TESTIMONY BEFORE THE OHIO HOUSE ENERGY AND NATURAL RESOURSE COMMITTEE HOUSE BILL 104

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PROPONENT TESTIMONY OF WILLIAM H. THESLING PH.D.

Thank you, Chairman Stephens, Vice-Chair Stewart, Ranking Member Weinstein, and members of the Committee, for the opportunity to provide testimony on HB434.

My Name is Dr. William Thesling. I have lived in Ohio my entire life. I have a doctorate in Electrical Engineering from Cleveland State University. I am a co-founder of Efficient Channel Coding Inc. and am an author or co-author on over 30 patents. I am a serial entrepreneur and strongly believe innovation is the key to a better future.

A goal of House Bill 434 is to make Ohio a leading state in Advanced Nuclear Technology Research, Development, and Commercialization. This has some enormous long-term benefits for Ohio as a manufacturing State.

- There has been much advancement in materials technology, digital controls, sensors, instrumentation, and computer modeling over the past several decades.
- These advancements in technology have allowed us to revisit old technologies that were previously considered to be not viable.
- Nowhere is revisiting an old technology more compelling than Molten Salt Reactor Technology that was abandoned in the early 1970's largely for political reasons. This technology was demonstrated in a working reactor at Oak Ridge National Laboratory for four years in the late sixties and the next step was to develop a demonstration reactor but was abandoned.
- Molten Salt Reactor technology represents a very different reactor architecture from the prevalent Light Water Reactor design that has been in use for decades. MSR technology was specifically developed to do the impossible – power an aircraft and give it unlimited range. There exists a strong set of reasons to pursue MSR technology for Energy production, but today I want to touch on a different aspect of MSR technology.
- There are some 40,000 medical imaging procedures performed in the US each day. (https://www.bnl.gov/newsroom/news.php?a=24796) These imaging procedures us a radioactive isomer of Technetium, called Technetium-99m. This substance comes from Molybdenum-99, a radioactive element created by the fission of Uranium-235. The production of Moly-99 largely takes place in aging reactors outside the USA and is flown in and distributed weekly. The half-life Moly-99 is only about 66 hours and must be replenished weekly. Cardinal Health (an Ohio company) operates the largest radiopharmaceutical network in the United States replenishes and distributes Technetium generators to hospitals.
- Supply disruptions have occurred in the recent past as these aging reactors go offline.

- These reactors produce Moly-99 fairly efficiently by way of the use of highly enriched uranium (HEU). However, the US has looked to eliminate the use of HEU in the production of Moly-99 over proliferation concerns.

- As a result, new techniques of producing Moly-99 (Shine Technologies) have been developed that do not use HEU. These new methods produce far less Moly-99 and at a greater cost. (China & Russia) don't eliminate the use of HEU in Moly-99 production and thus can produce Moly-99 much more cost competitively.

- Now, all Fission reactors produce copious amount of Moly-99, but there is no practical way to extract it from an operating reactor. However, the MSR is different in this regard. Such reactors have liquid cores operating at atmospheric pressure. This makes the extraction of Moly-99 much more practical, and at low cost. It should result in the lowest cost Moly-99 production method, lower than the use of HEU in research reactors as is presently done.

- This is just one huge advantage of using MSR technology in the medical field.

- Another promising aspect of MSR technology is its support for targeted alpha therapy. Radioactive substances that emit alpha particles upon decay can be attached to a monoclonal antibody. Alpha particle radiation has the property that the energy emitted is easily absorbed by human tissue. Inside the human body, this energy is absorbed within a few cell diameters. Using the monoclonal antibody to bring the alpha emitter in contact with cancer cells results in a "smart bomb" that kills the cancer cells, and very little healthy tissue. The difficulty has been in finding a radioactive isotope that alpha decays with the right energy and half-life that also doesn't further decay resulting in a toxic element in the human body. Actinium-225 is such an isotope. Creating Actinium-225, even in enough quantity for medical trials, has been a challenge. However, molten salt reactors that use Thorium as their fuel source produce relatively large quantities of Actinium-225. This would be an ideal treatment for many cancers, especially dispersed cancers such as leukemia (https://www.actiniumpharma.com)

The inherently lower costs along with multiple applications of advanced nuclear technology, particularly molten salt reactor technology, promises enormous benefits for humanity. The country (& State) that develops and brings these technologies to market first could be future "Silicon Valley" of nuclear technology. HB434 represents minimal risks for the state of Ohio and promotes the free-market to act as an agent of innovation within the nuclear sphere once again.

Thank you very much.

William H. Thesling Ph.D.