mitigating strategy for FCS with all fuel stored in the SFP does not utilize the Regional Response Centers.

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Maintain Spent Fuel Pool Cooling	
Baseline coping capability	
PWR Installed Equipment Phase 1:	
Based on a site specific calculation, assuming an ELAP initiation 60 days after shutdown, boiling in the SFP will start in approximately 15 hours and the water level would reach 12'-6" above the top of the active fuel in 76 hours. Additional boil off from SFP will result in a SFP level reduction to top of active fuel in approximately 129 hours. Makeup flow rate will be established to maintain SFP level between within the desired band. Makeup flow rates of approximately 20 gpm is needed to maintain the SFP level. There are no Phase 1 actions.	
Details:	
Provide a brief description of Procedures / Strategies / Guidelines	N/A since there are no Phase 1 actions
Identify modifications	N/A since there are no Phase 1 actions
Key SFP Parameter	A SFPI meeting the requirements of EA-12-051 is being installed.
PWR Portable Equipment Phase 2:	
Based on a site specific calculation, assuming an ELAP initiation 60 days after shutdown, boiling in the SFP will start in approximately 15 hours and the water level would reach 12'-6" above the top of the active fuel in in 76 hours. Additional boil off from SFP will result in a SFP level reduction to top of active fuel in approximately 129 hours. Makeup flow rate will be established to maintain SFP level between within the desired band. Makeup flow rates of approximately 20 gpm is needed to maintain the SFP level. Using only the SIRWT as the source for makeup water, there is adequate inventory to maintain the SFP water level above Level 2 for more than 12 days.	
Details:	
Strategies	The strategy used to maintain spent fuel pool cooling is illustrated in Figure 1. Water to maintain the level in the SFP is supplied from the SIRWT via one of two submersible pumps. The water from the pump is routed through a valve station to the SFP. Electrical power is supplied via one of two DG. The DG are located such that this strategy can be implemented for the worst case Sunny Day dam failure and adequate time is available to deploy equipment before flood waters arrive at the site. If conditions exist where a BDB flood could submerge the DG in their normal storage location, one DG is relocated to a higher elevation above the predicted level of a flood due to a hydraulic failure of one of the dams.
Procedures and Guidelines	The procedure flow chart is shown in Figure 2 and the procedures are listed in Table 1.
Modifications	A standpipe will be installed between Rooms 81 and 69.
Key SFP Parameter	A SFPI meeting the requirements of EA-12-051 is being installed. In cases of BDB flooding a portable SFPI is used.

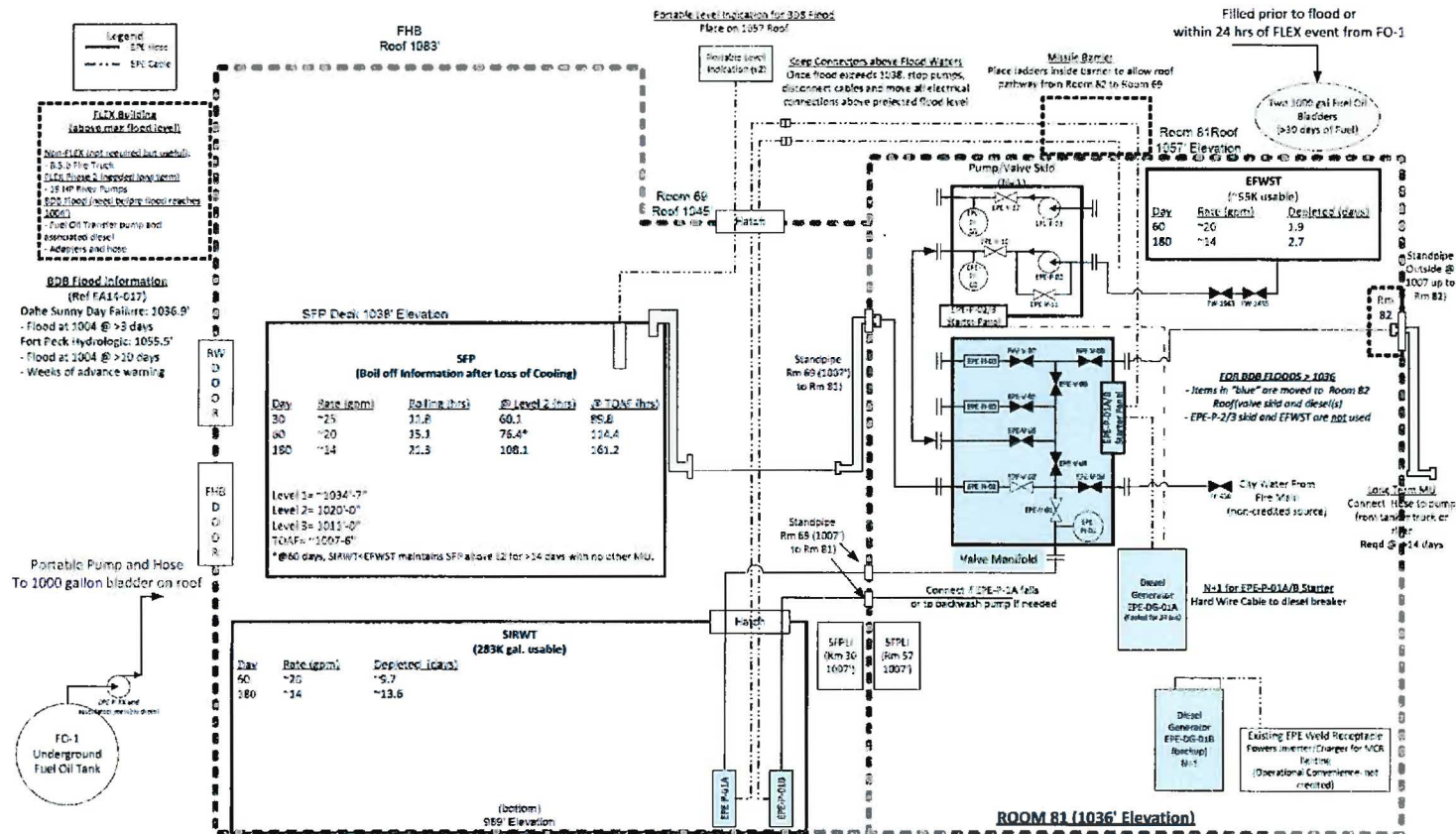
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Storage and Protection of Equipment		
FLEX portable equipment is stored either within the safety-related plant structures or in the FLEX Storage Building.		
Seismic	See the statement above.	
Flooding	See the statement above.	
Severe Storms with High Winds	See the statement above.	
Snow, Ice, and Extreme Cold	See the statement above.	
High Temperatures	See the statement above.	
Deployment (Attachment 3 contains the Deployment Sketches)		
<u>Strategy</u> The following is a simplified description of the deployment strategies employed in the FLEX Support Guidelines (FSGs) and the Field Implementation Guidelines (FIGs) that provide the equipment instructions to implement the FSGs. <u>FSG-01 (Initial Assessment and FLEX Equipment Staging)</u> <ul style="list-style-type: none">• Deploy FLEX Water Hoses from Room 81 to Room 69• Stage FLEX Valve Skid and connect to hoses• Stage FLEX Diesel Generators <u>FSG-02 (Alternate SFP Makeup and Cooling)</u> <ul style="list-style-type: none">• Install submersible pumps in SIRWT and connect hoses between pumps and FLEX Valve Skid• Connect hoses between FLEX Valve Skid and SFP standpipe <u>FSG-03 (LAP Electrical Bus Management)</u> <ul style="list-style-type: none">• Deploy FLEX Diesel Generators in room 81• Connect DG to submersible SIRWT pump starter panel on FLEX Valve Skid• Connect submersible SIRWT pump starter panel to the submersible SIRWT pump	<u>Modifications</u> The standpipe between Rooms 81 and 69 is to be installed by December 31, 2016.	<u>Protection of connections</u> Connections are appropriately capped while in storage. Connections are protected consistent with the guidance provided in NEI 12-06 Revision 2. Submerged cables and connectors are qualified to the appropriate depth of submersion.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

