



Entergy Nuclear Operations, Inc.
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November 19, 2014

U.S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, DC 20555-0001

SUBJECT: Notification of Intended Use of NSF Lead Use Channels
Pilgrim Nuclear Power Station
Docket No. 50-293
License No. DPR-35

LETTER NUMBER: 2.14.073

Dear Sir or Madam:

In accordance with NEDE-24011-P-A, "General Electric Standard Application for Reactor Fuel (GESTAR II)," Entergy Nuclear Generation Company (ENGCO) and Entergy Nuclear Operations Incorporated (ENOI) are making notification to the Nuclear Regulatory Commission (NRC) of the intended use of lead-use channels (LUC) at the Pilgrim Nuclear Power Station (PNPS).

A letter dated September 23, 1981 from the NRC to the General Electric Company, referenced in GESTAR II, indicates the notification should include a description of the LUCs, a statement of applicability to GESTAR II, the objectives of the LUC program, and an outline of the measurements to be made on the LUCs. The attachment provides this information.

This letter contains no new regulatory commitments. If you have any questions or require additional information, please contact me at 508-830-8323.

Sincerely,

A handwritten signature in black ink, appearing to read "Everett P. Perkins, Jr.", with a stylized flourish at the end.

Everett P. Perkins, Jr.
Manager, Regulatory Assurance

Attachment: 1- NSF Lead-Use Channels at Pilgrim Nuclear Power Station

cc: (See next page)

A001
NRR

U.S. Nuclear Regulatory Commission
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NRC Senior Resident Inspector
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Attachment 1
to
Entergy Letter No. 2.14.073
NSF Lead-Use Channels at Pilgrim Nuclear Power Station
(2 Pages)

ATTACHMENT 1 TO ENTERGY LETTER NO. 2.14.073

Background

Entergy is required to provide an information letter to the NRC describing the lead-test assemblies (LTA) or in this case the 8% lead-use channel (LUC) program per Section 1.2.1.b. of GESTAR (REF. 1). Specifically, the agreed content includes a description of the LUCs, a statement of applicability of GESTAR, a description of the objectives of the LUC program, and an outline of the kinds of measurements that will be made on the LUCs (REF. 2). This letter is intended to communicate the content required in the notification for Entergy's use in preparing the information letter.

The use of this LUC process for inserting NSF channels on up to 8% of the bundles in a core was requested and approved in References 3 and 4, respectively.

Description of Lead Use Channels

Forty-six NSF Channels will be loaded into the Pilgrim reactor during Cycle 21. The GNF supplied assemblies contain standard GNF2 components and fuel with the exception of the channel. The channels will be manufactured with a distortion-resistant material known as NSF. The term NSF reflects the presence of Niobium (Nb), Tin (Sn) and Iron (Fe) as the primary alloying metals combined with Zirconium. Similar zirconium-niobium alloys are commonly used in PWR and Russian plants, but not commercially used in BWR's.

The NSF alloy is resistant to channel bow. The mechanical properties of NSF (including in-reactor creep) are similar to the standard Zircalloys, and are considered adequate for reactor service. Corrosion performance of NSF is adequate based on visual and hot-cell examinations after six years of operation. The material properties of NSF have been documented in Reference 5 – a licensing topical report that the NRC is currently reviewing.

The surface condition of these NSF channels is different from the current standard channel. The NSF channels to be inserted in Pilgrim Cycle 21 will have a pre-oxidized surface condition similar to the pre-oxidized surface condition that was standard on Zircaloy-4 channels prior to 1990. As of January 2014, there were 16 pre-oxidized NSF channels operating in three different BWRs. By January 2015, an additional 84 pre-oxidized NSF channels will be inserted into four additional plants.

Applicability of GESTAR

GNF has reviewed the properties of the NSF channels relative to the properties of Zircaloy-2 and Zircaloy-4 in the context of required functions, including safety, of fuel channels as described in GESTAR and the relevant LTRs. GNF has concluded that the use of NSF as a channel material meets the approved criteria of GESTAR and may be used in an LUC or LTA.

ATTACHMENT 1 TO ENTERGY LETTER NO. 2.14.073

Objectives of NSF LUC Program

The objectives of this program are to expand the experience base for NSF channels to provide a better understanding of the inherent statistical variability in the performance of this new material. Channel distortion will be monitored to confirm previous measurements that indicate NSF is resistant to channel bow. Standard analyses will be performed to assure that the safety and licensing bases are maintained.

Outline of Measurements

In addition to the monitoring and inspection plan required in Reference 3, the corrosion performance will be evaluated visually during refueling outages and after discharge.

REFERENCES:

1. NEDE-24011-P-A-20 & NEDE-24011-P-A-20-US, *General Electric Standard Application for Reactor Fuel & Supplement for United States*, (GESTAR II, Licensing Topical Report).
2. Letter from T.A. Ippolito (NRC) to R.E. Engel (GE), *Lead Test Assembly Licensing*, September 23, 1981.
3. MFN 12-074, "Enhanced Lead Use Channel (LUC) Program for NSF Fuel Bundle Channels," September 25, 2012.
4. Letter from Sher Bahadur (NRC) to A. A. Lingenfelter (GNF-A), Subject: Final Safety Evaluation for Global Nuclear Fuel – Americas Topical Report (TR) Enhanced Lead Use Channel Program for NSF Fuel Bundle Channels (TAC No. ME9829), MFN 13-020, March 29, 2013.
5. MFN 13-008/NEDE-33798P, "Application of NSF to GNF Fuel Channel Designs," February 13, 2013.