



## Duquesne Light

Nuclear Construction Division  
Robinson Plaza, Building 2, Suite 210  
Pittsburgh, PA 15205

2NRC-3-019  
(412) 787-5141  
(412) 923-1960  
Telecopy (412) 787-2629  
April 22, 1983

United States Nuclear Regulatory Commission  
Washington, DC 20555

ATTENTION: Mr. Darrel G. Eisenhut, Director  
Division of Licensing  
Office of Nuclear Reactor Regulation

SUBJECT: Beaver Valley Power Station Unit No. 2  
Docket No. 50/412  
Response to Generic Letter 83-10c  
"Resolution of the TMI Action Plan Item II.K.3.5 -  
Automatic Trip of Reactor Coolant Pumps"

Gentlemen:

### INTRODUCTION

The criteria for resolution of TMI Action Plan Item II.K.3.5, "Automatic Trip of Reactor Coolant Pumps" were stated in letters from Mr. Darrel G. Eisenhut of the Nuclear Regulatory Commission (NRC) to all Applicants with Westinghouse (W) designed Nuclear Steam Systems (Generic Letter 83-10c) dated February 8, 1983, and received by Beaver Valley Project Office on February 22, 1983. The following represents the plan for demonstrating compliance with those criteria. In order to avoid confusion, the overall philosophy and plan will first be stated. Then, each section of the attachment to NRC letter 83-10c will be addressed as to how the overall plan responds to each NRC criteria.

### OVERALL PLAN

In the four years that have passed since the event at Three Mile Island (TMI), W and the Westinghouse Owners Group (WOG), of which Beaver Valley Power Station Units Nos. 1 and 2 are members, have held steadfastly to several positions relative to post accident reactor coolant pump (RCP) operation. First, there are small break LOCA's for which delayed RCP trip can result in higher fuel cladding temperatures and a greater extent of zircalloy-water reaction. Using the conservative evaluation model, analyses for these LOCA's result in a violation of the Emergency Core Cooling System (ECCS) Acceptance Criteria as stated in 10CFR50.46. The currently approved W Evaluation Model for small break LOCA's was used to perform these analyses and found acceptable for use by the NRC in letter 83-10c. Therefore, to be consistent with the conservative analyses performed, the RCP's should be tripped if indications of a small break LOCA exist.

B001

Secondly, W, Beaver Valley Power Station Unit No. 2 (BVPS-2), and WOG have always felt that the RCP's should remain operational for non-LOCA transients and accidents where their operation is beneficial to accident mitigation and recovery. This position was taken even though a design basis for the plant is a loss of off-site power. Plant safety is demonstrated in BVPS-2 Final Safety Analysis Report (FSAR) Chapter 15 for transients and accidents using the most conservative assumption for reactor coolant pump operation.

In keeping with these two positions, a low RCS pressure (symptom based) RCP trip criterion was developed that provided an indication to the operator to trip the RCP's for small break LOCA but would not indicate a need to trip the RCP for the more likely non-LOCA transients and accidents where continued RCP operation is desirable. The basis for this criterion is included in the generic Emergency Response Guideline (ERG) Background Document (E-O Basic Revision, Appendix A).

Thirdly, it has always been the position of W, BVPS-2, and the WOG that if there is doubt as to what type of transient or accident is in progress, the RCP's should be tripped. Again, the plants are designed to mitigate the effects of all transients and accidents even without RCP operation while maintaining a large margin of safety to the public. BVPS-2 emergency operating procedures are planned to reflect this design approach.

Lastly, it remains the position of W, BVPS-2, and the WOG that RCP trip can be achieved safely and reliably by the operator when required. An adequate amount of time exists for operator action for the small break LOCA's of interest. The operators will be trained on the need for RCP trip and the emergency operating procedures will give clear instructions on this matter.

W and the WOG will undertake a two-part program to address the requirements of NRC letter 83-10c based on the aforementioned positions for the purpose of providing more uniform RCP trip criteria and methods of determining those criteria. In the first part of the program, revised RCP trip criteria will be developed which provides an indication to the operator to trip the RCP's for small break LOCA's requiring such action but will allow continued RCP operation for steam generator tube ruptures, less than or equal to a double-ended tube rupture. The revised RCP trip criteria will also be evaluated against other non-LOCA transients and accidents where continued RCP operation is desirable in order to demonstrate that a need to trip the RCP's will not be indicated to the operator for the more likely cases. Since this study is to be utilized for emergency response guideline development, better estimate assumptions will be applied in the consideration of the more likely scenarios. The first part of the program will be completed and incorporated into Revision 1 of the ERG developed by W for the WOG. The scheduled date for completion of Revision 1 is July 31, 1983.

The second part of the program is intended to provide the required justification for manual RCP trip. This part of the program must necessarily be

done after the completion of the first part of the program. The schedule for completion of the second part of the program is the end of 1983.

The preferred and safest method of pump operation following a small break LOCA is to manually trip the RCP's before significant system voiding occurs. No attempt will be made in this program to demonstrate the acceptability of continued RCP operation during a small break LOCA. Further, no request for an exemption to 10CFR50.46 will be made to allow continued RCP operation during a small break LOCA.

#### DETAILED RESPONSE TO NRC LETTER 83-10C

Each of the requirements stated in the attachment to NRC letter 83-10c will now be discussed indicating clearly how they will be addressed. The organization of this section of the report parallels the attachment to NRC letter 83-10c.

