



Eden Isotope Production Complex Construction Permit Application

Enclosure 8: Request for Confirmation of Eligibility for Reduced Hourly Rate

Enclosure 8

Eden Radioisotopes, LLC Application for a Construction Permit

Request for Confirmation of Eligibility for Reduced Hourly Rate

BACKGROUND

On September 18, 2025, Eden submitted a letter (ML25261A104) to the NRC documenting Eden's eligibility for the Reduced Hourly Rate and provided numerous examples of how the Eden facility met the criteria of a "Qualifying Application," as described further below.

As noted in the Fee Rule, "the NRC is defining the term 'qualifying application' in § 170.3, 'Definitions,' as an application that "is for an advanced nuclear reactor as defined in section 3 of NEIMA (42 U.S.C. 2215 note) . . ."

In turn, Section 3 of NEIMA defines "advanced nuclear reactor" as follows:

a nuclear fission or fusion reactor . . . with significant improvements compared to commercial nuclear reactors under construction as of the date of enactment of this Act (January 14, 2019), including improvements such as-

- (A) additional inherent safety features; (emphasis added)
- (B) significantly lower levelized cost of electricity;
- (C) lower waste yields; (emphasis added)
- (D) greater fuel utilization; (emphasis added)
- (E) enhanced reliability;
- (F) increased proliferation resistance; (emphasis added)
- (G) increased thermal efficiency; or
- (H) ability to integrate into electric and nonelectric applications. (emphasis added)

Importantly, the Commission explained in the Statements of Consideration for the FY 2025 Fee Rule that:

consistent with the text of NEIMA, the NRC intends to *broadly apply* the term "advanced nuclear reactor" to a *wide variety of technologies* for the purposes of determining eligibility for the Reduced Hourly Rate.

2025 Fee Rule, 90 FR 26743 (emphasis added).

The Eden letter further presented a series of examples of what Eden considered to be “significant improvements” from earlier designs as defined in Section 3 of NEIMA.

On March 4, 2026, NRC responded to Eden’s request via letter (ML 26005A244) concluding the following:

Based upon the information provided to the NRC to date, Eden has not demonstrated that its proposed reactor for the Eden Isotope Production Complex meets the criteria outlined in section 201 of the ADVANCE Act. Specifically, while Eden’s proposed reactor would use some innovative operational approaches for isotope production, based on the information provided to the NRC to date, the reactor design would primarily utilize nuclear technologies existing and in use in reactors under construction or already constructed as of January 14, 2019.

Therefore, the NRC staff cannot find that Eden qualifies for the reduced hourly rate at this time. If Eden submits additional information or an application to the NRC, Eden may request a subsequent determination at that time to determine whether Eden may be eligible for the reduced hourly rate.

PURPOSE

This enclosure, along with corresponding details in the Preliminary Safety Analysis Report (PSAR) included with Eden’s Construction Permit Application (CPA), provides additional clarifying information demonstrating that the NRC’s licensing fees associated with its review of the CPA for the Eden Isotope Production Complex (EIPC) should be calculated using the reduced hourly rate specified in 10 C.F.R. § 170.20(b). Eden is an “advanced nuclear reactor applicant” and the CPA is a “qualifying application,” as those terms are defined in 10 C.F.R. § 170.3, because the proposed reactor meets the definition of an “advanced nuclear reactor” in section 3 of NEIMA—a definition which the NRC committed to “broadly apply.”

The purpose of the EIPC is to produce urgently needed medical isotopes, which are in short supply around the globe and produced primarily in foreign countries. As a domestic medical isotope production facility, the EIPC will enhance both national security and public health.

There are many reasons why the reactor described in the CPA is unique and encompasses “significant improvements,” as that term is used in NEIMA, compared to the existing world-wide medical isotope commercial nuclear reactors under construction as of the date of enactment of the Act (January 14, 2019).

One of the most dominant attributes of Eden’s innovation is that the complete production scheme in the EIPC has been optimized, in both design and operation, to produce the complete spectrum of nuclear reactor-produced medical radioisotopes for primarily the US healthcare system without the use of driver fuel and the resulting used fuel waste stream as well as a reduction in

transportation of radionuclides. These attributes correspond to multiple criteria in the NEIMA definition of “advanced reactor,” as further detailed below.

