



# Lessons From Sergeant Schultz

Jeffrey S. Merrifield  
Commissioner

U. S. Nuclear Regulatory Commission

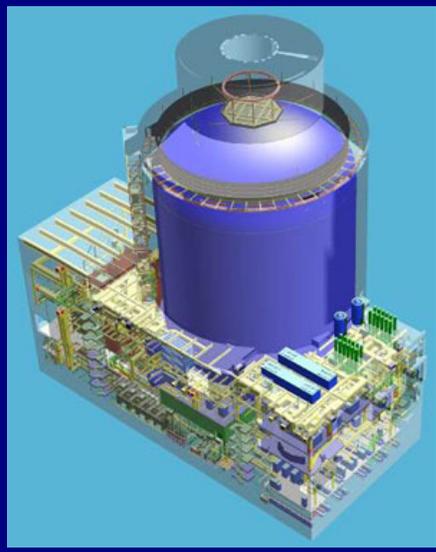
NRC Regulatory Information Conference

March 8, 2006



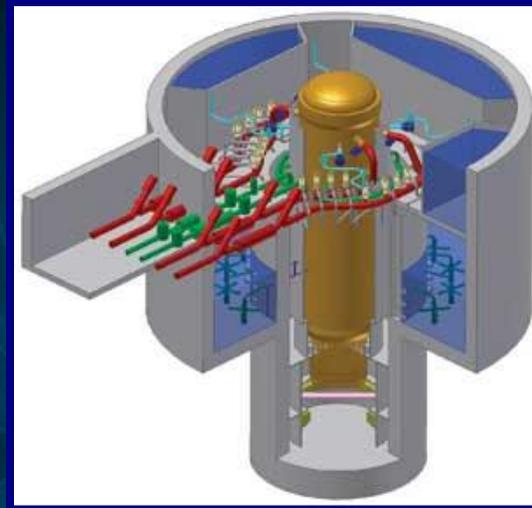
# Second Great Bandwagon Effect

## AP1000



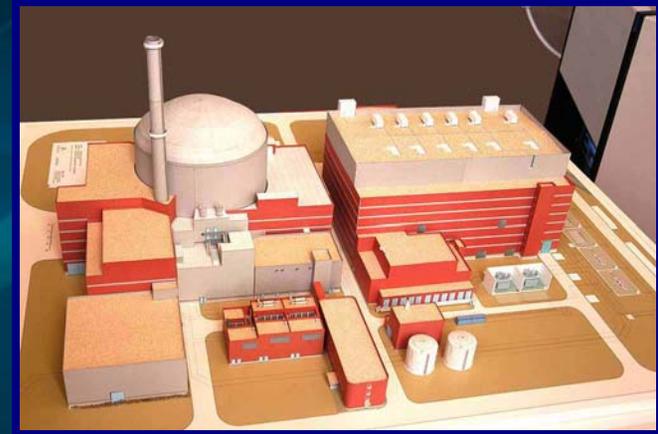
Duke Energy (TBD)  
NuStart (Bellefonte)  
Progress Energy  
(Shearon Harris + a  
Florida plant)  
SCE&G (VC Summer)  
Southern Co. (Vogtle)

## ESBWR



Dominion (North Anna)  
Entergy (River Bend)  
NuStart (Grand Gulf)

## EPR



Constellation (Calvert Cliffs,  
Nine Mile Point)



