

FISCAL YEAR 2008 BRIIE RESULTS

The Baseline Risk Index for Initiating Events (BRIIE) addresses the Initiating Event (IE) Cornerstone in the U.S. Nuclear Regulatory Commission's (NRC's) Reactor Oversight Program (ROP) for monitoring boiling water reactor and pressurized water reactor commercial nuclear power plants (NPP). It is based on NPP performance for the following 10 initiators:

| Initiator | Acronym | Applicable Plants |
|------------------------------|---------|---------------------------------|
| General transient | TRAN | Both plant types, separately |
| Loss of condenser heat sink | LOCHS | Both plant types, separately |
| Loss of main feedwater | LOMFW | Both plant types |
| Loss of offsite power | LOOP | Both plant types |
| Loss of vital AC bus | LOAC | Both plant types |
| Loss of vital DC bus | LODC | Both plant types |
| Stuck open SRV | SORV | Both plant types, separately |
| Loss of instrument air | LOIA | Both plant types, separately |
| Very small LOCA | VSLOCA | Both plant types |
| Steam generator tube rupture | SGTR | Pressurized water reactors only |

The BRIIE program, as described in NRC Inspection Manual Chapter 0313, "Industry Trends Program," and in NUREG /CR-6932, "Baseline Risk Index for Initiating Events (BRIIE)," consists of two levels, or tiers. The first considers individual IEs and evaluates performance based on statistical prediction limits. This evaluation is for ongoing monitoring and early detection of possible industry-level deficiencies. A second tier is a risk-based, integrated measure, evaluated for each plant type. Since four of the initiators have separate data for each plant type, there are a total of fourteen Tier 1 graphs.

The units for the Tier 1 initiating event frequency graphs are event counts for a fiscal year, divided by the industry critical time for the year. The Tier 1 graphs also show the average frequency for an established "baseline period," and 95 percent prediction limits for a future year if occurrences continue at the same rate as in the baseline period.

The prediction limits depend on the expected number of critical years of reactor operation in the upcoming year as well as on the baseline occurrence rate for each indicator. A rate can exceed a limit by having more events than expected, or by having events and less critical time than expected. In recent years, U.S. nuclear power plant availability has been approximately 90 percent at the industry level. This figure enters into the calculations determining the bounds on the number of events that might be expected. For all of the initiators, the 2008 occurrence rates are lower than the associated prediction limits.

The Tier 2, integrated index includes, for each plant type, the relative contribution of each initiator to the risk of core damage, based on the events that occurred in each fiscal year. The event frequencies are converted to core damage frequency estimates by multiplying by Birnbaum risk coefficients. These coefficients are industry averages of the contribution to core damage from each initiator as reflected in the industry standardized plant analysis risk (SPAR) models.

The BRIIE Tier 2 plot shows annual differences in estimated industry core damage frequency compared with the established baseline levels of these quantities. The combined industry BRIIE value in FY 2008 (-5.2×10^{-6} per reactor critical year) is well below the established threshold of 1×10^{-5} per reactor critical year.

