

# Nuclear Power Advocacy in California

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Plant Bowen in Cartersville, GA – The largest coal plant in the US, which consumes 1100 tons coal per HOUR



# Critical Review and Questions

## COMMISSION REPORT

### 2013 INTEGRATED ENERGY POLICY REPORT



CALIFORNIA  
ENERGY COMMISSION

Edmund G. Brown Jr., Governor

JANUARY 2014

CEC-100-2013-001-CMF

## Regarding the 2013 Integrated Energy Policy Report (IEPR):

"While California is a leader in addressing climate change, further work is needed to reduce greenhouse gas emissions and prepare California's energy system for the impacts of climate change," said Energy Commissioner Andrew McAllister. "Our economy, environment, and public health depend on cutting carbon along with criteria pollutants and investing in the infrastructure needed to deliver safe, reliable and affordable energy. This report identifies what we need to do immediately and in the years ahead if we are to realize our future energy and climate goals."

**“Monitor and evaluate interest in exporting liquefied natural gas.** Monitor the current national interest in exporting liquefied natural gas and the analyze implications of this for California’s natural gas supply needs.”

 **Immediately**

**In the years ahead**

**Future energy and climate goals**

**“Monitor changing revenue dynamics for natural gas.** Monitor changing natural gas corporation revenue requirements and their potential effects on ratepayers in an era marked by shale abundance, generation shifts away from coal, and expiring pipeline contracts and the implications for maintaining necessary supply flows into California.”

 **Immediately**

**In the years ahead**

**Future energy and climate goals**

**“Help implement the *2013 Zero-Emission-Vehicle Action Plan* and California’s high-speed rail. Provide guidance to implement the *2013 Zero-Emission-Vehicle Action Plan* and use electricity and alternative fuels in the California High-Speed Rail Project.”**

Immediately



In the years ahead

Future energy and climate goals

**“Develop a multiyear strategy to fund electric, hydrogen, and natural gas vehicle rebates.** The Energy Commission and California Air Resources Board should jointly prepare a multiyear strategy to estimate the need and amount of multiyear government funds required and revenue source options to fund electric, hydrogen, and natural gas vehicle rebates and incentives for related infrastructure.”

Immediately



In the years ahead

Future energy and climate goals



**Table 18: Alternative and Renewable Fuel and Vehicle Technology Program and Air Quality Improvement Program Funding Impact on Infrastructure and Vehicle Deployment in California (Through June 30, 2013)**

	<b>Fuel Area</b>	<b>Existing 2009-2010 Baseline Levels</b>	<b>Additions from ARFVT or AQIP Program Funding</b>	<b>Percent Increase</b>
Alternative Fueling Infrastructure	Electric	2,540 charge points	7,200 charge points (public, fleet and workplace)	283
	E85	39 fueling stations	205 fueling stations	525
	Natural Gas	443 fueling stations	50 stations	11
	Hydrogen	6 public fueling stations <i>(plus 5 more under construction)</i>	24 fueling stations	218
Alternative Fuel Vehicles	Electric Cars (ARB Vouchers)	13,268 (mostly neighborhood electric vehicles)	(8,903 – ARFVTP) 26,331 – Total AQIP*	198
	Electric Trucks	1,409	160	11
	Natural Gas Trucks	13,995	1,375	10

\* The Energy Commission has provided funding for 8,903 of these vouchers, about 33 percent of the total Clean Vehicle Rebate Project vouchers.

Source: Extrapolated from 2009 Department of Motor Vehicle data, plus actual deployment data. Electric truck and natural gas trucks extrapolated from 2009 data.

**“Fund research, development, and demonstration for technologies that reduce greenhouse gas emissions. Continue funding public-interest research, development, and demonstration on technologies that reduce California’s greenhouse gas emissions.”**

Immediately



In the years ahead

Future energy and climate goals

“Renewable energy is another of California’s top priorities, and the state continues to make progress toward achieving its goal of generating a third of its electricity using renewable resources like solar and wind.”

Immediately

In the years ahead



Future energy and climate goals

“To help ensure progress toward its 2050 greenhouse gas reduction goals, California needs to determine what the electricity system should look like in 2030 as an interim target.”

Immediately

In the years ahead



Future energy and climate goals

“A large portion of California’s energy needs has traditionally been met with natural gas. Natural gas supplies are currently plentiful and relatively inexpensive as a result of technological advances that allow recovery of natural gas from formations such as shale reservoirs that were previously inaccessible. However, potential environmental concerns are causing decision makers to reexamine the development of shale resources and consider tighter regulations, which could affect future natural gas supplies and prices.”