# Second Great Bandwagon Effect





# U.S. Nuclear Power Plants

Arkansas Nuclear 1	Arkansas Nuclear 2	Beaver Valley 1	Beaver Valley 2	Big Rock Point	Braidwood 1	Braidwood 2	Browns Ferry 1	Browns Ferry 2	Browns Ferry 3	Brunswick 1
Brunswick 2	Byron 1	Byron 2	Callaway	Calvert Cliffs 1	Calvert Cliffs 2	Catawba 1	Catawba 2	Clinton	Columbia Generating Station	Comanche Peak 1
Comanche Peak 2	Cooper	Crystal river 3	DC Cook 1	DC Cook 2	Davis-Besse	Diablo Canyon 1	Diablo Canyon 2	Dresden 1	Dresden 2	Dresden 3
Duane Arnold	Farley 1	Farley 2	Fermi 1	Fermi 2	Fizpatrick	Fort Calhoun	Ft. Saint Vrain	Ginna	Grand Gulf	Haddam Neck
Shearon Harris	Hatch 1	Hatch 2	Hope Creek	Humboldt Bay	Indian Point 1	Indian Point 2	Indian Point 3	Kewaunee	La Crosse	La Salle 1
La Salle 2	Limerick 1	Limerick 2	Maine Yankee	McGuire 1	McGuire 2	Millstone 1	Millstone 2	Millstone 3	Monticello	Nine Mile Point 1
Nine Mile Point 2	North Anna 1	North Anna 2	Oconee 1	Oconee 2	Oconee 3	Oyster Creek	Palisades	Palo Verde 1	Palo Verde 2	Palo Verde 3
Peach Bottom 1	Peach Bottom 2	Peach Bottom 3	Perry	Pilgrim	Pt. Beach 1	Pt. Beach 2	Prairie Island 1	Prairie Island 2	Quad Cities 1	Quad Cities 2
Rancho Seco	Robinson 2	St. Lucie 1	St. Lucie 2	Salem 1	Salem 2	San Onofre 1	San Onofre 2	San Onofre 3	Seabrook	Sequoyah 1
Sequoyah 2	Shoreham	South Texas 1	South Texas 2	Summer	Surry 1	Surry 2	Susquehanna 1	Susquehanna 2	TMI 1	TMI 2
Trojan	Turkey Point 3	Turkey Point 4	Vermont Yankee	Vogtle 1	Vogtle 2	Waterford 3	Watts Bar	Wolf Creek	Yankee Rowe	Zion 1
Zion 2										

■ Decommissioned plants



# What About Spent Fuel?

I hear  
Nothing!

I see  
Nothing!

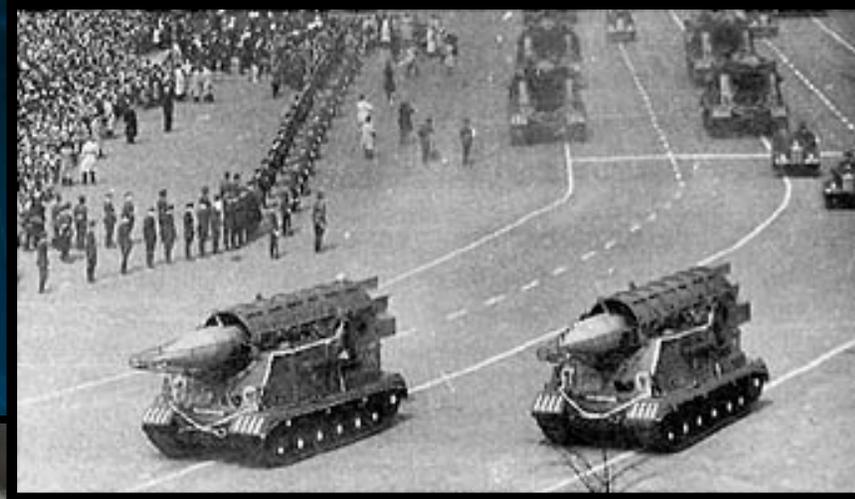
I know  
**NOTHING!**





# 1950s - No Time to Worry About Spent Fuel

U.S. Atomic bomb test -  
Bikini Atoll, July 1946



Soviet military parade  
through Red Square,  
circa 1953



1955 - NAVAHO missile



# 1<sup>st</sup> Nuclear Waste Repository – The Sea



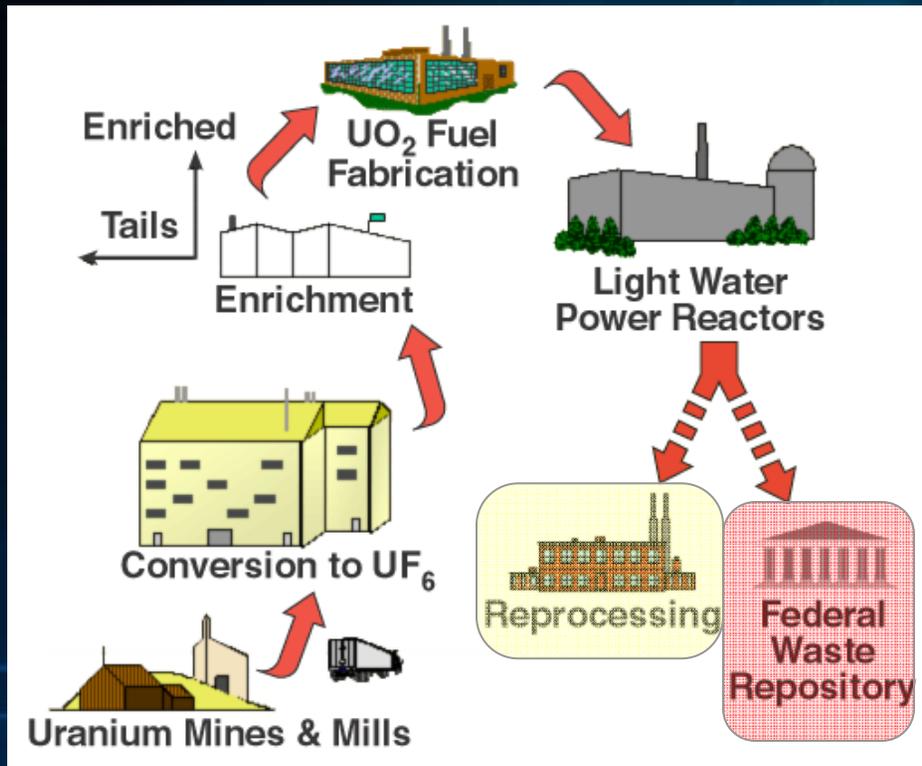
The "Gem," a ship chartered by the UK Atomic Energy Authority dumps barrels of low and intermediate level waste in the Atlantic