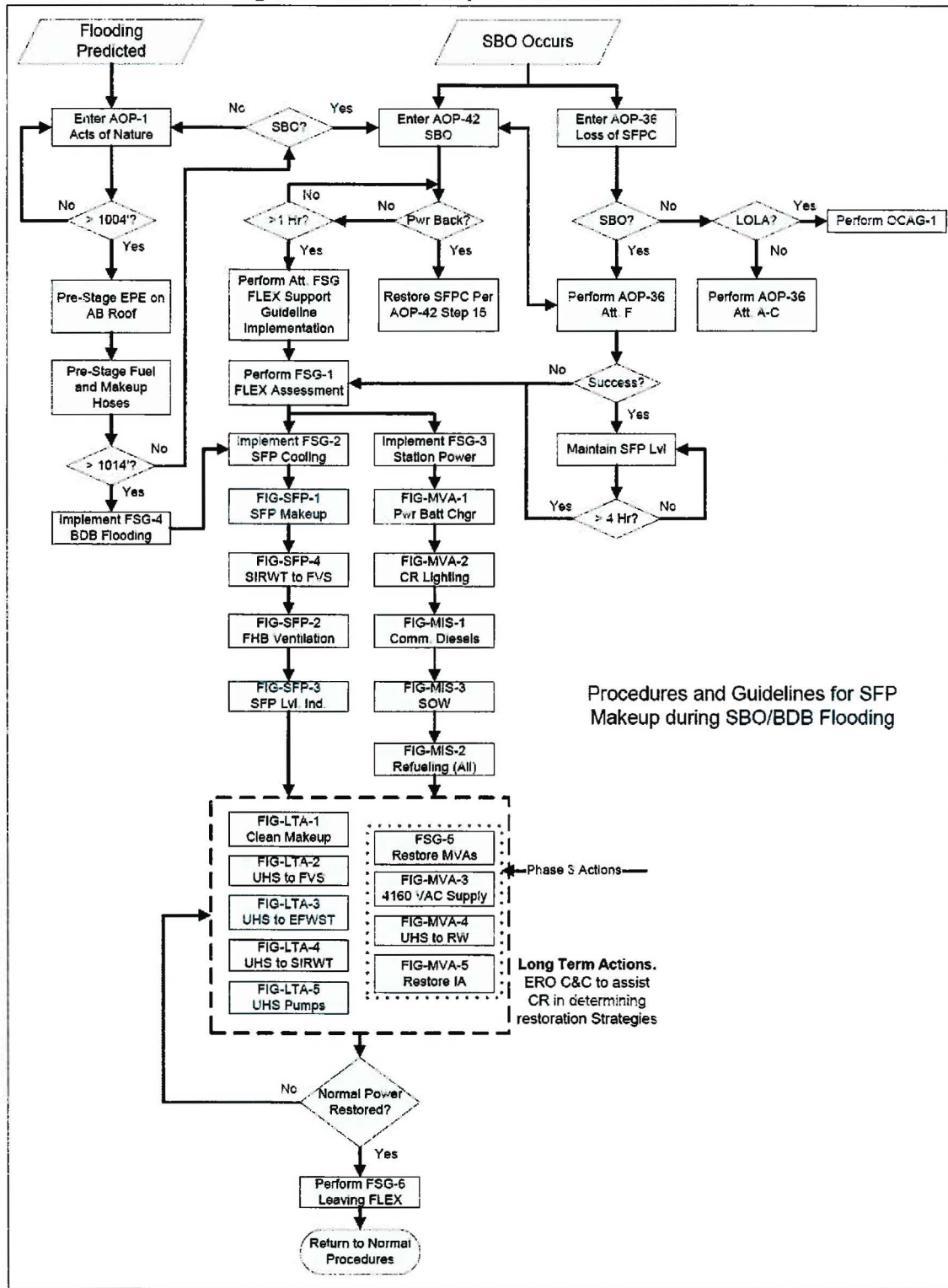
PWR Portable Equipment Phase 3:	
SFP cooling can continue to be provided indefinitely (The on-site DG fuel will last more than 30 days) using the Phase 2 strategy. Guidance is provided to provide fuel to the DG and to replenish the water in the SIRWT. This would be the case for BDB flooding where it is unlikely internal plant electrical buses could be restored. In the case of BDB flooding, a stand-alone self-powered heat exchanger would need to be installed and operated. Because of the large number of unknowns that would have to be addressed, additional guidance has not been developed for recovery from BDB flooding. For cases where the plant electrical busses can be restored, guidance is provided.	
Details:	
Procedures/Strategies/Guidelines	FSG-05, "Restoration of Vital Auxiliaries using Offsite Resources," with associated FIGs, provides guidance for repowering internal buses using either a 4160 VAC power source or a 480 VAC generator. FSG-05 also provides guidance for using a portable pump to restore flow to the RW system.
Modifications	No modifications are required
Key SFP Parameter	A SFPI meeting the requirements of EA-12-051 is being installed. In cases of BDB flooding, a portable SFPI is used.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Figure 1: FLEX Strategy



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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Figure 2: SFP Makeup Procedure Flow Chart



Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Table 1: SFP Make up Procedures

Procedure Number	Title
AOP-01	Acts of Nature
AOP-42	Station Blackout
AOP-36	Loss of Spent Fuel Pool Cooling
EOP/AOP Att. FSG	FLEX Support Guidelines Implementation
EOP/AOP Att. DGE	Diesel Generator ELAP Evaluation
FSG-01	Initial Assessment and FLEX Equipment Staging
FSG-02	Alternate SFP Makeup and Cooling
FSG-03	ELAP Electrical Bus Management
FSG-04	Response to Beyond Design Basis Flooding
FSG-05	Restoration of Vital Auxiliaries using Offsite Resources
FSG-06	Transition from FLEX Equipment
FIG-LTA-01	Water Supply to the FLEX Valve Skid from Various Clean Water Sources
FIG-LTA-02	Water Supply to the FLEX Valve Skid from the Ultimate Heat Sink (UHS)
FIG-LTA-03	Filling the EFWST from an External Water Source
FIG-LTA-04	Filling the SIRWT or SFP from the UHS
FIG-LTA-05	Deployment of External Portable FLEX Pumps
FIG-MIS-02	Emergency Portable Equipment
FIG-MVA-01	Deploy and Operate 30 KW Portable DG
FIG-MVA-02	Control Room Lighting/HVAC
FIG-MVA-03	Power 480/4160 VAC Buses With Vendor Supplied Generator
FIG-MVA-04	Establish Cooling Water Supply using External Resources
FIG-MVA-05	Establish Instrument Air using Vendor Supplied Air Compressor
FIG-SFP-01	Fill the SFP
FIG-SFP-02	Venting the Auxiliary Building
FIG-SFP-03	Setup and Operation of the BDB Spent Fuel Pool Level Indication System
FIG-SFP-04	Water Supply to the FLEX Valve Skid from the Submersible SIRWT Pumps

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

PWR Portable Equipment Phase 2

<i>Use and (potential / flexibility) diverse uses</i>				<i>Performance Criteria</i>	<i>Maintenance</i>
<i>List portable equipment</i>	SFP	Instrumentation	Accessibility		
FLEX SIRWT Primary Submersible Pump (FSP)	X			[200 gpm, 60 psia], Submersible	See Programmatic Controls discussion above
FLEX SIRWT Backup Submersible Pump	X			[200 gpm, 60 psia], Submersible	See Programmatic Controls discussion above
FSP Primary DG	X			480 V [30 kW]	See Programmatic Controls discussion above
FSP Backup DG		X	X	480 V [30 kW]	See Programmatic Controls discussion above
FLEX Valve Skid (FVS)	X			Flow indication 25-250 gpm	See Programmatic Controls discussion above
Diesel Skid Pumps (2) (B.5.b)	X			[310 gpm, 50 psia]	See Programmatic Controls discussion above
River Drafting Pump (B.5.b)	X			[345 gpm, 50 psia]	See Programmatic Controls discussion above

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Appendix A contains security-related information.

