Hanford Reach residents, great horned owl and chick perched in tree.

COLUMBIA RIVERKEEPER®

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This product was funded through a grant from the Washington Department of Ecology. While these materials were reviewed for grant consistency, this does not necessarily constitute endorsement by Ecology.

COLUMBIA RIVERKEEPER®

HANFORD ENVIRONMENTAL REPORT

What's Underground at Hanford?
What's in Your River?
What's in Your Fish?

Columbia Riverkeeper investigates the current research on groundwater contamination at the Hanford Nuclear Site, the amount of contamination entering the Columbia River, and the potential effect on human health and the environment, as well as salmon and other fish.

Columbia Riverkeeper's mission is to protect and restore the water quality of the Columbia River and all life connected to it, from the headwaters to the Pacific Ocean.

Clean Water • Healthy Rivers • Our Future

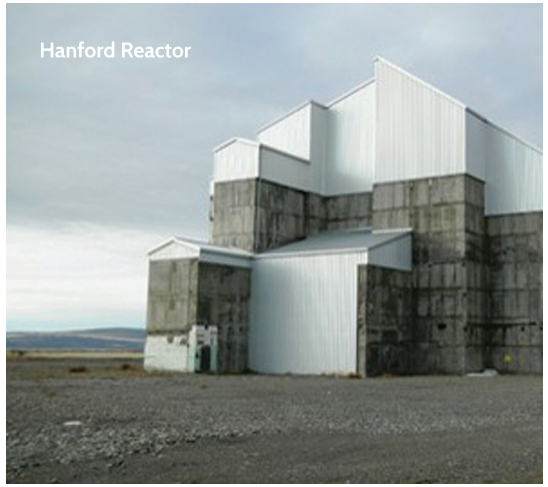
Why Hanford Cleanup Matters

Pollution from the Hanford Nuclear Site threatens the Columbia River and downstream communities. Hanford is the most contaminated place in the Western Hemisphere, where the United States dumped billions of gallons of radioactive waste on the banks of the Columbia and into the river. Today, waste in unlined cribs and trenches has spread into large pollution plumes and dozens of storage tanks have leaked high-level nuclear waste. Vast areas of groundwater are poisoned and, in some places, flowing into the Columbia River.

The findings in this report demonstrate the importance of Hanford cleanup and why the public must hold the government accountable to protect the Columbia and downstream communities.

About Columbia Riverkeeper

Columbia Riverkeeper's mission is to protect and restore the water quality of the Columbia River and all life connected to it, from the headwaters to the Pacific Ocean. To achieve our ambitious goals for the Columbia, we use an integrated strategy of community-based grassroots organizing, public education, advocacy, and hands-on river protection projects.


Hanford Reactor


Tank Farm Workers

Resources on Pollution at Hanford

Hanford Site Environmental Report for Calendar Year 2013, RL/DOE-2013-47, Revision 0

Hanford Site Groundwater Monitoring Report for 2013 (Aug. 2013)