The Russian tanker "Amur" dumping liquid radioactive waste in the Barents sea

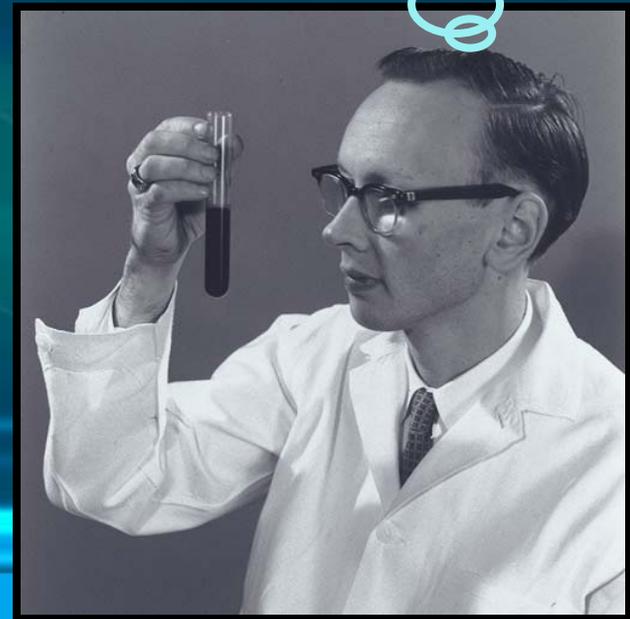




# Fuel Cycle - as Viewed in the 1950's



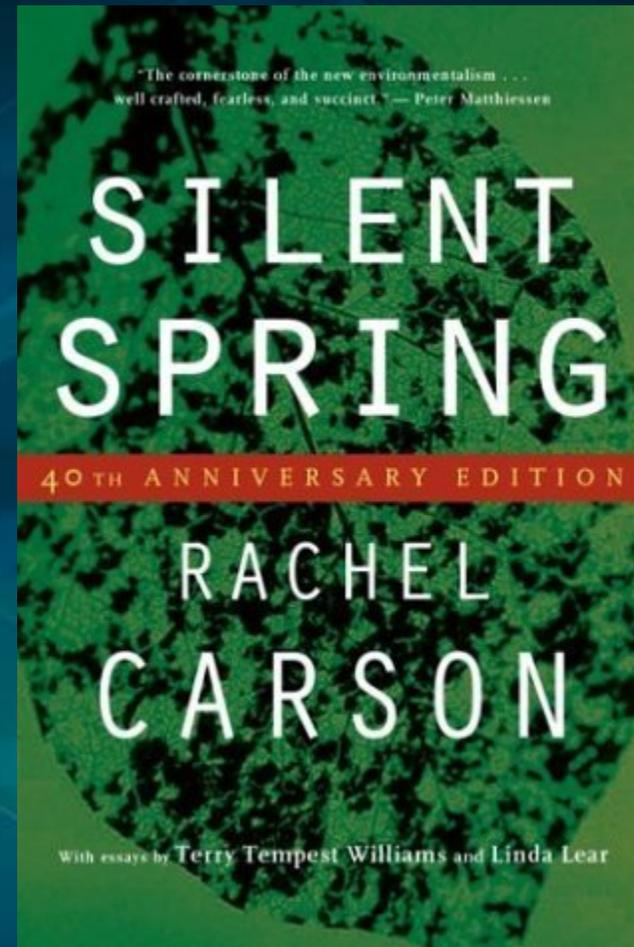
We can reprocess the spent fuel to re-use the uranium and store the remaining waste in a permanent underground repository!





