

NNSA's Mo-99 Topical Meeting
Santa Fe, NM
Dec. 6, 2011



GE Hitachi Nuclear Energy

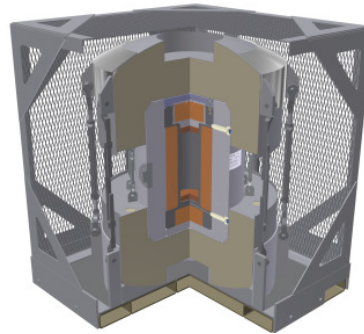


HITACHI

NEPA Review



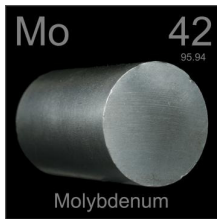
Reactor (research or BWR) irradiation
 ^{98}Mo to ^{99}Mo



Shipping



$^{99\text{m}}\text{Tc}$ Generator
Manufacture



Mo Target
Preparation

Molybdenum Life Cycle



Compounded by
pharmacist for use



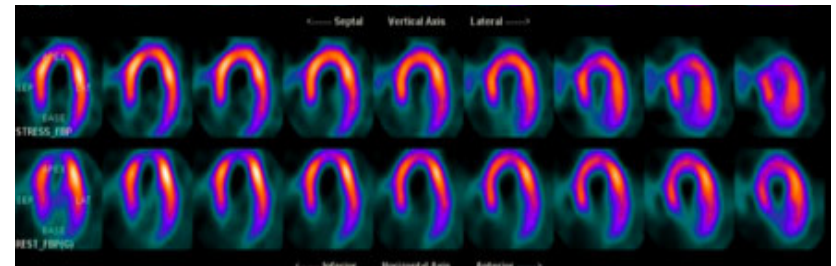
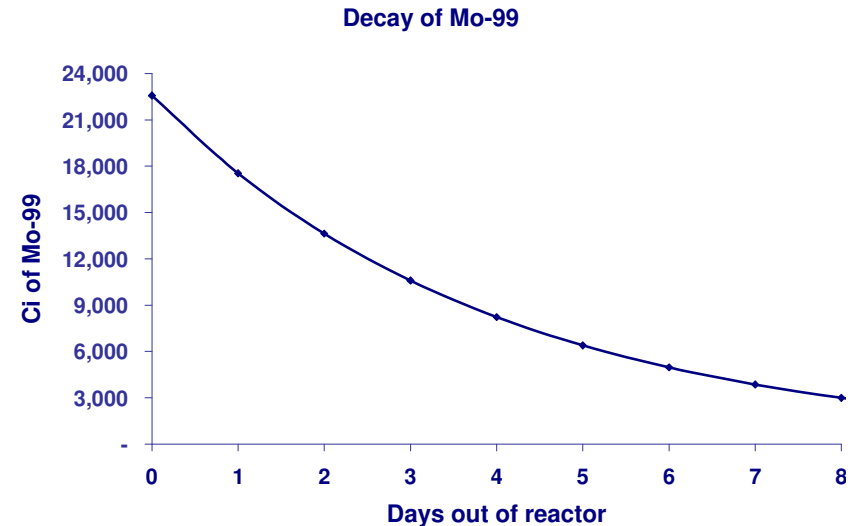
Patient Application



HITACHI

GEH's ^{99}Mo production goal

- **GEH Goal**...Produce up to 3,000 6-day Ci of ^{99}Mo /week which equals ~50% of domestic demand
- **What is a 6-day Curie?**...Amount of curies due to ^{99}Mo six days after the Tc generator is on manufacturer's shipping dock
- **Short Half Life**...Allowing two days for transport and generator fabrication, approximately 23,000 Ci of ^{99}Mo is required upon removal from reactor
- **Manageable Mass**...Specific activity required activation of approximately 25 kgs of Mo every week .



