

20 More Years of Risk at Entergy Nuclear Vermont Yankee?

Presentation to State of Vermont

House and Senate

Energy and Natural Resources Committees

By

Kevin Kamps

Radioactive Waste Watchdog

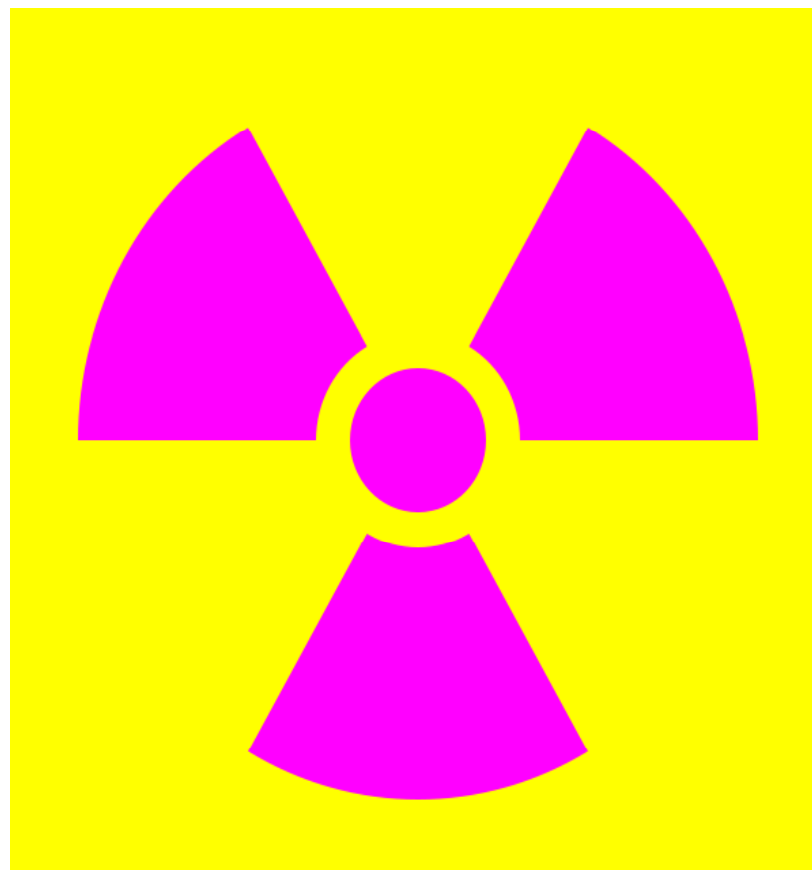
Beyond Nuclear

January 27, 2010

Overview

- Tritium and Cobalt-60 leaks: health risks
- Tritium and Cobalt-60 leaks: decommissioning cost escalation
- High-level radioactive waste:
de facto permanent on-site storage
- Is Entergy Nuclear a Good Neighbor? Grand Gulf, MS; Indian Point, NY; Palisades, MI case studies