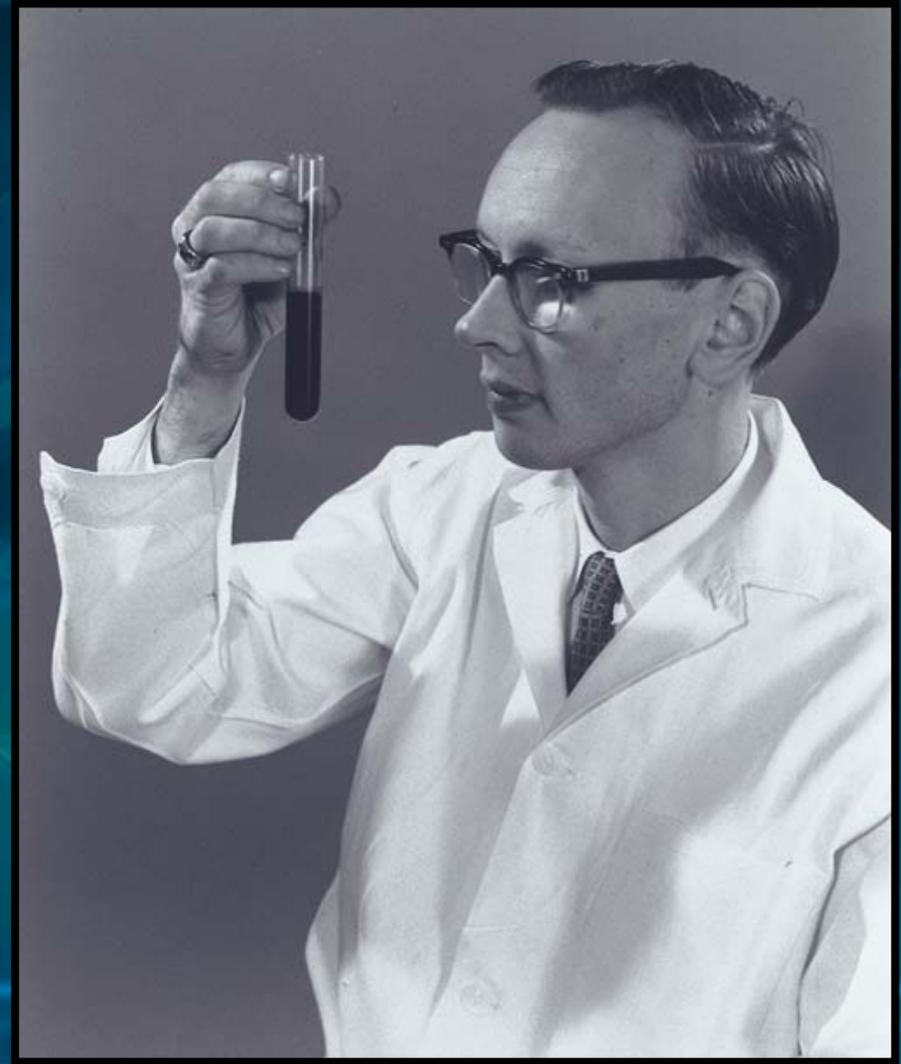
# Birth of the Environmental Movement

- Published in 1962
- Focused on the dangers of pesticides in the environment
- The author believed that chemicals were more dangerous than radiation





## What Happened? - Loss of Public Confidence





## What Happened? - Loss of Public Confidence

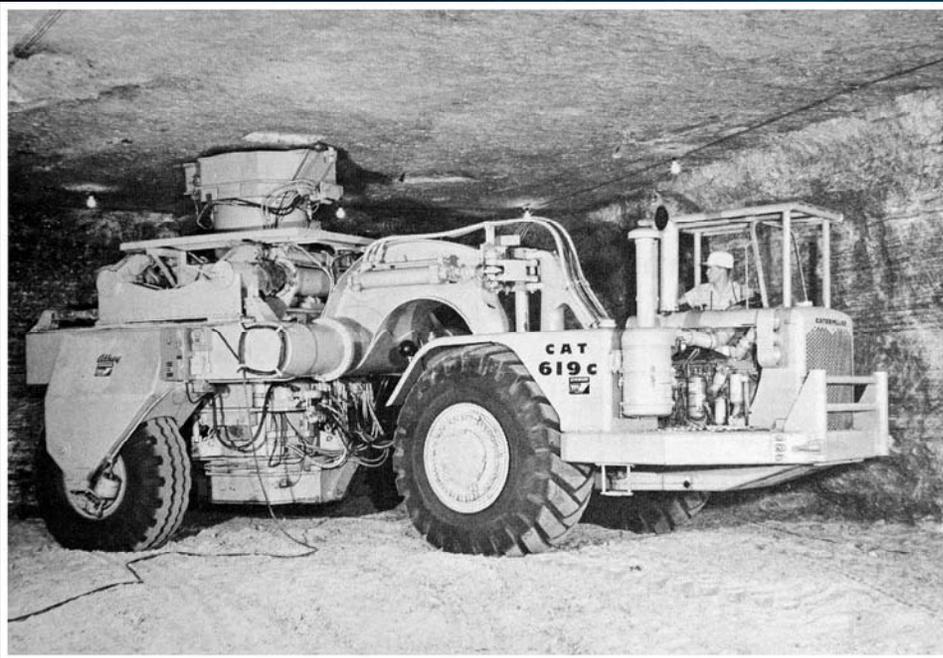
- Failure to communicate with the public
- Overly optimistic views by nuclear power supporters (rose colored lens)
- Overly pessimistic views by nuclear power opponents (smoke colored lens)
- Polemics rather than sound science



