

## DOE to halt strontium leaking toward river

*The headline sounds like they are the heroes rather than the villains! Read on.*

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The Department of Energy plans to begin laying a trap next week for wayward radioactive strontium that's leaking into the Columbia River.

The current method for removing the strontium is having little effect, even though DOE is spending up to \$1 million a year on it. The contaminated water is pumped out of the ground, strontium is removed and the cleaned water is reinjected back into the ground.

Newly developed technology should cost about the same, yet protect the river over the next 270 years.

Rather than removing the strontium, chemical barriers injected into the ground would bind it in place along the river banks until its radioactivity decays naturally.

The simplicity of the technique is a plus, Jane Hedges said as she stood Wednesday on the banks of the Columbia River on top of what is one of Hanford's most worrisome plumes of underground contamination. Hedges is nuclear waste program manager for the Washington State Department of Ecology,

When Hanford's N Reactor was irradiating fuel to produce plutonium for the nation's nuclear weapons program, up to 2,000 gallons per minute of contaminated water was discharged into soil near the reactor. Water that had circulated over the fuel and picked up strontium 90 isotopes continued to be discharged 800 feet from the river until 1992.

Now, the area has an underground plume of about three-fifths of a square mile with strontium contamination that's 1,000 times the drinking water standard. It's a threat to humans and the environment.

"Our body can't distinguish it from calcium," said Mike Thompson, project lead for DOE. It replaces calcium in the bones and can lead to cancer of the bone, skin and blood.

DOE's been operating a pump and treat program for 10 years to remove strontium, for lack of a better technology. The program has helped reduce the flow of ground water into the river that can carry along the strontium.

But at a pumping rate of 60 gallons per minute, the system removes about 0.2 curies per year, or about 10 times less than the amount removed by natural radioactive decay.

About 35 technologies were studied before building a chemical barrier was picked as the most promising four years ago, said John Price, the Department of Ecology's project manager for environmental restoration.

The intent is to inject a calcium phosphate mineral, or apatite mineral, that occurs naturally in Earth's crust into wells along the bank of the Columbia River near N Reactor. It will form a chemical barrier that will stretch about 300 feet along the Columbia in the area of the worst contamination.

When strontium hits the mineral, it should bond and remain in place until most of its radioactivity is gone 270 years from now.

Half of the radioactivity of strontium decays every 28.6 years. With some of the strontium already in the ground for 30 years, scientists are figuring it will require another 270 years for the strontium to decay to meet drinking water standards.

But finding a way to spread the apatite mineral into a uniform barrier has been a problem. Apatite tends to settle out quickly when injected into the ground, rather than moving with the water to form a barrier that spreads from injection well to injection well.

That problem was solved by Pacific Northwest National Laboratory.

By coating the apatite with citrate, it flows with the water until bacteria in the soil eat away the coating after it has spread along the river, Price said. The apatite is injected as a liquid that gels, then forms crystals.

The first apatite injection is planned for next week, said Dick Wilde, Fluor Hanford vice president for ground water projects. It will help Fluor calculate pressure and volume for the injections that will build the apatite barrier about 30 feet from the river. The barrier will spread to within 15 to 20 feet of the river.

The first full injection is planned for June to build a barrier to stop strontium in ground water from reaching the river. Next year a second, higher concentration injection is planned to catch strontium in the soil above the ground water between the initial apatite barrier and the river.

If needed, coyote willow could be planted along the river bank to remove any strontium not blocked at the apatite barrier. The roots would suck up the contaminated water until the willow is harvested as contaminated waste.

The apatite barrier is considered a pilot project and will be re-evaluated in 2008.

"This should give us some real answers about the strontium waste," Hedges said. "This is a high priority for us."