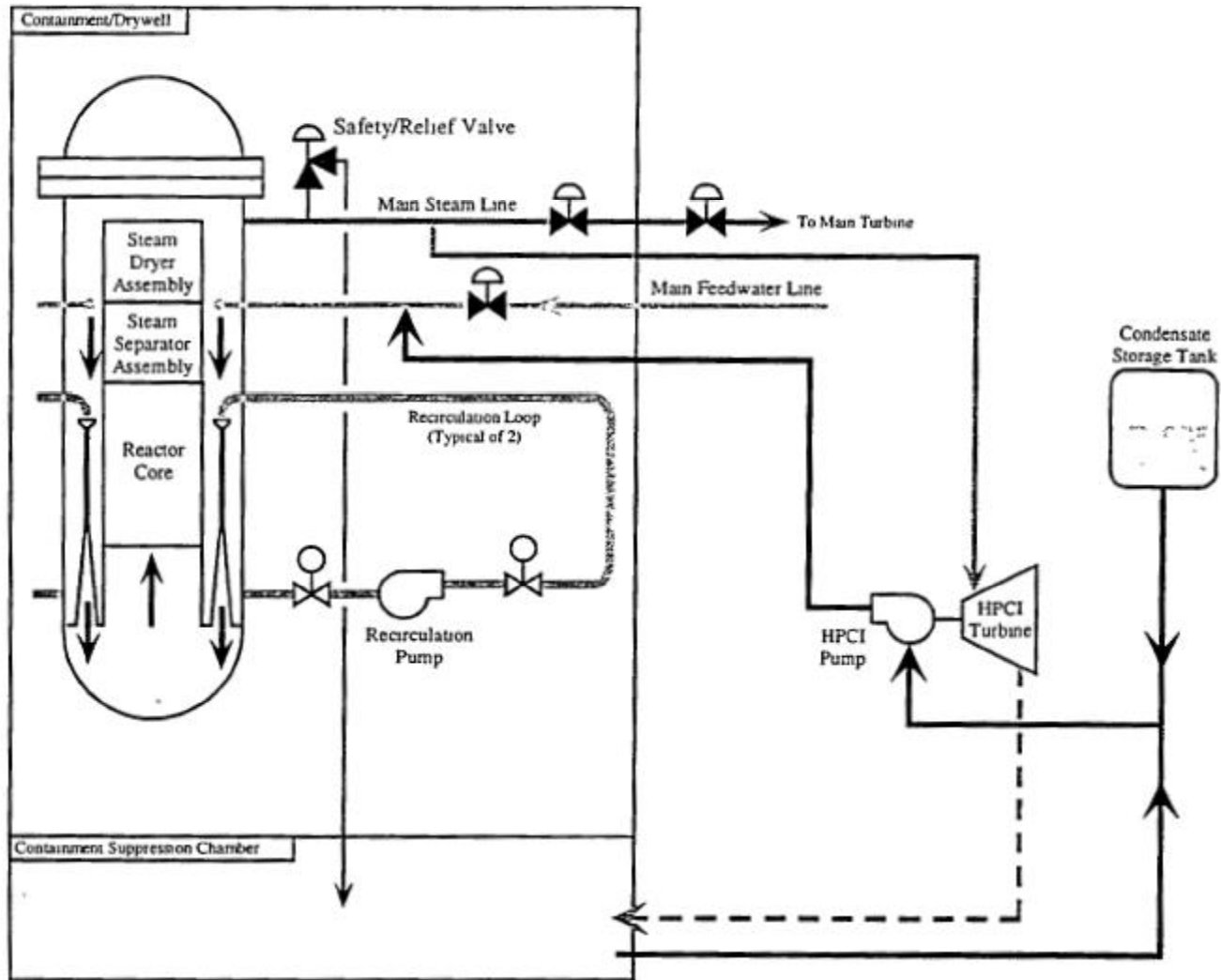
UNCONTROLLED & UNMONITORED



RADIOACTIVE RELEASES

VERMONT YANKEE

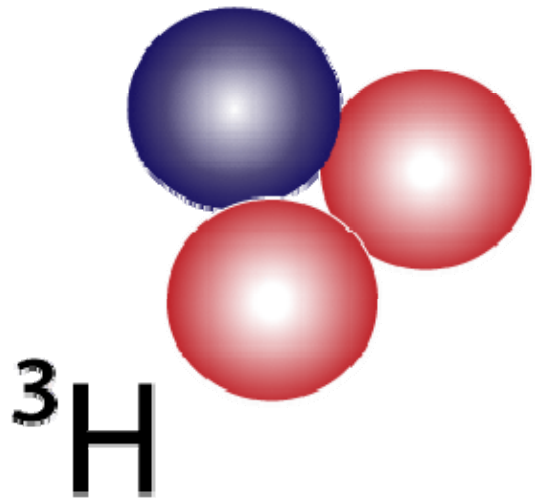


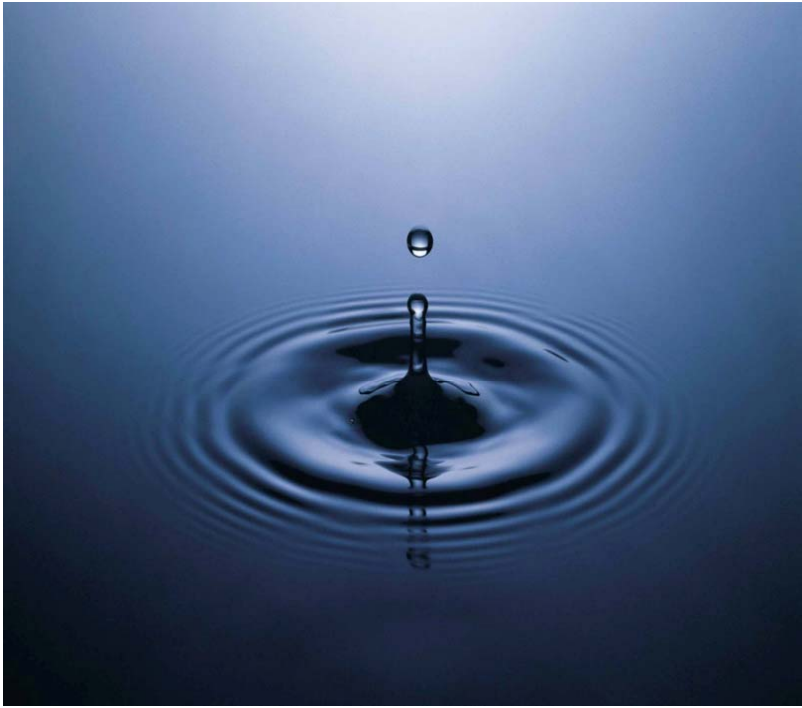




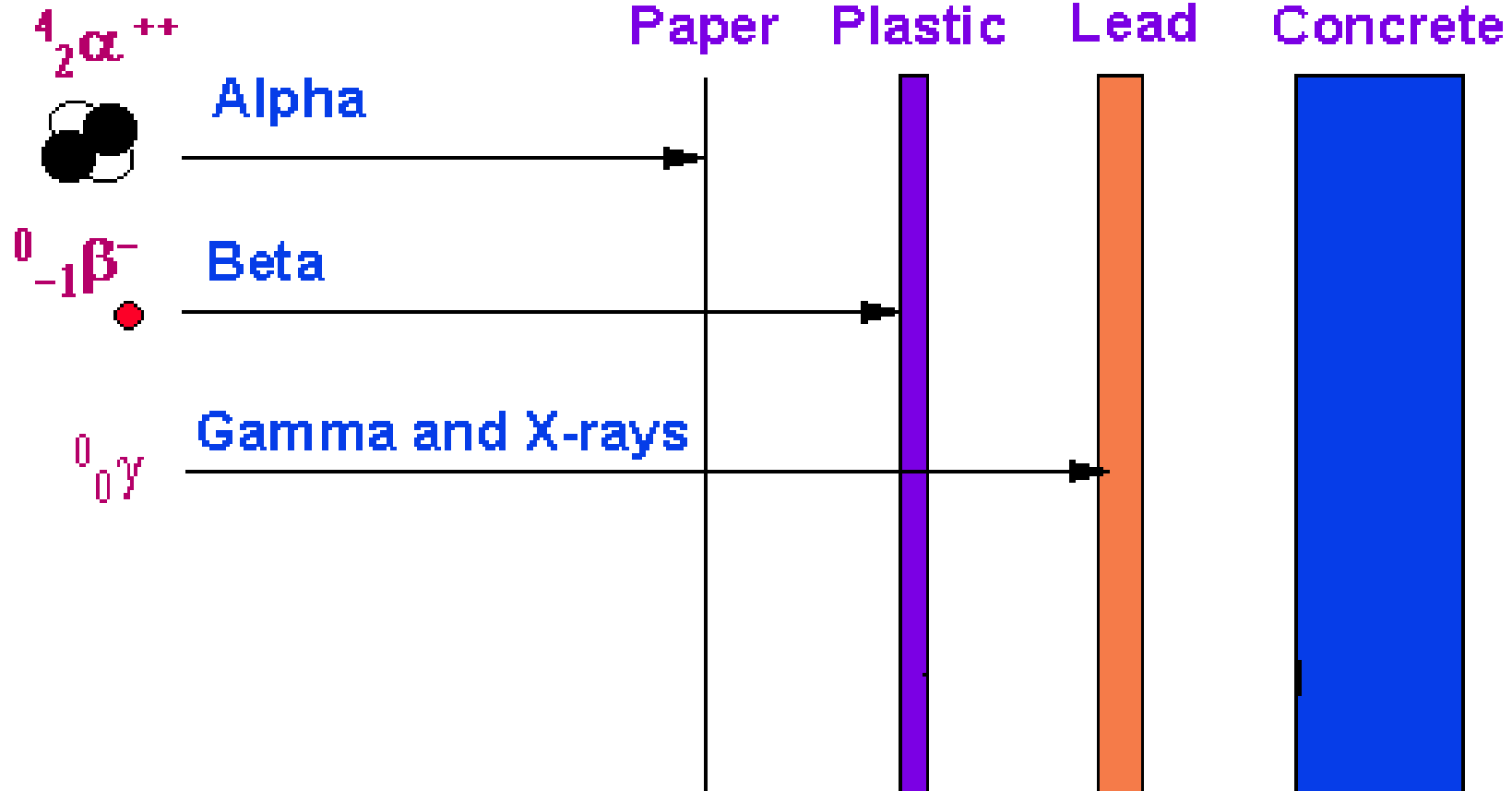
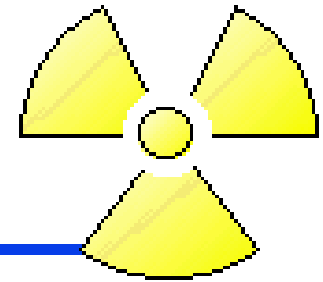
“LEAK FIRST,
FIX LATER”







