I am totally against nuclear microreactors. I listened to an Alaska Community Action on Toxics webinar on Nuclear Microreactors. Dr. Edwin Lyman, PHD, Director of Nuclear Power Safety in Washington DC gave part of the presentation. These are the points he made:

* There is currently no one with relevant experience in the industry on decommissioning a first of a kind reactor envisioned for this site and environment or what costs could come with it thirty (30) years from contract award.

* Where is the nuclear waste going to go? The Eielson RFP will require the vendor to remove it. This means the vendor will have to have the means to transport the spent fuel and a license for a spent fuel storage facility somewhere else.

* Industry history with nuclear 'first of its kind' technology is costly and characterized by time overruns. The RFP lays the risk entirely and solely on the bidders. There is no shared risk. There is no collaboration or partnership. It could be a company killer and industry setback.

* Vendors must supply their own emergency personnel. "Emergency services can be provided during construction, however, nuclear power incident response is currently outside of Eielson AFB's capability to provide. The Lessee shall pay for incident response outside of services furnished by the Government."

* Vendors Can't recover cost overruns: "As currently written, the inability to recover capital or construction costs over the first seven (7) year period of the contract creates two competitive issues: With no ability to recover what will be a significant capital cost for reactor construction during the construction period, these costs shift to the operational portion of the contract and as such, result in Megawatt and Kilowatt Hour costs that will far exceed comparative energy sources like natural gas or coal."

* It is simply infeasible for microreactors to have the kinds of containment structures that could effectively resist elevated accident pressures and temperatures and prevent releases of radionuclides into the environment. Instead, the NRC will likely approve so-called "functional containments" – for example, by giving credit for the accident resistance of TRISO fuel. However, TRISO fuel is not nearly as indestructible as some claim it to be, and it has not been fully qualified: Radionuclide release increases rapidly as temperature exceeds 1600 degrees Celsius. Fuel cannot come into contact with air or water.

* Small isn't always safer. Even if the amount of radioactivity is relatively small, the impact of a microreactor accident could be disproportionately large if there are few barriers to release of radiation. "For microreactors… the intent is to be placed near populations centers or with a significantly reduced Exclusion Area Boundary. These configurations may lead to higher offsite consequences associated with the potentially smaller releases" – A. Huning.D. Shropshire, and E. Kurt, "Oak Ridge National Laboratory Progress Report on Microreactor Functional Containment Economics." September 2022.

* Microreactor developers seek credit for assumed inherent safety features to justify relief from current requirements so capital and operating costs can be cut: No physical containment

structure. Siting close to populated areas (necessary if steam heat will be provided). Elimination of off-site radiological emergency planning; reduction or elimination of security officers; Reduction or elimination of operators; no safety-related (highly reliable) backup electrical power. Reduction in scope and detail of environmental reviews.

* Microreactors are only in the experimental state: None of the claims regarding safety and reliability have been demonstrated yet. Alaska will be an experimental test bed for these facilities.

* Microreactor fuel is expensive and not readily available: High assay low-enriched uranium is currently not produced in the large quantities (hundreds to thousands of kilograms) needed for microreactors; It is also more useful for making nuclear weapons than the low-enriched uranium used by current-generation reactors. TRISO fuel cost could be greater than $30,000 per kilogram. This means the fuel load alone could cost $15 million for a 2MW reactor. Fast microreactor fuel fabrication capabilities do not currently exist.

* Microreactors do not displace as much carbon as large reactors: Nuclear reactors do not emit carbon when generating electricity, but uranium mining, milling, and enrichment do. Since microreactors require more natural uranium and enrichment that large reactors, their fuel cycle emits more carbon per kilowatt hour. Depending on where and how the uranium is mined, the fuel cycle for a fast microreactor could emit as much carbon per kilowatt-hour as natural gas.

* Microreactors waste uranium: A typical thermal microreactor will require more than three times as much mined uranium to generate 1 kilowatt-hour of electricity. A fast microreactor could require 25 times as much uranium to generate 1 KW-hour. Thus microreactors will have much greater impacts on the environment from increased uranium requirements.

* Microreactors are inefficient: Nuclear reactors have grown in size over the decades because of economies of scale – larger reactors produce lower-cost electricity. Microreactors go against that principle in a big way. To prevent costs from going through the roof, they seek to cut capital and operating expenses drastically with major safety and security implications.

* Types of microreactors: “Thermal spectrum” microreactors: have a “moderator” material such as graphite that slows down neutrons. BWXT “Project Pete” (1-5 MWe) uses TRISO fuel containing uranium nitride. U-Batter (cancelled in March 2023). “Fast spectrum” microreactors – no moderator. – Oklo, Inc. Aurora (1.5-15 MWe) uses a metallic uranium fuel. Both types require high-assay low-enriched uranium containing close to 20 percent uranium-235, compared to less than 5 percent in conventional reactor fuel. Eielson AFB request for proposals all or either type.

* Microreactors make no sense from safety, economic, security, or environmental perspectives.

* Microreactors are nuclear reactors with a capacity of up to 20 MW of electricity, compared to 1000 MW for typical commercial reactors. Some claim microreactors can solve some of nuclear power’s problems – “Passive” safety, less radioactive material that can be dispersed= less risk to the public, “proliferation-resistant”.

* Nuclear energy is a low-carbon technology, but it poses significant risks: Safety (Fukushima) – US risk of core melt about 1%/yr, Risk from severe natural events (earthquakes, floods). Security – Radiological terrorism (reactor sabotage), military attacks (Ukraine), misuse of facilities or materials to make nuclear bombs. Environment – Impact of uranium mining and milling. No solution for disposal or spent nuclear fuel.