Photo Credits

Oregon Department of Energy

U.S. Department of Energy

Great Lakes Indian Fish & Wildlife Commission

Farnham Angling Society

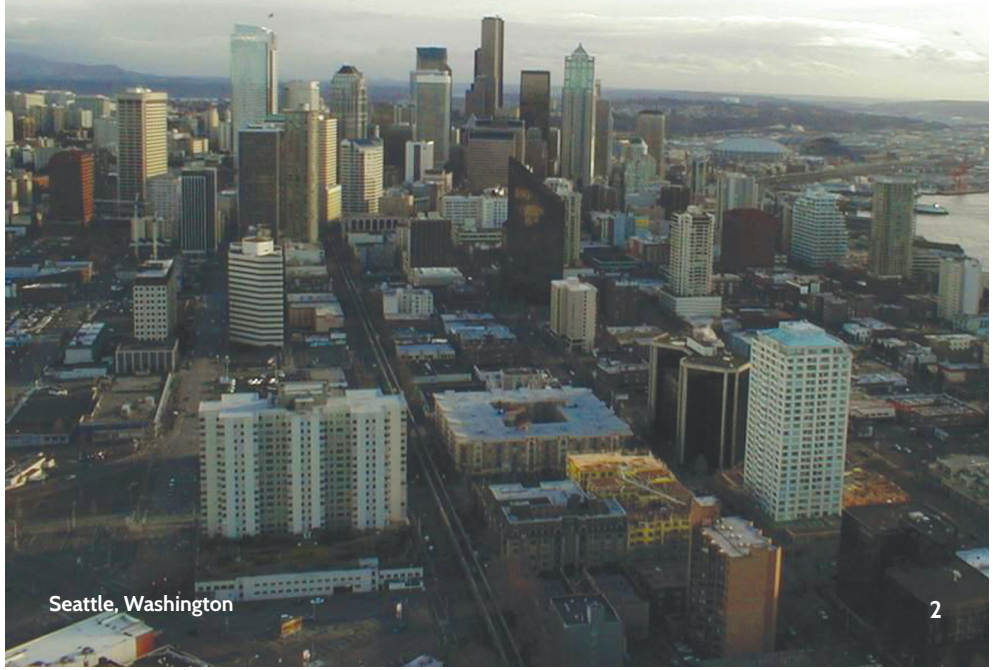
Oregon Public Health Division

U.S. Fish and Wildlife Department

What's Underground at Hanford?

The U.S. Department of Energy (Energy) 2013 Hanford Groundwater Monitoring Report revealed that extensive contamination of Hanford's groundwater remains a serious problem. Sources contributing to contaminated groundwater come from buried tanks, reactors, and other areas where the federal government disposed of radioactive and toxic wastes. **Carbon tetrachloride, hexavalent chromium, nitrate, iodine-129, strontium-90, carbon-14, trichloroethene, technetium-99, tritium** and **uranium** contaminate the groundwater at concentrations that exceed safe levels for drinking water. In addition, the groundwater contains pollution plumes that are highly toxic to aquatic life once the groundwater reaches the river. Many of these plumes are contaminating the Columbia River.

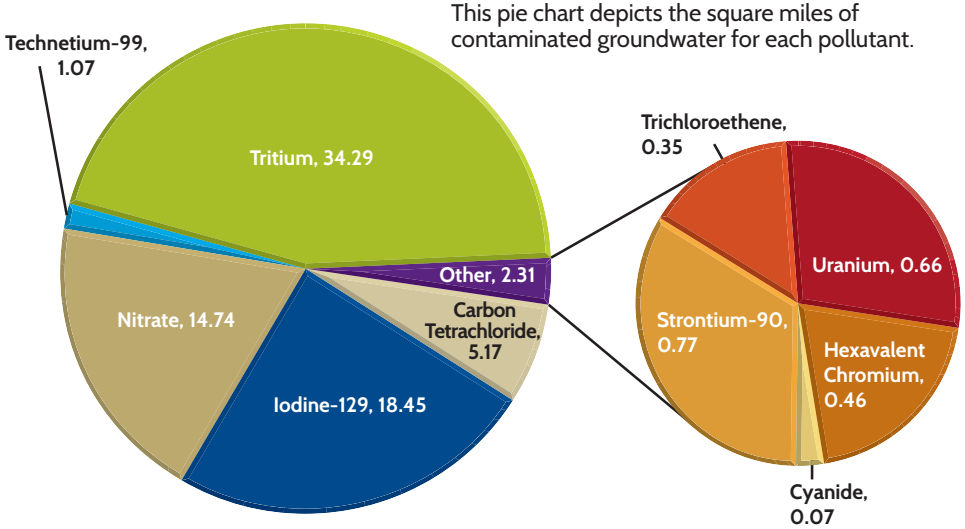
More than 70 square miles of groundwater is contaminated at Hanford. That much water would cover more than an eight-mile by eight-mile square. That's large enough to cover almost all of the land in Seattle, WA.


Seattle, Washington

What's Underground at Hanford?

Groundwater plumes are contaminated with radioactive and chemical pollutants that are harmful to human health and the environment.

Groundwater Contaminants on Hanford Site
This pie chart depicts the square miles of contaminated groundwater for each pollutant.



