SHINE Medical Technologies

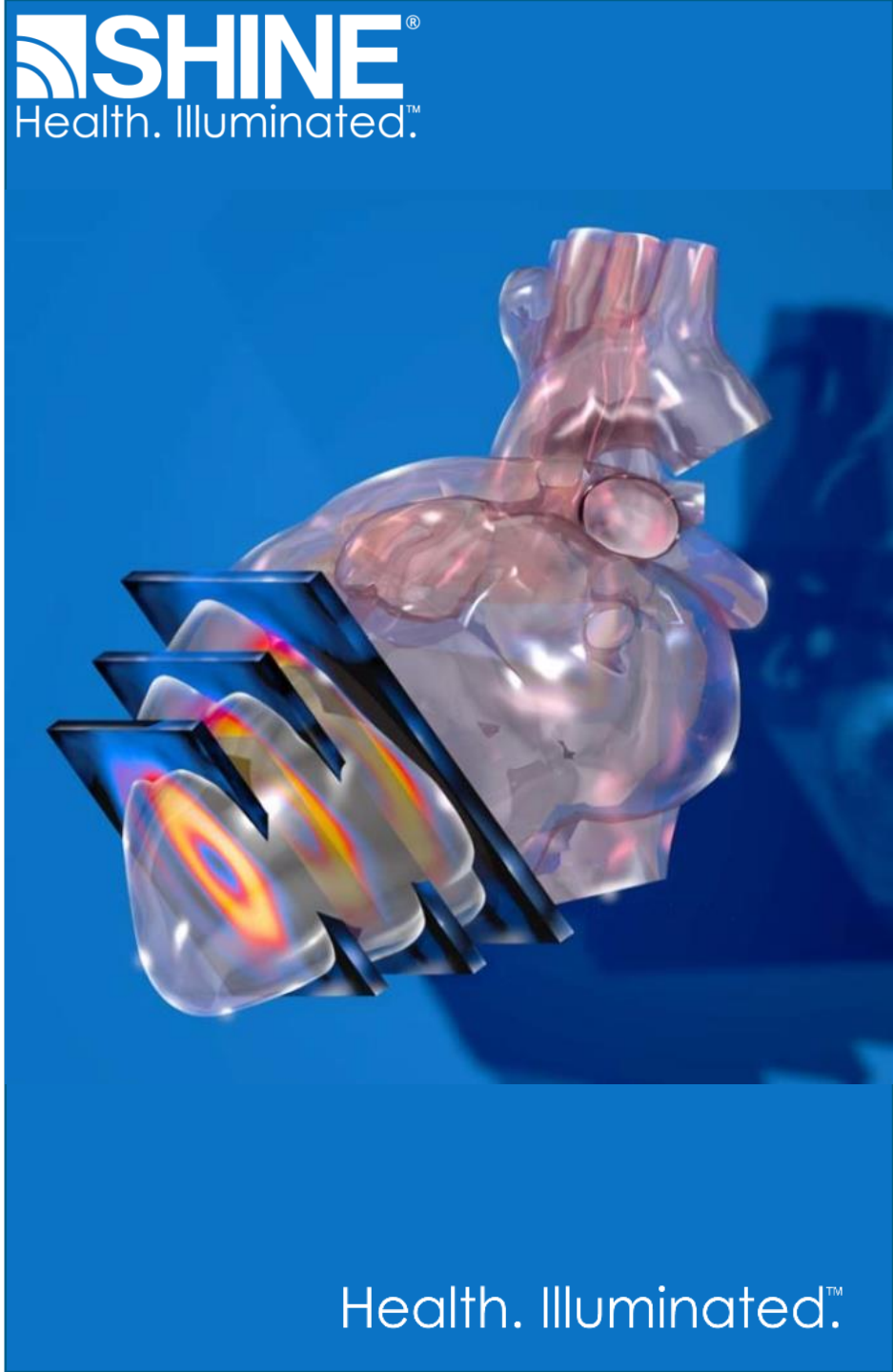
SHINE Intro

SHINE Medical Technologies | October 2018

Health. Illuminated.™

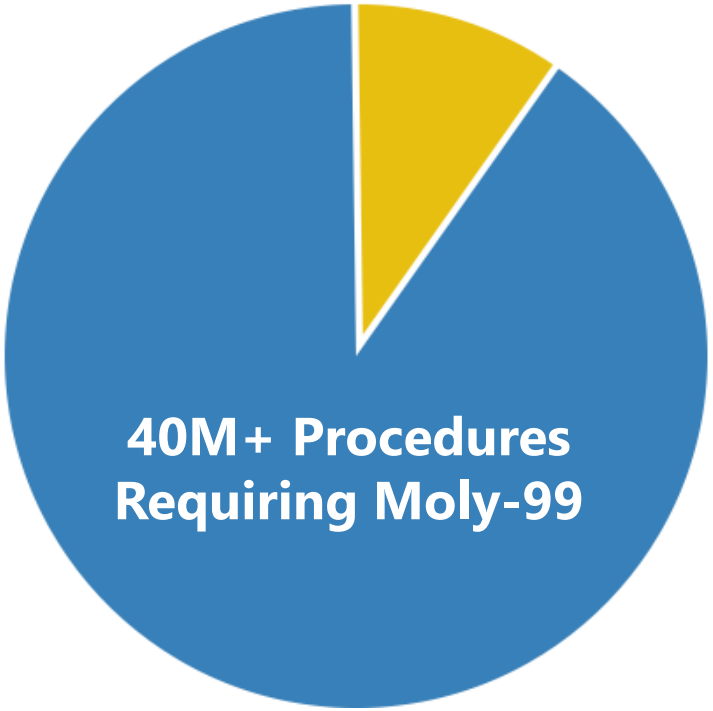
