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

November 19, 1979

Mr. Robert W. Reid, Chief  
Operating Reactors Branch No. 4  
Division of Operating Reactors  
U.S. Nuclear Regulatory Commission  
Washington, D.C. 20555

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

Dear Mr. Reid:

Mr. Harold R. Denton's letter of October 30, 1979 requires the Sacramento Municipal Utility District to review its October 18, 1979 response to NUREG-0578. This letter presents the results of that review related to the Auxiliary Feedwater (AFW) system. It also provides background with respect to the District's choice of refueling 1980 and refueling 1981 as commitment periods for completion of the two broad groupings of changes required by NUREG-0578.

The District currently projects January 19, 1980 as the Rancho Seco shutdown date for refueling. This date corresponds to a cycle III core burnup of 300 EFPD. The reload safety analysis which characteristically takes 3 months for NRC staff review has an applicable window of plus or minus 10 EFPD. The District considered three options for satisfying refueling requirements and NUREG-0578 change implementation timetables. They are:

1. Shutdown and cool down the plant on January 1, 1980, make the changes, startup, heatup, burn out remaining EFPD, shutdown, cooldown and then refuel. This option requires an additional cooldown cycle and loss of two or more additional weeks of power production.
2. Shutdown and cool down the plant on January 1, 1980 and refuel. This option requires sacrifice of up to 19 EFPDs in the current cycle with a resultant loss of more than one million dollars worth of fuel. In addition, it could delay startup at the end of the refueling period because of time required to recalculate the reload safety analysis and to obtain subsequent NRC staff review.

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3. Run the plant until fuel is exhausted. Then shutdown and cool-down on about January 15, 1979 if operating expectations hold.

The District strongly prefers option three.

In its October 18, 1979 letter the District projected that several NUREG-0578 related changes would be done during the 1981 refueling outage. Shutdown for the 1981 refueling outage could be as early as March 1981. That date is indeed beyond the Nuclear Regulatory Commission's desired implementation date of January 1, 1981, but it is certainly more realistic than the January 1981 date. Though the District does not yet have specific justification, in some cases difficulty is expected in attaining the 1981 refueling date. The District has several reasons for believing the January 1, 1981 date is premature.

First, many of the project definitions are only now being refined. This fact is pointed out by the clarification enclosure to the October 30, 1979 Denton to operating reactors letter. The District's experience with fire protection and security modifications has shown the difficulty and in many cases the impossibility of completing the design and construction of proposed modifications on a tight schedule when the NRC is still attempting to define or refine the requirements.

A good example of this problem is the technical support center. Technical support center communication and data transmission requirements from Rancho Seco to the NRC have not been defined by the NRC. This delay in definition impacts directly upon the design requirements for obtaining signals for and transmitting information from the technical support center. Only after the project is well-defined can the conceptual design requirements be developed. Then detail design and hardware procurement can proceed. Assuming it would be possible to complete the design and obtain the hardware in a timely manner, the possibility of installing hardware, pulling cable, testing operability of equipment, etc., by January 1, 1981 is essentially zero.

In addition, many utilities will attempt to procure identical items during the same time frame. Vendors may not be able to fully respond to utility hardware demands. The District is additionally handicapped by the state law which requires that it solicit bids on purchases over ten thousand dollars.

The District chooses to present a completion date based upon candid assessment rather than to supply a date which it expects to later amend.

Auxiliary feedwater modifications are the only near term modifications requiring review prior to implementation. The District has received multiple inputs concerning auxiliary feedwater from NRC staff members doing the Auxiliary Feedwater Reliability Study, from TMI-2 Lessons Learned Task Force members, from the team leader for NUREG-0578 implementation review, from

the NUREG-0578 regional implementation meeting in Las Vegas, Nevada on September 26, 1979, and of course from NUREG-0578 directly. The NRC groups providing this information have done so with the intention of defining the requirements for implementation. While the intention is appreciated, the District finds that the information is not always consistent from group to group. Therefore, the District requests that the NRC staff carefully review this submittal and then call a meeting where the acceptability of the auxiliary feedwater system can be resolved. We request that the NRC staff have personnel in attendance who can pass final judgment on auxiliary feedwater acceptability for operation during the interval between the January 1980 refueling and the 1981 refueling. We propose that the meeting be held in Bethesda, Maryland on 28, 29 or 30 November, 1979.