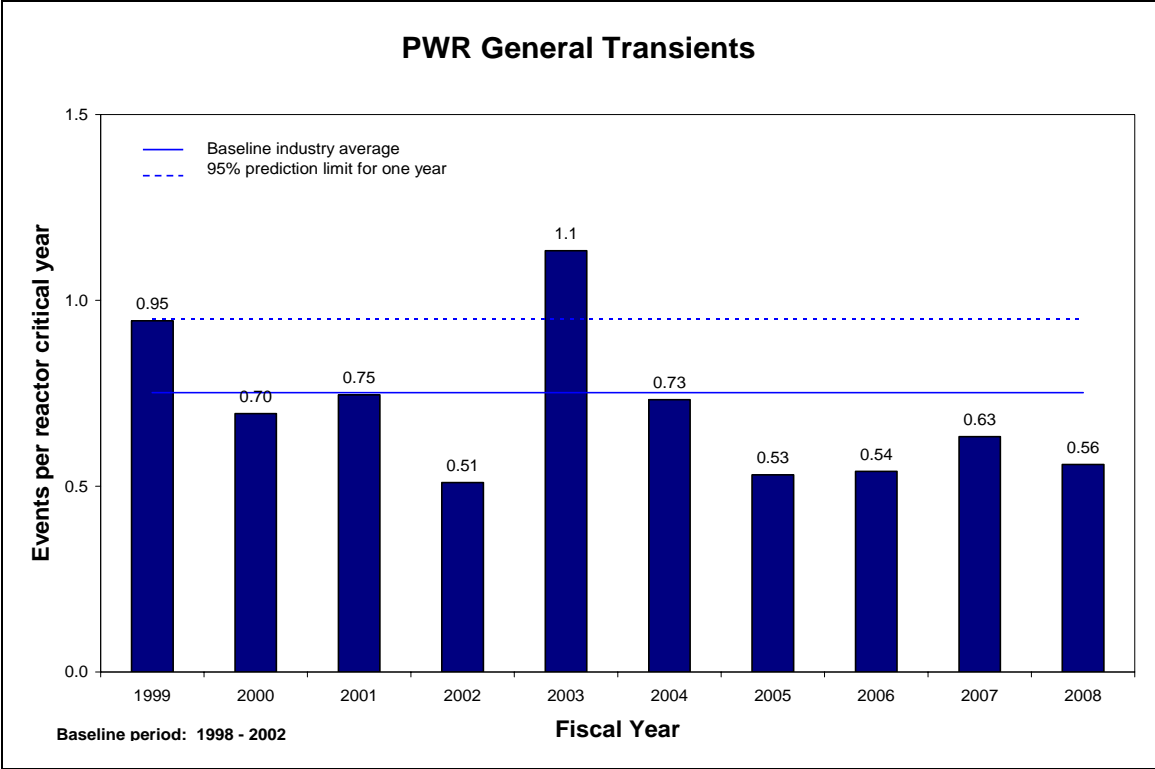


Figure 1. PWR General Transients

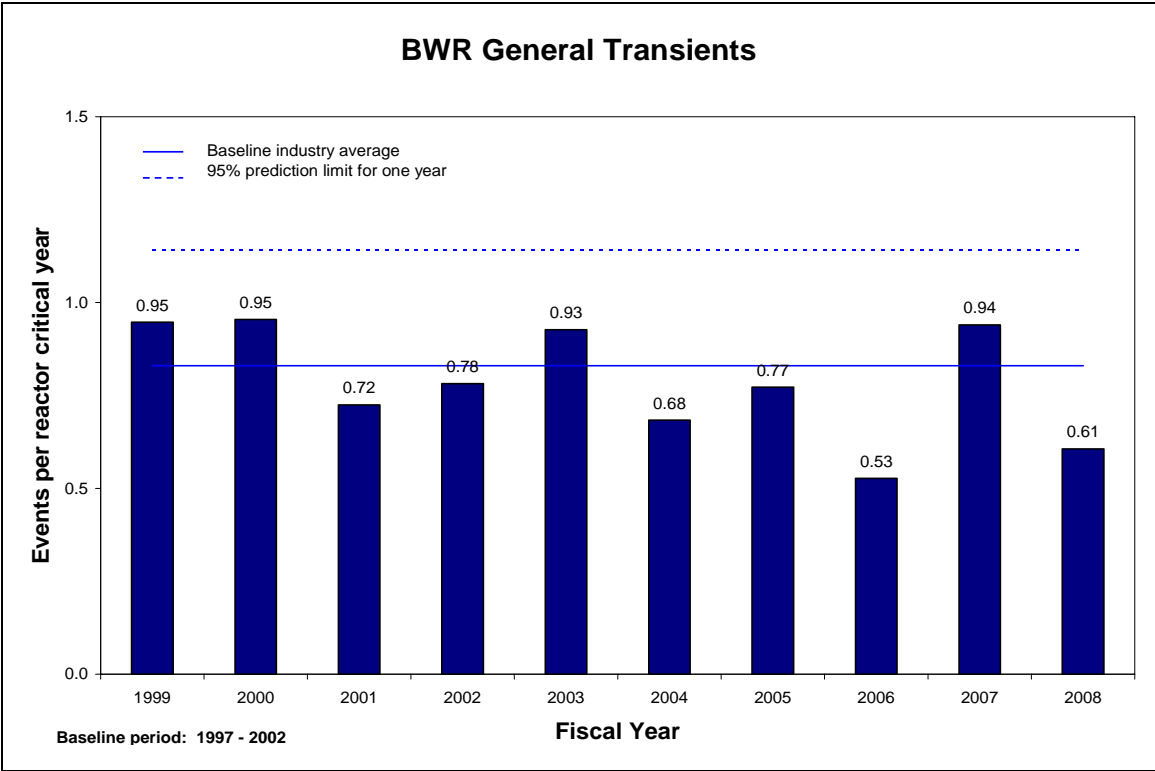


Figure 2. BWR General Transients

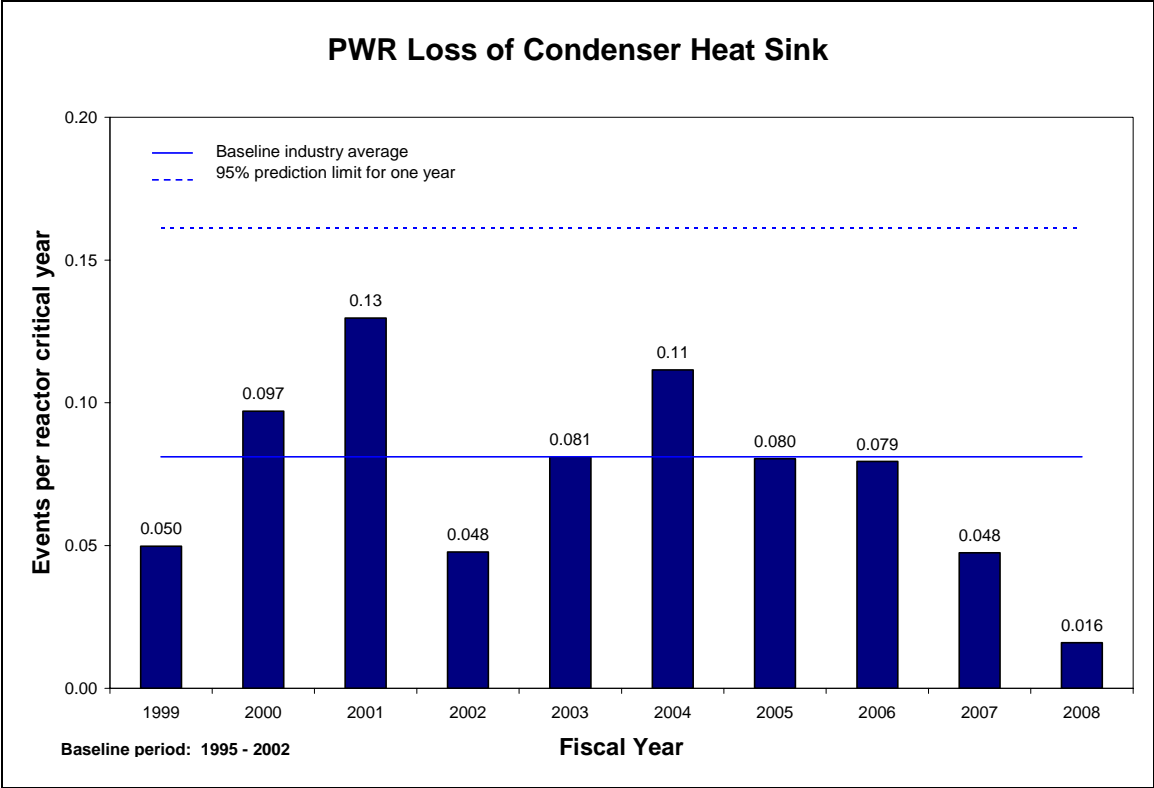