TRITIUM
High doses can contribute to cancer and damage genetic material in humans and fish

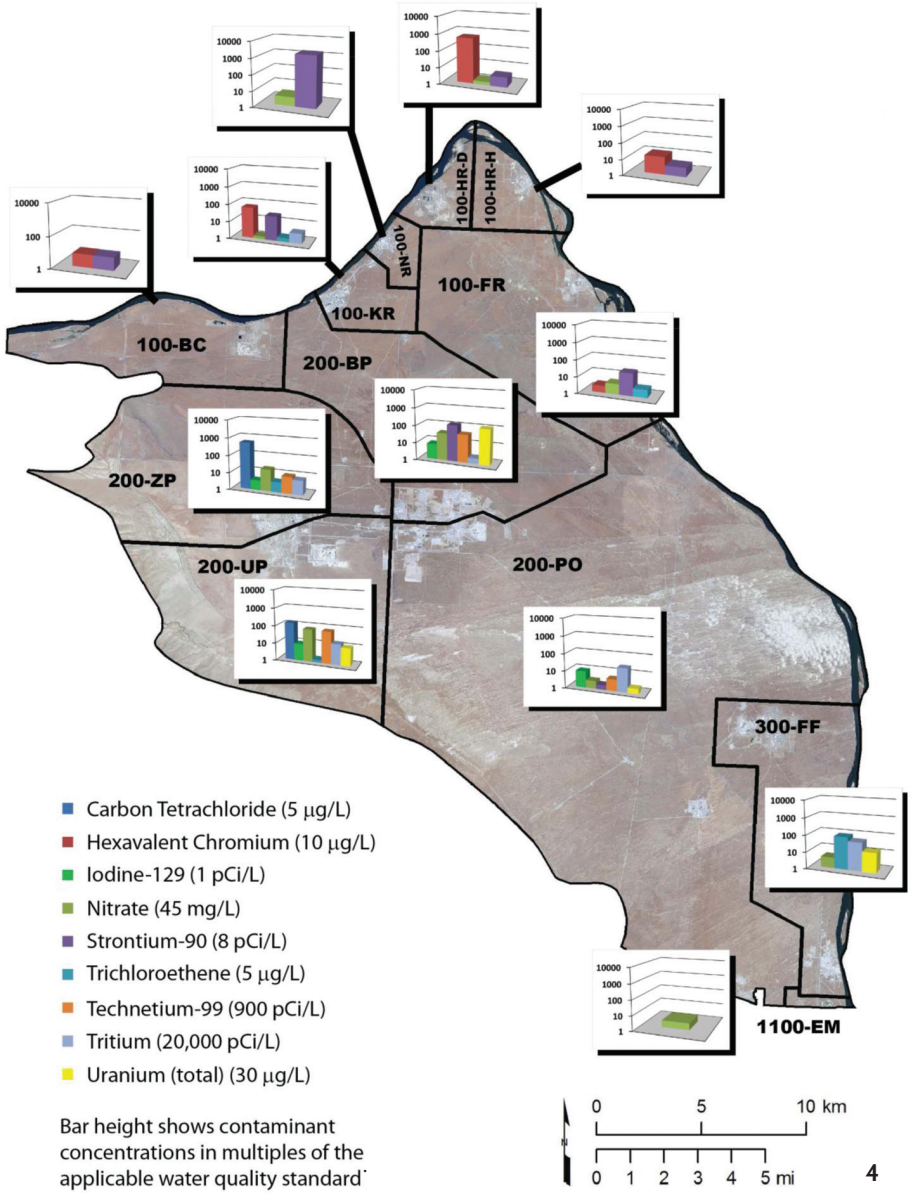
IODINE-129
Causes thyroid cancer and low doses inhibit activity in the thyroid gland

CARBON TETRACHLORIDE
A carcinogen and acutely toxic to humans

HEXAVALENT CHROMIUM
Human carcinogen and small amounts are highly toxic to salmon and aquatic life

STRONTIUM-90
A "bone seeker" in humans, strontium-90 becomes lodged near blood-forming bone marrow; causes bone cancer and immune system suppression

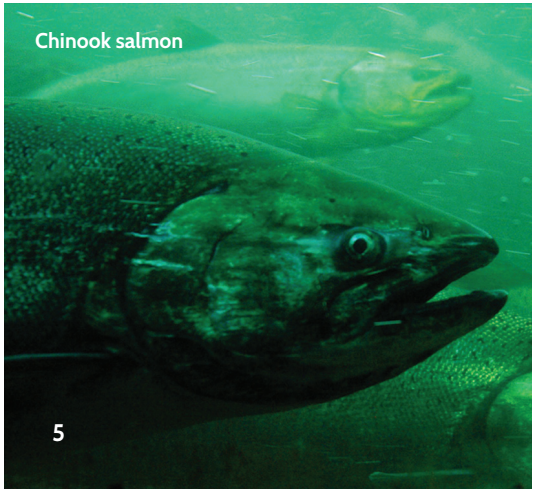
Pollutant concentrations in the groundwater plumes exceed drinking water quality standards. For example, strontium-90 in some places is 1,000 times greater than what is safe to drink. According to recent monitoring, hexavalent chromium and carbon tetrachloride are 100 times greater than the drinking water standards. The following map shows sections of the Hanford Site and groundwater pollution concentrations.