Immediately

In the years ahead



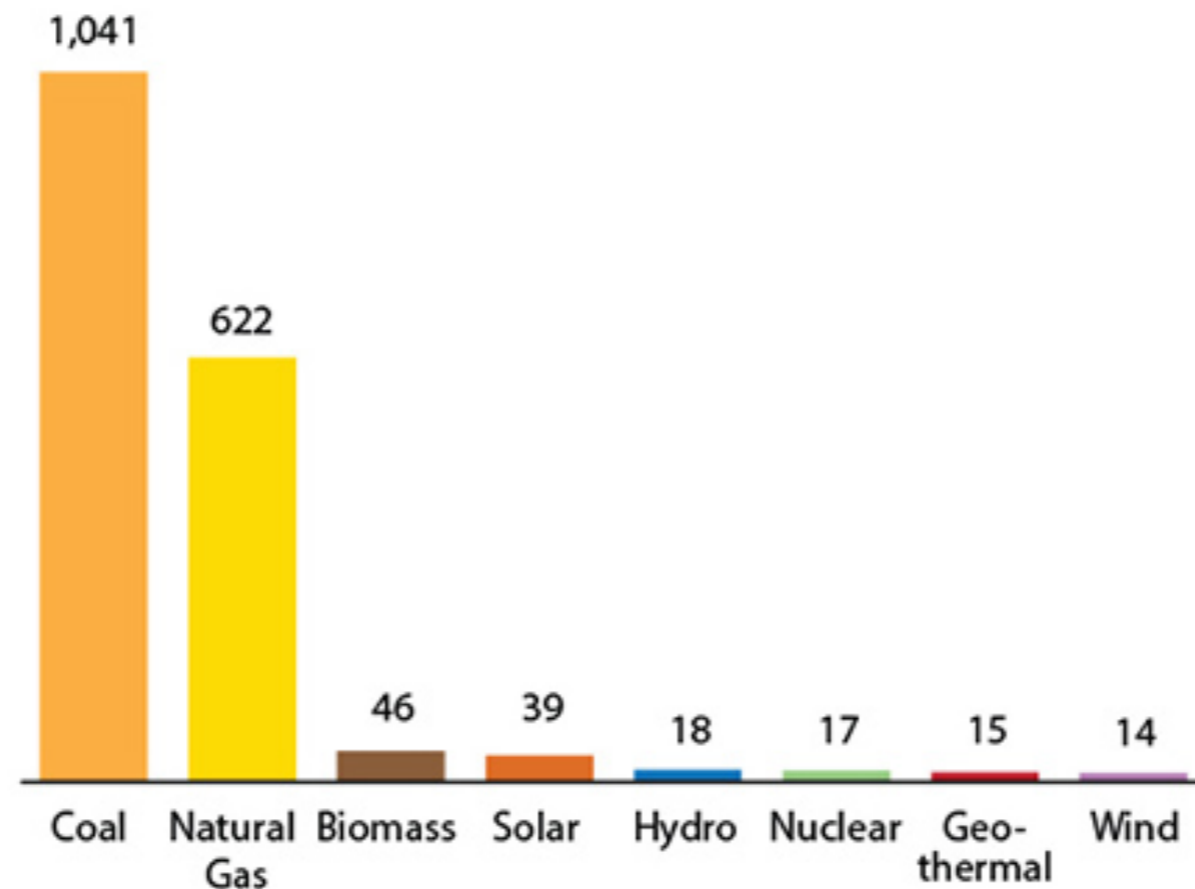
Future energy and climate goals

# Life-Cycle Emissions

Nuclear energy's life-cycle carbon emissions are comparable to those of renewable energy sources.

## Comparison of Life-Cycle Emissions

Tons of Carbon Dioxide Equivalent per Gigawatt-Hour



Independent studies show that nuclear energy's "life-cycle" emissions of carbon dioxide are about the same as wind and geothermal power and significantly less than other electricity sources. A life-cycle measurement takes into account the facility's construction, the mining and processing of fuel, routine operation, disposal of used fuel and the ultimate dismantling of the facility—in other words, its entire life cycle.

Source: Nuclear Energy Institute, January 28, 2014

<http://www.nei.org/News-Media/News/News-Archives/More-Scientists-Call-for-Nuclear-As-Climate-Change>

“California continues to depend upon out-of-state imports for nearly 90 percent of its natural gas supply, underscoring the importance of monitoring and evaluating ongoing market trends and outlook.”

“Increased public and private investment in the development of alternative and renewable fuel vehicles and fueling infrastructure is needed to achieve the goal of reducing the carbon intensity of California’s transportation fuels by at least 10 percent by 2020.”

Immediately

In the years ahead



Future energy and climate goals



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## Why the Increased Focus on Fukushima, Japan?

- “There are also seismic safety and spent fuel storage concerns with the remaining nuclear plant in the wake of the 2011 nuclear disaster in Fukushima, Japan.”
- Additional details in the Executive Summary
- Chapter 6: Nuclear Power Plants

# Palo Verde Nuclear Generating Station

Q: Why do we credit Palo Verde in Arizona, as a California energy source?

A: Let's look at the Station Ownership:

Arizona Public Service: 29.1%

Salt River Project: 17.5%

Southern California Edison: 15.8%

El Paso Electric: 15.8%

PNM: 10.2%

Southern California Public Power Authority: 5.9%

Los Angeles Department of Water and Power: 5.7%

SoCal Edison, SoCal PPA, and LA Water and Power, together own 27.4% of the station, so they get a specific amount of the power output.

<http://vimeo.com/user14666519/review/85499407/186d9659cb>

Nuclear Waste: Why do we call it “waste” at all?

