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NUCLEAR ENERGY INSTITUTE

December 20, 2021

The Honorable Jennifer Granholm
Secretary of Energy
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Updated Need for High-Assay Low Enriched Uranium

Dear Secretary Granholm:

The Nuclear Energy Institute appreciates the Department of Energy's (DOE) leadership and commitment to helping preserve and strengthen the civil nuclear energy sector. The Department's support for the development of innovative technologies, including the next generation of advanced reactors, and advanced fuels for the existing fleet of reactors, will help ensure that nuclear power continues to bolster America's national security by providing the dominant source of resilient, carbon-free power in the United States. In particular, the industry appreciates the steps the Department took last year with the awards under the Advanced Reactor Demonstration Program and the robust fiscal year 2022 budget request.

The existing fleet of reactors in the United States runs on uranium fuel that is enriched up to 5% Uranium-235. Many advanced reactor designs and at least one advanced fuel design for the existing fleet require High-Assay Low Enriched Uranium (HALEU). Unfortunately, the current commercial nuclear fuel suppliers, with the exception of Russia, are unable to produce uranium enriched between 10 and 20%.

The U.S. industry is very concerned that a sufficient domestic commercial supply of enriched uranium between 10 and 20% will not be available to support the development, demonstration, and deployment plans for advanced reactors. We appreciate the investment that Congress and the Department of Energy have made in demonstrating U.S. enrichment technology. However, the resulting pilot facility, which will be completed in 2022, will be capable of only producing less than a metric ton of HALEU per year which is well below the requirements of the industry as discussed below. Without an assured supply of HALEU that includes more than one supplier, the commercialization of many advanced nuclear technologies is in jeopardy. At the same time, the necessary commercial investment into a domestic HALEU fuel infrastructure is highly unlikely given the market uncertainty. As a result, the U.S. advanced reactor industry must rely on international suppliers until a commercial scale domestic enrichment capability is established.

NEI has surveyed advanced reactor developers and fuel designers that plan to utilize HALEU to identify their annual needs to 2035. The attached table provides this data. This is an update to the needs assessment that was provided to Secretary Brouillette on July 23, 2020. An earlier needs assessment was provided to Secretary Perry on July 5, 2018. This update was prompted by the significant increase in market interest for advanced reactors including the projects announced under all three pathways of the Advanced Reactor Demonstration Program in late 2020 as well as other privately funded projects. The names of the companies and the specific reactor designs have been withheld. This table does not necessarily represent the needs of all developers utilizing HALEU, and it does not include the uranium needs for those companies and utilities that will utilize uranium enriched between 5% and 10%. The developers represented in the table cover a range of advanced reactor technologies and a range of reactor sizes from a few Megawatt-electric to hundreds of Megawatt-electric and includes deployments in the U.S. and Canada. While the reported data is based on each developer's projection, the diversity of designs, applications, and markets provides confidence that there is minimal overlap in the developer's potential customer base. Although the annual HALEU needs may seem rather large by 2035, it is fraction of the approximately 2,000 metric tons of uranium used annually by the existing fleet in the United States. As a result, it is challenging to establish a domestic commercial supply of HALEU in the near term. However, without fuel supply certainty and a HALEU supply chain that's not reliant on a single international supplier, many advanced reactor designs and advanced fuels are at risk.

The federal government is in a key position to de-risk and accelerate the development of HALEU infrastructure in the U.S. by incentivizing the licensing, construction, and deployment of commercial HALEU enrichment facilities, through a competitive procurement process. While the domestic infrastructure is being established, the DOE and other government agencies should not impede the acquisition of HALEU from international suppliers. Some of the advanced reactor projects underway will be delayed without access to the international market.

NEI appreciates the Department's attention to this urgent issue, and we will continue to work with the Department to ensure that the advanced reactor developers and advanced fuel designers have the fuel that they need when they need it. Please get in touch with me or Everett Redmond (elr@nei.org; 202-361-1876) if you need more information.

Sincerely yours,

Maria Korsnick

Maria Korsnick

Attachment

c: The Hon. David Turk, U.S. Department of Energy
Dr. Katherine Huff, U.S. Department of Energy

December 20, 2021 **Attachment**

Estimated Annual Requirements for High Assay Low Enriched Uranium to 2035 (MTU/yr)

Company	A	B	C	D	E	F	G	H	I	J	Total	Cumulative
Year												
2022	0.1	0.4					0.2		1.1	0.0	1.8	1.8
2023	0.1	3.1							4.4	0.1	7.7	9.5
2024	1.0	5.6	0.2	3.0			1.5		6.6	0.1	18.0	27.5
2025	1.0	3.8	0.4	3.0		5.0			11.0	1.6	25.8	53.3
2026	1.0	15.1		4.9		10.0	2.0	24.2	13.2	1.7	72.1	125.4
2027	1.0	26.5		7.9			4.0	24.2	13.2	1.9	78.7	204.1
2028	1.0	37.8		16.6		13.0	23.0	24.2	13.2	2.0	130.8	334.9
2029	1.0	26.3	1.8	30.5	17.0	18.0	14.0	24.2	16.5	2.4	151.7	486.6
2030	1.0	34.4	1.8	40.4	46.0	18.0	30.0	24.2	16.5	2.7	215.0	701.6
2031	23.0	42.5	6.2	53.0	29.0	22.0	33.0	24.2	16.5	2.9	252.3	954.0
2032	35.0	52.9	12.5	67.6	46.0	40.0	50.0	48.4	19.8	3.1	375.3	1329.2
2033	47.0	63.5	32.2	82.1	46.0	32.0	80.0	48.4	19.8	3.2	454.2	1783.4
2034	58.0	76.1	62.4	96.7	46.0	36.0	80.0	48.4	19.8	3.7	527.1	2310.5
2035	70.0	90.9	96.0	112.4	91.0	29.0	50.0	48.4	22.0	4.1	613.8	2924.3

Notes:

- The material needs listed above are in metric tons of uranium per year and are a small amount compared to the approximately 2000 MTU used annually by the existing fleet of reactors.
- The material needs listed above include enrichments between 10.9 and 19.75% U-235.
- The year the material is needed is for fuel fabrication. Insertion in the reactor and reactor operations will occur in a later year.
- The material needs that are less than 1 MTU/year are for irradiation samples, lead test rods and lead test fuel assemblies.
- The material needs represent a few scenarios
    - The deployment of an advanced fuel design for the existing fleet of light-water reactors.
    - The deployment of multiple reactors of the same design that will not require refueling for many years.
    - The deployment of reactors that have annual refueling requirements.
- These reactors include a range of sizes from a few Megawatt electric to 100s of Megawatt electric.
- The data above does not include utilities that are considering enrichment between 5% and 10%.