



Comanche Peak Pre-Submittal Meeting with NRC for Proposed License Amendment Request (LAR) 15-001 TS 3.8.1, AC Sources -- Operating

Change to Emergency Diesel Generator Surveillance
Requirement Acceptance Criteria regarding Steady State Voltage
and Frequency

This document replaces in its entirety the package used during
the Pre-Submittal teleconference (ML19228A086) held on
November 5, 2019



Agenda

- Purpose of Meeting
- AC Sources - System Overview
- Reason for Technical Specification Change
- Description of Proposed Change
- Precedent
- Technical Evaluation
 - NRC Regulatory Guidance
 - Comanche Peak Specific Licensing Basis
 - Industry Guidance
- Supplemental Guidance – Risk Insight
- Summary
- Questions



Purpose of Meeting

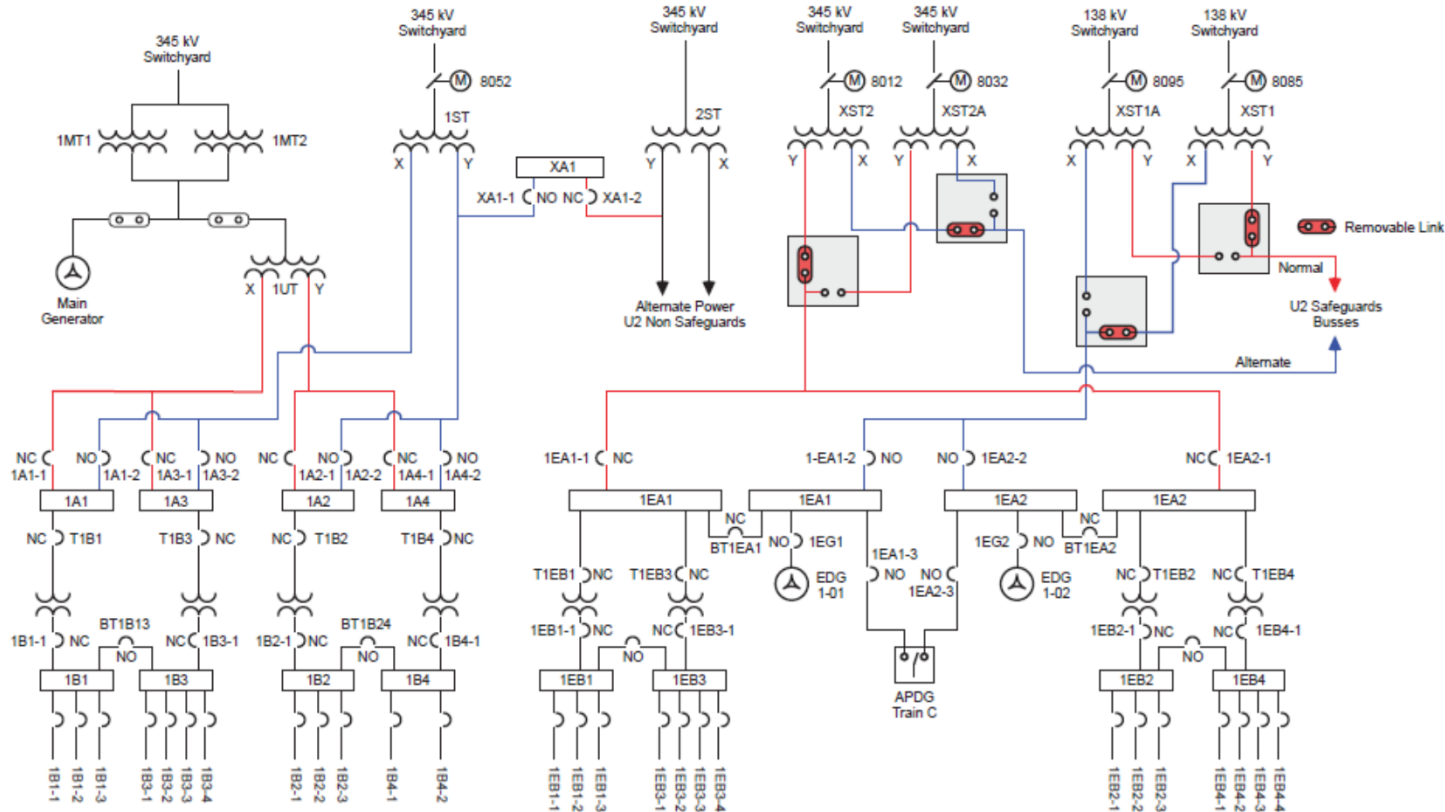
- Plan to submit LAR 15-001
- Gain understanding of NRC Staff perspectives to be addressed in submittal
 - Level of Detail
 - Technical Content
 - Use of Precedent
 - Regulatory Guidance and Requirements
- Schedule Milestones
 - Pre-submittal Teleconference: **TBD**
 - Submit LAR 15-001: **TBD**
 - Requested Approval Date: **One year from date of acceptance**



