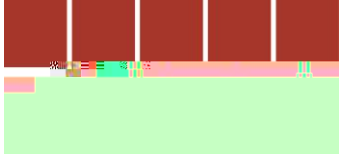


DREAM Inserts for Enhanced Pool Reactivity Control: A Solution for Degrading Neutron Absorbing Material or Power Upgrades



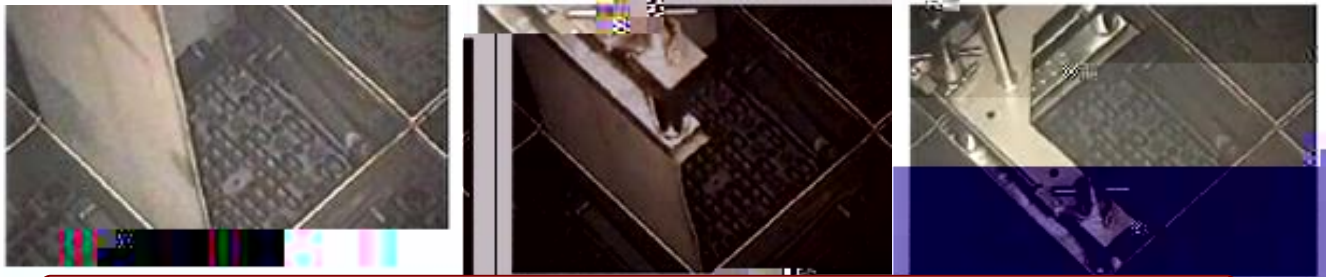
Degradation of many early neutron absorber materials used in the wet fuel storage racks of commercial nuclear power plants is limiting the storage capacities of plants around the world. Fuel storage racks that employ polymeric neutron absorbers (Boraflex and Tetrabor) have proven to be especially vulnerable to embrittlement, erosion, and gap formation under prolonged exposure to radiation. Degradation of these types of neutron absorber materials is continuous with time, resulting in gaps or severe erosion in nearly all fuel racks containing these materials. Additionally, operating the reactor at higher power levels results in discharged fuel that is more reactive (either due to higher initial enrichments or increased plutonium levels associated with higher burnups).

More than 2,400 DREAM inserts have been installed in the U.S. Holtec has four DREAM insert designs: DREAM C3, DREAM C2, DREAM C1, and DREAM F1. All DREAM inserts are fabricated at Holtec facilities.

Holtec has the in-house capabilities to re-qualify the spent fuel pool given the degradation issues or new fuel conditions across all disciplines germane to licensing, including criticality analyses. However, in some cases the reactivity levels in the spent fuel pool may be beyond the moderation capabilities of the installed spent fuel racks, even with increased credit for fuel burnup, resulting in the need for invasive mitigation measures.

The Device for Reactivity Mitigation (DREAM) insert provides a robust and economical alternative to moderate fuel reactivity and can be implemented on a relatively expedited schedule, without replacing the existing racks. Installing DREAM inserts in the fuel storage pool allows a plant to recover the criticality safety margins lost due to neutron absorber degradation or the enhanced reactivity of fuel following a power uprate. The DREAM insert serves to replace or augment the neutron attenuation function of the existing racks. DREAM inserts use Metamic® as the primary material of construction. The utilization of Metamic (with up to 32.5% B₄C) as the neutron absorber will ensure criticality control and continued high margins of safety. Holtec currently has four DREAM insert designs, all utilizing Metamic: DREAM C3, DREAM C2, DREAM C1, and DREAM F1.

The number, type, and location of the DREAM inserts are based on detailed criticality evaluations performed by Holtec under the control and surveillance of the Nuclear Regulatory Commission (NRC) and in accordance with the NRC's "Quality Assurance Criteria for Nuclear Power Plants."



Holtec's DREAM C1 Insert Installation Evolution at FPL's Turkey Point Nuclear Power Plant

