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AUTH.NAME AUTHOR AFFILIATION
VAN BRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
KNIGHTON,G. Licensing Branch 3

SUBJECT: Responds to Generic Ltr 83-10A re resolution of TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps." Description for resolving item & plan & schedule for plant-specific activities encl.

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Arizona Public Service Company
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June 30, 1983
ANPP-24213 - WFQ/MSN

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
File: 83-056-026; G.1.01.10

References: (A) Letter from D. G. Eisenhut, NRC, Director Divison of Licensing, to all Applicants with CE designed NSSSs, dated February 8, 1983; Subject: Resolution of TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" (Generic Letter No. 83-10a).
(B) Letter to George Knighton, NRC, from E. E. Van Brunt, Jr., APS, (ANPP-23562), dated April 21, 1983.

Dear Mr. Knighton:

Reference (A) requested technical justification for treatment of RCPs during transients and accidents and requested plans and schedules. Reference (B) stated plans and schedules would be provided by July 1, 1983. As a close out to our Reference (B) commitment, we hereby provide the following information:

1. The CEOG Program plan (Enclosure (1)): "CE Owners Group Program Description for Resolving TMI Action Plan Item II.K.3.5 - 'Automatic Trip of Reactor Coolant Pumps'." This CEOG Program is presently scheduled to be completed by December 31, 1983.

2. Our plan and schedule for plant-specific activities of factoring the CEOG program results into the PVNGS operator training and emergency operating procedures (Enclosure (2)): "PVNGS Plant Specific Activities for Resolving TMI Action Item II.K.3.5." The plant-specific activities are scheduled to be completed 6 months after receipt of the CEOG program results.

If you have any comments on this matter, please contact me.

Very truly yours,

E. E. Van Brunt

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

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EEVB/MSN/sp

cc: E. A. Licitra (w/a)
A. C. Gehr "

June 30, 1983 .
ANPP-24213 - WFQ/MSN

STATE OF ARIZONA)
) ss.
COUNTY OF MARICOPA)

I, Edwin E. Van Brunt, Jr., represent that I am Vice President Nuclear Projects of Arizona Public Service Company, that the foregoing document has been signed by me on behalf of Arizona Public Service Company with full authority so to do, that I have read such document and know its contents, and that to the best of my knowledge and belief, the statements made therein are true.

Edwin E. Van Brunt

Edwin E. Van Brunt, Jr.

Sworn to before me this 30th day of June, 1983.

Norma D. Wright

Notary Public

My Commission expires:

May 5, 1984

ENCLOSURE (2):

PVNGS PLANT SPECIFIC ACTIVITIES FOR RESOLVING

TMI ACTION ITEM II.K.3.5

("AUTOMATIC TRIP OF REACTOR COOLANT PUMPS").

Reference

Letter from D.G. Eisenhut, NRC, Director Division of Licensing, to all Applicants with CE designed NSSS's, dated February 8, 1983;
Subject: Resolution of TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" (Generic Letter No. 83-10a).

Introduction

APS is participating with other owners of CE NSSS's in the development of a CE Owner's Group (CEOG) program for resolving TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps". This program, Attachment B, will utilize the guidelines in the referenced letter, to produce the technical information and operational requirements, to resolve TMI Action Item II.K.3.5. The CEOG program will be utilized as the Base documentation for the PVNGS plant-specific activities. CE has estimated the time to complete this program at 6 to 10 months after starting their analysis. Upon receiving the results of the CEOG program the PVNGS procedures Group will begin the process of incorporating the required changes into the PVNGS Emergency Procedures, and support documentation.

This process can be broken down into the following tasks:

1. Review and analize the results of the CEOG program.

2. Revise the Emergency Procedure Technical Guidelines (EPTG) to be consistent with any change in Reactor Coolant Pump Trip philosophy, and document the source of the revision.

3. Revise the Emergency Procedure and Recovery Procedures in accordance with EPTG revision.

4. Verify and validate any procedural change in accordance with the PVNGS Verification and Validation method.

5. Incorporate revised procedures into the PVNGS Station Manual.

6. Incorporate change of Reactor Coolant Pump trip philosophy and procedural changes into the PVNGS Operator Training Program.

Completion of these tasks will resolve TMI Action Item II.K.3.5. A description of the tasks for factoring the CEOG program into PVNGS operator training and emergency operating procedures is included for clarification.

