



Assure a Domestic, Secure, and Reliable Supply of ^{99}Mo



Facility Siting – Discovery Ridge Research Park

- University system-owned 550-acre research park
- NWMI “anchor” for radioisotope ecosystem; two existing companies
- RPF would be located in Lot 15 of the Discover Ridge Phase II section (54.9 acres)
- Lot 15 is 7.4 acres and contains no existing structures

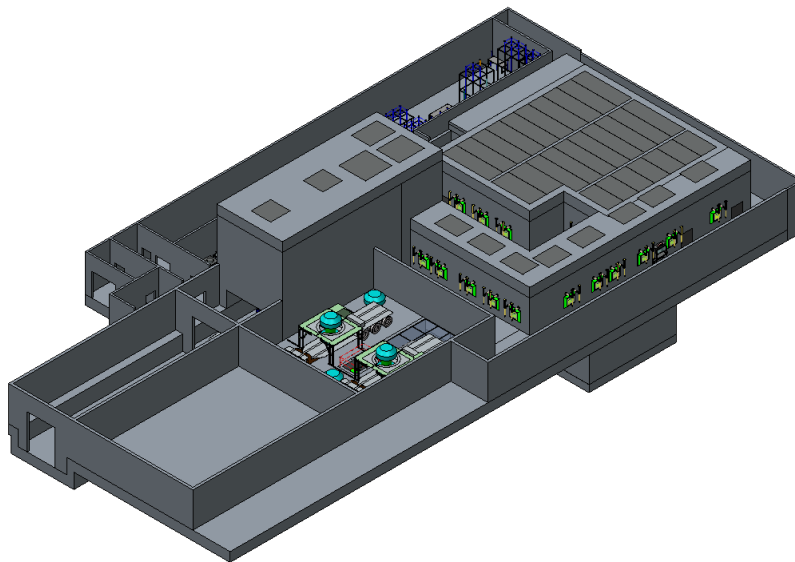


Facility Site Layout – Lot 15

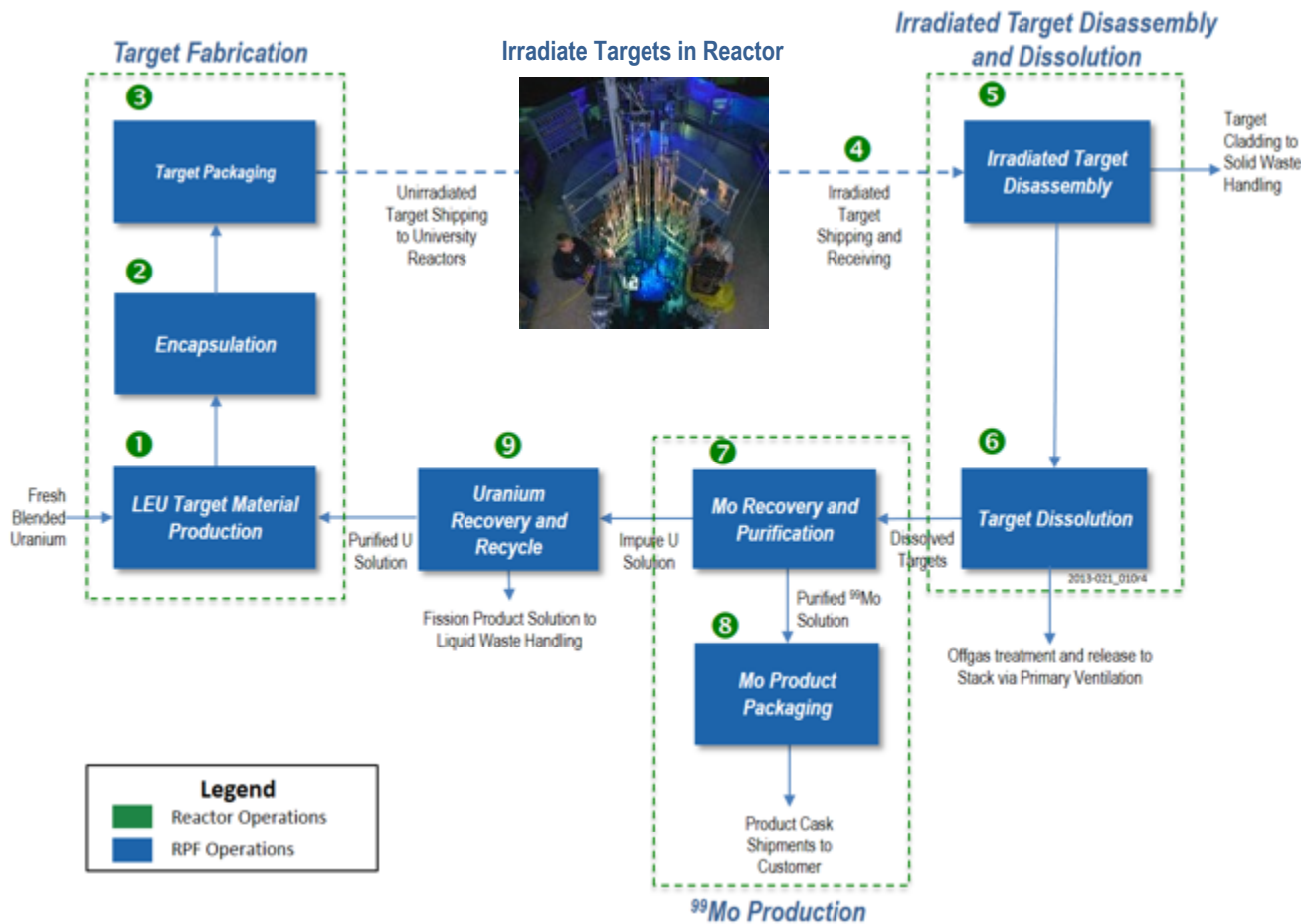
Source: MU, 2011, “Phasing Overview,” Maps and Roads, Research Parks & Incubators, Discovery Ridge, www.umsystem.edu/umrpi/discoveryridge/maps, University of Missouri, Columbia, Missouri, accessed July 2013.

Primary Assumptions

- Single RPF
 - Mo-99 produced using a fission-based method – “Gold Standard” using LEU
 - Simple/straightforward chemistry processes
 - Nominal capacity 3,500 6-day Ci; surge capacity of 1,500 6-day Ci
- Use network of university reactors
 - Use same target design for all reactors
 - Intellectual Property obtained
 - U.S., Australia, Russia, South Africa, Korea → Allowed
 - India, Europe, China → Pending
- Generate Class A, B, and C wastes; no greater than Class C (GTCC) waste



RPF Process Flow Diagram



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

NRC Licensing Strategy

- Submit one (1) application that meets all applicable regulations for construction/operation for RPF

