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

FEB 2 5 1983

MEMORANDUM FOR: Darrell Eisenhut, Director, Division of Licensing

FROM: Roger J. Mattson Director, Division of Systems Integration

SUBJECT: BOARD NOTIFICATION ON ARIZONA PUBLIC SERVICE COMPANY LETTER

Reference: Letter from E. E. Van Brunt to Harold Denton, November 3, 1982.

The reference letter presents information regarding Arizona Public Service (APS) Company evaluations on the safety effects and operational flexibility that could result from the installation of a pressurizer PORV. The letter concludes that PORVs are not warranted, and that, pending the results of the CE Owners Group evaluation, APS does not intend on proceeding with equipment procurement and installation. This APS decision is a reversal of its earlier decision. I recommend that the reference letter be forwarded to the appropriate boards for their information since it presents technical and policy evaluations regarding pressurizer PORVs on CE System 80 plants.

We have not yet completed our evaluation of the technical information presented in the reference letter. We have a number of calculations underway that will provide information to enable us to judge the technical statements, as well as the assertions made relative to operational flexibility. We anticipate our evaluation to be complete by about June 30, 1983.

The staff met with the CEOG on Wednesday, January 12 and discussed the status of the efforts to address the ACRS concern and staff questions on the CE plants without pressurizer PORVs. Preliminary staff calculations of single and multiple steam generator tube rupture analyses were also presented assuming a pressurizer PORV and auxiliary pressurizer spray system. Essentially the same information as above was presented at the ACRS subcommittee meeting on January 27, 1983. Based on these progress reports, the staff believes that the CEOG is properly evaluating the issue, however, a letter to the CEOG is being prepared to request additional analyses and considerations beyond those currently being performed by the CEOG.

L. S. Rubenstein
for Roger J. Mattson, Director
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cc: See Next Page

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XA Copy Has Been Sent to PDR

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November 3, 1982
ANPP-22188 - WFQ/TFQ

Mr. H. R. Denton, Director
Nuclear Reactor Regulation
U. S. Nuclear Regulatory Commission
Washington D.C. 20555

Subject: Palo Verde Nuclear Generating Station (PVNGS)
Units 1, 2 and 3
Docket Nos. STN-50-528/529/530
File: 82-056-026, G.1.01.10

References: See Attached List

Dear Mr. Denton:

On July 29, 1982 I discussed our position concerning the backfitting of power operated relief valves (PORVs) into the PVNGS design with F. Miraglia and E. Licitra of your staff. At the end of that conversation, I promised to formally submit an explanation of our activities and our technical conclusion concerning the need for this piece of equipment.

In recent months a great amount of attention and concern has been directed toward the lack of PORVs on the primary system of newer vintage Combustion Engineering (CE) NSSS designs (System 80 and the 3410s; e.g. San Onofre and Waterford). In our opinion the major reasons for this concern are that: (1) the vast majority of operating PWRs have PORVs on the primary system; (2) without PORVs it has been assumed that these new CE NSSS designs do not include rapid depressurization capability; and (3) without PORVs it has been assumed that these designs cannot remove decay heat in the event that all feedwater is lost. The following is a brief discussion of the events and meetings contributing to our evaluation of this issue.

As part of our continuing safety evaluation of the PVNGS plant design, the question of whether a PORV would enhance the operation or safety of PVNGS has been considered by APS for several years. Such consideration was initiated in recognition that PORVs might offer the following benefits: reducing challenges to the primary system safety valves, minimizing high pressure transients, providing high system pressure protection, venting of non-condensible gases, providing back-up to pressurizer sprays, providing mitigation of start-up and shutdown transients and providing an alternate means of decay heat removal. The on-going evaluation of these issues by both CE and APS indicated to us that the benefits were not sufficient to outweigh the negative aspects.

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The rapid depressurization and decay heat ("feed and bleed") removal issues have been raised and addressed frequently during the last several years and each time the conclusion has been that PORVs are not required. The accident at Three Mile Island, Unit 2, (TMI-2) illustrated an important shortfall in the use of PORVs, that is, the fail-open mode of PORVs is a potential breach of the reactor coolant pressure boundary, which subsequently could lead to a small break loss of coolant accident. TMI-2 is only one of several examples of PORV failures where PORVs have stuck open. These failures are of great concern to APS.