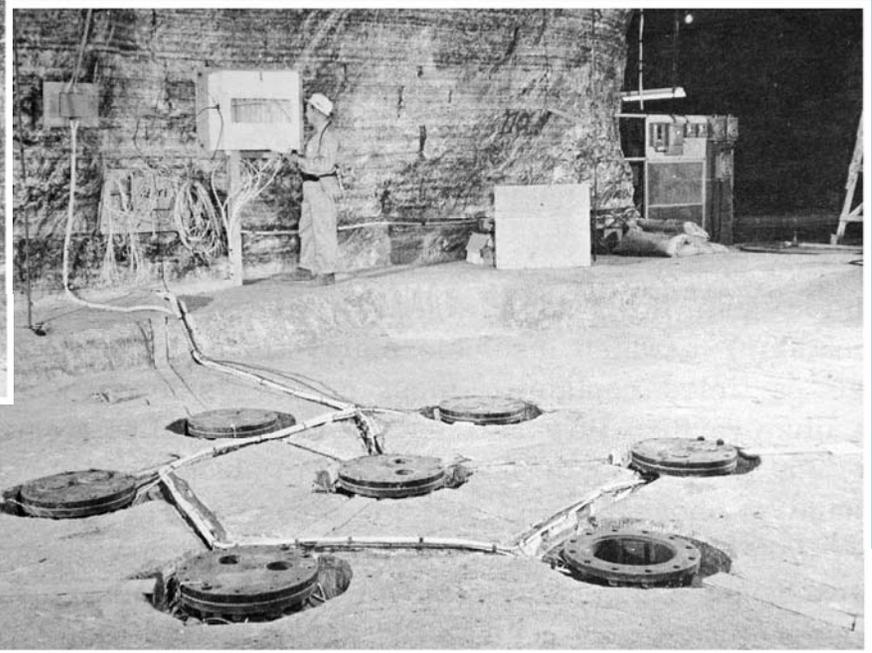


# The First U.S. Attempt at a Waste Repository

In 1970, the AEC tentatively selected a nuclear waste repository site in salt deposits near Lyons, Kansas.



Radwaste cask being lowered down the shaft to a specially designed trailer



The casks were placed in 12-ft deep stainless-steel lined holes in the salt mine floor



# 1977 – The End of Reprocessing

- Executive order signed by President Carter on April 7, 1977, banned reprocessing in the U.S.
- Driven by concerns over proliferation, cost, and the environment
- Lack of resolution on spent fuel disposal eroded public confidence.





# 1982 – Nuclear Waste Policy Act



- Signed into law by President Reagan on January 7, 1983
- Established a policy for interim and permanent storage of high-level nuclear waste
- Required DOE to propose, and NRC to license, a repository on each side of the Mississippi River



# Not In My Back Yard!



USGS scientists conducted hydraulic and tracer tests to characterize bedrock at New Hampshire candidate sites

DOE's lack of communication led to a "Not In My Back Yard" response in some candidate localities.





# 1987 – Nuclear Waste Policy Act Amended

Aerial view of Yucca Mountain

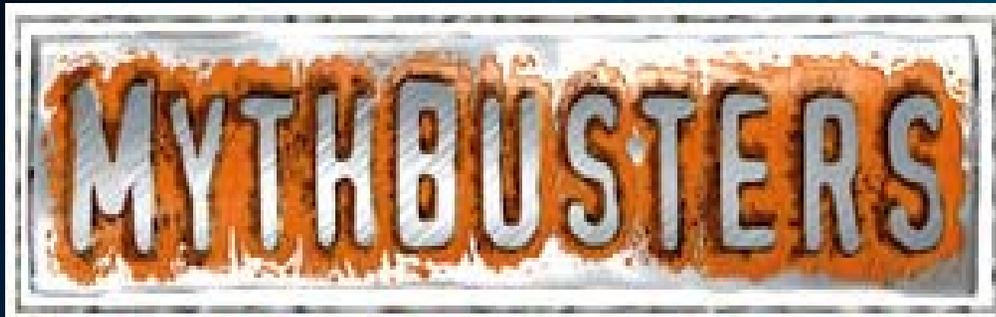


Entrance into Yucca Mountain

- Congress selected Yucca Mountain for site characterization
- Nineteen years and \$9 Billion later, DOE is still trying determine if Yucca Mountain is the appropriate location.



