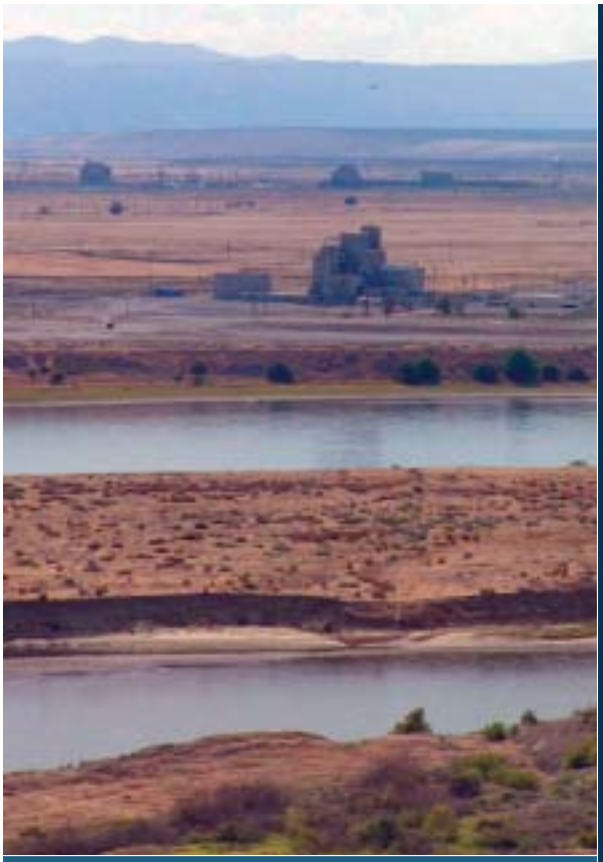

A Briefing Guide to Initiative 297

Protecting Washington from Nuclear Waste at Hanford

Travis Madsen
Robert Pregulman

The Washington Public Interest Research Group

October 2004

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WashPIRG
3240 Eastlake Avenue East, #100
Seattle, WA 98102

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Executive Summary

The Hanford Nuclear Reservation in southeastern Washington is one of the most contaminated nuclear waste sites in the world. During four decades of building nuclear weapons, more than 450 billion gallons of radioactive waste was dumped into the soil and into the Columbia River, enough to submerge the city of Seattle in a lake of waste 25 feet deep. Storage tanks for the most toxic liquid waste have leaked a million gallons of highly radioactive contaminants into the groundwater table. Containing the threat to public health and the environment from the Hanford Site will be a daunting and time consuming task, but a vitally necessary one.

Unfortunately, the U.S. Department of Energy (DOE) is advancing a new cleanup plan that will undermine progress and leave Washington at risk. The agency plans to abandon large amounts of high-level waste in leaking underground tanks, weaken groundwater cleanup standards, and ship in additional waste from nuclear weapons facilities all over the country.

To protect Washington from nuclear waste and ensure that DOE lives up to its commitment to clean up the Hanford Site, citizens have banded together to put forward Initiative 297 for voter approval this November. The initiative would require DOE to properly address the existing contamination at Hanford. This report summarizes the major issues behind Initiative 297 and the role it will play in holding the DOE to a higher standard.

Hanford is America's Nuclear Waste Dumping Ground

Of all the waste generated in producing nuclear material for America's nuclear arsenal, the Hanford Site holds:

- nearly 90 percent of the spent reactor fuel, the most radioactive substance on earth;
- almost 60 percent of the most dangerous high-level radioactive and toxic wastes; and
- 60 percent of the equipment and materials contaminated with highly radioactive transuranic wastes generated during bomb production, most of which is buried in shallow, unlined trenches.

These wastes remain dangerous for thousands to millions of years, and will need to be isolated from the human environment to ensure safety.

Hanford's Land and Water Are Massively Contaminated

Contaminated groundwater beneath the Hanford Site covers an area larger than the city of Seattle, between 80 and 200 square miles in size. The contamination is spreading toward the Columbia River and poses a serious threat to the future health of the region. The groundwater contamination includes:

- plumes of radioactive iodine, strontium, technetium, tritium, carbon, cesium, plutonium, and uranium.
- toxic chemicals like carbon tetrachloride, chromium, nitrate, arsenic, fluoride, and trichloroethylene.

Plumes of radioactive strontium and tritium and toxic chromium have already reached the Columbia River, and are entering the water at levels thousands of times higher than EPA drinking water standards. The tritium plume releases 3,000 curies of radiation into the Columbia River every year (60 times as much radioactivity as was released by the Three Mile Island accident).

The major sources of contamination include:

- Over 400 billion gallons of toxic and radioactive liquids and millions of cubic feet of radioactive solids dumped and buried into unlined trenches and pits over the past 50 years. Some of this contamination has already reached the Columbia River.
- 53 million gallons of extremely radioactive high-level waste, mixed with hazardous chemicals and stored in aging tanks that have leaked at least one million gallons into the groundwater. The DOE estimates that this waste, among the greatest threats at the site, could reach the river in as little as ten years, and continue contaminating it for another 4,000 years.

The Columbia River provides drinking water for more than 1.5 million people, irrigation water for important agricultural areas in Oregon and Washington, and is one of the most important spawning areas for Chinook salmon in the entire Pacific Northwest. River contamination holds the potential to endanger large numbers of people.

The Department of Energy's Cleanup Plan: Lower Standards for Groundwater Cleanup, Abandon High-Level Waste in Leaking Tanks, and Ship in More Waste from Other Facilities

In May 2002, the Department of Energy announced an "accelerated cleanup plan" for Hanford. However, the cleanup plan cuts corners, leaving important tasks undone and Washington at risk. Important milestones originally laid out in the Tri-Party Agreement, the legally binding cleanup plan agreed upon by DOE, the U.S. EPA, and the Washington Department of Ecology in 1989, would be abandoned under the new plan.

1) Weakening Groundwater Cleanup Standards

- In a recent decision, the DOE labeled the contamination of Hanford's groundwater "irreversible and irretrievable." This label opens several legal doors for the DOE to scale back or abandon plans to clean up the contaminated groundwater.

- The DOE is also planning to clean up waste sites to a weaker standard and checking for compliance farther away, where the pollution is more likely to be diluted. These steps will make cleanup easier, but allow further pollution of the water.

2) Abandoning High-Level Waste Sludge in Leaking Underground Tanks

- The DOE is working with Congress to change the definition of high-level waste, legally allowing the abandonment of highly radioactive sludge in leaking underground tanks. Under this loophole, the DOE would be able extract some waste, then fill the tank with grout and abandon it. Under the original cleanup agreement, DOE is required to remove more than 99 percent of the waste, immobilize it in glass, and store it in a national repository.

3) Shipping in Waste From Other Facilities

- On June 23, 2004, the DOE issued a final decision to import three million cubic feet of radioactive waste over the next 40 years from weapons facilities across the country and dump them at Hanford.
- The plan includes a landfill large enough to accept all the waste generated at Hanford, plus 13 million to 34 million cubic feet of imported waste. The size of the proposed landfill brings DOE's stated intention to limit waste imports to 3 million cubic feet into question.
- Adding additional waste will distract from the cleanup effort and exacerbate dangers associated with transporting nuclear waste, including terrorism and accidents.

A Better Plan for Hanford: Initiative 297

The Protect Washington Initiative, I-297, would hold the DOE to a higher standard. It would:

- Focus cleanup efforts on dealing with the contamination already present at Hanford instead of importing new waste from off site.
- Ensure that the high-level radioactive waste in leaking tanks is cleaned up to the standards set in state and federal hazardous waste laws, instead of abandoned in the ground.
- Require cleanup of waste previously dumped into unlined trenches, and monitoring of groundwater to detect any contamination that may have resulted.
- Enable greater public participation in decisions at Hanford.

The initiative is necessary because DOE has a history of making cleanup promises to the people of Washington and failing to follow through, as well as a history of mismanagement of the cleanup effort. Initiative 297 provides stronger legal tools to protect Washington.

Vote Yes on I-297!

Washington voters have the power to reject the DOE's reckless plan to abandon contamination at Hanford while importing new waste from other states. In order to ensure that the DOE cleans up Hanford and follows the same hazardous waste laws that every private company in the state must comply with, citizens should vote yes on I-297.

Introduction

Columbia River Valley just north of Richland, WA. There, at the Hanford Nuclear Reservation, more than 40 years of nuclear bomb manufacturing have left one of the most contaminated waste dumps in the Western Hemisphere.

Many Washingtonians have heard about Hanford regularly over the years. It seems that every few months the waste site reappears in the news. Reporters regularly describe frightening discoveries and events: a previously undisclosed dump site with flammable uranium shavings, a wildfire spreading over contaminated soil, a near-miss explosion at the high-level waste tanks, a real explosion in the old plutonium processing facility, more unsafe working conditions, and more employees alleging mistreatment after raising safety complaints.

The legal wrangling between the state of Washington and the DOE over the cleanup also frequently shows up in the news. Washington officials continue to struggle with an ongoing cycle of failed deadlines, broken promises, and ongoing re-evaluations of the Hanford cleanup program from the Department of Energy and its contractors. The Tri-Party Agreement, a legally binding document signed 15 years ago by the State of Washington, the U.S. Environmental Protection Agency (EPA), and the DOE, laid the standards and timelines for the cleanup tasks that need to be performed. However, with each new administration and new set of leadership at the Department of Energy, the cycle begins again. First the new managers re-evaluate the cleanup program and the resources

"We need absolute certainty that the cleanup work will be completed (at Hanford) before we are willing to even consider allowing more waste to come into the system. (The federal government) has failed to prove that shipping more waste to Hanford won't make the nation's most contaminated site even worse."[3]

— Governor Gary Locke, July 2004

devoted to it. Then old promises are broken and new promises are made. This cycle has resulted in a long list of missed deadlines and mismanagement at Hanford that puts the public, the cleanup workers, and the environment at risk.

This year, the details about the contamination at the Hanford Site and what the U.S. Department of Energy (DOE) is doing to clean it up are especially relevant. Citizens' groups, tiring of the ongoing series of broken promises made by the DOE, have filed a ballot initiative that all voters in Washington will have a chance to consider in November 2004. The measure is known as Initiative 297, and the Protect Washington Campaign is working to support its passage this fall.