Penetrating Distances



Radiation Exposure Pathways

Airborne Radioactive Materials

Deposition
Crop Uptake

Inhalation
Skin Absorption

Cosmic
Radiation



Indoor Air
Structural Radiation



Exposure
Crop Ingestion

Rocks and Soil
Radiation

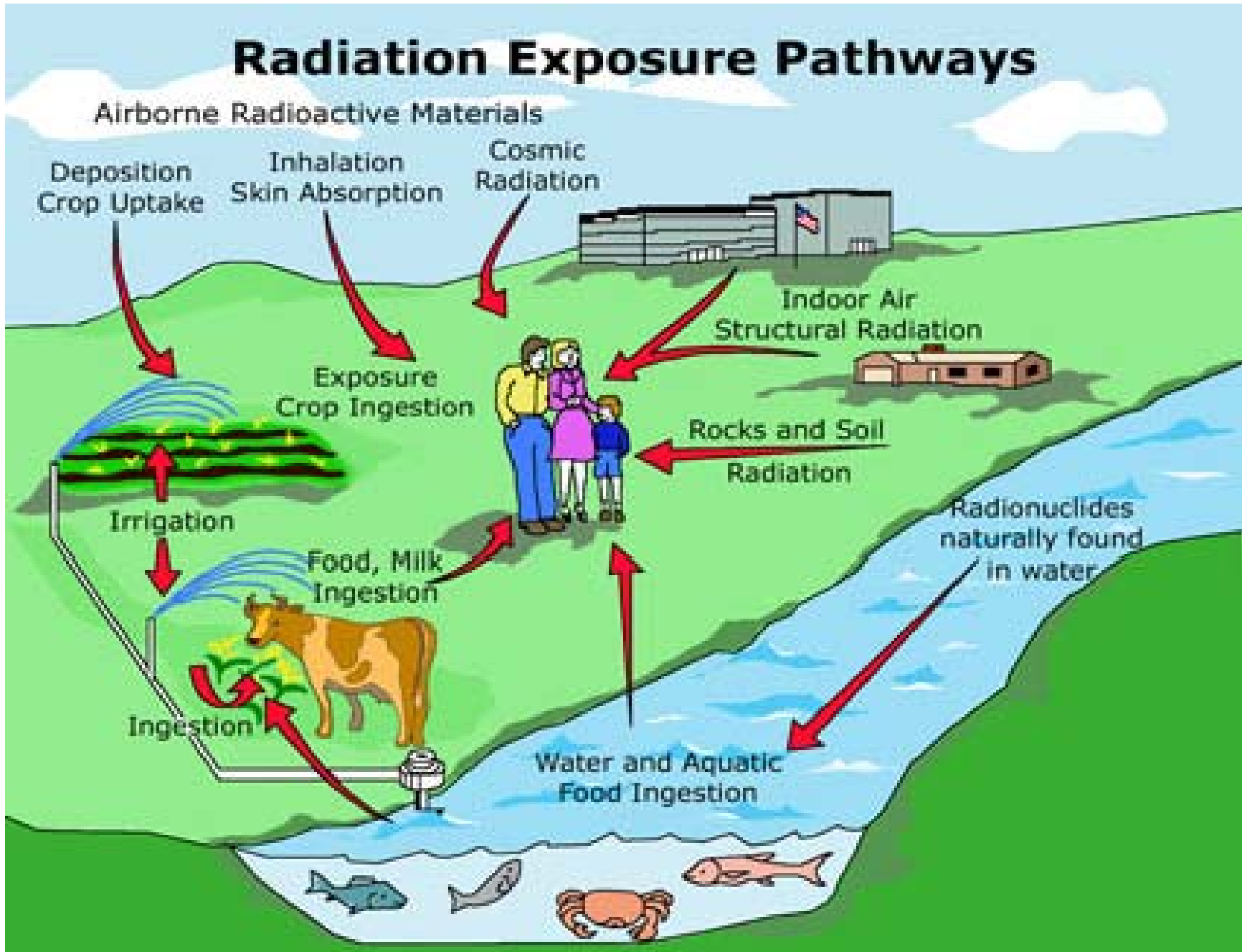
Radionuclides
naturally found
in water

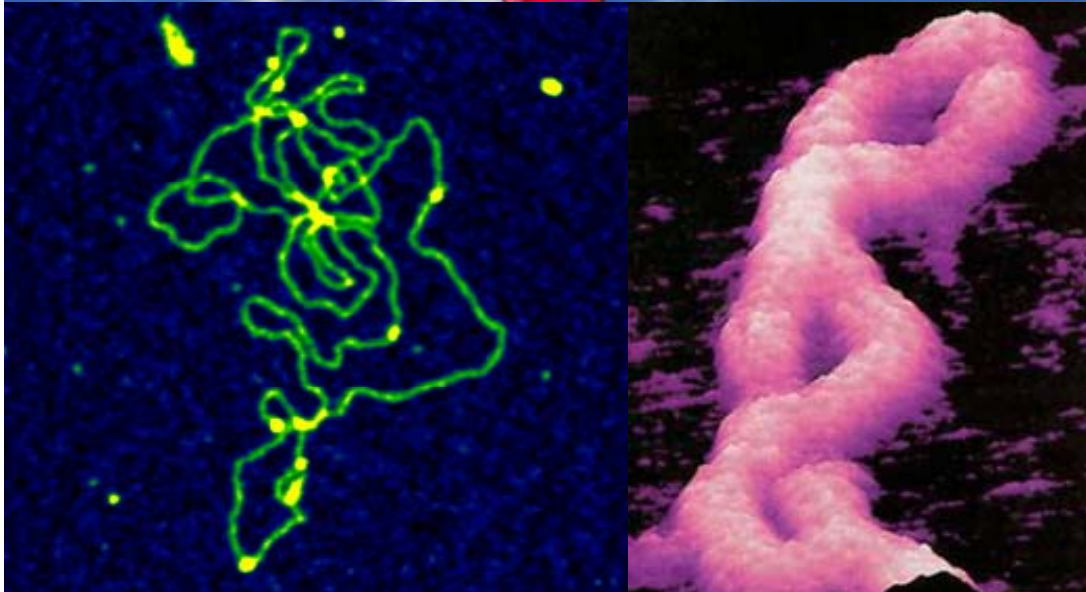
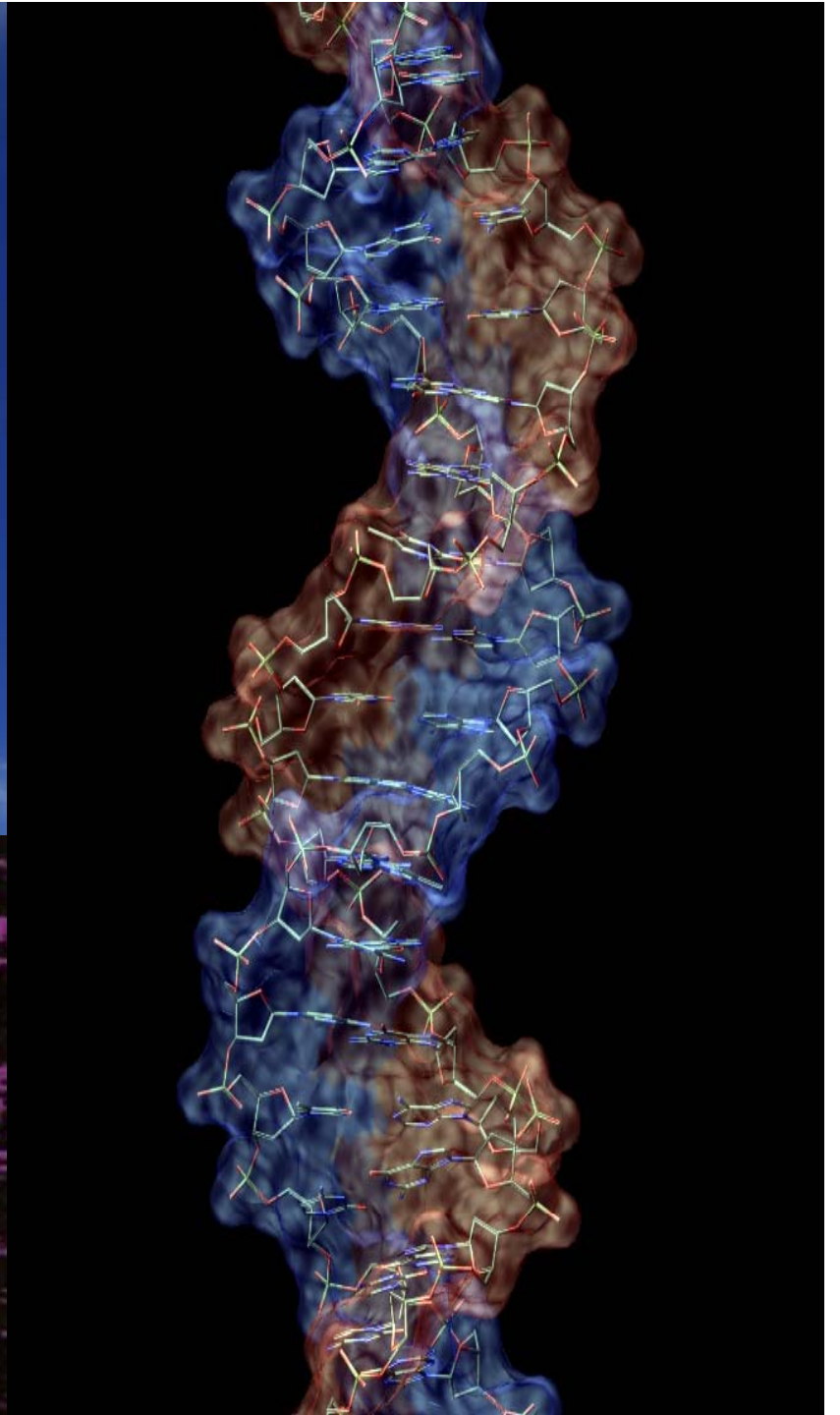
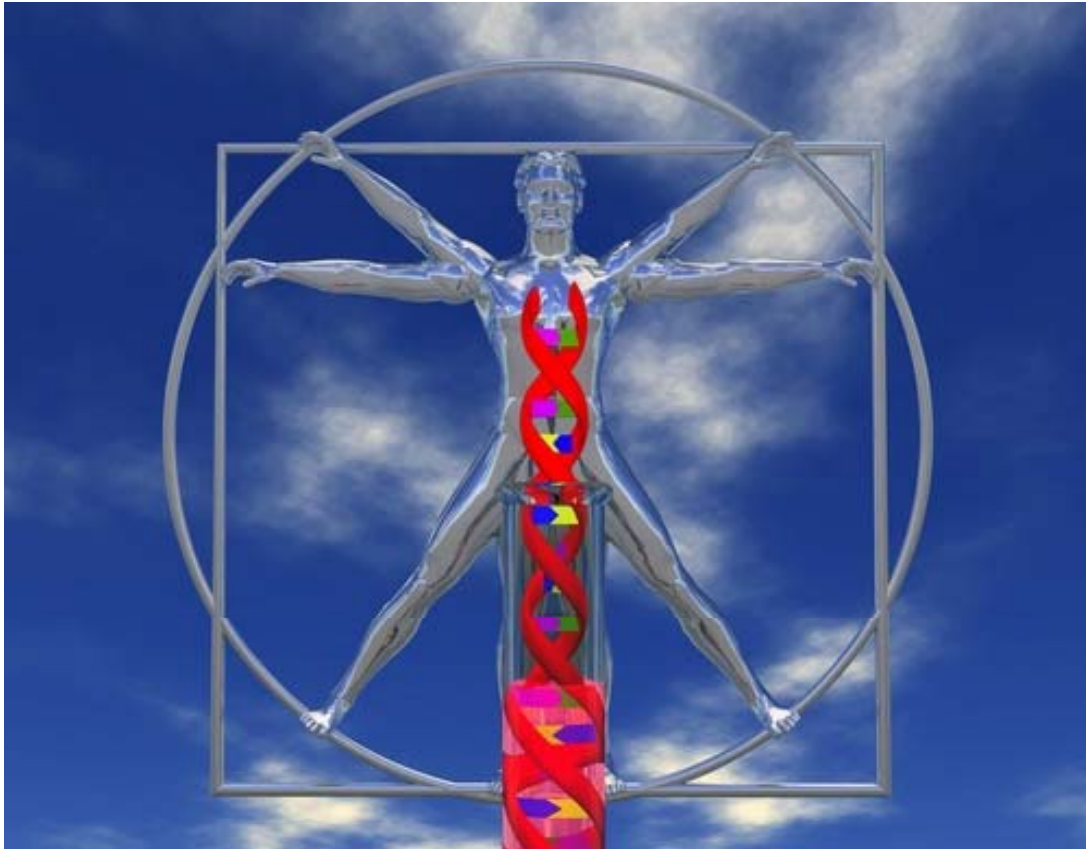
Irrigation

