



9.0 Quality Assurance

E. A. Lepel, L. P. Diediker, and D. L. Dyekman

Quality assurance and quality control practices are incorporated into all aspects of Hanford Site environmental monitoring and surveillance programs. This section discusses specific measures taken to assure quality in project management, sample collection, and analytical results.

Samples were collected and analyzed according to documented standard analytical procedures. Analytical data quality was verified by a continuing program of internal laboratory quality control, participation in interlaboratory crosschecks, replicate sampling and analysis, submittal of blind standard samples and blanks, and splitting samples with other laboratories.

Quality assurance/quality control for the Hanford Site environmental monitoring and surveillance programs also included procedures and protocols to

- document instrument calibrations
- conduct program-specific activities in the field
- maintain groundwater wells to assure representative samples were collected
- avoid cross-contamination by using dedicated well sampling pumps.

9.0.1 Environmental Surveillance and Groundwater Monitoring

During 2001, comprehensive quality assurance programs, including various quality control practices, were maintained to assure the quality of data collected through the Surface Environmental Surveillance Project and the Hanford Groundwater Monitoring Project. Quality assurance plans were maintained for all program activities and defined the appropriate controls and documentation required by the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE) for the project-specific requirements.

9.0.1.1 Project Management Quality Assurance

Site environmental surveillance, groundwater monitoring, and related programs such as processing of thermoluminescent dosimeters and performing dose calculations were subject to an overall quality assurance program. This program implemented the requirements of DOE Order 414.1A. Quality assurance plans are maintained by the site surveillance and groundwater monitoring projects; these plans describe the specific quality assurance elements that apply to each project.

These plans were approved by a quality assurance organization that conducted surveillances and audits to verify compliance with the plans. Work performed through contracts, such as sample analysis, must meet the same quality assurance requirements. Potential equipment and service suppliers are audited before service contracts or material purchases that could have had a significant impact on quality within the project are approved and awarded.

9.0.1.2 Sample Collection Quality Assurance/Quality Control

Surface Environmental Surveillance Project samples were collected by staff trained to conduct sampling according to approved and documented procedures (PNL-MA-580). Continuity of all sampling location identities was maintained through careful documentation. Field replicates were collected for water, soil, and biota samples (Table 9.0.1). Eighty-seven percent of the field replicate results for 2001 were acceptable. The results were acceptable if the relative standard deviation

Table 9.0.1. Summary of Surface Environmental Surveillance Project Field Replicate Results, 2001

Medium	Radionuclides	Number of Results Reported	Number Within Control Limits^(a)
Water	Gross alpha	8	7
	Gross beta	9	9
	³ H	35	35
	⁷ Be, ⁴⁰ K, ⁶⁰ Co, ¹⁰⁶ Ru, ¹²⁵ Sb, ¹³⁴ Cs, ¹³⁷ Cs, ¹⁵⁴ Eu, ¹⁵⁵ Eu	13	11
	⁹⁰ Sr	0	0
	⁹⁹ Tc	0	0
	²³⁴ U, ²³⁵ U, ²³⁸ U	25	24
	²³⁸ Pu, ^{239/240} Pu	7	4
Soil	Gross alpha	1	0
	Gross beta	2	2
	³ H	0	0
	⁷ Be, ⁴⁰ K, ⁶⁰ Co, ¹⁰⁶ Ru, ¹²⁵ Sb, ¹³⁴ Cs, ¹³⁷ Cs, ¹⁵⁴ Eu, ¹⁵⁵ Eu	8	6
	⁹⁰ Sr	4	4
	²³⁴ U, ²³⁵ U, ²³⁸ U	27	22
	²³⁸ Pu, ^{239/240} Pu	17	13
	²²⁸ Th, ²³² Th	3	2
Biota	Gross alpha	2	0
	Gross beta	2	0
	³ H	1	1
	⁷ Be, ⁴⁰ K, ⁶⁰ Co, ¹⁰⁶ Ru, ¹²⁵ Sb, ¹³⁴ Cs, ¹³⁷ Cs, ¹⁵⁴ Eu, ¹⁵⁵ Eu	29	29
	⁹⁰ Sr	9	8
	⁹⁹ Tc	2	2
	²³⁴ U, ²³⁵ U, ²³⁸ U	3	2
	²³⁸ Pu, ^{239/240} Pu	7	5

(a) The sample and duplicate results are acceptable if they fall within the control limit of $\pm 30\%$ for the sample and duplicate results above the detection limit or minimum detectable concentration.

was >30% for the sample and duplicate results. However, plutonium-238 and plutonium-239/240 failed in all three media at least twice, uranium-234, -235, -238 and gross alpha failed in all three media at least once, and thorium-228 and thorium-232 and strontium-90 failed in one media at least once.

