Global Nuclear Energy Partnership

What is it? How does it relate to Yucca Mountain?

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to the

Nevada Commission on Nuclear Projects

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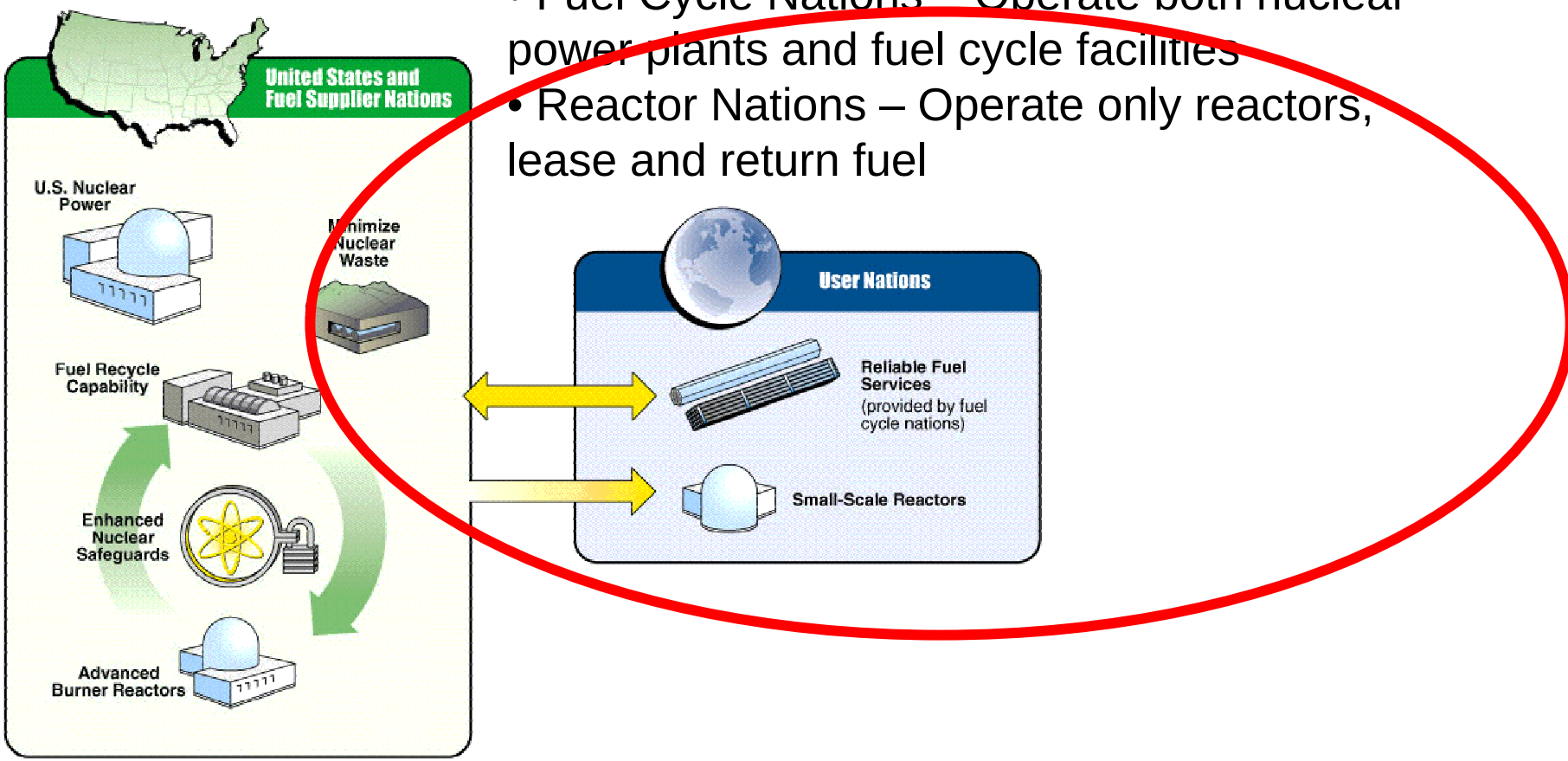
Budget