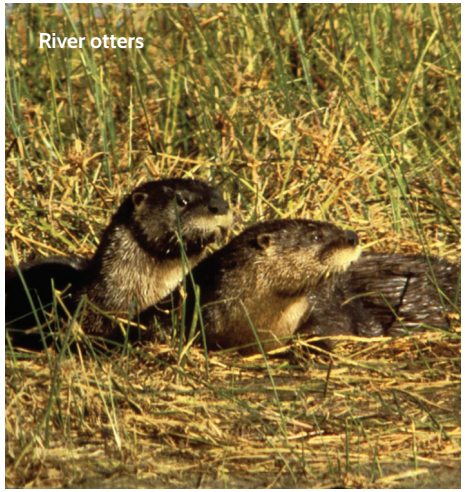
What's in the Columbia River?

The Hanford Reach of the Columbia River flows for 51 miles through the Hanford Nuclear Site and is home to sturgeon, salmon, and bull trout. **In fact, the Hanford Reach in the most productive spawning ground for the threatened Chinook salmon on the main stem Columbia, producing 52 million juveniles every year.** The Hanford Reach is also home to 42 mammal species, including river otters and elk, and 258 species of birds, including the golden eagle and white pelican.

Contaminated groundwater plumes flow from the Hanford Nuclear Site to the Columbia River and contaminate the sediments and river water. Energy recently investigated the contaminants upwelling in the Columbia River. While groundwater treatment programs have decreased the concentrations of some pollutants, such as strontium-90, reaching the river, elevated levels of other pollutants, specifically arsenic, cadmium and uranium, are frequently observed in the river.



Chinook salmon



River otters

Questions & Answers

ARE THERE ELEVATED LEVELS OF CONTAMINANTS IN THE RIVER?

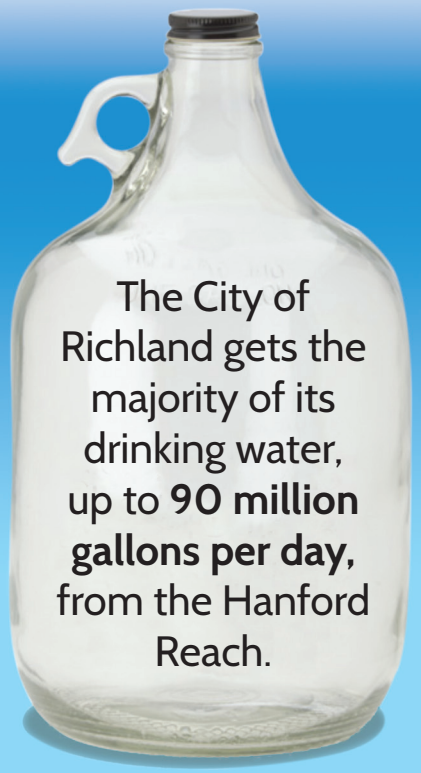
Yes, elevated levels of tritium, uranium-234, uranium-238, strontium-90, arsenic, and cadmium are frequently observed in the groundwater entering the river.

ARE THE CONTAMINATED GROUNDWATER PLUMES ENTERING THE COLUMBIA RIVER?