Samples for the Hanford Groundwater Monitoring Project were collected by trained staff according to approved and documented procedures (PNNL-13788, Appendix B). Chain-of-custody procedures were followed (EPA 1986). Samples representing full trip blanks and field replicates were obtained during field operations. Summaries of the 2001 groundwater field quality control sample results are provided in Appendix B of PNNL-13788. The percentage of acceptable field blank and replicate results in fiscal year 2001 were 97% for field blanks and 98% for field replicates.

9.0.13 Analytical Results Quality Assurance/Quality Control

Routine chemical analyses of water samples were performed under contract primarily by Severn Trent Laboratories, Incorporated, St. Louis, Missouri, for environmental surveillance and groundwater monitoring. Some routine analyses of hazardous and non-hazardous chemicals for the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) groundwater program also were performed under contract by Lionville Laboratory, Lionville, Pennsylvania. Each laboratory participated in the EPA Water Pollution and Water Supply Performance Evaluation Studies. Each laboratory maintained an internal quality control program that met the requirements in *Test Methods for Evaluating*

Solid Waste: Physical/Chemical Methods, SW-846, Third Edition (EPA 1986); each program was audited and reviewed internally and by Pacific Northwest National Laboratory. Pacific Northwest National Laboratory submitted additional quality control double-blind spiked samples for analysis.

Routine radiochemical analyses of samples for the Surface Environmental Surveillance and Hanford Groundwater Monitoring Projects were performed primarily by Severn Trent Laboratories, Incorporated, Richland, Washington. Severn Trent Laboratory, Richland, participated in DOE's Quality Assessment Program at the Environmental Measurements Laboratory in New York, and the Proficiency Testing Program at Environmental Resource Associates in Arvada, Colorado. The Environmental Resource Associates program replaced the EPA's Laboratory Intercomparison Studies Program, which was discontinued in December 1998. Environmental Resource Associates prepared and distributed proficiency standard samples according to EPA requirements. A quality control blind spiked sample program also was conducted for each project by Pacific Northwest National Laboratory. Each laboratory maintains an internal quality control program, which was audited and reviewed internally and by Pacific Northwest National Laboratory. Additional information on these quality control efforts is provided in the following sections.

9.0.1.4 DOE and EPA Comparison Studies

Standard water samples were distributed blind to participating laboratories as part of the EPA performance evaluation program. These blind samples contained specific organic and inorganic analytes that had concentrations unknown to the analyzing laboratories. After analysis, the results were submitted to Environmental Resource Associates, the EPA performance evaluation program sponsor, for comparison with known values and results from other participating laboratories. Summaries of the results for 2001 are provided in PNNL-13788, Appendix B, for the primary laboratory, Severn Trent Laboratories, Incorporated, St. Louis.

The DOE Quality Assessment Program and Environmental Resource Associates' Proficiency Testing Program provided standard samples of environmental media (e.g., water, air filters, soil, vegetation) that contained specific amounts of one or more radionuclides that were unknown by the participating laboratory. After analysis, the results were forwarded to DOE or Environmental Resource Associates for comparison with known values and results from other laboratories. Both

DOE and Environmental Resource Associates had established criteria for evaluating the accuracy of results (NERL-Ci-0045; EML-611; EML-613). Summaries of the 2001 results are provided in Tables 9.0.2 and 9.0.3. Ninety-five percent of the DOE quality assessment sample results fell within the acceptable control limits. Ninety-three percent of the Environmental Resource Associates samples fell within the acceptable control limit range.