This report summarizes background information for citizens and reporters on the issues at stake in the Initiative 297 vote this November, including the basic problems at the Hanford Site, the flaws in the DOE's cleanup plan, and the role that Initiative 297 will play in holding the DOE to a standard that will protect the people of Washington. In addition, the report points to more detailed documents and experts in the field for those who wish to explore the issue further.

"There is a troublesome pattern here… The pattern being that they [DOE], in isolation, figure out what's best and what they're willing to comply with—and they offer it as: 'Take it or leave it.'"[2]

— Tom Fitzsimmons, Director
Washington Department of Ecology, May 2003

Hanford is America's Nuclear Waste Dumping Ground

America's Cold War fallout lies buried in shallow trenches and leaking tanks in the Southeastern Washington's Hanford Site is one of the most contaminated nuclear waste sites in the world. Over the course of four decades of plutonium production for nuclear weapons, Hanford operators dumped more than 450 billion gallons of radioactive materials into the soil and into the Columbia River, enough to drown Seattle in a lake of waste over 25 feet deep.[4] Over one million gallons of radioactive wastes have leaked out of storage tanks used decades longer than they were designed to last, contaminating the groundwater. Now plumes of toxic and radioactive wastes are flowing toward the Columbia River, threatening the future of the entire region.

During over 45 years of operation, Hanford released more than 140 million curies of radiation into the air, soil, and water. (A curie is a measure of radioactivity). For comparison, the meltdown at

Figure 1: A Comparison of Release and Storage of Radioactive Materials at Three-Mile Island, Chernobyl, and Hanford.

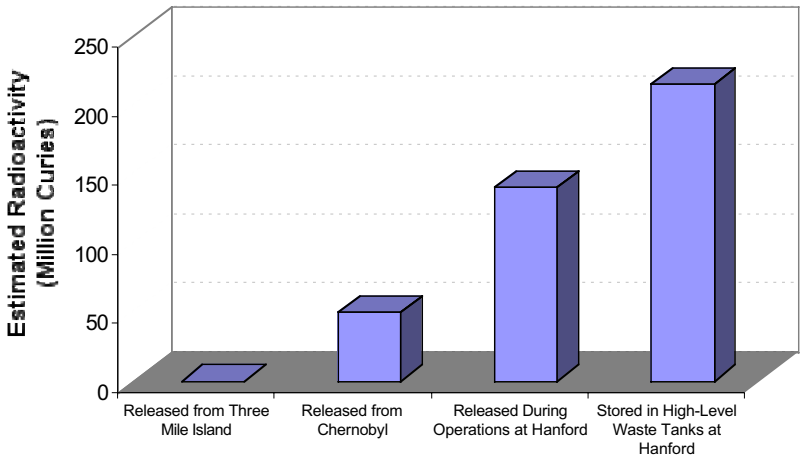


Figure 2: The Location of the Hanford Site

Chernobyl released 50 million curies, and the 1979 accident at Three Mile Island in Pennsylvania released 50 curies.[5] In other words, routine operations at Hanford released as much radiation as nearly three Chernobyls and 3 million Three Mile Islands. Even more radioactivity is currently stored at Hanford (Figure 1).

Hanford Contains the Bulk of the Nation's Nuclear Weapons Waste

Hanford holds the bulk of the most toxic byproducts of building the nation's nuclear weapons arsenal. Nearly three-fifths of the nation's high-level defense waste is at Hanford, along with close to 90 percent of defense-related spent nuclear fuel, 60 percent of the buried transuranic waste, and tens of thousands of cubic meters of low-level radioactive waste and low-level waste mixed with toxic chemicals (Table 1). In addition to the materials in Hanford's inventory, an enormous amount of waste contaminates the soil and water on the site.

Types of Nuclear Waste

Hanford's waste inventory falls into five classes:

1) Spent Nuclear Fuel, irradiated uranium rods from the cores of nuclear reactors – the most intensely radioactive material on the planet.

Half Lives of Major Radioactive Contaminants

A half-life is the time required for the intensity of radiation emitted by a chemical to fade by 50 percent. In general, contaminants are considered much less dangerous after more than 10 half-lives, when radiation has declined 1000-fold. Most Hanford contaminants will remain dangerous for hundreds to thousands of years. Some will remain dangerous for billions of years.

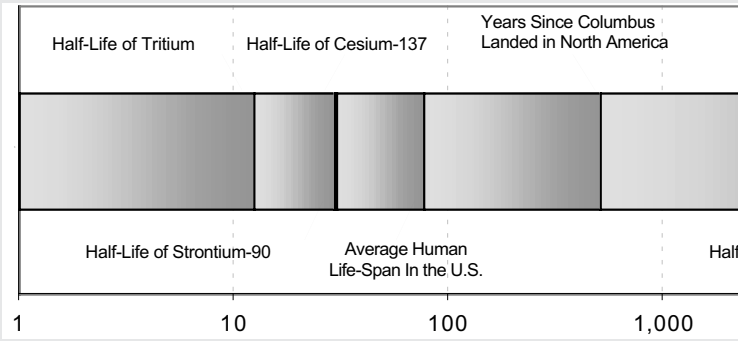
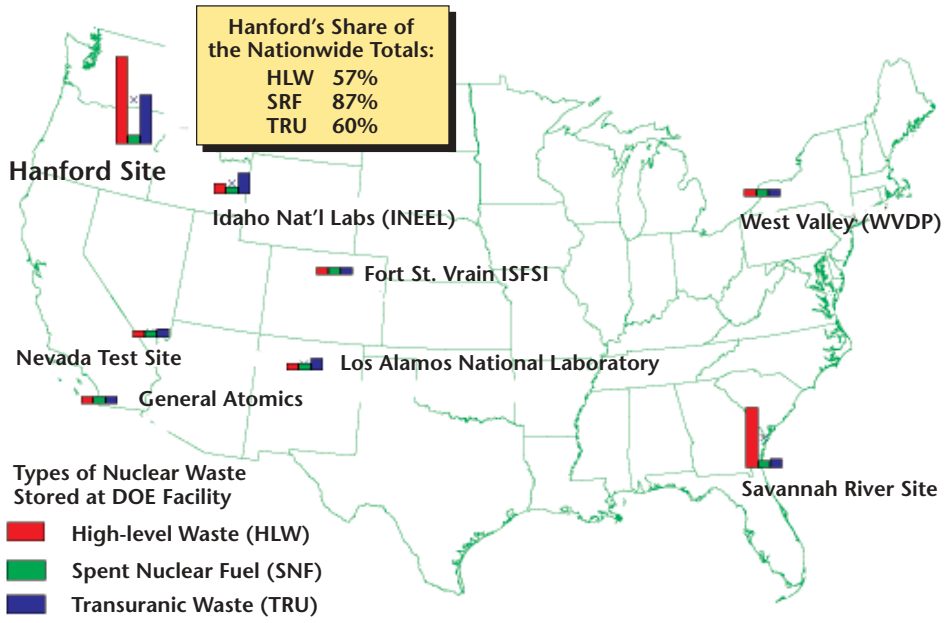
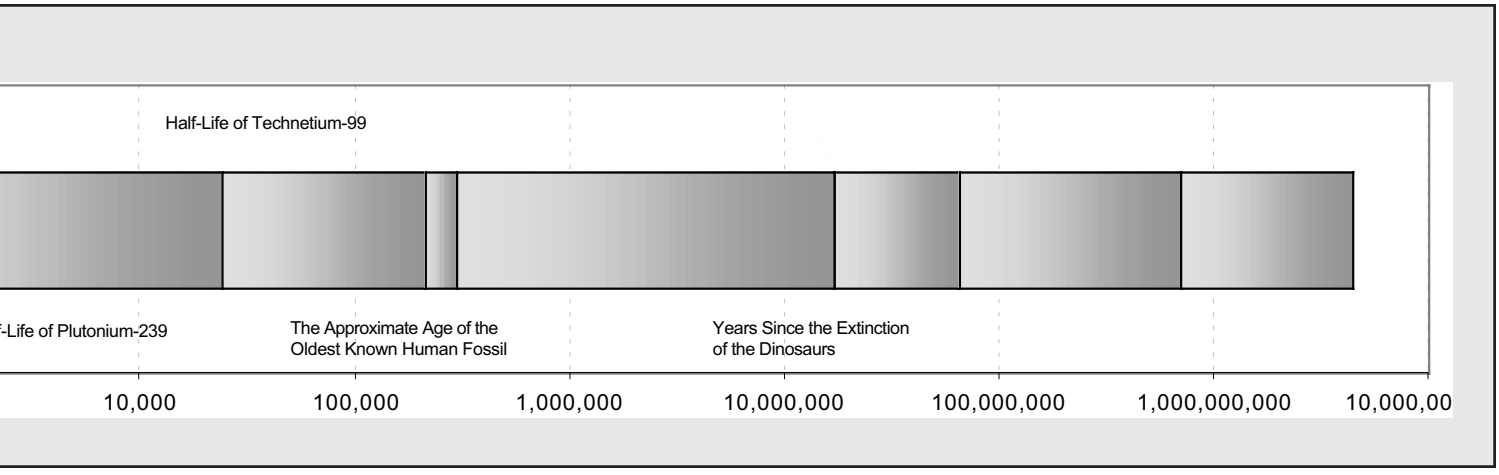


Table 1: Hanford's Share of the Nations Nuclear Weapons Waste[7]

	High-Level Waste (m3)	Spent Reactor Fuel (Metric Tons)	Buried Transuranic Waste (m3)	Low-Level Waste (m3)	Low-Level Waste Mixed with Toxic Chemicals (m3)
Hanford	206,832	2,136	75,800	305,084	7,677
Nationwide Total	353,500	2,467	126,000	14,847,573	46,549
Hanford's Share	57%	87%	60%	2%	16%

Figure 3: Selected Nuclear Wastes Stored at DOE Facilities Nationwide





2) **High-Level Radioactive Waste (HLW)**, the liquid and sludge wastes that are left over after irradiated fuel has been reprocessed to extract isotopes of uranium and plutonium for nuclear weapons.

