MILLSTONE 2

POOLSIDE EXAMINATIONS OF FAILED FUEL

JULY-AUGUST 2004

Final Report

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Poolside Examinations of Failed Fuel Milestone 2

July-August 2004

Final Report

[redacted]

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Nomenclature

Acronym	Definition
EOC	End of Cycle
FA	Fuel Assembly
GWd/Mtu	Gigawatt Days/Metric Ton Uranium
IRIS	Individual Rod Inspection System
OD	Outside Diameter
PWR	Pressurizer Water Reactor
SCFM	Standard Cubic Feet/Minute
UT	Ultrasonic Fuel Inspection

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1.0 INTRODUCTION AND SUMMARY

During Cycle 15 at Millstone Unit 2, coolant activity increased, indicating the presence of failed fuel. The reactor shut down at EOC-15 for a planned refueling outage in October 2003, and in-mast sipping was performed which identified 11 failed assemblies. Ten 3-cycle assemblies and one 2-cycle assembly were listed as being failed. After the outage, a limited ultrasonic testing campaign was performed by [ ] on 8 of the 11 FAs identified in cycle 15 and 1 fuel assembly identified in cycle 14 which identified 10 failed rods in 9 of the failed assemblies.

Nine of the failed assemblies were located on the [ ] during Cycle 15 and exhibited failed rod locations that were similar to failed rod locations previously observed in failed assemblies from [ ] These rod locations were [

, Because the failed assemblies were on the [ ] and the failed rods were located in specific assembly locations, the failure modes were likely to be [ ]

Two failed assemblies, however, were not located on the [ ] Each assembly exhibited a single failed rod which was located on the [ ] of the assembly. This did not fit the same failed rod location pattern exhibited by the other fuel assemblies. From the limited amount of information acquired from the examinations performed by the utility during the refueling outage, this failure mode appeared to be [ ]

Table 1.1 lists the assemblies and rods that were identified as being failed during the EOC-15 refueling outage and subsequent UT examinations. Reference 1 presented a preliminary assessment of the fuel failures based upon information collected by the utility during the outage. In that assessment, the failure mode of the assemblies that failed on [ ] was judged to be due to [ ] Unfailed rods in locations adjacent to the failed rods were suspected of having damage due to the same failure [ ]

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mechanism. Two assemblies that were not located on the had an

To gather more information about the failed rods and potentially damaged rods that are believed to be present in these assemblies, a limited fuel examination was performed at Millstone Unit 2 in July-August 2004. Two of the nine assemblies that failed on the were examined along with the two assemblies that failed in an location. Additionally, one assembly that failed in Cycle 14 on the was examined at this time. This report presents the results of the examinations on these five failed assemblies. These examinations confirmed that the assemblies that failed on the failed as a result of Also, adjacent unfailed rods exhibited damage from the same mechanism that caused failure in these assemblies. Assemblies that failed in the most likely experienced as the cause of failure. Actual locations were not found, but adjacent to the failed rod in one assembly was documented in the examination. Since the secondary damage in the other rod was similar in location and appearance, is also believed to be a likely failure mode for this assembly.

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