- President Bush has provided $250 Million in the Department of Energy's 2007 Budget
- It is an initial step of an ambitious plan to accelerate the development of nuclear technologies as part of GNEP

Global Nuclear Energy Partnership

- Expand nuclear energy while preventing spread of sensitive fuel cycle technology
- Fuel Cycle Nations – Operate both nuclear power plants and fuel cycle facilities
- Reactor Nations – Operate only reactors, lease and return fuel



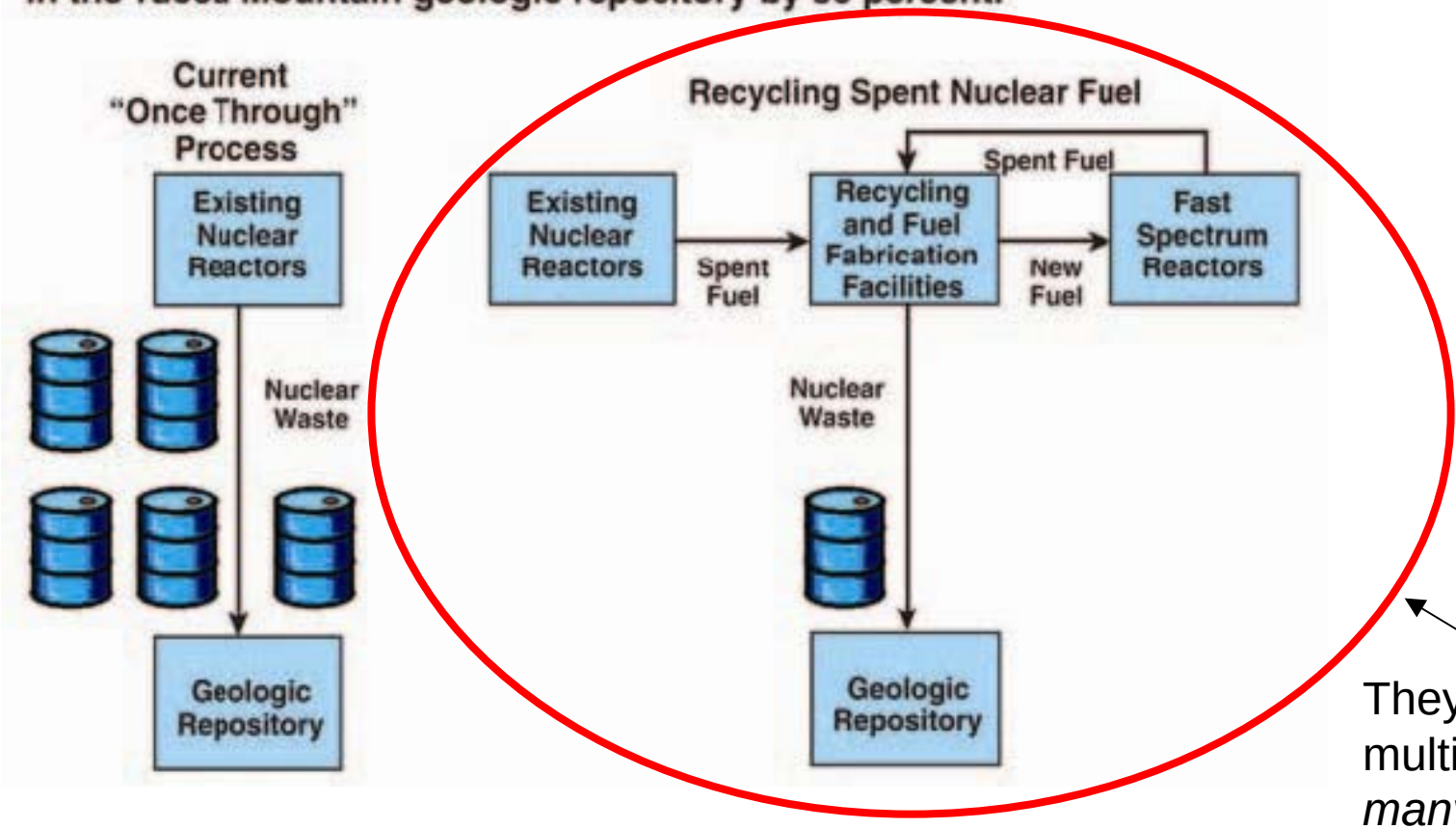
Minimize Nuclear Waste

- Significantly reduce the volume of nuclear waste to be disposed of in Yucca Mountain, making disposal less complex and minimizing the need for additional repositories

- Repository needed in all cases
- Aggressive plan to proceed
- One repository can meet U.S. needs this century with GNEP