3) **Transuranic Waste (TRU)** includes material contaminated with radioactive elements heavier than uranium, such as plutonium, neptunium, americium and curium. These elements do not occur naturally, and remain dangerous for thousands to billions of years.

4) **Low-Level Radioactive Waste (LLW)** has a misleading name. Low-level waste legally encompasses all waste that does not fit into the above categories, and includes everything from slightly radioactive trash (such as gloves and rags) to highly radioactive activated metals from inside nuclear reactors, including control rods and sludge generated from cooling reactor cores. "Low-level" wastes can actually contain extremely high levels of radioactivity.

5) **Mixed Low-Level Radioactive Waste (MLLW)** includes low-level wastes in combination with chemicals that are flammable, corrosive, reactive, or toxic.

Radioactive and Toxic Waste is Dangerous

It may be helpful to provide a simple review of the dangers posed by radioactive and toxic wastes.

1) **Radioactive elements are unstable.** When they decay, they release very small particles, ranging in size from the nucleus of a small atom to a photon of light. When these particles come into contact with living things, they cause damage. Radiation causes cancer and damages organ function. In acute doses, it can kill. In chronic doses, it can cause a wide variety of terminal illnesses. No amount of radiation exposure holds zero risk.

2) **Toxic chemicals damage living things.** In acute doses, they can disrupt critical functions of the human body and cause severe illness or death. In chronic doses, they can damage the nervous system and immune function, cause cancer, or create a number of other health problems.

Much of the radioactive waste stored at Hanford will be radioactive for thousands to millions of years. It is so dangerous that it will need to be isolated from the human environment for that entire time. This time period is far longer than that of recorded human history, and isolating waste for that long poses a severe challenge.

For More Information

Hanford's Waste Inventory:

- The Central Internet Database at cid.em.doe.gov.
- U.S. DOE, *Buried Transuranic-Contaminated Waste Information for U.S. Department of Energy Facilities*, June 2000.

Dangers Associated with Radioactive Waste:

- Hanford Health Information Network (Now Unfunded and Defunct), *Overview of Radiation and Potential Health Effects*, available at www.doh.wa.gov/hanford/

"What they've said, in effect, is 'we're going to build bombs, and the environment be damned.'"

— Senator John Glenn of Ohio

leader of the 1980s effort in Congress to uncover the legacy of waste left by nuclear weapons programs.[6]

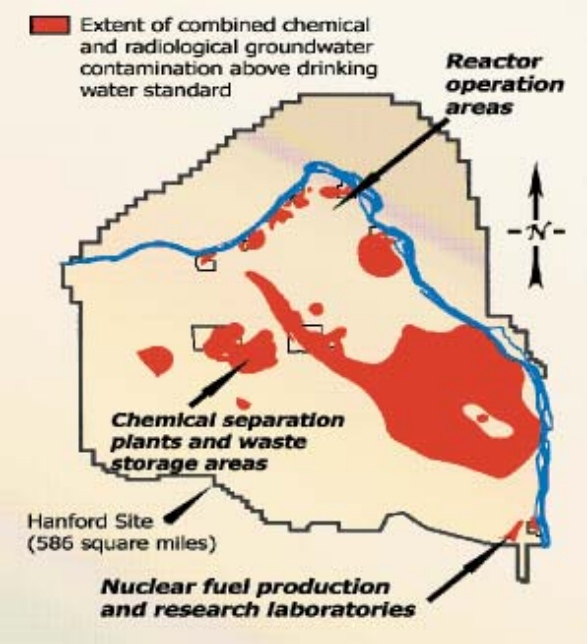
Hanford's Land and Water are Massively Contaminated

The enormous volumes of waste dumped at Hanford have created serious land and water contamination. Large amounts of toxic chemicals and radioactive isotopes pollute Hanford's land and groundwater. Groundwater from the site feeds pollution into the Columbia River, which flows directly along the border of the Hanford Site for more than 50 miles.

Over 1,400 separate contaminated sites have been identified at Hanford, with more potentially waiting to be discovered.[8] A Hanford contractor estimated in 1985 that Hanford soil contains some 22,600 curies of strontium-90, 24,600 curies of cesium-137, 192 kilograms of plutonium and 142,000 kilograms of uranium."[9] These contaminants will remain dangerous for hundreds to billions of years.

In all, more than a hundred different types of radioactive and toxic chemicals have been identified in the ground at Hanford. Scientists do not fully understand how all of these materials seep through the soil, but it is clear that the contamination presents a grave and growing threat to the Columbia River and all who depend on it.

Figure 4: Extent of Groundwater Contamination Above Drinking Water Standard



Groundwater Contamination Is Spreading Toward the Columbia River

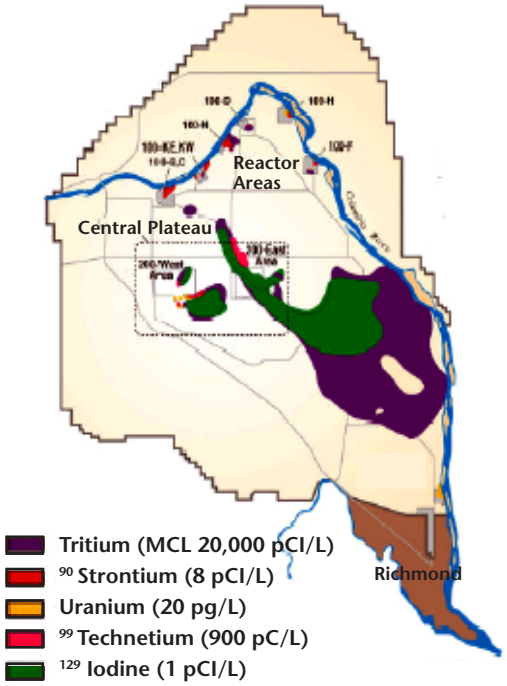
Contaminated groundwater beneath the Hanford Site covers an area larger than the city of Seattle.[10] Estimates place the area

of contaminated water at more than 80 square miles, and up to 200 square miles (Figure 4).[11] The aquifer beneath the Hanford Site is relatively shallow, allowing contaminants that were dumped or accidentally spilled to filter down into the water table and migrate toward the river.[12]

More than a dozen individual contaminants are present in the groundwater at levels much higher than EPA's maximum allowable contaminant standards for drinking water:[14]

- Iodine-129
- Strontium-90
- Technetium-99
- Tritium
- Uranium
- Carbon-14
- Cesium-137
- Plutonium
- Arsenic
- Hexavalent Chromium
- Fluoride
- Nitrate
- Trichloroethylene
- Carbon Tetrachloride

Figure 5: Distribution of Radioactive Contaminants in Hanford's Groundwater



Estimates of the size and composition of contamination plumes drifting toward the Columbia River vary. One estimate from DOE scientists is illustrated in Figure 5.[16]

Tritium and nitrate plumes cover an area of approximately 122 square miles.[17] Tritium contamination from the groundwater is already entering the Columbia River, delivering over 3,000 curies per year of radiation (60 times as much radiation as was released during the Three Mile Island incident).[18] One strontium-90 plume near the newest reactor is flowing into the Columbia River at levels 1,400 times the maximum allowable EPA drinking water standard.[19]

The central plateau is the site of the most dangerous groundwater contamination. With waste fields for liquids generated during plutonium extraction and leaking high-level waste tanks, the central plateau has become heavily contaminated with extremely radioactive uranium, technetium, iodine, and tritium, among other dangerous substances. The DOE estimates that these highly radioactive wastes could begin to enter the Columbia River within a decade, and continue contaminating the river for thousands of years.[20] In addition, the central plateau is contaminated with a 4.4 square mile plume of cancer-causing carbon tetrachloride, the result of a 1,100 ton spill.[21]

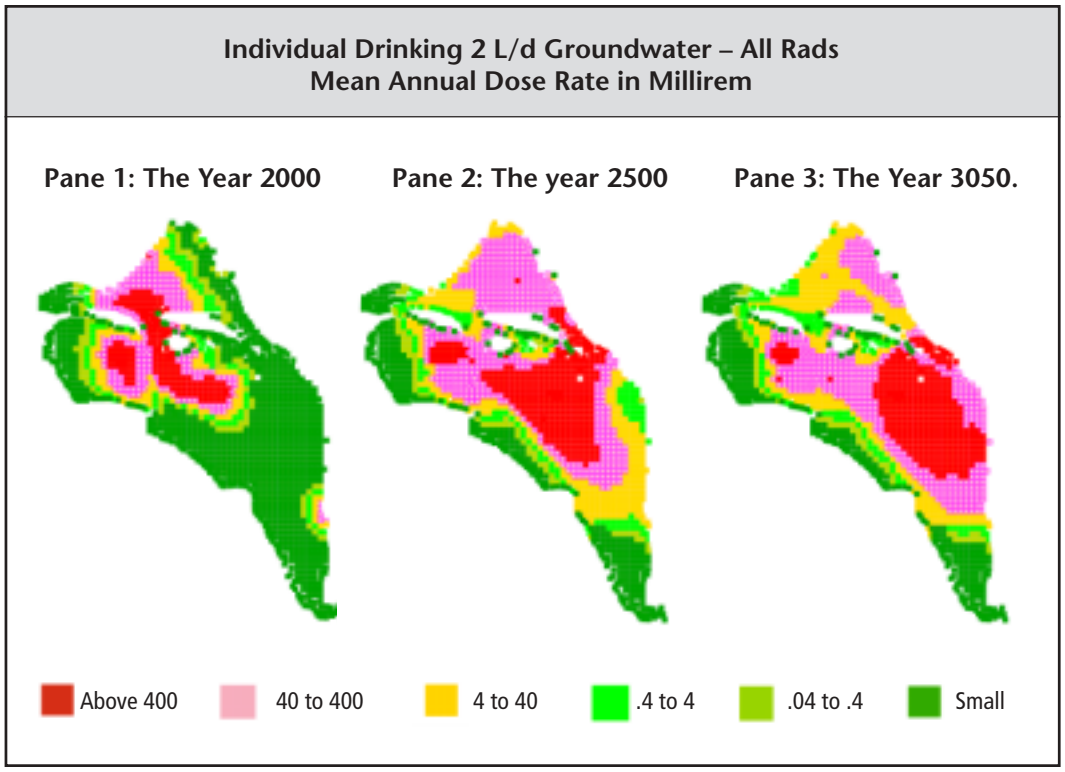
Scientists have yet to develop a complete understanding of how these wastes travel through the soil and the water table. However, models indicate that the contamination poses an immediate threat to the Columbia River that will last for thousands upon thousands of years (Figure 6).

