

4.3 Hanford Site Drinking Water Surveillance

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The primary purpose of Hanford Site drinking water surveillance is to verify the quality of the site's drinking water. This is achieved by the routine collection and analysis of drinking water samples and the comparison of the resulting data with established drinking water standards and guidelines (WAC 246-290, 40 CFR 141, EPA-570/9-76-003, EPA 822-R-96-001; see Appendix C, Tables C.2 and C.5). In 1997, most radiological surveillance of DOE-owned drinking water systems on the site was conducted by Pacific Northwest National Laboratory for DynCorp Tri-Cities Services, Inc. In addition, DE&S Hanford, Inc. collected radiological data for a single system in the 100-K Area (Table 4.3.1). Chemical and microbiological monitoring of all onsite DOE-owned drinking water systems was conducted by DynCorp Tri-Cities Services, Inc.

The national primary drinking water regulations of the Safe Drinking Water Act apply to the drinking water supplies at the Hanford Site. These regulations are enforced by the Washington State Department of Health. WAC 246-290 requires that all drinking water analytical results be reported routinely to the Washington State Department of Health. In previous years, this was accomplished at the Hanford Site by the issuance of an annual report produced by the Hanford Environmental Health Foundation (e.g., HEHF-95, HEHF-96). In recent years, summary and individual radiological results have been reported to the state through this annual Hanford Site environmental report and through a supplemental data compilation (PNNL-11796). Nonradiological data have been reported to the state by DynCorp Tri-Cities Services, Inc. and have not been published.

4.3.1 Radiological Monitoring of Hanford Site Drinking Water Systems

Drinking water is supplied to DOE facilities on the site by 12 DOE-owned, contractor-operated, water treatment