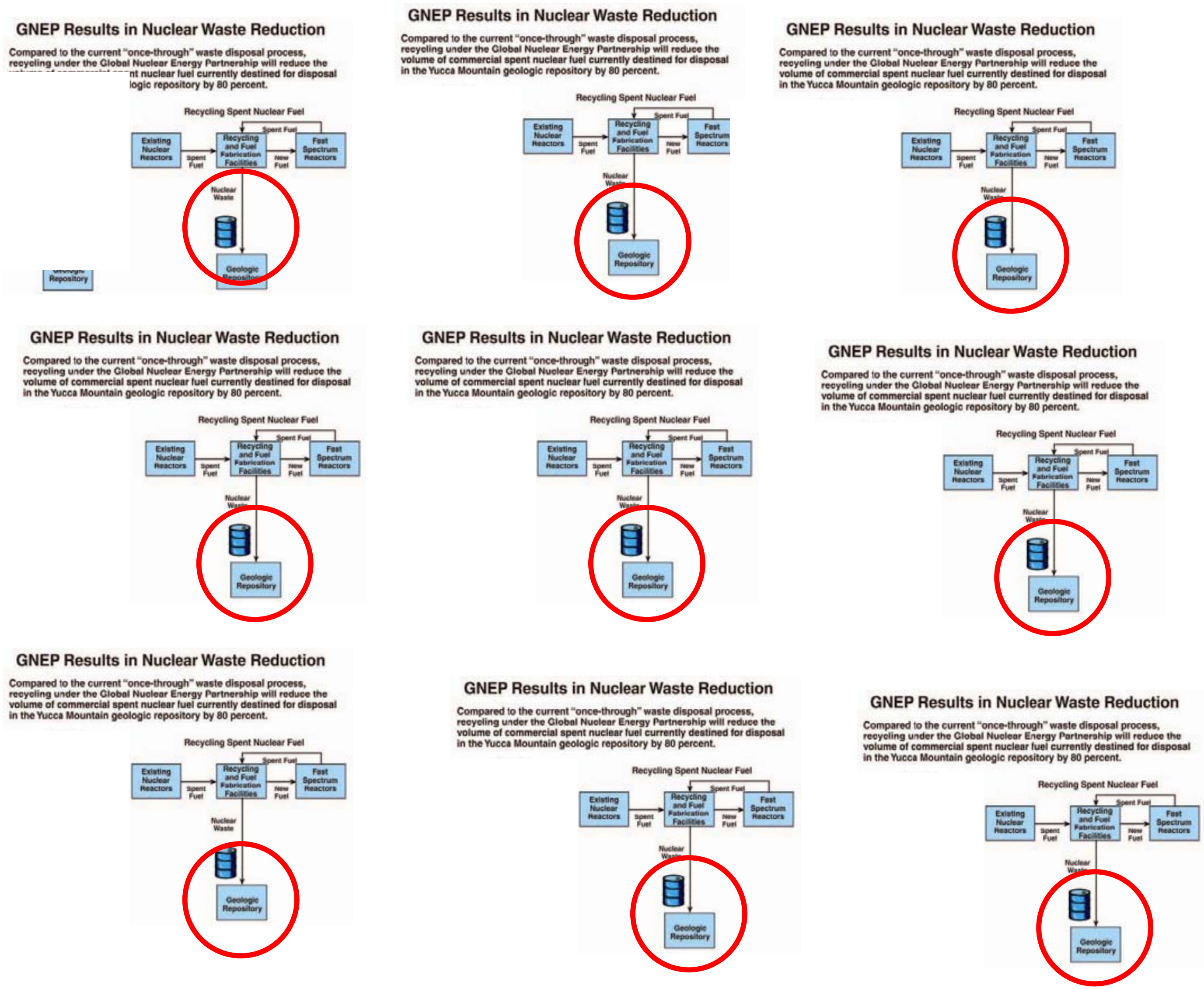
GNEP Results in Nuclear Waste Reduction

Compared to the current "once-through" waste disposal process, recycling under the Global Nuclear Energy Partnership will reduce the volume of commercial spent nuclear fuel currently destined for disposal in the Yucca Mountain geologic repository by 80 percent.