# Moving Past Sgt. Schultz



Dispelling Myths about  
spent nuclear fuel





# NRC -



**Myth #1: Individuals living near a spent fuel repository will be exposed to deadly levels of radiation**

**Facts: Site boundary dose rate limit is 15mR/year from all pathways, and groundwater dose rate is 4mR/yr, for the first 10,000 years**

**From 10,000 – 1,000,000 years, the EPA proposed rule limits the dose rate to 350mR (compared to natural background radiation of 700mR in Denver, 789mR in N. Dakota, and 963mR in S. Dakota)**

**Problem: Inability to communicate with the public on the risk posed by spent fuel**



# NRC -

# MYTHBUSTERS

Myth #2: Spent fuel shipments are the equivalent of “mobile Chernobyls,” and an accident involving one of these shipments could endanger thousands of people.



This presumption assumes the entire fuel cask is vaporized and contamination is spread over a vast area.



# NRC -

# MYTHBUSTERS

**FACT:** Tests show robust fuel in a robust container results in little or no release of radiation, even in the most extreme transportation accidents.



**A flatbed semi-trailer carrying a 24 ton Type B Package on it, after being struck by a 150 diesel locomotive traveling at 81 miles per hour.**

**The retrieved transportation cask**



# NRC -

# MYTHBUSTERS

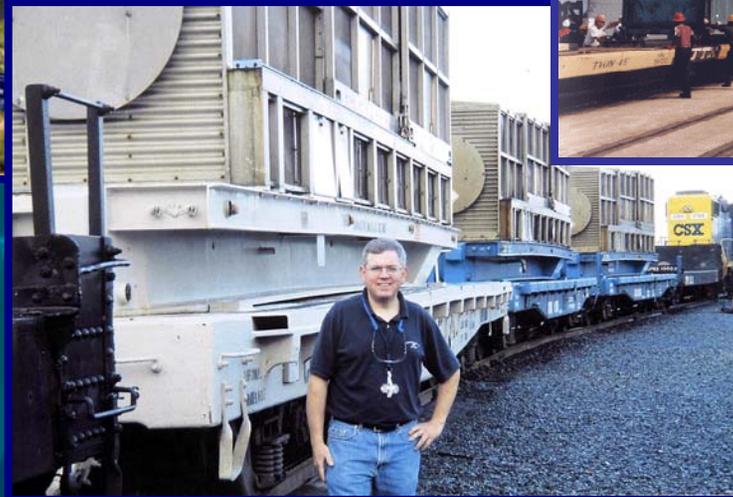
**FACT:** In the last 25 years, over 1,300 NRC-regulated spent fuel shipments have been made. Only 4 transportation accidents have occurred, none of which resulted in a release of radioactive material.



Since 1999, over 4,000 waste shipments have been to the WIPP facility with no major accidents.



Naval spent nuclear fuel shipment being loaded onto railcars



Commissioner Merrifield accompanied a spent fuel train



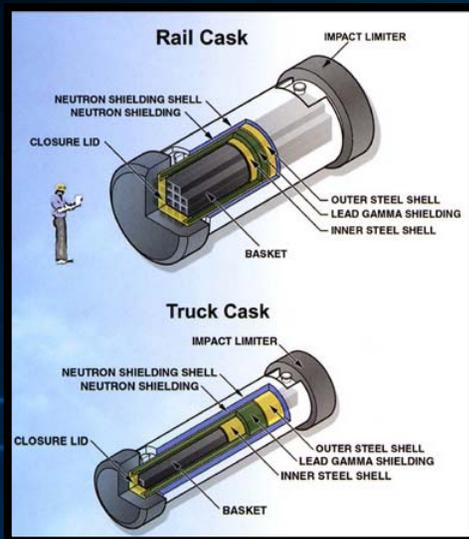
# NRC -

# MYTHBUSTERS

Myth #3: Spent Fuel is too dangerous to move from a reactor site.

- OR -

Spent fuel is so dangerous, it must be removed from a reactor site.



Fact: Spent fuel containers are specially designed to protect the public by withstanding accident Conditions without releasing their radioactive contents.