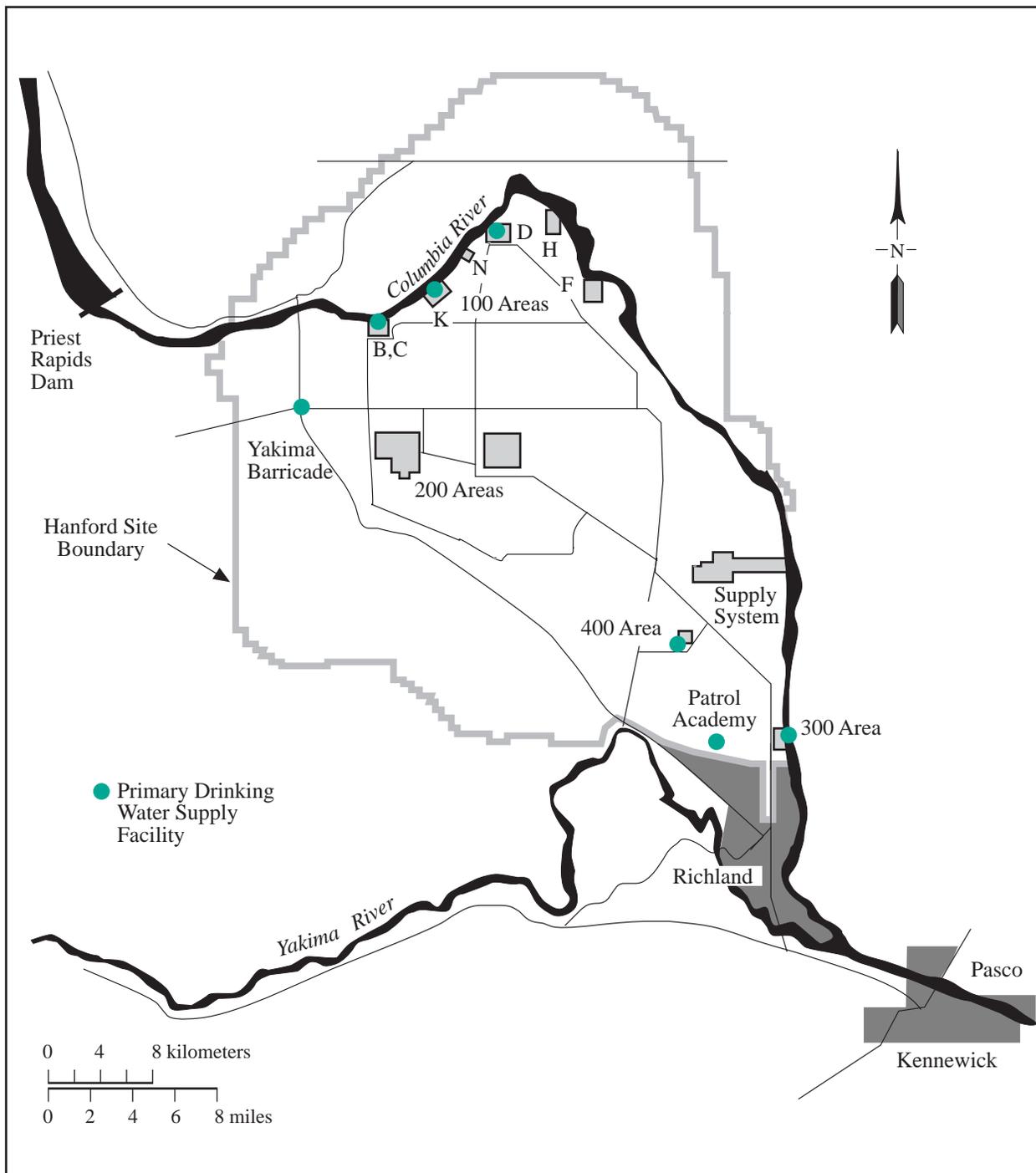
systems (see Table 4.3.1) and one system owned and operated by the city of Richland. Ten of these systems (including Richland's system) use water from the Columbia River. Three systems use groundwater from beneath the site. Most of the systems are operated by DynCorp Tri-Cities Services, Inc., however, DE&S Hanford, Inc., Bechtel Hanford, Inc., and B&W Hanford Company also each operate one system, though water for the Bechtel system is supplied by a pumping station operated by DynCorp. The city of Richland provides drinking water to the 700, 1100, and Richland North Areas of the site and serves as a backup supplier for the 300 Area. Water from Richland's system is not monitored through the site drinking water surveillance project; however, Pacific Northwest National Laboratory routinely collects water samples from the Columbia River at the Richland Pump-house, which is the city of Richland's drinking water intake. The analytical results (radiological) for these samples of untreated river water can be found in Appendix A (Table A.2).

In 1997, radionuclide concentrations in onsite drinking water were monitored at the seven facilities shown in Figure 4.3.1, which represent the principal water supply facilities for the site's DOE-owned drinking water treatment systems. The 100-B Area pumphouse continued to serve as the primary Columbia River pumping station for many areas on the site (100-N Area, 200-East and 200-West Areas, 251 Building, and 100 Areas Fire Station), with the 100-D Area pumphouse available as an emergency backup. Water for the 100-K Area was supplied by the 181-KE Pumphouse. The 300 Area obtains its water via the 312 Pumphouse or the city of Richland. The Yakima Barricade, Patrol Training Academy, and 400 Area (Fast Flux Test Facility) obtained water from groundwater wells.

The 400 Area continued to use well 499-S1-8J (P-16) for drinking water, with well 499-S0-8 (P-14) serving as the emergency supply. Well 499-S0-8 was used 6 times during 1997 (in January for 24.9 h, February for 53.5 h, April for 22.9 h, May for 19.7 h, June for 26.7 h, and July for 14.7 h). Well 499-S0-7 (P-15) continued to function as

