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Sent: Thursday, June 11, 2020 5:17 PM
To: AdvancedReactors-GEIS Resource
Subject: [External_Sender] Docket ID NRC-2020-0101

Introduction

The NRC's efforts to develop a GEIS for advanced nuclear reactors are very appreciated. In response to Docket ID NRC-2020-0101, I would like to express my hope that the NRC consider allowing for modification of general PPE parameters to give credit to applicant's whose reactor concepts (or specific applications) may have environmental advantages in their fuel cycle -- advantages that may not otherwise be accounted for by focusing only on the size of a reactor (30 MWth, which would use little or no water) or the site of the reactor. A few examples might be:

An applicant's reactor has an environmentally-friendly front-end of their fuel cycle.

Reducing the requirements for a front-end of the fuel cycle is significant to environmental protection, and should be credited to an applicant. For example, a reactor fueled only by thorium or depleted uranium (from stockpiles) would have no mining, milling, conversion, or enrichment requirements. Similarly, a liquid-fueled reactor would have no significant fuel fabrication. Or a HALEU-fueled reactor that downblends existing HEU instead of requiring new production. The environmental benefits compared to a traditional LWR (less mining/tailings, less CO2 emissions, less transportation risks, etc.) don't occur at the reactor site. To credit an applicant pursuing an environmentally-friendly fuel cycle, the PPE parameters could be, say, tripled. For a site that has a GEIS for a 30 MWth molten salt reactor consuming LEU (MSR base case), perhaps the NRC should allow an applicant pursuing a reactor with an environmentally-friendly fuel cycle to build, say, a 90 MWth reactor.

An applicant's reactor has a closed back-end of its fuel cycle.

Similar to the previous comment, a reactor with a small and/or short-lived waste stream should be allowed to use the GEIS with expanded PPE parameters.

An applicant's reactor helps close the back-end of the LWR fuel cycle.

There are over 80,000 metric tonnes of SNF in the country, and no national high-level waste repository. Many states forbid the construction of emission-free nuclear plants based on this fact. This is a major environmental concern. If an applicant is seeking to take SNF from dry cask storage, perform separations work, and fission most or all of the long-lived transuranics (leaving only short-lived fission products), credit should be given to the applicant by allowing use of a GEIS and, say, tripling the PPE parameters.

An applicant's reactor helps solve a national security risk.

A reactor may run on HALEU, which would ordinary new fuel production. But perhaps an applicant pursuing a certain sodium fast reactor would work with DOE to downblend existing HEU. If lifetime reactor operation did not result in significant production of weapons-grade plutonium, the net effect would be a reduction in the country's inventory of unwanted weapons material. This benefit, though not directly environmental in nature, could be credited to the applicant by, say, doubling the PPE parameters of the general sodium fast reactor case.

Summary

In summary, I believe it is appropriate for the NRC to credit the overall environmental benefits of an applicant's fuel cycle by multiplying the PPE parameters. This approach would accelerate deployment of nuclear reactors by 1) encouraging innovation by reactor designers, 2) decreasing risk to potential investors interested in advanced fuel cycles, and 3) expand the use of traditional LWRs by encouraging licensing of complementary advanced reactors.

Quantifying the exact multipliers could be left to the applicant. It may be reasonable for the NRC to allow an applicant to submit a proposal similar to:

"The GEIS for this site has a PPE table for an advanced LWR SMR, allowing for up to 30 MWth. Our application consists of a reactor and application whose fuel cycle has benefits that justify expanding the existing GEIS by multiplying one or more of the PPE parameters by the following factors:

Check if "yes"	Advantage	Factor
x	No mining/milling	1.5
x	No conversion	1.5
x	No enrichment (and DUF6 deconversion)	1.5
	No Solid Fuel Fabrication	1.5
	Produces a small quantity of radioactive waste	1.7321
	Produces only short-lived radioactive waste	1.7321
	Extracts and consumes TRU from LWR SNF	3.0
	Solves a national	2.0

	security issue identified by the NNSA	
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"Therefore, we request that the NRC allow the general PPE factors in the GEIS to be multiplied by $1.5 \times 1.5 \times 1.5 = 3.375$, e.g., the GEIS be applicable to our reactor and application for up to $30 \text{ MWth} \times 3.375 = 101.25 \text{ MWth}$."

Though the exact implementation of this concept could be refined, I hope my comment is well-received. Thank you again for your efforts and consideration of my comment.

Kurt Harris, PhD
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