



The SHINE Mo-99 Approach

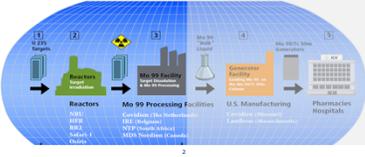
March 11, 2014



Health. Illuminated.™

SHINE Medical Technologies

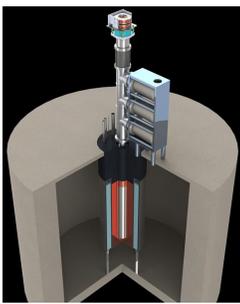
- Dedicated to being the world leader in safe, clean, affordable production of medical imaging agents and cancer treatment elements.
- Highest priority is safely delivering a highly reliable, high-quality supply of the medical ingredients required by nearly 50,000 patients in the U.S. each day.
- Products fit seamlessly into the existing medical tracer supply chain, but do not rely on a nuclear reactor for production.



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SHINE Mo-99 Advantage

- High-intensity accelerator to induce fission
 - Less complex
 - Low technical risk
 - Low cost
- Low-enriched uranium (LEU) target
 - Avoids the security concern of HEU
 - Preferred reimbursement
- Uranium dissolved in an aqueous solution
 - Target reusable, generates far less waste (~200 times less than existing reactor-based technologies)



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Technology Overview

- SHINE process uses a small, simple particle accelerator to create neutrons
 - Apply power to ion source
 - Apply power to accelerator
 - Introduce gas into chamber – beam colliding with gas creates fusion reactions
 - Neutrons pass through target chamber wall and can be used to produce isotopes

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The System Has Inherent Safe Shutdown Capability

- Accelerator immediately shuts down if power lost/turned off
 - Shut off power to source or accelerator and reaction stops
 - Extremely small amount of decay heat

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Coupling the Accelerator With a Reusable Uranium Target Greatly Improves the Efficiency

- Accelerator in center of target → Almost all neutrons used
- Target in liquid form, no need to machine uranium
- Uranium target reusable; Mo-99 separated after several days and target recycled
- Radioactive byproducts reduced by hundreds of times compared to other production methods

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SHINE Continues to Demonstrate Strong Progress

- Technology development
- Facility design
- NRC license application

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Plant Systems Continue to Develop

- System modeling continues at Los Alamos National Laboratory (LANL); confirms high yield, safety of SHINE approach
- UW system modeling and experiments also verify effective, high yield design
- Demonstrations at Argonne National Laboratory and LANL continue to show efficient, high yield chemical separation
- Plant-scale prototype accelerator has demonstrated full output at Monona facility



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Strong Achievement Developing Production Facility

- Hydrogen purification system nearly complete at Savannah River National Laboratory
- Second stage of facility design complete and processes developed
- Initiating detailed design



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Licensing Process

- Licensing regulations applicable to SHINE:
 - Production facility license under 10 CFR 50
 - Class 103 license per 10 CFR 50
 - Compliance with other regulations will likely be required by and part of the license
 - 10 CFR 20 (Byproduct Material)
 - 10 CFR 40 (Source Materials)
 - 10 CFR 70 (Special Nuclear Material)

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Licensing Process

The diagram shows a horizontal timeline with a large blue arrow pointing to the right. Seven milestones are marked with blue dots along the arrow. The milestones are as follows:

Date	Event
March 26, 2013	Part One of the SHINE CP Application Submitted
June 25, 2013	Part One of the SHINE CP Application Docketed
September 11, 2013	SHINE Receives Environmental Report RAIs from NRC
December 2, 2013	Part Two of the SHINE CP Application Docketed (NRC Detailed Review Underway)
March 26, 2013	Part Two of the SHINE CP Application Submitted
July 2013	NRC Public Meeting Held in Janesville for Environmental Report and the NRC Environmental Site Audit Conducted
October 4, 2013	SHINE Responds to Environmental Report RAIs

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SHINE is Working Closely with the Community

- Continued public outreach efforts
 - Regular (six-month) meetings
 - Strong public support
- Planning with City Officials
 - Development
 - Police
 - Fire
 - Emergency Management
- Job Creation
 - Expected to create ~150 jobs
 - Most jobs will require a technical education, with additional training specific to particular needs
 - Much of this training can be accomplished in Wisconsin Technical Colleges

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Partnership Between SHINE, Janesville, and the State of Wisconsin

- Provides many benefits for SHINE
 - Tax incentives
 - Loan assistance to help business start-up
 - Utility assistance
 - Logistical support, including excellent cooperation from City and State leaders
 - Excellent support from local educational system, including Blackhawk Technical College and UW-Rock County
- In turn, SHINE promises benefits to the State and Region
 - Provides a high-tech solution for a global problem – excellent visibility, help attract additional businesses
 - Job creation (~150 expected)
 - Strong addition to the business tax base
 - High-tech facility to add to property tax base (currently estimated at ~\$85M)
 - Outreach, education, other "give-back" programs

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Features of the Janesville, WI Region

- SHINE was drawn to Janesville for many reasons, such as:
 - Highly skilled workforce with strong work ethic
 - Very engaged leadership (City, Rock 5.0, Forward Janesville, State)
 - Strong desire to promote economic development
 - Exceptional infrastructure
 - Airport proximity, I-90 corridor, centrally located
 - Competitive economic incentives
 - Influence in the region

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Summary

- The NRC quickly developed guidance to address the new technology
- SHINE has designed a very safe, environmentally conscious approach to solving a global health issue
- Working with the regulatory community (NRC, FDA, state and local governments), SHINE has made significant progress
- SHINE technology has tremendous benefits
- Progress continues on technology, design, and licensing
- Will create ~150 good-paying jobs in Janesville, WI; add to tax base; become a strong community partner

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Questions?

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