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

June 7, 2018

MEMORANDUM TO: Chairman Svinicki
Commissioner Baran
Commissioner Burns
Commissioner Caputo
Commissioner Wright

FROM: Victor M. McCree ***/RA Daniel Dorman Acting for/***
Executive Director for Operations

SUBJECT: UPDATES ON STAFF ENGAGEMENT ON THE TENTATIVE DECISION TO DECOMMISSION THE HALDEN REACTOR

The purpose of this memorandum is to update the Commission on the status of the Halden research reactor. Specifically, this memorandum provides the most recent information received to date regarding the future of the reactor, which indicates a high likelihood that the reactor will not return to operation. In light of this information, this memorandum also provides the staff's planned path forward to address the expected shutdown and decommissioning of the reactor.

For 60 years, the U.S. Nuclear Regulatory Commission (NRC), and its predecessor, the Atomic Energy Commission, have participated in the Halden Reactor Project (HRP) in order to obtain the information necessary to validate confirmatory analytical tools, to establish safety criteria, and to gain an understanding of the implications of extending nuclear fuel use into higher power and higher burnup operation. The staff discusses the nature of the NRC's participation in the HRP and its benefits to the NRC in SECY-17-0113, "U.S. Nuclear Regulatory Commission Participation in the Halden Reactor Project during 2018–2020," dated November 14, 2017. Thirty-two organizations in 20 countries participate in and fund the HRP, which operates as a cooperative research project under the auspices of the Nuclear Energy Agency. Currently, each participating organization provides technical expertise to advance the research efforts of the HRP through participation in the Halden Program Group, a highly engaged technical community that scrutinizes test results, offers hypotheses to drive experimental investigations, and provides irradiated test material for use in the HRP. This highly leveraged program provides the NRC access to a substantial amount of valuable knowledge and data at a relatively low cost. Based on the established record of the program's value to nuclear safety research, the NRC staff supports the continued operation of the Halden research reactor.

Over the last few weeks, several communications have clarified the factors affecting an anticipated decision by the Norwegian Institute for Energy Technology (IFE) Board, which

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administers the HRP, to decommission the Halden reactor. These clarifications came from two engagements: (1) a meeting on May 25, 2018, between staff at the U.S. Embassy in Oslo and the Norwegian Ministry of Trade, Industry, and Fisheries (the relevant Norwegian ministry for the Halden reactor), and (2) a meeting on May 30, 2018, between Nuclear Energy Agency Director-General William Magwood and the Norwegian Minister of Industry, Trade, and Fisheries. Through these communications, it became clear that the Halden research reactor faces a number of significant technical and financial challenges and that there do not appear to be viable options for restart of the reactor. In light of this information, and absent changes in direction through continued consultation, the staff does not intend to pursue government-to-government efforts to communicate the U.S. interest in restarting the Halden research reactor beyond expressing support for continued operation during the Halden Management Board meeting on June 19, 2018. Instead of targeted efforts in support of the reactor's restart, the staff intends to shift the focus of its efforts toward mitigating potential impacts associated with the shutdown of the Halden reactor.

As noted in SECY-17-0113, the research planned for the 2018-2020 operations cycle of the HRP included tests and examinations that the staff intended to use to improve the NRC's Fuel Analysis under Steady-state and Transients fuel performance code, or FAST. Understanding that the U.S. nuclear industry is interested in pursuing more aggressive operating regimes for existing fuel designs, SECY-17-0113 also notes that the staff looked to the testing included in the HRP to provide an understanding of the implications of higher power and higher burnup operation. Finally, SECY-17-0113 notes that the HRP also included the testing of Accident Tolerant Fuel (ATF) claddings and fuel designs.

It is important to note that the agency's ATF Project Plan (Agencywide Documents Access and Management System (ADAMS) Accession No. ML17325B771) assumes that data supplied by vendors in their ATF applications (topical reports) will be sufficient for the staff to assess all confirmatory tools and methods needed for safety evaluations. This would eliminate the need for the staff to collect separate confirmatory data. This, however, presumes that the staff would be continually engaged as experimental programs are developed and conducted. Therefore, the staff will need to ensure that data acquired from test programs devised to replace Halden continue to meet regulatory requirements.

On May 21, 2018, the NRC staff met with representatives from the U.S. Department of Energy (DOE), Electric Power Research Institute (EPRI), and Nuclear Energy Institute (NEI) to discuss the information available at that time on the status of the Halden research reactor, each organization's actions in response to these developments, and the expected impacts of the reactor's potential closure on the fuel vendors, particularly to the development of ATF. At this meeting, EPRI and NEI expressed their strong support for continued reactor operation and conveyed that losing the Halden research reactor is expected to disrupt ATF development.

During the May 21 meeting, DOE indicated that it has asked each of the vendors who participate in the ATF program to provide DOE with detailed test plans that account for the shutdown of the Halden research reactor in June. DOE is currently planning to lead a workshop, tentatively proposed for July, to discuss potential alternatives for testing that will be impacted by the shutdown of the reactor. This workshop will inform DOE efforts to develop proposals to upgrade U.S. facilities to replace the capabilities lost by the reactor's closure. The NRC staff intends to participate in this workshop, under an addendum to a memorandum of understanding between DOE and the NRC on ATF (ADAMS Accession No. ML17130A815), to continue cooperation in support of the regulatory review of ATF designs and to obtain

information to assess the impact of the anticipated closure of the Halden research reactor on the ATF Project Plan.

Several of the capabilities available at Halden are currently not available anywhere else in the world. While not addressing the cost to other HRP participants, even if similar work could be performed elsewhere, the cost to the NRC for agency-specific research needs may be significantly higher unless new cost-sharing partnerships can be formed. The staff is starting to assess the feasibility and cost of performing work at other facilities. These costs will be considered when reevaluating the relative priority of the tasks being performed as part of the current HRP Program Plan and developing a mitigation plan.

The staff is also planning a number of other efforts in the event that a final decision is made to permanently close the Halden research reactor. The staff plans to work through the Halden Management Board to ensure an orderly closure of the HRP's fuels and materials-related work. The staff will work with the HRP to capture fuels and materials expertise and data developed over the last 60 years. The staff expects that work related to human factors and digital instrumentation and control, which is conducted under the HRP Man-Technology-Organization program, will continue even if the Halden reactor is decommissioned. However, it is not clear that the level of membership in a nonreactor-based joint program will be sufficient to support these areas. The staff plans to work with participating countries to encourage the continuation of the Man-Technology-Organization program. The staff also plans to work through the Halden Management Board to resolve project funding for 2018-2020 given the premature closure of the reactor. The staff also plans to continue cooperation with counterparts in France regarding development and operation of the Jules Horowitz Reactor.

The upcoming meeting of the Halden Management Board in Moscow on June 19, 2018, provides the next formal opportunity for engagement between NRC staff, the IFE, and other HRP participants. The insights and strategies described above will guide the staff's participation in that meeting. The staff understands that the IFE Board will make a final decision on the continued operation of the Halden research reactor at a meeting on June 27, 2018.

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