They plan to multiply this *many times*

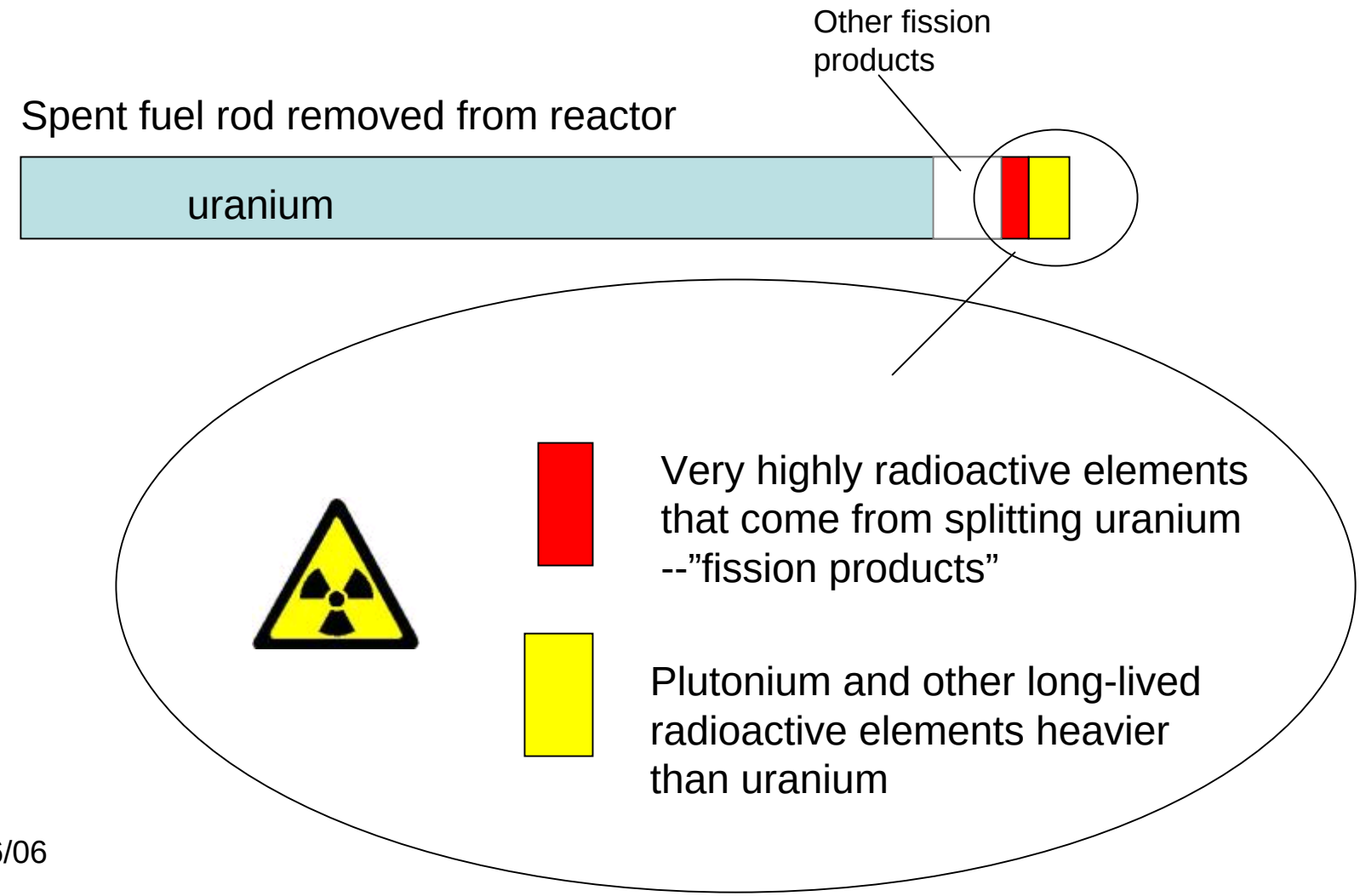
The Real Alternative



GNEP Starting Point: How to Pave Way for *Hundreds* of New Plants?

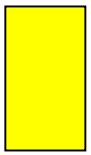
- White House/DOE see the waste problem as the main obstacle to hugely increased nuclear use
- They still think they'll get Yucca Mountain licensed, but . . .
- Nevada's opposition convinced them they won't ever get another repository
- So they want to increase Yucca Mountain's capacity, which is mainly limited by the heat from the radioactive spent fuel
- How?