The NRC staff, in the SERs (References A and B) for PVNGS, concluded that PORVs were not required for the safe operation of PVNGS. Reference (A), Section C.4, discussed unresolved safety issue A-45, "Shutdown Decay Heat Removal Requirements", in which the staff concluded that PVNGS can be operated prior to the ultimate resolution of the issue, relying on the primary method of decay heat removal, which is the use of the steam generators and the secondary system. This method depends on the operation of the auxiliary feedwater system, which was reviewed by the NRC staff and discussed in reference (A), Section 20.4.9 and 22.2, item II.E.1.1. Reference (B) did not conclude that PORVs or a rapid depressurization system needed to be included in the System 80 design prior to the granting of a Final Design Approval (FDA).

As reflected in references (C) and (D), the Advisory Committee on Reactor Safeguards (ACRS) was concerned that the System 80 design does not have the capability to rapidly depressurize the primary system in a direct manner and does not have a method to remove decay heat without the use of the steam generators. The ACRS expressed their concern that the safety of the plant was highly dependent on the integrity of the steam generators and the reliability of the auxiliary feedwater system. The ACRS requested that APS, CE and the NRC staff further evaluate the present design in light of their concerns. CE has presented their reevaluation before the ACRS subcommittee on Decay Heat Removal Systems on March 16, 1982, and before the ACRS full committee on April 1, 1982. (These meetings will be discussed in more detail later in this letter.)

Early this year, an incident at the Ginna Nuclear Facility placed further attention on the use of PORVs for rapid depressurization of the primary system, and ironically the failure of the PORV to close properly. This incident was a steam generator tube rupture which resulted in a radiological release through the main steam safety valves. Reference (E) reported that the release was controlled by using the PORV to rapidly depressurize the primary system, thus reducing the primary-to- secondary leakage. This event precipitated another review of the PVNGS design by APS.

In response to an NRC staff request, CE provided their evaluation of rapid depressurization and decay heat removal capability, reference (F).

This letter was reviewed by the NRC staff and a request for additional information was made in reference (G). The CE evaluation and the NRC request for additional information were discussed before ACRS on April 1, 1982. The ACRS agreed with the NRC staff approach to resolving this issue in an expeditious manner. The ACRS again requested that the NRC staff and CE reconsider the issue, but concluded that the resolution should not be a condition for licensing of plants at full power and that the need for future hardware or procedural changes should be contingent upon the results of the evaluation.

Based on a preliminary reassessment it appeared to us that it may be beneficial to provide the control room operator an additional means of direct primary system pressure control, and we decided in May of this year to proceed with the preliminary design of a direct rapid depressurization system, which included remote manually-operated PORVs. In conjunction with the decision to design the plant modification, we decided to determine if it was possible to install the modification prior to fuel load to minimize several key factors; radiological dose to construction workers, impact on future outage schedules, impact on present construction and start-up schedule and increased costs. To further enhance our ability to achieve these objectives, we also proceeded with a portion of the related procurement activities. All of these activities were based on our perception, based on preliminary analysis, that the following enhancements to the operation of PVNGS would be achieved:

- Operator flexibility to control primary system pressure
- Operator flexibility to mitigate to a SGTR accident
- Address possible future NRC requirements for Decay Heat Removal Systems
- Provide for a future alternate Low Temperature Over Pressure Protection System should the operators desire a more flexible system

This commitment was reflected in the telephone conversation I had with F. Miraglia and E. Licitra on July 29, 1982. During that conversation, I stated that we were pursuing the installation of PORVs on the basis that we were enhancing operator flexibility. We indicated that we did not consider this modification a safety enhancement, but we were evaluating the design to assure the PORVs did not degrade plant safety.

Development of our design criteria resulted in a preliminary design. This design included two remotely operated PORVs in parallel, which could only be manually operated from the control room (no automatic setpoint). The inlet piping to one of the primary safety valves would be modified to include a "TEE" for the inlet piping for the PORVs. Normally closed, remotely- operated block valves upstream of the PORVs would also be part of the system, and the PORVs would discharge into the existing reactor

drain tank. The piping and valves would be ASME Section III, Class 1, and IE power would be provided to the valve actuators and instrumentation. Design criteria for equipment which is part of the RCPB would also be met. This arrangement provided a depressurization capability of 20 psi/sec for one PORV and 40 psi/sec for two PORVs once the operator opened the valves. These depressurization rates could be reduced by throttling the block (globe) valves, to a rate of 4 psi/sec.