Figure 3. PWR Loss of Condenser Heat Sink

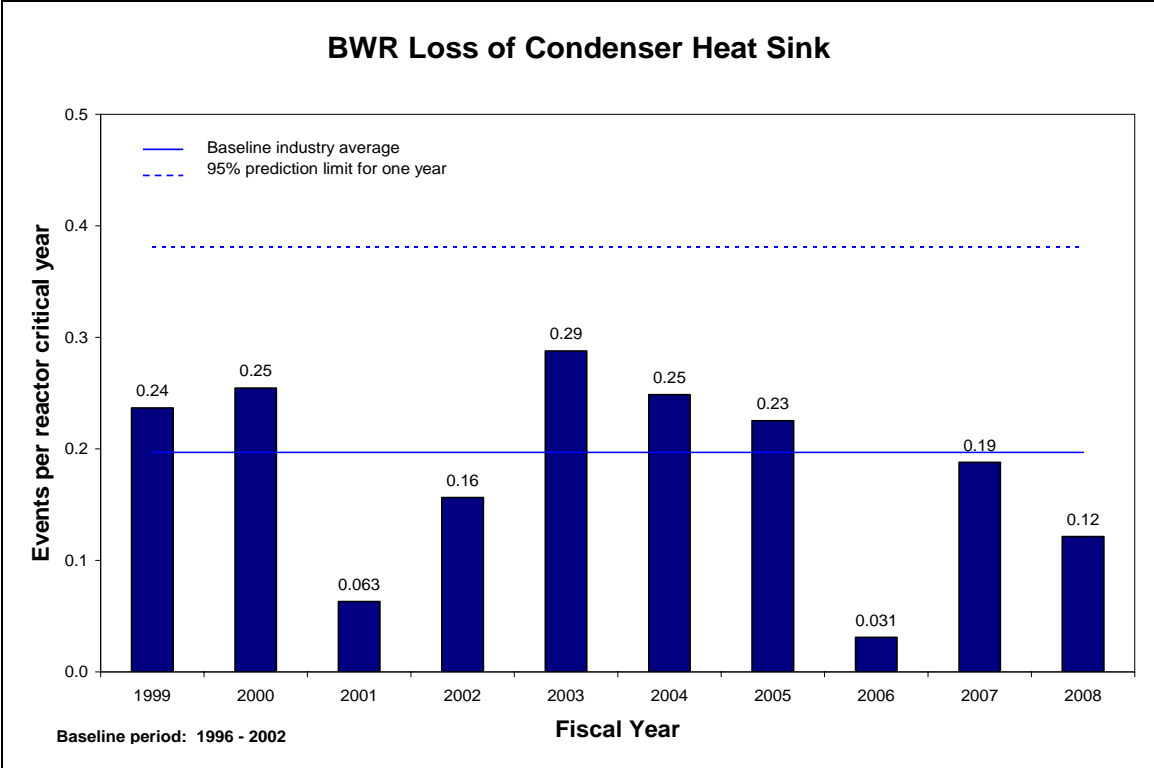


Figure 4. BWR Loss of Condenser Heat Sink

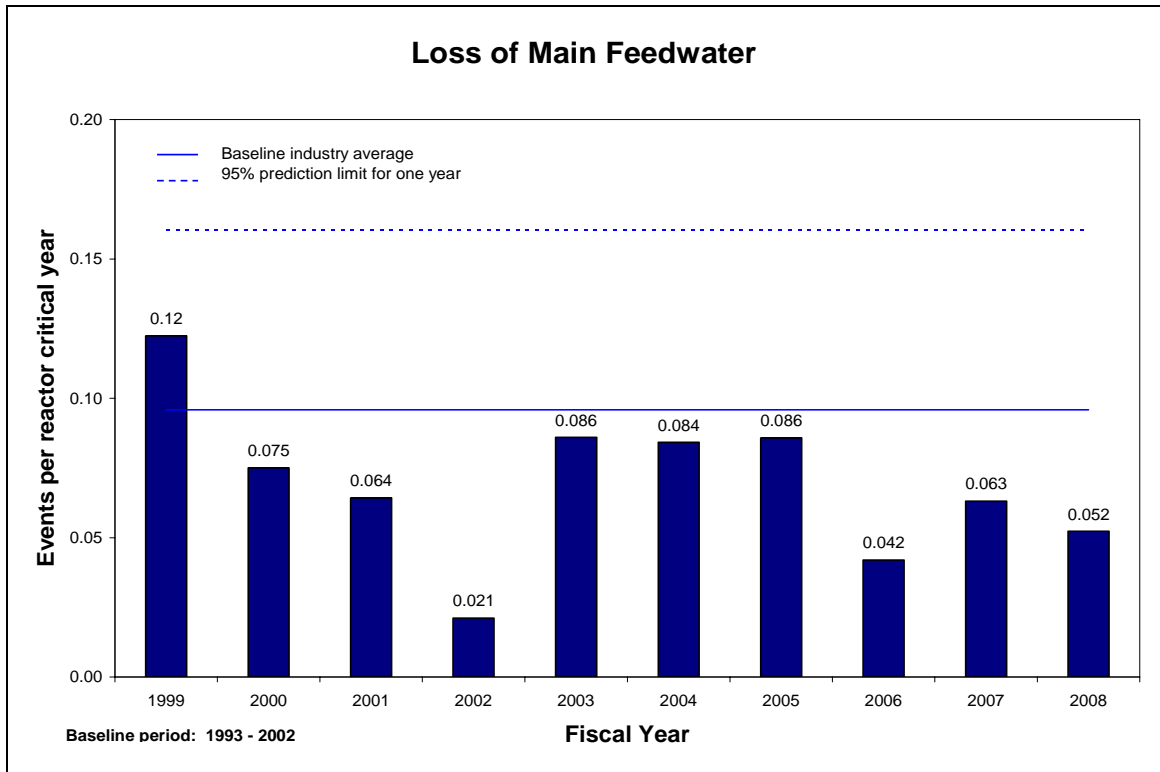


Figure 5. Loss of Main Feedwater