Some Basics on Commercial Spent Fuel



The GNEP Answer

1. Leave the hottest and most radioactive waste—strontium and cesium—on *the surface* for a few hundred years

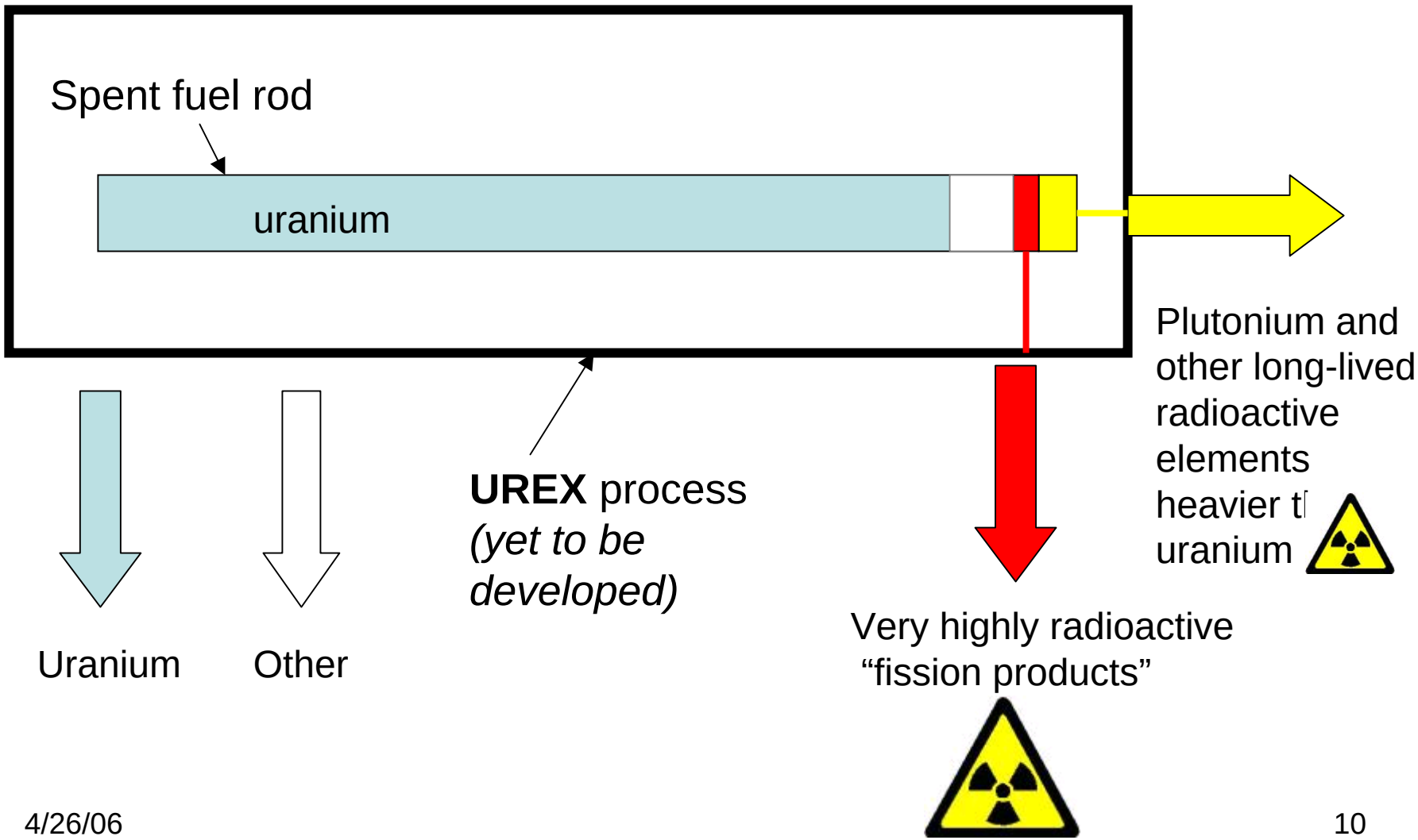