Description of Tasks

1. Review

Upon receipt of the CEOG program documentation a comprehensive review by Operations Supervisors will be performed. This review will evaluate the CEOG program results for applicability to PVNGS procedure philosophy in relation to RCP operation. The results of this review will be an outline of the method for incorporating the RCP trip philosophy, and supporting technical information, into the PVNGS emergency operating procedures and support documentation. A projection of the time requirements to develop this outline indicates it could take up to 800 man hours.

2. Emergency Procedure Technical Guidelines Revision

Based on the outline developed in the review process the Emergency Procedure Technical Guidelines (EPTG) will be evaluated and revised. This revision will ensure procedural consistancy where RCP trip actions are addressed. Items of concern are, compliance with technical guidelines, and proper step positioning in the procedures. The projected time required to complete the revision of the EPTG is 480 man hours.

3. Procedure Revision

Upon completion of the EPTG revision, the PVNGS Emergency Operating Procedure and Recovery Operating Procedures will be revised. This revision will incorporate the technical data from the CEOG program into the appropriate procedures, as determined by the EPTG revision. Time to complete the procedure revision process will depend on the complexity of the CEOG program. An estimation of the time to complete the procedure revision is 480 man hours.

4. Verification and Validation Process

The revised procedures will be verified and validated in accordance with the requirements of existing PVNGS procedures. Verification will ensure the technical accuracy and the proper incorporation of the CEOG program into the procedures. Validation will ensure

the adequacy of operator actions, and the effectiveness of this change to mitigate the adverse effects of the plant transient. This will be done on an individual procedure basis and therefore some overlap of tasks for the sake of expedience, may be necessary. The verification, validation process is estimated at 50 man hours per procedure, per task for a total of 900 man hours.

5. Formalizing Revised Procedures

Upon completion of the Verification and Validation process the revised procedures will be submitted to the Plant Review Board (PRB) for incorporation into the Station Manual. This process involves review by various PVNGS departments for accuracy, content, and potential impact on other plant operations. This process is estimated to take one month, and will formalize the revised procedures as a package.