For More Information:

- Government Accountability Project, *Hanford Water Contamination*, Presentation, available at www.whistleblower.org.
- Government Accountability Project, *Groundwater Contamination Migration at Hanford*, document leaked to GAP by a whistleblower, available at www.whistleblower.org.

Figure 6: Modeled Course of Radioactivity Entering the Columbia River over the Next 1,000 Years.[22]

These figures come from a document leaked to the Government Accountability Project from Pacific Northwest National Laboratory.



The DOE Does Not Have a Complete Picture of Hanford's Impact

Many citizens' organizations and the states of Oregon and Washington feel that the Department of Energy has thus far failed to produce a thorough analysis of the harm that Hanford has done to the groundwater, the Columbia River, and the surrounding ecosystem, or a thorough analysis of future threats.

For example, the work of nuclear watchdog Norm Buske recently revealed previously unknown contamination of the riverbed in the Columbia Reach with Uranium-233.[23] The contamination apparently stems from a previously undisclosed enriched uranium production program. Buske estimates that as much as 10 kg of uranium-233 rests in the riverbed.[24] As this uranium decays, it releases water-soluble and radioactive radium-255, a chemical that mimics calcium and concentrates in the bones of living things. Buske predicts that radioactivity from radium in the Hanford Reach will probably increase more than a hundred-fold over the next several thousand years. The Washington Department of Ecology is performing a follow-up study to confirm these findings later this year.[25]

The discovery of additional contamination raises questions about how thoroughly DOE and its contractors understand the contamination they are attempting to clean up. According to Greg deBruler, a Hanford expert at Columbia Riverkeeper, the following questions have only been partially answered:[26]

- How much waste and contamination is present, and where is it?
- What is the chemical composition of the waste?
- What are the biggest risks, who will be affected, and when will the risks occur?
- How long before the failure of waste containment?
- How does contamination move through the soil to impact groundwater?
- What are the current and future risks to groundwater and the Columbia River?
- What are the synergistic effects of all the wastes entering the river?
- Is the cleanup in progress going to protect human health and the ecosystem for as long as the wastes remain hazardous?

In 1995, a large group of stakeholders worked together to produce a vision of the ingredients of a thorough assessment, outlined in a document entitled "Requirements for a Columbia River Comprehensive Impact Assessment." However, DOE failed to implement many of the recommendations of the report, and thus faces serious knowledge gaps as it proceeds with cleanup. On July 8, 2004, the states of Washington and Oregon announced their intention to sue the DOE for failing to adequately study these basic questions.[27]

For More Information:

- Greg deBruler, Columbia Riverkeeper, *Hanford Cleanup: The Case for an Independent Assessment*, January 2003, available at www.columbiariverkeeper.org.
- Norm Buske, RadioActivist Campaign, U*ranium-233 Detected in Hanford Reach Sediments*, 4 November 2003, available at www.radioactivist.org.
- Norm Buske, RadioActivist Campaign, *Trouble in the Columbia Riverbed: Increasing Radioactivity in the Hanford Reach*, October 2003, available at www.radioactivist.org.
- Christine Gregoire, Washington Attorney General, planning a lawsuit against the DOE for failing to answer basic questions about the severity of contamination on site.

Hanford's Waste Poses a Serious Public Health Threat

Radioactive and toxic contamination of the Columbia River poses a serious threat to public health and the environment in the Pacific Northwest.

The Columbia River is the lifeblood of the region. It provides drinking water for tens of thousands of people in Richland, Kennewick, Pasco and Hermiston. It provides water for irrigating millions of acres of crops like wheat, corn, potatoes, peas,

"The Columbia River is nothing less than the lifeblood of Eastern Washington and the entire Pacific Northwest."[28]

— Christine Gregoire, Washington Attorney General
July 11, 2002

"Some of the fish being caught these days in the Columbia River are . . . marred with tumors, twisted spines and other abnormalities."[32]

—*Seattle Post-Intelligencer*
July 31, 2002

Photo: USGS Satellite Image of the Columbia River

As clearly seen in this satellite photo, the Columbia River provides irrigation water for thousands of farms just beyond the boundary of the Hanford site.

alfalfa, apples, and grapes. Four dams operated by the Army Corps of Engineers are downstream of Hanford, supplying irrigation water to southern Washington and northern Oregon farmers. The Columbia River is also the most important spawning ground for the Chinook salmon that are a vital part of Washington's natural heritage and the regional economy.

Past operations at Hanford have already caused damage to the health of people living downwind of the site, and to the Columbia River. Planned and accidental releases of radiation to the air and to the water may have caused a host of diseases in people living nearby. The legacy of contamination at the site, if left unaddressed, could seriously harm the health of the entire region for thousands of years into the future.

Toxic Effects Already Seen in Fish Living in the Hanford Reach

Fish living in the Hanford Reach are an indicator of the effects of the contamination present in the Columbia River.

In 2000, Dr. James Nagler at the University of Idaho and his colleagues discovered disturbing genetic damage in Hanford Reach salmon that could be affecting their long-term viability. The researchers found that 80 percent of all of the female fish began life as males.[29] The researchers speculated that some sort of hormone-like chemical contaminant in the river could be responsible. While this change may not be directly related to radiation at Hanford, the results do signal an environmental problem that could harm humans.[30]

Native peoples who rely on fish from the Columbia have noticed that some of the fish are unhealthy-looking. In 2002, the EPA studied contaminant levels in fish from the river, focusing on toxic chemicals like PCBs. They found that Native Americans eating sturgeon from the Columbia had a risk of cancer as high as 2 in 100.[31] This level of risk is far beyond the 1 in 100,000 to 1 in 1,000,000 cancer risk that the EPA typically considers acceptable.

While the EPA did not look for radioactive contaminants of the type that are entering the river from Hanford, these contaminants are dangerous and can cause cancer and damage to a variety of important bodily systems, including the immune and nervous systems. According to the Pacific Northwest National Labs, fish in the Hanford Reach are exposed to the equivalent of more than 20 chest X-rays worth of radiation every day.[33] If fish are accumulating radioactive isotopes in their bodies, people who eat the fish could be exposed to additional risk.

"A 1998 DOE-sponsored study concludes that there are enough radioactive and non-radioactive contaminants on most of Hanford's Benton County river shore to

lead to one person getting cancer or other health disorders out of every 10,000 people – if those people lived on the shore permanently, and drank local water."[34]

If the most serious groundwater contamination is allowed to reach the Columbia River, the risks to those living downstream will be magnified greatly.

For More Information:

Health effects of radiation exposure:

- Hanford Health Information Network (Now Unfunded and Defunct), *Radionuclides in the Columbia River: Possible Health Problems in Humans and Effects on Fish*, available at www.doh.wa.gov/hanford/.
- Hanford Health Information Network (Now Unfunded and Defunct), *Overview of Radiation and Potential Health Effects*, available at www.doh.wa.gov/hanford/.

Health problems caused by past Hanford operations:

- Downwinders.com, The Hanford Downwinders Litigation Information Resource
- Hanford Health Information Network (Now Unfunded and Defunct), *Are My Health Problems Caused by Radiation from Hanford?*, available at www.doh.wa.gov/hanford/.

The Contamination Comes from Many Sources: Leaking Waste Tanks, Unlined Pits and Trenches, and a History of Careless Dumping

During over 40 years of weapon manufacturing, Hanford staff, with full approval of management, routinely and carelessly dumped billions of gallons of toxic, radioactive waste into the Columbia River, injected waste into underground wells, and poured waste into unlined pits and trenches. The major sources of contamination at the site stem from:

- Leaking steel tanks holding 53 million gallons of an extraordinarily radioactive mix of solvents used to extract plutonium from irradiated fuel rods.
- Waste filtering through the soil and water table from old burial sites for liquid and solid wastes;
- Contamination left over from dumping water used to cool nuclear reactors back into the nearby Columbia River.

Highly Radioactive and Toxic Wastes in Leaking Tanks

Some of the most lethal wastes created in the process of plutonium production are stored in groups of steel tanks on Hanford's central plateau.

For every kilogram of plutonium extracted (a typical 8-hour work shift), workers generated more than 340 gallons of liquid high-level radioactive wastes in a mixture with hazardous chemicals.[35] This waste ranks high among the most toxic substances humans have ever produced, and among the most dangerous of all wastes held at Department of Energy facilities across the country. The waste will be extremely radioactive for millions of years, and it is mixed with hazardous chemicals that could

Photo: U.S. Department of Energy

The interior of one of the older single-walled tanks, showing a highly radioactive crust on top of liquid waste.

cause fires or explosions. Some tanks have enough concentrated radioactivity that a nuclear chain reaction could result from mishandling them.

The high-level waste is stored in 177 tanks on the central plateau. The Department of Energy knew for years that these tanks posed a serious threat to the environment, but failed to reveal the scale of the threat to the public.