9.0.1.5 Pacific Northwest National Laboratory Evaluations

In addition to DOE and EPA interlaboratory quality control programs, Pacific Northwest National Laboratory maintained a quality control program to evaluate analytical contractor precision and accuracy and to conduct special intercomparisons. This program included the use of blind spiked samples. Blind spiked quality control samples and blanks were prepared and submitted to check the accuracy and precision of analyses at Severn Trent Laboratories, Incorporated, Richland. In 2001, 325 blind spiked samples were submitted for groundwater (PNNL-13788, Appendix B) and for air filters, vegetation, soil, and surface water (Table 9.0.4). For results of all water sample non-radiochemistry blind spiked determinations, the results are discussed in Appendix B of PNNL-13788, and did indicate an acceptable performance by the laboratory.

For all media, 98% of Severn Trent Laboratories, Incorporated, Richland, radiochemistry blind spiked determinations were within the control limits (>30% of the known value), which indicated acceptable results. The only determination that failed was for cobalt-60 in soil.

9.0.1.6 Quality Assurance Task Force Results

Pacific Northwest National Laboratory also participated in a Quality Assurance Task Force, a program coordinated by the Washington State Department of Health. Public and private organizations from Idaho, Oregon, Washington, and Georgia participated in analyzing the intercomparison samples in 1999 and 2000. For the 2001 intercomparison sample exchange, samples from a Hanford Site well were collected. Results for uranium-234, -235, and -238 were determined. Pacific Northwest National Laboratory values for uranium-234 and uranium-238 agreed well with the respective grand means. However, the reported values for uranium-235 were 30% below the grand mean (Table 9.0.5).



Table 9.0.2. Summary of Laboratory Performance on DOE Quality Assessment Program Samples, 2001

<u>Medium</u>	<u>Radionuclides</u>	<u>Number of Results Reported for Each Analyte</u>	<u>Number Within Acceptable Control Limits^(a)</u>
Severn Trent Laboratories, Richland, Washington			
Air filter particulate	Gross alpha, gross beta, ⁵⁴ Mn, ⁶⁰ Co, ⁹⁰ Sr, ¹²⁵ Sb, ¹³⁴ Cs, ¹³⁷ Cs, ²³⁸ Pu, ²³⁹ Pu, ²⁴¹ Am, total uranium	2	2
	²³⁴ U, ²³⁸ U	1	1
Soil	⁴⁰ K, ¹³⁷ Cs, ²¹² Pb, ²¹⁴ Bi, ²¹⁴ Pb, ²²⁸ Ac, ²³⁹ Pu, ²⁴¹ Am, total uranium	2	2
	²¹² Bi, ²³⁴ Th	2	1
	⁹⁰ Sr, ²³⁴ U, ²³⁸ U	1	1
Vegetation	⁴⁰ K, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁹ Pu, ²⁴¹ Am, ²⁴⁴ Cm	2	2
Water	Gross alpha, gross beta, ³ H, ⁹⁰ Sr, ²³⁸ Pu, ²³⁹ Pu, ²⁴¹ Am, total uranium	2	2
	⁶⁰ Co, ¹³⁷ Cs	2	1
	²³⁴ U, ²³⁸ U	1	1

(a) Control limits are from EML-613 and EML-615.

Table 9.0.3. Summary of Laboratory Performance on Environmental Resource Associates Proficiency Testing Program, 2001

<u>Medium</u>	<u>Radionuclides</u>	<u>Number of Results Reported for Each Analyte</u>	<u>Number Within Control Limits for Each Analyte^(a)</u>
Severn Trent Laboratories, Richland, Washington			
Water	Gross alpha	4	4
	Gross beta	4	3
	⁶⁰ Co, ⁹⁰ Sr, ¹³⁴ Cs, ¹³⁷ Cs, ²²⁶ Ra, ²²⁸ Ra	4	4
	⁸⁹ Sr, total uranium	4	3
	⁶⁵ Zn, ¹³³ Ba	2	2
	³ H, ¹³¹ I	1	1

(a) Control limits are from NERL-Ci-0045.