The Eden Medical Isotope Facility (EMIF), which is the nuclear facility at the EIPC, integrates the “All-Target Reactor” Facility and Hot Cell (processing) Facility together into a single building, which allows for the efficient production of the fission produced isotopes, Mo-99, I-131, and Xe-133, and activation isotopes, like Lu-177, Cu-64, and Tb-161 without having to ship highly-radioactive irradiated materials to another location for bulk processing and purification. Congress expressly recognized integration capabilities—in other words, co-locating the reactor with the commercial purpose it is intended to serve—as a key feature of an “advanced nuclear reactor.” (NEIMA 3(H)). Importantly, it did not limit this criterion to power reactors or integration into electric applications; NEIMA’s text acknowledges integration into “nonelectric applications,” such as medical isotope processing facilities, as well.

Eden not only will be able to produce these isotopes but produce them concurrently in significant bulk quantities. The EIPC will enable reliable, concurrent access to Mo-99 and Lu-177, which are essential for diagnostic and cancer treatment. When operational, the facility will support over 40 million global diagnostic procedures annually.

The Eden All-Target Reactor was intentionally designed to optimize the production of fission-generated Mo-99 and at the same time produce the medical activation isotopes in bulk quantities without generating spent fuel. The analysis below documents these unique innovations .

The conclusions demonstrate that the Eden All-Target Reactor entails significant improvements compared to any other medical isotope reactor that was constructed prior to, or was under construction as of, January 14, 2019.

INTRODUCTION

The most widely used and in-demand medical radioisotope throughout the world is Tc-99m, the daughter radioisotope produced by the decay of Mo-99. Tc-99m is primarily used for diagnostic imaging to determine blood flow through the heart and organ functionality. Approximately 40,000 Single Photon Emission Computed Tomography (SPECT) diagnostic procedures are performed daily in the US alone using Tc-99m. The US demand for Tc-99m/Mo-99 is approximately half of the world demand. Fission produced Mo-99 is shipped as a bulk material from a nuclear reactor/hot cell facility to a generator company where it is loaded onto a shielded generator column and shipped to a radiopharmacy. At the radiopharmacy, the Tc-99m produced in the decay of Mo-99 is washed from the column and prepared as a dose for the patient. The Mo-99 has a half-life of 2.75 days and the Tc-99m has a half-life of 6 hours, so the supply chain logistics are critical. A delay in shipping or processing of one day will result in a 22 percent (%) loss of the Mo-99 product. After about 10 days, the Mo-99 generator is at the end of its useful life producing product.

One of the fundamental reasons that Eden’s design reflects a “significant improvement” over technologies in use as of January 2019 is that none of the reactor facilities that are currently operational throughout the world to produce medical isotopes were *designed or envisioned* for

that specific purpose. Not surprisingly, these existing reactors are very inefficient and have high waste yields. All the reactors that produce medical radioisotopes are government owned and subsidized. All these reactors are old and are prone to having unplanned outages. All these reactors are located overseas. All these reactors run at tens of megawatts, they all use significant quantities of high-assay low-enriched uranium (HALEU) fuel (some use highly-enriched uranium [HEU] fuel), and they all generate a significant quantity of spent fuel. Some of the HALEU fuel that is used to power these reactors comes from the US. None of the European reactors have collocated hot cell facilities to process and purify the Mo-99 product. All these reactors have other research missions that constantly compete with medical isotope production. All these factors combined make full cost recovery of Mo-99 for these facilities virtually impossible, unless the bulk market price were to increase significantly, like a factor of two or more.

