

# What You Can Do

Inform your elected officials of your support for **safe, renewable energy sources** and of your concerns about:

1. the need to **stop generating more radioactive wastes** until, if ever, the wastes accumulated over the past sixty years can be permanently isolated from the environment;
2. the dangers of transporting radioactive wastes from place to place, such as the threat of accidents, and terrorist attack;
3. the need to halt the proposed licensing and construction of the Yucca Mountain repository;
4. the public health risks of manufacturing nuclear power and weapons wastes into consumer products;
5. the dangers of commingling nuclear power and nuclear weapons production which could lead to weapons proliferation and acts of terrorism.

You can continue to be informed about nuclear issues by becoming a member of the **Nuclear Information & Resource Service**. Please send your contribution to **NIRS** at 1424 16th St., NW, Suite 404, Washington, DC 20036. [www.nirs.org](http://www.nirs.org)



## Some references:

1. To find your home along the nearest likely route to the proposed Yucca Mountain repository, type your address into [www.mapscience.org](http://www.mapscience.org) and click on "Get Map."
2. Donald L. Barlett and James B. Steele, Forevermore: Nuclear Waste in America. New York: W. W. Norton, 1985.
3. Kenneth D. Bergeron, Tritium on Ice: The Dangerous New Alliance of Nuclear Weapons and Nuclear Power. Cambridge, MA: MIT Press, 2002.
4. Rosalie Bertell, No Immediate Danger?—Prognosis for a Radioactive Earth. Toronto: Women's Educational Press, 1985.
5. Catherine Caufield, Multiple Exposures: Chronicles of the Radiation Age. New York: Harper & Row, 1989.
6. Luis F. Fajardo, Morgan Berthrong and Robert E. Anderson, Radiation Pathology. New York: Oxford University Press, 2001.
7. John Gofman, Radiation and Human Health: A Comprehensive Investigation of the Evidence Relating Low-Level Radiation to Cancer and Other Diseases. San Francisco: Sierra Club Books, 1981.
8. Ed Smeloff and Peter Asmus, Reinventing Electric Utilities: Competition, Citizen Action, and Clean Power. Washington, DC: Island Press, 1997.
9. Worldwatch Institute, Worldwatch Paper 106 — "Nuclear Waste: The Problem That Won't Go Away." Washington, DC: Worldwatch Institute © 1991.

This pamphlet is intended for reprint. You are encouraged to copy and distribute it widely.

# Enough Is Enough

"Governments continue to promote the use of nuclear power without having any sure knowledge that a solution to this haunting problem of nuclear waste is near, or indeed that the problem can be solved at all. The deadly residue of the nuclear age that [Enrico] Fermi inaugurated may be our civilization's longest-lasting legacy." Worldwatch Paper 106.



Time Capsule

©1976, 2002 Engelhardt in the St. Louis Post-Dispatch. Reprinted with permission. Mr. Engelhardt also contributed the title and logo of this pamphlet.

**Radioactive waste has been accumulating for 60 years, and we don't even know what to do with the first cupful.**



**the lethal legacy  
of the Atomic Age  
1942 → 2002 → ∞**

"The fission reactor produces both energy and radioactive waste; we want to use the energy now and leave the radioactive waste for our children and grandchildren to take care of. This is against the ecological imperative: Thou shalt not leave a polluted and poisoned world to future generations." Hannes Alfvén, 1970 Nobel Laureate in Physics

**Nuclear Information & Resource Service**  
1424 16th St., NW, # 404, Washington, DC 20036  
Ph: 202-328-0002 FAX: 202-462-2183  
[nirsnet@nirs.org](mailto:nirsnet@nirs.org) [www.nirs.org](http://www.nirs.org)

World Information Service on Energy  
Amsterdam  
[www.antenna.nl/wise](http://www.antenna.nl/wise)

# Then and Now

On December 2, 1942, scientists created the world's first self-sustaining nuclear chain reaction at the Fermi reactor in Chicago. They proved they could harness the energy of the atom. The Atomic Age was born — and so was nuclear waste.



Starting in the 1950s, commercial nuclear power plants began to produce electricity and tremendous amounts of radioactive waste. At every stage of the uranium fuel cycle — where uranium has been mined, milled, chemically converted, enriched, fabricated into fuel rods, fissioned in reactors and reprocessed — wastes are generated.

## At nuclear power plants the wastes include:

- irradiated fuel rods removed from the reactor vessel after fissioning for about six years;
- filters, resins, and evaporator sludges saturated with radioactive contaminants removed from the liquid and gaseous effluents that are released to the environment;
- radioactive, corroded and embrittled pipes, pumps, and other components that have been discarded;
- entire nuclear power plants — after decommissioning. A typical 1,000-megawatt reactor building may contain over 13,000 tons of contaminated concrete and over 1,400 tons of contaminated steel reinforcing bars in the floor alone.