Table 9.0.4. Summary of Surface Environmental Surveillance Project Blind Spiked Determinations, 2001

Medium	Radionuclides	Number of Results Reported	Number Within Control Limits^(a)
Severn Trent Laboratories, Richland, Washington			
Air Filters	⁶⁰ Co, ⁹⁰ Sr, ¹²⁵ Sb, ¹³⁴ Cs, ¹³⁷ Cs, ²³⁸ Pu	2	2
	^{239/240} Pu	1	1
Soil	⁴⁰ K, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁸ Pu, ^{239/240} Pu	2	2
	⁶⁰ Co	2	1
Surface Water	³ H, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁸ Pu, ^{239/240} Pu	2	2
Vegetation	⁴⁰ K, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ^{239/240} Pu	2	2
	²³⁸ Pu	1	1

(a) Control limit of $\pm 30\%$.

9.0.17 Laboratory Internal Quality Assurance Programs

The analytical laboratories were required to maintain an internal quality assurance and control program. Periodically, the laboratories were audited internally for compliance to the quality assurance and control programs. At Severn Trent Laboratories, Incorporated, St. Louis, the quality control programs met the quality assurance and control criteria in *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods, SW-846, Third Edition* (EPA 1986). The laboratories also were required to maintain a system to review and analyze the results of the quality control samples to detect problems that may have arisen from contamination, inadequate calibrations, calculation errors, or improper procedure performance. Method detection levels were determined at least annually for each analytical method.

The internal quality control program at Severn Trent Laboratories, Incorporated, Richland, involved routine calibrations of counting instruments, yield determinations of radiochemical procedures, frequent radiation check sources and background counts, replicate and spiked sample analyses, matrix and reagent blanks, and

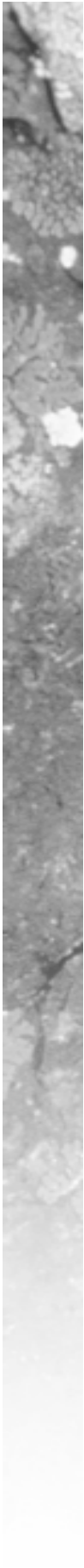
Table 9.0.5. Comparison^(a) of the Quality Assurance Task Force Intercomparison Well Water Results, 2001

Radionuclide	Number of Results	Intercomparison Sample Concentrations, pCi/L	Ratio PNNL/Mean
Uranium-234			
Grand Mean	16	35.8 ± 1.7	1.0
PNNL	2	36.5 ± 1.3	
Uranium-235			
Grand Mean	16	2.41 ± 0.43	0.7
PNNL	2	1.74 ± 0.13	
Uranium-238			
Grand Mean	16	33.9 ± 1.1	1.0
PNNL	2	35.6 ± 1.3	

(a) Pacific Northwest National Laboratory (PNNL) analyses by Severn Trent Laboratories, Incorporated, Richland, Washington, are compared against grand mean (± 2 standard deviations) of participating laboratories.

maintenance of control charts to indicate analytical deficiencies. Available calibration standards traceable to the National Institute of Standards and Technology were used for radiochemical calibrations. Calculation of minimum detectable concentrations involved the use of factors such as the average counting efficiencies and background for detection instruments, length of time for background and sample counts, sample volumes, radiochemical yields, and a pre-designated uncertainty multiplier (EPA 520/1-80-012).

Periodically, inspections of services were performed that documented conformance with contractual requirements of the analytical facility and provided the



framework to identify and resolve potential performance problems. Responses to assessment and inspection findings were documented by written communication, and corrective actions were verified by follow-up audits and inspections. In 2001, assessments of Severn Trent Laboratories, Incorporated, Richland, and Severn Trent Laboratories, Incorporated, St. Louis, were conducted February 25 to March 1, 2001 and April 24 to 26, 2001, respectively. Representatives from Bechtel Hanford, Inc. performed the Richland audit, and Hanford Site's Integrated Contractor Assessment Team, consisting of representatives from Bechtel Hanford, Inc. and Pacific Northwest National Laboratory conducted the St. Louis audit. The purpose of the assessments was to evaluate the continued support of analytical services to Hanford Site contractors as specified in the statement of work between Fluor Hanford, Inc. and Severn Trent Laboratories. Additional information may be found in PNNL-13788, Appendix B.