The remainder of this letter addresses NUREG-0578 Auxiliary feedwater system implementation details related to items 2.1.7a and b which remain to be resolved or for which additional information has been requested. Auxiliary feedwater related segments of the District's October 18, 1979 letter are attached for reference.

1. Resolution Required - Is existing auxiliary feedwater pump power supply satisfactory?

Origin of Concern - October 30, 1979 Denton to operating reactors letter and November 8, 1979 phone conversation with Charles Long of the NRC staff.

#### Sacramento Municipal Utility District Position

The auxiliary feedwater system at Rancho Seco contains two auxiliary feedwater pumps. Either of the pumps can provide full flow. Pump P-319 is powered by an electric motor drive while pump P-318 has both a turbine drive and an electric motor drive on the same shaft. Pump P-318 normally starts on the turbine drive with the electric motor serving as only a backup driver.

On loss of main feedwater or on loss of all reactor coolant pumps, pump P-318 starts on the turbine and pump P-319 starts on the motor if offsite power is available. If offsite power is not available only Pump P-318 starts on the turbine. Pump P-319 can be started using power from the safety grade diesel generator bus by using a key lock bypass switch in the control room. The electric motor drive for pump P-318 can be started in the same manner. Keys for the keylock bypass can be easily obtained and the pumps started within five minutes of the operator's decision to start.

The diesel generators have been tested to full ECCS load including auxiliary feedwater pumps though the diesel generators were not originally sized to accept the load. The diesel generators accepted the load though output voltage would not have satisfied the minimum transient voltage requirements of Regulatory Guide 1.9 if the auxiliary feedwater pumps had been automatically sequenced loads. It should be noted that the voltage dip caused by starting an auxiliary feedwater pump will not cause operating equipment to de-energize or fail.

The District is currently investigating the possibility of resequencing the diesel generator loading sequence to add auxiliary feedwater pump starts to a position early in the sequence. The following consideration must be addressed prior to making the change:

(a) To minimize the voltage dip the 1000 horsepower auxiliary feedwater pumps (largest of potential diesel generator loads) must be loaded early in the sequence. The auxiliary feedwater pump being loaded early enough in the sequence to allow acceptable voltage drop may cause problems with respect to FSAR assumptions concerning time to start for other devices.

(b) The District recently completed a system voltage study in response to Inspection and Enforcement 79-04. The District letter of October 17, 1979 conveyed the information. The study took sixty full days to complete. If the diesel generator loading sequence is changed, the study must be done again.

(c) If the diesel generator loading sequence is changed extensive retesting will be required. Retesting preparations will take several weeks.

Diesel generator loading sequence must be carefully studied relative to items (a) and (b) above before such a change can be considered. If the change is then deemed possible, the work must be completed and then testing must then be completed. The long time span of this potential effort coupled with the fact that a steam powered prime mover is available for one of the pumps causes the District to choose to stay with the existing automatic start capability.

2. Information required - Which valves are automatically loaded onto the diesel generator buses on loss of offsite power?

Origin of Concern - October 30, 1979 Denton to operating reactors letter and November 8, 1979 phone conversation with Charles Long of the NRC staff.

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Sacramento Municipal Utility District Response

As described in the attachment, one of the valves below must open and one of the auxiliary feedwater pumps must start in order for water to reach a once through steam generator (OTSG).

