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 FACIL: STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Public 05000528
 STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Public 05000529
 STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Public 05000530
 AUTH. NAME AUTHOR AFFILIATION
 VAN BRUNT, E.E. Arizona Public Service Co.
 RECIP. NAME RECIPIENT AFFILIATION
 KNIGHTON, G. Licensing Branch 3

SUBJECT: Requests partial exemption from GDC 4 to apply advanced fracture mechanics techniques to postulated pipe breaks in CESSAR design rcs main loop piping. Response requested by Oct 1984.

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 TITLE: Licensing Submittal: PSAR/FSAR Amdts, & Related Correspondence

NOTES: Standardized plant. 05000528
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Arizona Public Service Company

June 7, 1984
ANPP-29684-EEVB/WFQ

Director of Nuclear Reactor Regulation
Attention: Mr. George Knighton, Chief
Licensing Branch No. 3
Division of Licensing
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
Request for Partial Exemption to GDC4
File: 84-056-026; G.1.01.10

- References:
- (A) Generic Letter 84-04, D.G. Eisenhut to PWR Licensees, Construction Permit Holders and Applicants for Construction Permits, dated February 1, 1984
 - (B) Letter LD-83-053, A.E. Scherer to D.G. Eisenhut, Basis for Design of Plant Without Pipe Whip Restraints, dated June 14, 1983
 - (C) Letter LD-83-108, A.E. Scherer to D.G. Eisenhut, Basis for Design of Plant Without Pipe Whip Restraints, dated December 23, 1983
 - (D) ACRS Letter, J.J. Ray to W.J. Dircks, Fracture Mechanics Approach to Pipe Failure, dated June 14, 1983

Dear Mr. Knighton:

Arizona Public Service (APS), Combustion Engineering (CE), and the NRC staff have discussed on several occasions the application of advanced fracture mechanics techniques to certain postulated pipe breaks in the CESSAR design Reactor Coolant System (RCS) main loop piping. APS, based on these discussions and information provided, proposes to utilize those techniques to eliminate mechanical and structural load effects associated with postulated RCS main loop pipe breaks. In Reference (A), the NRC indicated that advanced fracture mechanics could be employed as a basis for an alternate approach to these postulated pipe breaks. To facilitate application of those techniques, APS hereby submits this request for partial exemption from General Design Criterion 4 (GDC-4).

As required by Reference (A) and as provided by 10CFR50.12(a), Arizona Public Service Company requests, for Palo Verde Nuclear Generating Station Units 1, 2, and 3, a partial exemption from the provisions of GDC-4. Specifically, APS requests exemption from those portions which require protection of structures, systems, and components against certain dynamic (including mechanical and structural loading) effects associated with postulated RCS main loop pipe breaks. This exemption pertains to all postulated breaks specified in Section 3.6 of CESSAR-F. APS does not seek exemption from GDC-4 for other postulated breaks. This request has

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1. The first part of the report is a general introduction to the subject of the study. It discusses the importance of the study and the objectives of the research. It also provides a brief overview of the methodology used in the study.

2. The second part of the report is a detailed description of the data collected during the study. It includes a table of the data and a discussion of the results. The data shows that there is a significant correlation between the variables studied.

3. The third part of the report is a discussion of the results of the study. It compares the results with the findings of other studies and discusses the implications of the results. It also provides some suggestions for further research.

no effect on the PVNGS design basis for environmental, containment, or ECCS analyses.

As justification for this exemption, the following information is provided:

1. In Reference (B) which was later revised in Reference (C), CE submitted for NRC staff review a fracture mechanics analysis to validate the "leak-before-break" failure scenario for the System 80 design. This submittal also provided details of the support system design to demonstrate that there is sufficient design margin for seismic excitation as recommended by the ACRS in Reference (D). Although staff review of this submittal is not complete, no significant deficiencies have been identified to date. CE believes that the approach in Reference (C) is more conservative than other submittals already approved by the staff.
2. Reference (C) demonstrates that for the System 80 RCS main loop piping:
 - a) A substantial sized flaw in the piping would not grow through the wall nor extend significantly in length during the plant design lifetime.
 - b) If a flaw were to grow through the wall of the piping, it would open sufficiently to leak many times the maximum allowable leakage before extending anywhere near critical crack length.
 - c) A very long through wall crack (many times longer than a leak detectable longitudinal or circumferential crack length) would remain stable under normal operation plus SSE loadings.

This demonstration provides sufficient justification for elimination of large postulated breaks from the design basis for the PVNGS Units 1, 2, and 3 RCS main loop piping.

3. The ACRS in Reference (D) has approved the application of the aforementioned fracture mechanics techniques to the analysis of asymmetric blowdown loads. Reference (D) states "That is, there is no known mechanism in PWR primary piping material for developing a large break without going through an extended period during which the crack would leak copiously."
4. The NRC staff has reviewed the PVNGS leakage detection systems and found them to meet the requirements of GDC-30 and the guidelines of Regulatory Guide 1.45. This is stated in the PVNGS SER (NUREG-0857) Section 5.2.5. PVNGS Technical Specifications Section 3/4.4.5 will require at least one of the required leakage detection systems be operable to continue plant operation.

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5. This exemption would result in radiation exposure reduction to plant maintenance personnel. Assuming each restraint is removed once for Inservice Inspection (ISI), a total of 560 man-rem per unit would be eliminated. Total man-rem savings for PVNGS Units 1, 2, and 3 would be 1680 man-rem. Thus the exemption, if granted, would be of significant benefit in the ALARA concept of plant operation.
6. An installation cost savings would be realized for PVNGS Units 2 and 3. This exemption would result in a savings of \$150,000.00 for tightening and adjustment of pipe whip restraints in Unit 2. Pipe whip restraint elimination for Unit 3 would result in savings of \$450,000.00 for fabrication and installation. The restraints and stops for Unit 1 are currently installed and adjusted.

Cost savings would also be realized in that the maintenance associated with ISI would be reduced. Assuming each restraint or stop is removed only once would result in a savings of \$280,000.00 per unit. The total maintenance cost savings would be \$840,000.00 for PVNGS Units 1, 2, and 3. The restraints currently installed in Unit 1 could be removed at minimal cost.

Total Cost Savings:

Unit 1	\$ 280,000.00	ISI
Unit 2	\$ 430,000.00	ISI and Adjust
Unit 3	\$ 730,000.00	ISI, Install, and Adjust
Total	\$1,440,000.00	

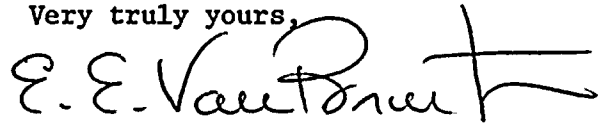
7. There would be no adverse effect on safety resulting from this exemption. This request, if granted, would have no effect on the potential for occurrence or the severity of accidents previously considered by the staff. Thus, while presenting no increased risk to the health and safety of the general public a known savings of 1680 man-rem to maintenance personnel can be achieved.

APS requests that review of this exemption request be completed prior to October of 1984 to avoid unnecessary adjustment of the pipe whip restraints in PVNGS Unit 2 and to eliminate the need for further fabrication and installation of restraints in PVNGS Unit 3. As always, APS is prepared to meet with the staff at their convenience to resolve any questions and to provide additional information that may be necessary to facilitate a prompt review.

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If you have any questions, please contact me.

Very truly yours,

A handwritten signature in dark ink, appearing to read "E. E. Van Brunt, Jr.", with a stylized flourish at the end.

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

EEVB/TFQ/js

cc: E.A. Licitra
A.C. Gehr