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Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

Fire Brigade Pumper Truck (B.5.b)	X			[1250 gpm, 150 psia]	See Programmatic Controls discussion above
Diesel Fuel Transfer Pumps (2)	X			(44 gpm, 142 ft. of head)	See Programmatic Controls discussion above
DG to power Diesel Fuel Oil Transfer Pumps (2)	X			5kw	See Programmatic Controls discussion above

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

PWR Portable Equipment Phase 3					
<i>Use and (potential / flexibility) diverse uses</i>				<i>Performance Criteria</i>	<i>Notes</i>
<i>List portable equipment</i>	SFP	Instrumentation	Accessibility		
480/4160 VAC Generator	X	X	X	500 kw	Portable 4160 VAC generator will power one installed vital bus.
Low Press. Pumps	X			1,200 gpm, 120 psi	Self-powered (or provided with necessary generator power).

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 Appendix A contains security-related information.
 Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 1
Sequence of Events Timeline

ELAP (Initial conditions in accordance with NEI 12-06 Revision 2)

Action item	Elapsed Time	Action	Time Constraint Y/N	Remarks / Applicability
	0	SBO occurs	N	All fuel in SFP
1	5 min.	Operators enter AOP-42, Station Blackout	N	AOP-42 replaces EOP-07 with all fuel in the SFP. See Note 1
2	15 min.	Minimize DC loads per AOP-42	N	See Note 1
3	30 min.	Attempt to restore SFP cooling per AOP-36	N	Approved procedure AOP-36 Attachment F
4	2 hr.	Survey plant for damage, determine status of DGs using FSG-01	N	See Note 2
5	6 hr.	Stage portable DG, hoses and pumps for alternate SFP makeup using FSG-01 and FSG-02	N	See Notes 2 and 3
6	6 hr.	Open hatch in roof of Auxiliary Building to establish path to vent steam and water vapor from the Auxiliary Building per FSG-02.	Y	See Note 2
7	8 hr.	Open door between the Radwaste Building and the Auxiliary Building to establish air inlet flow path to vent steam and water vapor from the Auxiliary Building per FSG-02.	Y	See Note 2
8	8 hr.	Monitor SFP level using the SFPI.	N	See Note 2
9	8 hr.	Reestablish power to a DC bus and restore CR lighting per FSG-03	N	See Note 2

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Appendix A contains security-related information.

Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 1
Sequence of Events Timeline

ELAP (Initial conditions in accordance with NEI 12-06 Revision 2)

10	12 hr.	Align power to submersible pumps	N	See Note 2
11	24 hr.	Maintain the SFP level within the desired band and filling the SFP as required per FSG-02.	N	See Note 2
12	5 days	Establish makeup to SIRWT from an alternate source of water (UHS - Missouri River) per FSG-02.	N	See Note 2

Note 1 Procedures have been validated in accordance with plant procedure approval process. Procedures will be issued prior to December 31, 2016.

Note 2 FLEX Support Guidelines (FSG) and Field Implementation Guidelines (FIG) have been validated in accordance with Appendix E of NEI-12-06 Revision 2. Guidelines will be issued prior to December 31, 2016.

Note 3 A configuration change will install pipe connections between Rooms 81 and 69 to connect the SIRWT Pumps to the FLEX Valve Skid and to connect the FLEX Valve Skid to the SFP Standpipe

**Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
 Attachment 1**

Sequence of Events Timeline

ELAP Due to Dam Failure Flooding (No Antecedent Conditions)

Assumptions: <ul style="list-style-type: none"> • There are no forecasts that river level will exceed 1004 feet. • Local river level indication is less than 1000 feet. 				
Action item	Elapsed Time	Action	Time Constraint Y/N	Remarks / Applicability
1	- 70 hr.	Operations enters AOP-01 based on notification by the U.S. Army Corps of Engineers that an upstream dam or dams have failed with flooding expected in the Fort Calhoun area.	N	See Note 1
2	- 60 hr.	River level is predicted to exceed 1014 feet and FSG-04, Response to Beyond Design Basis Flooding is implemented.	N	See Note 2
3	- 48 hr.	Deploy pumps, DG, valves, hoses and portable SFP level indicator per FSG-04.	N	See Note 2
4	- 36 hr.	Ventilate the Auxiliary Building per FSG-04.	N	See Note 2
5	- 4 hr.	Missouri River level is expected to exceed El. 1014' within 4 hours. Induce Dark Plant Conditions per FSG-04.	N	Dark Plant Condition is defined as no installed AC or DC power available to the site. See Note 2
6	-2 hr.	Dark Plant Conditions established. Maintain the SFP level within the desired band and filling the SFP as required per FSG-04.		
7	0	Missouri River level exceeds El. 1014'		
8	+ 5 days	Maintain the SFP level within the desired band and filling the SFP as required per FSG-04.	N	See Note 2

Note 1 Procedures have been validated in accordance with plant procedure approval process. Procedures will be issued prior to December 31, 2016.

Note 2 FLEX Support Guidelines (FSG) and Field Implementation Guidelines (FIG) have been validated in accordance with Appendix E of NEI-12-06 Revision 2. Guidelines will be issued prior to December 31, 2016.

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Appendix A contains security-related information.
 Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 1
Sequence of Events Timeline
ELAP Due to Dam Failure Flooding (Antecedent Conditions)

Assumption: The National Weather Service or the U.S. Army Corps of Engineers forecasts that river level will exceed 1004 feet.				
Action item	Elapsed Time	Action	Time Constraint Y/N	Remarks / Applicability
	-14 days	Operations enters AOP-01 based on 1. the pool level at either Ft. Peck or Garrison is greater than the maximum operating pool elevation OR 2. river flow out of Oahe is sufficient that road access to the plant could be lost due to flooding when this flow reaches FCS in approximately 3 days as reported by the U.S. Army Corps of Engineers Daily River Bulletin.		The pool elevation at either Ft. Peck or Garrison is greater than the pool level assumed in the sunny day dam failure analysis. See Note 1
	-12 days	One DG and the valve skid are moved to the Auxiliary Building roof (Elevation 1057') and tested per FSG-04.		See Note 1
	- 61 hr.	Notification by the U.S. Army Corps of Engineers that an upstream dam or dams have failed.	N	See Note 1
	- 60 hr.	River level is predicted to exceed 1014 feet and FSG-04, Response to Beyond Design Basis Flooding is implemented.	N	See Note 2
	- 48 hr.	Deploy pumps, DG, valves, hoses and portable SFP level indicator per FSG-04.	N	See Note 2
	- 36 hr.	Ventilate the Auxiliary Building per FSG-04.	N	See Note 2

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Appendix A contains security-related information.
 Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 1
Sequence of Events Timeline
ELAP Due to Dam Failure Flooding (Antecedent Conditions)

	- 4 hr.	Missouri River level is expected to exceed El. 1014' within 4 hours. Induce Dark Plant Conditions per FSG-04.	N	Dark Plant Condition is defined as no installed AC or DC power available to the site. See Note 2
	-2 hr.	Dark Plant Conditions established. Maintain the SFP level within the desired band and filling the SFP as required per FSG-04.		
	0	Missouri River level exceeds El. 1014'		
	+ 5 days	Maintain the SFP level within the desired band and filling the SFP as required per FSG-04.	N	See Note 2

Note 1 Procedures have been validated in accordance with plant procedure approval process. Procedures will be issued prior to December 31, 2016.

Note 2 FLEX Support Guidelines (FSG) and Field Implementation Guidelines (FIG) have been validated in accordance with Appendix E of NEI-12-06 Revision 2. Guidelines will be issued prior to December 31, 2016.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

Attachment 2

Milestone Schedule

The following will be completed by December 31, 2016:

- Installation of the SFPI
- Installation of the standpipe between Rooms 81 and 69
- Training and issuance of procedures and guidelines
- Procurement of the diesel fuel oil transfer pumps
- FLEX equipment staged in either the safety-related plant structures or in the FLEX Storage Building.

LIC-16-0095

Enclosure 1

**Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches**

(Sketches, to indicate equipment which is installed or equipment hookups necessary for the strategies.)

Section A. Deployment Pathways

Section B. Mechanical Drawings

Section C. Electrical Drawings

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Appendix A contains security-related information.

Upon removal of Appendix A this letter is Decontrolled.

**Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches**

Section A

Deployment Paths

- Figure A-1. Deployment Paths from the FLEX Storage Building to the Plant**
- Figure A-2. Deployment Paths, Basement 989' Level**
- Figure A-3. Deployment Paths, Ground Floor 1007' Level**
- Figure A-4. Deployment Paths, Intermediate Floor, 1025' Level**
- Figure A-5. Deployment Paths, Operating Floor, 1036' Level**

**Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches**

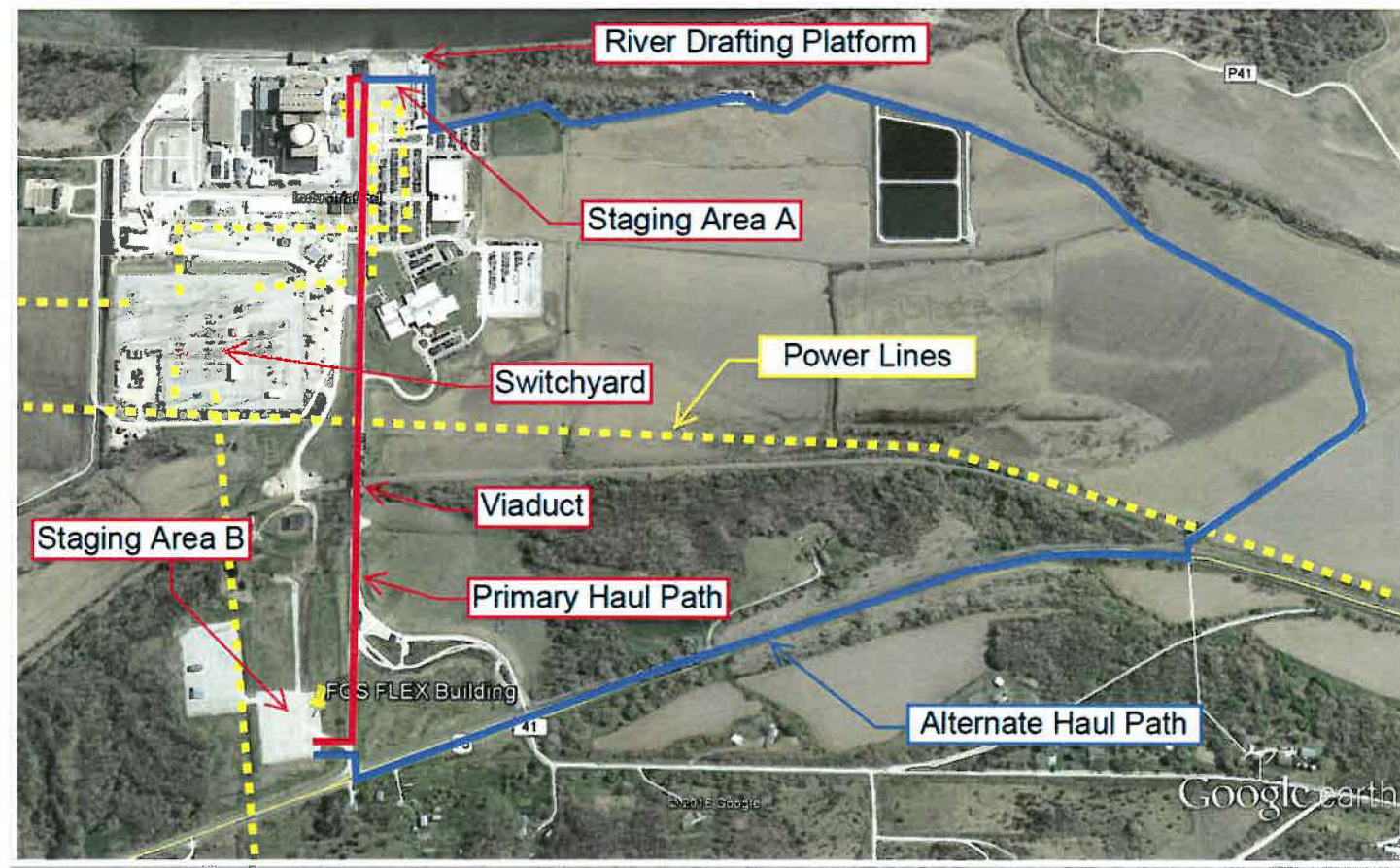


Figure A-1. Deployment Paths from the FLEX Storage Building to the Plant

Security-Related Information - Withhold From Public Disclosure Under 10 CFR 2.390
Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

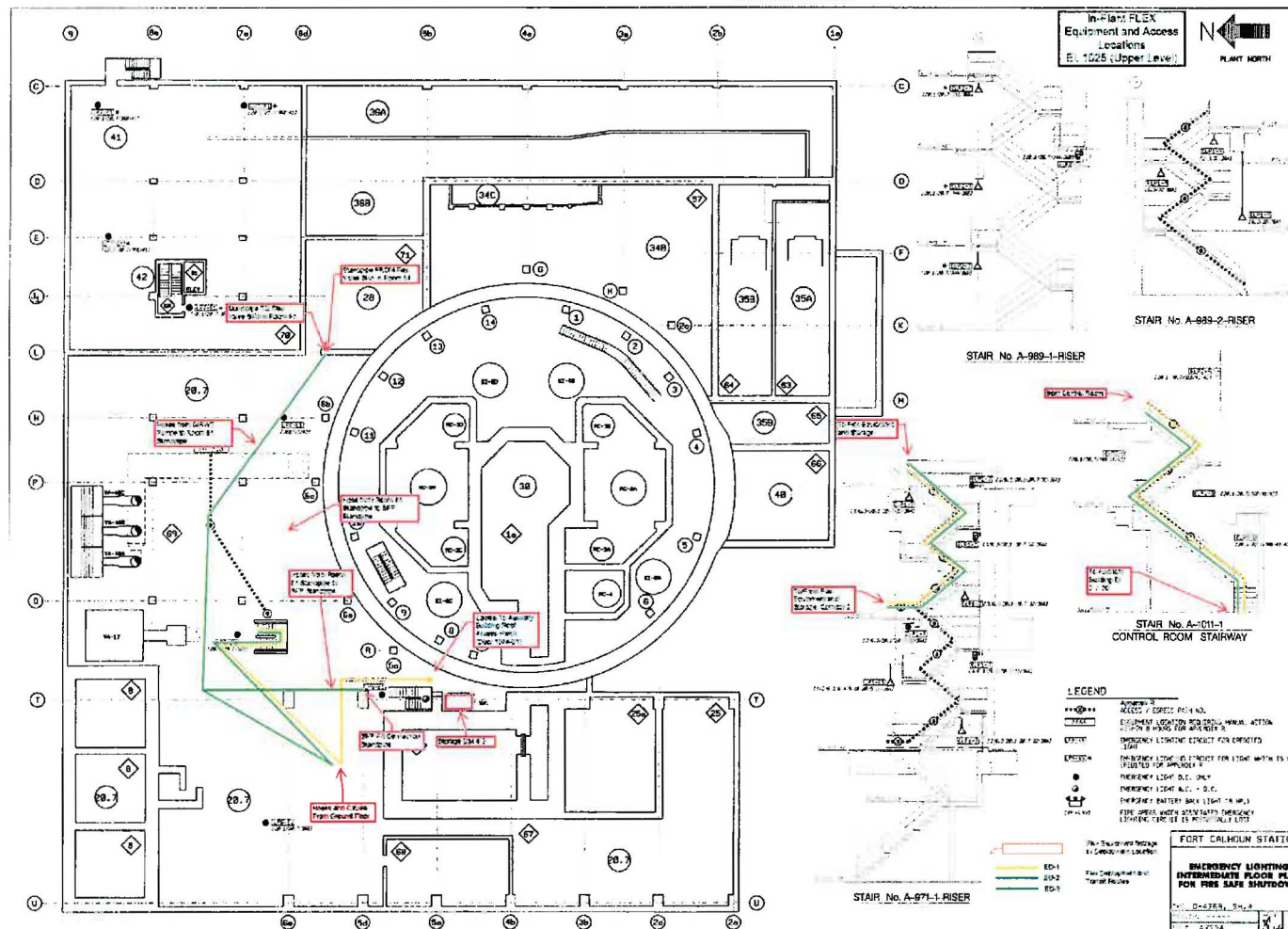


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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.