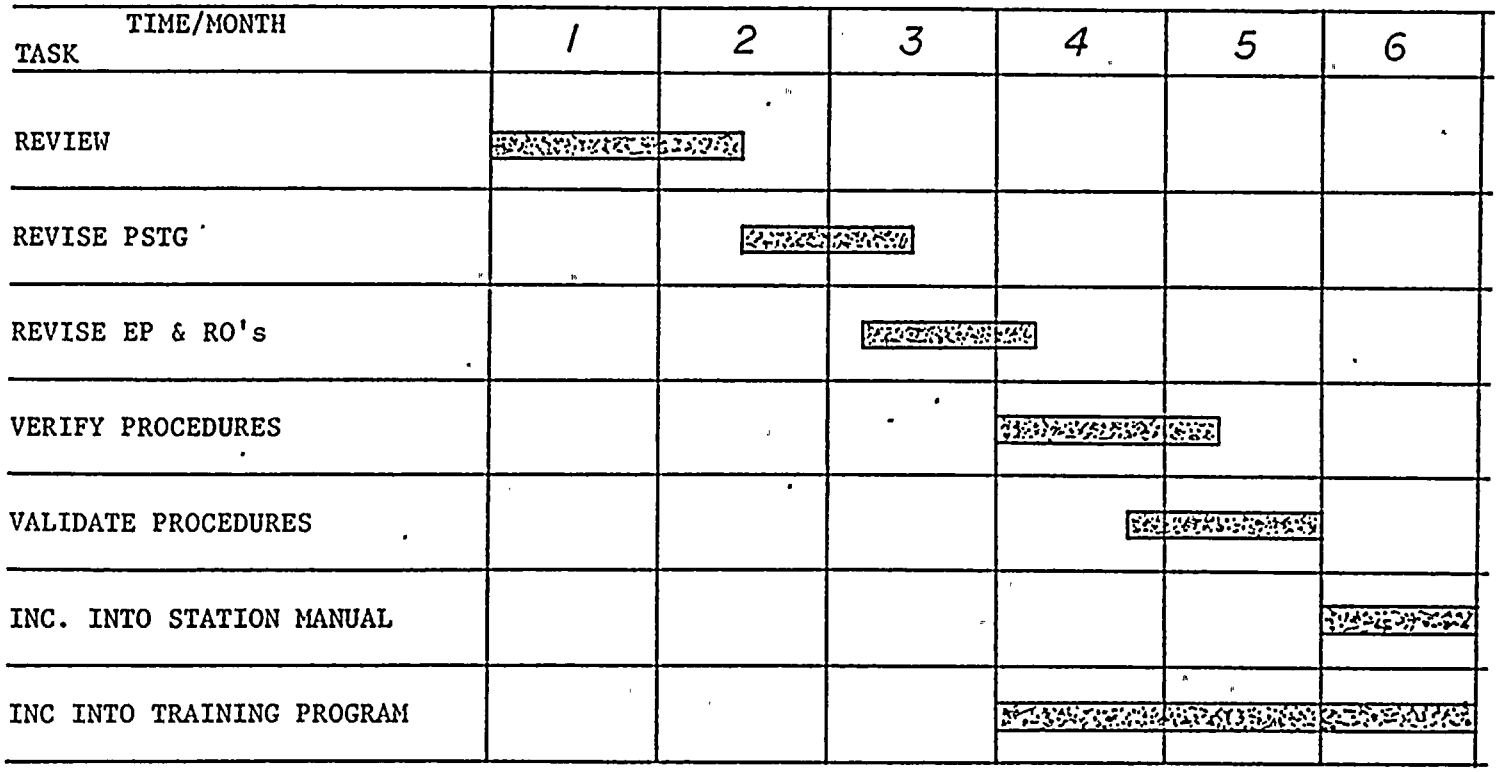
6. Training

A draft of the revised procedures and the revised EPTG will be submitted to Training Department at the time the Verification and Validation process is started. This draft submittal will allow Training the earliest opportunity to incorporate changes into operator training materials. Upon submittal to the PRB the formal procedures will be supplied to training for incorporation into operator training and simulator courses. With the draft submittal, the Training Department will have approximately two to three months to incorporate the information into training materials. This is considered to be adequate time providing the PRB finds no major problems with the procedure package.

Schedule

CE has estimated the time for completing the CEOG program for resolving the RCP trip issue at eight months from the start date. PVNGS plant-specific activities for factoring the CEOG program results into PVNGS operating procedures and training program will begin upon receiving the completed program documentation. PVNGS Operations has estimated six months from the start date to complete the revision process. A schedule breakdown by task, Figure 1, is attached for reference.

FIGURE 1



6 - 10 months for results from CE
6 months for incorporation into PVNGS
12 - 16 months from start to completion

ENCLOSURE (1): -CE OWNERS GROUP

PROGRAM DESCRIPTION FOR RESOLVING

TMI ACTION PLAN ITEM II.K.3.5

"AUTOMATIC TRIP OF REACTOR COOLANT PUMPS"

Program Description for Resolving
TMI Action Plan Item II.K.3.5 -
"Automatic Trip of Reactor Coolant Pumps"

INTRODUCTION

In accordance with NRC Guidelines and Criteria provided in Generic Letters No. 83-10a and 83-10b (see Reference 1), the C-E Owners Group (CEOG) has developed a program which will close out TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" for participating utilities. The "trip two/leave two" Reactor Coolant Pump (RCP) trip strategy has been identified in the past as the preferred approach and forms the basis for the program which is described in the following section. This trip strategy is described in Appendix A in more detail and consists of manually tripping two RCPs initially and later on manually tripping the remaining two RCPs at the time a LOCA has been diagnosed.

It is recognized that the evaluation of pertinent plant parameters might lead to a selection of setpoints which could result in tripping of the second two RCPs a short time after tripping the first two RCPs. In this case, the practical difference between a trip two/leave two and a trip four strategy might become small enough from an operational point of view to result in a reassessment of the trip two/leave two strategy after the determination of the trip setpoints is completed.

Regardless of what trip strategy will be implemented, the objective is to avoid tripping the RCPs for non-LOCA and steam generator tube rupture accidents and to provide the appropriate justifications for the adopted trip scheme.

DESCRIPTION OF PROGRAM

The program will provide information which both meets the NRC guidelines stated in Reference 1 and provides the operational requirements for participating utilities to use in developing emergency operating procedures and conducting training. The program consists of selection of RCP trip setpoints, justification of the manual RCP trip relative to the NRC Guidelines and Criteria in Reference 1, and development of information for use in implementing the trip two/leave two scheme into emergency operating procedures.

