

May 20, 2014

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

Limerick Generating Station, Unit 2
Facility Operating License No. NPF-85
NRC Docket No. 50-353

Subject: Limerick Generating Station Introduction of Lead Use Channels

Reference: Letter from T. A. Ippolito (U.S. Nuclear Regulatory Commission) to
R. E. Engel (General Electric Company), "Lead Test Assembly
Licensing," dated September 23, 1981

The purpose of this letter is to notify the U.S. Nuclear Regulatory Commission of the use of a Lead Test Assembly (LTA), or in this case the 8% lead-use channel (LUC) program, as required by the referenced letter and the General Electric Standard Application for Reactor Fuel (GESTAR II). As described in the attached letter, 60 NSF Channels will be loaded into the Limerick Generating Station, Unit 2, Cycle 14, which is scheduled to begin in spring 2015. 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 BWRs.

As discussed in the referenced letter, the elements of an approved licensing process for LUC programs include the following:

- The analysis of the LTAs (in this case LUCs) using approved methods meets approved criteria;
- The Licensee will provide an information letter to the NRC describing the LUCs, stating the applicability of GESTAR, describing the objectives of the LUC program, and outlining the kinds of measurements that will be made on the LUCs; and
- The results obtained from the LUCs program will be summarized in a timely manner in subsequent GNF fuel experience reports.

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Analysis of the NSF channels was conducted using an approved methodology and the channels were demonstrated to meet the approved criteria for use. The required information letter is provided in the attachment to this letter and contains the required information on the LUCs. GNF summarizes the results obtained from the LUC programs in the technology update meetings in order to meet the GESTAR II, Section 1.2.1.C, requirements for a yearly operating experience report presenting the examination of Lead Use Assemblies (in this case the LUCs) and selected discharge bundles.

There are no regulatory commitments contained in this letter.

Should you have any questions concerning this letter, please contact Mr. Thomas R. Loomis at (610) 765-5510.

Respectively,

A handwritten signature in black ink, appearing to read "James Barstow". The signature is written in a cursive style with a long horizontal stroke extending to the right.

James Barstow
Director, Licensing and Regulatory Affairs
Exelon Generation Company, LLC

Attachment: Letter from Paul E. Cantonwine (Global Nuclear Fuel), "Information on NSF Lead-Use Channels at Limerick," dated March 31, 2014

cc: USNRC Region I, Regional Administrator
USNRC Senior Resident Inspector, LGS
USNRC Project Manager, LGS
R. R. Janati, Bureau of Radiation Protection

ATTACHMENT

**Letter from Paul E. Cantonwine (Global Nuclear Fuel),
“Information on NSF Lead-Use Channels at Limerick,”
dated March 31, 2014**



Global Nuclear Fuel

A Joint Venture of GE, Toshiba, & Hitachi

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March 31, 2014

SUBJECT: Information on NSF Lead-Use Channels at Limerick

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.

Exelon 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 Exelon’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, and incorporated into GESTAR (REF. 1).

Description of Lead Use Channels

60 NSF Channels will be loaded into Limerick 2 Cycle 14. 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 Limerick 2 Cycle 14 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.

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 fuel outages and after discharge.

Please let me know if you have any questions.



Paul E. Cantonwine
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