



COVIDIEN

Covidien's Experience with the Conversion from Highly Enriched Uranium (HEU) to Low- Enriched Uranium (LEU)

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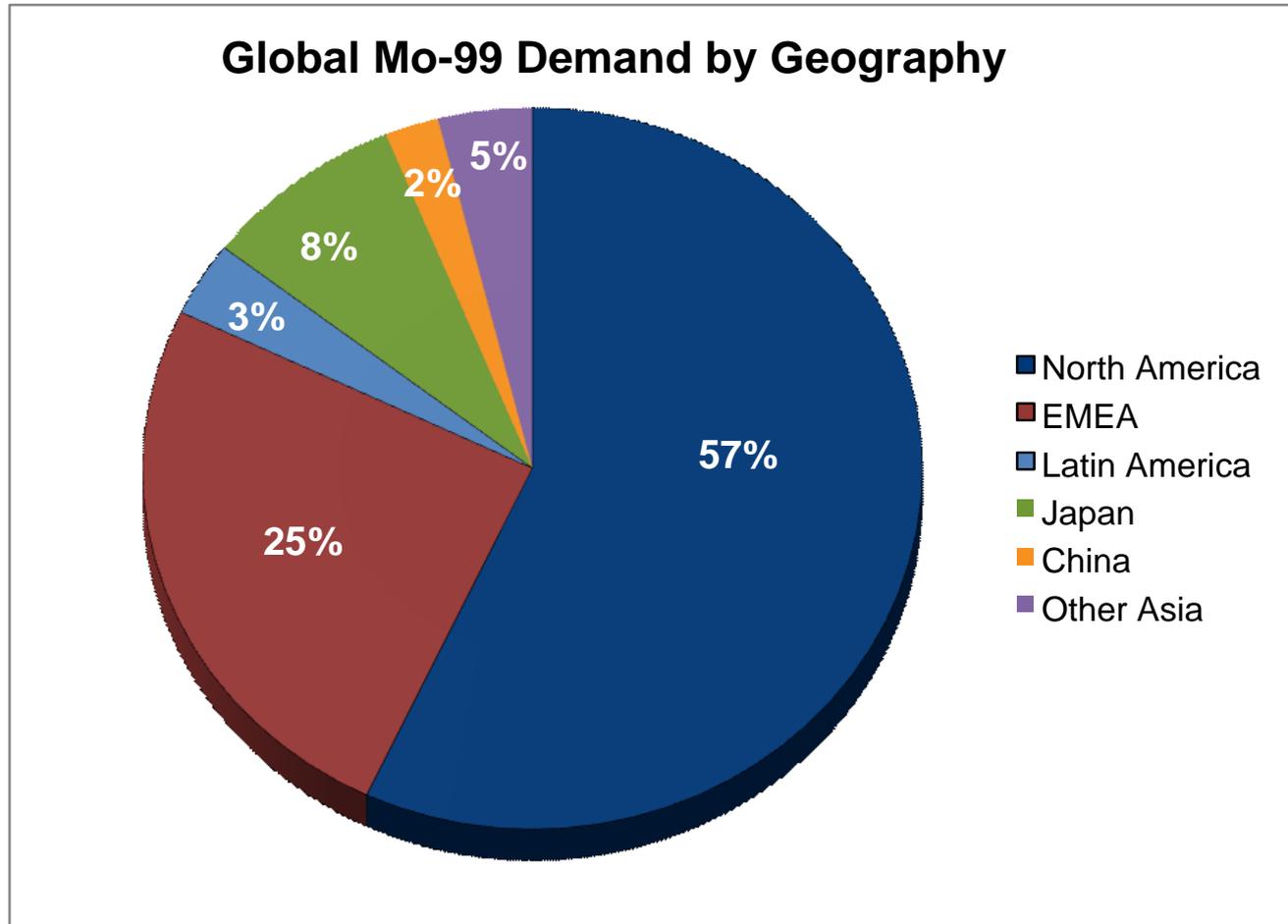


