ATTACHMENT 3

Non-Proprietary Global Nuclear Fuel Report, 006N3997NP Revision 1, "High Burnup Lead Use Assembly (HBLUA) Information Report for Limerick 2," February 2021

Global Nuclear Fuel

Global Nuclear Fuel

006N3997NP

Revision 1

February 2021

Non-Proprietary Information

High Burnup Lead Use Assembly (HBLUA) Information Report for Limerick 2

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REVISION SUMMARY

Rev #	Section Modified	Revision Summary
0	N/A	Initial Release
1	N/A	Technically identical to Revision 0 except for the addition of mention of the NSF channels and prepared for submittal.

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LIST OF TABLES

1.0 INTRODUCTION

The purpose of this report is to provide a description of the High-Burnup Lead Use Assembly (HBLUA) program at Limerick 2 to support an Exelon-to-NRC communication (for information) required per Appendix B of Reference 1. This communication must include the following information:

- A description of the lead assembly program
- Estimated duration of the program
- Inspection plans with a basis for those plans
- Assurance that the lead assemblies meet all GESTAR II licensing requirements for HBLUAs

2.0 DESCRIPTION AND DURATION OF THE LIMERICK 2 HBLUA PROGRAM

HBLUAs are licensed fuel designs that are operated beyond the current GNF burnup limits. In this HBLUA program, eight standard GNF2 assemblies that have completed two cycles will operate in a 3rd cycle in Limerick 2 Cycle 17 in such a way that they will exceed the current GNF burnup limits in the last six months of operation. One cycle is equivalent to ~2 years.

The bundle IDs for the eight standard GNF2 assemblies are YLN599, YLN600, YLN614, YLN615, YLN626, YLN627, YLN641, YLN642.

The channel material is NSF. (Appendix B of Reference 1)

The peak pellet exposures in these bundles at the start of cycle 17 are ~59 GWd/MTU, and by the end of cycle, the bundles will reach 72-73 GWd/MTU (peak pellet exposure), which exceeds the current burnup limit by [[ ]].

The quantity of HBLUA bundles (i.e., 8) is half the number of HBLUAs allowed in Appendix B of Reference 1.

After completing Cycle 17, the plan is to discharge four of the HBLUAs and reinsert four in Cycle 18 for a 4th cycle of operation. It is expected the HBLUAs will exceed the current burnup limit by [[ ]] by the end of Cycle 18.

3.0 INSPECTION PLANS

After discharge of the HBLUAs, the bundles will be inspected. The inspections will be performed off-outage at a time that is consistent with the Limerick site priorities. The scope of the inspection will be one or a combination of the following poolside examinations:

- Visual examinations of the assemblies and specific rods in the assemblies
- Eddy current measurements of the corrosion thickness, crud thickness and cladding diameter
- Gamma scan measurements of fission gas pressure
- Channel length and distortion measurements

The results of these examinations will be compared to similar examinations of 2nd cycle fuel with peak pellet exposures that are comparable to the HBLUAs at the start of Cycle 17. The HBLUA program and inspection findings will be presented to the NRC during the annual GNF Technology Update meeting. Based on GNF's understanding of fuel performance, the two

variables most affected by exposure are corrosion and fission gas release. Thus, these variables will have the highest priority when developing the detailed inspection plans. The channel length and distortion measurements will provide justification for operation of the NSF channels beyond the current exposure limit.

4.0 COMPLIANCE WITH GESTAR II HBLUA REQUIREMENTS

The HBLUAs are accounted for in standard reload licensing evaluations required in the US Supplement to GESTAR II (Reference 2), which will be documented in the Supplemental Reload Licensing Report (SRLR). The SRLR will be issued separately from this report. For some of the GESTAR II evaluations, a new thermal-mechanical operating limit (TMOL) is required. The new TMOL for the HBLUAs was created using the NRC-approved PRIME methodology and is documented below in Section 4.1. As stipulated in Appendix B of Reference 1, the use of PRIME beyond the current burnup limit "does not result in a departure from a method of evaluation as defined by 50.59."

4.1 Thermal-Mechanical Operating Limit (TMOL) for HBLUAs

The PRIME-based Linear Heat Generation Rate (LHGR) limits versus exposure for UO_2 and 2wt% to 8wt% Gad rods in the GNF2-B36-HBLUAs are shown in Table 4-1.

Table 4-1 TMOL for GNF2-B36-HBLUA

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5.0 CONCLUSIONS

The information provided herein fulfills the NRC communication requirements as defined in Appendix B of Reference 1.

6.0 ACRONYMS

6.1 Acronyms

Acronym	Explanation
BOL	Beginning of Life
EOL	End of Life
GESTAR	GE Standard Application for Reactor Fuel
GNF	Global Nuclear Fuel
HBLUA	High-Burnup Lead Use Assembly
LHGR	Linear Heat Generation Rate
NRC	Nuclear Regulatory Commission
TMOL	Thermal Mechanical Operating Limit

7.0 REFERENCES

1. NEDE-24011-P-A-31, “General Electric Standard Application for Reactor Fuel (GESTAR II),” November 2020.
2. NEDE-24011-P-A-31-US, “General Electric Standard Application for Reactor Fuel (GESTAR II) (Supplement for United States),” November 2020.