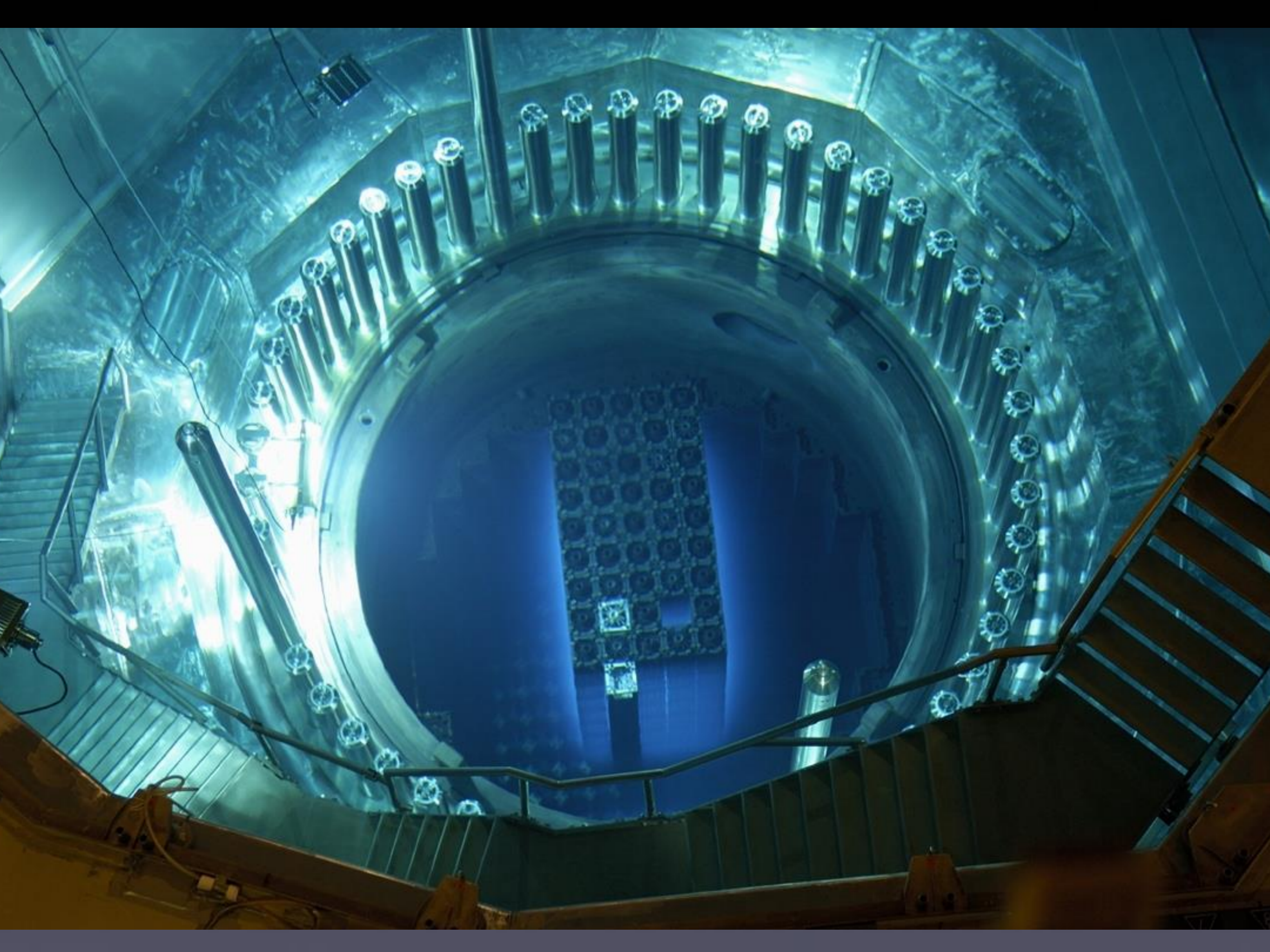


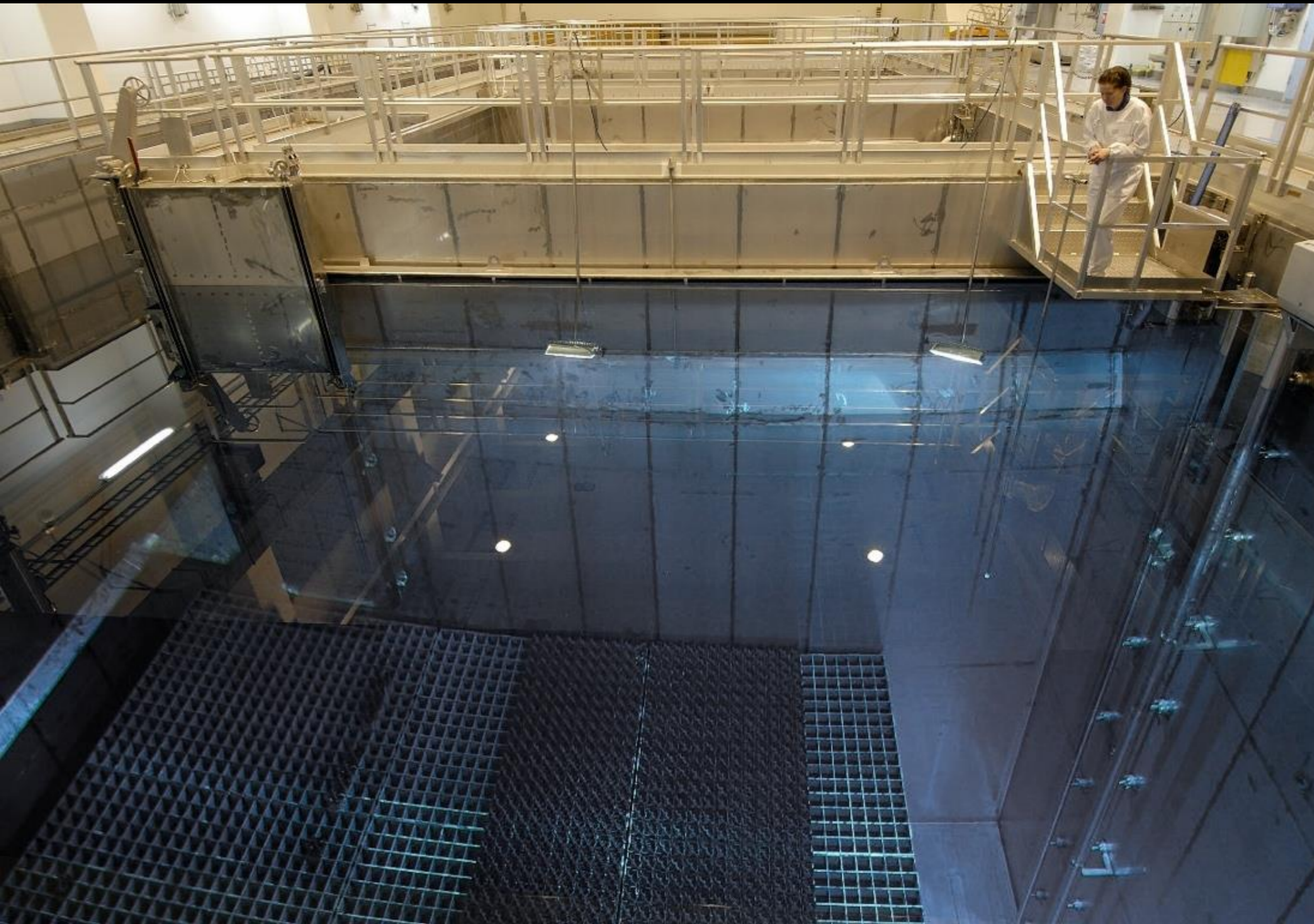
From the US Department of Energy in January, 2013:

The term “used nuclear fuel” as used... is intended to be synonymous with the term “spent nuclear fuel” as used in the Nuclear Waste Policy Act...