Covidien's Commitment to Conversion

- Committed to the conversion from HEU to LEU
- Two technology efforts underway utilizing LEU technology
 - Aqueous Homogeneous Reactor (AHR) project with Babcock & Wilcox Technical Services Group (B&W)
 - Designed to use LEU fuel to produce molybdenum-99 (Mo-99) with less waste
 - Intended for use in the U.S.
 - Conversion of Mo-99 targets from HEU to LEU at our Petten, the Netherlands, processing facility
 - Working closely with the Nuclear Research consultancy Group (NRG) and the Company for the Study of Atomic Fuel Creation (CERCA) in the development of suitable LEU targets
- Continue to evaluate other LEU-based Mo-99 technologies being developed
- Covidien/NRG/CERCA will require HEU until the conversion to LEU targets is complete to ensure patient access to vital diagnostic procedures



Mo-99 Market Demand and Growth*



Mo-99 growth in mature markets: 2% Mo-99 growth in developing markets: 3-5%**

*Sources: Internal data. OECD report "The Supply of Medical Isotopes", June 2011.

Technetium-99m (Tc-99m) Market Summary

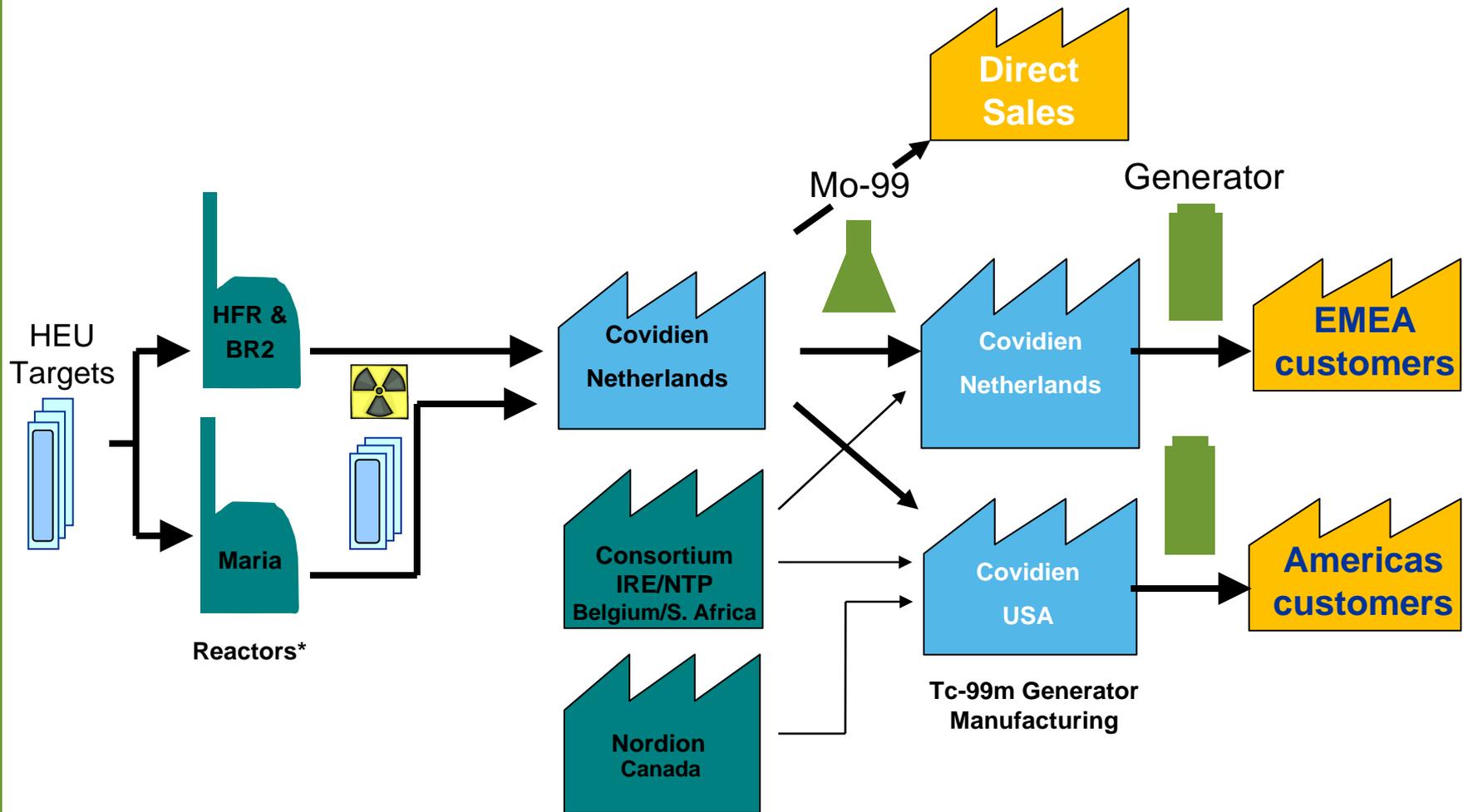
- The Tc-99m market continues to remain strong
- Procedure volumes, which dipped during the Mo-99 shortage, are expected to return to pre-shortage levels within the next few years
- The installed base of SPECT and SPECT/CT* cameras favor Tc-99m SPECT imaging vs. PET**