Internal laboratory quality control program data were reported with the analytical results. Scientists at Pacific Northwest National Laboratory summarized the results quarterly. The Surface Environmental Surveillance Project and the Groundwater Monitoring Project indicated an acceptable performance for the internal quality control program at Severn Trent Laboratories, Richland and St. Louis.

9.0.1.8 Media Audits and Comparisons

Additional audits and comparisons were conducted on several specific types of samples. The Washington

State Department of Health routinely co-sampled various environmental media and measured external radiation levels at multiple locations during 2001. Media that were co-sampled and analyzed for radionuclides included groundwater, water from 20 locations along and across the Columbia River, water from 5 riverbank springs, water from 1 onsite drinking water location, sediment from 14 Columbia River sites, and soil from 11 locations throughout the Hanford Site. Also co-sampled and analyzed for radionuclides were upwind and downwind samples of leafy vegetables, alfalfa, fruit, tomatoes, concord grapes, whitefish, geese, rabbits, and wine. The Washington State Department of Health and Pacific Northwest National Laboratory co-sampled data may be found in PNNL-13910, APP. 1.

The U.S. Food and Drug Administration also received co-samples from upwind and downwind sampling locations and analyzed grapes, leafy vegetables (cabbage), potatoes, and alfalfa for radionuclides (Table 9.0.6). There is good agreement between the U.S. Food and Drug Administration and Pacific Northwest National Laboratory data.

Quality control for environmental thermoluminescent dosimeters included the audit exposure of three environmental thermoluminescent dosimeters per quarter to known values of radiation (between 17 and 30 mR). On average, the thermoluminescent dosimeter measurements were unbiased. For 12 measurements, the lowest ratio of determined/known was 0.94; the highest determined/known ratio was 1.05, with an average of 1.01 ± 0.03 (Table 9.0.7).

9.0.2 Effluent Monitoring and Near-Facility Environmental Monitoring

The Effluent Monitoring and Near-Facility Environmental Monitoring Programs were subject to the quality assurance requirements specified in the *Hanford Analytical Services Quality Assurance Requirements Document* (DOE/RL-96-68). These quality assurance programs complied with DOE Order 414.1A, using standards from the American Society of Mechanical Engineers (ASME NQA-1-1997) as their basis. The program also adhered to the guidelines and objectives in EPA/005/80 and EPA QA/R-5.

The monitoring programs each have a quality assurance plan describing applicable quality assurance elements. These plans were approved by contractor quality assurance groups, who conducted surveillances and

audits to verify compliance with the plans. Work such as sample analysis performed through contracts had to meet the requirements of these plans. Suppliers are audited before the contract selection was made for equipment and services that may have significantly affected the quality of a project.

9.0.2.1 Sample Collection Quality Assurance

Samples for the Effluent Monitoring and Near-Facility Environmental Monitoring Programs were collected by staff trained in accordance with approved procedures. Established sampling locations were

Table 9.0.6. Comparison of U.S. Food and Drug Administration Co-Sampling, 2001^(a)

Medium	Sampling Area	Organization	Strontium-90, pCi/g^(b,c)	Cesium-137, pCi/g^(b,c)	Ruthenium-106, pCi/g^(b,c)	Iodine-131 pCi/g^(b,c)	Tritium pCi/g^(b,c)
Alfalfa (stem-leaf)	Sunnyside	FDA ^(d)	0.0085 ± 0.0019	<0.045	<0.10	<0.045	<0.0020
		FDA	0.0079 ± 0.0021	<0.045	<0.10	<0.045	<0.0020
		PNNL ^(e)	0.0656 ± 0.042	0.0030 ± 0.042	-0.08 ± 0.39	NA ^(f)	NA
	Riverview	FDA	0.0103 ± 0.0021	<0.045	<0.10	<0.045	<0.0020
		FDA	0.0097 ± 0.0021	<0.045	<0.10	<0.045	<0.0020
		PNNL	0.047 ± 0.038	0.0038 ± 0.049	-0.080 ± 0.45	NA	NA
Leafy vegetables (stem-leaf)	Sunnyside	FDA	0.0038 ± 0.0018	<0.045	<0.10	<0.045	<0.0020
		FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		PNNL	0.00042 ± 0.0021	-0.00056 ± 0.013	0.021 ± 0.11	NA	NA
	Riverview	FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		PNNL	0.0094 ± 0.0043	-0.0034 ± 0.011	0.0041 ± 0.1	NA	NA
Potato tuber	Sunnyside	FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		PNNL	0.0022 ± 0.0042	0.0018 ± 0.0059	-0.045 ± 0.051	NA	NA
Grapes, Concord	Riverview	FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		FDA	<0.002	<0.045	<0.10	<0.045	<0.0020
		PNNL	0.0072 ± 0.0037	-0.0043 ± 0.0051	0.0076 ± 0.045	NA	NA