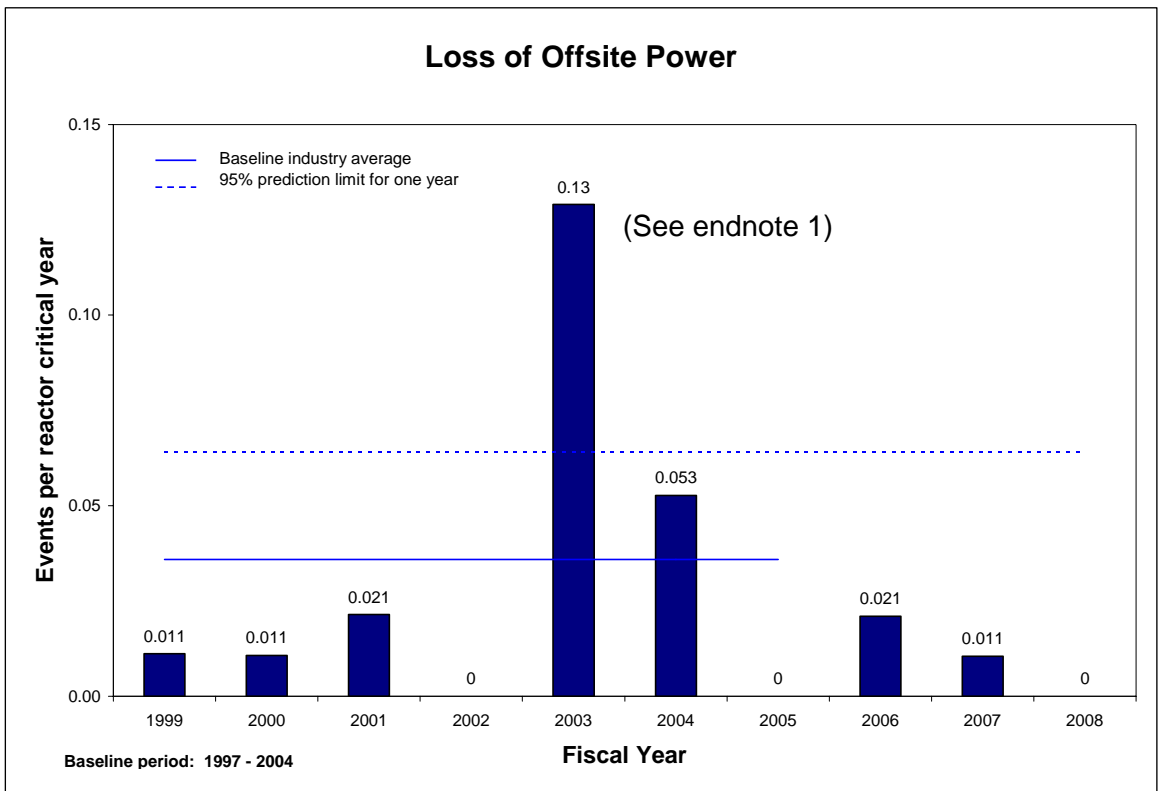


Figure 6. Loss of Offsite Power

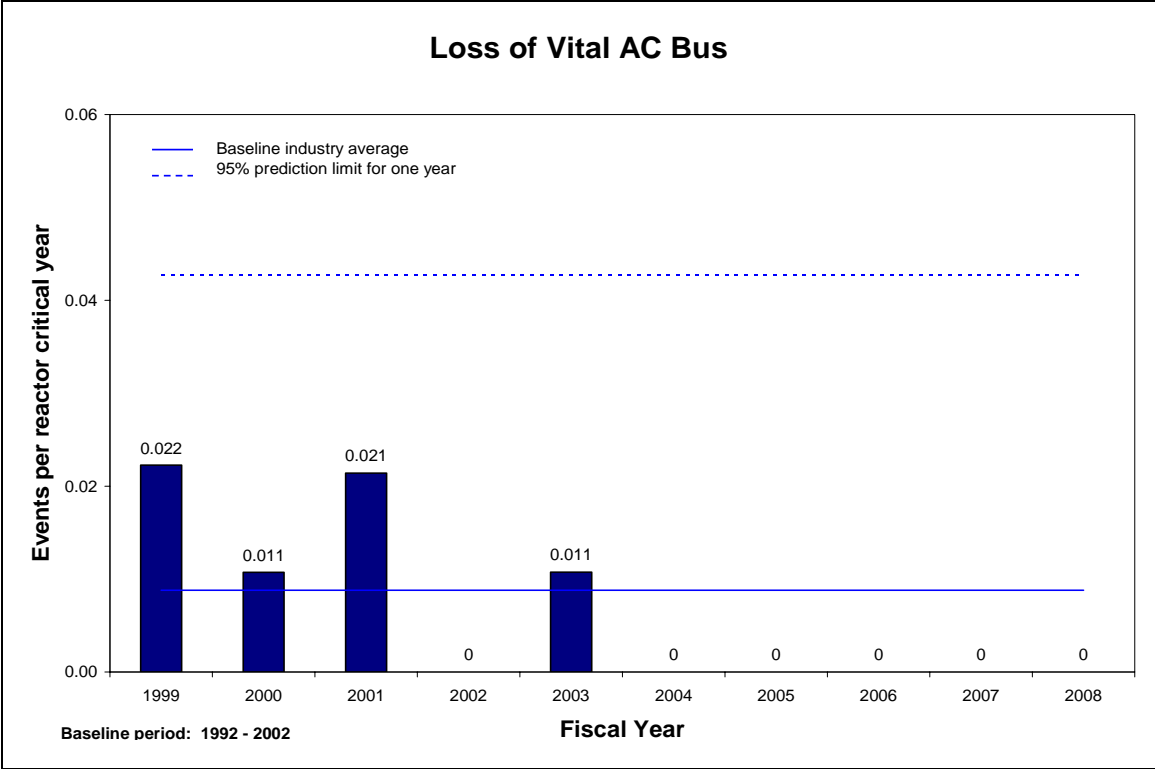


Figure 7. Loss of Vital AC Bus

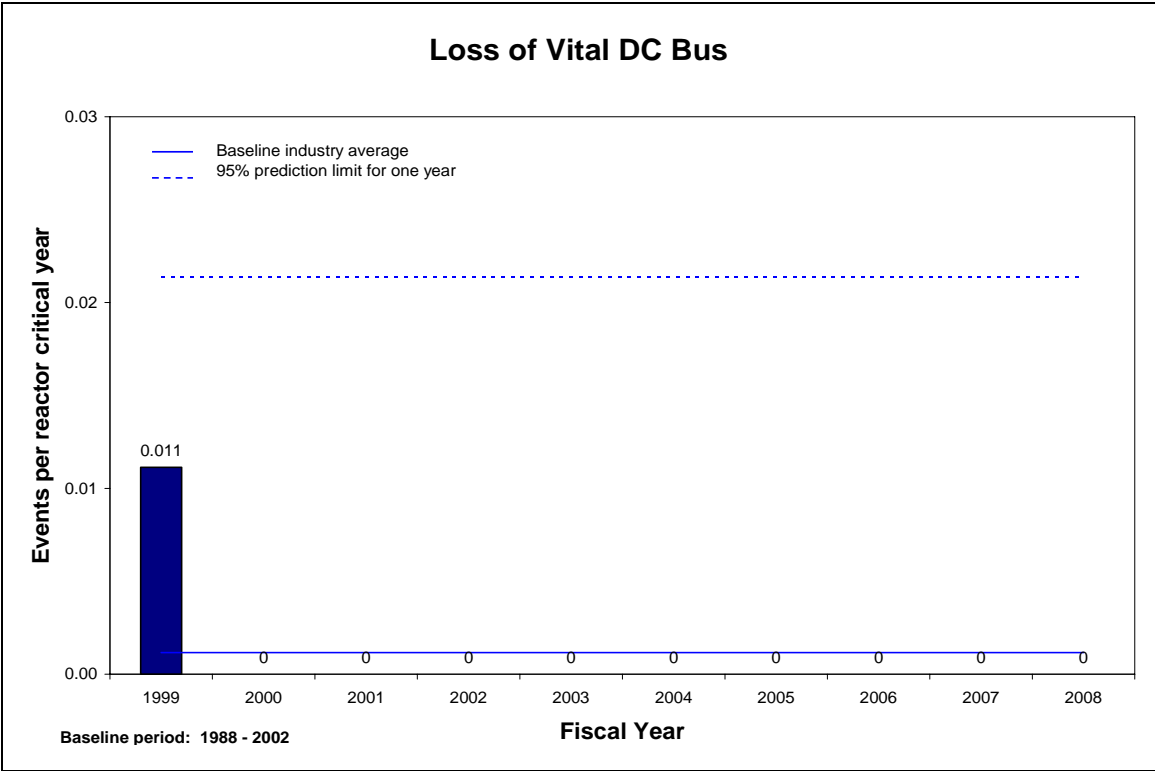


