

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

.. BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of )  
COMMONWEALTH EDISON COMPANY )  
(Byron Station, Units 1 and 2) )

Docket Nos. 50-454  
50-455

TESTIMONY OF ALECK SERKIZ ON DAARE/SAFE CONTENTION 9A

### Serkiz Summary

This testimony addresses the issue raised in DAARE/SAFE Contention 9(a) regarding the implications of the 1981 KRSKO water hammer event on Byron. It makes the following principal points:

1. As best as can be determined, the KRSKO water hammer occurred external to the steam generator, namely, a bulge or blister in the bypass piping of the secondary shield wall. The cause is attributed to backleakage through auxiliary feedwater (AFW) check valves which were apparently known to leak. It was reported that the incident occurred during intermittent testing of the AFW pumps.
2. Whereas the KRSKO event indicated that a water hammer (due to a steam void collapse) can occur in a plant which employs a preheat steam generator, there are key design features, controls and operating procedures for Byron which differ from those that contributed to the KRSKO event. A generic evaluation performed by Staff consultants concluded that water hammer potential is very low if these features, controls and procedures are present.
3. In the Staff opinion, the KRSKO event is unique to that plant and not generic in nature.

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TESTIMONY OF ALECK W. SERKIZ  
REGARDING DAARE/SAFE CONTENTION 9(a)

Q.1. Please state your name and affiliation.

A.1. My name is Aleck W. Serkiz. I am a Senior Task Manager in the Generic Issues Branch, in the Office of Nuclear Reactor Regulation, U.S. Nuclear Regulatory Commission. A copy of my professional qualifications is attached.

Q.2. What is the purpose of your testimony?

A.2. The purpose of this testimony is to address the staff position with regard to DAARE/SAFE Contention 9(a) dealing with serious water hammer problems.

Q.3. Do you adopt the SER section on water hammer as part of your direct testimony?

A.3. Yes. As task manager for Unresolved Safety Issue (USI) A-1, "Water Hammer", I have reviewed Section C.5 (A-1) of the February 1982 Byron Safety Evaluation Report (NUREG-0876) and adopt it as a part of my direct testimony on contention 9(a).

(e.g., "start and stop") of the AFW pumps. Thus, it appears that both design deficiencies (i.e., leaky check valves and random AFW system operation) led to the KRSKO event.

Q.6. What corrective measures did Westinghouse recommend to KRSKO?

A.6. The corrective actions recommended to KRSKO were: (a) maintain steam generator water level above the auxiliary feedwater discharge pipe inside the steam generator, (b) at low load or hot standby conditions, the operator is instructed to supply feedwater continuously rather than intermittently, and (c) instrument the piping upstream of the steam generator auxiliary feedwater nozzle to monitor temperature for detecting the onset of steam back leakage. In retrospect, had these corrective measures been in effect in the first place (particularly the continuous feedwater flow in the AFW line), the KRSKO water hammer event would likely not have occurred.

Q.7. What is your assessment of the significance of the KRSKO event to Byron?

A.7. Whereas the KRSKO event reveals that a water hammer (due to steam void collapse) can occur in a plant which employs preheat steam generators, there are important design features, controls and operating procedures for Byron which are designed to prevent establishment of those conditions which contributed to the KRSKO water hammer. These can be summarized as follows:

(1) In contrast to KRSKO startup, Byron startup uses the main feedwater system. Leakage through the feedwater regulatory

valves is eliminated by closure of the upstream isolation valve and steam generator level control during hot standby is to be controlled by blowdown not intermittent feed.

- (2) Although automatic switchover to the lower steam generator nozzle occurs at 20% power, tempering flow will be maintained through the upper steam generator auxiliary feed nozzle during all phases of power operation. With continuous flow in this line back leakage of steam is essentially eliminated. Also, the Byron steam generators are to be under automatic level control at all times thus further lowering the potential for uncovering of the AFW nozzle within the steam generator and avoiding exposure of the AFW line to steam. A more detailed discussion of the Byron design and operational procedures are contained in the September 9, 1982 Applicant answers to Staff questions.<sup>2</sup>
- (3) Although the applicant has indicated<sup>3</sup> that warming flow to the auxiliary nozzle will not be maintained during the heat-up phase, and that the check valve near the auxiliary nozzle of the steam generator will be removed (or made inoperable), the installation of temperature sensors on the bypass piping near the auxiliary nozzle will provide a means for detecting back leakage of steam or hot water -- thereby avoiding the type of situation which occurred at the KRSKO plant.

In addition, the question of water hammer potential in preheat steam generators has been studied from a generic viewpoint.<sup>4</sup> This generic evaluation concluded that water hammer potential is very low if the types of design features and operational controls such as planned for the Byron plants are implemented. Thus, it is the Staff position that the KRSKO event is plant-specific and not generic in nature.