2. Burn the plutonium and other heavy elements in a new generation of fast reactors (that have yet to be developed)

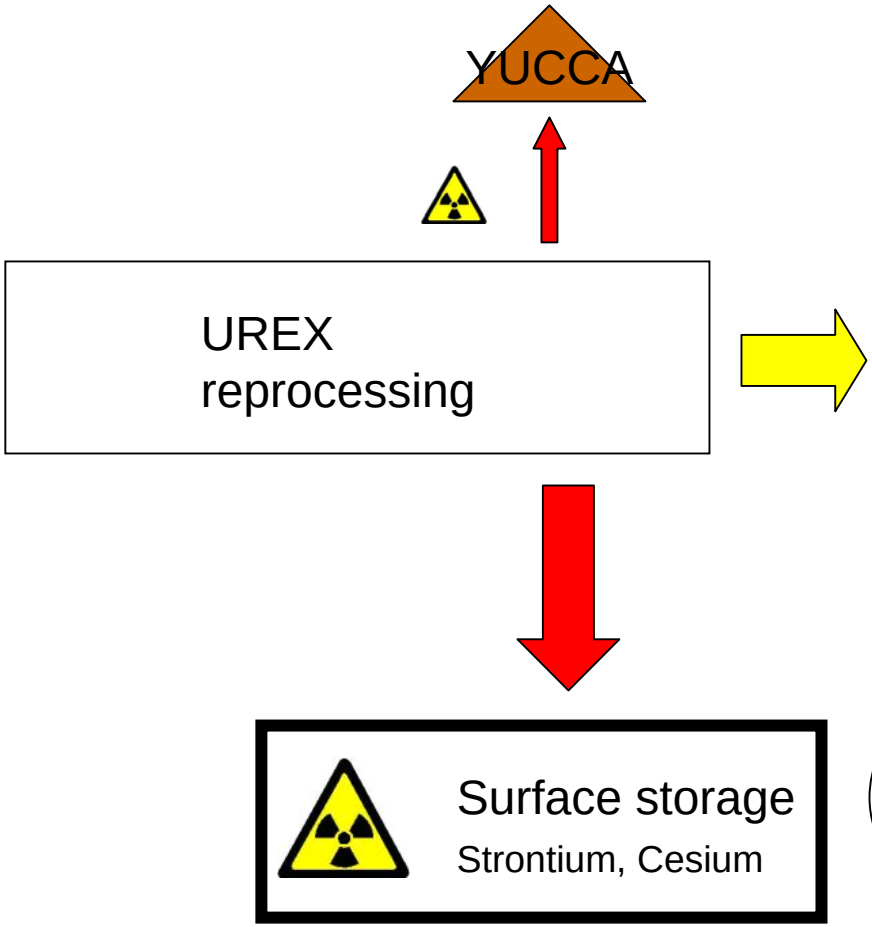
3. Put the radioactive residue into Yucca Mountain—which would then handle *many times* as many reactors as now contemplated