The basic approach in selecting and justifying the trip setpoints is to determine on the basis of Conservative Best Estimate (CBE) considerations for small break LOCA and non-LOCA events the setpoints for manually tripping the first two RCPs and for tripping the second two RCPs. Thereafter, on the basis of ECCS Evaluation Model (EM) considerations, compliance with 10CFR50.46 limits for the LOCA events will be evaluated. If the limits are exceeded, the possibility of requesting an exemption from specific requirements of 10CFR50.46 will be considered. In addition, compliance with draft ANSI Standard N660 will be demonstrated for LOCA events.

The use of conservative best estimate methods for the determination of the setpoints includes the assumption of availability of only one high pressure safety injection pump, a 1.0 factor on the ANS decay heat curve, homogeneous equilibrium break flow model, and a best estimate pump head degradation model from C-E/EPRI Pump Tests. The 2700 Mwt Reference Plant selected for this program will conservatively bound the core cooling performance of plants of other participating utilities (e.g., 3410 Mwt and System 80 classes). This CBE approach provides setpoints for tripping the first two RCPs for depressurization transients. The second setpoints are selected so that the second two RCPs will not be tripped for non-LOCA depressurization events but will be tripped for LOCAs.

Justification of manual RCP trip is performed relative to the criteria in 10CFR50.46 and the draft ANSI Standard N660. Using the ECCS Evaluation Model (EM), it will be determined whether the limits of 10CFR50.46 are met if the RCPs are tripped according to the selected setpoint scheme. The EM methods are based on Appendix K groundrules which include flowrate of only one HPSI pump, 1.2 factor on the ANS decay heat curve, and use of the Moody break flow model. Compliance with the draft ANSI standard will be demonstrated relative to the version ANS 58.8/ANSI N 660, Rev. 2 of March 1981.

The justification of the RCP trip setpoints assumes that Section II of the NRC Guidelines and Criteria of Reference 1, "Pump Operation Criteria Which Will Not Result in RCP Trip", does not apply to the trip two/leave two strategy because the strategy will result in tripping of all RCPs for LOCAs.

To support implementation of the trip two/leave two scheme into operator guidance, applicable items from the Guidance and Criteria in Reference 1 will be addressed, e.g., challenges to PORV, reactor vessel head voiding. In addition,

instrumentation capabilities needed for implementation of the RCP trip scheme will be examined on a generic basis. This operations-related information will be applied toward the development of generic bases which can be used by participating utilities in modifying operator guidance.

The completion of the program is scheduled for the end of year 1983.

REFERENCE

1. NRC Letter from Darrell G. Eisenhut (Director of Licensing, NRC) to All Applicants [or Licensees] with Combustion Engineering Designed Nuclear Steam Supply Systems, Resolution of TMI Action Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps", (Generic Letter No. 83-10a and 83-10b), February 8, 1983.

APPENDIX A
THE TRIP TWO/LEAVE TWO STRATEGY

Tripping the RCPs during a small break LOCA minimizes the loss of coolant from the primary system. Keeping the RCPs running during non-LOCA depressurization events, however, maximizes the margin to fuel failure or radiological releases. The trip two/leave two RCP operating strategy reconciles the conflicting preferences of RCP operation for small break LOCAs and non-LOCAs.

The trip two/leave two RCP strategy is shown schematically in Figure 1. The sequence of events during a depressurization which results in RCP trip begins with event initiation, t_1. This could be a small break LOCA, steam generator tube rupture, certain secondary breaks, or anticipated operational occurrences which result in primary system depressurization (e.g., increase in main or auxiliary feedwater flow, decrease in main feedwater temperature, etc). The reactor trip occurs, for example, on low primary system pressure, at t_2. At t_3*, the setpoint for trip of the first two RCPs is reached. The operator then trips two RCPs in opposing loops (to maintain pressurizer spray) at t_3. Tripping the second two RCPs depends on whether or not the second trip setpoint is reached. For a LOCA, the setpoint for trip of the second two RCPs occurs in Figure 1 at t_4*. The operator then trips the remaining two RCPS at t_4. For a non-LOCA, the second trip setpoint will not be reached and the remaining two RCPs will continue running.

FIGURE 1
PROPOSED RCP TRIP STRATEGY