There are no commercially owned reactors that make Mo-99. There are no reactors in North America that can make high specific activity fission Mo-99. When the EIPC becomes operational in New Mexico, the US will have the world's first integrated and optimized reactor facility and hot cell facility dedicated to the commercial production of the full spectrum of reactor produced medical isotopes having the advantage of optimized fuel utilization with lower waste yields. When that happens, Eden will become the technology leader in providing a stable supply of these critical medical isotopes to the US healthcare system and to the world when needed. And because Eden's reactor *was* purposefully designed for the specific task of generating medical isotopes, it has significantly lower waste yields, greater fuel utilization, and increased proliferation resistance—improvements cognizable under NEIMA's definition of "advanced nuclear reactor"—compared to the general use reactors currently in operation, which are summarized below.

ISOTOPE PRODUCTION REACTORS ASSOCIATED WITH MO-99 PRODUCTION

The few reactors that currently make the world demand for fission Mo-99 are located in Europe, Australia, and South Africa.

Europe

There are four reactors that can produce fission Mo-99 in Europe, two of which operate on a standby backup basis. These reactors are:

1. High Flux Reactor (HFR), Netherlands, 45 MWt, 65 years old, 41% world demand,
2. LVR-15, Czech Republic, 10 MWt, 39 years old, 9% world demand,
3. BR-2, Belgium, 70 MWt, 65 years old, backup supplier,
4. Maria, Poland, 30 MWt, 52 years old, backup supplier.

The two operational reactors (HFR and LVR-15) produce 50% of the world demand for Mo-99. The two backup supply reactors (BR-2 and Maria) operate with a much smaller capacity factor but can produce 49% of the world demand when needed.

It is important to note that all these reactors operate at much higher power levels than the Eden All-Target Reactor, by as much as a factor of 40. Also note that none of these reactors have hot cell processing facilities onsite. Over the road shipments of the highly radioactive irradiated targets must be made at distances of up to 800 miles, which further complicates the supply chain logistics and increases the safety considerations as compared to Eden’s reactor, which has the “ability to integrate into” a co-located hot cell facility (NEIMA 3(H)). After the Mo-99 is processed, the uranium, fission products, and transuranics must be disposed of as a separate waste stream at these remote processing facilities. Safety considerations are significant as the waste must be prepared and shipped to the ultimate disposal site. The driver fuel for the reactors must be disposed of through a separate waste stream with additional shipping requirements for spent fuel. The final shipment of product from Europe to the US (Missouri or Massachusetts) must include two ground shipments to and from the airports, and an overseas air shipment on a commercial passenger airliner, which also increases the safety considerations during transit.

Australia

The Opal reactor in Australia produces 23% of the world demand for Mo-99. It operates at 20 MWt and is 19 years old. It has a collocated hot cell facility. Irradiated targets must be moved to the hot cell facility by an internal shield cask. Its power level is a factor of 10 larger than the Eden All-Target Reactor, and the Mo-99 product shipment requires more than two days to reach the US, with more than half of the product lost by decay.

South Africa

The Safari reactor in South Africa produces 26% of the world demand for Mo-99. It operates at 20 MWt and is 61 years old. It has a collocated hot cell facility. Irradiated targets must be moved to the hot cell facility by an internal shield cask. Similar to the Opal reactor in Australia, its power level is a factor of 10 larger than the Eden All-Target Reactor, and the Mo-99 product shipment requires more than two days to reach the US, with more than half of the product lost by decay.

United States

As stated previously, there are currently no reactors in North America that make fission produced, high specific activity Mo-99. SHINE Technologies in Wisconsin is planning on commercially producing Mo-99 on or before the end of the decade, but its facility was not under construction as of January 14, 2019 (*see* ML25226A150, Encl. 1 at p. 2, stating construction began “in May 2019”). The University of Missouri Research Reactor (MURR) is an operating reactor in the US that makes some medical radioisotopes, but it does not currently produce any Mo-99. The reactor runs at 10 MWt and is 66 years old. The reactor has a central irradiation location and uses 93% enriched fuel.

