The power and the glory: th

by Anna Gyorgy

This feature is the first in a series of articles The Gateway *will be running this year dealing with nuclear energy.*

The first article, originally entitled "Nuclear Waste Storage: Where Will All the Garbage Go?", first appeared in New Age magazine. The article was reprinted by the Environmental Action Reprint Service in a pamphlet circulated by the San Francisco chapter of People Against Nuclear Power. The author of the article, Anna Gyorgy, is a prominent American anti-nuc

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The Gateway *welcomes c nuclear question.*

And of course, we await

In the heat of discovery and development of nuclear power during World War II, little thought was given to the final disposal of wastes. Scientists assumed that, like many new problems confronted during that time, waste disposal would also be solved. But it remains the Achilles heel of the nuclear industry.

Radioactive wastes are the dangerous end of the fuel cycle. They are toxic, poisonous. If released into the environment, they contaminate land and water, virtually forever.

At present there is no agreed-upon safe way to isolate radioactive materials from the environment for thousands of years, a time span longer than human civilization has been on earth. In fact, nuclear storage facilities have had a hard time protecting wastes for even a decade.

There are three categories of nuclear wastes, as well as the mining wastes (tailings).

Low-level waste

The Environmental Protection Agency (EPS) has estimated that by the year 2000, federal and commercial nuclear power together might generate up to 400 million cubic feet of low-level waste. These wastes include anything that has picked up radiation during any part of the fuel cycle. Also included are medical wastes contaminated by hospital use of radiation, as well as tools used in mining and gloves and uniforms of workers in enrichment and reprocessing plants. Another low-level waste is the radioactive plant cooling water. Highly contaminated cooling water is removed from the core, allowed to cool and evaporate while short-lived radioactive by-products decay, and then mixed with cement and solidified in barrels. The barrels are buried as low-level waste.

Low-level wastes have historically been handled with some abandon. Between 1946 and 1962, 47,500 55-gallon drums of radioactive waste from atomic weapons and research were dumped into the ocean near the Farallones Islands 35 miles west of San Francisco. An EPA oceanographer estimated that "about 25% of the barrels have broken open and that low levels of radioactive waste had leaked out in an area where fish such as the deep sea sole and the commercially important sable fish were observed." However, only a few of the 28,800 barrels dumped into the Atlantic Ocean near the Maryland-Delaware border were found broken open. The two dumping areas were licensed by the AEC for low-level waste disposal from 1946 until 1970.

There was also casual dumping of radioactive tools near a mining and milling operation in Beatty, Nevada, exposing people unnecessarily to radiation. People had entered the poorly guarded dumping reservation and made off with seemingly new, abandoned tools. Several house foundations were poured using a radioactive cement mixer taken from the dumping area.

There are six major commercial burial sites for low-level nuke waste. One of these, the West Valley site, was closed in 1975 when it was finally revealed that the burial trenches were leaching into the nearby creeks that feed Lake Erie.

Similar leaching of radioactivity from trenches where barrels, boxes, and canisters full of waste are buried has been discovered at Maxey Flats near the Morehead, Kentucky, disposal area. In the fall of 1977 the facility was closed because of the leaks, including one that was reportedly fourteen years old.

Intermediate-level waste

So-called "intermediate wastes" are liquids and materials contaminated with fission products, including uranium and plutonium. These wastes are not necessarily less dangerous than high-level wastes but are less concentrated and do not contain spent fuel rods, although used fuel rod cladding is included.

About 75 percent of all U.S. nuclear wastes are stored at ERDA's Hanford, Washington, reservation. There, intermediate-level waste has been put into concrete-covered trenches called "cribs," which let radioactive materials such as plutonium-239, cesium-137, strontium-90, and tritium (a radioactive form of hydrogen) percolate into the soil below. It is assumed that they will stop long before reaching the desertlike reservation's water table far underground. A large amount of plutonium has apparently been buried at Hanford in this way.

High-level waste

These wastes contain uranium-235 and plutonium-239. They are highly radioactive. The wastes are dangerous in any form; they can, in fact, be used to make an explosive weapon.

