RAS 14367

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GPU Nuclear

Memorandum

Subject: 14R Reactor Cavity Leak Detection Effort

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Location: Oyster Creek
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To: Distribution

The purpose of this memo is to provide a brief overview and current status of efforts to locate a leak which allowed reactor cavity water to wet the sandbed region of the Oyster Creek drywell.

Background:

On December 9, 1992, water was found leaking into the O.C. drywell sandbed at elevation (-) 19'-0" in and around Bay #11. The sandbed region was exposed to gain access to the lower portion of the drywell exterior in support of corrosion mitigation efforts planned for this outage. The first indication of water seeping into this area was coincident with reactor cavity floodup in preparation for reactor disassembly and fuel movements. Approximate water level in the cavity was at elevation 109'-0" at the time the leak was detected. The cavity at this level is about half full. It is believed, reactor cavity water leaked through a defect in the cavity, bypassed and/or seeped through a concrete trough designed to collect and channel water to equipment drain tanks. It is further believed, the water worked its way into an annulus between the drywell vessel and concrete containment wall, saturating insulation in this area before collecting in the sandbed region below. The identification of reactor cavity water was later confirmed by chemical analysis of water samples taken. The analysis revealed that tritium and gamma levels were consistent with that of reactor vessel and spent fuel pool water. Water continued to wet this region until after the cavity was drained.

Leak Detection Efforts:
° Pre Drain Down:

Prior to floodup, and as part of reactor disassembly/assembly and refueling efforts, the reactor cavity and equipment pool walls are covered with an impervious membrane to prevent water from seeping through numerous "thru-wall" cracks in the cavity liners. This membrane consists of placing stainless steel tape on large defects, and the spray application of a removable latex based coating. Initially it was believed, water seeped through application defects in the membrane and/or through cracks in exposed seal welds on penetrations penetrating the cavity. Early efforts to isolate the leak consisted of reviewing photographs, masking plans, daily log books, etc., to try and find a flaw in

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the application of the membrane. High suspect areas were identified and three separate attempts were made to find the leak. They consisted of remotely injecting dye in and around the suspect areas, placing divers in the cavity to perform vacuum box and acoustic emission testing, and by remote acoustic emission testing in selected areas from the bridge crane. Areas thought to have the highest probability of leaking were sealed with an underwater epoxy coating. None of these efforts proved to have any affect on the quantity of water leaking into the sandbed region.

° Drain Down:

A series of flow curves plotting reactor cavity elevation and leak flow rate were developed to predict the elevation of the leak during drain down of the reactor cavity. By maintaining a constant drain down rate and measuring leakage flow it was anticipated the leak could be isolated to a specific elevation of the cavity. Leak retention time and other variables though, proved to impair the accuracy of this approach. Data collected was inconsistent with the plots developed which made a location difficult to predict. However, this attempt did identify a water level at which time the leak subsided in the sandbed. A later close visual examination of the cavity wall at this elevation revealed an application defect in the coating and S.S. tape. Vacuum box testing confirmed this area to be a "thru-wall leak".

°Post Drain Down:

A series of inspections were also performed after the cavity was drained. Again, high suspect areas were targeted and remedial actions were performed where appropriate. The attached chart identifies the areas inspected and summarizes actions taken or planned.

Conclusion:

Several areas considered having the highest potential for being a leak were repaired or are scheduled for repair prior to the next cavity flood up. These areas are the 30" x 7" steel trough drain seal plate, the 8" diameter standard pipe well in the concrete trough, stainless steel patch #6/91 on the cavity west wall, the vent line penetration at elev. 109' and the 2" diameter concrete trough drain. Although these areas were identified as potential leak sources, we cannot positively conclude that all leak sources or locations have been identified. Considering that leak configurations differ under dry and wet conditions, assurance of a leak tight cavity will not be obtained until the cavity is reflooded, and inspections are performed.