Source: Strategy for the Management and Disposal of Used Nuclear Fuel and High Level Radioactive Waste, DOE, January, 2014







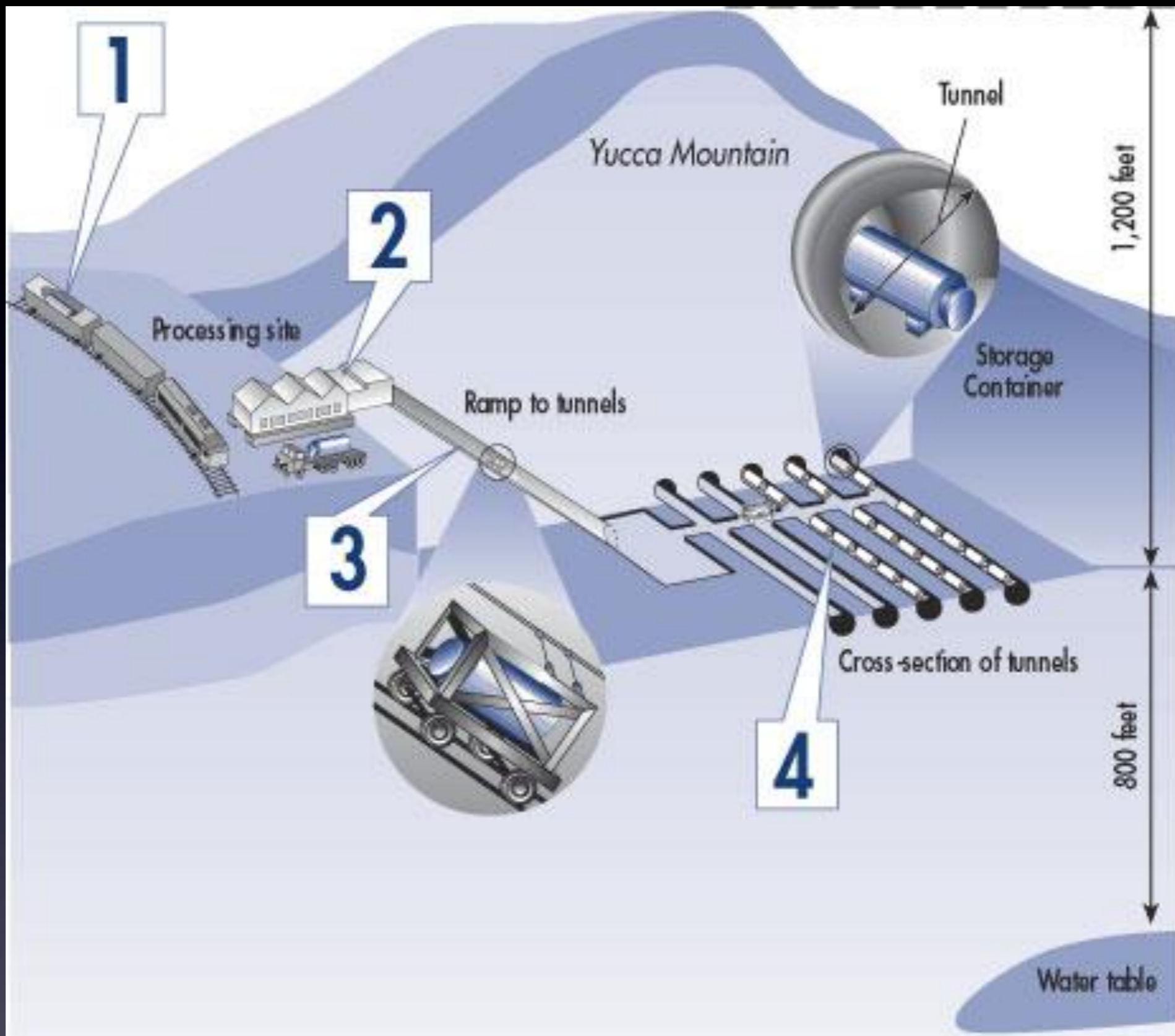








AP / Rick Gunn, File



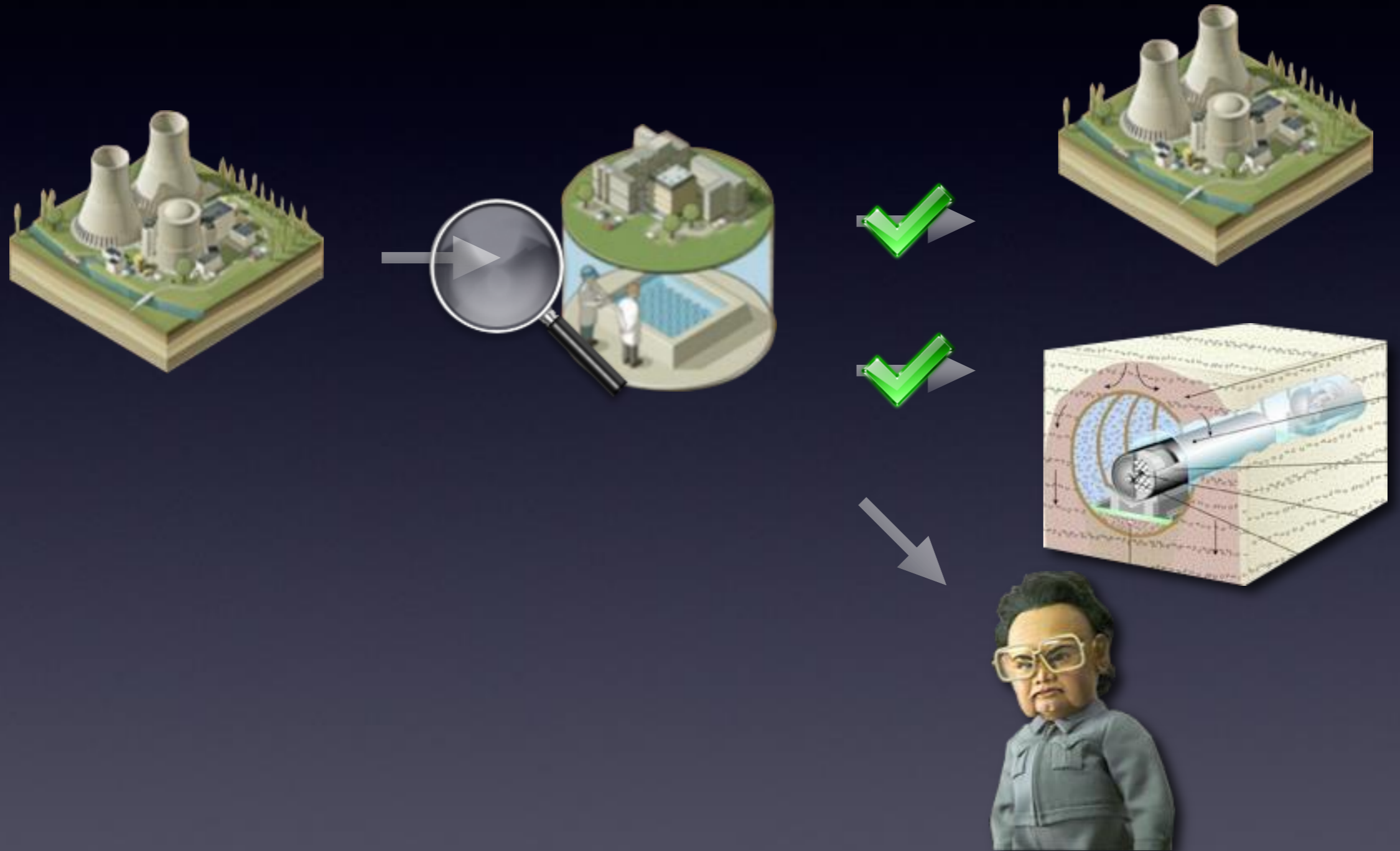
Source: <http://www.nrc.gov/waste/hlw-disposal/design.html>, March 29, 2012

