

# Northwest Medical Isotopes, LLC Radioisotope Production Facility Overview



$^{99}\text{Mo}$  Topical Meeting

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# NWMI Project – Primary Assumptions

**NWMI Mission** – Establish and deliver (as soon as possible) a domestic, reliable, securable source of at least 3,000 6-day curies of  $^{99}\text{Mo}$  per week, steady state and without the use of highly enriched uranium.

- $^{99}\text{Mo}$  produced by a fission-based method using LEU – “Gold standard”
- Single radioisotope production facility (RPF)
  - Target fabrication,  $^{99}\text{Mo}$  production, and uranium recycle and recovery
  - Nominal capacity >3,000 6-day curies (Ci); surge capacity of 1,500 6-day Ci
- Use network of university reactors → Same target design for all reactors
- Fission product releases will comply with environmental release criteria
- Generate Class A, B, and C wastes; no greater than Class C waste
- Legal and regulatory drivers define how RPF work will be performed

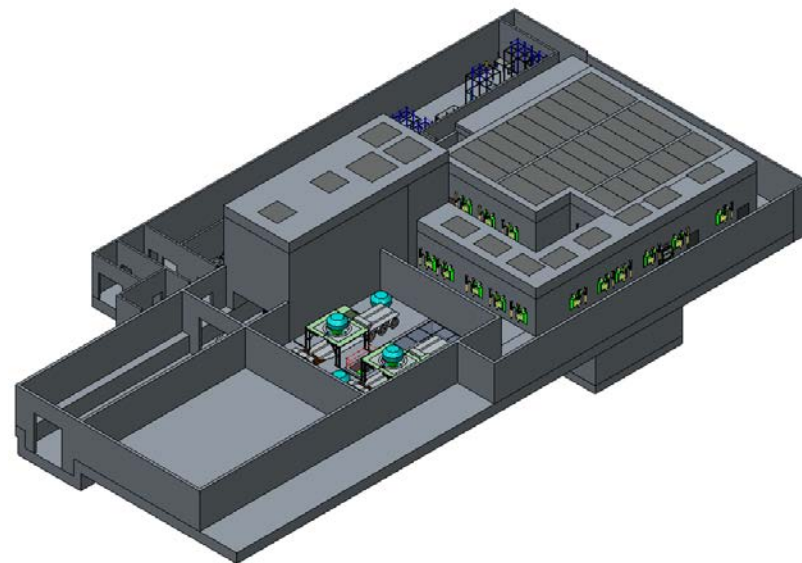
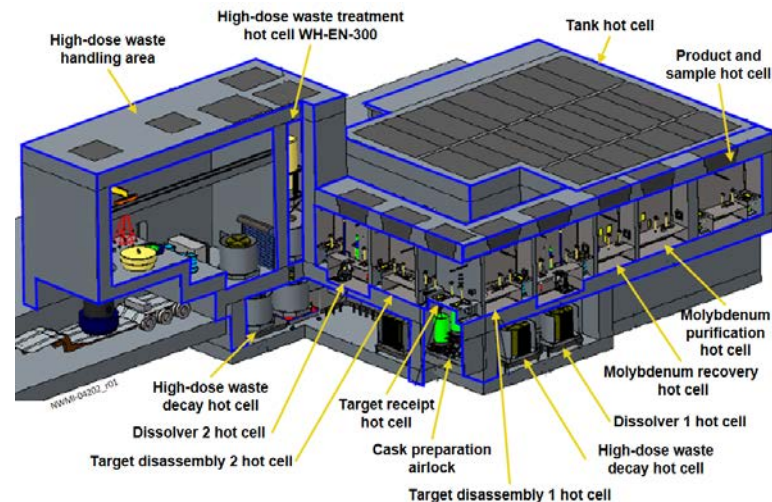


SCALE: N.T.S.  
3D View 3



# NWMI Project Status and Schedule

- Radioisotope Production Facility
  - Site – Discovery Ridge Research Park (Columbia, MO)
  - Received ~\$7 million in tax abatements
  - Completed RPF preliminary design and initiated final design
  - 10 CFR 50 Construction Permit approved (May 2018)
  - Final EIS published by the NRC (May 2017)
  - 10 CFR 70.21 exemption – EA/FONSI complete; exemption approval imminent
  - Initiated development of OLA and preconstruction activities
- Research and development
  - Completed cold and hot small-scale irradiation and processing demonstration tests
  - Completed and continuing large-scale  $^{99}\text{Mo}$  production to support  $^{99\text{m}}\text{Tc}$  generator testing
  - Completed target material production with both NU and LEU
- University research reactors
  - University reactor network identified; commercial irradiation services agreements complete
  - OSTR license amendment approved for irradiation of up to three prototypic targets (January 2016)





# NWMI RPF Site and University Reactor Network Locations



- 7.4 acre parcel optioned
- 6 mi to MURR
- 5 mi to regional airport
- Anchor of isotope "ecosystem"
- 3<sup>rd</sup> Reactor selection complete but not yet socialized



