MAR 11 1986

MEMORANDUM FOR: Chairman Palladino

FROM: Victor Stello, Jr.
Acting Executive Director
for Operations

SUBJECT: DESIGN ADEQUACY OF THE AUXILIARY PRESSURIZER SPRAY SYSTEM AT PALO VERDE NUCLEAR GENERATING STATION

In a letter to you dated January 13, 1986, Messrs. Jesse C. Ebersole and Glenn A. Reed noted that the ACRS had decided during its November 1985 meeting not to provide additional comments regarding the design adequacy of the auxiliary pressurizer spray system at the Palo Verde Nuclear Generating Station. Messrs. Ebersole and Reed expressed disagreement with that decision and provided their comments in their letter to you.

In view of the pending Commission consideration of the full power license for Palo Verde Unit 2, I am forwarding for your information the enclosed staff discussion of the concerns expressed by Messrs. Ebersole and Reed.

Original signed by
Victor Stello

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Acting Executive Director
for Operations

Enclosure:
As stated

cc: Commissioner Roberts
Commissioner Asselstine
Commissioner Bernthal
Commissioner Zech
OPE
OGC
SECY

CONTACT:
R. Wright, NRR
x28900

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*PREVIOUS CONCURRENCE SEE DATE
*REVISED ENCLOSURE IN DEDROGR OFFICE 3/7/86

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ENCLOSURE

STAFF DISCUSSIONS OF CONCERNS EXPRESSED

BY J. EBERSOLE AND G. REED

I. Staff Review of the Auxiliary Pressurizer Spray System (APSS)

As reported in SECY 85-384, the Arizona Nuclear Power Project (ANPP) has responded to the staff concerns regarding design adequacy of the APSS in letters dated October 15, 1985, October 22, 1985, and November 4, 1985. The staff also addressed this issue in the ACRS Subcommittee meeting of November 5, 1985, and ACRS Full Committee meeting of November 7, 1985.

In NUREG-0857, Supplement No. 9, Safety Evaluation Report related to the operation of Palo Verde Nuclear Generating Station, dated December 1985, the staff reported the details of our evaluation on this subject. The staff's conclusion is that the current design of APSS and the pressurizer gas vent systems with the planned modifications and surveillances provide adequate means of reactor coolant system (RCS) depressurization at an appropriate rate of depressurization to satisfy the required safety function at Palo Verde.

The bases of the staff conclusion are as follows:

1. Within the design basis, the appropriate rate of depressurization is based on two scenarios: a) steam generator tube rupture (SGTR) accident mitigation, and b) reactor coolant system depressurization during plant cold shutdown per the staff position in the Standard Review Plan (BTP RSB 5-1).

2. By a letter dated October 15, 1985 (ANPP-33713), ANPP provided the results of a reanalysis of the SGTR accident. In this reanalysis, the APSS was assumed inoperable and the safety-grade gas vent system from the pressurizer was used for accident mitigation. The reanalysis showed that the radiological consequences are within the limits of 10 CFR 100 guidelines. An independent staff evaluation verified the results of the ANPP reanalysis. The staff also reviewed the design of the gas vent system from the pressurizer and concluded that it meets safety-grade standards.

3. To satisfy BTP RSB 5-1, the APSS is needed to depressurize the RCS during plant cold shutdown. However, as indicated in BTP RSB 5-1, a plant which receives its operating license after January 1979 is classified as a Class 2 plant with respect to implementation requirements. Palo Verde Units 1, 2 and 3 are Class 2 plants and their design does not have to meet all the provisions specified in BTP RSB 5-1. Specifically, for a Class 2 plant, manual operator actions outside the control room are permitted to correct a single failure of a safety-related component if those actions can be justified. During the staff review of the subject, ANPP committed to implement a number of modifications to the Palo Verde design to improve the operator's ability to operate the charging/auxiliary spray system from

the control room. ANPP also committed to Technical Specification changes which would ensure the likelihood of APSS flow paths. In order to reduce the probability of damage to the charging pumps with respect to possible gas binding, ANPP committed to do the following: a) perform an external surface examination on the Unit 2 charging pumps utilizing the appropriate NDE technique, b) perform weekly visual examinations of each charging pump with appropriate aids suitable for the detection of cracking, c) declare the charging pump inoperable within 72 hours of discovery of an apparent thru-wall crack, d) perform a demonstration of the hydrogen gas venting process at the charging pumps prior to initial criticality at Palo Verde Unit 2, and e) provide a detailed evaluation of the charging pump operability when subjected to the various phenomena associated with hydrogen gas binding prior to the end of the first refueling outage of Palo Verde Unit 1.

