UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 29, 2020

Dr. Robert N. Hill
National Technical Director
Advanced Nuclear Energy
Research & Development
Nuclear Science and Engineering Division
Argonne National Laboratory
9700 S. Cass Ave.
Lemont, IL 60439

SUBJECT: SAFETY EVALUATION REGARDING THE ARGONNE NATIONAL LABORATORY "QUALITY ASSURANCE PROGRAM PLAN FOR SODIUM FAST REACTOR METALLIC FUEL DATA QUALIFICATION" (EPID NO. L-2019-TOP-0023)

Dear Dr. Hill:

By letter dated May 30, 2019 (Agencywide Documents Access and Management System Accession No. ML19156A404), Argonne National Laboratory (ANL) submitted for U.S. Nuclear Regulatory Commission (NRC) staff review, "Quality Assurance Program Plan for SFR [Sodium Fast Reactor] Metallic Fuel Data Qualification." The NRC staff sent a request for additional information to ANL on September 26, 2019 (ADAMS Accession No. ML19263D296). By letter dated October 21, 2019 (ADAMS Accession No. ML19311C506), ANL submitted "Quality Assurance Program Plan for SFR Metallic Fuel Data Qualification ANL/NE 16-17" (Revision 2). The Quality Assurance and Vendor Inspection Branch (IQVB) staff completed its review and determined that ANL QAPP ANL/NE-16/17, Revision 2, satisfies the quality assurance requirements of Appendix B to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. The NRC staff documented its review in the enclosed safety evaluation (SE) which was previously provided to you for comments on March 3, 2020 (ADAMS Accession No. ML20054A297). The enclosed SE is final and will be made publicly available since ANL had no comments. If you have any questions, please contact Lucieann Vechioli at 301-415-6035.

Sincerely,

/RA/

Benjamin Beasley, Chief
Advanced Reactor Licensing Branch
Division of Advanced Reactors and Non-Power
Production and Utilization Facilities
Office of Nuclear Reactor Regulation

Enclosure:
Final SE

SUBJECT: SAFETY EVALUATION REGARDING THE ARGONNE NATIONAL LABORATORY QUALITY ASSURANCE PROGRAM PLAN FOR SODIUM FAST REACTOR METALLIC FUEL DATA QUALIFICATION (EPID NO. L-2019-TOP-0023) DATED: April 29, 2020

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ADAMS Accession No.: ML20106F242 ***via email** **NRR-106**

OFFICE	**NRR/DANU/UARL/PM***	**NRR/DANU/UARL/LA***	**NRR/DANU/UARL/BC***
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DATE	4/16/2020	4/13/2020	4/29/2020

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SAFETY EVALUATION BY THE OFFICE OF NUCLEAR REACTOR REGULATION

REGARDING THE ARGONNE NATIONAL LABORATORY

QUALITY ASSURANCE PROGRAM PLAN

ANL/NE-16/17, REVISION 2

EPID NO. L-2019-TOP-0023

1.0 INTRODUCTION

By letter dated October 21, 2019 (Agencywide Documents Access and Management System (ADAMS) Accession No. ML19311C506), the U.S. Department of Energy's (DOE's) Argonne National Laboratory (ANL, the applicant) submitted to the U.S. Nuclear Regulatory Commission (NRC) for review, a proposed Quality Assurance Program Plan (QAPP), ANL/NE-16/17, Revision 2. The purpose of the ANL's QAPP is to provide adequate quality assurance (QA) controls to validate key legacy nuclear fuel developmental information and plant data for use by potential developers of advanced reactor design applications. The information was generated, characterized, and summarized at historic DOE research and development facilities. The ANL legacy metallic fuel data qualification program collected, maintained, and qualified metallic fuel data generated through the Sodium Cooled Fast Reactor (SFR) program. The ANL will manage and establish the pedigree of the data and information in accordance with the QAPP.

The QAPP establishes a general process to determine the use of the historical information and legacy metallic fuel data for a future end user's licensing activities using the standards and QA requirements of the American Society of Mechanical Engineers (ASME) Nuclear Quality Assurance (NQA)-1-2008/2009 Standard, which the NRC staff has found as an acceptable method of meeting Appendix B, "Quality Assurance Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," to Title 10 of the *Code of Federal Regulations* (10 CFR) Part 50. The process will consist of evaluating the adequacy of the QA controls which initially developed the legacy metallic fuel data. This includes the methods used for collection, the input of the data, and the verification that data management systems QA requirements were met, per the specified quality standards. Specifically, the QAPP will be used to evaluate historic metallic fuel irradiation information in support of fuel qualification. The intended end users may then use the acceptable data to support licensing activities for advanced reactor designs that satisfy the NRC's nuclear plant licensing regulations.