**No permanent, safe technology or location has been found to isolate any of the sixty-year accumulation of radioactive waste from the human biosphere for the requisite millennia. And yet we keep generating more and more.**



Nuclear power plants generate **high-level** and so-called “**low-level**” wastes. High-level wastes are the irradiated fuel rods; “low-level” refers to everything else. Much “low-level” waste must be handled by remote-controlled equipment because contact with it could give a worker a lethal dose.

“Low-level” nuclear power and weapons wastes have accumulated all over the country, creating an expensive and dangerous storage problem. It is a problem so out of control that the federal government is actually proposing to sell radioactively contaminated metals on the commercial market that could be used in the manufacture of pots and pans, prostheses, coins, toys, zippers, and other consumer goods.

Nuclear power plants cannot operate without regular, deliberate releases of radioactive liquids, gases and particles into the environment during their **routine, everyday operation**. **It does not take an accident.**

## Why does the government allow releases of radioactivity?

No economically feasible technology exists to filter out some of the wastes — for example, radioactive hydrogen (tritium) and noble gases (like krypton and xenon that decay into biologically harmful radioactive strontium and cesium). The federal government, therefore, does not require that these materials be filtered.

Any releases that do not exceed the government's **permissible** contaminant levels are allowed to be discharged — into our air and into our water, unmonitored and unreported. **“Permissible” does not mean safe.**



**‘Just Keep Driving Around – We May Come Up With A Solution Yet’**

©1978, 2002 Engelhardt in the St. Louis Post-Dispatch. Reprinted with permission.

Science and common sense dictate that radioactive wastes must be kept isolated from people and other living things; from water, soil and air; and from terrorists.

The federal government has had a long-standing policy of keeping nuclear weapons separate from civilian nuclear power. Currently, however, the US Department of Energy plans to generate tritium for bombs at Tennessee nuclear power plants and to use plutonium (from dismantled weapons) in commercial nuclear reactor fuel. Increasing the amount of weapons-grade materials at power plants makes these facilities even more attractive to terrorists, and more vulnerable.

**Already every nuclear power reactor generates plutonium;** a 1000-megawatt reactor generates enough to make 40 nuclear bombs a year. As long as nuclear power plants operate, plutonium and other long-lived radioactive wastes will continue to be generated, endangering the environment and human health.



The government is planning to build a deep geologic repository at Yucca Mountain, Nevada, to store irradiated fuel rods. **This site, however, is known to be geologically unsuitable and seismically unstable.** Earthquakes have fractured the rock, creating pathways for radioactivity to percolate to the groundwater below — a source of water for drinking and irrigation.

President Bush chose the Yucca Mountain site in 2002 to be the first national high-level waste repository, **but it has not yet been approved** by the US Nuclear Regulatory Commission.

The Nevada location would mean transporting high-level wastes nationwide on highways, rail-ways and rivers — through population centers and farmland — through some communities as often as every day.

Moving tens of thousands of shipments through 45 states and Washington, DC, for more than thirty years would not solve the problem. As long as nuclear plants keep operating, they will keep generating waste. During the time the fuel rods currently stored at nuclear power plants (in fuel pools and dry-storage casks) are being shipped to Yucca Mountain, roughly the same amount of new nuclear waste will have been generated. (There would be about as much waste stored on site at nuclear power plants after Yucca Mountain is full as there is at those plants today.)

**We should stop generating more waste until, if ever, a safe disposal solution can be found.**

# and Forever

Many radioactive waste products are dangerous **virtually forever**. They continue giving off radioactive particles and rays for at least ten times each isotope's “half-life.” Plutonium-239 has a half-life of 24,000 years. Xenon-135 decays into cesium-135, an isotope with a 2.3-million-year half-life. Uranium-238 has a half-life of 4.5 billion years.

Every radioisotope decays at its own rate, regardless of temperature, pressure or chemical environment. No process has been found to speed up the radioactive decay. It occurs only with the passage of time.



**Exposure to radiation increases the risk of damage to tissues, cells, DNA, and other vital molecules — potentially causing programmed cell death (apoptosis), genetic mutations, cancers, leukemias, birth defects, and reproductive, immune, cardiovascular, and endocrine system disorders.**

“I don't think the present controversy is over whether or not there is a safe level. I think all agree that we have no reason to assume that any level of radiation is utterly safe.” Arthur C. Upton, MD, 1979, former director, National Cancer Institute.

“[Scientists and researchers] know that radiation causes leukemia and almost every type of cancer, and that it will shorten a person's life span by months, years, or decades. They know that it will cause cataracts and weaken bodily defenses. They know that, if ingested or inhaled, some radioactive substances will be more harmful to certain body organs than to others . . . . The tiniest amount of radiation to the reproductive cells will cause mutations. And as the National Academy of Sciences once put it, ‘the more radiation, the more mutations. The harm is cumulative.’ . . . . More important, the cancer estimates deal with only one part of the problem. The other involves a greater unknown — **the genetic damage to future generations.**” (Barlett and Steele, 1985, pp. 298, 302)