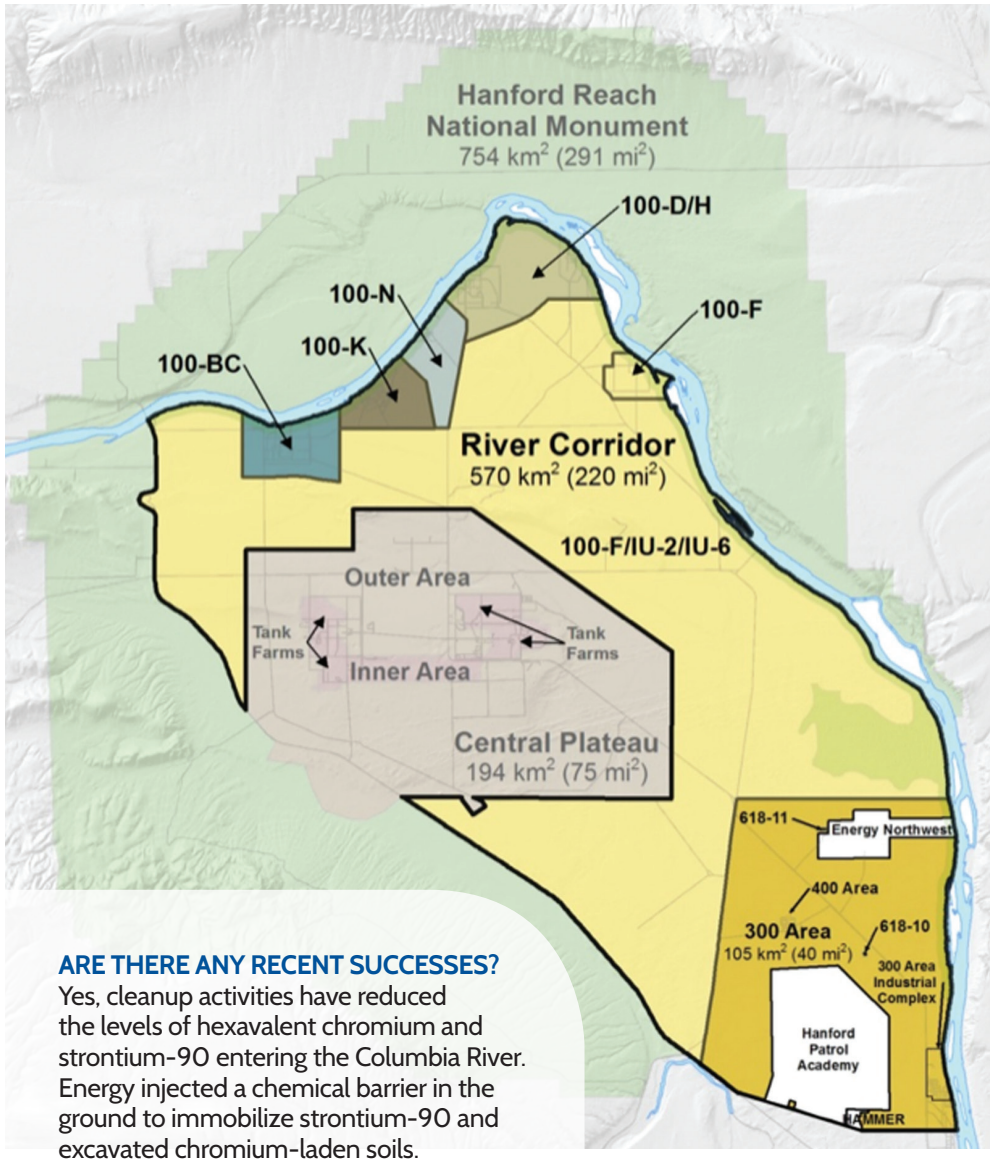
In-river samples show contaminated water is upwelling into the river in the 100 and 300 Areas of Hanford.

WHERE IS STRONTIUM-90 ENTERING THE RIVER?

Strontium-90 enters the river in high concentrations at the 100-N and 100-D Areas.



The City of Richland gets the majority of its drinking water, up to **90 million gallons per day,** from the Hanford Reach.



Map of the Hanford Site by U.S Department of Energy

ARE THERE ANY RECENT SUCCESSES?

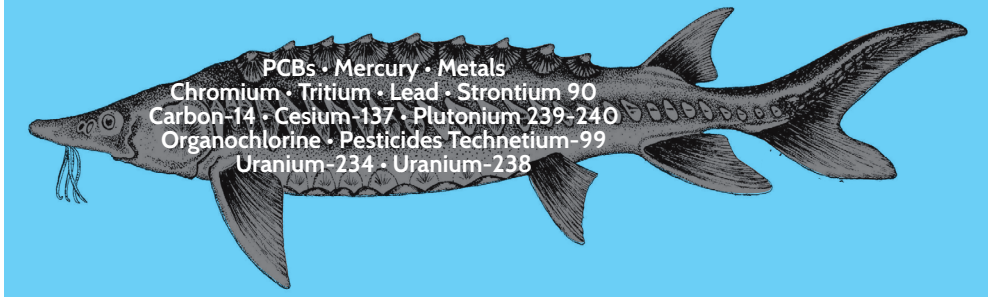
Yes, cleanup activities have reduced the levels of hexavalent chromium and strontium-90 entering the Columbia River. Energy injected a chemical barrier in the ground to immobilize strontium-90 and excavated chromium-laden soils.