Mission

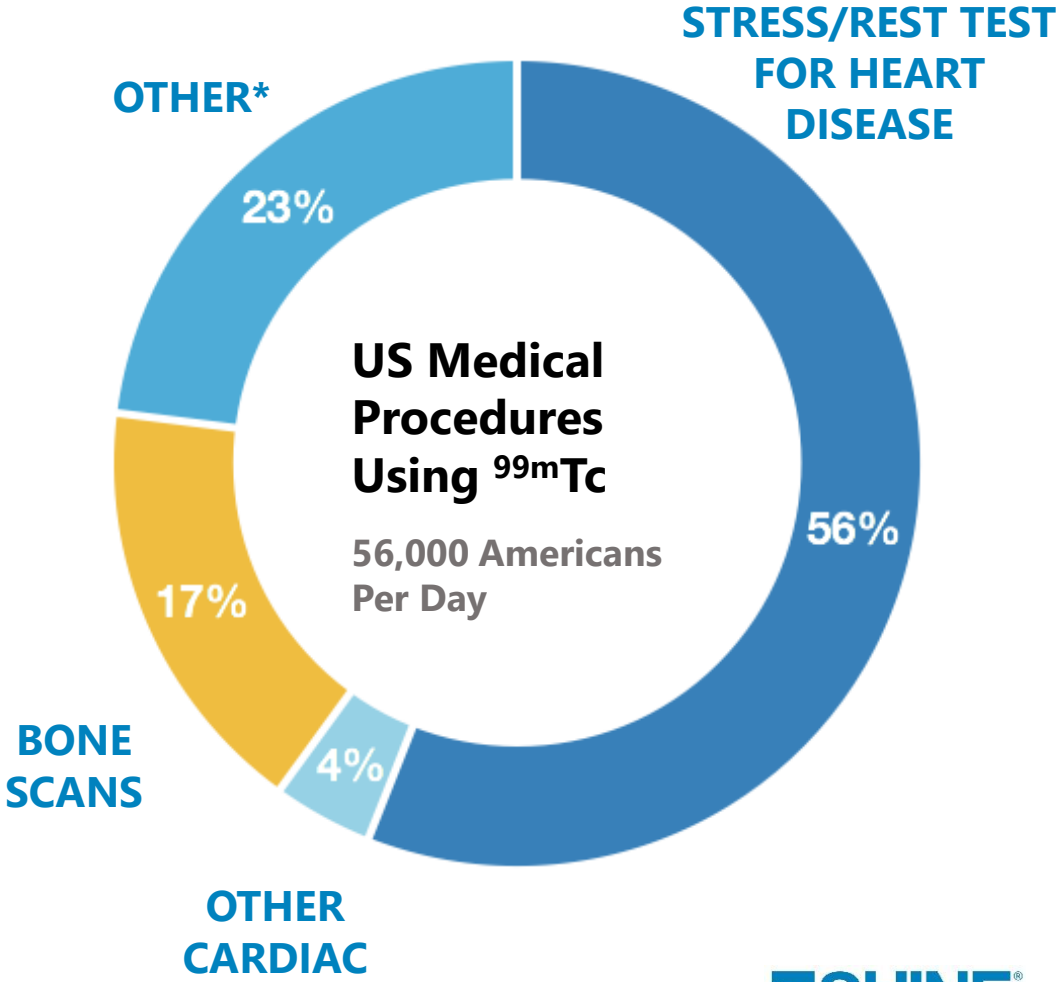
Dedicated to being the world leader in the safe, clean, affordable production of medical tracers and cancer treatment elements.