Most radioactive wastes from the civilian nuclear rogram remain in the spent reactor fuel, where they were created. The NRC has not yet defined spent fuel as high-level waste, because of its potential value as fuel if reprocessed. However, as no reprocessing is in the offing, the used fuel *is* a waste product, whether defined as such or not.

And the spent fuel is piling up at commercial reactor sites. About 3000 metric tons of spent fuel are now stored on-site. The amount could grow by an additional 17,000 metric tons over the next 10 years. By 1985 there will be a severe shortage of on-site storage capacity.

Waste storage now ...

About 71 million gallons of high-level waste are now being stored "temporarily": 50 million gallons at the Hanford Reservation in Richland, Washington; 21 million gallons at Savannah River in Aiken, South Carolina; 3 million at the Idaho National Engineering Lab in Idaho Falls, Idaho. These wastes are from the weapons program, leftovers following reprocessing of spent fuel from the DOE's production reactors which make U-235 and plutonium for nuclear weapons.

The super-hot liquid wastes are stored in concrete-encased carbon steel tanks. The wastes generate such heat that they often boil, and must be cooled. Although the tanks are supposed to last for fifty years, the stress on them from the hot, corrosive, and acidic wastes has caused far shorter tank life and a series of leaks.

By 1970, there had been fifteen tank failures: eleven at Hanford and four less serious ones at Savannah River. The worst was discovered on June 8, 1973, at Hanford. The waste storage facility was then being run by ARCO (Atlantic-Richfield Co.). Tank 106T, an old one built in 1944, had leaked from corrosion some 115,000 gallons of liquid high level waste. A leak was finally discovered that was draining the tank by some 2,500 gallons a day. It had leaked for 51 days. Experts say that methods for detecting leads are crude, and there may be many small leaks that simply go unnoticed. In this case, poor records were kept on the tank. The 115,000 gallons contained 14,000 curies of strontium-90, 40,000 curies of cesium-137, and 4 curies of plutonium, along with other fission products. Robert Gillette commented in *Science*, August 1973, "It was the largest single accidental release of radioactive waste in the Commission's history, and easily its most embarrassing incident since Project Baneberry, a weapons test that went awry in Nevada in 1970, sending a puff of fallout all the way to the Canadian border."

The AEC claimed that all the radiation would be contained underground and would pose no threat to the Columbia River, just 10 miles from the spill site. In fact, abnormally high levels of radioactivity have already been monitored in the river, its fish, plankton, and wildlife. These levels may be due more to direct discharge of wastes into the ground than to spills from the high-level waste storage tanks. But the contamination is nonetheless there.

In 1972 a government report noted that enough plutonium had collected in the soil of the Hanford cribs used to store intermediate-level wastes to "conceive of conditions which could result in a nuclear chain reaction," hence an explosion. Subsequently the plutonium-contaminated soil was dug up for reprocessing and storage elsewhere.

... And later

Managing nuclear waste is less difficult than managing many other by-products of our industrial society. The technology to handle nuclear wastes is available today ... The Federal Government is presently reviewing several permanent techniques for storing high-level waste. The most promising method is burial in deep salt deposits.

— Northeast Utilities,
"The Way It Is" (July 1975)

Utility and government hopes for an easy solution to the waste mess have been repeatedly dashed. "The Nuclear Fuel Cycle," a report prepared by the Union of Concerned Scientists in 1974, reviewed the chancy nature of waste storage "solutions":

Except for the storage of liquid wastes in tanks, for which experience from weapons production applies, all proposals for long term storage or disposal of high-level waste from the nuclear industry lie at the research and development stage. The proposals so far considered seriously by the AEC for the disposal of wastes are dubious in concept (caverns evacuated by nuclear weapons, depositing wastes in liquid form in rock caverns), not technically feasible (disposal in solar orbit), or they are so dependent upon site specific geological characteristics that suitability cannot be determined *a priori* without extensive on-site investigation (disposal in bedded salt or under Antarctic ice.) ... The matter of man-made vaults at or near the surface for long-term storage (500 years) is equally uncertain. Their maintenance depends upon the existence of social and political institutions, the permanence of which cannot be guaranteed ...

Not much has changed since the UCS report was issued. But public and even official awareness of the problem has heightened. In July 1976, a court ruling on an appeal of the licensing of