Fact: Spent Fuel pools and ISFSIs are safe interim storage facilities

Problem: Insufficient efforts to provide information to the public.



# Independent Spent Fuel Storage Facilities

Surry Power Station received the first ISFSI license in 1986.

ISFSIs were initially licensed for 20 years.

The NRC subsequently authorized 40-year extensions for two ISFSI sites.

Currently, 38 ISFSIs have been approved, using 15 different cask designs, 8 of which are certified for transportation.



Surry Power Station's Independent Spent Fuel Storage Installation



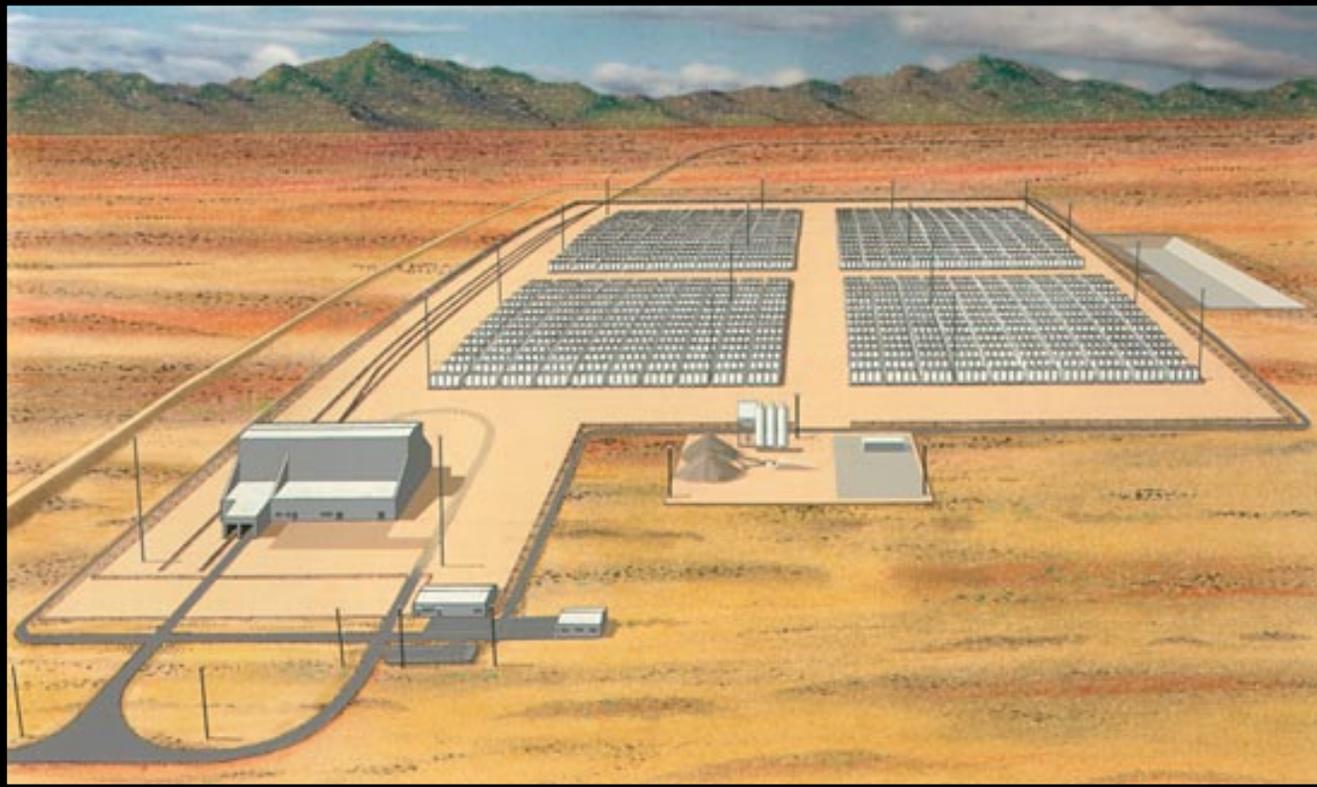
# Private Fuel Storage Facility

NRC approved a license to build a larger version of the Surry ISFSI on the Goshute Indian Reservation in Skull Valley, Utah.





# Private Fuel Storage Facility



The proposed spent fuel storage facility is designed to store 4,000 spent fuel casks for the life of the 20-40 year license, or until a permanent repository is completed.