Figure 8. Loss of Vital DC Bus

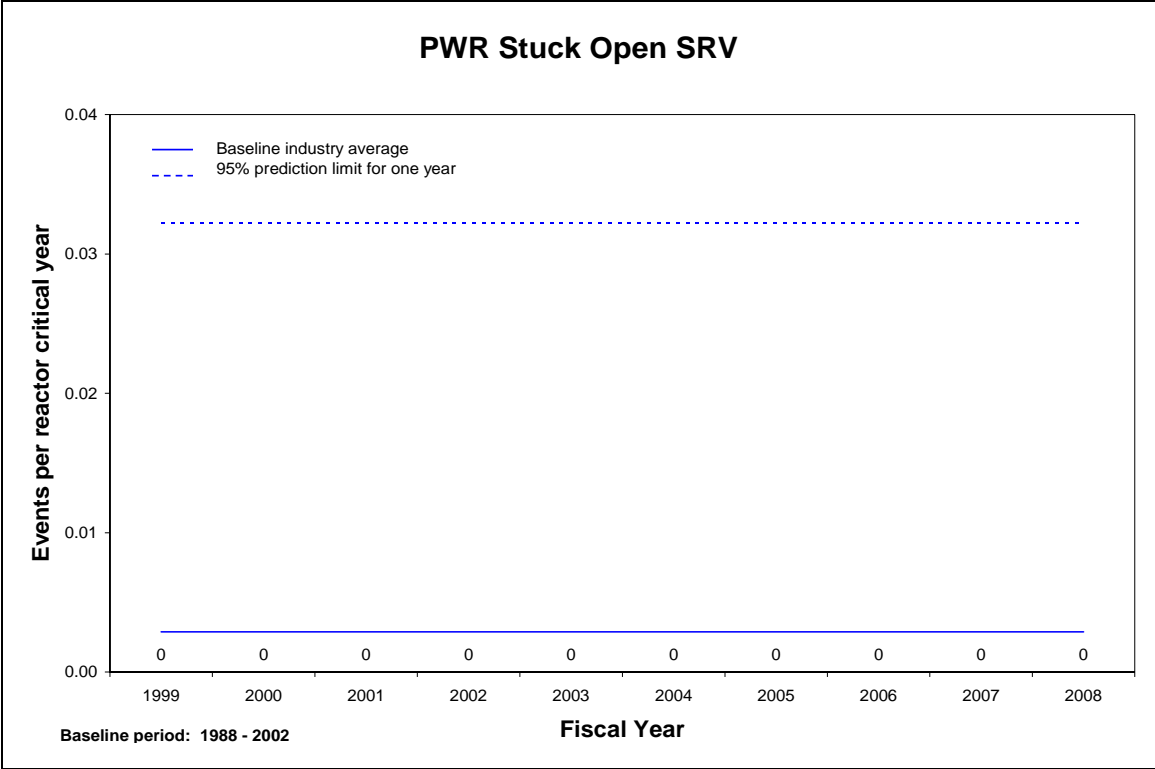


Figure 9. PWR Stuck Open SRV

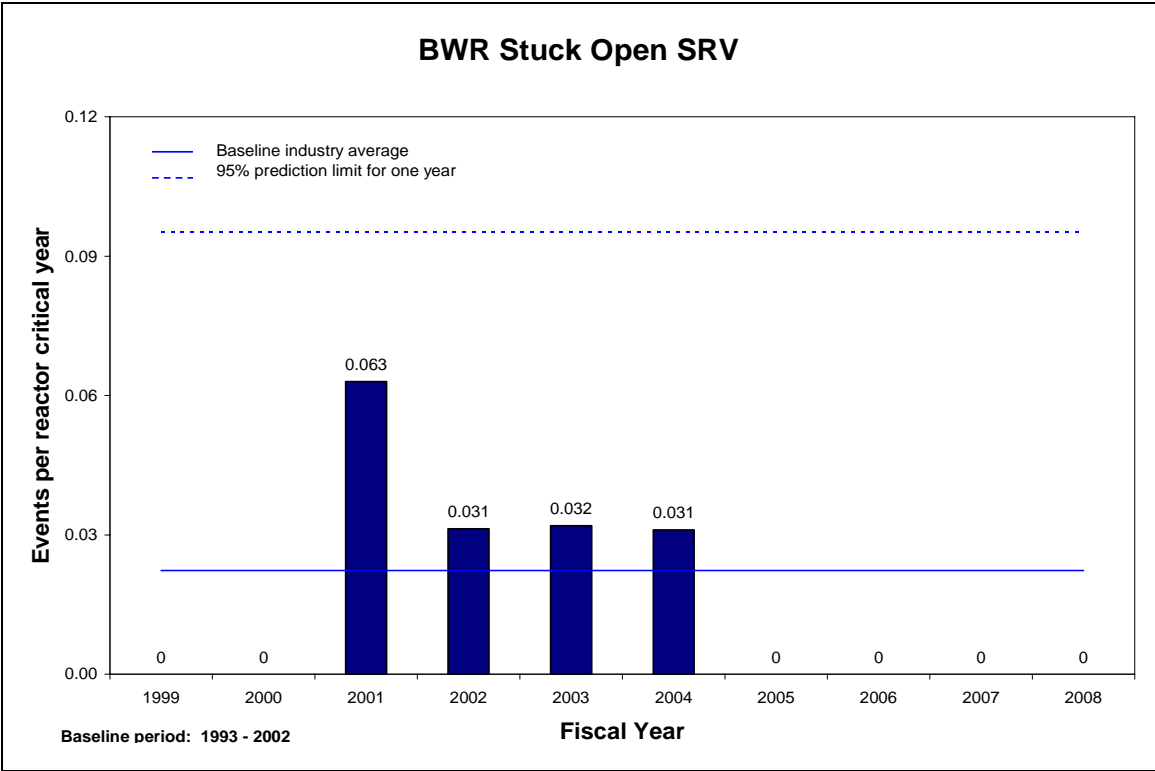


Figure 10. BWR Stuck Open SRV

