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SACRAMENTO MUNICIPAL UTILITY DISTRICT □ 6201 S Street, Box 15830, Sacramento, California 95813; (916) 452-3211

December 4, 1978

Director of Nuclear Reactor Regulation
Attention: Mr. Robert W. Reid, Chief
Operating Reactors, Branch No. 4
U. S. Nuclear Regulatory Commission
Washington, D. C. 20555

Docket No. 50-312
Rancho Seco Nuclear Generating
Station, Unit No. 1

Dear Mr. Reid:

On November 22, 1978, the Sacramento Municipal Utility District requested an exemption from 10 CFR 50.46 until further improvements to the ECCS can be made. These improvements consist of modifications which will eliminate any requirement for operator action following a small break. You advised us on August 16, 1978 that you found this modification conceptually acceptable and we provided additional details in our letter of November 22, 1978 including an electrical schematic of the control scheme which will provide throttling of high pressure injection flow sufficient to prevent HPI pump runout. During further discussions, your staff has indicated the need for the following additional information.

The controlling items for the modification are DC motors to replace the AC motors on the high pressure injection valve operators. The current expected delivery date of these motors is November 1, 1979. By expediting the engineering design, procurement, and manufacturing of these motors, delivery could be achieved around September 1, 1979 for a total additional cost of approximately $25,000.

It is estimated that at least a 7-day outage would be required to install this modification if the plant were shutdown for this purpose. This includes time for cooldown, electrical installation and testing, SFAS testing, flow testing, and heatup. During this period, replacement power would be from oil fired generation, which costs an additional 20 mills/kilowatt hour, resulting in an outage cost of over $3 million. This represents an unnecessary cost to the people of Northern California since the District feels operation without these improvements is still in conformance with the performance requirements of 10 CFR 50.46(b) and public health and safety will not be endangered. Therefore, we are requesting the exemption from 10 CFR 50.46 for the duration of Cycle 3 operation and commit to implement these modifications prior to the start-up for Cycle 4 operation.

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Listed below are the major pieces of equipment required and the standards, seismic criteria and design requirements that the purchase specification will request:

1. 125 VDC Motor:

   The motors shall be purchased to meet the test conditions described in Limitorque Test Report B0009. This test includes aging of the motor at 180°C for 100 hours, a seismic test per IEEE 344-1975, a total radiation exposure of 1×10^7 rads, and a temperature transient test where the temperature is between 340°F and 310°F for 7 hours and at 212°F for 18 hou , with successful operation of the motor.

   Our motors will be located outside of the containment and sufficient design margin is provided between the above described test conditions and the worst environmental conditions the motor will see in service. The motors shall be specified to have a design life of forty years rated for continuous operation at 120°F and able to stroke the valve in ten seconds with maximum design differential pressure at a voltage range of 105 to 140 volts.

2. Power and Control Cable:

   All power and control cable required for this modification wil' be specified to meet the applicable portions of the following standards:

   A. IPCEA Standard S-66-524 - Crosslinked - Thermosetting Polyethylene - Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

   B. IPCEA Standard S-19-81 - Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Ene.gy.

   C. IPCEA Standard S-61-402 - Thermoplastic-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.

   D. IPCEA Standard S-68-516 - Cables Rated 0 - 35,000 Volts and Having Ozone Resistant Ethylene-Propylene Rubber Insulation.

   E. IEEE 383-1974 - Type Test of Class IE Electric Cables, Field Splices, and Connections for Nuclear Power Generation Stations.

   F. NEMA WC-21-1972 - Nonreturnable Reels for Wires and Cables.

   G. NEMA WC-25-1975 - Protective Coverings for Wire and Cable Reels.

3. 125 Volt DC Starters:

The starters shall be specified to meet to IEEE 344-1975 and to operate continuously between 105 and 140 VDC, the maximum voltage range on the Class I DC system. The starters are to be located in an environmentally controlled room, and will be enclosed in a NEMA 1 enclosure. This enclosure is adequate for normal and abnormal environmental conditions in the room.

The District has performed a battery sizing calculation which verifies that the nuclear service batteries proposed to be used in the design are capable of supplying its existing load along with the additional load of the motor operations. The calculation method used is the Hoxie method described in IEEE Paper 54-177. For your information, a copy of the assumptions and calculations are attached.

Once installation of this modification is complete, testing will be performed to determine that all design criteria have been met. The following are items to be included in this testing:

A. Electrical test to verify proper operation of the motor operator with the new 125 VDC motor and contactor.

B. Battery test to verify that the battery has adequate capacity to supply the new motor load along with its existing load.

C. Tests to determine valve opening times are less than 10 seconds.

D. SFAS initiation tests to determine all valves stroke to the proper position with a SFAS initiation signal.

E. Flow tests to assure greater than 450 gpm flow at a system pressure greater than or equal to 600 psig.

F. Tests to determine limit switch settings which will assure adequate ECCS flow with all pump/valve combinations while still preventing pump runout with all possible combinations.

If you have any further questions concerning this modification or our request for an exemption from the provisions of 10 CFR 50.46, please contact us.