Table 4.3.1. DOE-Owned Drinking Water Systems on the Hanford Site, 1997

Name/Number	Source of Supply	Notes
100-D/001761	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 183-D. Operated by DynCorp Tri-Cities Services, Inc.
100-B/04480U	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 182-B. Operated by DynCorp Tri-Cities Services, Inc.
100-K/00177J	Columbia River via 181-K Pumphouse	Filtered and chlorinated at 183-KE. Operated by DE&S Hanford, Inc.
100-N/418532	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 183-N. Operated by Bechtel Hanford, Inc.
200-E/41866V	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 283-E. Operated by DynCorp Tri-Cities Services, Inc.
200-W/001004	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 283-W. Operated by DynCorp Tri-Cities Services, Inc.
251 Bldg/001782 (electrical switching)	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 251 Building. Operated by DynCorp Tri-Cities Services, Inc.
609 Bldg/001806 (100 Areas Fire Station)	Columbia River via 181-B or D raw water export	Filtered and chlorinated at 609 Building. Operated by DynCorp Tri-Cities Services, Inc.
Yakima Barricade/ 001848	Well 699-49-100C	No treatment provided. Operated by DynCorp Tri-Cities Services, Inc.
Patrol Training Academy/00183Q	Well 699-S28-E0	Chlorination only. Operated by DynCorp Tri-Cities Services, Inc.
400 Area/419470	Wells 499-S1-8J, 499-S0-7, and 499-S0-8	Supplied from well 499-S1-8J (P-16); well 499-S0-8 (P-14) is the emergency supply, well 499-S0-7 (P-15) is the dire emergency supply. Chlorination only. Operated by B&W Hanford Company.
300 Area/418408	Columbia River via 312 Pump-house or city of Richland	Filtered and chlorinated at 315 Building. Operated by DynCorp Tri-Cities Services, Inc.



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Figure 4.3.1. Hanford Site Primary Drinking Water Supply Facilities, 1997

the dire emergency supply but was not used as a source of drinking water in 1997. In addition to supplying drinking water, these three wells are also important for maintaining fire suppression capabilities within the 400 Area.

4.3.2 Collection of Drinking Water Samples and Analytes of Interest

Pacific Northwest National Laboratory collected samples according to a schedule established at the beginning of the calendar year (PNNL-11464). A majority of the samples were collected and analyzed quarterly. The 300 Area samples were collected monthly and composited for quarterly analysis. The Yakima Barricade and Patrol Training Academy samples were collected quarterly and composited for annual analysis. Well water samples from the 400 Area were collected and analyzed monthly. Samples from most locations were grab samples of treated water collected at the tap. The 300 Area samples were cumulative raw river water samples collected at the water supply pumphouse before any treatment. Tap water samples obtained from the Patrol Training Academy in January, April, July, and October, and the 400 Area in April were cosampled with the Washington State Department of Health. The analytical results from the state's samples help to verify the quality of the drinking water data reported herein and in PNNL-11796.

All 1997 drinking water samples were analyzed for gross alpha, gross beta, tritium, and strontium-90. Additionally, samples from the 300 Area were analyzed for uranium and technetium, and concentrations of plutonium and americium were monitored in water from the 100-K Area. The 100-K Area and 300 Area samples were also analyzed by gamma spectrometry.

Gross alpha and gross beta measurements provided a general indication of radioactive contamination. Gamma spectrometry was used to detect numerous specific radionuclides (see Appendix E). Radiochemical analyses were used to determine the concentrations of other specific radionuclides.

4.3.3 Radiological Results for Hanford Site Drinking Water

Results for radiological monitoring of Hanford Site drinking water during 1997 are summarized in Table 4.3.2. Concentrations of gross alpha, gross beta, tritium, strontium-90, and total uranium are included in the table to demonstrate compliance with drinking water standards. The maximum amount of beta-gamma radiation from manmade radionuclides allowed in drinking water by Washington State and the EPA is an annual average concentration that will not produce an annual dose equivalent to the whole body or any internal organ greater than 4 mrem/yr. If both tritium and strontium-90 are present, the sum of their annual dose equivalent to bone marrow must not exceed 4 mrem. Compliance with this standard may be assumed if the annual average concentration for each of gross alpha, gross beta, tritium, and strontium-90 are less than 50, 15, 20,000, and 8 pCi/L, respectively (40 CFR 141 and WAC 246-290). All DOE-owned drinking water systems on the Hanford Site were in compliance with Washington State and EPA annual average radiological drinking water standards in 1997, and results were similar to those observed in recent years (Section 4.3 in PNNL-11139 and PNNL-11472).