Keep in mind: this is all in the "pre-conceptual" stage

GNEP: Separate Spent Fuel into Constituents Using "UREX" Reprocessing



GNEP: Leave Hottest Stuff on Surface

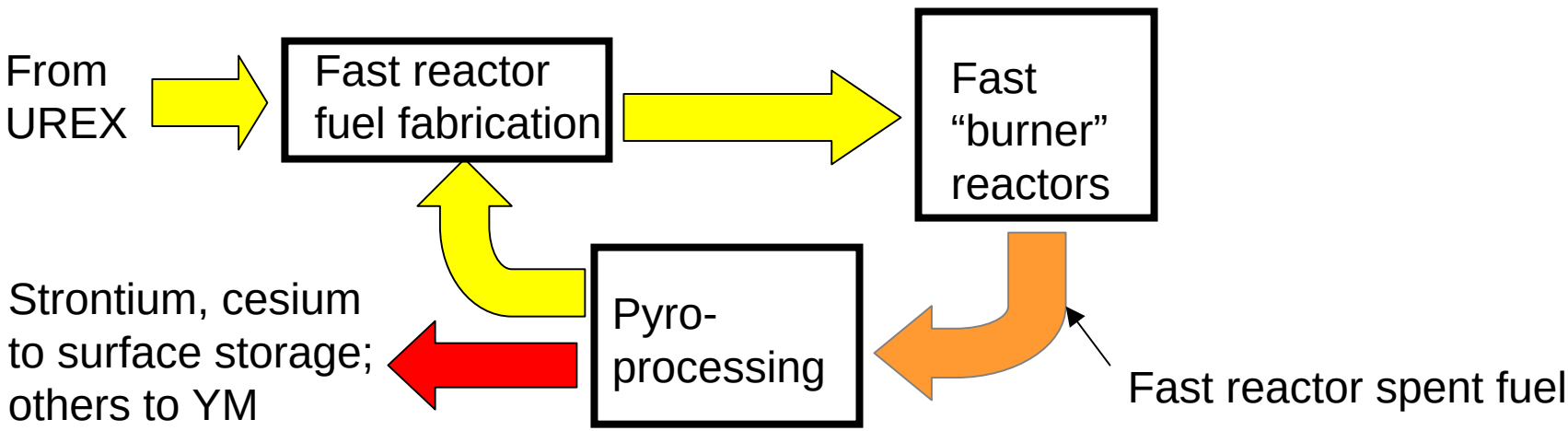


- Strontium and cesium
  - Dangerous for hundreds of years
  - Main initial radioactive heat sources
  - Leaving it out sharply reduces heat load and increases repository capacity