*Single-photon emission computed tomography/computed tomography

**Positron emission tomography



Covidien's Current Mo-99 Supply Chain



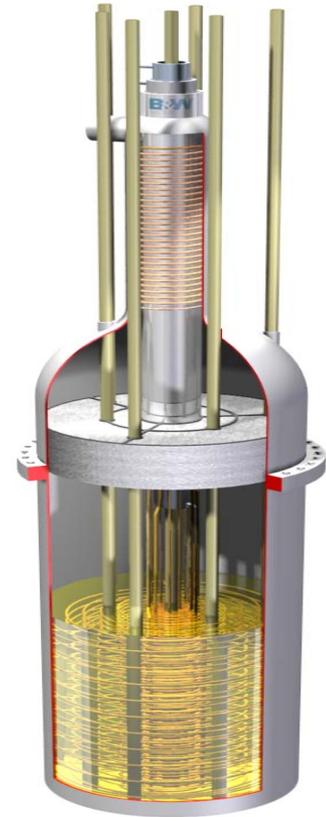
*High-Flux Reactor, Netherlands
 BR2 Reactor, Belgium
 Maria Reactor, Poland (Covidien exclusive)

Mo-99 Processors



Update on B&W Project

- Development of an AHR
- LEU-based fuel, no separate target required
- Completed milestones
 - Facility & process design
 - Conceptual design
 - Reactor simulation code
 - Off-gas system design
 - Extraction column design & sorbent
- Process simulation underway
- Mo-99 successfully produced in “mini-loop” at reactor in Argentina, meeting specifications



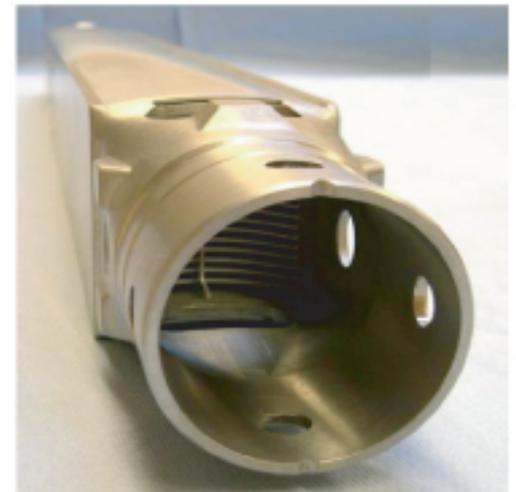
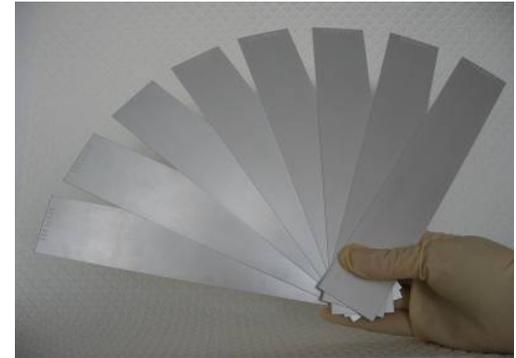
Drawing of B&W AHR

Conversion of Covidien Mo-99 Processing Facility Targets to LEU

- Original goals of conversion project
 - Convert from HEU to LEU targets
 - Complete conversion as soon as technically feasible
 - Design a target to maintain a Mo-99 production efficiency of 90% of current level
 - Retain as much of the current configuration as practicable (to control costs and expedite schedule)
 - Convert with minimal transitional disruption to Mo-99 supply
 - Provide robust process and redundancies to ensure uninterrupted supply for the future
 - Minimize waste for ecological considerations