In 1991, the General Accounting Office revealed that a leak reported by the DOE as 5,000 gallons was really closer to 800,000 gallons, and that the agency and its contractor, Westinghouse Hanford, both knew about it and kept it secret in violation of federal law.[38] The discrepancy occurred because DOE considered water pumped into the tanks to prevent boiling to be clean on the way in, and thus clean on the way out (after mixing with the tank waste). The GAO said that the practice likely helped spread highly radioactive materials into the soil.[39]

Despite knowing of leaks in the tanks since 1956, the first public announcement from DOE that leaks from the underground tanks had reached the groundwater came in March 1998.[41] According to the *New York Times*, managers at DOE believed that leaks from the tanks were insignificant because the material would be trapped by the surrounding soil. The department had

"This report shows a continuing pattern of behavior by the Department of Energy and its contractors to downplay the seriousness of its contamination problems at Hanford."[40]

—Senator John Glenn, Ohio

Chairman of the Governmental Affairs Committee, September 1991

Facts About the High-Level Waste Tanks[36]

- The oldest tanks have only a single shell, while the newer tanks are reinforced with a second shell.
- The tanks contain 53 million gallons of extremely toxic chemicals and radioactive wastes.
- The tanks contain an estimated 215 million curies of radioactivity, more than two times the amount released at Chernobyl.
- The oldest tanks, built in the 1940s, have a design life of 10 to 20 years.
- Hanford officials realized in 1956 that some of the high-level waste storage tanks were leaking. This fact was not admitted publicly for at least another 20 years.[37]
- More than one-third of the tanks are believed to have leaked, spilling at least one million gallons of highly radioactive waste into the ground.
- The DOE says that the leaked waste may reach the Columbia River in the next decade and continue contaminating the Columbia for at least 4,000 years.

claimed that no waste from the tanks would reach groundwater in the next 10,000 years. However, two whistleblowers brought the issue to light in 1997, after weathering mistreatment and penalties for making safety complaints.

A General Accounting Office report found specific warnings dating back to 1989 that the issue of leaking tanks was significant.[42] The Labor Department also found that contractors dismissed veteran employees for raising the issue too vigorously.[43]

"The reason that the department never studied the problem adequately, it now appears, is that it did not want to know."[44]

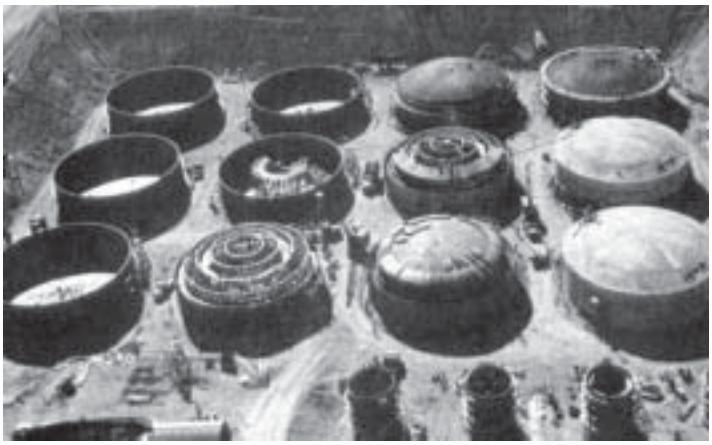
— *The New York Times*, March 23, 1998

The challenge of dealing with these tanks is illustrated by tank SY 101. When Hanford staff attempted to make more room in the tank by allowing water to evaporate, hydrogen gas built up and bubbled up in a way that threatened to start a sustained nuclear reaction. Engineers finally had to add water back in to prevent catastrophe.[46]

According to cleanup plans developed by the state and DOE, the waste will be dealt with by first pumping liquid from the least stable single-shelled tanks to more secure containers, then by turning the waste to glass for permanent storage at the national waste repository, potentially to be built at Yucca Mountain.

For More Information

- U.S. DOE, *Tank Waste Remediation System Environmental Impact Statement*, DOE/EIS-0189, 1 July 2002. (This document has been removed from the DOE website, but you can get copies of it on CD from Diane Stock at 509-372-7738).
- U.S. Department of Energy, Office of River Protection, *The Retrieval, Treatment, and Disposal of Tank Waste and Closure of Single-Shell Tanks at the Hanford Site Environmental Impact Statement: A Guide to Understanding the Issues*, 14 February 2003.



Tank farm under construction.

Waste Dumped into Unlined Pits and Trenches

Across the Hanford Site, standard waste disposal practice for all but the most dangerous materials included dumping huge volumes of radioactive liquids into unlined trenches, pits, and wells, and burying barrels and other solid wastes in unmarked dumps.

In addition to the extremely radioactive wastes stored in the tank farms, every kilogram of plutonium produced at the site yielded more than 55,000 gallons of low to intermediate level wastes and more than 2 1/2 million gallons of contaminated cooling waters. These wastes were all discharged directly to the ground where contamination was allowed to spread.[47] In all, more than 400 billion gallons of waste were carelessly spilled.[48]

Contaminated solid wastes were buried in shallow dumps across the site. These primitive landfills, without safeguards to prevent toxins from leaching into the soil and groundwater, would not meet the legal standard for disposing of household trash, much less radioactive waste. The practice of dumping waste into unlined pits has continued in recent years (see photo), although the DOE pledged to stop in June 2004.

In many cases, workers at the site did not keep complete records about what was buried where. New excavations can reveal unpleasant surprises.[49]

For example, on March 13, 1998, workers cleaning up a landfill just a few hundred yards from the Columbia River found a cache of mystery barrels. After talking to people who used to work at the Hanford Site, the cleanup staff determined that the barrels probably contained uranium shavings submerged in oil. But some barrels had leaked, creating conditions in which the uranium could spontaneously and disastrously ignite.

Bob McCleod, then the DOE Project Manager for the Hanford 300 Area, noted that the scene would be repeated. He said, "The former [Hanford] employees we spoke with have assured us that there are other surprises, like these barrels, waiting for us."[50]

Photo: Tom Carpenter

Contaminated waste dumping in unlined pits.

Other Sources of Contamination

Coolant water and wastes generated by the nuclear reactors on the shore of the Columbia River were dumped directly back into the river without treatment, and spent fuel from the reactors was stored in leaking pools near the river. These practices have contributed to the contamination of the Columbia River.

Eight reactors along the banks of the Columbia were designed to use river water as a coolant, pumping water into the reactor where it became heavily radioactive, and then discharging it back into the river. These reactors released large amounts of radioactive materials into the Columbia, making it the most radioactive river in the United States at least until the 1970s.[51]

Toxic chemicals like chromium were added to the cooling water as a cleaning agent. Large amounts of these chemicals were discharged directly to the river. Even today, toxic chromium and radioactive chemicals like uranium and europium can be found in the river. Some studies have recently found contamination in the river that suggests that toxic wastes were dumped off barges directly into the river.[52]

The spent reactor fuel generated by the reactors was stored in leak-prone concrete holding pools just 400 yards from the Columbia River.[53] 2,100 tons of this fuel was held in the pools for longer than three decades past their intended lifespan. One pool leaked more than 15 million gallons of contaminated water in 1979 alone.[54] In addition, storage pools hold two thousand 2,000 cesium/strontium capsules containing over 5 million curies of radiation.

These wastes are extremely dangerous. Exposing them to the air could trigger an explosion that could release large amounts of radioactive material to the air or cause a nuclear explosion.

Photo: Tom Carpenter

Standard waste disposal practice for all but the most dangerous materials included dumping huge volumes of radioactive liquids into unlined trenches.

For More Information

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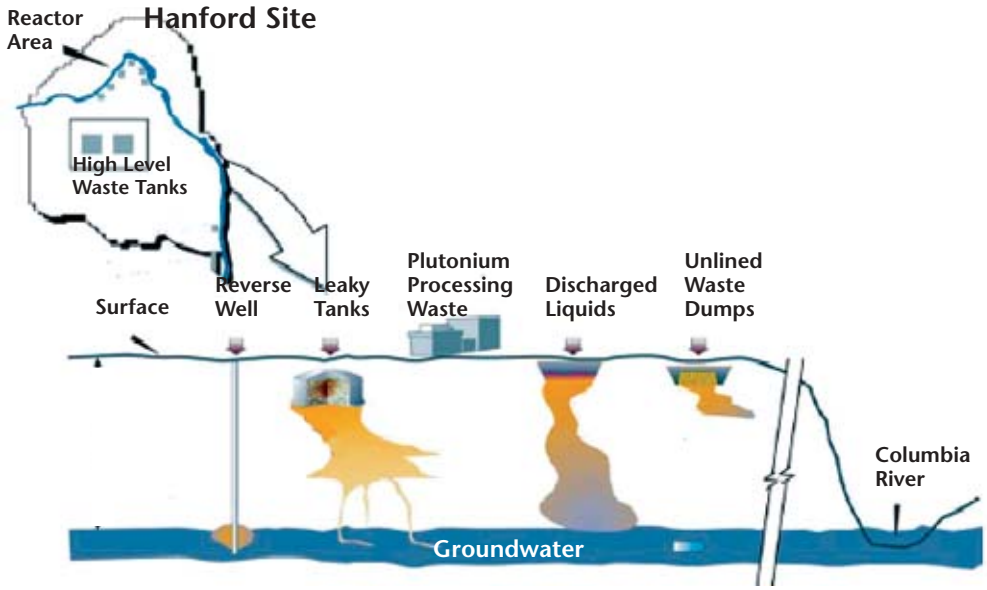
- Government Accountability Project, *Hanford Water Contamination*, Presentation, available at www.whistleblower.org.
- Hanford Advisory Board: an independent group that issues yearly progress reports on cleanup activities at www.hanford.gov/boards/hab.

Figure 7: The Legacy of 50 Years of Nuclear Defense Production.



The Department Of Energy's Plan to Clean Up Hanford is Inadequate

The Department of Energy faces an enormous task in cleaning up Hanford to the point where it no longer threatens human health and the environment. Over the past decade and a half, the DOE has been studying the problem, developing programs to address contamination, and making promises to reach cleanup milestones and standards on a specific timeline agreed upon by the State of Washington and the U.S. EPA.

Unfortunately, the DOE and its contractors have a history of making cleanup promises and failing to live up to them. The latest installment in an ongoing cycle of broken promises is the proposed "accelerated cleanup plan" for Hanford. The DOE promises to finish the job in half the time for $100 billion dollars less than originally estimated. On the surface, this looks like a good thing.

Unfortunately, however, the DOE plans to achieve this goal by abandoning a significant amount of high-level radioactive waste in leaking underground tanks, weakening the standards for groundwater remediation to make them easier to achieve, and burying millions of cubic feet of nuclear waste from facilities outside of Washington on the Hanford Site.

This plan will leave Washington at risk.