Food, Milk
Ingestion

Ingestion

Water and Aquatic
Food Ingestion





Certain radioisotopes “seek” specific human organs

IONIZING RADIATION
(radiation delivered to rays, x-rays, gamma) human cells from beta rays or alpha particles)

THYROID
Iodine-131
beta (gamma), 8 days

SKIN
Sulfur-35
beta, 87 days

LIVER
Cobalt-60
beta (gamma), 5 yrs.

OVARIES
Iodine-131
gamma, 8 days
Cobalt-60
gamma, 5 yrs.
Krypton-85
gamma, 10 yrs.
Potassium-42
gamma, 12 hours
Cesium-137
gamma, 30 yrs.
Plutonium-239
alpha, 24,000 yrs.

MUSCLE
Potassium-42
beta (gamma), 12 hours
Cesium-137 (and gonads)
beta (gamma), 30 yrs.

LUNGS
Radon-222 (and whole body)
alpha, 3.8 days
Uranium-233 (and bone)
alpha, 162,000 yrs.
Plutonium-239 (and bone)
alpha, 24,000 yrs.

SPLEEN
Polonium-210
alpha, 138 days

KIDNEYS
Ruthenium-106
gamma (beta) 1 yr.

BONE
Radium-226
alpha, 1620 yrs.
Strontium-90
beta, 28 yrs.
and more.

The reproductive organs are attacked by all radioactive isotopes emitting gamma radiation. In addition, the deadly Plutonium-239 is known to concentrate in the gonads. The radiation it emits can cause birth defects, mutations and miscarriages in the first generation after exposure and/or successive generations.

The times listed next to the type of ray emitted are the half-lives: how long it takes for half of the radioactive material to break down.

If you ingest alpha and beta emitters, they set up permanently next to the marrow of your bones, in your reproductive organs or elsewhere.

The effects of ionizing radiation are not immediate. Exposure to radiation can cause cancers many years later. Exposure to very low levels of radiation can be equally dangerous over time.

Authenticity notes:
Based on a drawing by Norman H. Rasmussen, "From The Dawn of the Atomic Bomb to the Dawn of the Atomic Dawn," The New York Times, April 22, 1945, and "The Atomic Bomb," The New York Times, April 22, 1945. The drawing is reproduced in the book "The History of Atomic Energy," by Francis and Taylor, London, 1954. The drawing is reproduced in "The Atomic Bomb," by Norman H. Rasmussen, "From The Dawn of the Atomic Bomb to the Dawn of the Atomic Dawn," The New York Times, April 22, 1945, and "The Atomic Bomb," The New York Times, April 22, 1945.