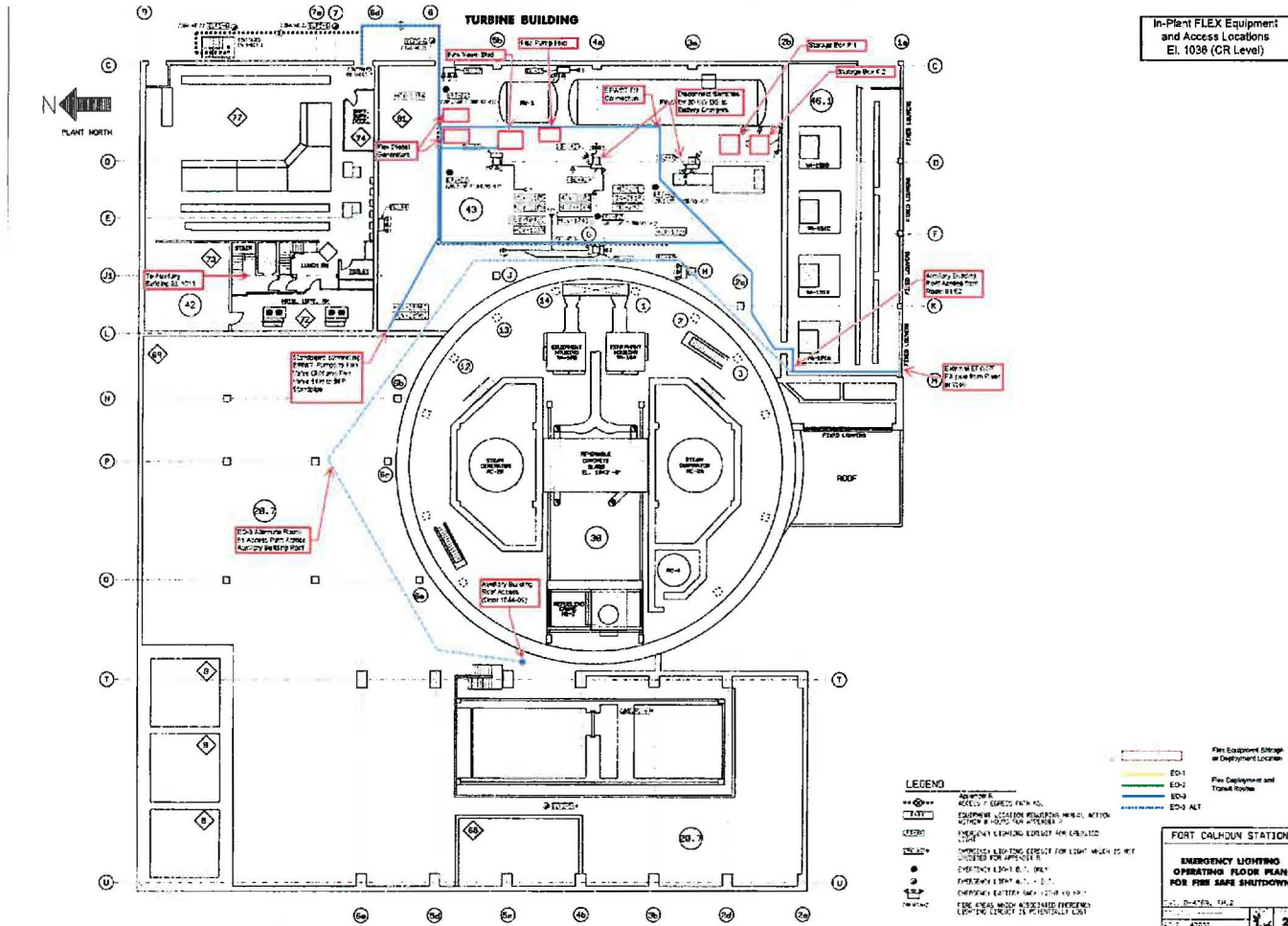
Security-Related Information - Withhold From Public Disclosure Under 10 CFR 2.390
Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan Attachment 3 Sketches



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Appendix A contains security-related information.
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Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan **Attachment 3** **Sketches**



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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