Based on the enhancement of the APSS proposed by ANPP and other ANPP commitments discussed in NUREG-0857, Supplement 9, the staff concludes that reasonable assurance exists that the APSS would perform its safety-related function for plant cold shutdown and that the design of APSS meets the provisions in BTP RSB 5-1 applicable for Class 2 plants.

II. Test Data for the APSS and Pressurizer Vents

On January 24, 1986, Palo Verde Unit 1 performed its boron mixing and natural circulation test to demonstrate its compliance to BTP RSB 5-1. The APSS was used for RCS depressurization after the RCS hot leg temperature reached 350°F and the RCS pressure was approximately 1500 psig. Several members of the NRR staff observed this test. The preliminary results show that with one charging pump in operation, the RCP seal injection system open, and the loop isolation valves (CH-239 and CH-240) slightly open, the rate of RCS depressurization is approximately 13 psi per minute. Thus, the APSS has demonstrated that RCS depressurization is achieved during plant cold shutdown per the requirements of BTP RSB 5-1.

ANPP has stated that the flow paths of the gas vent system from the pressurizer were tested as a part of Unit 1 pre-core hot functional tests in 1984. However, the rate of RCS depressurization using pressurizer vents has not yet been determined by test. The need for testing the depressurization capability of the pressurizer gas vent system is currently being discussed between the licensee and the staff to determine whether further action is warranted.

III. Concerns Expressed by J. Ebersole and G. Reed

Messrs. Ebersole and Reed have expressed concerns regarding the lack of a rapid depressurization capability in the Palo Verde design. The lack of PORVs in current plants designed by Combustion Engineering was highlighted to the Commission at the Commission meeting held on July 28, 1982, to consider a full power license for San Onofre 2. At that meeting, the staff recommended that the Commission require these plants to install PORVs. However, the Commission

voted not to require PORVs and to await the completion of the staff generic study on this subject. The staff study was completed and sent to the Commission as SECY 84-134 on March 23, 1984. It was subsequently published as NUREG-1044, "Evaluation of the Need for a Rapid Depressurization Capability for CE Plants."

The conclusion of this study was that the cost-benefit analysis showed that the need for PORVs was a "close call" (that is, the detriments to safety, or increased risk, tended to balance the improvements to safety, or decreased risk). Furthermore, it was concluded that because the benefits of the PORV as a rapid depressurization feature were directly applicable to improving decay heat removal capability, it was appropriate to defer a decision on the need for PORVs to the USI A-45 Program (Decay Heat Removal Requirements). The staff is currently following this approach.

In general, the staff agrees with Messrs. Ebersole and Reed that a rapid depressurization capability has substantial merit. Although it cannot be justified at this time for backfit in operating reactors or in reactors for which construction is substantially complete, the staff believes such a system should be seriously considered on future plants.

On Monday, February 24, 1986, the staff met with Mr. Glen Reed of the ACRS and Westinghouse representatives to discuss the merits of a rapid depressurization system. Mr. Reed expressed his views on the subject, and Westinghouse provided information on how such a system was being incorporated in their advanced design and, in fact, existed in their operating plants.

The following are staff responses to the concerns of J. Ebersole and G. Reed expressed to Chairman Palladino in their letter of January 13, 1986:

Concern

"We believe that these current systems at Palo Verde, even with the planned modifications and surveillances, may not be adequate to provide for the rapid depressurization need."

Response

As discussed above, for cold shutdown under normal operating conditions the design of APSS meets the staff position in BTP RSB 5-1 for Class 2 plants for which manual operator actions are permitted if justified. For depressurization under the accident conditions considered, see the concerns/responses immediately following. In summary, subject to a final determination regarding the possible need to further verify (e.g., by testing) the effectiveness of the gas vent system as assumed in the analyses that have been done, the staff believes that the current design of APSS and the pressurizer gas vent systems with the planned modifications and surveillances provide adequate means of reactor coolant system (RCS) depressurization at an appropriate rate of depressurization to satisfy the required safety function at Palo Verde.

Concern

"The 'rapid' depressurization function has been elevated (NUREG-1044) to a safety function but a dedicated safety grade system in this new plant has not been provided to perform it. (Of course, it has not yet been required of older plants which use nonsafety-grade PORVs)."

Response

When the APSS is not operable, the safety-related function of mitigating an SGTR accident is performed by the use of a safety-grade gas vent system from the pressurizer.