EDEN’S ALL TARGET REACTOR INNOVATION

The All-Target Reactor is the critical foundational component of Eden’s innovative approach to medical isotope production (*NEIMA 3(H)*). The fundamental idea is this – ***it is inefficient to use a high-power research reactor to irradiate uranium loaded targets to produce fission Mo-99 when the targets themselves can be assembled and formed into a low-power reactor, without the use of any additional driver fuel elements.*** Eden’s significant innovation is that the Mo-99

targets are also the fuel elements for the reactor and form the reactor core. Designing a low-enriched uranium (LEU) target/element to safely carry out the functions of the reactor's fuel and also efficiently produce Mo-99 required an extensive engineering effort. This engineering effort is described below.

Approximately 1 MW of target fission power is required to meet the US demand for fission Mo-99, if the targets are processed every week. About 2 MW of target fission power is required to meet the world demand, again with the targets processed every week. Mo-99 was originally produced by the activation of targets containing Mo. But since the 1960s, fission produced Mo-99 has been the main method of production because fission Mo-99 has a very high specific activity, it can be made in bulk quantities using a nuclear reactor, and a simple Mo-99 to Tc-99m generator can be used by radiopharmacies. Mo-99 was originally made by irradiating HEU targets in a reactor core to maximize the Mo-99 production and minimize the amount of Pu-239 produced, that could potentially contaminate the Mo-99 product. From 1970 to 1989, the Cintichem reactor in New York made half the US demand by irradiating HEU targets. From 1970 to 2016, the National Research Universal (NRU) reactor in Canada made 40% of the world demand by irradiating HEU targets. The recent conversion of Mo-99 production to LEU targets, because of proliferation concerns, in a driver nuclear reactor (that still may operate using HEU) has continued as the status quo throughout the world to the present time.

During the 1990s, the Department of Energy (DOE) commissioned Sandia National Laboratories (SNL) to become a backup supplier for Mo-99 using the Cintichem process. The approach was to produce Mo-99 using HEU targets fabricated at Los Alamos National Laboratory (LANL) and irradiate them at the center of the Sandia Annular Core Research Reactor (ACRR) with processing in the Sandia hot cell facility. At that time, research at SNL led to the revolutionary new approach of an All-Target Reactor. This innovative design was a reactor composed of only Mo-99 production targets, that did not use any driver fuel elements. The DOE program ended in 1999 with no backup supplier. And, to this day, no commercial reactor employing this novel technology, reflecting a "significant improvement" over existing medical isotope facilities, has ever been constructed.

In the 2000s, the major world producers of Mo-99 were the NRU reactor in Canada and the High Flux Reactor (HFR) in the Netherlands. A major worldwide shortage of Mo-99 occurred in 2009, lasting into 2010, as both the NRU reactor and the HFR had major reactor tank leaks that required significant down times to repair. The 2012 American Medical Isotope Production Act (AMIPA) was passed by Congress to support the development of domestic commercial producers of Mo-99 using LEU fuel (not HEU), through DOE grants and DOE funded national laboratory work packages, and by establishing the Uranium Lease and Take Back (ULTB) program.

During this time period, the All-Target Reactor concept continued to mature with a significant focus centered on the use of LEU targets as fuel elements. The All-Target Reactor was patented by Sandia National Laboratories in 2017 (US 9,691,511 B1). The idea is simple but profound – a reactor that would use LEU fueled targets as fuel elements in an optimized configuration to produce the US demand for Mo-99 without any additional driver fuel elements and the need for a large test reactor. So, in essence, the novelty of the design is a low-power reactor that can

produce as much Mo-99 as a high-power (on the order of 45 MW) test reactor at a fraction of the core LEU mass and that generates no spent fuel. Once our reactor becomes operational, the Eden reactor will revolutionize and break the paradigm of using a driver reactor to produce Mo-99 and other medical isotopes produced by neutron activation.

Hundreds of neutronic calculations were performed over several years to optimize the reactor design such that the US demand for Mo-99 could be met on a weekly basis while at the same time minimizing the LEU mass in the core. With no driver fuel in the core, and the core mass minimized, no spent fuel is generated in the reactor, resulting in significantly lower waste yields (*NEIMA 3(C)*). In addition, the amount of Mo-99 produced per gram of U-235 is maximized (*NEIMA 3(D)*). While the Eden plan is to recycle the 19.75% enriched LEU fuel, since the burnup is very small (less than 3% of the U-235 is consumed in a cycle), even a once-through cycle would be significantly more efficient compared to the usage of LEU for reactors with driver fuel elements. This is described later in this paper.