Myocardial perfusion SPECT – stress/rest

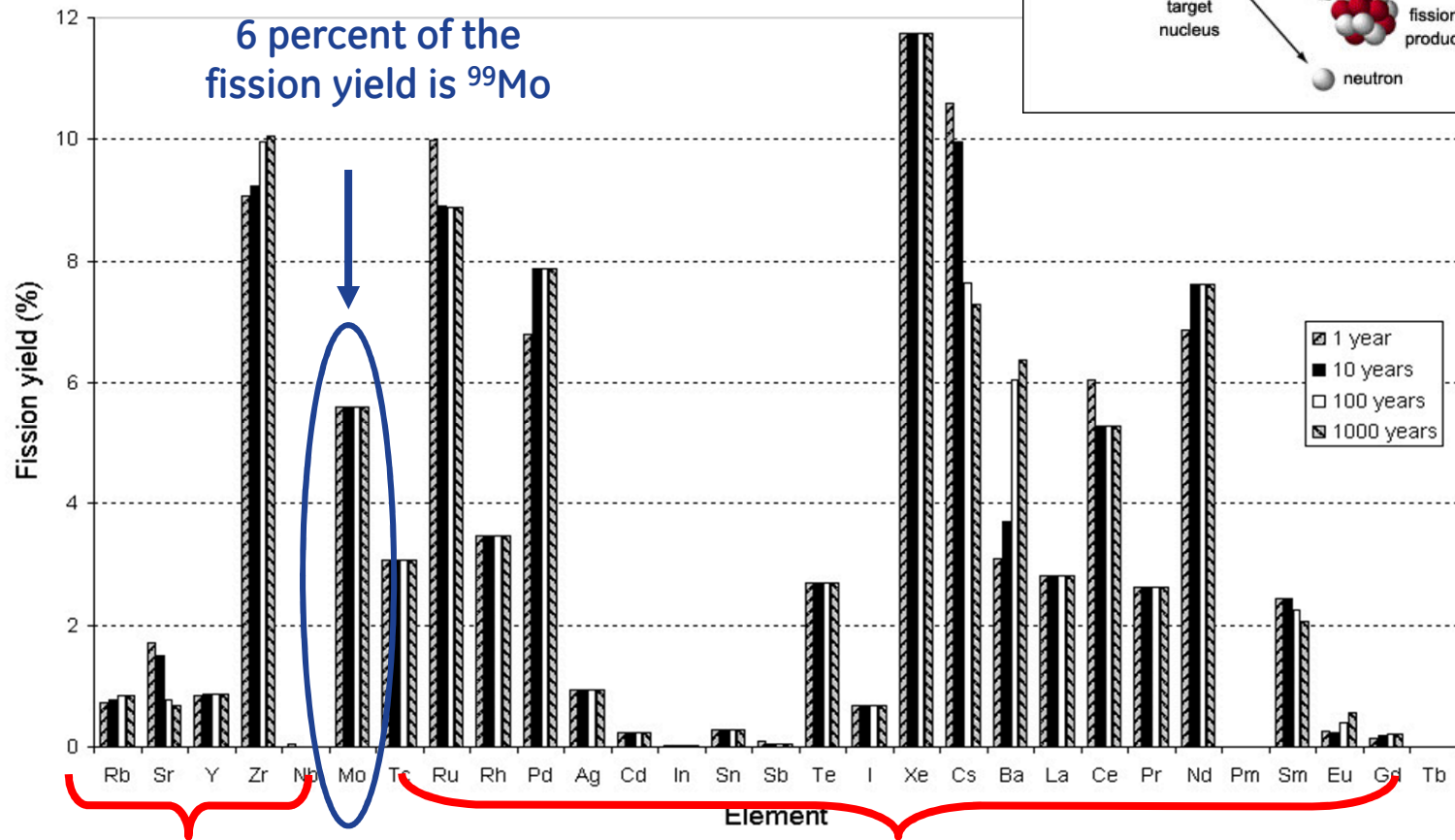
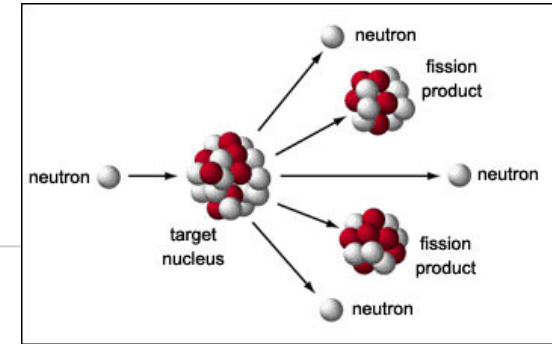
Myocardial perfusion SPECT- stress/rest scan in a patient with dilated cardiomyopathy.



HITACHI

How is ^{99}Mo currently produced?