Medical isotopes enable doctors to diagnose and treat illnesses, such as heart disease and cancer

50M+ Procedures Requiring Medical Isotopes





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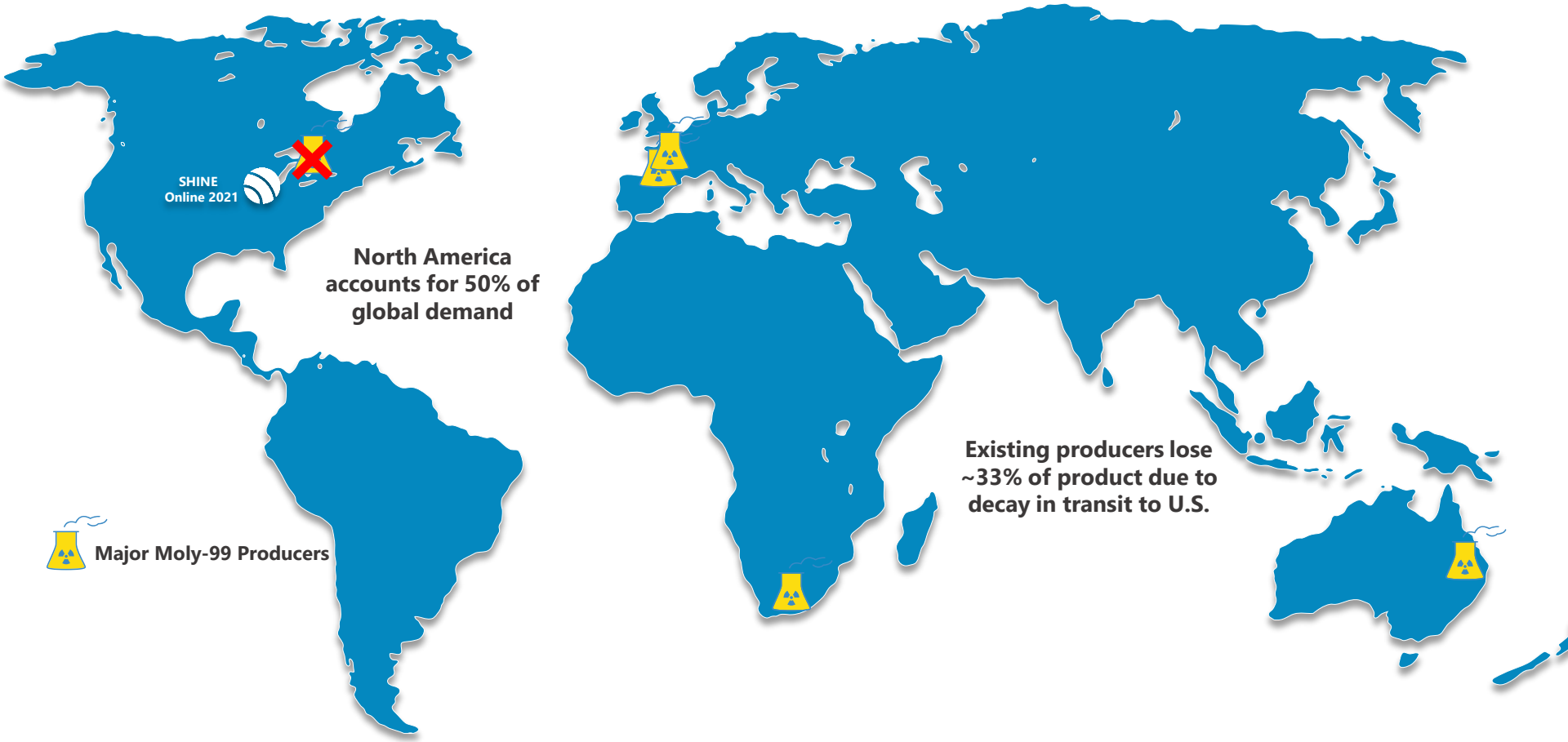
Moly-99 decays at ~1% per hour, making proximity to patients critical



