



THE SECRETARY OF THE NAVY
WASHINGTON, DC 20350-1000
THE DEPARTMENT OF ENERGY
NATIONAL NUCLEAR SECURITY ADMINISTRATION
WASHINGTON, DC 20585



July 24, 2018

The Honorable William M. "Mac" Thornberry
Chairman, Committee on Armed Services
House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

This letter is in response to Section 3115 of Public Law 115-91, the *National Defense Authorization Act for Fiscal Year 2018*. Section 3115 requested a report on the cost and timeline required to assess the feasibility, costs, and requirements for design of the VIRGINIA Class replacement nuclear powered attack submarine that would allow for the use of a low-enriched uranium (LEU) fueled reactor, if technically feasible, without changing the diameter of the submarine.

A pre-conceptual reactor plant study costing up to \$10 million over 18-24 months could be performed to assess the impact of LEU fuel on a nuclear powered attack submarine reactor plant. Such a study would be highly speculative because performance details for a requisite advanced fuel system have not been established, but the study could quantify some of the potential impacts and risks to the reactor plant characteristics and ship performance.

Development of a practical LEU fueled naval core is a difficult challenge, since there is nearly a five-fold decrease in fuel energy density inherent in reducing uranium enrichment from the current 93 percent to below 20 percent. Substantial technology development of an advanced naval fuel would be needed to increase uranium loading in naval reactors while simultaneously meeting performance requirements of U.S. Navy warships.

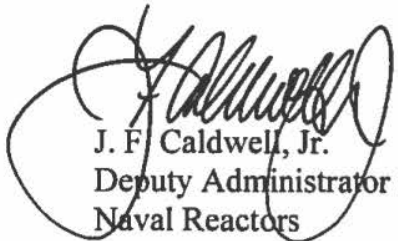
At present, such an advanced fuel remains an unproven concept. The Navy's 30-Year Shipbuilding Plan, issued in February 2018, includes plans for shipbuilding authorization in the 2030s for a new fast-attack submarine class to follow the VIRGINIA Class. To support this schedule, initial ship concept design studies would need to occur no later than the mid 2020s, nearly a decade before sufficient advanced fuel information could be available to support reactor design efforts. Naval Reactors provided a report to Congress in July 2016 outlining a 15-year test and development effort that would need to be done to support initiating a reactor design using advanced fuel.

Naval Reactors continues low level research and development efforts on advanced fuel concepts within base technology efforts, consistent with the mission to deliver reactor advancements to meet increasing Navy capability needs. Such fuel advancements could be applied to either high or low enriched uranium fuels. Advanced fuel with greater uranium loading could provide several benefits, including smaller and more capable reactors at current enrichment levels, and a development path toward meeting U.S. Navy warfighting requirements at lower fuel enrichment levels. Advanced fuel could conceivably be used in a future ship beyond the next submarine design if sufficient funding were made available for development.


Research and development on fuel systems over the course of Naval Reactors' history has enabled the Navy to go from reactor cores that lasted only 18 months to reactor core lifetimes of over 40 years. We are committed to designing better fuel systems that will meet the needs of the future fleet, and we will keep Congress informed of these efforts as they progress.

A similar letter has been sent to Chairmen Rogers, McCain, and Fischer. If you have any questions, please contact Mr. Neil Lapointe, Naval Reactors Deputy Director of Governmental Affairs, at (202) 781-5805.

Sincerely,



J. F. Caldwell, Jr.
Deputy Administrator for
Naval Reactors



Richard V. Spencer
Secretary of the Navy

Copy to:
The Honorable Adam Smith
Ranking Member