(a) Sample results are wet weight.

(b) To convert pCi/g to Bq/g, multiply by 0.037.

(c) Errors reported are 2 sigma. Less than (<) values are minimum detectable activities at 3 sigma.

(d) FDA = U.S. Food and Drug Administration.

(e) PNNL = Pacific Northwest National Laboratory.

(f) NA = Not analyzed; not specifically requested by contract unless present.

Table 9.0.7. Comparison of Thermoluminescent Dosimeter Results with Known Exposure, 2001

Quarter	Exposure Date	Known Exposure, mR	Determined Exposure, mR	Ratio of Determined/ Known Exposure
1st	February 23, 2001	24.0 ± 0.4	24.9 ± 0.2	1.04
		28.0 ± 0.5	27.6 ± 0.8	0.98
		19.0 ± 0.3	19.2 ± 0.7	1.01
2nd	May 15, 2001	29.0 ± 0.5	30.0 ± 0.3	1.03
		18.0 ± 0.3	18.4 ± 0.1	1.02
		23.0 ± 0.4	23.7 ± 0.6	1.03
3rd	August 20, 2001	25.0 ± 0.4	25.3 ± 0.4	1.01
		17.0 ± 0.3	16.1 ± 0.5	0.95
		28.0 ± 0.5	26.3 ± 1.4	0.94
4th	November 16, 2001	30.0 ± 0.5	31.5 ± 0.4	1.05
		21.0 ± 0.4	21.5 ± 0.5	1.02
		27.0 ± 0.5	27.0 ± 0.4	1.00

identified and documented to assure continuity of data for those sites and are described in DOE/RL-91-50.

9.0.2.2 Analytical Results Quality Assurance

Samples for the Effluent Monitoring and Near-Facility Environmental Monitoring Programs were analyzed by up to three different analytical laboratories. The use of these laboratories is dependent on the Hanford contractor collecting the samples and contract(s) established between the contractor and the analytical laboratory(ies). Table 9.0.8 provides a summary of the Hanford Site's analytical laboratories used for effluent monitoring and near-facility monitoring samples.

The quality of the analytical data was assured by several means. Counting room instruments, for instance, were kept within calibration limits through daily checks, the results of which were stored in computer databases. Radiochemical standards used in analyses were regularly measured and the results were reported and tracked. Formal, written laboratory procedures were used to analyze samples. Analytical procedural control was assured through administrative procedures. Chemical technologists at the laboratory(ies) were qualified to perform analyses by attending formal classroom and on-the-job training.

The participation of the Hanford Site analytical laboratories in EPA and DOE laboratory performance

programs also served to assure the quality of the data produced. The Waste Sampling and Characterization Facility performance was evaluated in four different laboratory performance studies for calendar year 2001. In the EPA Water Pollution Studies #73 and #78 for inorganic and organic analyses, 311 different analytes and compounds were submitted to the Waste Sampling and Characterization Facility for analysis. Of the 311 analyses performed, 292 results were acceptable while 19 were unacceptable for a total acceptable rate of 95%. In the DOE Mixed Analyte Performance Evaluation Program studies (MAPEP-00-W8 and MAPEP-01-S8), 68 different radionuclides and analytes were submitted to the Waste Sampling and Characterization Facility for analysis. Of the 68 different analyses performed, 66 results were acceptable while 2 were unacceptable for a total acceptable rate of 97%. In the National Institute of Standards and Technology Radiochemistry Program study, eight different radionuclides were submitted to the Waste Sampling Characterization Facility for 40 different analyses. All radionuclide results were acceptable for a total of 100% acceptable rate. In the DOE Quality Assessment Program, 74 different radionuclides were submitted to the Waste Sampling Characterization Facility for analysis. Of the 74 analyses performed, 70 results were acceptable while 4 were unacceptable for a total acceptable rate of 95%. Performance results for DOE Quality Assessment Program and others are presented in Tables 9.0.9 through 9.0.11.