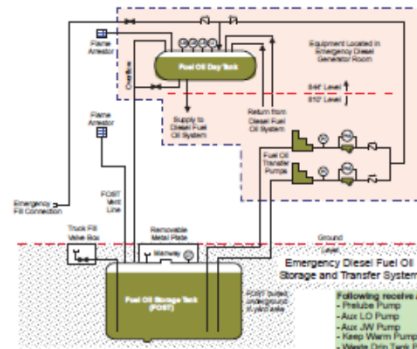
AC Sources System Overview

- At Comanche Peak each unit has two safety-related 6900V buses that are normally power by the “Preferred Offsite Source.”
- If the “preferred offsite source” is not available then there is an “Alternate Offsite Source.”
- If neither the “preferred nor alternate offsite sources” are available, such as during a Loss of All Offsite Power (LOOP), each safety-related 6900V bus may be powered from an Emergency Diesel Generator (EDG) dedicated to each bus.
- The EDGs are designed to supply all necessary loads during a LOOP or a Loss of Coolant Accident (LOCA) concurrent with a LOOP.
- EDG surveillance testing includes a series of sequential and overlapping tests, in which the sum of the tests ensure the entire connection and loading sequence is verified.
- The EDG testing scheme ensures the availability of the standby electrical power supply (EDG) to mitigate Design Basis Accidents (DBA) and transients and to maintain the unit in a safe shutdown condition.





6900VAC and 480VAC
FOR INFORMATION ONLY

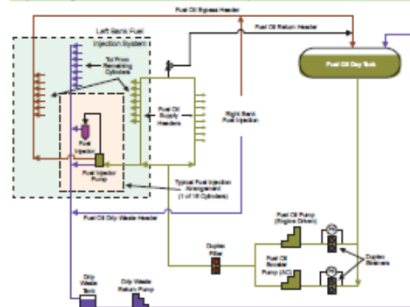


Technical Specs:

- FO Storage Tank min volume 88,000 gals (Required when the EDG is required to be operated)
- Air Receivers ≥ 150 # (min limit is 154#)
- FO Day Tank min volume is 1440 gals (37')

Voltage Regulator Modes of Operation

- Automatic Voltage Regulation (AVR) - will maintain voltage within 0.5% of setpoint, normal mode of operation
- Exciter Current Regulation (CCR) - voltage must be controlled manually for charging loads
- Magnetics - will maintain voltage within 4.8% of no load voltage, if the AVR trips during normal operation as indicated by the AVR Trip light being illuminated, the DG will trip
- Anytime voltage control is not in AVR then the EDG is inoperable



Emergency Diesel Fuel Oil Supply System Simplified

Emergency Start Signals:

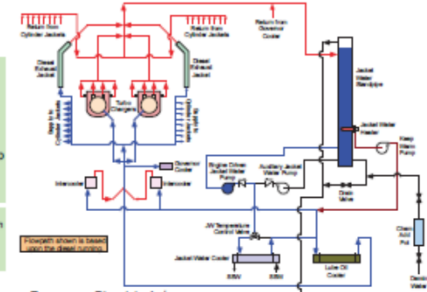
- SI
- SIS
- CR Emergency Start HS w/ RLMS in Local
- Local Emergency Start HS w/ RLMS in Local