[Click on image to launch video in Youtube.](#)



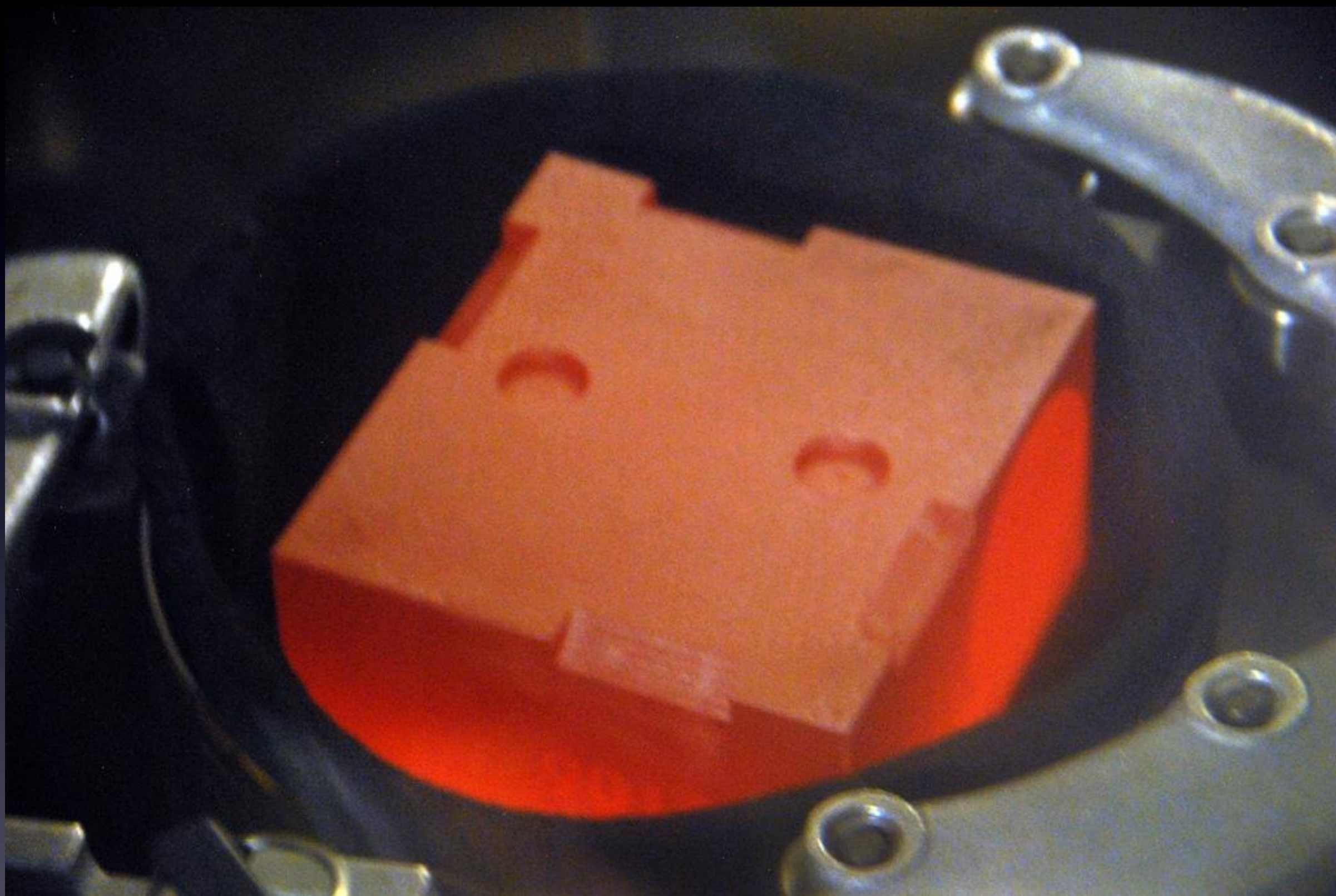


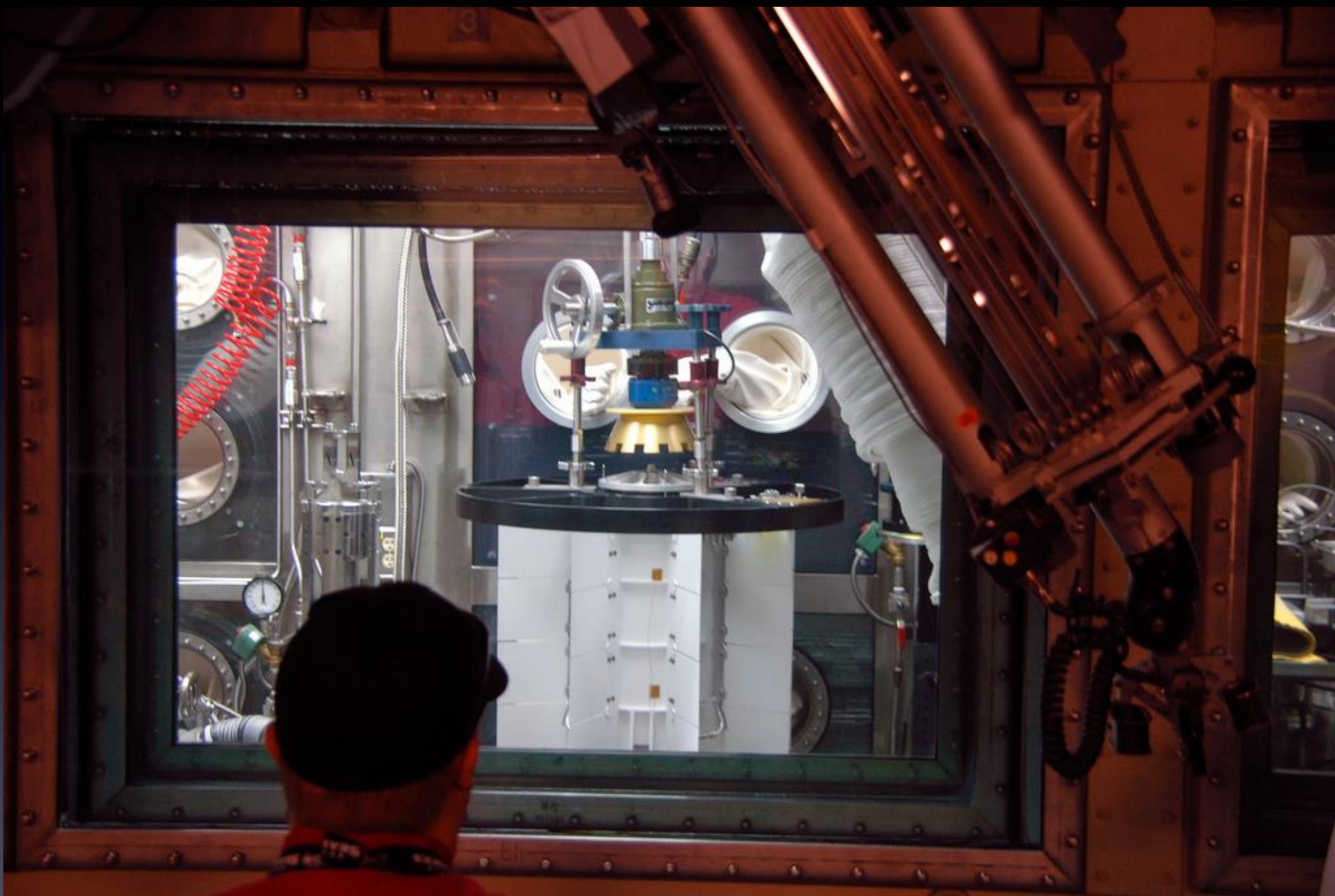
# Materials Accountability



What else could be done with radioactive materials rather than bury them in the ground?