Table 9.0.8. Hanford Site Laboratories used by Contractor and Sample Type, 2001

Analytical Laboratory	Effluent Monitoring Samples						Near-Facility Environmental Monitoring Samples		
	Fluor Hanford, Inc.		Pacific Northwest National Laboratory	Bechtel Hanford, Inc.		Fluor Hanford, Inc.			
	Air	Water	Air	Air	Water	Air	Water	Other	
Waste Sampling and Characterization Facility ^(a)	X	X		X	X	X	X	X	
222-S Analytical Laboratory ^(a)								X	
Severn Trent Laboratories, Inc., Richland	X	X	X	X	X				
Analytical Chemistry Laboratory ^(b)	X	X	X						

(a) Operated by Fluor Hanford, Inc.

(b) Operated by Pacific Northwest National Laboratory.

Table 9.0.9. Waste Sampling and Characterization Facility^(a) Performance on DOE Quality Assessment Program Samples, 2001

Medium	Radionuclide	Number of Results Reported	Number Within Control Limits
Air filters	⁵⁴ Mn, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁴ Cs, ¹³⁷ Cs, ²³⁴ U, ²³⁸ Pu, ²³⁸ U, ²³⁹ Pu, ²⁴¹ Am, gross alpha, gross beta	24	22 (¹³⁴ Cs and ⁵⁴ Mn failed once)
Soil	⁴⁰ K, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁴ U, ²³⁸ U, ²³⁹ Pu, ²⁴¹ Am	14	12 (²³⁴ U and ²³⁸ U failed once)
Vegetation	⁴⁰ K, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁹ Pu, ²⁴¹ Am, ²⁴⁴ Cm	14	14
Water	³ H, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁴ U, ²³⁸ Pu, ²³⁸ U, ²³⁹ Pu, ²⁴¹ Am, gross alpha, gross beta	22	22

(a) Onsite laboratory operated by Fluor Hanford, Inc.

Table 9.0.10. 222-S Analytical Laboratory^(a) Performance on DOE Quality Assessment Program Samples, 2001

Medium	Radionuclide	Number of Results Reported	Number Number Within Acceptable Limits
Air filters	⁵⁴ Mn, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁴ Cs, ¹³⁷ Cs, ²³⁸ Pu, ²³⁹ Pu, ²⁴¹ Am, gross alpha, gross beta	18	14
Soil	⁹⁰ Sr, ¹³⁷ Cs, ²¹² Pb, ²¹⁴ Bi, ²¹⁴ Pb, ²²⁸ Ac, ²³⁹ Pu, total uranium	12	12
Vegetation	⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁹ Pu, ²⁴¹ Am, ²⁴⁴ Cm	11	11
Water	³ H, ⁶⁰ Co, ⁹⁰ Sr, ¹³⁷ Cs, ²³⁸ Pu, ²³⁹ Pu, ²⁴¹ Am, gross alpha, gross beta, total uranium	20	18

(a) Onsite "high-level" radiological laboratory operated by Fluor Hanford, Inc. (Note: These samples are "low-level" environmental activity samples.)

Table 9.0.11. 222-S Analytical Laboratory^(a) Performance on EPA Laboratory Water Pollution Inorganic and Organic Studies, 2001

Laboratory	Water Pollution Study (WP-74) April 2001 % Acceptable	Water Pollution Study (WP-80) October 2001 % Acceptable
222-S Analytical Laboratory	88 ^(b)	92 ^(c)

(a) Onsite "high-level" radiological laboratory operated by Fluor Hanford, Inc.

(b) Thirty-seven of 42 analytes scored as acceptable.

(c) Eighty-seven of 95 analytes scored as acceptable.

9.0.3 References

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