Another advantage of the All-Target Reactor is that only one fuel cycle is required for the production of medical isotopes. Since there are no driver fuel elements, only one fuel source, fabrication line, and disposition path is required. Conversely, operational reactors producing Mo-99 today require at least two fuel cycles; one for the LEU Mo-99 targets and one for the driver fuel elements. These two fuel cycles require separate and significantly different waste disposition paths. In the US, dispositioning of driver fuel elements (spent fuel) is a major nuclear industry issue. There is currently no disposition path for commercially generated spent fuel (*NEIMA 3(C)*).

In addition to the fuel efficiency and low-level Class C waste yields, the amount of fission products in the reactor core at any given time is minimized since the reactor operates at 1.8 MWt, 25 times less than the HFR in the Netherlands, which makes the bulk supply of Mo-99 for the world. This means that the overall material-at-risk in the reactor, the fission products and transuranics, is 25 times lower for the Eden All-Target Reactor, compared to the HFR (*NEIMA 3(D) and 3(F), respectively*).

Since Eden does not produce any spent fuel, there is no additional material-at-risk that must be considered. Also, for Eden, the LEU is separated from the fission product and transuranic waste stream using the UREX process. The LEU will be in the form of an oxide and can be recycled back into a metal form for reuse as target fuel material. The fission product and transuranics are grouted in 55-gallon drums, stored for decay at the EMIF, and then shipped by truck approximately two miles east to the Waste Control Specialists (WCS) low-level waste disposal site, as Class C waste. It is anticipated that no waste will need to be returned to DOE through the ULTB program due to lack of a commercial pathway (*NEIMA 3(C), 3(D), and 3(F) respectively*).

The All-Target Reactor design is based on the invention of using LEU fueled targets in an optimized neutronic configuration to produce the US demand for Mo-99 without any additional driver fuel elements (*NEIMA 3(C), and 3(D), respectively*). With this novel approach, a number of unique design elements were factored into the reactor to achieve this goal. These design

elements are presented in detail in the Preliminary Safety Analysis Report (PSAR) and include the following:

- Target Design – PSAR Section 4a.2.1
 - Nickel plated LEU metal foil
 - Aluminum cladding
 - Hydroforming fabrication
 - Welding and sealing
 - End flutes
- Neutronic Design – PSAR Section 4a.5
 - Fuel mass
 - Be metal reflector
 - Activation locations
 - Thermal neutron flux
 - Subcritical geometry
- Thermal Hydraulic Design – PSAR Section 4a.6
 - Natural circulation flow
 - Chimney and Downcomer
 - Pool cooling
 - Heat flux and dimensions

ALL - TARGET REACTOR DESIGN

The target/fuel element design of the All-Target Reactor is discussed in PSAR Section 4a.2.1 Reactor Fuel. The target design, not in use by any operating reactor, is at the heart of the reactor design. The target is what allows the All-Target Reactor to be optimized for Mo-99 production with the lowest fuel mass. To have a high target heat rate (30 kW for the average target) the target must have a large surface area per fuel mass. This is accomplished by using annular-type targets with water flow cooling on both the inner and outer sections of the target. This, combined with the thin LEU metal foil, allows for optimization of the neutronic and thermal hydraulic design. Parameters that were evaluated in the optimization included the neutronic keff calculations as a function of the dimensions of the target, the fuel loading of the target, number of targets, and the reflector geometry. The final design included 60 targets with a beryllium (Be) metal reflector. In order to meet the US demand for Mo-99, 30 of the 60 targets in the core would be processed per week in the integrated Hot Cell Facility using the modified Cintichem process.