Precautionary Principle

Rosalie Bertell, Ph.D., GNSH



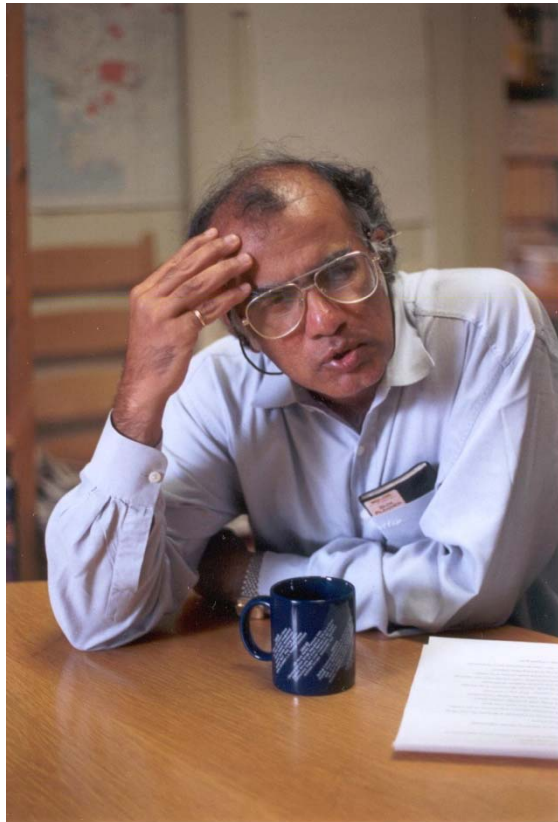
Kay Drey, ANS, Beyond Nuclear





International Calls for Strengthening Tritium Health Standards

Arjun Makhijani, Ph.D.



Ian Fairlie, Ph.D.



Tritium leaks

are occurring nationwide

“TRITIUM LEAKS AT OTHER PLANTS” (BurlintonFreePress.com, 1/24/2010)

Illinois: Braidwood, Byron, Dresden

Missouri: Callaway

Georgia: Hatch

New York: Indian Point 1 and 2

Connecticut: Connecticut Yankee (Haddam)

New Jersey: Oyster Creek

Arizona: Palo Verde

Ohio: Perry

Wisconsin: Point Beach

Delaware: Salem

New Hampshire: Seabrook

Pennsylvania: Three Mile Island, Peach Bottom

Tennessee: Watts Bar

Kansas: Wolf Creek

Massachusetts: Rowe, Pilgrim

Vermont: Vermont Yankee

...and beyond:

- But in addition to Entergy's VY, **Indian Point NY (strontium-90)**, and Pilgrim MA nuclear power plants, its Palisades reactor in MI has also leaked tritium on the shoreline of Lake Michigan.
- NRC website also lists Quad Cities, IL as a tritium “leaker.”
- In fact, whether it's a cupful or a million gallons, perhaps every single operating reactor in the U.S. has leaked tritium.

Tritium and Cobalt-60 leaks: decommissioning cost escalation

“In the case of the Connecticut Yankee nuclear plant in Haddam Neck, Conn., its underground tritium plume did not become an issue until years after it was shut down in 1996. The discovery helped expand the subsequent cost of decommissioning the facility from \$481 million to \$870 million.

“They had to remove a massive amount of soil and bedrock because of it,” said Rosemary Bassilakis, a Haddam resident who sat on a local advisory committee that dealt with the decommissioning process.

Robert Capstick, a Connecticut Yankee consultant, said the discovery of the tritium plume itself was not the reason for the cost increase. Instead, he said a legal fight with a contractor over whether the tritium cleanup work was part of the decommissioning job caused delays in the project and drove up the cost.”

“Tritium leaks a problem at many plants,” BurlingtonFreePress.com,
1/24/2010

Big Rock Point NPP, MI: Decommissioning Costs/Failures



To maintain our quality of life, we should provide reliable and affordable electricity for future generations while protecting the air we breathe.

Nuclear Energy

Today's Solution to Help Meet Our Future Energy Needs

Nuclear energy helps keep our air clean by producing 20% of our electricity without emitting any greenhouse gases. But in less than six years, the fast-growing electricity demands in some regions of the U.S. will challenge our electric supply reliability.

We need to maintain diverse supplies of electricity production along with energy efficiency and conservation. Nuclear energy is a solution we have today to help meet our future electricity demands.

Nuclear. Clean air energy.

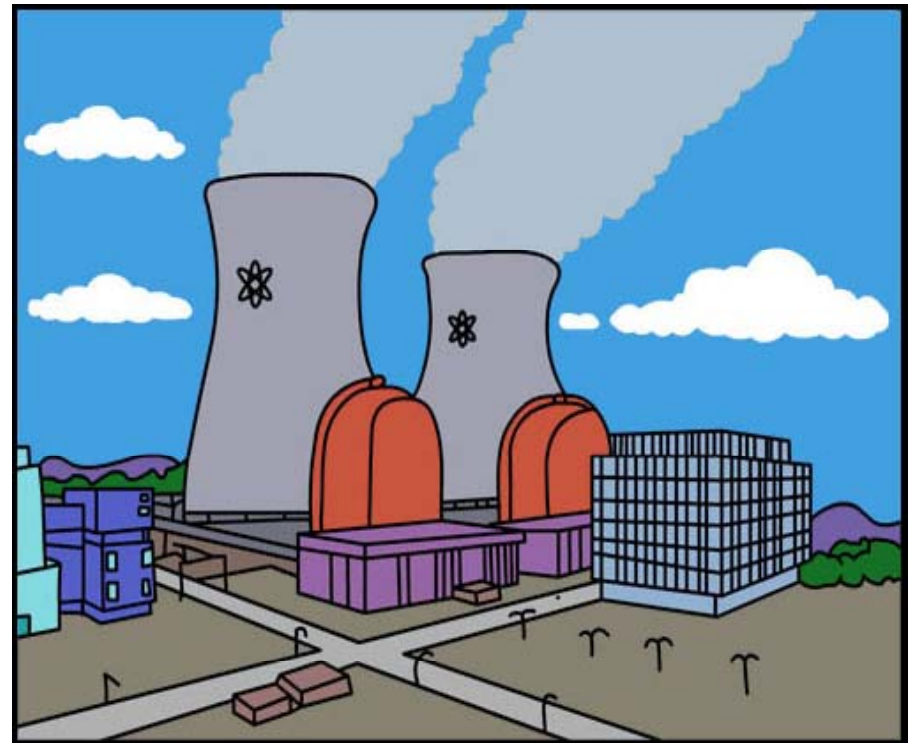
Find out more by visiting nei.org

NEI

NUCLEAR ENERGY INSTITUTE

NEI

NUCLEAR ENERGY INSTITUTE



OVERSIGHT & ENFORCEMENT ?!



