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## **Tank Leaks at Hanford: A Review of New Allegations**

Washington Physicians for Social Responsibility Hanford Task Force

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## *Washington Physicians for Social Responsibility*

# **Tank Leaks at Hanford: A Review of New Allegations**

### Introduction

The Hanford Task Force (HTF) of Washington Physicians for Social Responsibility (WPSR) has been providing medical perspectives on Hanford issues since 1987. Our focus is educating the public on Hanford decisions that affect human health and the environment. WPSR has held a public health seat on the regional Hanford Advisory Board since its inception more than a decade ago.

WPSR's Hanford Task Force recently had the opportunity to review a report on suspected new and unreported leaks from Hanford's high-level radioactive waste tanks. This report was prepared by John R. Brodeur, P.E., L.E.G, an environmental engineer and geologist who worked at Hanford during the 1990s. The document is titled *Recent Leaks From Hanford's High-Level Waste Tanks: USDOE's Failure to Monitor, Report or Characterize Tank Leaks* (April 2006). It was prepared in anticipation of the U.S. Department of Energy's new "Hanford Tank Closure and Waste Management Environmental Impact Statement." WPSR is particularly concerned about radioactive waste in the vadose zone, the area from ground surface to the water table, because it filters into the groundwater which flows directly into the Columbia River. The Columbia River is the lifeblood for salmon spawning, agriculture, and recreation for a large part of southern Washington and northern Oregon. It also provides drinking water for the Tri-Cities, as well as many other cities further downstream.

### Background

The Hanford Nuclear Reservation is a 586-square mile site, about half the size of Rhode Island, on the Columbia River in southeastern Washington. As a former nuclear weapons facility, it produced plutonium for atomic bombs for more than 40 years. The Hanford Site is controlled and operated by the U.S. Department of Energy (USDOE). It is the most contaminated site in the Western Hemisphere and the world's largest environmental cleanup project.

An estimated 53 million gallons of high-level nuclear waste from decades of plutonium production have been stored in 177 underground tanks (see photo next page, courtesy USDOE). According to the USDOE's *Hanford Site End State Vision* (October 2005), the 53 million gallons include 240,000 tons of chemicals and 195 million curies of radioactivity. Of the 177 tanks storing this waste, 149 are single-shelled and the newer 28 tanks are double-shelled. The USDOE acknowledges that more than one-third of the single-shelled tanks have leaked:

“The 149 single-shell tanks built until the mid-1960s had a design life of only 10 to 20 years. Waste leakage from those tanks to the soils beneath them was suspected as early as 1956 and was confirmed in 1959. By the late 1980s, 67 of

***Supported by a grant from the Citizens' Monitoring and Technical Assessment Fund***

these tanks were known or suspected leakers. DOE estimates that about 1 million gallons of waste had been released to the soils in the tank farms...” (1)



Some radioactive waste has already reached the groundwater, contributing to the estimated 200-square miles of groundwater contamination beneath Hanford. This groundwater is migrating to the Columbia River, endangering its use by humans and the river’s fragile ecology.

Oversight of the massive tanks, tank waste retrieval and stabilization is governed by the “Hanford Federal Facility Agreement and Consent Order” (1989), commonly referred to as the Tri-Party Agreement or TPA. The three parties to this legally binding 30-year cleanup schedule are the USDOE, the

U.S. Environmental Protection Agency (EPA) and the Washington State Department of Ecology. Ecology is the lead regulator on tank and vadose zone cleanup.

### Summary of Findings

Brodeur’s report was commissioned to provide input for three Hanford projects: the upcoming Tank Closure and Waste Management Environmental Impact Statement (EIS), characterization for remediation of groundwater, and the closure of Hanford’s high-level nuclear waste tank farms. His focus was the single-shell tanks in the T-Complex Tank Farms (TX and TY).

By examining past and current tank leak characterization work, including the most recent characterization effort at the TY tank farm, Brodeur concludes: “...tank TY-102 has leaked, creating a contamination plume at the base of the tank. In spite of this, the tank remains designated (by USDOE) as a sound tank.” (2)

Brodeur asserts that USDOE’s method for detecting tank leaks is not only flawed, *but designed to avoid finding leaks*. This is based on his own experience at Hanford for many years and was also the conclusion of the Government Accountability Office as early as 1989:

“DOE does not collect sufficient data to adequately trace the migration of the leaks through the soils and studies predicting the eventual environmental impact

of tank leaks do not provide convincing support for DOE's conclusion that the impact will be low or non-existent." (3)

Brodeur states that monitoring data indicating additional leaks have been ignored by USDOE and its contractor. He also believes there is an institutional bias to avoid detecting, reporting and addressing suspected "leakers."