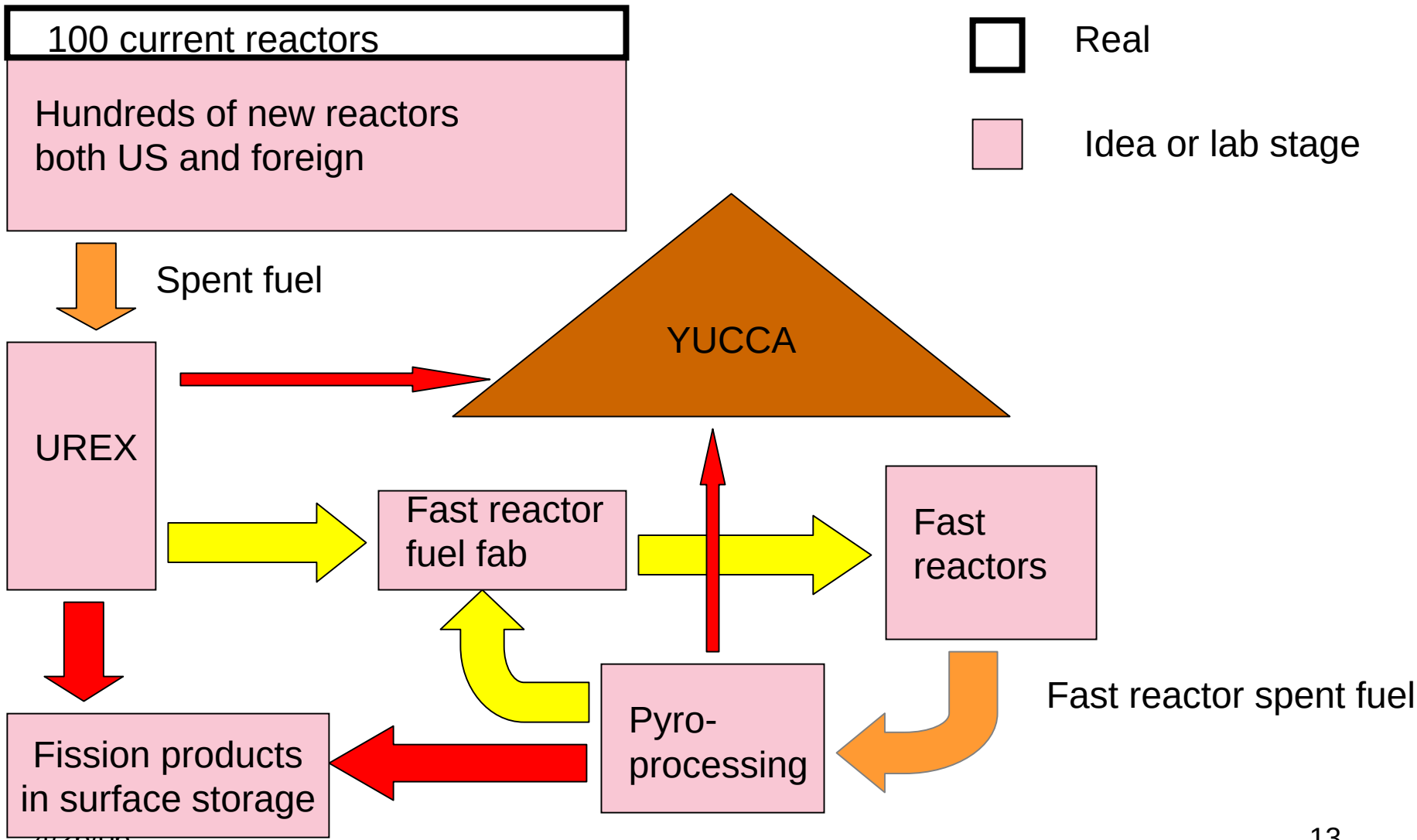
But if you are going to leave the most dangerous part on the surface, why not avoid all the complications and store the spent fuel on the surface?

GNEP: Use Plutonium, etc., to Fuel Fast Reactors

- Plutonium and similar elements are the long-term radioactive sources—for many thousands of years and longer
- *In principle*, they can be used to fuel "fast reactors"
- To "burn" most of it up would require *many passes* through the reactors
- So you have to reprocess and recycle the fast reactor fuel
- This requires a different reprocessing scheme (pyroprocessing?) for the fast reactor fuel



The Whole GNEP Vision



Now Back to Reality

- GNEP idea has lots of problems, among which
  - Many uncertainties over scaling up advanced reprocessing technologies from the lab
  - Would need many reprocessing plants (safety, security problems)
  - Would need many fast reactors to make it work—about 1 for every 5 ordinary ones
  - The system costs would be astronomical
- In short, some demo plants might get built (at much higher costs than estimated) and the national labs will get to play with new technology, but GNEP is not our nuclear future

Meanwhile, GNEP goal of reprocessing US and foreign spent fuel is at odds with current DOE plans for Yucca Mountain and *will likely complicate DOE's efforts to license the site*