Normal Start Signals:

- CR Normal Start
- CR Normal Start HS w/ RLMS in Local

Response to Emergency Start

- Engine will rotate with air until > 200 rpm or pressure in both receivers ≥ 150 W
- Emergency start blocked if air receivers ≥ 150 W
- Automatic protective features disabled except mechanical overspeed and 85-1 lockout
- Full Protection Restoration from Remote Manual Emergency Start
- RLMS to LOCAL
- CR DG Emergency HS to STOP
- RLMS to REM



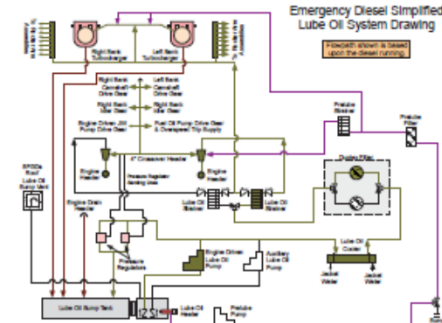
Emergency Diesel Jacket Water Simplified Drawing

EDG TRIPS

- Hi bearing Temperature 228°F
- Return Line LO Temperature 200°F
- LO Pressure at Turbochargers 15#
- LO Pressure at Header 30#
- Hi Vibration on a Turbocharger
- Engine Hi Vibration
- Discharge Hi pressure 58"
- JW Return 200°F
- Reverse Power (85-2)
- Loss of Field (85-2)
- Time Overcurrent (85-2)
- Ground Overcurrent (85-2)
- Over excitation (85-2)
- Neutral Voltage (Gen grd) (85-2)
- High Gen Bearing Temp $> 190^{\circ}\text{F}$ (85-2)
- Phase to Phase Fault (85-1)
- Mechanical Overload (115%)

* 60 sec time delay after normal start before active

Emergency Diesel Generators
FOR INFORMATION ONLY



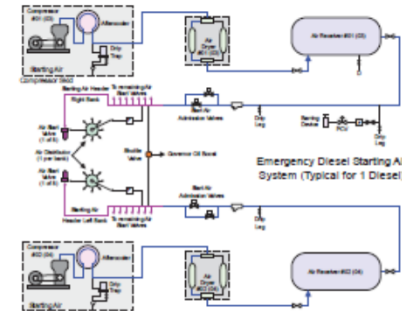
Emergency Diesel Lube Oil System Drawing

DG Output Breaker Trips (RLMS in Remote)

- SI and either normal or alternate feeder breaker are closed.
- 85-2 for the bus or generator without an emergency start.
- 85-1
- Engine shutoff cylinders are pressurized to shutdown the engine
- Breaker HS to TRIP or PULLOUT

DG Output Breaker Trips (From RSP)

- Breaker control is transferred with normal or alternate feeder breaker closed.
- 85-2 for the bus or generator without an emergency start.
- 85-1
- Engine shutoff cylinders are pressurized to shutdown the engine
- Breaker HS to TRIP or PULLOUT
- If breaker is tripped from the RSP must transfer control back to the CR and then back before the breaker can be reclosed from the RSP, because of anti-pumping circuit



Emergency Diesel Starting Air System (Typical for 1 Diesel)



Reason for Technical Specification Change

- Long standing issue related to a past Component Design Bases Inspection.
- Adjust the frequency tolerance to a value that ensures systems and components remain OPERABLE when the EDG is the sole power source (≥ 59.9 Hz & ≤ 60.1 Hz).
- EDG steady state frequency of ≥ 59.9 Hz and ≤ 60.1 Hz ensures adequate frequency at safety related loads for performance of their safety related function.
- The proposed frequency change will be a better indicator of EDG control system OPERABILITY as it is based on engineering evaluation and control system design and not solely on Regulatory Guide 1.9 criteria.