Only moly-99-producing reactor in North America shut down in March 2017

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Proven Technology

Technology proven by US National Laboratories and GE Healthcare

GE Healthcare

Argonne NATIONAL LABORATORY

SRNL™

Los Alamos NATIONAL LABORATORY EST. 1943

OAK RIDGE National Laboratory

ACCELERATOR (ELIMINATES REACTOR)

+

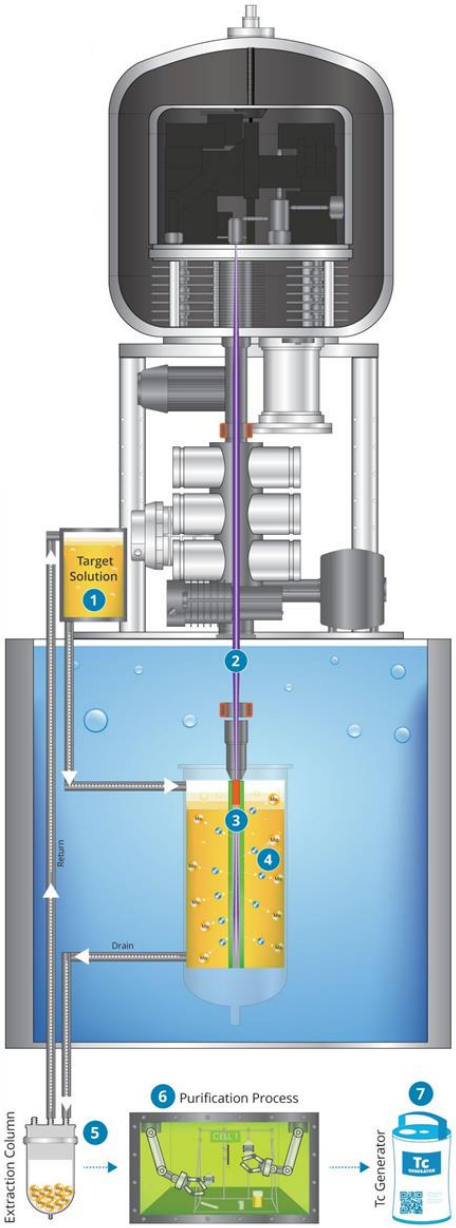
RE-USABLE LIQUID TARGET

=

