SAR Chapter 1

Section 1.3.1: The SAR states the "grid plate box" is approximately 26.3 ft below the pool surface. The word "box" is an editorial error and shall be removed in an updated version of the SAR.

SAR Chapter 2

Section 2.1: The following provides corrections to information provided in Section 2.1. The tritium concentration in the pool has been measured to be approximately 10 pCi/ml. The correct units for the 10CFR Part 20 Appendix-B Table-3 concentration limit for the release of tritium to the sewer system is micro-Ci /ml. Consequently, the tritium concentration in the reactor pool is three orders of magnitude less than the release limit. These corrections shall be included in an updated version of the SAR.

SAR Chapter 4

Section 4.1: The correct pool depth is 31 ft. The correct distance from the pool surface to the top of the core grid plate is 26.25 ft. The distance from the top of the grid plate to the bottom of the pool is 4.75 ft. The core centerline distance to the top of the pool is 25 ft.

Section 4.2: Partial fuel elements are located in core position C3 and core position E3.

Section 4.3: The pool depth to core centerline is incorrectly stated as 26 ft. The correct depth is 25ft.

Section 4.5.4: The following components provided in Table 4-5 should be in bold font – "Water Temp Only", "$T_{fuel}$", "Coolant Void".

These corrections and additions shall be included in an updated version of the SAR.

SAR Chapter 15

The 2015 cost for decommissioning is presented in Chapter 15, section 15.4 of the SAR submitted in October 2015. A detailed decommissioning cost estimate is provided in the appendix to Chapter 15. Using the CPI calculator provided by the US Bureau of Labor Statistics, the inflation adjusted estimate as of January 2018 is $4,900,000 (rounded to the nearest $100,000). The 2018 inflation adjusted estimate shall be included in an updated version of the SAR.

The five-year forecast for the reactor operating expenses and revenue (SAR Table 15.1) has been updated based on 2018 data. The five year projections for fiscal years 2019-23 include a three percent inflationary adjustment for each year. The following table shall replace Table 15.1 in an updated version of the SAR.

Reactor Operating Expenses and Revenue – Five Year Forecast

| **EXPENSES** | **FY2018** | **FY2019** | **FY2020** | **FY2021** | **FY2022** | **FY2023** |
|---|---|---|---|---|---|---|
| Salaries (1) | 344 | 355 | 365 | 376 | 387 | 399 |
| Salaries (2) | 469 | 483 | 497 | 512 | 528 | 543 |
| Student Wages (2) | 163 | 168 | 173 | 178 | 183 | 189 |
| Supplies&Equipment | 116 | 119 | 123 | 127 | 130 | 134 |
| Travel/Conf | 10 | 10 | 10 | 11 | 11 | 11 |
| Miscellaneous | 9 | 9 | 9 | 10 | 10 | 10 |
| TOTAL | 1110 | 1144 | 1178 | 1213 | 1250 | 1287 |
| **REVENUE** | | | | | | |
| University | 344 | 355 | 365 | 376 | 387 | 399 |
| Gamma | 659 | 679 | 699 | 720 | 742 | 764 |
| Reactor | 107 | 110 | 114 | 117 | 121 | 124 |
| TOTAL | 1110 | 1144 | 1178 | 1213 | 1250 | 1287 |

(1) University Funded (does not include fringe or overhead)
(2) Grants and Contracts Funded (includes fringe and overhead)
Values are in thousands of dollars

Facility Response RAI 13.2 (a), (b), (d)

*Power Fraction Effect on Fuel Plate Temperature During LOCA*: The following additional clarifying information is provided.

Pool Surface Area:

The UMLRR pool has two sections that are normally open to each other (see SAR section 4.3). The surface area of the stall pool at the top is 200 $ft^2$ and the surface area of the bulk pool at the top is 200 $ft^2$, resulting in a combined surface area of 400 $ft^2$. However, the stall pool gradually tapers down to a smaller area that is approximately 110 $ft^2$. The original license FSAR used an effective constant surface area of 372 $ft^2$ for the LOCA analyses. Upon further review, a more conservative effective area value is estimated to be 350 $ft^2$ based upon an average stall pool surface area for all depths.

The following equation was derived by Feldman for the RINSC analysis (previously submitted in Response to RAI-13.6.a):

$$t_{final} = \frac{2A_1}{C_d\,A}\left[\sqrt{\frac{h_{initial}}{2g}}\right]\left[1-\frac{\sqrt{(h_{final})}}{\sqrt{(h_{initial})}}\right]$$

Rearranging to solve for A, where A is the drain opening diameter:

$$A = \frac{2A_1}{C_d t_{final}} \left[ \sqrt{\frac{h_{initial}}{2g}} \right] \left[ 1 - \frac{\sqrt{(h_{final})}}{\sqrt{(h_{initial})}} \right]$$

The following values are then used to calculate the maximum acceptable drainage diameter for the LOCA analysis:

| **Variable** | **Representation** | **Value** |
|---|---|---|
| $A_1$ | Cross sectional area of the tank | 350 $ft^2$ |
| $h_{initial}$ | Initial liquid level (pool level LSS) | 30.25 ft |
| $h_{final}$ | Final liquid level (beamtube height) | 6 ft |
| $t_{final}$ | Minimum shutdown time | 3947 s |
| $C_d$ | Orifice coefficient | 0.61 |
| g | Acceleration due to gravity | 32.2 ft / $s^2$ |

The calculation yields an area of 0.11 $ft^2$ (15.8 $in^2$) which is equivalent to a diameter of approximately 4.5 inches. The diameter for the beam tube drain lines at the UMLRR are one inch. Note this diameter does not take into account the in-line valve that further constricts the diameter. As a result, the slightly smaller drainage diameter presented in this clarification (4.5 vs 4.7) does not affect the conclusions in the response for RAI 13.2 (a), (b), (d).

RINSC Pool Surface Area

The response to RAI 13.2 (a), (b), (d) included a discussion of the RINSC pool surface area. The information provided indicating the RINSC pool surface is larger than that used in the RINSC calculations has subsequently been determined to be incorrect. However, the information has no bearing on either the RINSC or UMLRR LOCA analyses and was included only for comparison purposes.

End Clarification Information