

Providing the Washington State Department of Ecology's views on Hanford tank waste issues

Tank Waste Treatment News (TWTN)

is a quarterly newsletter providing current information about treatment and long-term storage of Hanford's tank waste.

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Why It Matters

The 586-square-mile Hanford Site is located in south-central Washington along the **Columbia River**. Hanford's mission included defense-related nuclear research, development, and weapons production activities from 1943 to 1987. During that period, Hanford operated a **plutonium**-production complex with nine nuclear reactors and associated processing facilities.

Today at Hanford, 177 **underground storage tanks** hold a total of 56 million gallons of dangerous waste. Some of these tanks have leaked, contributing to more than 70 square miles of contaminated groundwater currently under Hanford. This tainted groundwater threatens the Columbia River and all life that depends on it.

Contacts

Suzanne Dahl, Tank Waste Treatment manager
Erika Holmes, community outreach, TWTN editor

Nuclear Waste Program
3100 Port of Benton Boulevard
Richland, Washington 99354
hanford@ecy.wa.gov | 509-372-7880



Yucca Mountain — The Saga Continues...

The nation's search for a **deep geologic repository** for **high-level nuclear waste** (HLW) has been a long, challenging process. Ultimately, Washington State's top priority is **vitrifying** Hanford's HLW to stop impacts to **groundwater** and the **Columbia River**. But it's also important to know where the vitrified HLW will go, and we'd like that location to be chosen for scientific reasons, not political ones.

Washington hosts 60 percent of the nation's defense-related HLW and 98 percent of the defense-related spent nuclear fuel. Due to the secrecy of the World War II effort to build an atomic bomb, Washingtonians were never given a choice in the matter. The [Washington State Attorney General's Office](#) and the Department of Ecology are fighting to ensure storing HLW at Hanford in perpetuity will not become our ultimate fate by default. As of today, the legally binding [Nuclear Waste Policy Act](#) (NWP) still designates **Yucca Mountain**, Nevada, as the nation's sole repository despite contrary actions taken by the federal government.

What's in the Nuclear Waste Policy Act?

In 1982, Congress passed NWP to address the growing inventories of nuclear waste stockpiled throughout the nation. The Act:

- Set up a repository site screening process.
- Required two repositories (one in the East; one in the West) to assure regional equity.
- Assigned siting, building, and operating duties to the [U.S. Department of Energy](#) (USDOE).
- Directed the [U.S. Environmental Protection Agency](#) to develop environmental standards for repositories.
- Required the [Nuclear Regulatory Commission](#) (NRC) to license repositories.

In 1987, Congress amended the NWP guidelines and changed the number of required repositories from two to one. This ended the search for a repository in the eastern side of the country and downsized the site suitability studies in the West from three sites (including Hanford) to just one: Yucca Mountain.

Short history of Yucca

Suitability studies began on the Yucca Mountain project in 1991. In 2002, the Secretary of Energy deemed Yucca a suitable disposal site. Then in 2008 at the direction of Congress, USDOE filed an [application](#) with the NRC for a license to construct the repository. In January 2010, President Obama and USDOE announced they would withdraw the application without providing any technical or safety reasons for doing so. The project cost is \$12 billion. *(Continued on page 2)*

(Yucca Mountain... Continued from page 1)

As the Yucca project came to a halt, the Secretary of Energy created the [Blue Ribbon Commission on America's Nuclear Future](#) (BRC) to recommend a new plan for choosing a disposal site. Not to locate a new site, just to recommend a process for selecting another site—something already decided by NWPAs.

Despite Washington State's legal efforts imploring the federal government to uphold NWPAs, they have closed the Yucca Mountain project, eliminated all funding for it, and stopped the NRC's licensing process.

Washington goes to court

The legal actions described in the timeline (sidebar, page 2) are based on the State's argument that USDOE's withdrawal of the Yucca Mountain repository licensing application breaks the following laws:

- NWPAs because it requires USDOE to submit a licensing application after Congress approved Yucca as a repository.
- The [National Environmental Policy Act](#) because it requires federal agencies to prepare an environmental impact study with alternatives for all "major federal actions significantly affecting the quality of the human environment," such as closing the Yucca Mountain project without locating another site for an HLW repository.
- The [Administrative Procedure Act](#), which governs how regulations are developed and enacted, because USDOE's actions have not been transparent. Its assertion that Yucca Mountain is "not a workable option" is not backed by sufficient scientific evidence, which would have been part of the environmental impact study that was never completed.