Description of Proposed Change

- Revise TS 3.8.1, AC Sources – Operating, Surveillance Requirements
 - LCO 3.8.1 [CONDITION A revised COMPLETION TIME (Deletes one time change)]
 - SR 3.8.1.2 [Revised Steady State Frequency Band]
 - SR 3.8.1.7 [Revised Steady State Frequency Band]
 - SR 3.8.11 [Revised Steady State Frequency Band]
 - SR 3.8.1.12 [Revised Steady State Frequency Band]
 - SR 3.8.1.13 [Remove NOTE that no longer applies]
 - SR 3.8.1.15 [Revised Steady State Frequency Band]
 - SR 3.8.1.19 [Revised Steady State Frequency Band]
 - SR 3.8.1.20 [Revised Steady State Frequency Band]



Description of Proposed Change

- LCO 3.8.1 CONDITION A, COMPLETION TIME

• ~~OR~~

~~14 days for a one time outage on XST1 to complete a plant modification to be completed by March 31, 2017.~~

- SR 3.8.1.2
 - Verify each DG starts from standby conditions and achieves steady state voltage ≥ 6480 V and ≤ 7150 V, and frequency ≥ 59.9 Hz and ≤ 60.1 Hz.
- SR 3.8.1.7
 - Verify each DG starts from standby conditions and achieves:
 - a. in ≤ 10 seconds, ≥ 6480 V and frequency ≥ 58.8 Hz; and
 - b. steady state, voltage ≥ 6480 V and ≤ 7150 V, and frequency ≥ 59.9 Hz and ≤ 60.1 Hz.



Description of Proposed Change

- SR 3.8.1.11
 - Verify on an actual or simulated loss of offsite power signal:
 - c. DG auto-starts from standby condition and:
 - 4. maintains steady state frequency ≥ 59.9 Hz and ≤ 60.1 Hz
- SR 3.8.1.12
 - Verify on an actual or simulated Safety Injection (SI) actuation signal each DG auto-starts from standby condition and;
 - b. Achieves steady state voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz;
- SR 3.8.1.13
 - ~~NOTE For Unit 2, testing need only be performed for LOOP concurrent with SI until unit startup following 2RF05.~~



Description of Proposed Change

- SR 3.8.1.15
 - Verify each DG starts and achieves:
 - b. steady state, voltage ≥ 6480 V and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz
- SR 3.8.1.19
 - Verify on an actual or simulated loss of offsite power signal in conjunction with an actual or simulated SI actuation signal:
 - 4. achieves steady state frequency ≥ 59.9 Hz and ≤ 60.1 Hz, and



Description of Proposed Change

- SR 3.8.1.20
 - Verify when started simultaneously from standby condition, each DG achieves:
 - a. in < 10 seconds, voltage ≥ 6480 V and frequency ≥ 58.8 Hz, and
 - b. steady state, voltage ≥ 6480 V, and ≤ 7150 V and frequency ≥ 59.9 Hz and ≤ 60.1 Hz.



Precedent

None cited



Technical Evaluation

- Applicable Regulatory Requirements
 - The regulatory basis for Technical Specifications 3.8.1, AC Sources -- Operating is to ensure that a Loss of Offsite Power or a Loss of Coolant Accident with a Loss of Offsite Power are sensed and operation of systems and components important to safety are initiated in order to protect against violating core design limits, challenging the reactor coolant system pressure boundary, and to mitigate the consequences of accidents.
 - 10 CFR 50.36(c), Technical Specifications include the following categories: (1) safety limits, limiting safety systems settings and control settings, (2) limiting conditions for operation, (3) surveillance requirements, (4) design features, and (5) administrative controls.
 - The surveillance requirements for AC Sources -- Operating are included in the technical specifications in accordance with 10 CFR 50.36(c)(3), "Surveillance Requirements."



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - General Design Criterion (GDC) 17 "Electric power Systems," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, among other things, an onsite electric power system and an offsite electric power system shall be provided to permit functioning of structures, systems, and components important to safety.
 - The proposed operational change continues to provide onsite electric power supplies, including the batteries, the onsite electric distribution system, and the emergency diesel generators that shall have sufficient independence, redundancy, and testability to perform their safety functions assuming a single failure.



