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Appendix 1

Assumptions Made in the SFP PRA

Case 1 - The as-found spent fuel pool and spent fuel pool cooling systems

1. The spent fuel pool has one level, one temperature, and radiation monitors and alarms in the control room. The instrumentation is maintained in an operable state. Annunciators are in computers, which can track trends.

2. The certified fuel handlers are former senior reactor operators who know the facility, the surrounding community, and facility maintenance personnel well.

3. The utility has removed the emergency diesel generators and other support systems such as residual heat removal and service water that could provide spent fuel pool cooling or makeup prior to the plant being decommissioned.

4. There is limited makeup capability (with respect to volumetric flow) with the exception of fire pumps, which can provide makeup via 2.5 inch diameter hoses.

5. The certified fuel handlers enter the spent fuel pool area once or twice per shift (8 to 12 hour shifts).

6. The site is staffed during the day shift Monday through Thursday with maintenance people, health physics staff, QA/QC staff, fuel handlers, and administrative staff. Nights and weekends there is a skeleton staff.

7. The highest action level of offsite warning for decommissioned plants is an alert.

8. The spent fuel pool cooling system (sled mounted) and any support systems all run off the same electrical bus.

9. Certified fuel handlers are assumed to walkdown the spent fuel pool area at least once per shift. The human error probability (HEP) based on this was estimated to be 0.01.

10. The only significant Technical Specification applicable to spent fuel pools is the requirement for radiation monitors to be operable when fuel is being moved.

11. The utility has procedures for small leaks from the spent fuel pool or for loss of spent fuel pool cooling system.

12. The spent fuel pool water was clear and the fuel was observable. The control room monitors the spent fuel pool level via a camera that can zoom in on a measuring stick in the pool that can alert operators to level changes. The measuring stick is about three to four feet long.

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13. There is little fire protection equipment in the spent fuel pool area and it all is manual.

14. Overhead cranes had stops to help prevent heavy loads from being moved over the spent fuel pool.

15. Note: One plant cleaned its spent fuel pool and found thousands of foreign material pieces. Sizes were not discussed.

16. The site has operable two fire pumps (one diesel-driven and one electrically driven from offsite power).

Case 3 The Minimum system required by NRC Regulations

1. The spent fuel pool has one level and one temperature indicator in the control room. They are not required to be maintained in an operable state. The radiation monitors and associated alarms in the control room are only required to be operable when fuel is being moved. Annunciators are analog, are not trended, and need not work. In the PRA model, the control room/spent fuel pool instrumentation is assumed unavailable 10% of the time (i.e., the fraction of time during which the component is in a failed state is 1×10^{-1}) for Case 3, which is 20 times higher unavailability than assumed in Case 1 (i.e., 5×10^{-3}).

2. The certified fuel handlers are not former utility employees who know the facility, but are individuals who meet the minimum training requirements for a certified fuel handler.

3. The utility has removed the emergency diesel generators and other support systems such as residual heat removal and service water that could provide spent fuel pool cooling or makeup prior to the plant being decommissioned.

4. There is limited makeup capability (with respect to volumetric flow). The fire pumps have been removed from the site.

5. The certified fuel handlers rarely enter the spent fuel pool area. It was assumed in the PRA model that the HEP is five times higher than Case 1 (i.e., the Case 3 HEP is 0.05.)

6. The site is staffed during the day shift Monday through Thursday with a minimal number of maintenance people, health physics staff, QA/QC staff, fuel handlers, and administrative staff. Nights and weekends there is a skeleton staff. Recovery probabilities are assumed to be lower for Case 3 than Case 1.

7. The highest action level of offsite warning for decommissioned plants is an alert.

8. The spent fuel pool cooling system (sled mounted) and any support systems all run off the same electrical bus.

10. The effects of recriticality were not considered in the risk evaluation. Its potential for impact on risk is considered to be very low.

11. One year after the last of the reactor fuel is transferred to the spent fuel pool there is no longer any day-to-day NRC onsite oversight. We did not attempt to quantify the effect of this assumption.