Washington comments on BRC report

This summer, the BRC issued its [draft report](#) recommending a new strategy for managing HLW and **spent nuclear fuel**. Ecology submitted a [letter](#) formally responding to the BRC's recommendations during the public comment period for this draft report. The list below includes the BRC recommendations in italics; summaries of Ecology's responses follow in blue text.

1. A new, consent-based approach to siting future nuclear waste management facilities.

While it would be ideal to gain consent between federal, state, tribal, and local rights before moving forward with a national repository, this process doesn't reflect the urgency of the situation for defense-related waste. However, if the USDOE did continue the Yucca licensing process, this would be a good approach for locating a second disposal site. We also recommend that the BRC include language in their final report guaranteeing regulatory authority to any state with a proposed repository.

Washington State's Yucca Legal Actions

2010

March 3: Filed a petition to intervene in the Yucca Mountain licensing process in front of the NRC.

April 13: Filed suit in U.S. Court of Appeals to stop USDOE from ending the Yucca Mountain project by withdrawing their licensing application.

June 3: Presented oral arguments to the NRC.

June 18: Filed opening brief in U.S. Court of Appeals and an original action for judicial review of USDOE's decision to withdraw their licensing application.

June 29: The Atomic Safety & Licensing Board (ASLB), a panel of NRC judges who conduct licensing hearings, denied USDOE's motion to withdraw the application.

September 27: Filed a motion to re-institute an expedited case schedule. We were on one until July 2010, when the court granted a motion to stay the case schedule pending a final decision from the NRC. Our motion was based on USDOE's continued dismantling of their Yucca Mountain program; the NRC's continued inaction in reviewing ASLB's decision; and the NRC's action to end its Yucca Mountain licensing activities.

December 1: The court re-instituted an expedited schedule.

2011

January 3: The Department of Justice submitted its response brief.

January 18: The state submitted a reply brief.

March 22: Presented oral arguments in U.S. Court of Appeals. The court dismissed our arguments in this case, awaiting the NRC's decision on the ASLB's denial of license withdrawal. We accepted the dismissal.

July 1: The U.S. Court of Appeals rejected our request to stop the termination of the Yucca Mountain project.

July 29: Along with South Carolina, Aiken County, and others, we filed a petition for mandamus that requests the court to order the NRC to perform their lawful duties. The case alleges that the NRC has failed to issue a decision within the three-year timeline required by NWPAs. Moreover, the NRC has failed to "consider" USDOE's application by not resolving the matter of USDOE's motion to withdraw and, at the same time, closing out agency review of the application.

September 9: The NRC announced that it deadlocked in a 2 – 2 split decision on whether the Obama administration could legally withdraw its application for Yucca, while at the same time directing its ASLB to wrap up Yucca proceedings by September 30.

October 1: Funding for Yucca ended.

December 5: Filed opening brief in mandamus action.

2012

Jan 11-12: U.S. Court of Appeals reply is due.

January 30: State's reply is due.

(Yucca Mountain... Continued from page 2)

2. *A new organization dedicated solely to implementing the waste management program and empowered with the authority and resources to succeed.*

We propose an organization formed solely to manage HLW and spent fuel so it can be dealt with as quickly as possible.

3. *Access to the funds nuclear utility ratepayers are providing for the purpose of nuclear waste management.*

We requested that the BRC include a recommendation that treating the nation's defense HLW be a guaranteed priority. This would ensure funding for building and operating the **Waste Treatment Plant**.

4. *Prompt efforts to develop one or more geologic disposal facilities.*

Agreed, and we urge the BRC to recommend that the NRC complete the Yucca licensing process.

5. *Prompt efforts to develop one or more consolidated interim storage facilities.*

We propose that legal deadlines with penalties be set for the removal of waste from temporary storage facilities.

