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

January 02, 2024

MEMORANDUM TO: Raymond V. Furstenau, Director
Office of Nuclear Regulatory Research

FROM: Milton Valentin, Acting Branch Chief ***/RA/***
Division of Risk Analysis
Office of Nuclear Regulatory Research

SUBJECT: MACHINE LEARNING FUTURE FOCUSED RESEARCH (FFR) PROJECT CLOSEOUT

This memo provides notice of the closeout of the Future Focused Research project titled, “Use of Machine Learning to Inform Inspection Planning.” This project performed a feasibility study on the use of off-the-shelf machine learning (ML) algorithms to identify the safety clusters among U.S. nuclear power plants. A safety cluster represents the incidents with similarity in the failure/degradation modes and causes of the structure, system, component, and instrumentation that could affect plant safety. The master list of incidents are the inspection findings for reactor safety from 1998 to 2022. This project analyzed both supervised and unsupervised ML.

NRC researchers and reactor oversight staff worked with a contractor to perform the analysis. The results showed (1) certain algorithms summarize inspection findings well that can be used by NRR reactor oversight program to reduce workload, and (2) ML has potential to identify safety clusters but requiring more analyses to evaluate the practicality. Results of this project are documented in the final project reports (ADAMS Accession Nos. ML23262B206 and ML23262B214). The staff presented the work in a RES seminar, an Advisory Committee of Reactor Safeguards subcommittee meeting (ADAMS Accession No. ML23361A167), and a GRS/IRSN/NRC Joint Workshop on AI & Nuclear Safety.

This FFR project has been featured as an important step for implementing the NRC’s Artificial Intelligence (AI) Strategic Plan Fiscal Years 2023-2027 and serving as a seed project for subsequent research activities.

Cc: Raymond Furstenau, RES
John Tappert, RES
Christian Araguas, RES
Mehdi Reisi-Fard, RES

CONTACT: Y. James Chang, RES/DRA/HFRB
301-415-2378