High-level radioactive waste: de facto permanent on-site storage

Spent Fuel Dry Storage Single & Dual Purpose Cask

At some nuclear reactors across the country, spent fuel is kept on site, above ground, in systems basically similar to the ones shown here.

1 Once the spent fuel has cooled, it is loaded into special caskets which are designed to hold Pressurized-Water Reactor and Boiling-Water Reactor assemblies. Water and air are removed. The casket is filled with inert gas, welded shut, and rigorously tested for leaks. It may then be placed in a "cask" for storage or transportation.



2 The caskets can also be stored in above-ground concrete bunkers, each of which is about the size of a one-car garage. Eventually they may be transported elsewhere for storage.



Two Types of Spent Fuel Dry Storage Casks


1 Vertical



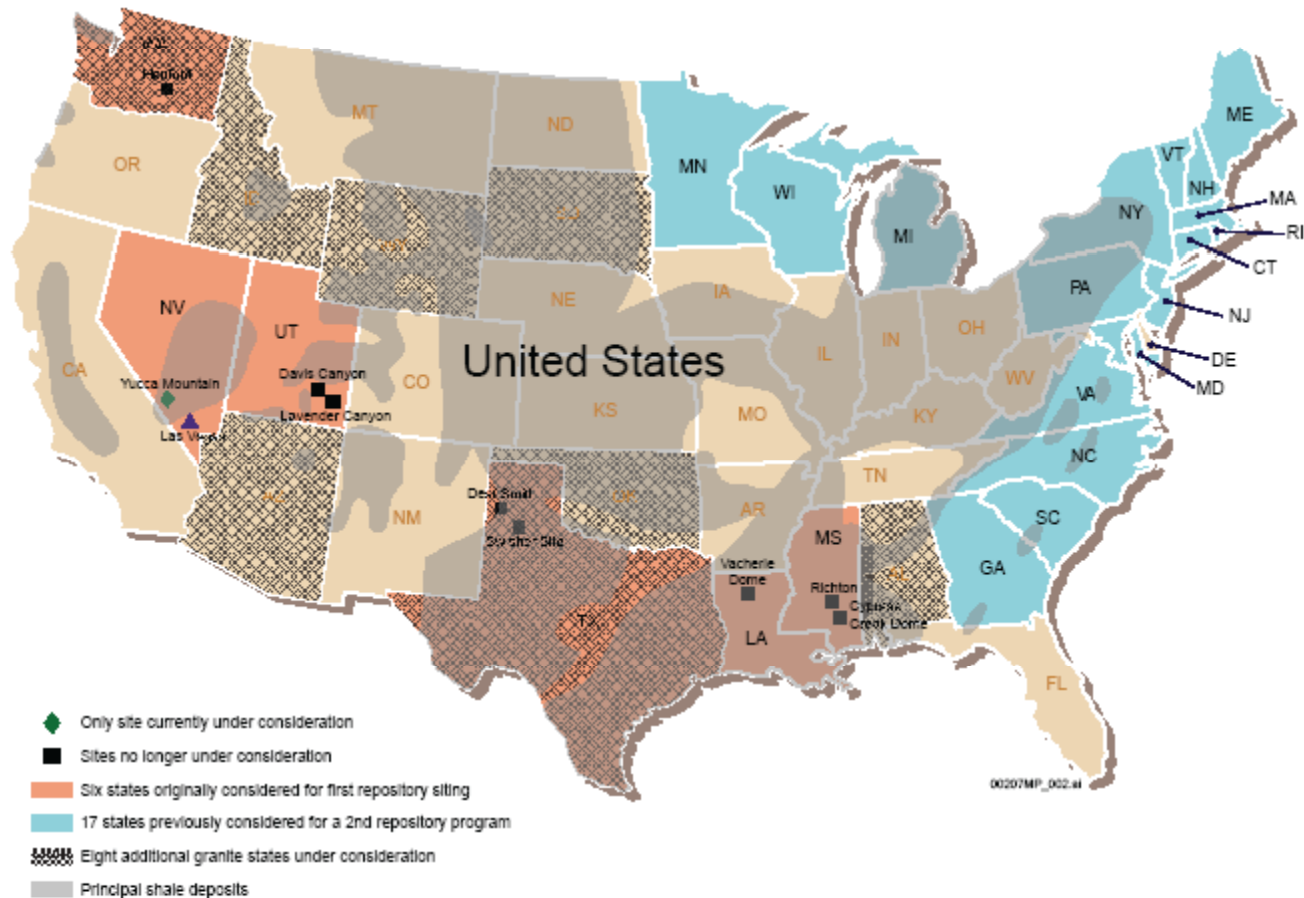
2 Horizontal



Train Carrying Spent Nuclear Fuel



DOE Report to President and Congress on Need for 2nd Repository, Dec. 2008



**United States
Government Accountability Office**



Nuclear Waste *Confidence?*



Time Capsule

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What do Vermont & Chernobyl have in common?