Concentrations of uranium, plutonium, americium, and radionuclides measured by gamma spectrometry at selected locations (see PNNL-11796) were all below drinking water standards.

Raw water samples from all three 400 Area drinking water wells were collected and analyzed monthly by the site Ground-Water Monitoring Program. Results from these samples show that tritium levels continued to be lowest in well 499-S0-8J and highest in well 499-S0-7 (Table 4.3.3, Figure 4.3.2).

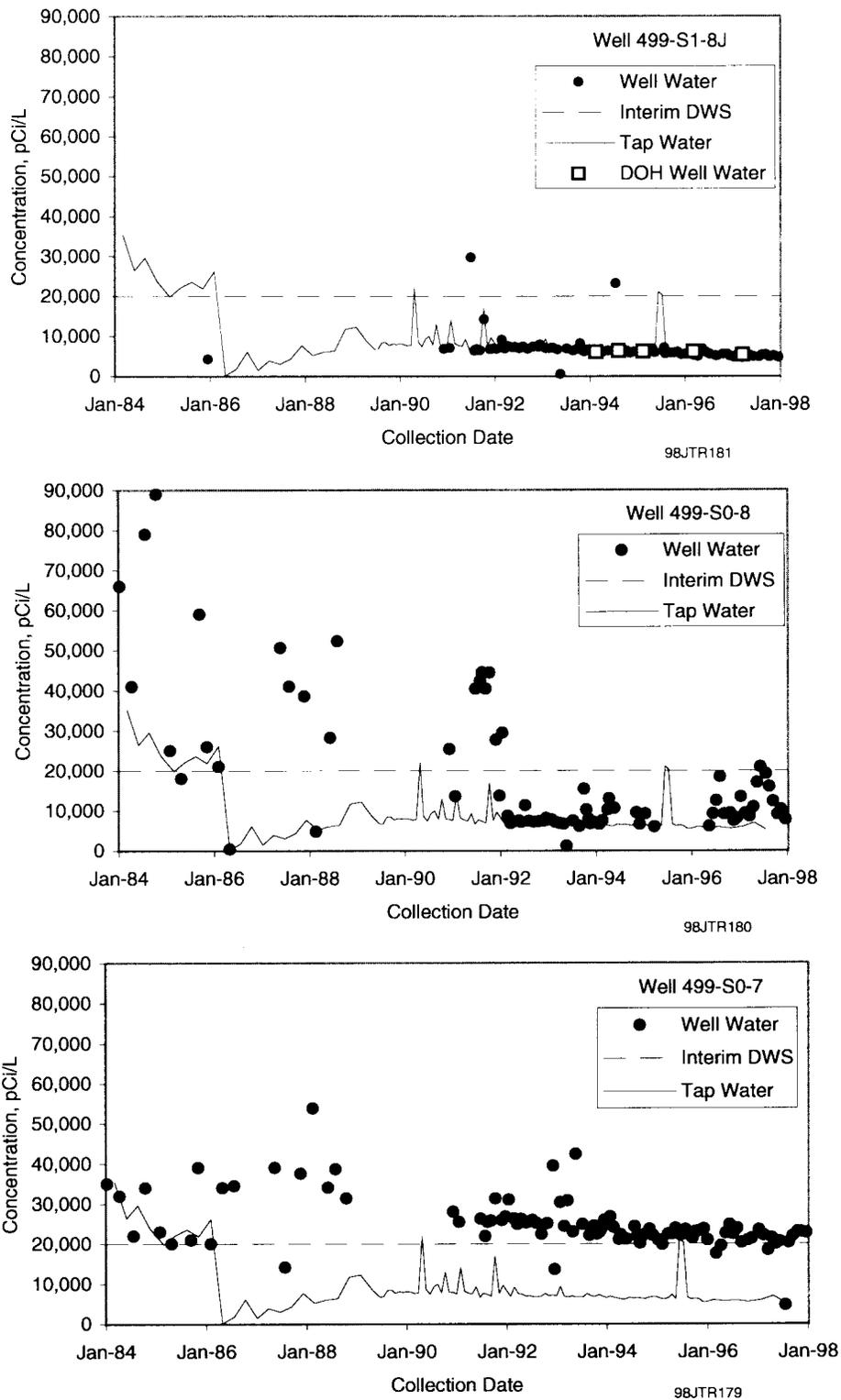


Figure 4.3.2. Tritium Concentrations in Drinking Water from Three Wells in the 400 Area, 1984 Through 1997 (DOH = Washington State Department of Health, DWS = Drinking Water Standard)