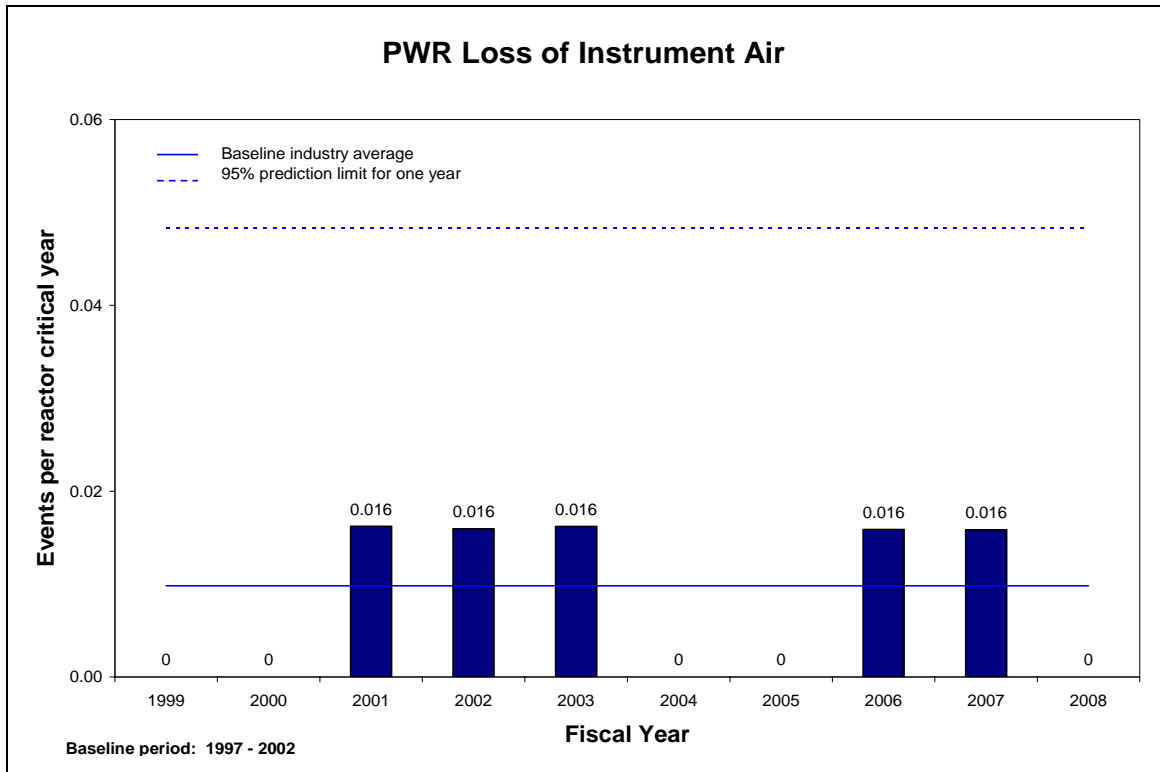


Figure 11. PWR Loss of Instrument Air

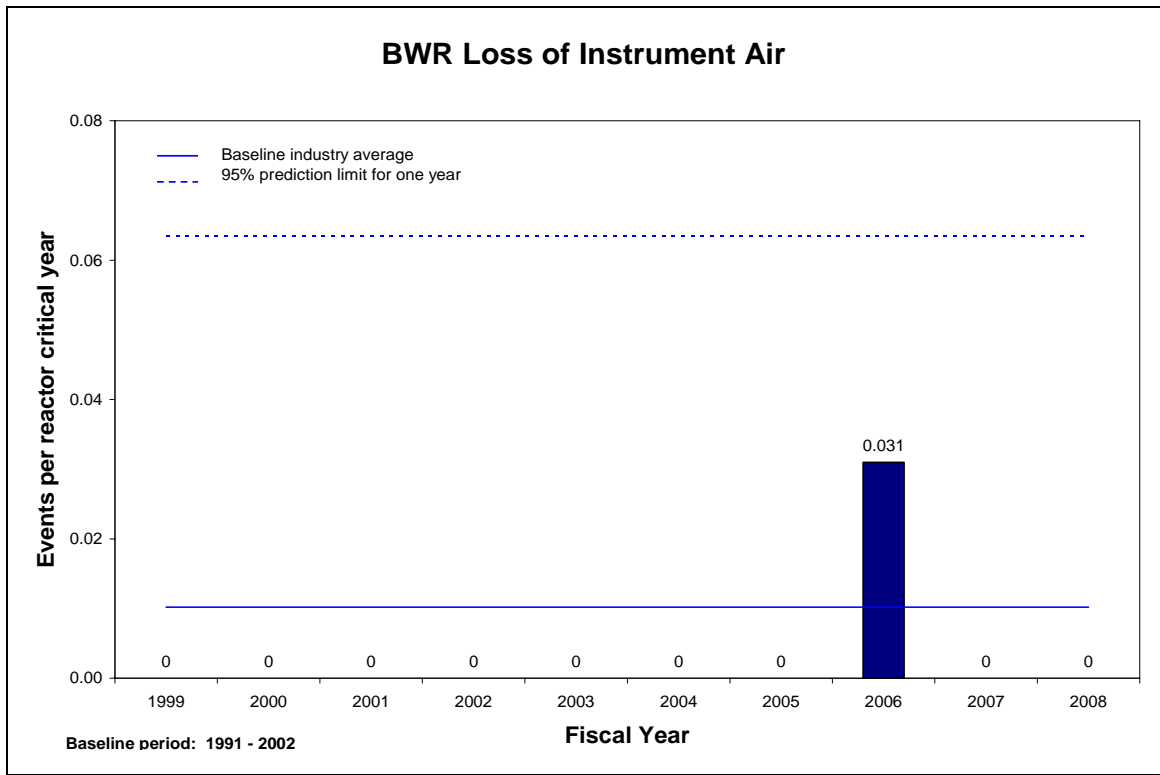


Figure 12. BWR Loss of Instrument Air

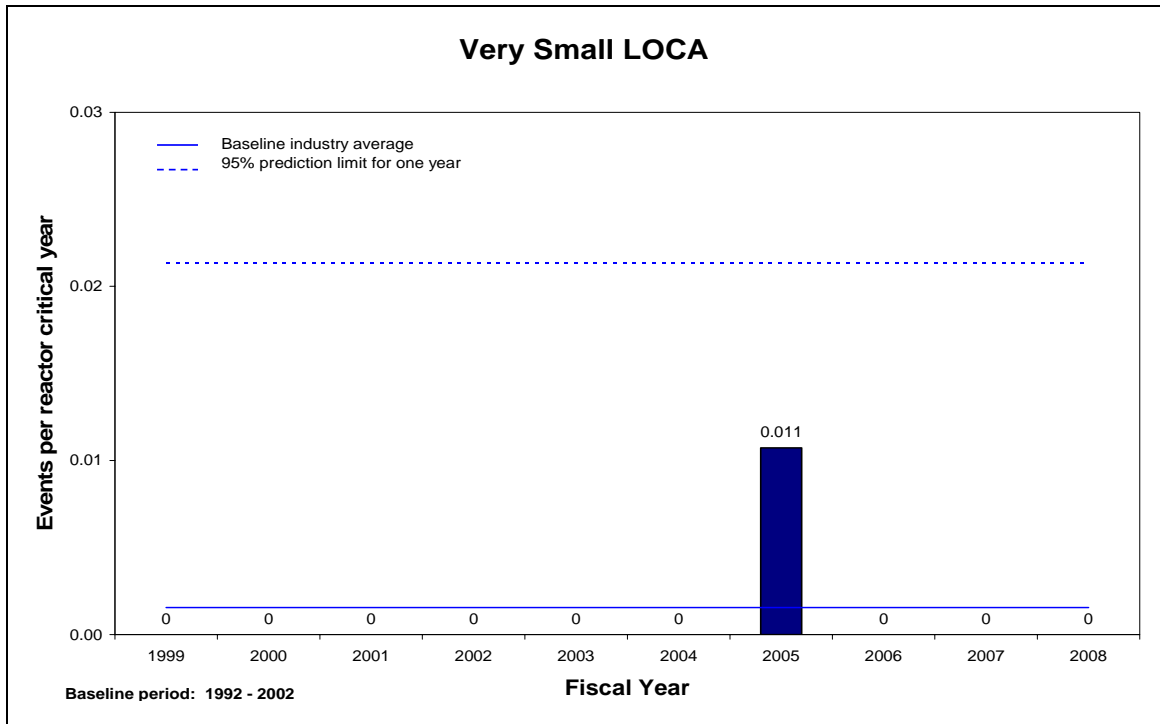