WHAT ARE THE NEXT STEPS?

Energy should commit to using reliable groundwater and soil cleanup strategies to prevent more pollution from reaching the river. Energy should prioritize removing the sources of contamination in soils above the groundwater, which protects both groundwater and the river.

What's in Your Fish?

Energy recently sampled fish caught in the Hanford Reach of the Columbia River. This was the first large-scale sampling of fish that live in the Hanford Reach year-round. Although detected infrequently, Energy's sampling results revealed some radionuclides at orders of magnitude above human health screening levels. The highest concentrations of tritium were in sturgeon caught adjacent to Hanford's 300 Area. Tritium levels were up to 320 times higher than the human health level of 0.46 picocuries per kilogram.



Key Results

- **During the 2008 to 2010 sampling season, Energy sampled six fish species – salmon, bass, carp, sturgeon, walleye, and whitefish – and tested fillet, carcass, liver, and kidney tissue from individual fish samples as well as composite samples made up of many fish. In total, Energy sampled 534 fish.**
- **Lead, chromium, and mercury were frequently detected in tissues.**
- **Fish caught in the Columbia River near Hanford's 100 and 300 Areas have elevated concentrations of arsenic, mercury, cadmium, uranium, and lead compared to fish sampled upriver. Chromium displayed the opposite trend.**

What's in Your Fish?

Although Energy detected elevated levels of pollutants in Hanford fish, the only fish consumption advisory in the Hanford Reach is for mercury. But this only tells part of the story.

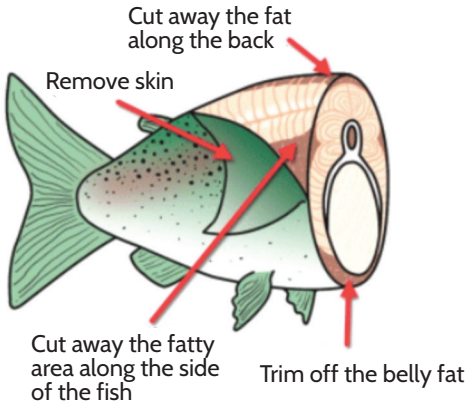
Unfortunately, Washington's current human health criteria for fish consumption are outdated and do not adequately protect public health. According to the Washington Department of Ecology, "until new human health criteria are adopted by Ecology, Washington will continue using outdated federal standards that do not reflect current science on protection from toxic chemicals."

The current estimate of how much fish people eat in Washington State is just 6.5 grams per day. That's the size of this little fish which is barely bigger than a quarter. That's less than one-tenth the figure used by Oregon.

Follow These Tips to Reduce Your Exposure to Toxic Pollutants

Guidelines

- Throw away internal organs, skin, head and tail.
- Remove all skin.
- Cut away the dark fat on top of fish along its backbone.
- Slice off fat belly meat along the bottom of fish.
- Cut away the dark, V-shaped wedge of fat located along the lateral line on each side of the fish.
- Do not eat raw fish.
- Bake or broil skinned, trimmed fish on a rack or grill so fat drips off and discard drippings.
- Thoroughly clean and trim fish if making stew or soup.



Courtesy of Oregon Health Authority

This OUR River: Get Involved!

Join Riverkeeper

Columbia Riverkeeper's staff of scientists, policy analysts, and clean water attorneys can help you stay informed on the ever-changing landscape at Hanford. As a member, you'll receive our informative newsletter, Hanford Action Alerts, and join a network of people dedicated to a healthy, safe Columbia River. Visit columbiariverkeeper.org to join today.

Sign Up for Action Alerts

You can make a difference in Hanford cleanup. To stay informed and learn about important opportunities to submit public comments or attend public hearings, sign up for Columbia Riverkeeper's Action Alerts by emailing info@columbiariverkeeper.org.

Attend a Public Hearing

Energy, the Washington Department of Ecology, and the U.S. Environmental Protection Agency hold public meetings or hearings across the Pacific Northwest for major cleanup decisions. Public hearings are a great opportunity to learn about an issue, ask questions, and speak up.