SAFER

100x LESS WASTE

LOWER COST



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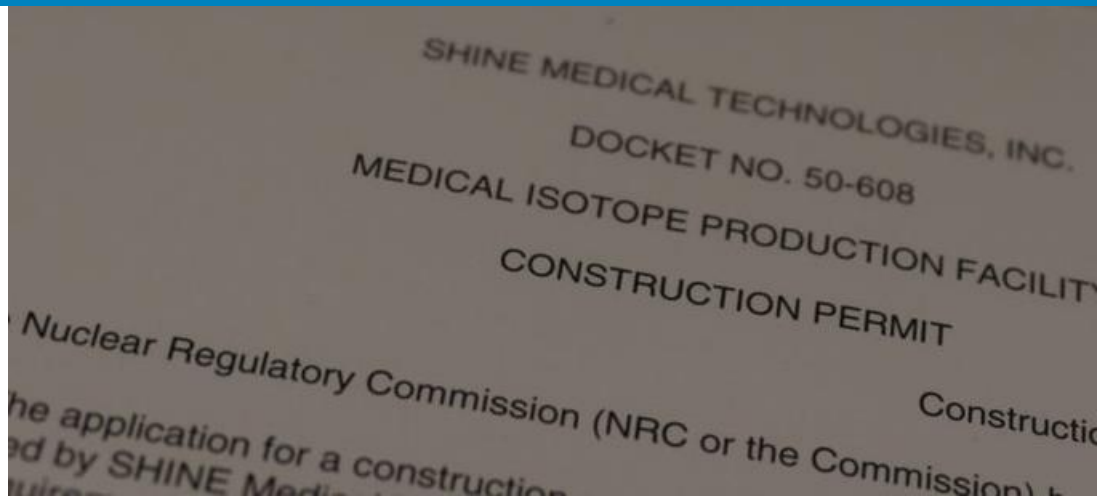
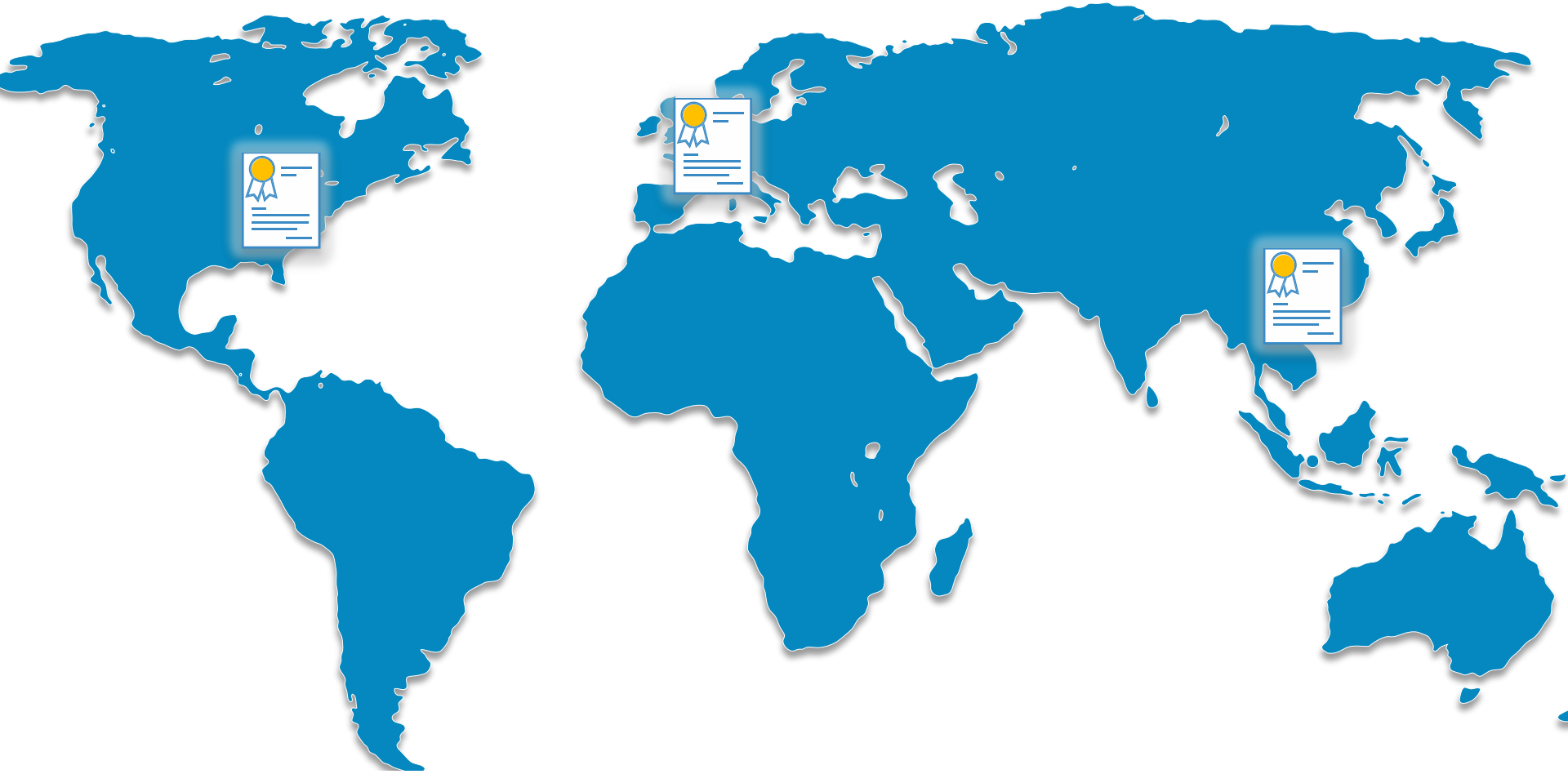
Nuclear Regulatory Commission construction approval

- Construction permit issued Feb 2016
- Culmination of 4 years of work
- First approval of its kind since 1961



Three signed customer contracts



Lantheus Medical Imaging

GE Healthcare

原子高科股份有限公司
HTA CO. LTD.