10 CFR 50 Activities

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

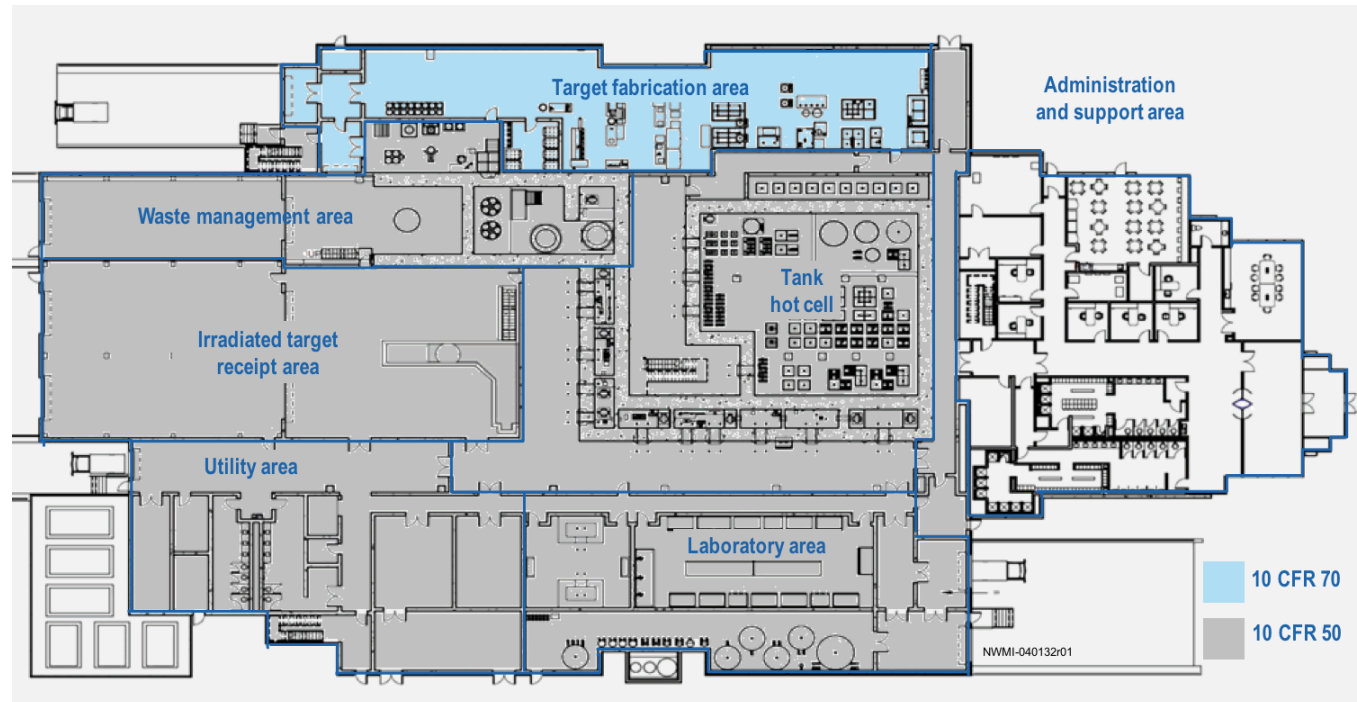
10 CFR 70 Activities

- Receipt of LEU (from DOE)
- Production of LEU target material
- 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



Facility Description

- First level footprint ~52,000 ft²
 - Target fabrication area
 - Hot cell processing area (dissolution, ⁹⁹Mo, and ²³⁵U recovery)
 - Waste management, laboratory and utility areas
- Basement ~2,000 ft² (tank hot cell, decay vault)
- Second level ~17,000 ft² (utility, ventilation, offgas equipment)
- Waste Management Building ~1,200 ft²
- Administration Building (outside of secured RPF area) ~10,000 ft²
- 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 Team

Commercial Irradiation Services University Reactors



Radioisotope Production Facility

Engineering Design

ATKINS



Nuclear Criticality, Shielding, and Safety Analysis

ATKINS

Preconstruction/Construction

MCCARTHY

Environmental Assessments and Permitting



Technology Demonstration



**Narodowe Centrum Badań Jądrowych
National Centre for Nuclear Research
Świerk**



Status

- Preliminary design complete, final design in-progress
- Research and Development
 - Demonstration tests (cold and hot chemistry) complete – >90% of theoretical recovery
 - Large scale Mo-99 production and Tc-99m generator testing on-going
- Siting secured – Discovery Ridge Research Park
- RPF will be licensed under both NRC 10 CFR 50 (Research Reactors and Production Facilities) and 10 CFR 70 (Fuel Fabrication Facilities)
 - EIS Published May 2017
 - ACRS Technical Review complete
 - Commission meeting late 2017
 - CP approval early 2018
 - Operating license submission Q2 2018
- University research reactor network identified
 - Commercial Services Agreements completed
 - University license amendment approach finalized and being developed