Currently Produced by Fission of Highly Enriched Uranium Targets

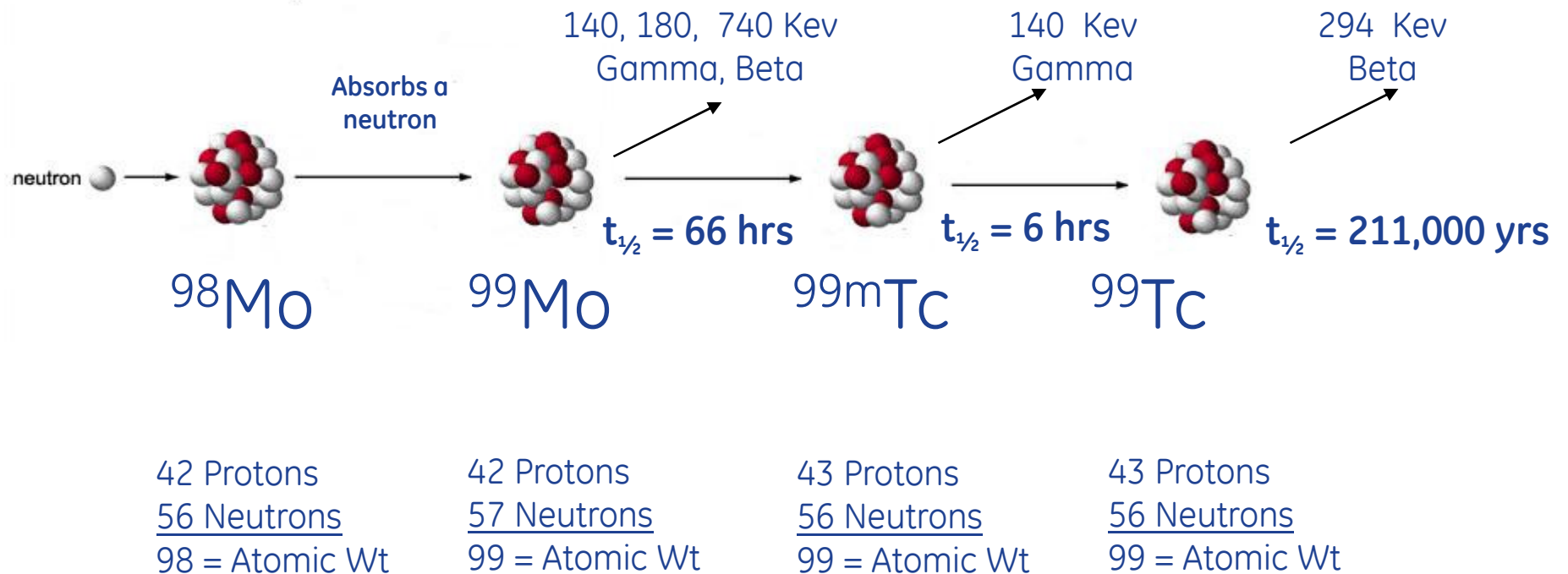


HITACHI

Fission Product Waste (Spent Fuel)

GEH method to produce ^{99}Mo

GEH process uses neutron capture to produce the parent of $^{99\text{m}}\text{Tc}$ from ^{98}Mo



HITACHI

GEH's process advantages

	Traditional Method	GEH Method
Target Composition/National Security	High Enriched Uranium	Natural Molybdenum
Waste/Environment	High Level Radioactive Waste	Low Level Radioactive, not Hazardous (RCRA) waste
Chemistry	Complicated separations of Mo from Uranium	Simpler process, no uranium complications
Supply Reliability	Unreliable supply	BWRs (>90% CF) produces reliable supply
Cost	Requires new build	Leverages current infrastructure



HITACHI

Benefits of ^{99}Mo project

- **Saves lives**...Consistent supply of important medical isotope for the U.S.
- **National Security**...Allows White House to achieve their goal of producing molybdenum-99 without the use of HEU
- **Environmentally Favorable**...Generates U.S. imaging medical isotope supply without creating HLW
- **Asset Utilization**...Provides important medical isotope without the need for new reactors, while leveraging proven and licensed equipment

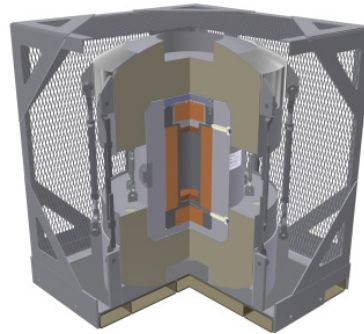


HITACHI

NEPA Review



Reactor (research or BWR) irradiation
 ^{98}Mo to ^{99}Mo

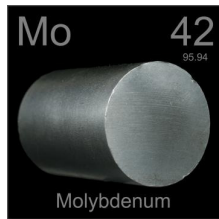


Shipping



$^{99\text{m}}\text{Tc}$ Generator
Manufacture

Molybdenum Life Cycle



Mo Target
Preparation



Patient Application



Compounded by
pharmacist for use



HITACHI