Lack of adequate characterization of the contamination at Hanford has been a recurring theme with many groups, including the Hanford Advisory Board. Brodeur concurs: "In simple terms, we do not have enough boreholes to understand how the contamination plumes are distributed in, and through, the vadose zone soil. We need to quantify the horizontal and depth extent of contamination plumes." (4)

Brodeur summarizes his findings as follows: "...the characterization effort for the TY Tank Farm (and others as well):

- ignores actual data that deep contamination has already reached and impacted groundwater;
- is misdirected in its focus;
- does not investigate deep enough into the vadose zone soil;
- uses the wrong instrumentation; and
- lacks an essential monitoring component." (5)

He recommends additional sampling boreholes to determine the depth and width of the contamination plumes beneath the tanks, as well as a geostatistical method to quantify the data.

#### Discussion and Recommendations

If Brodeur's report is accurate, this raises serious questions about potential leakage from other tanks that have undergone the same type and extent of monitoring, as well as USDOE's planning model. It also has grave implications for groundwater remediation as well as plans to close Hanford's tank farms. USDOE has proposed leaving 10% of tank waste in the tanks as a "reasonable" alternative. Not only is this proposed alternative in violation of the Tri-Party Agreement, which requires 99% retrieval where practicable, but it means 5.3 million gallons of toxic waste would remain in the aging tanks. This increased potential for radioactive leakage and ongoing contamination of the vadose zone must be considered in USDOE's planning if the Columbia River is to be protected.

WPSR is also concerned about Brodeur's report of increased levels of cesium-137 in the vadose zone of the TY Tank Farm, a 50-fold increase between 1996 and 2002. (6) Cesium-137 and strontium-90 represent the majority of radioactive contamination at Hanford. Cesium-137 was first believed to have very low mobility through the soil to the groundwater. (7) Brodeur reports that cesium-137 appears to be moving much more rapidly than first thought. This raises serious concerns that it may be carried with the more mobile radioactive materials in the plumes. Cesium-137 emits both beta and gamma radiation and poses a serious health threat to humans from both external and internal

radiation. It is readily absorbed by humans and animals and acts similar to potassium throughout the body. Exposure to cesium-137 can increase cancer risks.

**WPSR recommends that:**

- **USDOE develops a much more thorough system to assess the true extent of contamination in the vadose zone;**
- **USDOE continues to keep as a first priority its plans to immobilize tank waste and prevent it from reaching the groundwater and, ultimately, the Columbia River;**
- **USDOE includes in its Environmental Impact Statement the high probability of both present and future extensive contamination of groundwater, and thus the Columbia River, from the current insufficiently characterized vadose zone, and**
- **USDOE adheres to the Tri-Party Agreement requirements regarding tank waste retrieval.**

References

- (1) “The Accelerated Retrieval, Treatment, and Disposal of Tank Waste and Closure of Tanks at the Hanford Site Environmental Impact Statement: A Guide to Understanding the Issues;” USDOE Office of River Protection, January 2003, RPP-14193, p.7.
- (2) Brodeur, John R., “Recent Leaks From Hanford’s High-Level Nuclear Waste Tanks: USDOE’s Failure to Monitor, Report or Characterize Tank Leaks,” April 2006, p.19.
- (3) U.S. Government Accountability Office, “DOE’s Management of Single-Shell Tanks at Hanford, Washington,” 1989.
- (4) Brodeur, John R., “Recent Leaks From Hanford’s High-Level Nuclear Waste Tanks: USDOE’s Failure to Monitor, Report or Characterize Tank Leaks,” April 2006, p.18.
- (5) *ibid*, p. 19.
- (6) *ibid*, p.19
- (7) “Vadose Zone Characterization Project at the Hanford Tank Farms, SX Tank Farm Report,” USDOE Grand Junction (Colorado) Office, September 1996, 3.1.

*To view the full Brodeur report, go to [http://www.hoanw.org/PDF/9\\_11\\_6.pdf](http://www.hoanw.org/PDF/9_11_6.pdf)*

*This publication was funded by the Citizens’ Monitoring and Technical Assessment Fund  
September 2006*

*Washington Physicians for Social Responsibility  
4554 12<sup>th</sup> Ave. NE, Seattle, WA 98105  
206.547-2630                      [www.wpsr.org](http://www.wpsr.org)*

***Supported by a grant from the Citizens' Monitoring and Technical Assessment Fund***