# Siting – Discovery Ridge Research Park (Columbia, MO)



# NWMI NRC Licensing Strategy

- Combine several license activities and submit one application that covers all applicable regulations for construction/operation of the RPF under 10 CFR 50

## 10 CFR 50 Activities

- Irradiated target receipt
- Irradiated target disassembly
- Target dissolution
- $^{99}\text{Mo}$  separations, purification, and packaging
- Uranium (U) recycle and recovery
- Waste management
- Associated laboratory and support

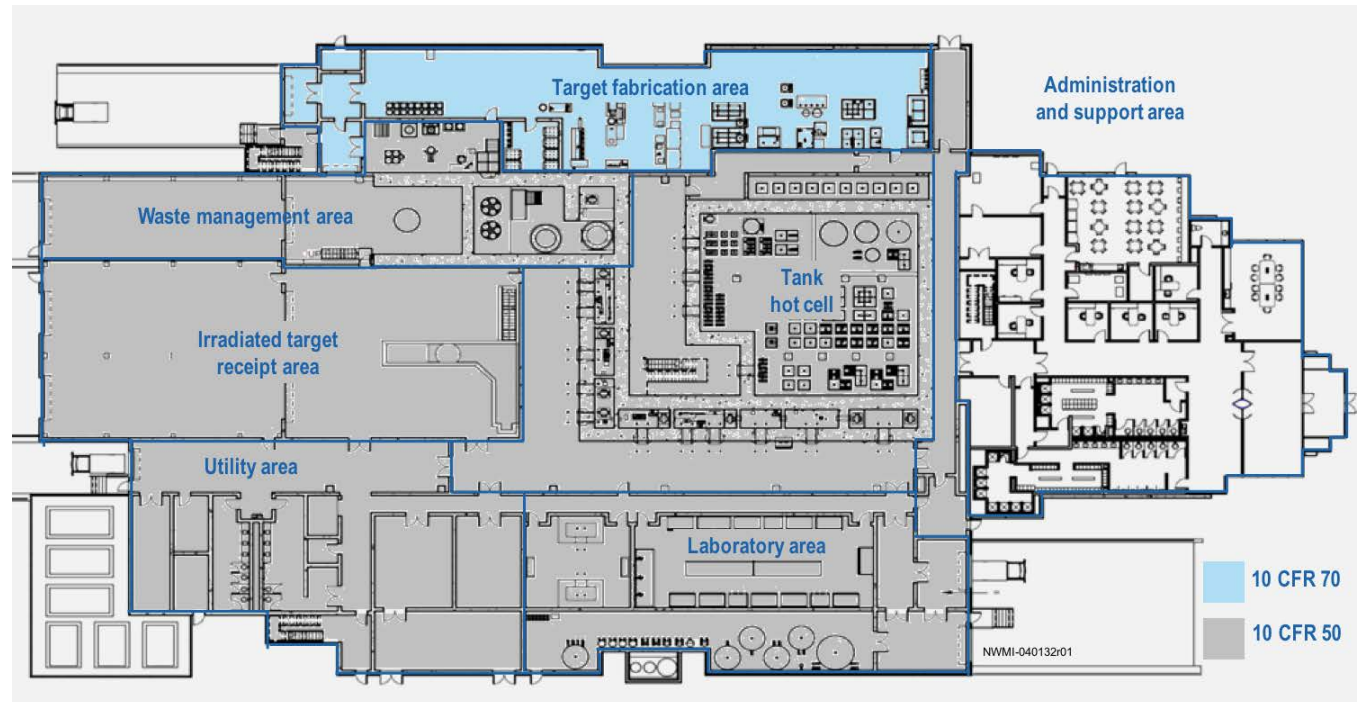
## 10 CFR 70 Activities

- Receipt of low-enriched uranium (LEU) (from DOE)
- Production of LEU microspheres
- Target fabrication and testing
- Shipping/loading of fabricated targets
- Laboratory and support areas