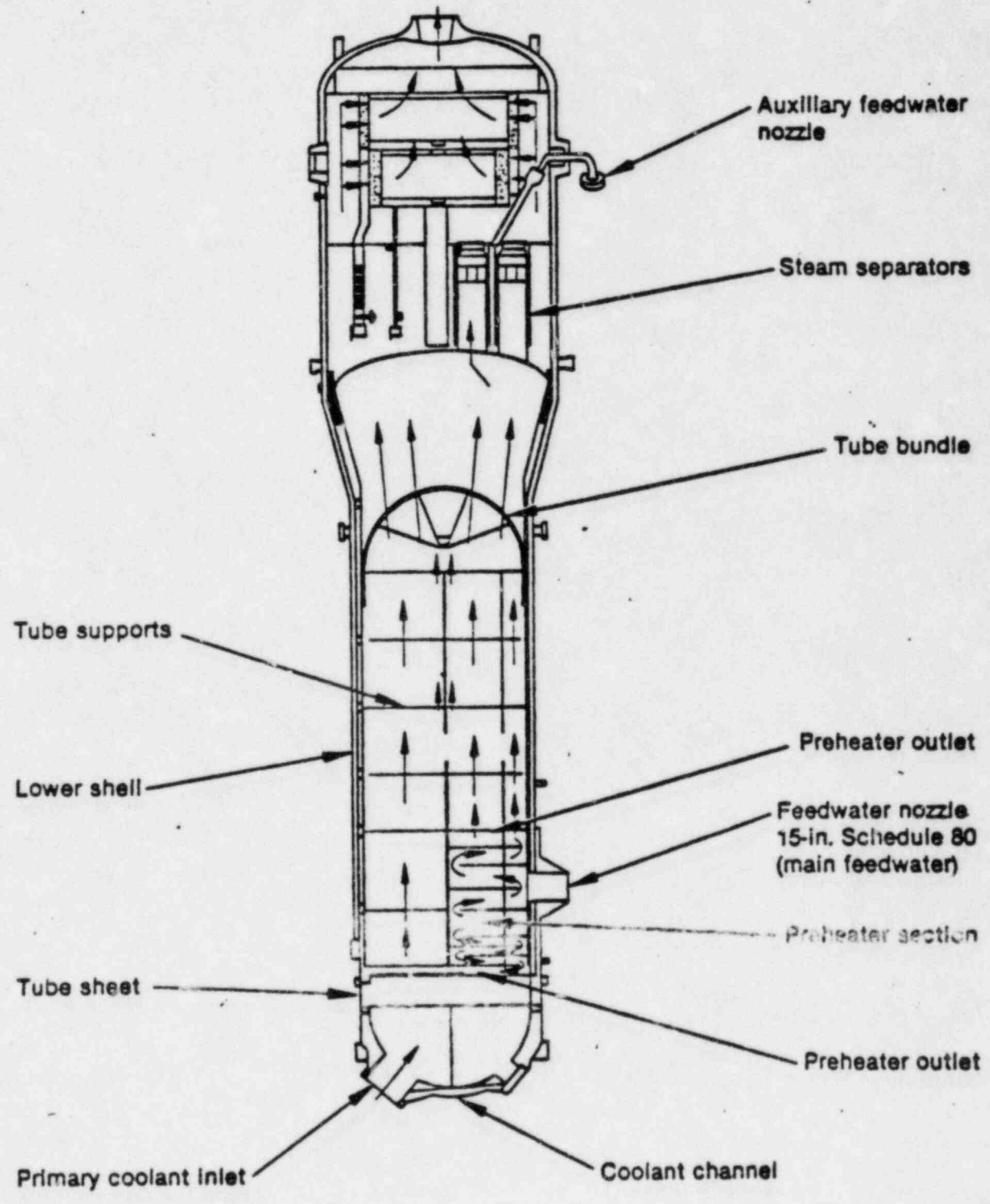
Q.8. Does the Staff believe that any additional water hammer protection features are necessary as a result of this event?

A.8. No. As noted above, the Byron plant design features and operational procedures appear adequate and capable of avoiding a water hammer condition similar to that which occurred at KRSKO. Furthermore, the actual susceptibility of the Byron steam generators to water hammer will be determined during preoperational testing as noted in Section 10.4.7 of the Byron SER.

References

1. 8/5/82, Memo from S. H. Chestnut to B. J. Youngblood summarizing 7/27/82 meeting with Westinghouse.
2. 9/9/82 Memo from T. R. Tramm (Commonwealth Edison) to H. R. Denton (NRC), "Byron Station Units 1 and 2, Braidwood Station Units 1 and 2 Water Hammer Prevention, NRC Docket Nos. 50-545, 50-455, 50-456, 50-457."
3. Affidavit of Kenneth A. Ainger (Commonwealth Edison Co.) submitted before the Atomic Safety and Licensing Board on February 10, 1983.
4. NUREG/CR-3090, "Evaluation of Water Hammer Potential in Preheat Steam Generators," December 1982.

Figure 1 Preheat Steam Generator at McGuire 1



## PROFESSIONAL QUALIFICATIONS

Aleck W. Serkiz

My name is Aleck W. Serkiz and I am employed as a Senior Task Manager in the Generic Issues Branch, Division of Safety Technology, U. S. Nuclear Regulatory Commission, Washington, D. C. I have held this position since April 1981 and am responsible for managing efforts related to the resolution of the Unresolved Safety Issue A-1, Water Hammer.

I received my Bachelor of Science Degree in Mechanical Engineering from Clarkson College of Technology in 1956 and attended the University of Cincinnati graduate school in 1958-1960. I am also a registered Professional Engineer in Ohio and Pennsylvania.

Prior to joining the Generic Issues Branch, I was employed in Division of Reactor Safety Research, Office of Nuclear Reactor Research, NRC for 7½ years in the position of Senior Nuclear Engineer, Section Leader and Branch Chief (Acting). During those years I planned and supervised experimental research programs directed at resolving thermal hydraulic questions associated with the loss-of-coolant accident phenomena. I joined the Atomic Energy Commission in 1973, being employed by the Division of Reactor Licensing. Prior to government employment I was employed by Battelle Memorial Institute - Columbus Laboratories and by the General Electric Company. I have accumulated 26 years of experience in engineering, project management and supervision; 17 of those years have been in the private sector. Most of my experience has been related to power systems (both nuclear and non-nuclear), nuclear safety related research and reactor licensing.