VALVE NO.	VALVE NAME	VALVE POWER SUPPLY
FV-20527	AFW Flow Control Valve	ICS power supply for control power Air for pneumatic power
FV-20528	AFW Flow Control Valve	ICS power supply for control power Air for pneumatic power
SFV-20577	Bypass Valve for FV-20527	Safety grade Diesel Generator bus
SFV-20578	Bypass Valve for FV-20528	Safety grade Diesel Generator bus

Valves FV-20527 and FV-20528 provide normal OTSG level control capability for auxiliary feedwater. If air fails, these valves fail full open while if the control power fails, the valves fail to 50 per cent open. Though control power is not fully safety grade, it is supplied from a battery via an inverter. The power supply would be available for at least two hours after loss of offsite power and loss of both diesel generations. If the flow control valves fail closed for some reason, the bypass valves may be opened to supply water to the OTSG's.

3. Resolution Required - For those designs where instrument air is needed for operation, the electric power supply requirement should be capable of being manually converted to emergency power sources.

Origin of Concern - October 30, 1979 Denton to operating reactors letter.

Sacramento Municipal Utility District Position

Air compressor power supplies are not safety grade. However, as described in item 2 above, if flow control valve FV-20527 or FV-20528 should loose control air, the valve fails full open. In addition bypass valves SFV-20577 and SFV-20578 which are powered from safety grade emergency buses may be manually controlled from the control room to provide flow to the OTSGs. This backup capability and the failure position of the normal flow control valves provides a highly reliable flow path to the OTSGs. The District believes the existing Rancho Seco auxiliary feedwater system satisfies the intent of

NUREG-0578 item 2.1.7a because it provides reliable multiple flow paths to the OTSGs.

4. Resolution Required - Is non-safety grade OTSG level indication acceptable as backup indication for control grade auxiliary feedwater flow? The District understands that this new requirement for backup indication is being considered.

Origin of Concern - November 8, 1979 phone conversation with Charles Long.

Sacramento Municipal Utility District Response

The existing auxiliary feedwater flow indication system at Rancho Seco consists of a sonic flow detector on the inlet line to each OTSG. They are both powered from the same non-safety grade inverter which is supplied from a battery. As a backup, OTSG level indication is available. Each OTSG has three ranges of level instrumentation. Though the power to each set of OTSG level indications originates from a safety grade inverter powered by a safety grade battery, the power scheme cannot be considered to be fully safety grade.

To upgrade the power supply reliability for the primary indication source, the District will provide a different safety grade power supply for each flow detector.

5. Information Requested - What is the accuracy of existing auxiliary feedwater flow indication?

Origin of Concern - November 8, 1979 phone conversation with Charles Long.

Sacramento Municipal Utility District Response

Accuracy of existing auxiliary feedwater flow indication at Rancho Seco is within \* 10%.

6. Information Requested - Is the existing control grade auxiliary feedwater flow indication testable?

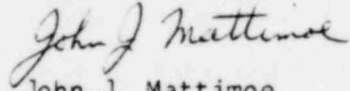
Origin of Concern - October 30, 1979 Denton to operating reactors letter and November 8, 1979 phone conversation with Charles Long of the NRC staff.

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Sacramento Municipal Utility District Response

Auxiliary feedwater flow indication can be tested by injection of a simulated signal at the detector. The detector is accessible during normal operation.

Sincerely yours,



John J. Mattimoe  
Assistant General Manager  
and Chief Engineer

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Attach

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ATTACHMENT

Auxiliary Feedwater System Related Excerpts from the District's October 18, 1979 NUREG-0578 Response.

2.1.7.a Auto Initiation of the Auxiliary Feedwater System

Sacramento Municipal Utility District Commitment

The District believes that the Rancho Seco auxiliary feedwater system satisfies the intent of the short term NRC position on this system. The point-by-point comparison below shows that it comes close to satisfying each detail of the NRC position. In those instances where it does not satisfy a detail, there are one or more backup capabilities to insure that water reaches the once through steam generator (OTSG). By January 1, 1980 the District feels that it could not design and install a system which would satisfy each detail of the NRC position, and yet operate as reliably as the existing system. In the long term, The District intends to install a safety grade system independent of the ICS. The system will be installed during the refueling outage in 1981.

A comparison of the existing system to the NRC position is made below:

1. "The design shall provide for automatic initiation of the auxiliary feedwater system."

