What is SHINE Medical Technologies?

SHINE Medical Technologies is dedicated to being the world leader in the safe, clean and affordable advanced manufacturing of medical tracers and cancer treatment elements.
SHINE Snapshot

*SHINE is building new irradiation and processing infrastructure*

- Dedicated to being the world leader in the safe, clean, affordable production of medical isotopes
- One of few projects aggressively pursuing new irradiation and processing infrastructure
- Since last year:
  - Moved HQ to Janesville
  - Continued aggressive hiring
  - Groundbreaking on Building One
  - Selected Baker Concrete as prime contractor for manufacturing facility
- Leading efforts to establish domestic fission-based isotope supply
SHINE Technology

A modernized approach to making Mo-99

• Integrated production and refining
• SHINE irradiation unit is a hybrid
  • Accelerator creates D-T neutrons that drive reactions in the target
  • Neutrons multiply in subcritical uranium sulfate solution, allowing for very high yield
• 100% LEU
• Cost effective approach
  • Elimination of reactor results in 100s of times less waste than conventional production
  • Reusable target
Demonstrated Technology

The world’s strongest neutron generators

- Plant-scale accelerator at Monona, Wisconsin facility
- March 2016 demonstration
  - 132 consecutive hours of operation
  - 97% uptime
- Thousands of hours of operation logged on similar accelerators
**Demonstrated Technology**

*Every part of the process demonstrated*

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<th>Process Step</th>
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| Irradiation  | ✔️            | • Plant-scale neutron driver operational  
               |               | • Operation at plant cadence demonstrated |
| Target       | ✔️            | • Many SHINE-specific uranyl sulfate irradiations performed at ANL and LANL  
               |               | • Uranyl sulfate solutions routinely used in critical reactors at 2x power density (Argus) |
| Processing   | ✔️            | • Separations demonstrated from sulfate solutions (Argus, LANL, ANL)  
               |               | • Cintichem process was used for decades |
Market Acceptance

Supply chain compatibility

• Fission-based, high-specific activity
  • No changes to pharmacy practices
  • Ensures access to other isotopes, including I-131 and Xe-133
• Announced supply agreements
  • 2014 - GE Healthcare and Lantheus Medical Imaging
  • June 2016 - HTA Co., Ltd.
GE Drytec Generator and Kit Test

Mo-99 produced by the SHINE process met all GE quality requirements

- Mo-99 produced by the SHINE process at Argonne National Laboratory was loaded on a GE DryTec generator
- Eluted Tc-99m was used with Myoview and Ceretec kits
- Mo-99, Tc-99m and both drugs met all GE specifications
- Demonstrates SHINE chemistry is compatible with DryTec generators and drugs
NRC Construction Permit Issued

*SHINE noted as model applicant*

- NRC issued SHINE Construction Permit February 2016
  - Culmination of over four years of work
  - Only U.S. medical isotope producer with NRC approval to construct

SHINE Testimony at the NRC Hearing (photo by NRC)

SHINE Construction Permit Signing Ceremony (photo by NRC)
New SHINE HQ in Janesville, WI

*Relocation and expansion*

- Monona facility too small
- Ribbon cutting in January 2017
- Currently ~55 employees
- 15 new hires expected in the next few months
SHINE Building One

One of the most advanced private nuclear technology facilities in the world

- First building to be built on the SHINE campus
- Will demonstrate actual production equipment
- Schedule
  - Construction complete Q4 2017
  - Occupancy Q1 2018
  - Demo Q2 2018
- Beyond the pilot demonstration
  - Employee training facility
  - Developing operating history with equipment
  - State-of-the-art technology development center
Construction team coming together

• Baker Concrete Construction
  • Civil firm with nuclear experience
  • Over 45 years of experience
  • Every type of project imaginable
• Focused, highly-efficient, internal engineering team established
• S&L supplementing structural work
• Enercon supplementing process and licensing work
Production Facility Design

*Designed for logistical efficiency*

- SHINE facility to be built in Janesville, Wisconsin, USA
- <50,000 ft² production facility
- Plant capacity of 4000 6-day Ci/week
  - Over 1/3 global demand
- 8 independent irradiation units – ensures high reliability, flexible production schedule
- Independent hot cell chains further increase reliability and flexibility
Next Steps

*Industry-leading progress*

- Transitioning into construction
- Current key activities
  - Construction team selected
  - Preparing operating license
  - Completing detailed design
  - Negotiating additional supply agreements
- Building One operational 2018
- Production facility construction to begin 2018
- Commercial production in 2020
Questions?

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