Attachment 3

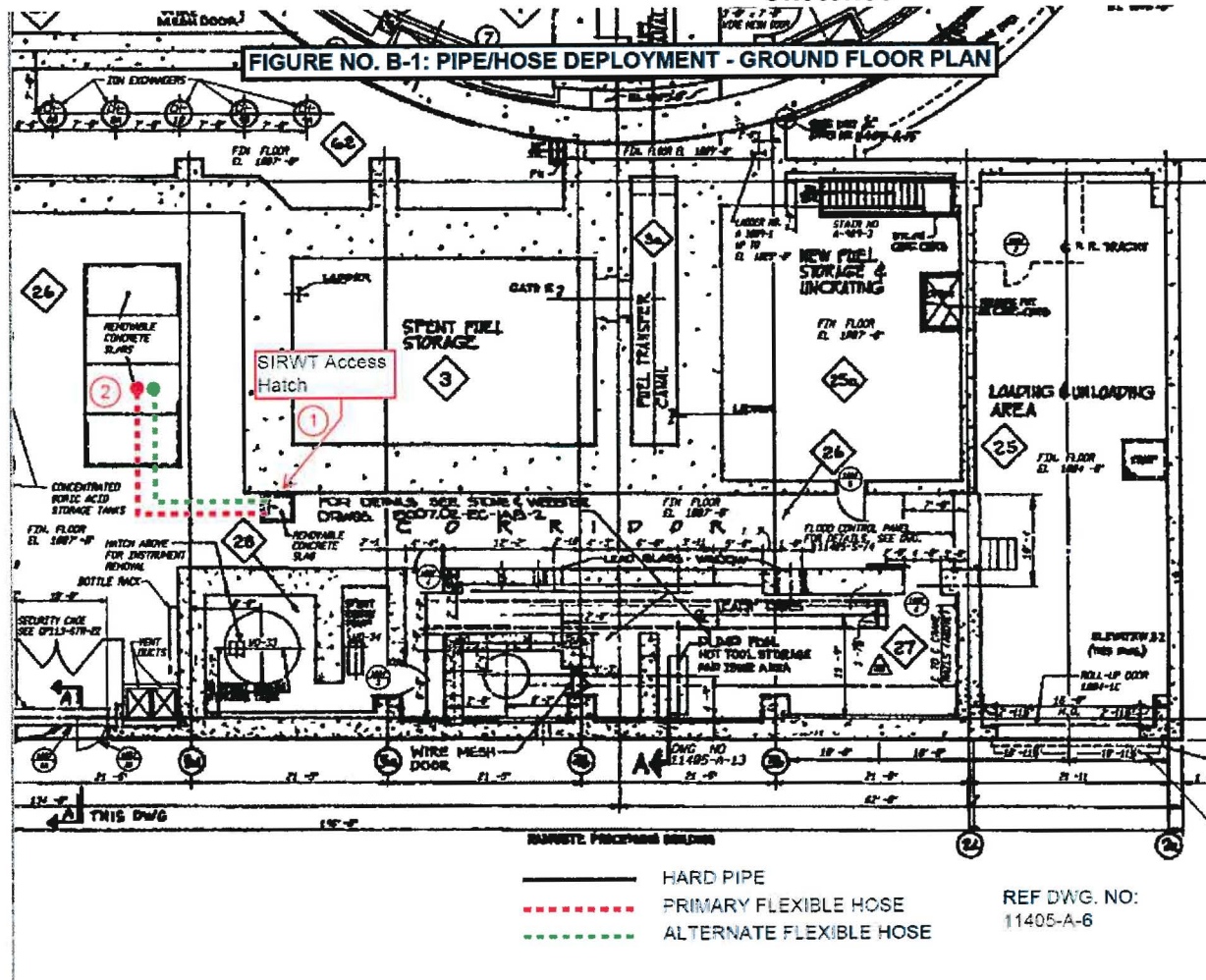
Sketches

Section B

Mechanical Drawings

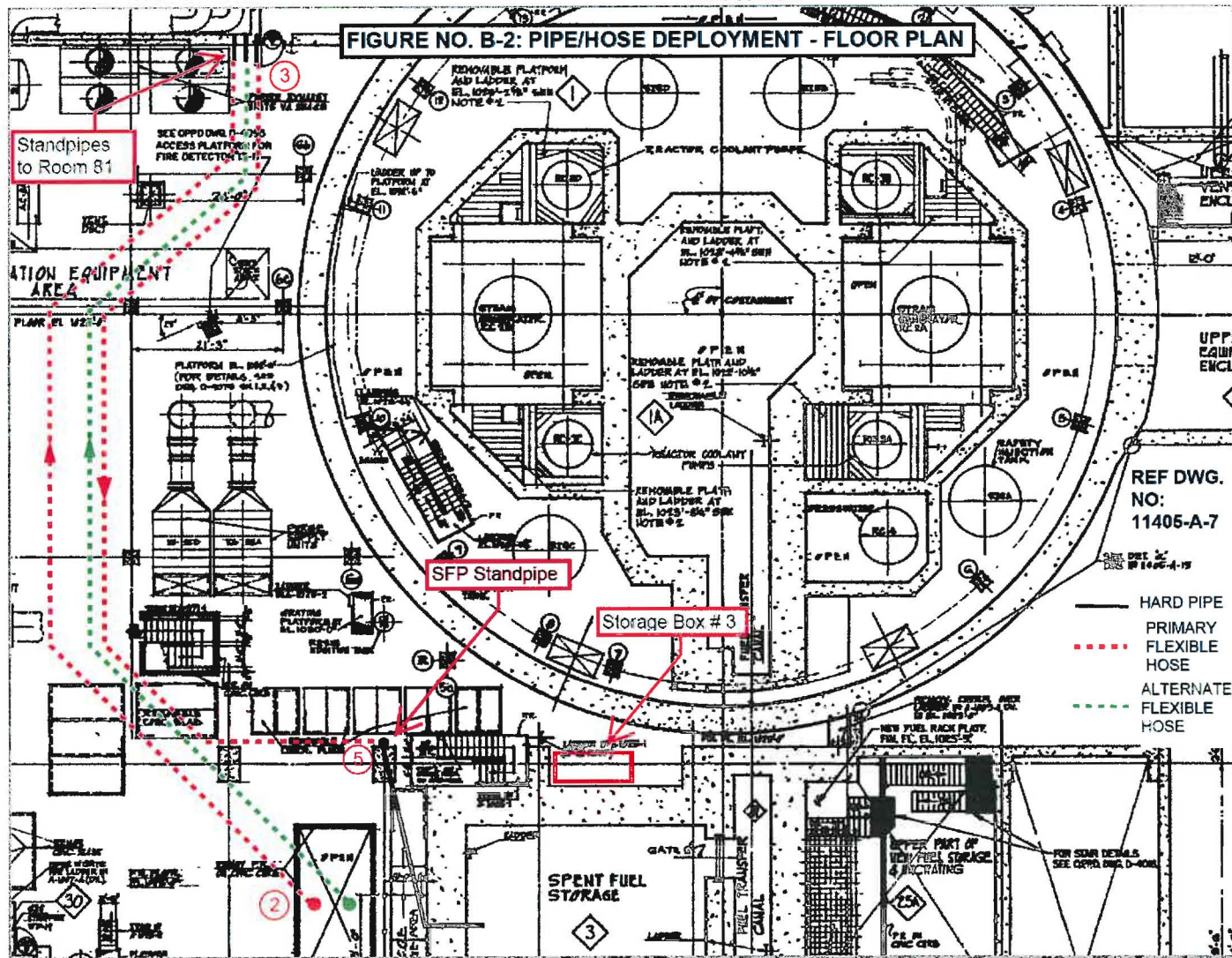
- Figure B-1. Pipe/Hose Deployment – Ground Floor Plan**
- Figure B-2. Pipe/Hose Deployment – Floor Plan**
- Figure B-3. Pipe/Hose Deployment – Operating Floor Plan**
- Figure B-4. Pipe/Hose Deployment – South Elevation**

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches



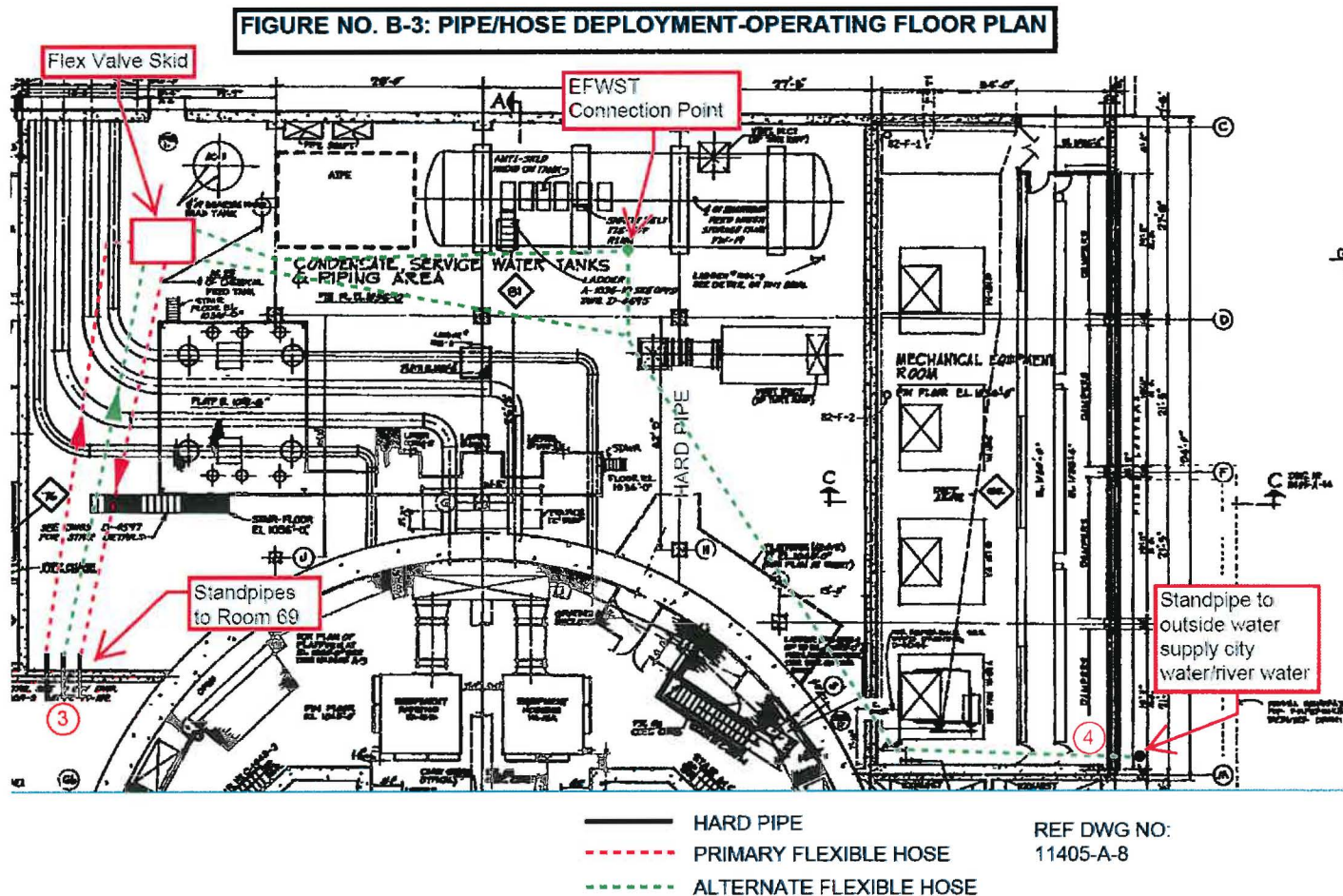
Security-Related Information - Withhold From Public Disclosure Under 10 CFR 2.390
Appendix A contains security-related information.
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Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches



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Appendix A contains security-related information.
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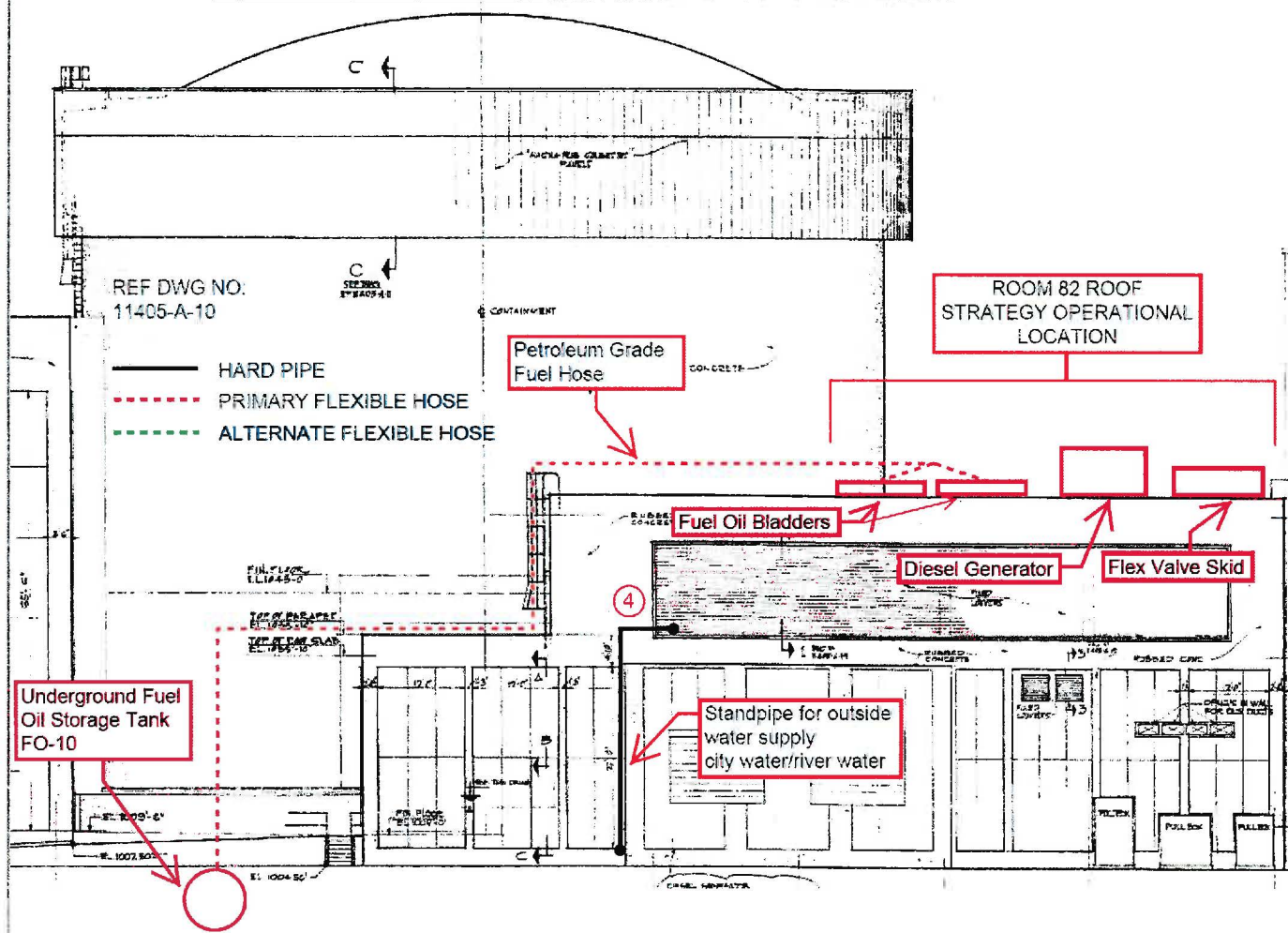
Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches



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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

**Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches**

FIGURE NO. B-4: PIPE/HOSE DEPLOYMENT-SOUTH ELEVATION



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Appendix A contains security-related information.
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LIC-16-0095

Enclosure 1

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

Attachment 3

Sketches

Section C Electrical Drawings

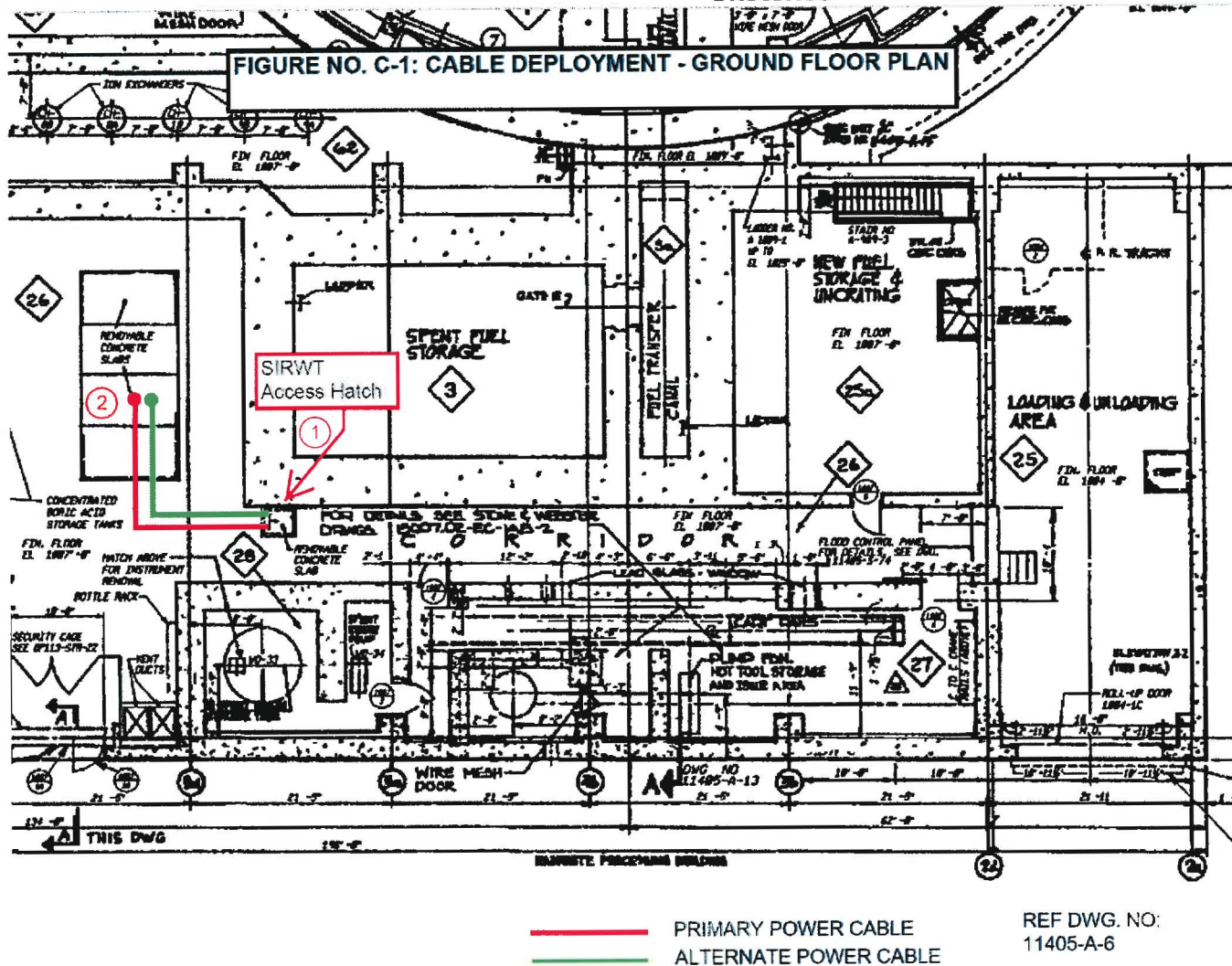
- FIGURE C-1. CABLE DEPLOYMENT - GROUND FLOOR PLAN**
- FIGURE C-2. CABLE DEPLOYMENT - FLOOR PLAN**
- FIGURE C-3. CABLE DEPLOYMENT - AB ROOF**
- FIGURE C-4. CABLE DEPLOYMENT-OPERATING FLOOR PLAN**

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Appendix A contains security-related information.