Conversion from HEU to LEU Targets

- Current target is a plate type with the uranium (U) UAl_x meat inside a laminated aluminum exterior
- Target plates are stacked inside target rig for irradiation in reactor
- Total U content will increase due to reduced enrichment
- Advanced technology has been employed to maximize the amount of U per volume without impacting current extraction/purification process
- Change in target cladding was made which required change in dissolution chemistry
- Close coordination is maintained with target manufacturer to ensure robust design



Costs of Conversion to LEU Targets

- There are multiple cost components to the development and use of new LEU targets
 - Upfront development costs
 - Facility modification costs
 - Regulatory costs
 - Operational cost of using new targets
- These costs require upfront investment several years before LEU-based Mo-99 is produced
- Conversion to LEU targets will have inherent loss of efficiency
 - Conversion from 93% to <20% U-235 enrichment
- Development of a new target creates a conflict between taking the time necessary to optimize a new LEU target versus trying to stay on a reasonable schedule

Detail on Costs of Conversion to LEU

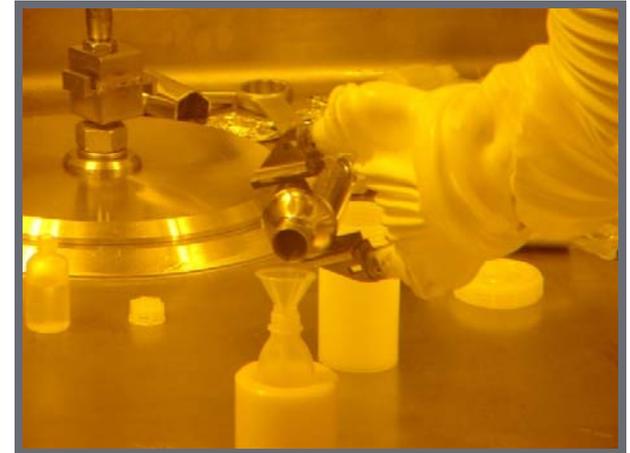
- Upfront development costs
 - Target design, trial irradiations, post irradiation evaluations, new waste effluent process
- Facility modification costs
 - Modifications to existing processing lines, new transport containers for targets
- Regulatory costs
 - New drug master file (DMF), cost of validation runs, drug supplement submissions, licensing costs for amendments to reactors, processing facility and containers
- Operational cost of using new targets
 - Additional waste disposal charges

Regulatory Needs

- New batch records will need to be written for processing targets
- DMF will need to be written for new process
 - Must be filed with regulatory authorities
- Tc-99m generators will need to be produced from multiple LEU-based Mo-99 validation batches
- Supplements will need to be filed for U.S. Food and Drug Administration and European Medicines Agency, and in other countries where generators are sold
- Validation and licensing of new target transport container will be needed
- License upgrades will be needed at Mo-99 production facility and at all relevant reactors

Operational Costs

- Fixed costs
 - Plant overhead will remain the same
 - Liquid waste disposal costs (fixed fee paid to waste facility in addition to volume fees) will rise with LEU use due to higher volume needs
 - Irradiation positions in reactor will likely remain the same
 - Contractual purchase obligations will likely remain the same



Mo-99 Process



Hotcells

Results of Conversion Efforts to Date

- Original target design had to be modified
 - The resulting yield was less than desired
 - Decision made to stick with modified design to keep project on track
 - The result will be a less-than-optimal target and increased cost
- The new target design chosen is not entirely compatible with all the reactors' target rigs currently in use
 - In some cases the number of targets per rig will need to be reduced
 - This will result in lower production efficiency
 - Target rig re-design is also being examined, which would require further capital investment

Covidien Remains Committed to LEU Conversion

- Covidien will continue conversion of its Petten, the Netherlands, Mo-99 processing facility to LEU
- Covidien's conversion program is in full compliance with the recommendations of the OECD
- The current expected date of first commercial production of LEU-based Mo-99 is 2015
- We have sacrificed target yield optimization to minimize the time for conversion