Concern

"The utility has now taken credit (after problems with the APSS during the testing program) for an alternate system (the gas vent system) for depressurization. This would permit very slow depressurization through a preferred 3/4-inch line or alternatively through a 7/32-inch orifice."

Response

When the APSS is not operable, the use of the gas vent system from the pressurizer has been assumed in an ANPP reanalysis of an SGTR accident. The results of this reanalysis show that the radiological consequences of the accident are within the limit of 10 CFR 100 guidelines when this alternate means of depressurization is used and that depressurization of the RCS is achievable.

Concern

"The systems (APSS and vent) have numerous single failure vulnerabilities."

Response

The APSS is designed such that following a single failure in the system, manual operator actions outside the control room are required for system operation. The staff has reviewed the design and concluded that the APSS design meets the staff position in BTP RSB 5-1 for a Class 2 plant. The design of the gas vent system from the pressurizer meets safety-grade standards including the single failure criterion.

Concern

"The reliability of both of these systems depends on many valves that must open from a normally closed position and on the operability of several air-operated valves."

Response

The valve arrangement has been evaluated against the single failure criterion. The air-operated valves are designed to fail to their safe position upon loss of non-safety grade air supply. The air-operated valve located in the RWT common water supply line has been administratively locked into its open position to assure a flow path.

The systems are designed such that the APSS would have a flow path available with a postulated single failure of a safety-grade component or power supply to the valves. In some cases, manual operator actions are required to establish a flow path for the APSS. This is permitted for a Class 2 plant with respect to implementation of BTP RSB 5-1. In addition, the gas vent system from the pressurizer meets safety grade standards, including the single failure criterion.

IV. Conclusion

In summary, the staff concludes that: 1) the safety-grade gas vent system from the pressurizer provides sufficient RCS depressurization for SGTR mitigation, and 2) the enhancements, technical specifications and schedules described in Palo Verde SSER 9 provide reasonable assurance that the APSS will perform plant cold shutdown per BTP RSB 5-1. Thus, the staff finds the Palo Verde design regarding the capability of RCS depressurization meets current regulatory requirements as stated in NUREG-1044. The decision regarding PORVs for CE plants without PORVs should be deferred and incorporated into the technical resolution of USI A-45.

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UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D. C. 20555

EDO PRINCIPAL CORRESPONDENCE CONTROL

FROM:

JESSE C. EBERSOLE
GLENN A. REED

DUE: 2/24/86

EDO CONTROL: 001338
DOC DT: 01/13/86
FINAL REPLY:

TO:

CHAIRMAN PALLADINO

FOR SIGNATURE OF: ** GREEN **

SECY NO: 86-38

DESC:

COMMENTS ON OPERATIONAL TEST RESULTS OF PALO VERDE NUCLEAR GENERATING STATION, UNITS 1, 2, AND 3 AND SUGGESTED FOLLOW-UP ACTIONS

DATE: 01/15/86
ASSIGNED TO: NRR CONTACT: DENTON

ROUTING:

STELLO
ROE
REHM
SNIEZEK
HELTEMES
GCUNNINGHAM

SPECIAL INSTRUCTIONS OR REMARKS:

FOR APPROPRIATE ACTION.
ADVISE EDO'S OFFICE (X27585) BY 1/31/86
OF WHAT ACTION, IF ANY, WILL BE TAKEN.

NRR RECEIVED: 1/16/86
ACTION: DPL-B: MIRAGLIA

NRR ROUTING: Denton/Eisenhut
PPAS
Mossburg

Note: Feel free to call upon Ron Hernan, PPAS/TOSB, for assistance.

Brayton

OFFICE OF THE SECRETARY
CORRESPONDENCE CONTROL TICKET

PAPER NUMBER: CRC-86-0038 LOGGING DATE: Jan 14 86

ACTION OFFICE: EDO

AUTHOR: J.C. Ebersole--Tenn Valley
AFFILIATION:

LETTER DATE: Jan 13 86 FILE CODE: ID&R-5 Ariz--Palo Verde

SUBJECT: Comments on oper test results of Palo Verde 1, 2, & 3 and suggested follow-up actions

ACTION: Appropriate

DISTRIBUTION: RF

SPECIAL HANDLING: None

NOTES: (Please advise SECY of intended action, if any, by Jan 30)

DATE DUE:

SIGNATURE: DATE SIGNED:
AFFILIATION:

Rec'd OM, EDO
Date 1-15-86
Time 1645

EDO --- 001338