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Building One: 1st building on the SHINE campus

- Construction complete Q1 2018
- First Production Unit accelerator demo Q1 2019
- Future use for employee training and technology development

Building One Construction

- Groundbreaking August 2017
- Completed 3 weeks ahead of schedule
- Zero OSHA-recordable incidents
- 11,400 square feet
- Licensed by State of Wisconsin

First Production Unit Accelerator Demo

- Deuterium-tritium accelerator demonstration
  - Shielded bunker built
  - Accelerator delivered this week (Oct. 16)
  - Tritium ordered
  - State license obtained

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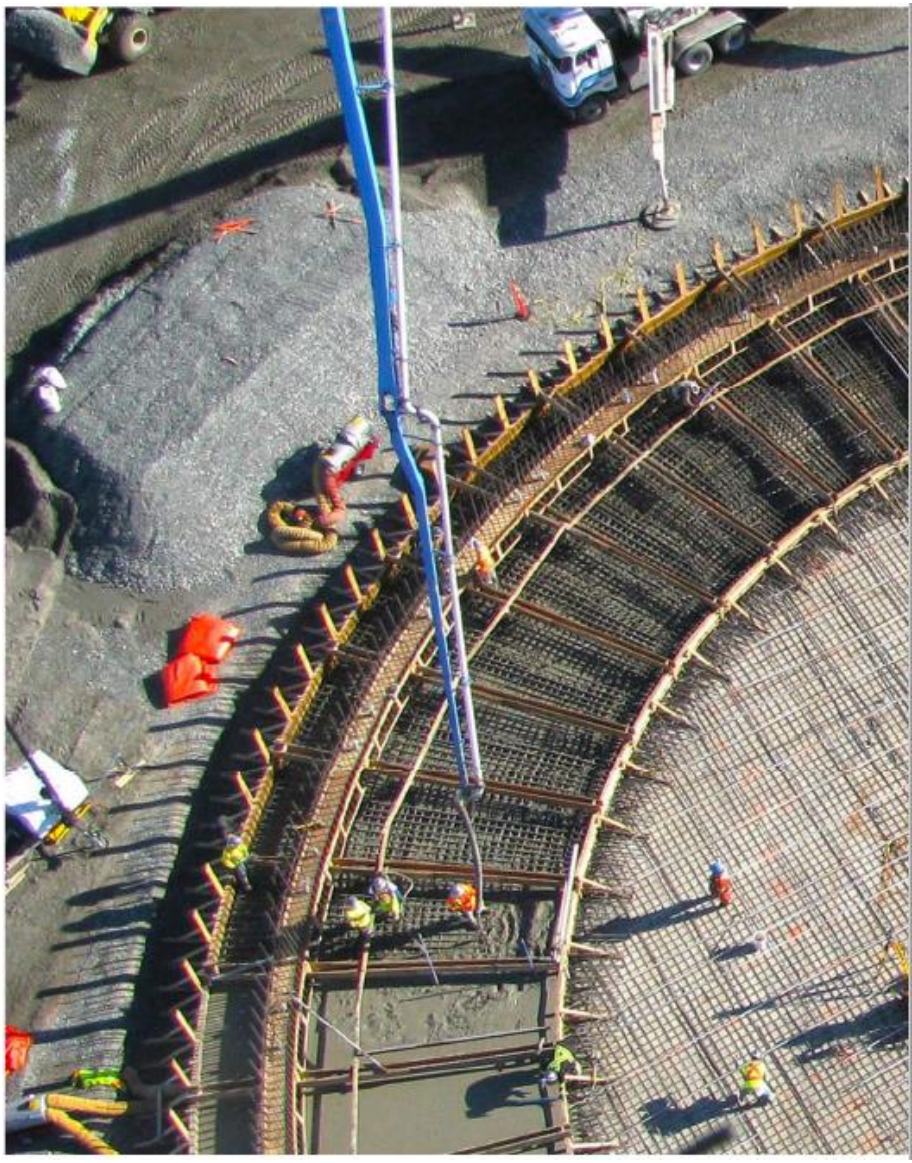
Preparing to Build