The target design was also required to have additional features to allow for safety and efficiency in Mo-99 production. The LEU metal foil must be fabricated and then coated with nickel (Ni) to allow for the foil to be separated from the cladding material during processing. The DOE, through work packages with Y-12 National Security Complex and Oak Ridge National Laboratory (ORNL), provided technical assistance in the development of the coated uranium foil fabrication process. A novel hydroforming process was developed by Eden engineering to ensure that exceptional thermal contact efficiency is maintained by the LEU foil and the aluminum (Al) cladding tubing through the lifecycle of the target. The ends of the target are welded and leak checked to ensure that if any fission gases are released by the foil during target irradiation, they

will be sealed within the target. Also end flutes are provided on the targets to allow for ease in placement and retrieval of the target in the core grid.

The neutronic design of the All-Target Reactor is discussed in the PSAR Section 4a.5 Nuclear Design. The neutronic calculations included many iterations to determine the lowest LEU fuel mass in the core at the highest power level, directly contributing to lower waste yields and greater fuel utilization (*NEIMA 3(C) and 3(D), respectively*) than any other isotope reactor ever built or operated. Fuel temperature and moderator temperature and density effects were analyzed with excess reactivity, control and safety rod design and positioning, and burnup calculations, to ensure that the low mass core could operate from critical to full power with acceptable safety margins.

The Be metal reflector plays an important role in the optimization of the neutronic behavior of the core. The Be reflector allows optimized neutron reflection back to the core. Not only does the Be reflector allow for a smaller core mass, but it also has the effect of flattening the radial neutron flux in the core. Placing activation locations in the reflector will allow for the concurrent production of activation isotopes without interfering with the Mo-99 production. The use of a Be reflector is an uncommon design feature in low power research reactors.

A notable safety feature of the core design is that the Be reflector is required for the reactor to become critical. Without the Be reflector, the 60 targets cannot be made into a critical condition under any pitch arrangement (*NEIMA 3(A)*).

The thermal and thermal hydraulic design of the All-Target Reactor is discussed in the PSAR Section 4a.6 Thermal-Hydraulic Design. The unique feature of the thermal hydraulic design was to have natural circulation flow through the core without the addition of any pumps. This is a significant improvement relative to all operating isotope reactors, which use force circulation cooling (*NEIMA 3(A)*). To do this a unique downcomer and chimney are incorporated into the reactor core. The reactor pool is cooled using pumps, heat exchangers and a draft cooling tower. But the reactor core is cooled by natural circulation that develops when the cold water return from the pool cooling system enters the downcomer, and the hot water from the reactor core exits into the chimney. This flow path ensures that the thermal hydraulic natural circulation flow is well established.

The natural circulation flow combined with the large, heated surface area of the targets due to their unique annular design allows for a target power of 30 kW average in the core. The conditions allow for a minimum critical heat flux ratio of two to be maintained over a large range of inlet coolant temperatures. This will allow better thermal performance than current research reactors that use solid fuel elements. The large pool also allows for the reactor to be operated at full power with pool cooling system inoperable, for some period of time (*NEIMA 3(A)*).

The large pool ensures that the reactor core is coolable with the reactor shut down and the pool cooling system not operating (*NEIMA 3(A)*).

SUMMARY OF “SIGNIFICANT IMPROVEMENTS”

The Eden All-Target Reactor entails “significant improvements,” in four key areas that are expressly acknowledged in the plain text of Section 3 of NEIMA, compared to “commercial nuclear reactors under construction as of [January 4, 2019].” No other reactor has ever been designed like Eden’s that can produce the US and world’s supply of Mo-99 and concurrently produce other medical activation isotopes. The patented All-Target Reactor is unique in that it efficiently utilizes all the LEU in the core to produce Mo-99. There are no driver fuel elements, and therefore no spent fuel generated. The low power level design provides for an inherently safe low fission product inventory and the ability to make the same amount of Mo-99 as for high power reactor with driver fuel elements. Each of the design features and the nonelectric application of the reactor described above are significant improvements relative to any reactor in operation or being constructed in 2019, directly addressing the stated criteria of NEIMA Sections 3(A), 3(C), 3(D), 3(F), and 3(H).