## 10 CFR 30 Activities

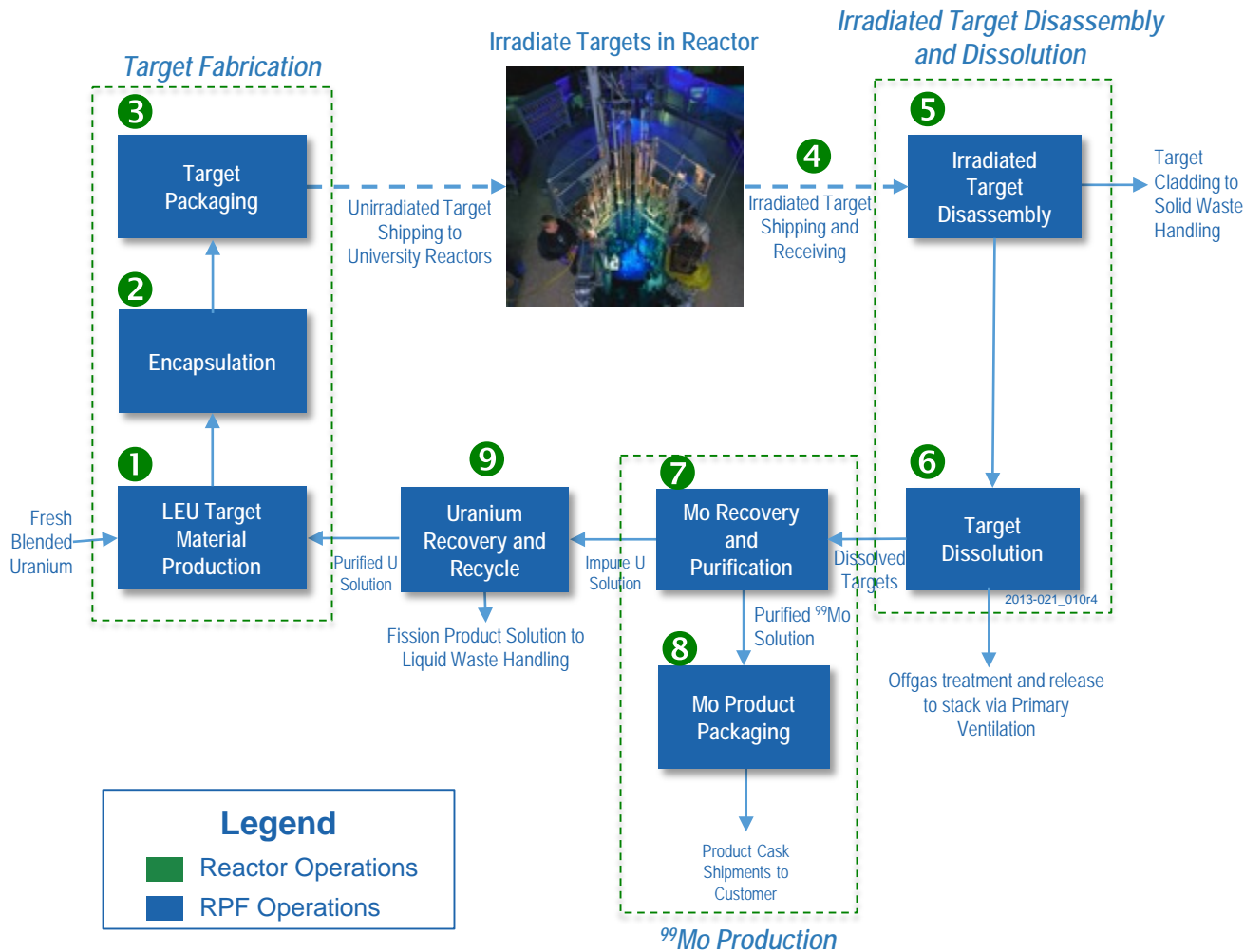
- Handling of byproduct material

- University reactor(s) and cask licensee(s) will amend their current operating licenses





# NWMI RPF Operating Characteristics



- LEU target material is fabricated (both fresh LEU and recycled U)
- LEU target material encapsulated using metal cladding → LEU target
- LEU targets are packaged and shipped to university reactors for irradiation
- After irradiation, targets are shipped back to RPF
- Irradiated LEU targets disassembled
- Irradiated LEU targets dissolved into a solution for processing
- Dissolved LEU solution is processed to recover and purify <sup>99</sup>Mo
- Purified <sup>99</sup>Mo is packaged/shipped to a radiopharmaceutical distributor
- LEU solution is treated to recover U and is recycled back to Step 1

# RPF Details

- First level footprint ~52,000 square feet (ft<sup>2</sup>)
  - Target fabrication area
  - Hot cell processing area (dissolution, <sup>99</sup>Mo, and <sup>235</sup>U recovery)
  - Waste management, laboratory, and utility areas
- Basement ~2,000 ft<sup>2</sup> (tank hot cell, decay vault)
- Second level ~17,000 ft<sup>2</sup> (utility, ventilation, offgas equipment)
- Waste Management Building ~1,200 ft<sup>2</sup>
- Administration Building (outside secured RPF area) ~10,000 ft<sup>2</sup>
- High bay roof – 65 ft
- Mechanical area, second floor – 46 ft
- Top of exhaust stack – 75 ft
- Loading dock (back) roof – 20 ft
- Support and admin (front) roof – 12 ft
- Depth below grade for hot cell/high-integrity container (HIC) storage – 15 ft





# NWMI Project Conclusions

- Complete RPF construction and initiate cold and hot startup by mid-2021 in concert with receiving NRC operating license
- Complete and obtain NRC approval for required University research reactor license amendments
- NWMI's strategy for success is threefold
  - Maintaining a realistically sustainable cost and schedule
  - Initiate operations in late 2021 and maximizing production of  $^{99}\text{Mo}$  (e.g., > 3,000 Ci)
  - Reducing risk by completing necessary research and development in-concert with RPF design
- NWMI activities focus on integrating best technology and best practices from DOE, NRC, and around the world to address  $^{99}\text{Mo}$  challenges while:
  - Facilitating regulatory buy-in
  - Minimizing "reinvention" investment and risk
  - Maximizing return on investment once RPF operations have been initiated



# Questions?

