

7.0 QUALITY ASSURANCE PROGRAMS FOR ENVIRONMENTAL DATA

MEMP participates in quality assurance (QA) exercises sponsored and/or recognized by the DOE. Such exercises provide objective evaluations of the validity of the environmental data generated by MEMP. In this Chapter, QA programs involving radiological and nonradiological analyses of a variety of environmental media are described. In addition to these external QA programs, MEMP performs internal QA studies that make use of reagent blanks, internal standards, and replicate samples. The environmental manager and staff have developed performance monitoring tools (“metrics”). The metrics are prepared and reviewed by the Environmental Data Administrator on a monthly or as-generated basis. The metrics are also reviewed by the Environmental Manager. Trends of concern are identified and brought to the attention of Senior Management.

Internal QA Program

MEMP employs a quality-based approach to environmental data. Such an approach is imperative because many sample results are at or below the lower detection limit. QA samples, including blanks, standards, and replicates, are routinely analyzed to evaluate analytical bias and precision. Blank samples are analyzed to verify the absence of excessive instrument contamination or background levels. The standard deviation of the blanks is used to calculate the lower limit of detection. Standards and replicates are used to evaluate analytical bias and precision, respectively. QA parameters are closely monitored and tracked. Deviations from expected values result in a review of analytical protocol.

External QA Activities

DOE EML Quality Assessment Program. Twice each year MEMP participates in DOE’s Office of Environmental Management, Quality Assessment Program conducted by Environmental Measurements Laboratory (EML). EML supplies samples containing specific quantities of radionuclides to each participating lab for radiological analysis. The radionuclides are present as contaminants on air filters, soil, vegetation, or water. The radionuclide activity present in the sample is not disclosed to the participating laboratory. A laboratory’s performance is evaluated by comparing their results with the EML reference values.

In the 2000 EML Performance Evaluation, four environmental media were analyzed. The results reported by MEMP are shown in Table 7-1. EML reference values are also shown. A useful method of evaluating MEMP’s performance is to examine the ratio of MEMP’s result to the EML reference concentration for each environmental medium. This is shown graphically in Figure 7-1. MEMP’s results compared favorably with DOE (EML) reference values with an overall average ratio of 1.00.

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DOE MAPEP Quality Assessment Program. In 2000, MEMP also participated in the DOE Radiological and Environmental Sciences Laboratory Mixed Analyte Performance Evaluation Program (MAPEP). The primary objective of the MAPEP is to foster reliability and credibility for the analytical results used in the decision making process, particularly as it relates to the environment and public health and safety. Participation in MAPEP requires analysis of samples (one water and one soil sample each year) that contain known concentrations of plutonium and uranium isotopes. The results reported by MEMP in 2000 and the corresponding MAPEP reference values are shown in Table 7-2. The figure-of-merit used to evaluate a laboratory is the bias, or the difference between the MAPEP reference value and MEMP result for each analysis, expressed as a percent. MAPEP has established “acceptable,” “warning,” and “not acceptable” limits of acceptability for these studies. These limits have been set at 20 percent and 30 percent bias, respectively. In 2000, MEMP results in all categories were within acceptability limits. The results for each environmental medium are shown graphically in Figure 7-2.

NPDES QA Program

National Pollutant Discharge Elimination System (NPDES) permits are used by the EPA to regulate discharges of water effluents. The permits limit the concentrations of certain wastewater constituents to protect the receiving body of water. To ensure that effluent limits are not exceeded, NPDES permits impose strict requirements for effluent characterization. EPA has required that laboratories performing analyses for NPDES parameters participate in QA exercises. These exercises ensure EPA that the laboratories are producing reliable and accurate data.

Discharge Monitoring Report (DMR) Quality Assessment Program. In 2000, the USEPA did not conduct the NPDES DMR QA exercise.

Table 7-1. DOE EML Quality Assessment Program Results for 2000: Radionuclides in Environmental Samples

Sample Type ^a	Date	Radionuclide	MEMP Result	EML ^b Reference	Ratio ^c MEMP/EML
Air filters, Bq/filter	March	Pu-238	0.08	0.08	1.00
		Pu-239	0.09	0.09	1.01
		U-234	0.06	0.06	0.97
		U-238	0.06	0.06	0.97
	September	Pu-238	0.04	0.04	0.89
		Pu-239	0.07	0.07	0.95
		U-234	0.04	0.04	0.98
		U-238	0.04	0.04	0.98
Vegetation, Bq/kg	March	Pu-239	14.63	15.50	0.94
Soil, Bq/kg	March	Pu-239	7.40	7.00	1.06
		U-234	127.09	111.00	1.15
		U-238	127.02	114.00	1.11
	September	Pu-239	17.80	16.80	1.06
		U-234	138.63	157.00	0.88
		U-238	145.00	163.00	0.89
Water, Bq/L	March	Tritium	73.26	79.40	0.92
		Pu-238	1.10	0.94	1.17
		Pu-239	1.07	0.92	1.17
		U-234	0.51	0.48	1.06
		U-238	0.50	0.49	1.02
	September	Tritium	90.40	91.30	0.99
		Pu-238	0.79	0.79	1.01
		Pu-239	0.59	0.59	1.00
		U-234	0.46	0.48	0.96
		U-238	0.35	0.37	0.95

^a 1 Bq = 2.7 x 10⁻¹¹ Ci

^b DOE Environmental Measurements Laboratory (EML)

^c Data have been rounded.