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - General Design Criterion (GDC) 18 "Inspection and Testing of Electric Power Systems," of Appendix A "General Design Criteria for Nuclear Power Plants," to 10 CFR Part 50 requires, among other things, Electric power systems important to safety shall be designed to permit appropriate periodic inspection and testing of important areas and features, such as wiring, insulation, connections, and switchboards, to assess the continuity of the systems and the condition of their components.
 - The proposed operational change continues to periodically test the specific operability and functionality of the Emergency Diesel Generators and loading sequencers.



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - Regulatory Guide 1.9 [1971], Selection of Diesel Generator Set Capacity for Standby Power Supplies.
 - The rating of the diesel generators is based on the maximum continuous load demand. This rating exceeds the sum of the conservatively rated loads. Motor loads are based on nameplate rating, pump runout conditions, or flow pressure conditions. 6600 V motor efficiency is based on design data.
 - Each diesel generator set is capable of starting, accelerating to rated speed, and loading all Class 1E loads in the required sequence.
 - Sequencing of large loads at 5 second intervals ensures that large motors have reached rated speed and that voltage and frequency have stabilized before the succeeding loads are applied.



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - Regulatory Guide 1.32 [1977], Criteria for Safety-Related Electric Power Systems for Nuclear Power Plants.
 - The offsite power system includes the preferred design stated in NRC Regulatory Guide 1.32: namely, two immediate access circuits from the transmission network are available to the emergency (Class 1E) bus systems.
 - Regulatory Guide 1.93 [1974], Availability of Electric Power Sources.
 - Comanche Peak power operation procedure is in compliance with NRC Regulatory Guide 1.93 as described in technical specifications. The power operation procedure is initiated and continued without restriction only when the limiting conditions for operation (LCO) are met. If the LCOs are not met, the power operation will be restricted in accordance with the technical specification.



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - Regulatory Guide 1.108 [1977], Periodic Testing of Diesel Generator Units used as Onsite Electric Power Systems at Nuclear Power Plants.
 - The Comanche Peak design complies with the intent of Regulatory Guide 1.108, Revision 1 (8/77).
 - IEEE 387-1977, Criteria for Diesel Generator Units Applied as Standby Power Supplies for Nuclear Power Generating Stations.
 - Testability and Maintenance - Circuit design provisions incorporate test capability to periodically monitor the operational capability of the safety-related Class 1E systems during power operation. Initially, all safety-related equipment is tested during the startup testing phase.
 - EDG Periodic Testing - Performed as specified in the Technical Specifications to verify their continued capability and availability to perform their design function after commercial operation of the plant.



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - The Comanche Peak preventative maintenance program is established to prevent failures.
 - Should failures occur, the program functions to identify root cause of any malfunction and perform required repairs or component replacement.
 - Following repairs or maintenance, a final equipment check is performed prior to starting of any tests.
 - Upon satisfactory completion of post-maintenance testing, control of equipment is transferred to the control room operator.



Technical Evaluation

- Applicable Regulatory Requirements (continued)
 - There are no regulatory commitments outside of the Technical Specification Surveillance Requirements in Limiting Condition for Operation 3.8.1, AC Sources – Operating.
 - The proposed changes to the surveillance requirements are being submitted pursuant to 10 CFR 50.90.



Supplemental Information

- Risk Impacts
 - No additional risk is identified due to the proposed change in surveillance requirement acceptance criteria. The proposed frequency band is bounded by the current frequency band and has been evaluated to comply with the current safety analyses.



Summary

- Results of this deterministic evaluation / analysis provides assurance that the systems and equipment required to safely shutdown the plant and mitigate the effects of a design basis accident will remain capable of performing their safety functions.
- No additional risk is identified due to the proposed surveillance requirement acceptance criteria changes.
- The proposed changes to TS 3.8.1, surveillance requirements are consistent with NRC guidance and meet the following principles:
 - Meets the current regulations
 - Consistent with defense-in-depth philosophy
 - Maintains sufficient safety margins
- Questions