The DOE's Accelerated Cleanup Plan: Abandon High-Level Waste in the Ground, Lower Standards, Ship in More Waste

On May 1, 2002, the Department of Energy issued a draft document outlining a plan for accelerated cleanup of the Hanford Site.[63] Under the plan, the DOE proposed to complete all cleanup tasks at Hanford by 2035, instead of the original estimate of 2070, and thereby save $100 billion dollars in cleanup costs.

However, DOE plans to cut corners in the cleanup job in order to save time and money. In testimony before the United States Senate on July 11 2002, Washington Attorney General Christine Gregoire described her view of the DOE plan:

"This is what the public, and frankly, I fear the Department of Energy means by accelerated cleanup:[64]

The Department of Energy and Hanford Cleanup: Broken Promises and Mismanagement

The DOE has failed to meet many of the legal commitments of the Tri-Party Agreement governing cleanup, and demonstrated an inability to perform tasks in a safe and timely manner. Failures include:

- **Requesting too little money from Congress during the appropriations process.** The enforceability of the Tri-Party Agreement is limited by the level of funding appropriated by Congress. In the event that not enough money is allocated, DOE can blame Congress for failing to meet deadlines.[55] For example, for fiscal 2002, the Bush administration proposed a cleanup budget that was $235 million short of the amount required to meet the legal requirements faced by the DOE.[56] Then for fiscal 2003, the administration proposed a quarter-billion dollar cut in funding for the cleanup project, with restoration of funding contingent upon accepting the abandonment of large amounts of high-level waste in leaking tanks.[57] The eventual agreement still failed to completely fund the necessary work.[58]
- **Failing to remove tank waste from the single shelled tanks to safer storage on an agreed-upon timeline**. Under the Tri-Party Agreement, the Department of Energy was supposed to stabilize and pump all of the tank waste from the insecure single-shelled tanks to better storage containers by 1995. DOE continued to make promises to do this, and then fail to live up to them. In June 1999, the state of Washington announced plans to sue the DOE over the series of missed deadlines, and compel the agency to agree to a new timeline for dealing with the waste. The task is still not complete.
- **Initiating a privatization plan for the tank waste vitrification project which eventually collapsed**. In 1995, DOE initiated a plan to privatize cleanup work at Hanford. Dr. William Weida, an economist and expert on nuclear waste at Colorado College, said the plan would raise costs to taxpayers by 50 percent.[59] In 2000, the contractor hired to stabilize tank waste for long-term storage announced that it had underestimated the cost of cleanup by more than 50 percent. After years of wasting taxpayer dollars on this company, the contract collapsed and DOE had to start from scratch.[60]
- **Shipping in wastes from outside weapons facilities without the impact statements required by law or involvement from affected parties;** For example, DOE made plans to ship highly radioactive TRU wastes to Hanford for disposal in 2002. The DOE did not consider the impact of this plan with an Environmental Impact Statement, instructed

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Hanford officials to make receiving the new waste a higher priority than cleaning up existing contamination, and attempted to keep the plans from citizens' groups and the state. The state sued the Energy Department in March 2003 to block shipments of imported waste to Hanford, "contending the department failed to follow federal law for public participation and evaluation of the effects of the radioactive waste importation plan."[61] A federal judge issued an injunction against the shipping plan in May 2003.

- **Providing unsafe working conditions and treating safety whistleblowers with contempt**. DOE and its contractors have a history of providing unsafe working conditions. For example, workers exposed to vapors from vents in the high-level waste tanks did not have appropriate protection, and many were exposed to dangerous levels of chemicals. Employees that spoke up about safety hazards were often persecuted by management and or fired from their jobs.
- **Illegally dumping waste in unlined trenches.** For example, in 2000, USDOE imported 232,000 cubic feet of radioactive wastes to Hanford and dumped them in unlined soil trenches with no legally compliant groundwater or soil column monitoring systems.[62] DOE continued this practice well over a decade after it was declared illegal. Only in July 2004 did DOE respond to public pressure and pledge to end this practice.
- **See the appendix on page 35 for a timeline of events at Hanford, including broken promises and mismanagement.**

1) Reclassifying high-level radioactive waste to low-level waste, so that it may be disposed of in-place in leaky, underground storage tanks already decades beyond their design life;
2) Leaving buried at Hanford in unlined trenches tons of radioactive transuranic waste that Congress intended be cleaned up and stored at WIPP [The Waste Isolation Pilot Plant, a permanent repository in New Mexico]; and
3) Moving points of compliance for groundwater contamination to make cleanup easier."

In developing the plan, the DOE generally did not consult with state regulators or local citizens.[65] Instead, the Bush administration used pressure tactics during the budget process to try to muscle states into accepting the plan. In early 2002, the administration announced that it would give cleanup funding preference to locations that agree to commit to a quicker cleanup. According to Senator Jeff Bingaman of New Mexico, this approach "could be viewed as an incentive to encourage state regulators to relax site cleanup standards."[66]

Ms. Gregoire's fears have been borne out by the recent actions of the DOE. The agency has:

- Issued a decision that abandons the groundwater below Hanford, claiming that the contamination is "irreversible and irretrievable."

- Pushed a bill through the U.S. Senate that would change the legal definition of high-level waste, allowing much of it to be abandoned in the tanks and buried in place.
- Authorized the construction of a massive landfill to hold millions of cubic feet of low-level radioactive and mixed low-level radioactive and toxic wastes to be imported from other weapons facilities across the country.

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- Bob Alvarez and Tom Carpenter, Government Accountability Project, *The U.S. Department of Energy's Closure Plan for the Hanford Site: Implications for the Columbia River and the People of the Pacific Northwest*, June 4, 2002, Presentation available at www.whistleblower.org.
- Heart of America Northwest, *Comments of Heart of America Northwest, Heart of America Northwest Research Center on Revised Draft Hanford Solid (Radioactive and Hazardous) Waste Program Environmental Impact Statement (RD-HSWEIS)*, June 10, 2003, available at www.heartofamericanorthwest.org.

Lowered Cleanup Standards

The "accelerated cleanup plan" weakens groundwater cleanup standards in several ways. First, in a recent decision, the DOE labeled the contamination of Hanford's groundwater "irreversible and irretrievable." This label opens several legal doors for the DOE to scale back or abandon plans to clean up the contaminated groundwater. Second, the DOE is planning to clean up waste sites to a weaker standard and checking for compliance farther away, where the pollution is more likely to be diluted. These steps will make cleanup easier, but allow further pollution of the water. Finally, the DOE is using models which underestimate the mobility of contaminants in the soil, and fail to address the cumulative impact of all 1,400 waste sites.

Irretrievable Commitment of Groundwater

In the environmental impact statement for DOE's solid waste management plan at Hanford, DOE revealed that it considered groundwater beneath or downstream from waste sites to be "an irreversible, irretrievable commitment of the groundwater" for an unidentified area perhaps encompassing the entire site, forever.[67] In other words, the DOE opened a legal door to leaving the contamination in the ground and doing nothing more than monitoring its travel toward the river. The impact statement provided no analysis of how large an area might be impacted, how new and existing waste disposal will impact the problem, or how the waste will migrate.

In June 2004, DOE issued a record of decision finalizing that determination. According to Attorney General Christine Gregoire, under the federal Superfund law, the language relieves the DOE of liability if the contaminated water causes damage to public health or the environment outside of the Hanford Site.[68]

On July 8, 2004, Attorney General Gregoire announced her intent to sue the DOE for refusing to assess the damage to groundwater and the environment at Hanford, and to contest the new "irreversible and irretrievable" label for groundwater contamination.[69]

Weakening Cleanup Standards

As a part of its "accelerated cleanup plan," DOE is lowering the standards to which many waste sites are being cleaned up. There are three major ways in which this is happening. DOE is:

- using "risk based" policy to justify weaker land use standards,
- checking for compliance with groundwater standards farther away from the site of contamination, where the pollution is less likely to have spread; and
- using models that underestimate the mobility of contaminants in the soil, and fail to address the cumulative impact of all 1,400 waste sites

DOE moved to set cleanup standards for waste sites in a policy known as "Risk-Based End States," where future anticipated land use determines how clean the site has to be. The most stringent cleanup standard is for unrestricted use, but in many cases DOE is choosing less stringent standards. For example, in a site just north of Richland where fuel rods were created and wastes dumped and buried, known as the 300 area, DOE has selected an industrial land-use scenario, which only requires reducing contamination to a level that would allow human use of the area for a maximum of eight hours a day, five days a week, and no longer. Workers staying on-site longer would exceed legal radiation exposure levels. The cleanup would address contamination only in the first 15 feet of soil, and no further. The industrial-use scenario would allow uranium levels almost 50 times higher than would be acceptable under an unrestricted-use scenario.[70]

This level of cleanup does not take into account the need for long-term protection of groundwater, and assumes that contamination below ground is relatively fixed in place, as predicted by DOE models. Field evidence from monitoring wells to date clearly indicates that this assumption is too optimistic.[71] In 1991, a stakeholder group with broad public and government involvement developed a long-term land use plan for the Hanford Site that envisioned all areas along the river corridor cleaned up to allow unrestricted use.[72] DOE's change to industrial standards was made without public input. DOEs cleanup plans also do not take into account the effect of contamination migrating from the 1,400 waste areas at other parts of the site, and thus do not completely characterize the cumulative risk to the river.

The "accelerated cleanup plan" also proposes to move the point for testing groundwater to see if it meets standards to areas farther away from the waste site, where pollution is less likely to quickly spread, making cleanup easier but leaving large amounts of dangerous materials in the ground.

Under state and federal hazardous waste laws, the testing point should be selected to make sure no degradation to groundwater happens beyond the edge of the waste site. In the environmental impact statement for its hazardous waste disposal plan, the DOE provided an analysis of groundwater impacts only for a single well that was one kilometer away from the burial grounds.[73] In the accelerated cleanup plan, the DOE proposes to move groundwater testing to the edge of the Columbia River as the contamination spreads over the course of 150 years.[74]

For More Information

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and its Partner Tri-Party Agreement Agencies' Vision and Goals: Comments of Heart of America Northwest Research Center, and Heart of America Northwest on the Draft "Hanford Site Groundwater Strategy" and "Hanford's Groundwater Plan," March 2003.

