

## AEOD TECHNICAL REVIEW REPORT

UNIT: Beaver Valley, Unit 2 TR REPORT NO. AEOD/T 90-16  
DOCKET NO.: 50-412 DATE: November 15, 1990  
LICENSEE: Duquesne Light EVALUATOR/CONTACT: S. Israel

SUBJECT: IMPACT OF PIPE LINER FAILURE ON PUMP OPERATION

### SUMMARY

A search was made for events related to the pipe liner failure at Beaver Valley, Unit 2. Several events involving failed pipe coating have been reported and previously addressed in an information notice, industry report, and an NRC generic letter. These previously initiated activities and the small number of observed events argue against additional action on this issue at this time.

### DESCRIPTION OF EVENT

While Beaver Valley, Unit 2, was operating at full power, the current on both running component coolant pumps suddenly increased, with the current in one pump distinctly higher (Ref. 1). Investigation revealed that the metal liner to the expansion joint, located at the suction to one of the pumps, had failed. This liner, which had exhibited cracking about one month earlier, was reinstalled in the system one week before its failure. Analysis of the failed liner indicated that vibration induced cyclic fatigue which caused the weld joining the liner to the expansion joint to fail. The vibration was caused by adverse flow conditions. The expansion joint connected a reducing elbow to the pump suction. All three pumps in the component cooling water system had similar piping arrangements.

The failed liner was drawn into the pump suction causing binding and reduced flow. After the second failure of a liner, all the liners were replaced with thicker models that were attached by a flange rather than welding.

### DISCUSSION

Separation of a pipe liner, as observed at Beaver Valley, could result in pump blockage and loss of system function if redundant trains are affected simultaneously. Sequence Coding and Search system (SCSS) and Nuclear Plant Reliability Data System (NPRDS) databases were searched for pipe liner failure events at other facilities over a five year period. One other event was found where a pipe liner failed and affected a downstream pump, however, there were several events where pipe coating had come loose and restricted flow. An event at

Oyster Creek (Ref. 2) resulted in partial blockage of a containment spray heat exchanger by coal tar that was used to coat the emergency service water system. This event was subsequently discussed in a 1985 industry report made available to all licensees.

In the same 1985 time frame, an information notice was issued on failures of protective coatings in pipes and heat exchangers (Ref. 3). The notice discussed two occurrences at Palo Verde involving delamination of an epoxy coating in spray pond piping and a similar failure of an epoxy coating in jacket water coolers, lube oil coolers, and diesel generator heat exchangers. Catawba reported restricted flow of cooling water through a condenser (Ref. 4). This flow reduction was attributed to delamination of cooling water interior pipe coating material.

The service water system would be the most likely system to have problems with failed liners because it is generally coated to protect against corrosion. A study of service water problems (Ref. 5) showed that only one percent of the service water degradation events was attributed to pipe coating failure or carbonate deposition. In this same report, the Oyster Creek event (noted above) was cited as one of twelve events that led to complete loss of function. A generic letter was issued subsequent to the service water study (Ref. 6). Part of the recommended action was to monitor potential plugging of the various components connected to the service water system. This activity was prompted in part by concerns about delamination of the pipe coatings.

The safety concern is the total loss of function. As noted in the service water study, this occurred in one out of 12 events examined. The Beaver Valley event did not result in a total loss of function, but did result in a system degradation. The small number of related events do not indicate that this issue poses considerable concern, especially in light of the monitoring procedures being implemented on service water systems.

## CONCLUSIONS

The detached expansion joint liner event that occurred at Beaver Valley appears to be an isolated incident based on searches of two databases. A larger concern is potential delamination of coatings on piping systems. This issue has already been addressed by generic communications and therefore no further action is considered necessary at this time.

## REFERENCES

1. Duquesne Light, Licensee Event Report 412/89-06, Beaver Valley, Unit 2, April 4, 1989.
2. Jersey Central Power and Light, Licensee Event Report 219/85-18, Oyster Creek, August 1985.

3. U.S. Nuclear Regulatory Commission, Information Notice 85-24, "Failures of Protective Coatings in Pipes and Heat Exchangers," March 26, 1985.
4. Duke Power, Licensee Event Report 414/88-07, Catawba, Unit 2, March 1988.
5. P. Lam and E. Leeds, "Operating Experience Feedback Report - Service Water System Failures and Degradations," NUREG-1275, vol. 3, November 1988.
6. U.S. Nuclear Regulatory Commission, Generic Letter 89-13, "Service Water System Problems Affecting Safety-Related Equipment," July 18, 1989.