The state has strenuously argued that removing Yucca Mountain as the nation's primary nuclear waste repository would significantly set back Hanford cleanup and risk Washington's environment and its people. We will continue to urge the federal government to be transparent about their decisions, taking into account the science, extensive evaluation, and resources invested in Yucca Mountain.

Assessing Risks at WTP

Because Hanford's **Waste Treatment Plant** (WTP) permit is for a thermal treatment unit (it heats waste), a risk assessment is required for the air emissions from its stacks. Data gathered during the risk assessment and startup demonstration testing will be used to put limitations on WTP so that it operates in a manner that protects humans and the environment. Basically, it ensures the safety of anyone who lives or works on or near the Hanford Site, including plants and animals.

The *Environmental Risk Assessment Work Plan for the Hanford Tank Waste Treatment and Immobilization Plant* (document 24590-WTP-RPT-ENS-03-006) is the first step in the risk assessment process. It defines the concept, methods, and data to be used in an environmental risk assessment.

The next step is the pre-demonstration test risk assessment, which will evaluate risks based on engineering emission rate estimates. The final step in risk assessment will be analyzing the demonstration test data (stack testing).

Along with the WTP permit, the risk assessment process:

- Establishes operating conditions for WTP.
- Identifies **radionuclides** and chemicals in the waste that need to be controlled.
- Sets up a monitoring program for WTP that must be followed to comply with the WTP permit.

After the regulatory agencies and Native American Tribes complete reviews of the draft *Environmental Risk Assessment Work Plan for WTP*, it will go out for public comment.

If you need this document in a format for the visually impaired, call the Nuclear Waste Program at 509-372-7950. Persons with hearing loss can call 711 for Washington Relay Service. Persons with a speech disability can call 877-833-6341.



The risk assessment will gauge the air emissions coming from the stacks at the **Waste Treatment Plant**. The stacks pictured above are on the **Low-Activity Waste Facility**.

Ecology Participates in WTP Open House

The U.S. Department of Energy - Office of River Protection (ORP) is tasked with managing Hanford's tank waste and **Waste Treatment Plant** (WTP) construction. Ecology regulates these activities with our Dangerous Waste Permit for the Hanford Site. To promote public awareness, ORP held an open house at the Richland Red Lion Hotel on November 30, 2011. WTP experts were available to answer questions about the exhibits.



Ecology was pleased to participate in this public-friendly event. ORP is gathering feedback to prepare for another one scheduled tentatively in the spring. Visit our [Hanford Education & Outreach Facebook page](#) and ORP's [River Protection Project Facebook page](#) to see additional photos.

Left: Attendees mingling in the Volpentest Ballroom. ORP estimated that 300 people showed up!

Right: Model pulse-jet mixer (PJM) (not to scale), the air-driven devices installed in WTP waste processing tanks to keep solids and liquids evenly distributed.

PJMs have been controversial due to concerns that they will allow solids to build up in tank bottoms. This could plug the flow of waste, allowing solids and hydrogen gas to collect. These scenarios could lead to the loss of equipment, or worse, explosions.

For more on this issue, visit the [Office of Health, Safety, and Security website](#).



Left: Ecology Tank Waste Treatment Section Manager Suzanne Dahl (left) talks with an attendee.

Glossary

Columbia River: A 1,214-mile river that begins in British Columbia, Canada, flows down through Eastern Washington and heads west, forming the border between Washington and Oregon, before emptying into the Pacific Ocean. It is the largest river in the Pacific Northwest, and approximately 50 miles of it flow through the Hanford Site.

Deep geologic repository: A long-term nuclear waste disposal site excavated underground, below 980 feet, in a stable geologic environment.

Groundwater: Water below the ground surface in a zone that is completely saturated.

High-level waste: Material resulting from the reprocessing of **spent nuclear fuel**. This includes liquid produced during reprocessing and solids derived from this liquid waste that contain fission products in sufficient concentrations and other highly radioactive material that, by law, requires permanent isolation.