Holtec dry storage casks



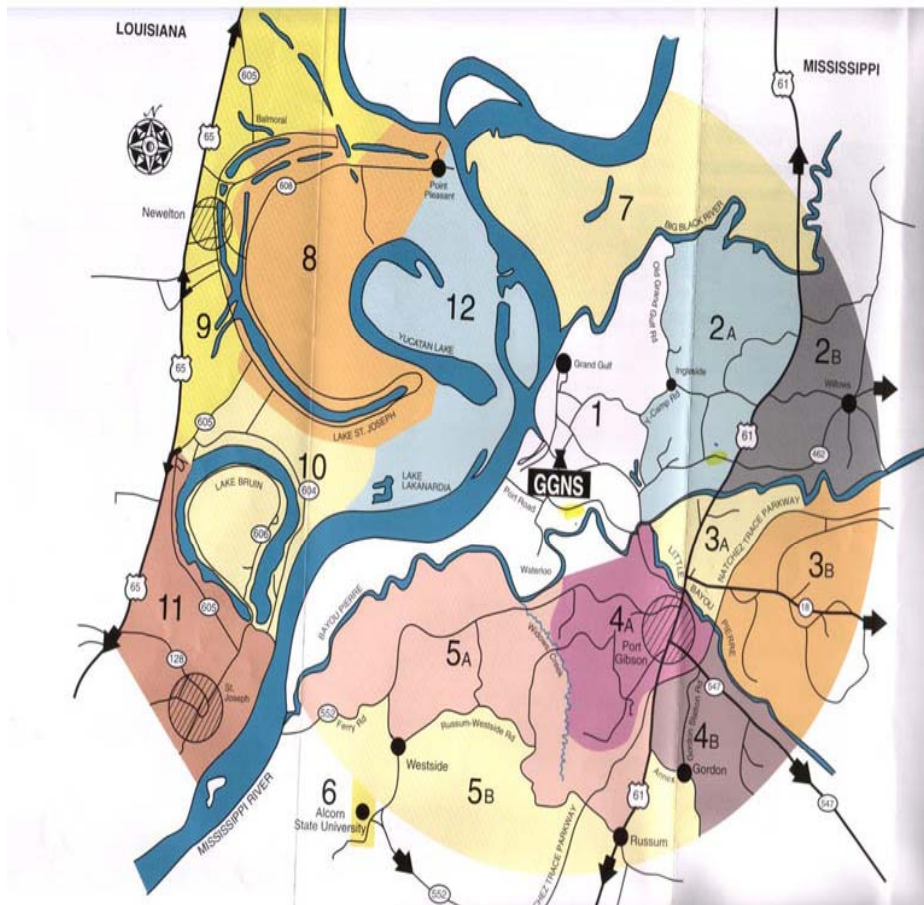
“Chernobyl matroschka doll”



ENTERGY NUCLEAR: THE GOOD NEIGHBOR?



ENERGY NUCLEAR: “I am Grand Gulf” PORT GIBSON, MISSISSIPPI



“I am Palisades”

**Entergy Palisades NPP,
Covert, MI**



FirstEnergy Davis-Besse NPP,



Entergy's neglect of major safety repairs/replacements



The Palisades Nuclear Power Plant

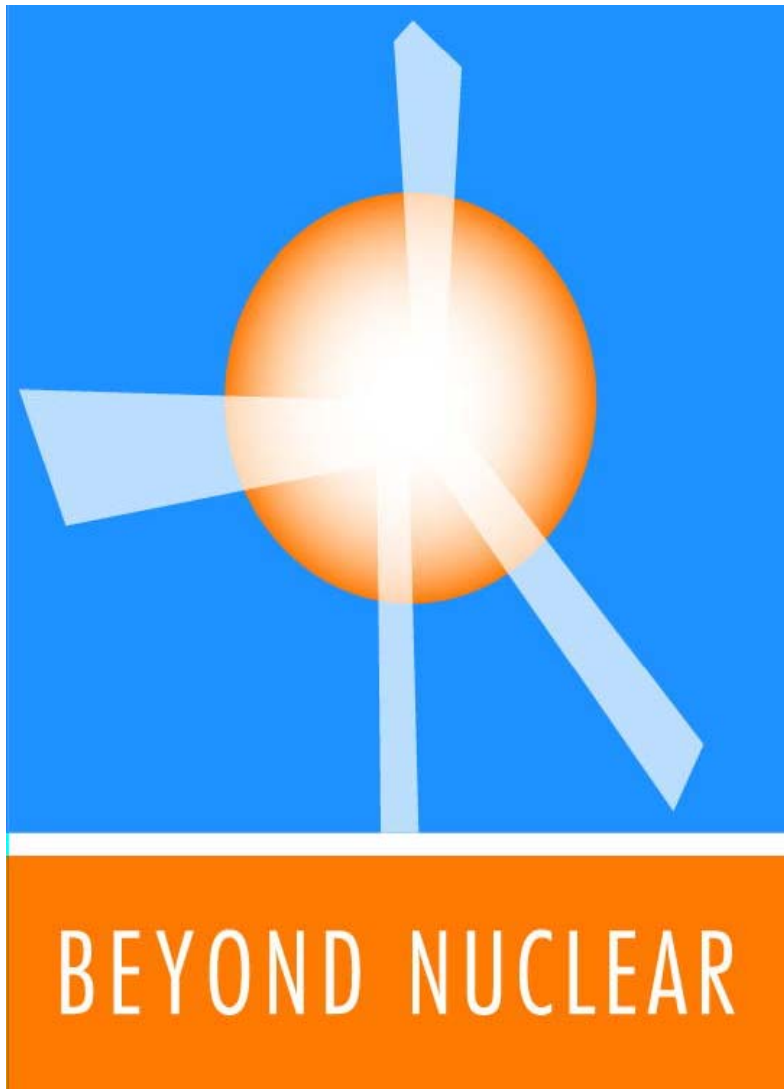
Highlights of Palisades include:

- Commenced commercial operation in 1971; current NRC operating license expires in 2011.
- License renewal application filed in March 2005; license renewal, anticipated early 2007, would extend the license to 2031.
- Qualified workforce of approximately 470 persons.
- Currently operated on behalf of Consumers by the Nuclear Management Company (NMC).
- Required significant future capital expenditures required above the routine \$20M per year, including:
 - Reactor vessel head replacement \$100 million
 - Steam generator replacement 1991 \$ million
 - Reactor vessel embrittlement concerns
 - Increasing NRC fees and fire protection requirements
 - Containment coatings and sump strainers

“Mercenary,” *Esquire*, June 2007

by Tom Junod, photo by Steve Raymer/National Geographic Image Collection





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