- Baker Concrete chosen as the prime construction contractor
- Commercial construction firm with nuclear experience
- Integrating many lessons learned from Urenco USA
- City building permit approved
- Current activities
  - Negotiating rebar and concrete contracts
  - Adding to QA team
  - Starting long-lead procurement

BAKER™
CONCRETE CONSTRUCTION
expect more



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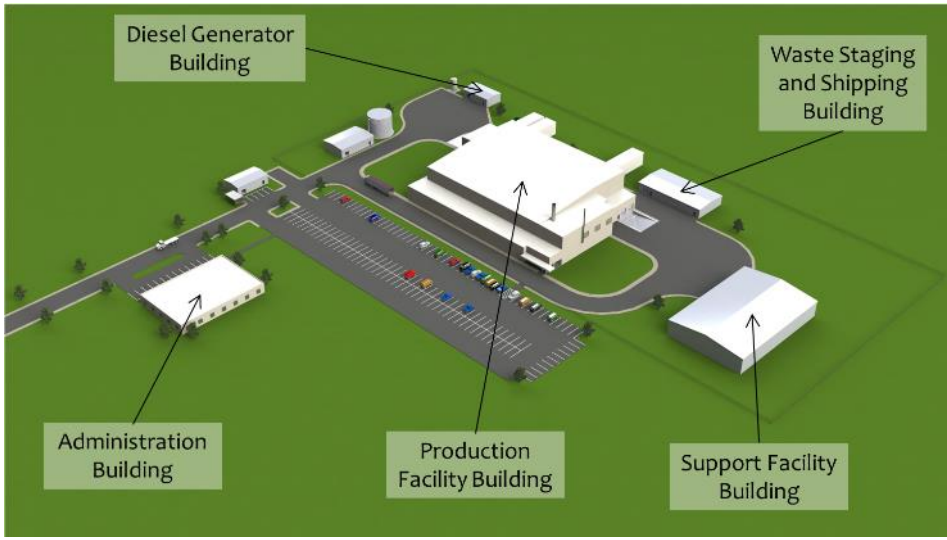
Production Facility Design

- To be built in Janesville, Wisconsin
- Mo-99 capacity >4,000 6-day Ci/wk
- Xe-133, I-131, Lu-177, Sr-89, others
- 8 independent irradiation units accelerators
  - High reliability
  - Flexible production schedule
- Close to regional airports
  - designed for logistical efficiency



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Square Feet	Accelerators	Independent Hot Cell Chains	Annual U.S. Demand Met

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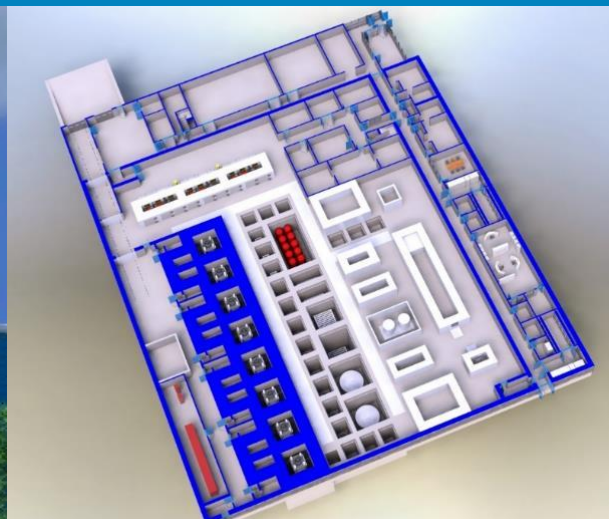
Next Steps



- Current key activities
  - Preparing OL application
  - Preparing for start of construction
  - Building One first production unit demo
  - Negotiating additional supply agreements
  - 80+ employees; 20 new hires by end of year
- First production late 2020/early 2021

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Janesville, WI

Building One vs Production Facility

- Building One
  - State of Wisconsin DHS
  - Inputs: deuterium, tritium, sealed sources
  - Outputs: activation products
- Production Facility
  - Nuclear Regulatory Commission
  - Inputs: deuterium, tritium, low-enriched uranium, sealed sources
  - Outputs: Mo-99, I-131, Xe-133, spent target solution, activated equipment, other waste
  - Interim Staff Guidance (ISG) to NUREG 1537
  - Environmental Report 19.4.10 Transportation
    - Describes the transportation of nuclear and non-nuclear materials, including waste and radioisotopes
- All shipments in packages that meet NRC/DOT requirements