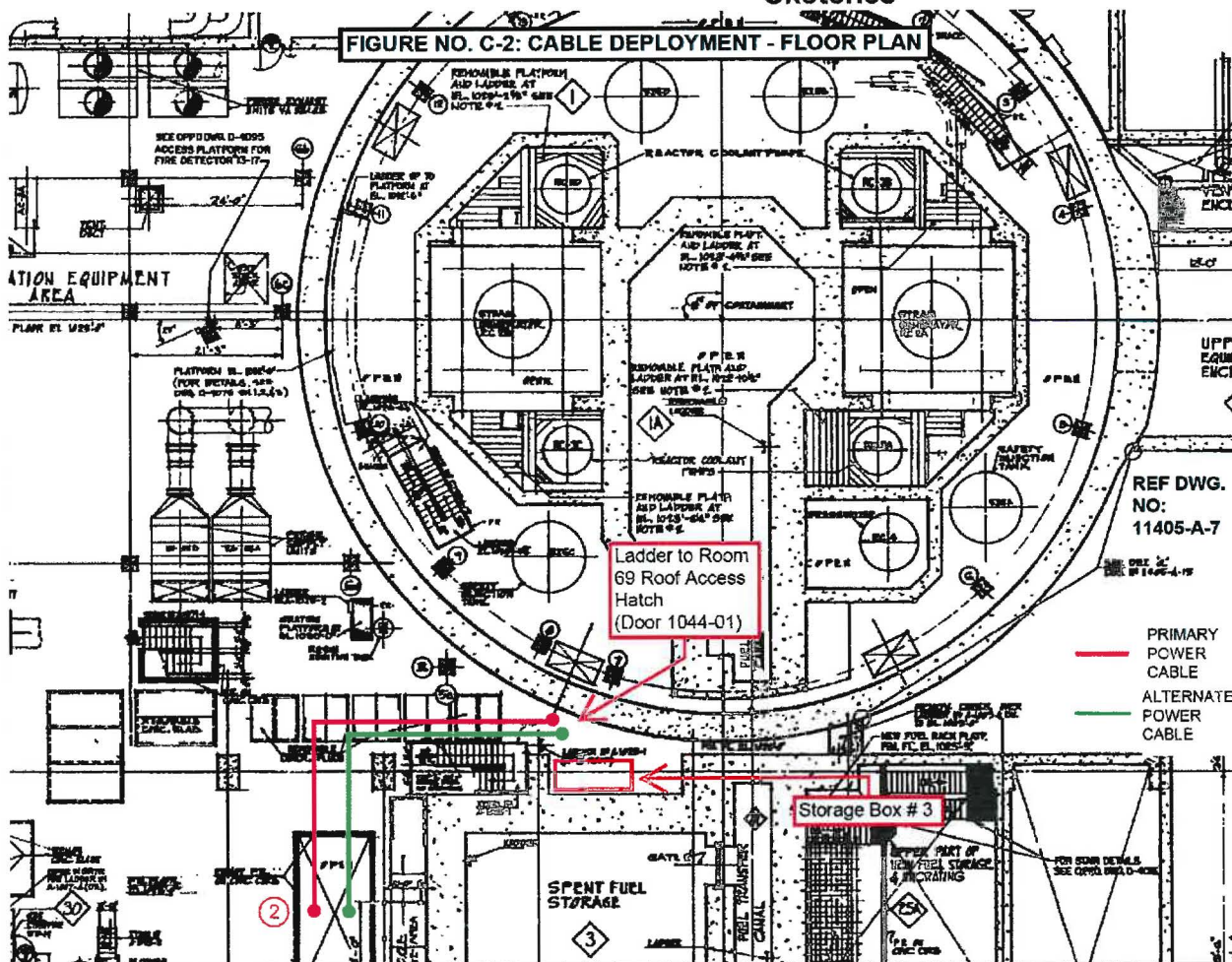
Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches



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Appendix A contains security-related information.
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Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan
Attachment 3
Sketches

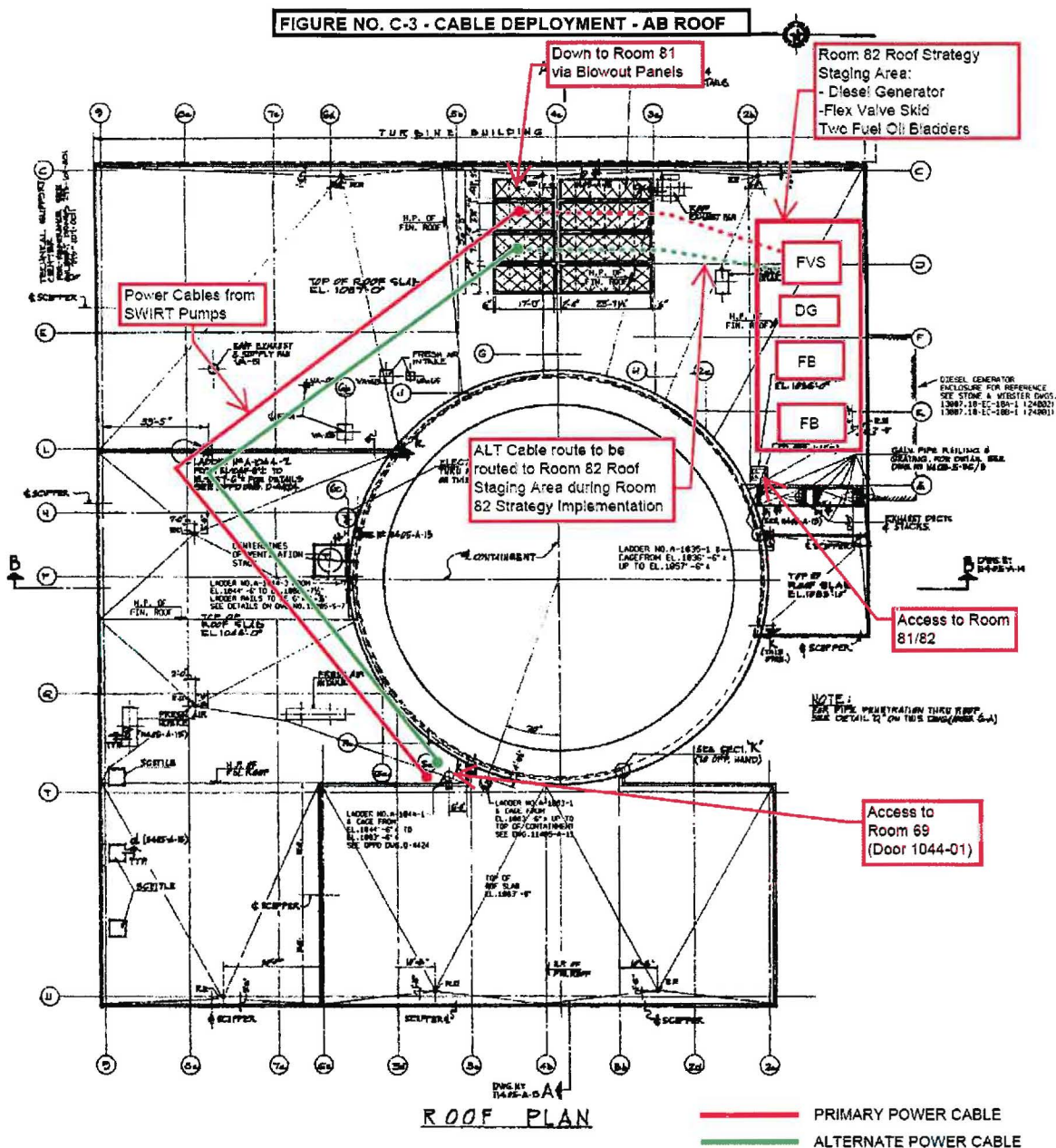


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Appendix A contains security-related information.
Upon removal of Appendix A this letter is Decontrolled.

Fort Calhoun Station Decommissioning Overall Integrated Implementation Plan

Attachment 3

Sketches



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Appendix A contains security-related information.

Upon removal of Appendix A this letter is Decontrolled.

FIGURE NO. C-4: CABLE DEPLOYMENT-OPERATING FLOOR PLAN