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Figure 7-1. MEMP Performance in the DOE EML Quality Assessment Program in 2000

Ratio: MEMP Concentration to EML Reference Concentration

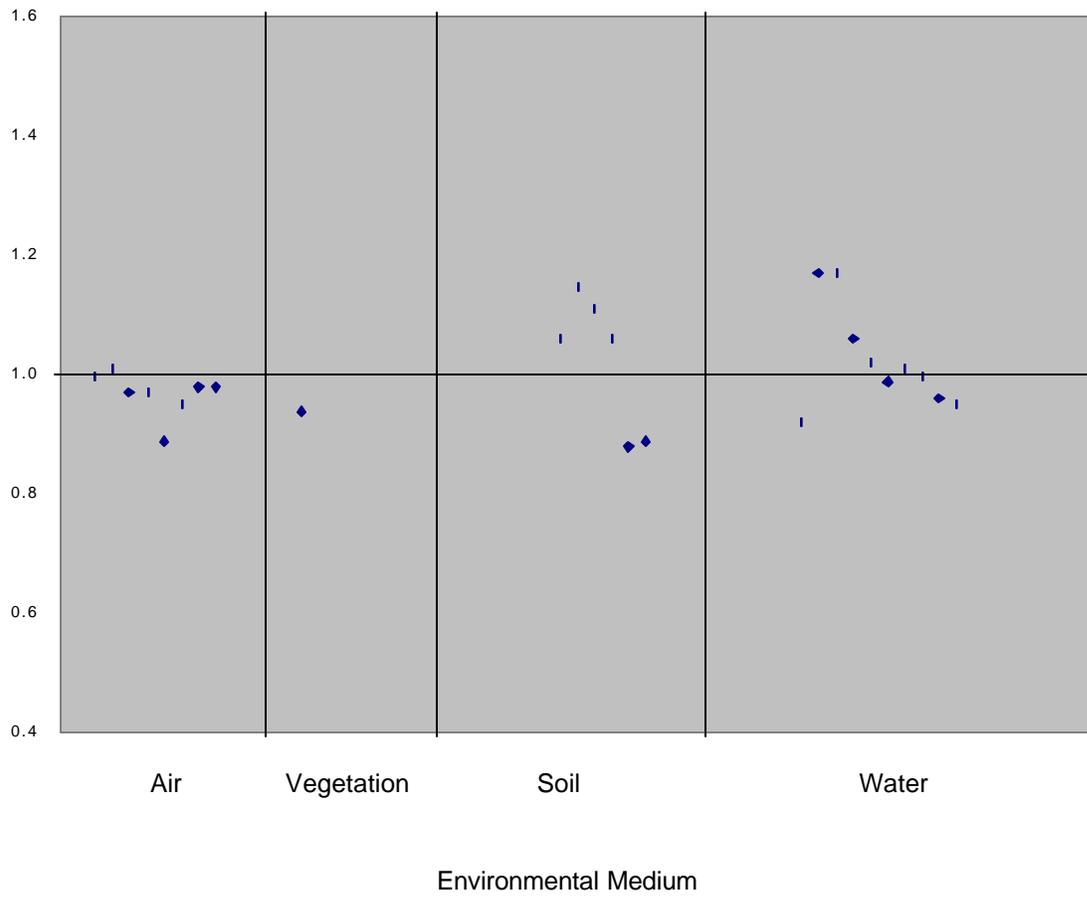


Table 7-2. DOE MAPEP Quality Assessment Results for 2000: Radionuclides in Environmental Samples

Sample Type ^a	Radionuclide	MEMP Result	MAPEP ^{b, c} Reference Concentration	Bias (percent)
Soil (Bq/kg)	Pu-238	0	0	N/A
	Pu-239/240	70.61	74.4	-5.1
	U-233,234	85.73	90.00	-4.7
	U-238	87.02	93.00	-6.4
Water (Bq/L)	Pu-238	2.28	2.12	7.3
	Pu-239,240	2.00	1.86	7.6
	U-233,234	1.02	0.99	3.3
	U-238	1.00	1.02	-2.1

^a 1 Bq = 2.7 x 10⁻¹¹ Ci

^b DOE Mixed Analyte Performance Evaluation Program.

^c The bias for the Pu-238 result is not included due to a zero reference concentration.

Figure 7-2. MEMP Performance in the MAPEP Quality Assessment Program in 2000

MEMP Percent Bias Relative to MAPEP Reference Value

