



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

September 18, 2024

MEMORANDUM TO:

Russell Felts, Director
Division of Reactor Oversight
Office of Nuclear Reactor Regulation

Meena Khanna, Director (Acting)
Division of Risk Assessment
Office of Nuclear Reactor Regulation

Jeremy Bowen, Director
Division of Advanced Reactors and Non-Power Production and
Utilization Facilities
Office of Nuclear Reactor Regulation

Tania Martinez Navedo, Director (Acting)
Division of Engineering and External Hazards
Office of Nuclear Reactor Regulation

FROM:

Brian Smith, Director
Division of Risk Analysis
Office of Nuclear Regulatory Research

A handwritten signature in black ink, appearing to read "Brian Smith".

Signed by Smith, Brian
on 09/18/24

Christian Araguas, Director
Division of Engineering
Office of Nuclear Regulatory Research

A handwritten signature in black ink, appearing to read "Christian Araguas".

Signed by Araguas, Christian
on 09/09/24

SUBJECT:

RESEARCH INFORMATION LETTER (RIL 2024-10)
"REGULATORY SIGNIFICANCE OF HALDEN HUMAN-
TECHNOLOGY-ORGANISATION PROJECT RESEARCH
ACTIVITIES FOR 2021-2023"

The Office of Nuclear Regulatory Research (RES) is providing for your information and use Research Information Letter (RIL) report, "Regulatory Significance of Halden Human-Technology-Organisation Project Research Activities for 2021-2023" (RIL 2024-10).

RIL 2024-10 summarizes the regulatory significance of research conducted during the 2021-2023 Programme period at the Organisation for Economic Co-operation and Development's (OECD) Nuclear Energy Agency's Halden Human-Technology-Organisation (HTO) Project

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(Halden HTO) and describes the collaboration with the U.S. Nuclear Regulatory Commission (NRC). This collaboration supports NRC's efficiency goals and preparedness in achieving performance-based, technology independent regulatory practice through cooperatively engaging with other countries in regulatory research information exchange and addressing critical gaps in the technical basis and regulatory criteria for advanced and new reactor designs. Key areas of focus include enhancing human-system interfaces, exploring cognitive performance in crew operations, developing guidelines to support the integration of new technologies into regulatory frameworks, and enabling performance-based safety assurance and evaluation of digital instrumentation and control systems. This report highlights specific research activities conducted by Halden HTO that have shaped NRC guidance documents, underscoring its role in addressing research gaps aimed at enhancing modern regulatory practices. By fostering dialogue and exchanging innovative approaches, this collaboration contributes significantly to nuclear safety and preparing for the challenges posed by future nuclear technologies.

RIL 2024-10 also describes how the NRC benefits directly from the research performed by the Halden HTO by supporting evidence-based, risk-informed regulatory decision making in a number of key areas. For instance, research topics informed the development of NRC documents related to the proposed 10 CFR Part 53 rulemaking (e.g., 10 CFR 53.730(c) proposed requirement to submit, as part of combined and operating license applications, a facility concept of operations). Additionally, the topics addressed represent key inputs to the formation of the technical basis underlying key regulatory guidance needed in preparation for reviews of advanced reactor applications (e.g., staffing (DRO-ISG-2023-02), scalable HFE review (DRO-ISG-2023-03) and updates to NUREG-0700 and NUREG-0711). Further, their digital instrumentation and control safety assurance research will enable performance-based assurance in a manner that is independent of the reactor technology. High levels of automation are an anticipated feature for advanced reactors and modernization of existing nuclear power plant control rooms. The Halden HTO research on advanced automation and automation failure enhances the technical basis for reviewing automation technologies in NPPs.

The development of this report was informed by the collective input of the technical staff collected during the program proposal and evaluation activities for the 2021-2023 research period which ensured inclusion of a variety of agency perspectives and that the research produced met agency needs. The human factors engineering (HFE) staff from RES' Division of Risk Analysis (DRA) coordinated with staff in RES' Division of Engineering (DE), the Office of Nuclear Reactor Regulation (NRR), and the Office of Nuclear Security and Incident Response (NSIR) to include technical perspectives spanning HFE, licensing, human reliability, digital instrumentation and control, and cybersecurity. This close coordination ensured that the research summaries and regulatory uses detailed in this report appropriately reflect the regulatory significance in the respective disciplines.

RES has worked closely with the staff in RES, NRR, and NSIR to ensure that the cognizant staff members from each organization were satisfied with the quality and completeness of the work products prior to transmittal of the final report. We expect that this close working relationship will continue. Staff have also coordinated closely with lead researchers at Halden HTO to ensure information in the report appropriately showcases the work of the organization and that future research continues to meet agency needs. We expect this to continue.

RES established an online quality survey to collect feedback from user offices on the usefulness of RES products and services. The Research Operating Plan System (ROPS) will send the

requesting office staff Point of Contact (POC) a link to complete the quality survey. The email will be from "RES OpPlan Admin RESOpPlanAdmin@nrc.gov" with the subject line "ROPS Work Request Survey". We would appreciate the recipient completing the survey within the next 5 working days to represent your Office's views of the completed product and services.

ENCLOSURE:

1. RIL 2024-10; "Regulatory Significance of Halden Human-Technology-Organisation (HTO) Project Research Activities for 2021-2023

Regulatory Significance of Halden Human-Technology-Organization Project Research Activities for 2021-2023 (RIL 2024-10) DATE September 18, 2024

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