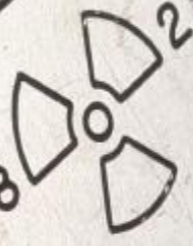


MEDTRONIC

PULSE GENERATOR

LAURENS-ALCATEL  
MODEL 9000

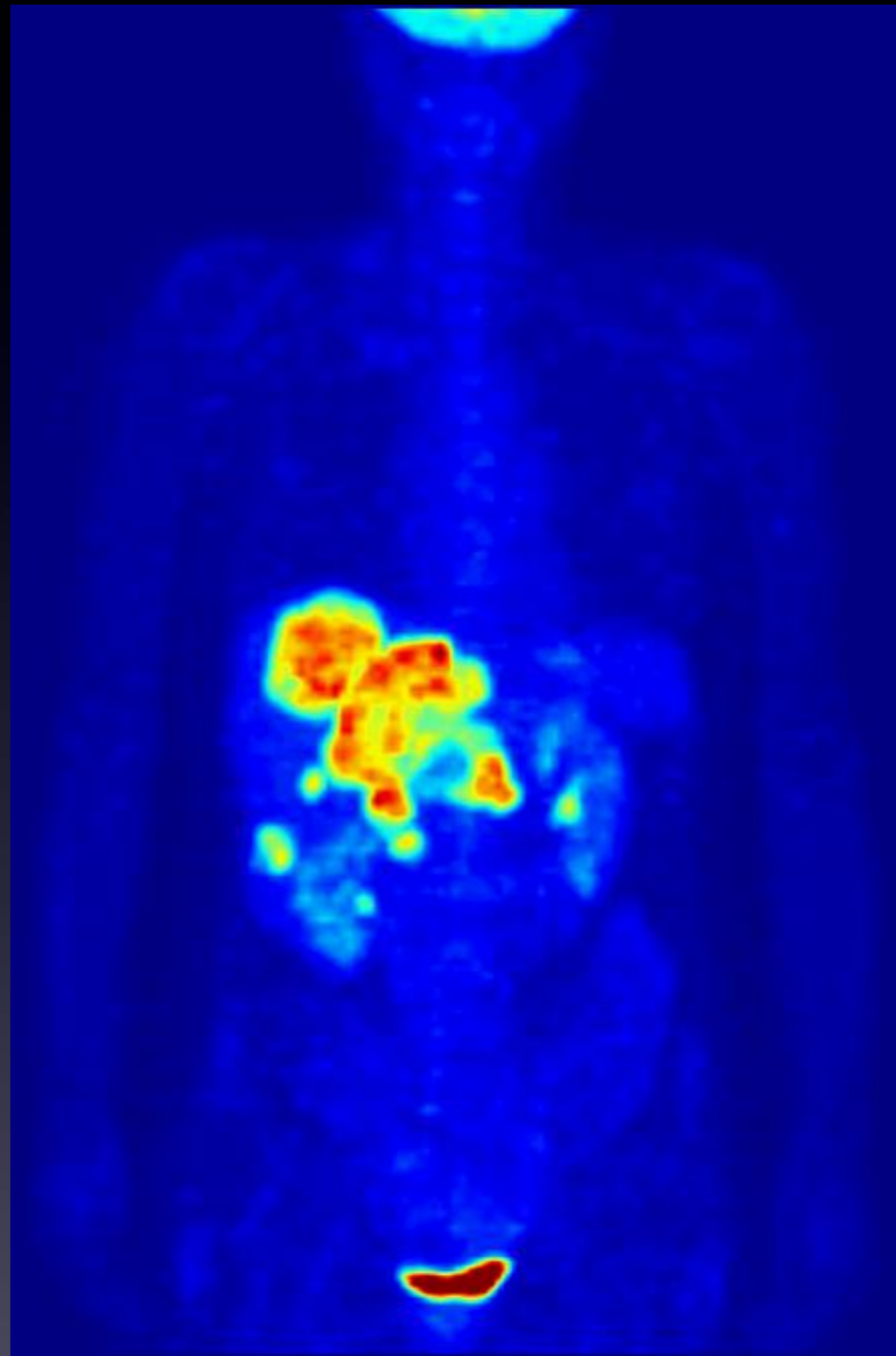
PU-238



2.5Ci - 1974

RADIOACTIVE  
USA