Low-activity waste: Waste that remains after as much radioactivity as is technically and economically practical has been separated from **high-level waste**. When immobilized in glass, it may be disposed of as low-level radioactive waste in a near-surface facility at Hanford.

Plutonium: A heavy, radioactive, metallic element with the atomic number 94. Plutonium-239 is the radioactive isotope used in nuclear weapons.

Radionuclide: A nuclide that has artificial or natural origin and exhibits radioactivity.

Spent nuclear fuel: Fuel taken from a nuclear reactor that was never processed for **plutonium** separation.

Underground storage tank: A tank that is entirely below the surface of and covered by the ground. At Hanford, there are two types of underground storage tanks with capacities ranging from 50,000 to one million gallons. The single-shell tanks have one steel liner encased in concrete, and the double-shell tanks have two steel liners encased in concrete.

Vitrification: A method used to immobilize waste (radioactive, hazardous, and mixed). This involves adding glass formers and waste to a vessel and melting the mixture into a glass form.

Waste Treatment and Immobilization Plant: Facility designed and built to thermally treat and immobilize (vitrify) tank waste at Hanford.

Yucca Mountain: A Nevada mountain designated as the nation's **deep geologic repository** in 2002. As of early 2010, the Obama administration cut funding for this project and tasked the BRC with finding alternatives.

(Ecology participates in WTP... Continued from page 4)



Above: Ecology Tank Waste Treatment Project Manager Dan McDonald (left) greets attendees at our booth.



Left: Model ion exchange column (not to scale) that will channel cesium-137, a radioactive isotope, into the **high-level waste** stream for processing.



Right: Models of the stainless-steel containers (not to scale) that will hold **vitrified** waste.

The taller canister is for high-level waste, and actual canisters will measure 2 ft. by 14.5 ft. The smaller, squatter container is for low-activity waste, and actual containers will measure 4 ft. by 7.5 ft.

After being filled with molten waste and glass, they will be welded shut, and the outsides will be decontaminated for storage.

WSU Students Create a Buzz about Hanford

Working with the Tri-Cities branch of Washington State University (WSU), we tasked 48 technical communication students with the goal of reaching high school and college students about Hanford cleanup. These students didn't disappoint, single-handedly informing over 600 young Tri-Citians!



Above: Richland High School students participating in a Hanford trivia session.

Four of the eight groups chose to present Hanford information in history and science classes at four local high schools. In all, they presented to 14 classes, playing Jeopardy-style games and giving away informative handouts, [vitrified](#) marbles simulating treated waste from Hanford's **underground storage tanks**, and WSU and Ecology promotional items.

Another group took a risk by holding a public presentation about the various roles of [Hanford contractors](#) and the types of people they employ. Knowing the success of their project depended upon attendance at their event, they offered free pizza afterward and extra credit for Hanford High students who stayed throughout.

The remaining three groups sought to reach young minds through the Internet. [HanfordLearning.com](#) includes historical and cleanup information with quizzes to test users' comprehension, video interviews with Tri-Party agency representatives, and resources for teachers and others interested in learning more about Hanford. This group's phenomenal work also creates an opportunity for other students to maintain and grow this website.

The [B-Reactor Hanford Facebook group](#) scored when the reactor's former historical researcher joined and started posting trivia questions. They deserved the boost based on all they did to bring their membership to 84 people. This dedicated team talked to friends, visited the [CREHST Museum](#), and shot informative videos to upload. They also walked Richland's streets with signs advertising gift card raffles for people joining their group. The icing on the cake: 23 lucky Facebook group members were offered a [special tour of the B Reactor](#).

The last group created the animated video [What's In Hanford's Backyard?](#), overviewing Hanford history and cleanup with a focus on why it matters to young people. Their process included researching the issues, writing a detailed script including the narrator's lines and the accompanying drawings, recording the voice-over, drawing the animations, and editing it all into one fabulous movie. Next step: going viral, and we need your help!

These students have far exceeded the class learning goals and our expectations. They've become more skilled at collaboration, document design, public speaking, project management, and plain ol' problem solving. And, did we mention that they reached over 600 other students in less than a month?!

For more photos of the project, [see the album on our Hanford Education & Outreach Facebook page](#).