Figure 13. Very Small LOCA

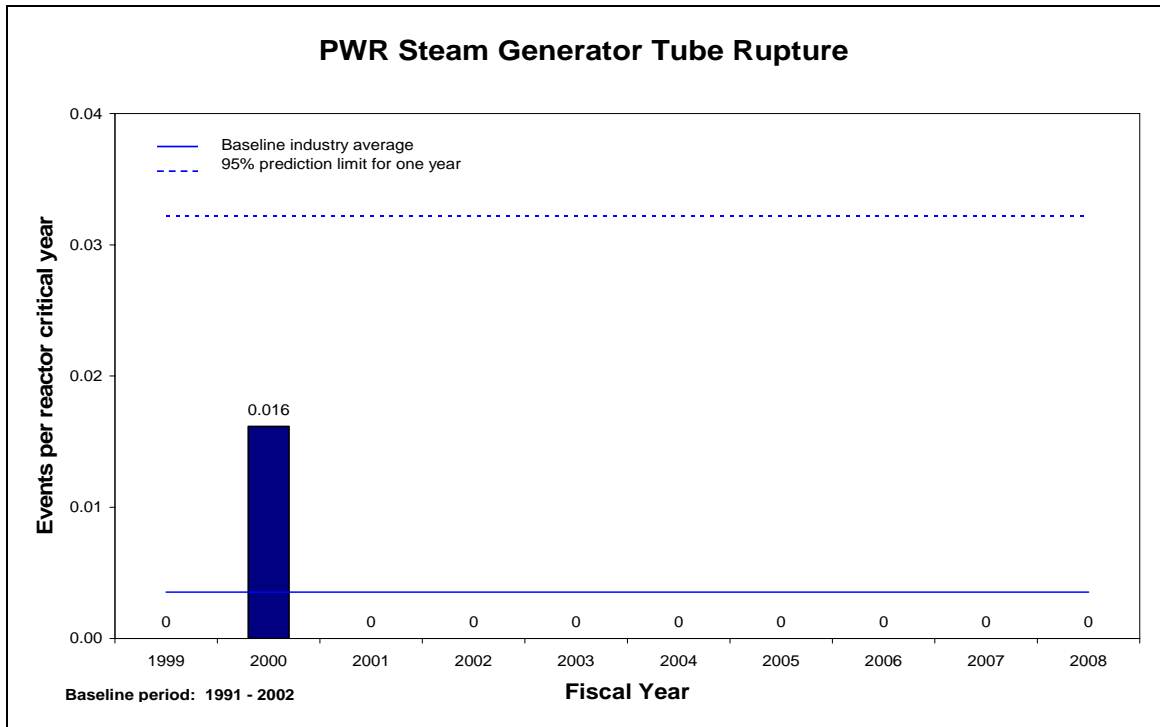


Figure 14. PWR Steam Generator Tube Rupture

NOTE 1: The prediction limit for the Loss of Offsite Power (LOOP) graph, shown in Figure 6, was calculated assuming the 9 LOOP events that occurred during the 2003 blackout event were a single event. This treatment results in a more conservative prediction limit.