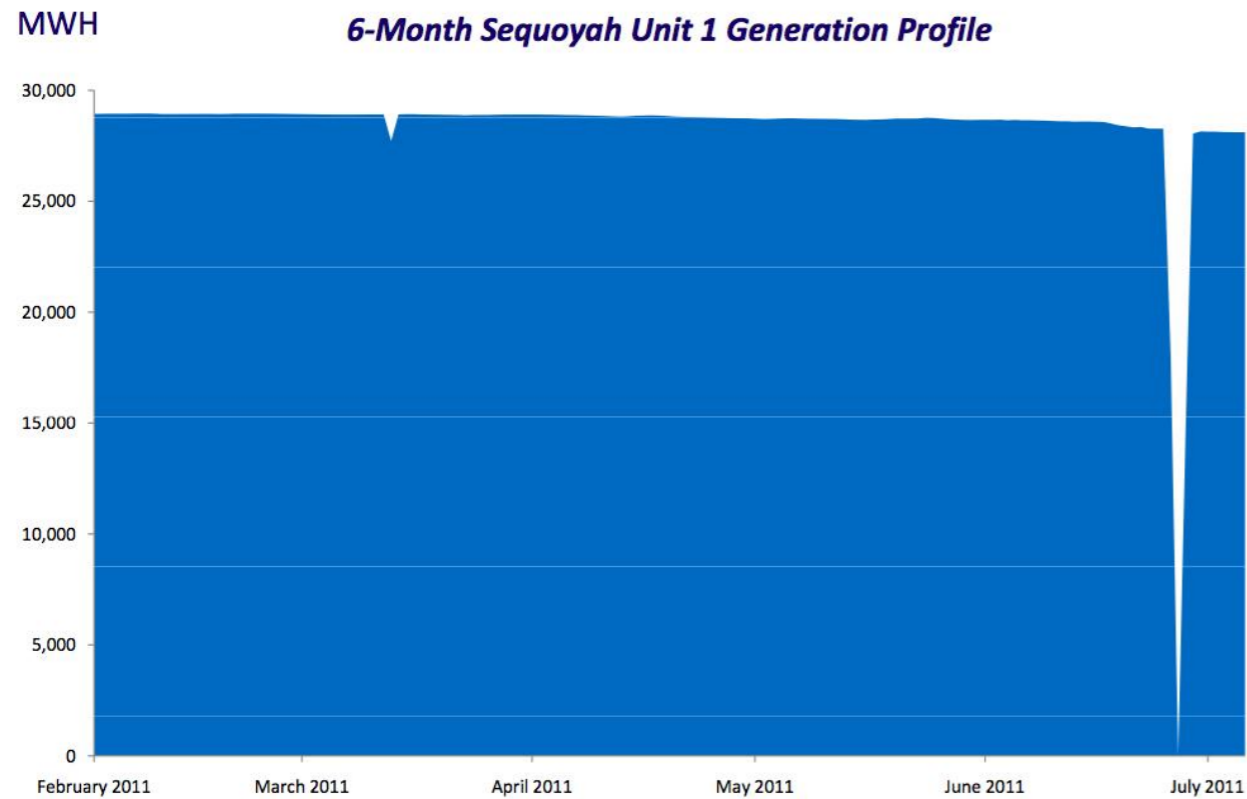
# PET Scan (Positron emission tomography)



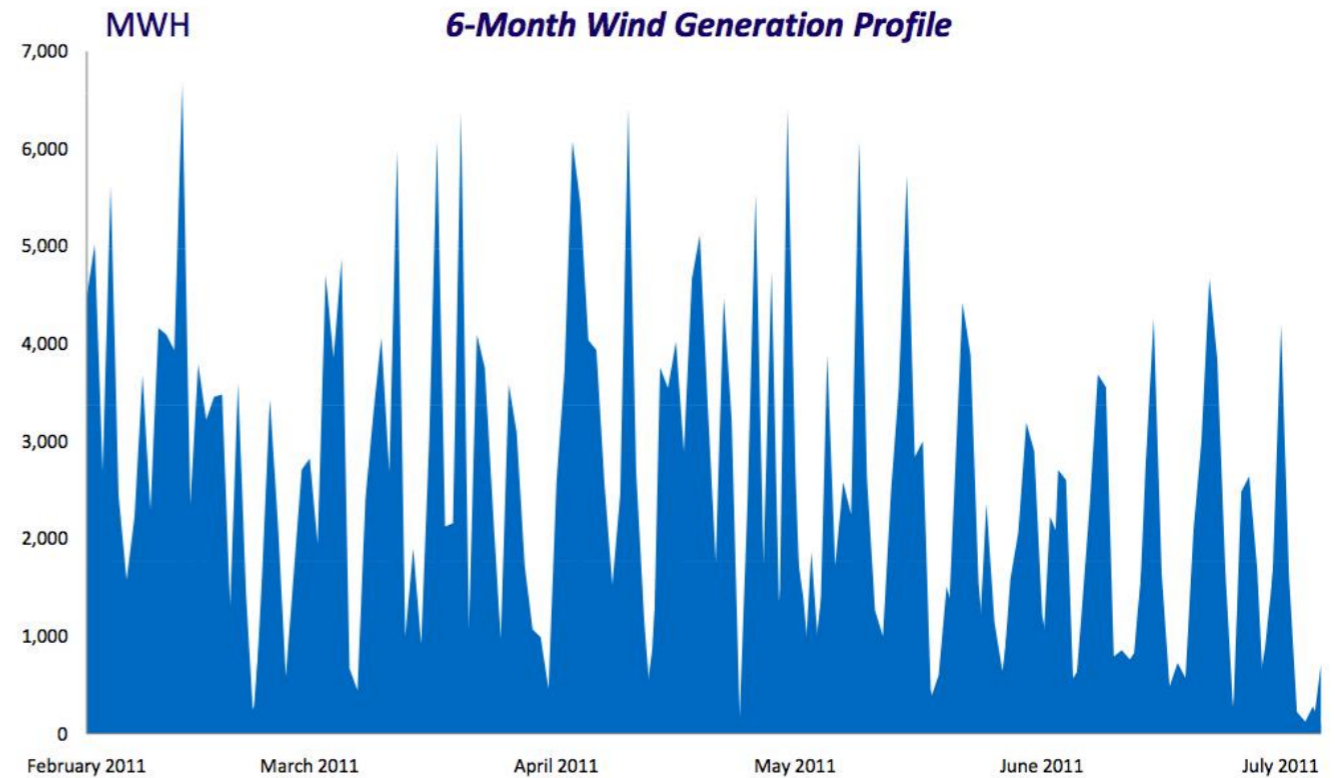
Source: <http://en.wikipedia.org/wiki/File:PET-MIPS-anim.gif>, January, 2014