The ANL QAPP validation process is based on the method provided in ASME's NQA-1-2008/2009, Part III, Subpart 3.3, Non-Mandatory Appendix 3.1, "Guidance on Qualification of Existing Data." The NRC does not evaluate Part III as Part of its acceptance review of the NQA-1 Standard, as documented in Regulatory Guide 1.28, "Quality Assurance Program Criteria (Design and Construction)." The ANL has stated that the QAPP is the top-level policy document that establishes the method in which quality is achieved for evaluating and controlling the SFR legacy fuel data. In accordance with ANL's QAPP, ANL has prepared software under a

Software Quality Assurance Plan (SQAP) in accordance with the requirements of NQA-1-2008, Part II, Subpart 2.7. The ANL has requested a formal NRC review of the QAPP for the SFR Metallic Fuel Data Qualification evaluation.

2.0 REGULATORY EVALUATION

The NRC's regulatory requirements related to applicant's QA programs are set forth in Appendix B, "Quality Assurance Program Criteria for Nuclear Power Plants and Fuel Reprocessing Plants," of 10 CFR Part 50, "Domestic Licensing of Production and Utilization Facilities."

Appendix B to 10 CFR 50 states:

> Every applicant for a construction permit is required by the provisions of § 50.34 to include in its preliminary safety analysis report a description of the quality assurance program to be applied to the design, fabrication, construction, and testing of the structures, systems, and components of the facility. Every applicant for an operating license is required to include, in its final safety analysis report, information pertaining to the managerial and administrative controls to be used to assure safe operation. Every applicant for a combined license under Part 52 of this chapter is required by the provisions of § 52.79 of this chapter to include in its final safety analysis report a description of the quality assurance applied to the design, and to be applied to the fabrication, construction, and testing of the structures, systems, and components of the facility and to the managerial and administrative controls to be used to assure safe operation. For applications submitted after September 27, 2007, every applicant for an early site permit under Part 52 of this chapter is required by the provisions of § 52.17 of this chapter to include in its site safety analysis report a description of the quality assurance program applied to site activities related to the design, fabrication, construction, and testing of the structures, systems, and components of a facility or facilities that may be constructed on the site. Every applicant for a design approval or design certification under Part 52 of this chapter is required by the provisions of 10 CFR 52.137 and 52.47, respectively, to include in its final safety analysis report a description of the quality assurance program applied to the design of the structures, systems, and components of the facility. Every applicant for a manufacturing license under Part 52 of this chapter is required by the provisions of 10 CFR 52.157 to include in its final safety analysis report a description of the quality assurance program applied to the design, and to be applied to the manufacture of, the structures, systems, and components of the reactor. Nuclear power plants and fuel reprocessing plants include structures, systems, and components that prevent or mitigate the consequences of postulated accidents that could cause undue risk to the health and safety of the public. This appendix establishes quality assurance requirements for the design, manufacture, construction, and operation of those structures, systems, and components. The pertinent requirements of this appendix apply to all activities affecting the safety-related functions of those structures, systems, and components; these activities include designing, purchasing, fabricating, handling, shipping, storing, cleaning, erecting, installing, inspecting, testing, operating, maintaining, repairing, refueling, and modifying.

The acceptance criteria associated with the relevant Commission's regulations for the QAP description are given in the Standard Review Plan (SRP) Section 17.5, "Quality Assurance Program Description - Design Certification, Early Site Permit and New License Applicants," of NUREG–0800, "Standard Review Plan for the Review of Safety Analysis Report for Nuclear Power Plants (LWR Edition)," Revision 1, dated August 2015 (ADAMS Accession No. ML15037A441). Although NUREG-0800 is guidance for the NRC staff related to the review of light-water reactor (LWR) applications, the quality assurance program guidance in Section 17.5 can also be applied to non-LWRs, as the guidance is not design specific.

3.0 EVALUATION

The NRC staff used SRP Section 17.5 to ensure that the relevant requirements of Appendix B to 10 CFR Part 50 were satisfied by the ANL QAPP. Additionally, the NRC staff verified that ANL's QAPP adequately incorporated, as requirements, the supplementary guidance outlined in NQA-1-2008, Part III, Subpart 3.3 Non-Mandatory Appendix 3.1, for qualification of existing data.

The NRC staff noted that Appendix 3.1 provides adequate guidance on the qualification of existing data, including data of indeterminate quality, for use in activities specified in Part I of NQA-1-2008/2009. The data qualification process includes data qualification planning, a controlled process for evaluating and establishing data quality, and documentation of the results of this process. Appendix 3.1 is comprised of four qualification methods including a) quality assurance program equivalency, b) data corroboration c) confirmatory testing and d) peer review. The NRC staff identified that ANL has incorporated the requirements of Appendix 3.1 in the QAPP. However, ANL chose to delete confirmatory testing as a method available for data validation. The NRC staff determined that using the three alternative methods provides adequate confidence for an evaluation process and may be used to support licensing activities for advanced reactor designs. Based on the above, the NRC staff finds that the applicant's QAPP meets the qualification of existing data requirements.

4.0 CONCLUSION

The NRC staff has completed its review of ANL's QAPP ANL/NE-16/17, Revision 2. The NRC staff determined that ANL QAPP ANL/NE-16/17, Revision 2 satisfies the quality assurance requirements of Appendix B to 10 CFR Part 50.

Principal Contributor: Nicholas Savwoir

Date: April 29, 2020