- U.S. DOE, *Hanford's Groundwater Management Plan: Accelerated Cleanup and Protection*, DOE/RL-2002-68, March 2003
- U.S. DOE, *Hanford Site Risk-Based End State Vision*, DOE/RL-2003-59, April 2004.

The DOE Plans To Abandon Large Amounts of Radioactive Sludge in Leaking Tanks

Immobilizing high-level waste for long-term storage is the most expensive part of the cleanup plan, with an anticipated cost of $86 billion. DOE has been looking for ways to accomplish the task with less money, and has settled on abandoning the waste in the ground as the best option. DOE intends to accomplish this by changing the legal definition of high level waste, a strategy identified in a General Accounting Office report about the accelerated cleanup plan as a major departure from past DOE policy.[77]

Starting in 1990, the DOE began to develop an internal policy for managing its radioactive waste. In 1999, it issued Order 435.1, which contained a clause allowing it to reclassify high-level waste as incidental waste. This loophole would allow it to abandon millions of gallons of high-level radioactive waste in the ground. After pumping some of the liquid out of the tanks, the DOE would be able to call the remainder "incidental waste" and fill the tank with concrete. The problem is that the incidental waste is likely more radioactive than the waste removed from the tank, and will eventually escape into the environment through a container leak. The DOE has begun this process for at least two tanks in South Carolina.[78]

After a lawsuit by the Natural Resources Defense Council and over 30 nuclear watchdog groups stopped this plan in the courts, DOE is now turning to Congress to amend the Nuclear Waste Policy Act to allow the abandonment plan to go forward.

In 2002, Jessie Roberson, then Assistant Secretary for Environmental Management at DOE, said she only wanted 25 percent of the most radioactive waste vitrified.[79] At a Senate hearing on the waste reclassification plan, she refused to promise that DOE would not redefine wastes at Hanford.[80]

The U.S. Senate passed a bill on June 16, 2004 that includes the high-level waste definition change the DOE had been pushing for. The change was included in an amendment to the Defense Authorization bill, a massive and complicated piece of legislation. David Mears, the Assistant Attorney General of Washington, said that no hearings were held on the matter, no testimony by experts was offered, and the DOE refused to enter into substantive discussions. Senator Maria Cantwell of Washington called it "a sneak attack."[81] The bill has yet to be considered by the U.S. House of Representatives.

> Our fear is that if the Department of Energy is left to its own devices, it will reclassify much of that waste to leave it in tanks in the current untreated condition."[75]
>
> — Mike Wilson
> Nuclear Waste Program Manager,
> Washington Department of Ecology
> May 2004

For More Information

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- Heart of America Northwest, "\t "new" DOE Makes False Claims Regarding Cost Savings From Reclassification of Nuclear Waste" (Press Release), October 24, 2003.
- Annette Cary, "Waste Reclassification Fight Comes to Hanford, Wash." *Tri-City Herald*, 28 May 2004.

The DOE Plans to Build a Landfill for Disposal of Nuclear Waste from Other States

Instead of concentrating resources on cleanup and protecting public health from tank wastes and groundwater contamination at the site, the DOE is planning to build a huge new landfill and to truck tens of thousands of loads of radioactive waste through places like downtown Portland and Spokane for the next 40 years.

On June 23, 2004, the DOE issued a final decision to import radioactive wastes from other nuclear weapons facilities across the country and dump them at Hanford. The decision announces plans to construct a massive new landfill on the Hanford Site to house three million cubic feet of radioactive waste from weapons facilities across the country, imported over the next 40 years.[83]

However, the actual landfill has a proposed capacity of almost 70 million cubic feet, large enough to hold all of the waste generated during Hanford cleanup and the maximum amount of imported waste proposed in the initial versions of the waste disposal plan.[84] Hanford cleanup is expected to generate 18 million cubic feet of waste. The maximum volume of waste DOE proposed to ship into the site in the final environmental impact statement was 13 million cubic feet (Table 2).[85] The new landfill would be capable of holding much more waste.

The largest volume of waste considered for import by DOE was 65 million cubic feet, a substantial fraction of the LLW, MLLW, and TRU wastes from all DOE sites across the nation.[87] The landfill would be just large enough to hold all of this waste.

The size of the proposed landfill calls the stated intention of DOE to limit itself to

> "There should be no more shipments to Hanford until waste improperly stored at the site is cleaned up."[92]
>
> — Christine Gregoire
> Washington Attorney General, June 2004

Table 2: Proposed Volumes of Imported Waste [86]

Waste	Lower Bound	Upper Bound
Low-Level Waste	735,000	7,750,000
Mixed Low-Level and Hazardous Waste	3,600	4,960,000
Transuranic Waste	1,500	54,400
Total Proposed Shipping Volume	740,000	12,800,000

3 million cubic feet of imports into question. It offers the flexibility for DOE to make a decision at a later date to import much more waste from other sites.

Regardless of the amount, however, importing waste should not be Hanford's mission, given the enormous extent of contamination and the massive resources needed to remediate the waste that is already at the site.

Adding Additional Waste Will Divert Money Away from the Cleanup Effort

Shipping in new wastes from DOE facilities across the country and disposing of them in a huge landfill will cost a lot of money that could be used to clean up the waste already at the Hanford Site.

The FY 2005 budget for Hanford cleanup already has problems. According to Heart of America Northwest, the DOE budget cuts $720 million from Hanford cleanup by 2010, the equivalent of a full year's funding for the DOE offices in Richland. In addition, DOE is shifting money away from previously identified priorities and delaying critical tasks. For example, DOE is delaying the removal of highly reactive spent nuclear fuel capsules from an aging pool on the edge of the Columbia River to free up money to pay for new regulatory requirements to remove transuranic waste from old burial grounds.[88]

In this context, it makes very little sense to spend money on transporting wastes from other sites around the country.

Transporting Nuclear Waste Poses Serious Risks

DOE plans already call for transporting immobilized high-level wastes to a national repository, which will pose serious risks. Shipping an additional three million cubic feet of waste to Hanford will add to these risks. At minimum, the transport plan would require more than 20,000 shipments on transport routes that would cross through major cities, including Spokane and Portland.

DOE expects up to 75 accidents during waste shipments.[89] These accidents will put emergency responders and other drivers at risk. In the worst-case event of an explosion, radioactive material could be released to the air, potentially exposing large numbers of people. In addition, nuclear waste shipments could make an attractive target for terrorists. A terrorist attack on a radioactive waste shipment as it passes through a populated area could effectively act as a "dirty bomb," exposing large numbers of people to airborne radiation.

"From the public perspective, this is a shell game. This 70,000 truckloads is the initial salvo."[90]

— Greg deBruler
Columbia Riverkeeper

The Shell Game

An additional danger looms: that Hanford will end up stuck with the waste already there, and also have to deal with the additional burden of imported waste. Shipping high-level waste off site, once it is stored and stabilized in dry casks or immobilized in glass, depends on the availability of a national waste repository.

Yucca Mountain has technical and political problems that stand in the way. A federal court threw the future of Yucca Mountain into doubt on July 9, 2004 when it decided that the facility was not designed well enough to protect the public from radiation releases beyond 10,000 years, and demanded that the government come up with a better design.[91] Nevada politicians have consistently opposed the repository. If built, it would be in an earthquake prone

area above the aquifer that provides drinking water to Las Vegas.

There may never be a suitable national repository. In that event, Hanford could become the *de facto* Yucca Mountain, permanently holding high-level waste and huge volumes of low-level waste, with underground contamination putting the Pacific Northwest at risk.

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"Saving money by refusing to remove a potent danger to the public's health ought to be unthinkable."[82]

— Editorial, *The News Tribune*, (Tacoma, WA), June 11, 2004

A Better Plan for Hanford: Initiative 297

The Department of Energy's accelerated cleanup plan leaves much to be desired. The citizens of Washington deserve better, and the DOE can do better.

Initiative 297 seeks to hold the DOE to a higher standard and protect Washington from nuclear waste. If passed, it will:

- Focus cleanup efforts on dealing with the contamination already present at Hanford instead of importing new waste from off site.
- Ensure that the high-level radioactive waste in leaking tanks is cleaned up to the standards set in state and federal hazardous waste laws, instead of abandoned in the ground.
- Require cleanup of waste previously dumped into unlined trenches, and monitoring of groundwater to detect any contamination that may have resulted.
- Enable greater public participation in decisions at Hanford.

Table 3 provides a comparison between the approach promoted by the Department of Energy and the higher standard set by Initiative 297.

Vote Yes on I-297!

Washington voters have the power to reject the DOE's reckless plan to abandon contamination at Hanford while importing new waste from other states. In order to ensure that the DOE cleans up Hanford and follows the same hazardous waste laws that every private company in the state must comply with, citizens should vote yes on I-297.

For More Information

Read the Text of the Initiative Online at: http://www.protectwashington.org

"We like the goals of Initiative 297. It would establish additional requirements for regulating waste at Hanford and impose new standards for cleanup and permits while formally banning the use of unlined trenches rather than leaving things to the whim of the federal government."[93]

— Editorial, *The Columbian*, Vancouver, WA
27 June 2004

Table 3: DOE's Accelerated Cleanup Plan vs. The Approach of Initiative 297

Problem	DOE Plan	A Better Plan: I-297
Extremely radioactive high-level waste mixed with toxic chemicals remains in leaking tanks.	Call the high-level waste something else and leave the most radioactive sludge in place. The waste will eventually spread to the Columbia River.	Require the DOE to empty the waste tanks, treat 99 percent of the waste, and clean up the leaks. I-297 will make this a permit condition for all tanks storing mixtures of radioactive and hazardous wastes in the state, regardless of what name the federal government tries to give it.
Groundwater in an area larger than 80 square miles is contaminated with radioactive and toxic waste exceeding drinking water standards.	Label the contamination below and downstream of waste sites "irreversible and irretrievable," limiting liability in the event it causes harm to people or the environment outside of the Hanford Site. Weaken cleanup standards to make them easier to achieve.	Require DOE to clean up spills at Hanford to meet the same minimum standards required at other toxic waste sites in the state. Require the DOE to consider the risk posed by mixtures of contaminants rather than individual chemicals to ensure that cleanup actions protect public health.
Hanford has historically accepted shipments of low-level radioactive waste from other DOE sites for disposal.	Ship at least 3 million additional cubic feet of radioactive waste into Hanford from outside waste sites, and dump it in a massive new landfill, using dollars that could be spent on cleaning up the waste already at Hanford.	Make cleanup of Hanford the top priority. Require the DOE to focus on cleaning up on-site waste before importing new waste. Prohibit any waste import until on-site waste is stored, treated, or disposed of in accordance with the standards set by all state and federal environmental laws.
Waste is stored in unlined trenches that threaten to contaminate the Columbia River.	Stop using unlined trenches after ongoing demands from Washington and Oregon citizens.	End the practice of dumping waste in unlined trenches. Require the cleanup of waste in unlined trenches on a set schedule.
The Tri-Party Agreement is only enforceable if Congress appropriates enough money for the job.	Request too little money. Allow managers to change funding priorities set by Congress without congressional approval.	Require agencies to make available public budget reports showing how much money they need each year, and how much money they have asked for. Ensure public discussion of cleanup priorities.
Many people have been and will continue to be affected by contamination at Hanford.	Make decisions affecting the public without soliciting input from all affected communities. Use complicated and technical language that is difficult for even well-informed citizens to understand.	Encourage and enhance effective public and tribal involvement in the complex decisions relating to cleanup, closure, permitting, and transportation of mixed waste; and provide effective assistance to the public and local governments in reviewing and commenting upon complex documents.