Patented (*NEIMA 3, significant improvements recognized under federal law*)

The All-Target Reactor is patented in the US. The All-Target Reactor (Target-Fueled Nuclear Reactor for Medical Isotope Production) was patented by Sandia National Laboratories in 2017 (US 9,691,511 B1). No commercial reactor using this design was under construction as of January 14, 2019.

To receive a US patent, the idea must pass three legal bars.

1. Novelty (Newness) – The exact same thing cannot already exist in the public domain.
2. Non-Obviousness – The idea can't be something an expert in the field would have easily conceived.
3. Utility – The idea must actually work and serve a practical purpose.

The fact that a patent was issued for the All-Target Reactor means that the idea is unique, innovative, and novel.

The All-Target Reactor was judged by the DOE to be worthy of development by SNL who was allowed to proceed with development and resultant patent. Eden conducted additional development work on the design. This is further evidence that the fuel element/target and core design are innovative.

Fuel Efficiency (*NEIMA 3(D)*)

The All-Target Reactor design has been optimized to produce the US demand, and more, of Mo-99 using the lowest amount of LEU fuel possible. With the high thermal neutron flux in the core, the reactor can also produce medical activation isotopes efficiently. The design of our targets is what allows for the high Mo-99 production rate in the core. The annular targets have a large amount of heat transfer surface area with a minimum fuel mass. The fuel is a 19.75% enriched LEU metal foil that is Ni coated and is hydroformed between an inner and outer Al tubing. This allows for high thermal conductivity and subsequently a low fuel temperature with a high heat flux. The core is cooled by natural circulation flow using a chimney and a downcomer.

When compared to global isotope production reactors, Eden is a factor of 2.4 times more fuel efficient than HFR.

Driver Fuel (NEIMA 3(C) and 3(D))

Unlike our global competitors, the All-Target Reactor does not use any driver fuel elements. Only the LEU targets are in the core and act as the fuel elements. Since we don't have driver fuel elements, we only have one fuel cycle. The lack of driver fuel elements also factors into the fuel efficiency.

Spent Fuel Generation (NEIMA 3(C), 3(D) and 3(F))

Since we don't have any driver fuel elements, and all of the 60 targets in the core are used to make Mo-99, we also do not generate any spent fuel. The waste that we do generate is in the form of fission products and transuranics that is grouted in 55-gallon drums, staged in our hot cell facility for decay, and shipped to WCS as Class C low level waste. There is no waste disposal path in the US for spent fuel, and unlike the world producers for Mo-99, Eden will not be generating any.

Inherent Safety (NEIMA 3(A))

One way to look at inherent safety is the inventory of fission products and transuranics that are in the reactor core during operations, that is, the material-at-risk. Since Eden does not have driver fuel elements, we don't have to run a reactor at 10s of megawatts or more to produce the Mo-99.

For Eden, operating the reactor at 1.8 MW will allow us to produce the world's supply for Mo-99. No other reactor currently making Mo-99 can do this. Also, our Reactor Facility and Hot Cell Facility are integrated in the EMIF. We do not need to make over the road shipments of highly radioactive irradiated LEU Mo-99 targets to be processed at another hot cell facility. This significantly reduces the risk to the public.

The Eden simple design with passive safety has less safety-related structures, systems and components and less engineered safety features than higher powered reactors with driver fuel elements. The reactor core can be cooled without primary or shutdown pumps, and is not subject to loss of flow, transition from forced to natural convection cooling and loss of coolant events.

CONCLUSION

In conclusion, Eden's All-Target Reactor meets the definition of "advanced nuclear reactor" in section 3 of NEIMA. . Eden's proposed reactor uses unique, innovative, and novel approaches for medical isotope production that currently do not exist in reactors that are operational, under construction, or already constructed as of January 14, 2019. Eden's patented reactor far exceeds the current status quo expectations regarding key characteristics listed in section 3 of NEIMA compared to the world reactors that produce Mo-99. Given the Commission's stated intent to "broadly apply" the statutory definition, the NRC should conclude that Eden is an "advanced nuclear reactor applicant" and that the CPA is a "qualifying application," for which licensing review fees should be calculated using the reduced hourly rate specified in 10 C.F.R. § 170.20(b).