Time for an International Commitment to End Use of HEU for Mo-99

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Outline

dA Nonproliferation Perspective

HEU-based medical isotopes: Phasing Out?

Positive Developments & Challenges

What’s Needed?

2014 NSS Commitments
HEU-based Medical Isotopes: Phasing Out?

▓ Current Major Mo-99 production reactors and processors in Europe, Australia, South Africa, Canada, Russia

▓ All have said shifting from HEU at some point in next few years

▓ South Africa/Australia have shifted already

▓ European producers by 2015

▓ Canada shutting NRU by 2016; switching to non-LEU

▓ Russia’s RIAR to use own HEU-based targets and HEU-fueled reactor for supply to MDS Nordion in near future; but Russians have pledged to convert
# Medical Isotopes: Current U.S. Mo\(^{99}\) / TC\(^{99m}\) Supply Matrix

<table>
<thead>
<tr>
<th>Reactor</th>
<th>Mo(^{99}) Extraction &amp; Purification</th>
<th>Tc(^{99m}) Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maria * Poland</td>
<td>Covidien Netherlands</td>
<td>Covidien</td>
</tr>
<tr>
<td>HFR* Netherlands</td>
<td>IRE Belgium</td>
<td>Lantheus</td>
</tr>
<tr>
<td>BR2* Belgium</td>
<td>NTP South Africa</td>
<td></td>
</tr>
<tr>
<td>LVR-15* Czech Republic</td>
<td>AECL Canada</td>
<td></td>
</tr>
<tr>
<td>OSIRIS * France</td>
<td>NTP South Africa</td>
<td></td>
</tr>
<tr>
<td>SAFARI * South Africa</td>
<td>AECL Canada</td>
<td></td>
</tr>
<tr>
<td>NRU Canada</td>
<td>NTP South Africa</td>
<td></td>
</tr>
<tr>
<td>RIAR Russia</td>
<td>ANSTO Australia</td>
<td></td>
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<tr>
<td>OPAL Australia</td>
<td>RIAR Russia</td>
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**Key**

- HEU Fuel & HEU Target
- LEU Fuel & HEU Target
- LEU Target & LEU Fuel
- HEU Processing
- LEU Processing

* Converting to LEU targets
Policy Successes

- March 2012 Nuclear Security Summit
- June 2012 White House Policy
- Summer-Fall 2012: New Russian Commitments (?)
- Jan 2013– New U.S. law
2012 Nuclear Security Summit

Important steps toward eliminating HEU in Mo 99 production

Communique:

(1) “We encourage States to take measures to minimize the use of HEU taking into account the need for assured supplies of medical isotopes, and encourage States in a position to do so, by the end of 2013, to announce voluntary specific actions intended to minimize the use of HEU.

We also encourage States to promote the use of LEU fuels and targets in commercial applications such as isotope production, and in this regard, welcome relevant international cooperation on high-density LEU fuel to support the conversion of research and test reactors.”
Joint Statements ("Gift Baskets")

-belgium, france, and the netherlands pledged to eliminate heu use in medical isotope production by 2015
-belgium, france, rok, and u.s. promised to cooperate in development and testing of new high-density leu fuel
Obama administration announced steps to encourage purchases of LEU-based Mo-99:

- “Calling upon the Mo-99 industry to voluntarily establish a unique product code or similar identifying markers for Mo-99-based radiopharmaceutical products that are produced without the use of HEU;” (In Progress

- “Preferentially procuring, through certain U.S. government entities, Mo-99-based products produced without the use of HEU, whenever they are available, and in a manner consistent with U.S. obligations under international trade agreements;” (Underway with VA soon

- “Examining potential health-insurance payment options that might promote a sustainable non-HEU supply of Mo-99;” (Limited Effect and Challenges - $10 differential for medicare/medicaid)

- “Taking steps to further reduce exports of HEU that will be used for medical isotope production when sufficient supplies of non-HEU-produced Mo-99 are available to the global marketplace;” (One last shipment? )

Continued on next page.
June 2012 Commitments (2)

☞ “Continuing to encourage domestic commercial entities in their efforts to produce Mo-99 without HEU during the transition of the Mo-99 industry to full-cost-recovery, and directing those resources to the projects with the greatest demonstrated progress;”  (Yes)

☞ “Continuing to provide support to international producers to assist in the conversion of Mo-99 production facilities from HEU to LEU.”  (Yes)

American Medical Isotope Production Act

Signed into law by President Obama January 2, 2013

- Incentivizes U.S. medical isotope production using LEU
  - Bans U.S. exports of HEU for targets, fuel to WEU and Canada over a 7-13 year period. Goal is phase out by 2020.
  - Authorizes cost-sharing arrangements to generate domestic isotope production
    - But emphasis on non-reactor technologies? Does this make sense?

- Establishes U.S. government responsibility for waste disposition
Nicholas Archangelsky from Rosatom made speech at October RERTR conference in Poland

Said Rosatom Chief Kiriyenko had launched program to consider converting

- all civil Russian HEU reactors to LEU and
- Mo-99 target conversion to LEU

Short term— projects that don’t require new fuel types

- Includes ARGUS reactor for MO-99 production
- Feasibility study on converting Obninsk-NIFKHI—uses same fuel assemblies as WWR-K in Kazakhstan-used for domestic Mo-99 production

Medium term-

- Obninsk conversion
- Conversion from HEU targets in RIAR

Long term- development of certain HD fuels—needed for RIAR reactors

Rhetoric is good, but lack specifics

Apparently having technical problems with product
Policy Challenges

- Need for Russian implementation of commitments
- Need for other countries to match U.S. policy changes
- Need for licensing non-HEU Tech-99, Mo-99 especially in Europe
- Implementation of full cost recovery
  - needed for new producers to come online & new processors
  - not primarily an HEU conversion issue but will affect public acceptance
  - Leave debate to others on how to handle this transition
What’s needed?

- **International:** Commitment by leaders at the 2014 NSS

- **Suggested Communique Language**
  - Commitment to end the use of HEU in Mo-99 production
  - Ideally by December 31, 2016 but Russians may balk
  - Pledge to engage in full cost recovery as defined by NEA
  - Support for Providing Developing Ctrys with Technology for indigenous production and supply of Mo-99
What’s needed? (2)

Potential “Gift Basket” from Key NEA Members–US, EU, Japan, South Korea, and Australia

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- Pledge to adhere to December 31, 2016 deadline for ending HEU-based production if not included in communique with a fallback if NEA says insufficient global non-HEU production capacity is available.

- Pledge to ban the use of HEU-based Mo-99 by December 31, 2016, assuming the NEA certifies that a sufficient supply of LEU-based Mo-99 exists at that time.

- Commitment to enact policies to expedite medical licensing, engage in preferential procurement, and provide sufficient reimbursement for non-HEU based Mo-99 by the end of 2014.

- Seek to expand the pledges regarding HD targets and qualification

- Pledge to make significant contribution to efforts to help developing ctys develop domestically oriented mo-99 programs.
What’s needed? (3)

❖ U.S. : On Right Track but tweaks needed
❖ Congress needs to Ban the Use of non-HEU based Mo-99 by December 31, 2016 w/ fallback if insufficient supplies available.
❖ Congress should hold hearings on issue to discuss this and implementation of American Medical Isotopes Act and Medicare Rule. Consider if any other tweaks needed for transition.