Appendix: Timeline of Major Events and Broken Promises at Hanford

DATE	EVENT
January 1943	U.S. Government selects Hanford as the site for the world's first nuclear reactor. Plutonium production begins this year as part of the secret Manhattan Project.[95]
August 1945	A bomb built with Hanford plutonium was detonated over Nagasaki, Japan, in the closing days of World War II.
March 1947	Cold War with the Soviets begins; a $350 million expansion of Hanford facilities follows.[96]
1956	Hanford officials note that some of the high-level waste storage tanks are leaking. This fact was not admitted publicly for another 20 years.[97]
1963	Construction of the last of nine reactors is finished.[98]
May 1973	The *Seattle Post-Intelligencer* reports that 100 billion gallons of low-level liquid waste were discharged into the ground during 30 years of Hanford operations.[99]
1978	Hanford's nuclear waste surveillance program manager, Stephen Stalos, resigns. He accuses the DOE of covering up tank leaks and the contractor, Rockwell Hanford, of poor safety practices.[100]
1985	DOE selects Hanford as one of three candidates for a national nuclear waste repository authorized under the Nuclear Waste Policy Act of 1982.
1986 to 1989	A congressional investigation led by Senator John Glenn of Ohio begins to bring Hanford's secret history to public light.[101]

DATE	EVENT
1987	The last reactor is shut down.[102]
February 1989	The U.S. Environmental Protection Agency, the Washington Department of Ecology, and the U.S Department of Energy sign the Tri-Party Agreement, a legally binding document committing DOE to a cleanup plan with set standards and hundreds of milestones.[103] The commitments include pumping tank waste from leaking single-shell tanks to more stable tanks by 1995, converting the high-level waste to glass logs in a vitrification plant to be built by 1999, and removing spent nuclear fuel from leaking pools near the Columbia River by 2001. Later amendments require the removal of as much of the remaining 53 million gallons of liquid high-level tank waste as possible, but not less than 99 percent.
February 1991	DOE notifies the state that its budget does not contain enough money to begin building the vitrification plant. Construction would have to begin by July 1991 to meet the deadline set in the Tri-Party Agreement.[104]
September 1991	DOE boosts its cost estimate for cleanup, claiming that it will be difficult to meet milestones without additional funding from Congress.[105]
September 1991	The General Accounting Office reveals that a tank waste leak reported by the DOE as 5,000 gallons was really closer to 800,000 gallons, and that the agency and contractor, Westinghouse Hanford, both knew about it and kept it secret in violation of federal law.[106]
1990s	DOE repeatedly delays plans to transfer pumpable liquids from leaking single-shell tanks to safer double-shell tanks.
Fall 1997	DOE announces that some of the tank wastes have reached the groundwater near the Columbia River.[107] DOE managers then slash funding for a program to see how far the leaks have traveled.[108]
June 9, 1998	The state of Washington announces its intent to sue DOE for missing tank waste cleanup deadlines.[109]
July 9, 1999	An editorial in the *Columbian* claims: "A decade and $15 billion after environmental restoration became the primary mission of the Hanford Nuclear Reservation, the old bomb-making site is no less polluted and dangerous than it was before. In fact, the past ten years of delay and indecision have made Hanford an even greater threat, as nuclear waste has migrated farther into groundwater and toward the Columbia River."[110]
September 1999	DOE signs agreement with Governor Locke modifying timeline for dealing with tank waste. New deadlines: 25 percent of the radioactivity must be glassified by 2018, and the rest by 2028.[111]

DATE	EVENT
1999	DOE designates Hanford (along with the Nevada Test Site) as permanent dumps for low-level and mixed low-level radioactive waste from around the country. Washington state officials protest the decision, requesting that imports be tied to tank waste cleanup milestones. The DOE has yet to agree to such a step.
1999	DOE issues Order 435.1, which contains a clause allowing the reclassification of high-level waste as "incidental waste." This loophole would allow DOE to abandon millions of gallons of high-level radioactive waste in the ground. After pumping some of the liquid out of the tanks, the DOE would be able to call the remainder "incidental waste" and fill the tank with concrete. The problem is that the incidental waste is likely more radioactive than the waste removed from the tank, and will eventually escape into the environment through a container leak.[112]
May 2000	DOE fires BNFL, Inc., the contractor hired to stabilize tank waste for long-term storage, after BNFL more than doubles its original cost estimates.[113]
Dec. 7, 2000	Hanford workers remove the first batch of spent reactor fuel from water filled basins near the Columbia River and place it in dry storage, beginning the process less than a year before it was supposed to be fully complete under original commitments.[114]
September 2001	Work begins on glassification facilities, nearly a decade after the original target date, and months after a renegotiated deadline of July 2001, leading to fines.[115]
April 2002	Cleanup costs reach $35 billion.[116]
May 1, 2002	DOE issues draft "Performance Management Plan for the Accelerated Cleanup of the Hanford Site."[117] The plan proposes to finish the job by 2035 instead of 2070, at less cost. Washington state officials suspect this will be achieved by cutting corners, like abandoning high-level radioactive sludge in the bottom of leaking waste tanks, burying and abandoning the tanks themselves, cutting corners in dealing with transuranic wastes—leaving them on site instead of treating them and shipping them to permanent storage, weakening groundwater cleanup standards to leave more contamination at the site "than currently contemplated by the Tri-Party Agreement and more than justified under applicable regulations," failing to involve stakeholders and the public in revising and implementing new strategies. [118]
2002	DOE decides to ship toxic transuranic waste from Ohio to Hanford. They tell the state of Washington that it has no authority to regulate transuranic waste.

DATE	EVENT
May 2003	A federal judge bars DOE from shipping any more transuranic waste into Hanford pending the results of a lawsuit filed by the state attorney general and several citizens groups..[119]
July 3, 2003	A federal judge rules that DOE's 1999 order to reclassify high level waste as "incidental waste" is illegal.[120] DOE turns to Congress.
June 2004	DOE works to change definition of high-level waste in Congress, passing a rider on the Defense Authorization Bill through the Senate.[121]
June 2004	DOE pledges to end disposal of waste in unlined trenches, and announces plans to open a new landfill to take 3 million cubic feet of low-level waste from outside sources at Hanford.[122]

Future Cleanup Milestones

July 2004	Target for removing all spent fuel from basins.
2007	Deadline for beginning to immobilize tank waste in glass (vitrification).
2012	Cleanup and closure of eight reactors due.
2018	25 percent of radioactive material in tanks must be vitrified.
2028	All tank waste must be vitrified.

"By now, it has become a familiar dance: the Hanford Tango. The federal government promises to clean up the Hanford Nuclear Reservation. The feds break the promise. The state sues the feds. The feds give up and promise all over again. Repeat until you get dizzy."[1]

— Editorial, *The Columbian*, (Vancouver, WA), March 9, 2003

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"The only way we're going to get this done is if the citizens of Washington hold the DOE accountable."[94]

— Christine Gregoire, Washington Attorney General, 2002

"The Department of Energy has been sticking its head in the contaminated sand for years, years."[45]

— Senator Ron Wyden, Oregon, March 1998

"Some of the proposed changes in waste treatment, such as eliminating the need to vitrify at least 75 percent of the high-level waste, which could result in disposing of more of the waste at DOE sites, would signal major changes in DOE assumptions about acceptable waste treatment and disposal options."[76]

— General Accounting Office May 2002

For Further Information or to Volunteer on the Protect Washington Campaign

For further information, contact the **Protect Washington Coalition**, made up of the leading citizen's groups working on Hanford cleanup:

Protect Washington Campaign

1314 NE 56th Street, Suite 100
Seattle, WA 98105
www.protectwashington.org

Betty Means, Campaign Director 206-713-9849 (cell)
Bob Cooper, Press Secretary 206-852-3616 (cell)
Aisling Kerins, Protect Washington Field Director

WashPIRG

3240 Eastlake Avenue E, Suite 100
Seattle, WA 98102 206-568-2850
www.washpirg.org

Robert Pregulman, Executive Director

Heart of America Northwest

1305 4th Avenue, Suite 208
Seattle, WA 98101
www.heartofamericanorthwest.org

Gerald Pollet, Executive Director 206-382-1014
Hyun Lee, Esq.

The Government Accountability Project

1511 Third Avenue, Suite 321
Seattle, WA 98101
www.whistleblower.org

Tom Carpenter, Nuclear Program Director 206-292-2850

Columbia Riverkeeper

P.O. Box 912, Bingen, WA 98605 509-493-2808
P.O. Box 1254, Hood River, OR 97031 541-387-3030
721 NW 9th Avenue, Suite 300
Portland, OR 97209 877-252-6077
www.columbiariverkeeper.org

Greg deBruler
Hanford Technical Assistant, Riverkeeper