Table 4.3.2. Selected Radiological Constituents in Hanford Site Drinking Water, 1997 Annual Average Concentrations (pCi/L)^(a)

System	No. of Samples	Gross Alpha	Gross Beta	Tritium	Strontium-90	Total Uranium
100-B Area	4 ^(b)	0.55 ± 0.55	1.39 ± 0.76	83.83 ± 30.20	0.11 ± 0.03	NM ^(c)
100-D Area	4 ^(b)	0.47 ± 0.27	2.43 ± 0.25	48.28 ± 70.58	0.11 ± 0.03	NM
100-K Area	4 ^(b)	0.04 ± 0.23	-0.77 ± 2.96	22.85 ± 30.63	0.03 ± 0.07	NM
300 Area	4 ^(d)	1.41 ± 0.45	1.62 ± 1.11	340.53 ± 362.74	0.09 ± 0.03	1.71 ± 1.02
400 Area	4 ^(b)	0.26 ± 0.53	8.47 ± 1.18	5,760 ± 882	0.03 ± 0.05	NM
Yakima Barricade	1 ^(e)	0.83	7.33	13.6	0.02	NM
Patrol Academy	1 ^(e)	0.35	6.25	19.3	0.02	NM
Standards ^(f)		15 ^(f,g)	50 ^(g,h)	20,000 ^(g,i)	8 ^(f,g)	

- (a) Average value ±2 standard error of the calculated mean.
(b) Grab samples collected and analyzed quarterly.
(c) NM = Not measured.
(d) Cumulative sample, collected monthly and composited for quarterly analysis.
(e) Grab sample, collected quarterly and composited for annual analysis.
(f) WAC 246-290.
(g) 40 CFR 141.
(h) Equivalent to 4 mrem/yr standard.
(i) Concentration assumed to yield an annual dose of 4 mrem/yr.

Table 4.3.3. Tritium Concentrations (pCi/L) in 400 Area Drinking Water Wells, 1997^(a)

Sampling Date	Well 499-S1-8J (P-16) ^(b)	Well 499-S0-8 (P-15) ^(c)	Well 499-S0-7 (P-14) ^(d)
January 10, 1997	4,730 ± 526	23,500 ± 1,890	13,400 ± 1,150
February 14, 1997	5,550 ± 610	22,100 ± 1,810	9,310 ± 880
March 18, 1997	4,600 ± 511	18,400 ± 1,510	8,500 ± 792
April 17, 1997	5,470 ± 590	21,500 ± 1,750	10,900 ± 987
May 14, 1997	4,920 ± 553	20,000 ± 1,650	17,000 ± 1,430
June 10, 1997	4,870 ± 554	20,600 ± 1,690	20,900 ± 1,710
July 21, 1997	4,790 ± 555	4,690 ± 550	19,200 ± 1,600
August 15, 1997	5,210 ± 580	20,300 ± 1,670	16,000 ± 1,360
September 12, 1997	5,360 ± 581	21,900 ± 1,780	12,300 ± 1,080
October 17, 1997	4,820 ± 551 ^(e)	23,100 ± 1,860	9,020 ± 836
November 13, 1997	5,090 ± 551	23,000 ± 1,850	10,300 ± 929
December 18, 1997	4,740 ± 537	22,800 ± 1,850	7,740 ± 754

- (a) Reported concentration ±2 total propagated analytical error.
(b) Drinking water well.
(c) Dire emergency supply well.
(d) Emergency supply well.
(e) Sample collected on October 10, 1997.