# Examples from Around the US and the World In Terms of Energy Equivalency

## Consistent Production



## Intermittent Production



2324 MW for Sequoyah Units 1 & 2



~18 wind turbines 3-4 MW each; 72 MW

## Small Modular Reactors (SMRs)

**Nuscale** (<http://www.nuscalepower.com/>)

One NuScale SMR is 45 MWe (from their website), so  
50 – 51 (50.9) NuScale SMRs = 1 Diablo Canyon site.

**mPower** (<http://www.generationmpower.com/>)

The Generation mPower electric generation plant has the capacity to match customer demand in nominal 180 MWe increments for a four-year operating cycle without refueling, using standard pressurized water reactor (PWR) fuel.



# Examples from Around the US and the World

Vogle Construction Update – 4<sup>th</sup> Quarter 2013

<http://youtu.be/dKeRwkrhaTs>

VC Summer Site, South Carolina - 2013

<http://youtu.be/Cc0TxxmlPrc>

United Arab Emirates (UAE)

<http://youtu.be/RBbIbGdKapg>

# A Look into the Future





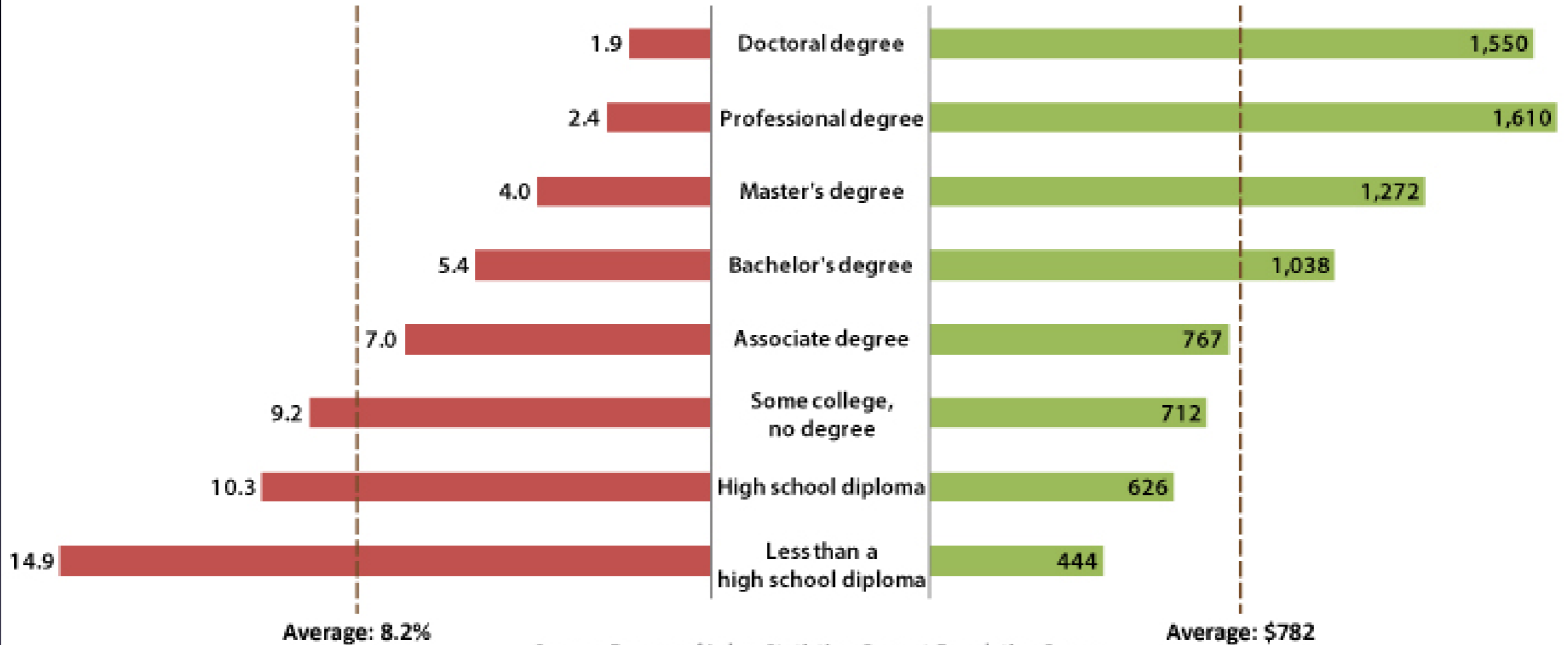
Jobs...



# Education pays:

Unemployment rate in 2010 (%)

Median weekly earnings in 2010 (\$)



Source: Bureau of Labor Statistics, Current Population Survey

# Questions