However, further investigation and evaluation indicated that this rapid depressurization capability posed operational concerns not previously identified in our preliminary analysis. These operational concerns were associated with the use of PORVs to rapidly reduce primary system pressure and resulted in voiding of the reactor vessel upper head, degradation of pressurizer level control and liquid discharge to the containment. These concerns then led to a more detailed evaluation of situations where this system would be used and how the present design would cope with them. For PVNGS the depressurization capability of the primary system is provided by the pressurizer sprays, when the reactor coolant pumps are running, and by the safety-grade auxiliary spray system when the RCPs are not running. The use of the auxiliary sprays, instead of PORVs to depressurize when the RCPs are not operational will result in a depressurization rate of 6 psi/sec, with better control of pressurizer level and partial reactor vessel upper head voiding. This evaluation concluded, contrary to our initial preliminary evaluation, that PORVs did not enhance operator flexibility.

Current APS Technical Position

The evaluation of adding remote-manual operated PORVs to PVNGS design resulted in the following benefits and drawbacks of this modification. The benefits are as summarized below:

- Direct manual method of depressurization, which will backup the existing safety-grade auxiliary spray system.
- Provides capability for decay heat removal, "feed and bleed", if neither steam generator and the safety-grade auxiliary feedwater system are not operable.
- May provide a more flexible low temperature over pressure protection method (if an automatic setpoint is utilized for actuation).

The drawbacks are summarized below:

- The PORVs add a potential path of RCS leakage.
- Inadvertent opening may violate the reactor coolant pressure boundary (RCPB).

- Probability of PORVs sticking open increases probability of plant transients (similar to small break loss of coolant accidents) LOCAs.

- If used when RCPs are not operable, the reactor vessel upper head voids, and the pressurizer becomes solid (degrading pressurizer level control very quickly).

- Any extended use will result in a discharge to the containment.

- Adverse impact on construction, without balancing enhancement start-up and preoperational test schedules, and their related costs.

When considering these benefits and drawbacks, we conclude that this modification does not significantly improve the operational flexibility. Therefore, PORVs will not, at this time, be backfitted into the PVNGS design.

APS is continuing to participate in the CE Owner's Group effort to provide the additional information requested in reference (F), so that the NRC staff can complete their reevaluation of the CESSAR design with respect to this issue. As we have in the past, as additional information concerning this subject becomes available, we will reevaluate the PVNGS design which may or may not require installation of PORVs.

We will be available to discuss this letter or any additional concerns on this matter with the NRC at your request.

Sincerely,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President
Nuclear Projects
ANPP Project Director

EEVB/TFQ/wp

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ATTACHMENT

REFERENCES

(A) NUREG-0857, "Safety Evaluation Report related to the operation of the Palo Verde Nuclear Generating Station, Units 1, 2 and 3" dated November, 1981.

(B) NUREG-0852, "Safety Evaluation Report related to the final design approval of the Combustion Engineering Standard Nuclear Steam Supply System (CESSAR) System 80", dated November, 1981.

(C) NRC letter from J. Carson Mark, Chairman of Advisory Committee on Reactor Safeguards, to Nunzio J. Palladino, Chairman, U.S. Nuclear Regulatory Commission, dated December 15, 1981. "ACRS Report on Final Design Approval for Combustion Engineering, Inc. Standard Nuclear Steam Supply System."

(D) NRC letter from J. Carson Mark, Chairman of Advisory Committee on Reactor Safeguards, to Nunzio J. Palladino, Chairman, U.S. Nuclear Regulatory Commission, dated December 15, 1981. "ACRS report on the Palo Verde Nuclear Generating Station, Units 1, 2 and 3."

(E) NUREG-BR-005, Volume 4, No. 2 USNRC Power Reactor Events Jan-Feb, 1982

(F) Letter from A. E. Scherer, CE, Director of Nuclear Licensing, USNRC, LD-82-029, dated March 4, 1982.

(G) NRC letter from R. L. Tedesco, Assistant Director for Licensing, Division of Licensing, USNRC, to P. E. Scherer, Director of Nuclear Licensing, Combustion Engineering, Inc. "Depressurization and Decay Heat Removal Capability of the CESSAR Design", dated March 26, 1982.

(H) NRC letter from P. Shewman, Chairman Advisory Committee on Reactor Safeguards, to William J. Dircks, Executive Director for Operations, USNRC, dated April 5, 1982, "Reliability of the Shutdown Heat Removal System on the System 80 Design."

BOARD NOTIFICATION 83-31
Palo Verde, Units 1, 2 & 3
San Onofre, Units 2 & 3
Waterford, Unit 3

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