In the existing system, one of the valves in the table below must open and one of the pumps in the table below must operate in order to provide water to an OTSG.

AUTOMATIC INITIATION SIGNAL

Auxiliary Feed System Component	Loss of Main Feed Pump Discharge Pressure	Loss of Four RCPs	SFAS Actuation	
			Channel A	Channel B
AFW Pump P-318	X	X	X	X
AFW Pump P-319	X	X		
AFW Flow Control Valve FV-20527	X	X		
AFW Flow Control Valve FV-20528 Opens	X	X		
AFW Bypass Valve SFV-20577 Opens				X
AFW Bypass Valve SFV-20578 Opens			X	

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2. "The automatic initiation signals and circuits shall be designed so that a single failure will not result in the loss of auxiliary feedwater system function."

The function of the auxiliary feedwater system is to provide water to the OTSGs. Failure of any active component including initiating circuits and signals will not result in a loss of auxiliary feedwater system function. In addition, only two single failure cases would require operator action to provide water to the OTSGs.

One case is when the turbine driven pump P-318 fails after loss of offsite power. In that case, the motor drives on pumps P-318 and P-319 can be manually loaded onto the diesel generator supplied emergency buses. The other case is failure of the ICS. Failure of the ICS could prevent automatic opening of AFW flow control valves, FV-20527 and FV-20528 to the OTSG (AFW pump starts are not controlled by the ICS). However, AFW bypass valves SFV-20577 and SFV-20578 are independent of the ICS and they can be opened from the control room. In addition, from the control room the air may be dumped from the pneumatic operators of AFW flow control valves FV-20527 and FV-20528 using circuitry independent of the ICS. Relieving air pressure fails the valves full open.

3. "Testability of the initiating signals shall be a feature of the design".

Each of the auxiliary feedwater system components discussed for NRC position 1 above can be tested for initiation by simulation of appropriate signals. Prudence dictates that some of the tests be done only while shut down.

4. "The initiating signals and circuits shall be powered from the emergency buses."

All AFW motive and initiation power comes directly from diesel backed emergency buses or from battery backed power supplies. Batteries are charged from diesel backed emergency buses.

5. "Manual capability to initiate the auxiliary feedwater system from the control room shall be retained and shall be implemented so that a single failure in the manual circuits will not result in loss of system function."

Manual initiation capability is not prevented by any single system failure.

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6. "The A-C motor-driven pumps and valves in the auxiliary feedwater system shall be included in the automatic actuation (simultaneous and/or sequential) of the loads to the emergency buses."

Refer to the table in the discussion of NRC position 1 when following this discussion.

AFW valves SFV-20577 and SFV-20578 are automatically supplied by diesel backed emergency buses with or without offsite power.

AFW flow control valves FV-20527 and FV-20528 are pneumatically operated and have battery backed control power supplies.

When called upon by an automatic initiation signal, Pump P-318 starts on its own turbine whether or not offsite power is available. If the turbine fails to start, a backup motor may be started by merely depressing a push button in the control room if offsite power is available. If offsite power is not available, a key-lock bypass switch in the control room must be turned before using the push button.

P-319 starts automatically on its A-C motor when called upon by an automatic initiation signal if offsite power is available. If offsite power is not available, a key-lock bypass switch must be turned prior to loading the pump motor onto the emergency bus.

7. "The automatic initiating signals and circuits shall be designed so that their failure will not result in loss of manual capability to initiate the AFWS from the control room."

No automatic initiation signal will prevent manual control of system components.

#### 2.1.7b Auxiliary Feedwater Flow Indication to Steam Generator for PWRs

##### Sacramento Municipal Utility District Commitment

The auxiliary feedwater (AFW) system at Rancho Seco currently has control grade flow indication for flow to each OTSG. OTSG level instruments act as backup instruments. Power to the AFW flow and OTSG level instruments is from a battery backed inverter.

The District intends to install safety grade AFW flow instrumentation during the 1981 refueling outage.