

NRC Request for an Explanation of  
The Reported Areal Densities in FPL Letter L-2001-115

NRC Request

Explain the statements in FPL Letter L-2001-115 that concluded that the areal density of a measured panel was  $0.004 \text{ gms-B}_{10}/\text{cm}^2$ .

FPL Response

**Summary:**

The areal density of  $0.004 \text{ gm-B}_{10}/\text{cm}^2$  reported in FPL L-2001-115 represents a conservative determination of the minimum areal density found in only a portion of a Boraflex panel in Region II of the Turkey Point Unit 3 Spent Fuel Pool (SFP) during the 2001 BADGER testing campaign. The lowest average panel areal density of any Region II panel measured during the 2001 BADGER testing campaign was  $0.0077 \text{ gm-B}_{10}/\text{cm}^2$  found in the West panel of Storage Cell M16.

**Details:**

Page 1 of the Attachment to FPL Letter L-2001-115 states:

“The lowest dissolved region areal density for the Region II racks is  $0.004 \text{ gm-B}_{10}/\text{cm}^2$  and corresponds to a total dissolution length of 96 inches in the West panel of storage cell M16. The average areal density of all panels tested meets or exceeds the assumed minimum design areal density of  $0.006 \text{ gm-B}_{10}/\text{cm}^2$ .”

The areal density of  $0.004 \text{ gm-B}_{10}/\text{cm}^2$  applies only to the sections of this panel that had evidence of dissolution. The cumulative linear amount of the panel that had evidence of dissolution was 96 inches of the total panel length of 139.4 inches. The average dissolution in these sections of the panel was conservatively determined to be  $0.004 \text{ gm-B}_{10}/\text{cm}^2$  based on the initial areal density assumed to be the minimum design areal density of  $0.012 \text{ gm-B}_{10}/\text{cm}^2$ . The average areal density over the entire length of this panel was greater than the assumed minimum design dissolved areal density of  $0.006 \text{ gm-B}_{10}/\text{cm}^2$ .

The results of the in-situ panel areal density testing is reported in terms of the deviation of the average areal density of the irradiated panel being tested from the average areal density of the unirradiated reference panel. The results for Region II from this test campaign are provided in Table 2 of the Attachment to FPL Letter L-2001-115. This table shows that the greatest amount of panel average dissolution was observed in the West Panel of Storage Cell M16 and was reported as a 48.6% reduction in areal density from the reference panel areal density. Page 1 of the Attachment to FPL Letter L-2001-115 states: “For conservatism, the minimum design areal densities of  $0.020 \text{ gm-B}_{10}/\text{cm}^2$  and  $0.012 \text{ gm-B}_{10}/\text{cm}^2$  for Regions I and II respectively were chosen for the reference panel areal densities, since the as-built areal densities associated with the specific storage cells are not known”. Assuming the Region II reference panel is at the minimum design areal density of  $0.012 \text{ gm-B}_{10}/\text{cm}^2$ , the panel average dissolution of 48.6% for the West

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Panel of Storage Cell M16 results in a panel average area density of  $0.0062 \text{ gm-B}_{10}/\text{cm}^2$  for this panel and is greater than the assumed minimum design dissolved areal density of  $0.006 \text{ gm-B}_{10}/\text{cm}^2$ .

We have determined that it is more appropriate to use the available as-built information to determine the actual condition of the Boraflex panels. Although the areal density of the individual panels is not known, it is conservative to assume that the reference panel areal density is at the 95/95 lower confidence limit (LCL) of the as-built areal density. A review of the as-built records for material used for the Region II panels determined that there is a 95% probability with a 95% confidence that the as-built areal density of any Region II panel is  $0.015 \text{ gm-B}_{10}/\text{cm}^2$  (LCL as-built areal density) or greater. Assuming the reference panel is at the 95/95 LCL as-built areal density of  $0.015 \text{ gm-B}_{10}/\text{cm}^2$ , the average areal density of the West Panel of Storage Cell M16 is  $0.0077 \text{ gm-B}_{10}/\text{cm}^2$  and is the lowest average panel areal density measured in the 2001 BADGER surveillance campaign.