# Waste or Future Energy Source?

- NRC believes spent fuel can be safely stored for at least 100 years in short-term or intermediate facilities
- The world uranium supply will be depleted in 100-150 years
- The rate of energy consumption is increasing worldwide
- The U.S. will have the largest concentrated source of uranium in the world
- Spent fuel is a potential future energy reserve, that may be key to meeting our nation's energy future



# Global Nuclear Energy Partnership

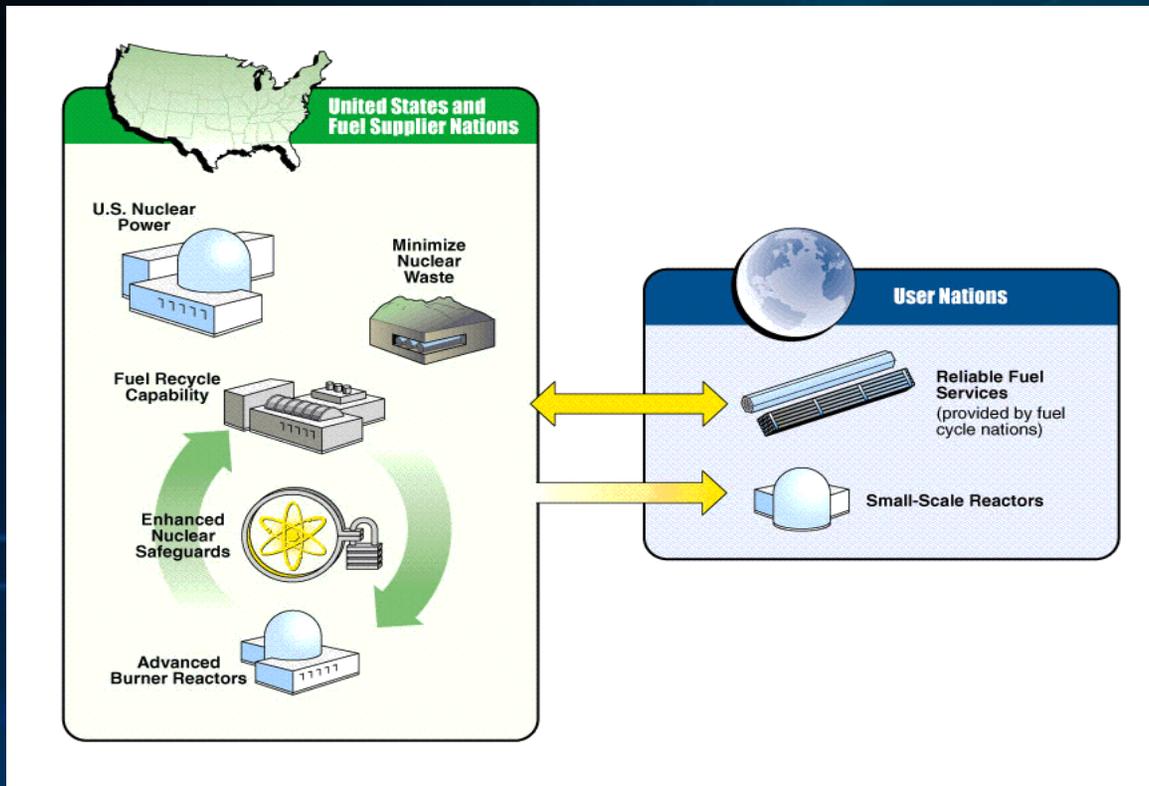


“The world must create a safe, orderly system to field civilian nuclear power plants without adding to the danger of weapons proliferation.”

**President George W. Bush,  
February 11, 2004**



# Global Nuclear Energy Partnership



**G**oal... expand the use of nuclear energy by demonstrating new technologies to recycle nuclear fuel and minimize waste

Reprocessing raises concerns about cost, non-proliferation, and environmental consequences

Further Congressional debate is expected to deal with this vexing policy issue



# Where Do We Go From Here?

- Yucca Mountain – is there an ending to this story?
- Can the repository be licensed?
- Can new reactors be built, if there is no permanent repository?



# Waste Confidence Rule

- Reaffirmed by the Commission in 2005
- Reasonable assurance that a geologic repository is feasible and will be available by 2025
- Spent fuel will be managed safely until a repository is available
- Spent fuel can be safely stored onsite without significant environmental impact for an extended period
- Onsite or offsite storage capacity will be available, if necessary
- Decision is valid for both existing and future reactors



# Final Thoughts

- We must do a better job of explaining to stakeholders the honest facts about spent fuel.
- We must overcome the hysteria about the dangers of transporting spent fuel, and use real facts to provide real answers to questions.
- We must reassure stakeholders that spent fuel can be safely stored, whether it is temporarily stored onsite or offsite, or in a permanent repository.
- The Waste Confidence Decision remains valid for both the currently operating reactors and future reactors.