Production Facility: LEU Feed Material

- Shipments originate in the Y-12 facility in Oak Ridge, TN
- Destination is Janesville, WI
- Transportation distance is approximately 650 mi
- Mode of transportation is exclusive use truck
- Multiple shipments in the first year
  - One per quarter beginning in Q4 2020
  - One per year beginning in 2023

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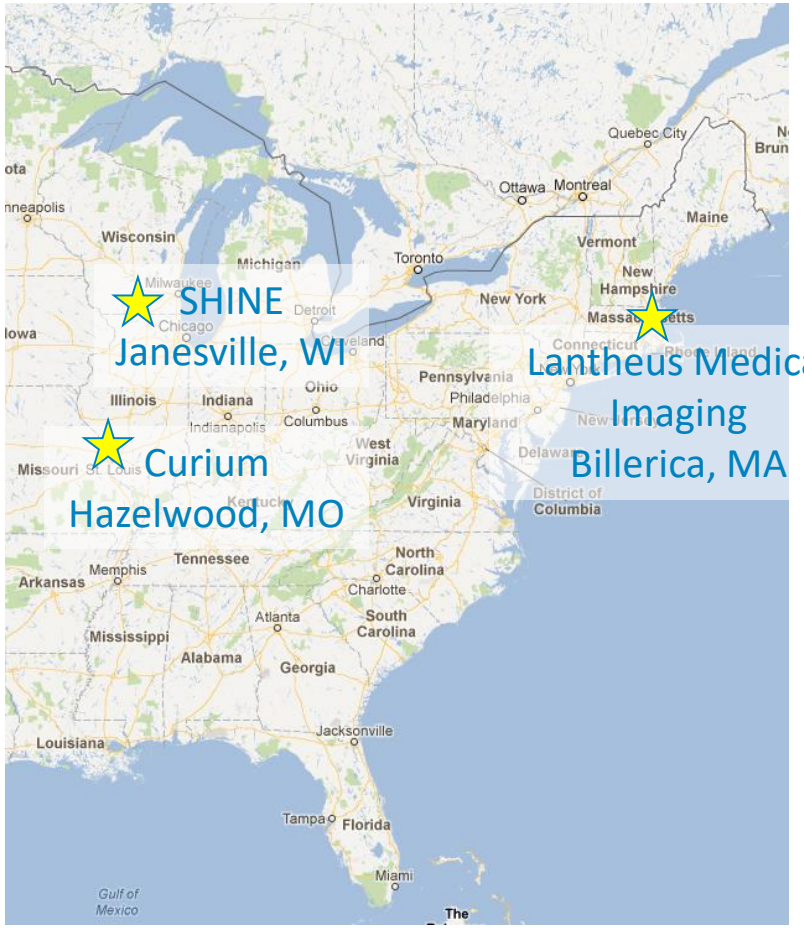
Mo-99 Shipments

- Extracted from the target solution and purified
- Mo-99 normally transported by air – truck transport is backup
- Expect 9 shipments per week Mo-99
- Expected destinations
  - Curium facility
    - Located in Hazelwood, MO
    - Transportation distance 300 mi
  - Lantheus Medical Imaging facility
    - Located in North Billerica, MA
    - Transportation distance 1,100 mi
  - Other facilities may be identified in the future



Radioactive Waste

- All waste is expected to be Class C or lower
- Solid waste/trash consolidated and shipped as LSA
- Higher activity solid waste (resins/zeolite) and liquid waste is stored on site for decay, solidified and shipped as LLW
- Expect 22 shipments per year
- Expected destinations
  - EnergySolutions facility
    - Located in Clive, UT
    - Transportation distance 1,450 mi
  - Waste Control Specialists (WCS) facility
    - Located in Andrews, TX
    - Transportation distance 1,305 mi
  - Diversified Scientific Services facility
    - Located in Kingston, TN
    - Transportation distance 975 mi
- Mode of transportation is exclusive use truck

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Questions?
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PROSPECT 101
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