#### I. Pump Operation Criteria which can Result in RCP Trip during Transients and Accidents

##### 1. Setpoints for RCP Trip

The WOG response to this section of requirements will be contained in Revision 1 to the ERG scheduled for July 31, 1983. BVPS-2 will review the ERG's Revision 1 for developing its own plant specific emergency operating procedure (EOP). BVPS-2 plans on having plant specific EOP's drafted by August 1, 1984.

a. As stated above, W and the WOG are developing revised RCP trip criteria which will assure that the need to trip the RCP's will be indicated to the operator for LOCA's where RCP trip is considered necessary. The criteria will also ensure continued forced RCS flow for:

1. steam generator tube rupture (up to the design bases, double-ended tube rupture)
2. the other more likely non-LOCA transients where forced circulation is desirable (e.g., steam line breaks equal to or smaller than one stuck-open PORV)

The criteria being considered for RCP trip are:

1. RCS wide-range pressure  $<$  constant
2. RCS subcooling  $<$  constant
3. Wide-range RCS pressure  $<$  function of secondary pressure

Instrument uncertainties will be accounted for. Environmental uncertainty will be included if appropriate. No partial or staggered RCP trip schemes will be considered. Such schemes are unnecessary and increase the requirement for training, procedures, and decision making by the operator during transients and accidents.

- b. The RCP trip criteria selected will be such that the operator will be instructed to trip the RCP's before voiding occurs at the RCP.
- c. The criteria developed in Item 1a above is not expected to lead to RCP trip for the more likely non-LOCA and SGTR transients. However, since continued RCP operation cannot be guaranteed, the emergency response guidelines provide guidance for the use of alternate methods for depressurization.
- d. The ERG contains specific guidance for detecting, managing and removing coolant voids that result from flashing. The symptoms of such a situation are described in these guidelines and in detail in the background document for the guidelines. Additionally, explicit guidance for operating the plant with a vaporous void in the reactor vessel head is provided in certain cases where such operation is needed. BVPS-2 will address these issues in their EOP's draft scheduled for August 1, 1984.
- e. Water services essential for RCP operation will be re-established as described in BVPS-2's FSAR, Section 6.2.4.

## 2. Guidance for Justification of Manual RCP Trip

- a. A significant number of analyses have been performed by W for the WOG using the currently approved W Appendix K Evaluation Model for small break LOCA. This Evaluation Model uses the W FLASH Code. These analyses demonstrate for small break LOCA's of concern, if the RCP's are tripped 2 minutes following the onset of reactor conditions corresponding to the RCP trip setpoint, the predicted transient is nearly identical to those presented in the Safety Analysis Reports (SAR) for BVPS-2, Chapter 15. Thus, BVPS-2 FSAR demonstrates compliance with requirement 2a. The analyses performed for the WOG will be used to demonstrate the validity of this approach.
- b. Better estimate analyses will be performed for a limiting W design plant using the W FLASH computer code with better estimate assumptions. These analyses will be used to determine the minimum time available for operator action for a range of break sizes such that the ECCS acceptance criteria of 10CFR

50.46 are not exceeded. It is expected that the minimum time available for manual RCP trip will exceed the guidance contained in Draft ANSI Standard N660. This will justify manual RCP trip for all plants.

3. Other Considerations

- a. BVPS-2 will respond to the criteria upon completion of the WOG report and its review.
- b. The ERG contains guidance for the timely restart of the reactor coolant pumps when conditions which will support safe pump start-up and operation are established.

II. Pump Operation Criteria which will not Result in RCP Trip during Transient and Accidents

The preferred and safest method of operation following a small break LOCA is to manually trip the RCP's. Therefore, there is no need to address the criteria contained in this section.

DUQUESNE LIGHT COMPANY

By E. J. Woolever  
E. J. Woolever  
Vice President

SDH/wjs

cc: Mr. G. Walton, NRC Resident Inspector  
Ms. L. Lazo, NRC Project Manager

SUBSCRIBED AND SWORN TO BEFORE ME ON THIS

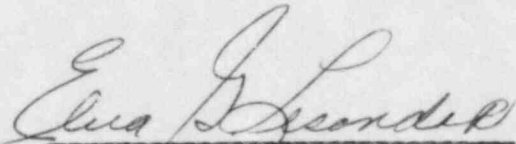
22<sup>nd</sup> DAY OF April, 1983.

Elva G. Lesondak  
Notary Public

ELVA G. LESONDAK, NOTARY PUBLIC  
ROBINSON TOWNSHIP, ALLEGHENY COUNTY  
MY COMMISSION EXPIRES OCTOBER 20, 1986

COMMONWEALTH OF PENNSYLVANIA )  
 ) SS:  
COUNTY OF ALLEGHENY )

On this 22nd day of April, 1983, before me,  
a Notary Public in and for said Commonwealth and County, personally  
appeared E. J. Woolever, who being duly sworn, deposed and said that (1)  
he is Vice President of Duquesne Light, (2) he is duly authorized to exe-  
cute and file the foregoing Submittal on behalf of said Company, and (3)  
the statements set forth in the Submittal are true and correct to the best  
of his knowledge.

  
\_\_\_\_\_  
Notary Public

ELVA G. LESONDAK, NOTARY PUBLIC  
ROBINSON TOWNSHIP, ALLEGHENY COUNTY  
MY COMMISSION EXPIRES OCTOBER 20, 1985