Sincerely yours,

J. J. Mattimoe

J. J. Mattimoe
Assistant General Manager
and Chief Engineer

Attachments

SUBJECT: ADDITIONAL LOADS TO BATTERY BC DUE TO SMALL BREAK ANALYSIS

DATE: December 1, 1978

DEPT.: Generation Engineering

BY: R. E. Daniels

REFERENCE:

I. Assumptions for attached calculations

A. The following MOV's will be added to battery BC:

SFV23809
SFV23811
SFV23604

B. The following MOV's will be added to battery BD:

SFV23810
SFV23812

C. The existing design load on both battery BC and BD is the same, 160 amps. All motors involved are the same size. Therefore the calculation will consider only battery BC since it is the worst case.

D. The existing motors are rated at 460VAC and 25 ft-lb. Based on a Limitorque data sheet a 25 ft-lb DC motor will have an inrush of 82 amps at 125 VDC.

E. All valves operate at the same time for an SFAS, therefore total inrush for motors is 3 x 82 = 246 amps. The valves will be energized at t=0 and this inrush current is superimposed on existing cycle to get a peak inrush of 406 amps.

SUBJECT: ADDITIONAL LOADS TO BATTERY BC DUE TO SMALL BREAK ANALYSIS

DATE: 12/1/78

DEPT.: Generation Engineering

BY: R. E. Daniels

REFERENCE:

II REFERENCES

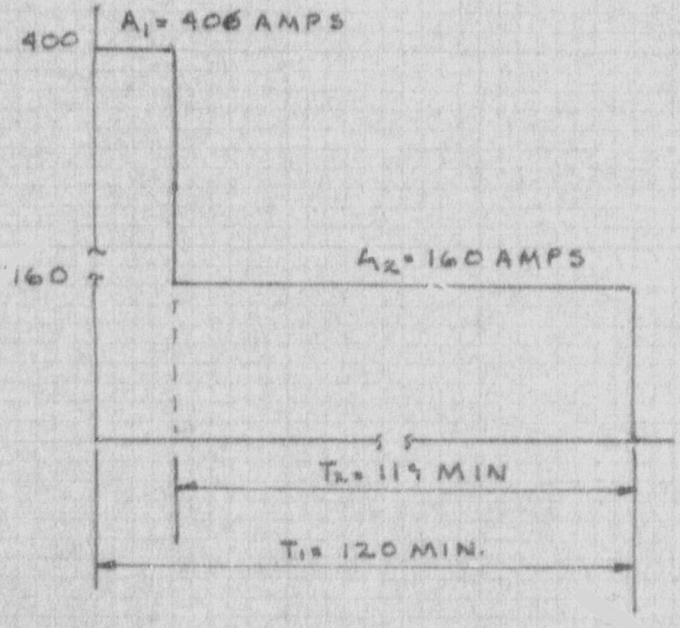
A. GOULD DISCHARGE CURVE FOR BATTERY FPS CURVE TC105605

B. GOULD TEMPERATURE CORRECTION CURVE MC101970

C IEEE PAPER 54-177 "50MG DISCHARGE CHARACTERISTICS OF LEAD ACID BATTERIES" BY E.A. HOXIE

III CALCULATIONS

THE EXISTING DUTY CYCLE FOR BATTERY BC IS 160 AMPS FOR TWO HOURS AT 60°F. THE NEW DUTY CYCLE IS SHOWN BELOW



SUBJECT: ADDITIONAL LOADS TO BATTERY BC DUE TO SMALL BREAK ANALYSIS

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REFERENCE:

FROM REFERENCE C - IEEE PAPER 54-177

(1) $$P = \frac{A_1}{R_1} + \frac{A_2 - A_1}{R_2}$$

WITH

P = NUMBER OF POSITIVE PLATES REQUIRED

A_N = LOAD IN AMPS FOR PERIOD N

R_N = RATE PER POSITIVE PLATE FOR TIME T_N.

∴ FROM GRAPH OF DUTY CYCLE

(2) $A_1 = 406$ AMPS
$A_2 = 160$ AMPS

FROM GOULD DISCHARGE CURVE TC1050605

$R_{1(77)}$ = DISCHARGE RATE PER POSITIVE AT 77°F FOR 120 M

$R_{1(77)} = 27.5$

FROM GOULD TEMPERATURE CORRECTION CURVE MC10970 THE CORRECTION FACTOR AT 60°F IS .91

$R_{1(60)} = R_{1(77)} \times$ CORRECTION FACTOR

$R_{1(60)} = (27.5)(.91)$

(3) $R_{1(60)} = 25.03$ AMPS/POSITIVE PLATE.

$R_{2(77)}$ = DISCHARGE RATE PER POSITIVE AT 77°F FOR 119 MINUTES. AT 77°F

FROM CURVE TC1050605

$R_{2(77)} = 27.5$

FROM GOULD CURVE MC10970 CORRECTION FACTOR IS .91 AT 60°F

∴ $R_{2(60)} = R_{2(77)} \times$ CORRECTION FACTOR
$= (27.5)(.91)$

(4) $R_{2(60)} = 25.03$ AMPS/POSITIVE PLATE

∴ SUBSTITUTING 2, 3, AND 4 INTO EQUATION 1

$$P = \frac{406}{25.03} + \frac{160 - 406}{25.03}$$

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SACRAMENTO MUNICIPAL UTILITY DISTRICT

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REFERENCE:

P= 6.39 POSITNE PLATES REQUIRED

THE EXISTING BATTERY IS A GOULD FPS-15 WHICH HAS SEVEN POSITIVE PLATES THEREFORE THE EXISTING BATTERY CAN SUPPLY THE NEW DUTY CYCLE.