

ABSTRACT

Radioanalytical Laboratory Performance Assessment Using Performance Evaluation Samples

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Industrial, utility, and government facilities that work with unsealed sources of radioactive material are required by federal, state, and local regulations to ascertain the impact of their operations on the local environment. Consequently, these facilities need to assess the performance of their radioanalytical laboratories that provide analyses to ascertain contractual and regulatory compliance. One method that may be used to assess performance is laboratory intercomparison programs as an independent source of blind performance evaluation samples. Recognizing this fact, the Department of Energy (DOE) and the Nuclear Regulatory Commission (NRC) have mandated that major facilities under their jurisdiction participate in such intercomparison programs. DOE Order 5400.1 requires that laboratories providing radioanalytical data for DOE sites participate in the Environmental Measurements Laboratory Quality Assessment Program (QAP). All laboratories that provide environmental analytical measurements for DOE's Office of Environmental ⁴Management are likewise required by Memorandum from the Assistant Secretary for Environmental Management, May 31, 1994, Newberry: 3-7615, to participate in the Mixed Analyte Performance Evaluation Program (MAPEP). In addition, the U.S NRC has issued Regulatory Guides 4.14 and 4.15, which recommends participation in performance evaluation programs as a condition of facility operation.

Both the QAP and MAPEP assess a laboratory's analytical performance for each individual analyte of concern; however, these programs have deferred to the individual facilities the definition of acceptable analytical performance. Fernald has chosen to use these programs to define site-specific acceptable performance criteria. Fernald's approach has been to use a multi-tiered system that permits emphasis to be placed on the most important analytes at a site based upon its operational history. This approach could be applied to other facilities and is summarized below:

1. Determine the significant matrices and analytes of concern to the facility
2. Determine other less significant matrices and analytes of concern which are important to the facility
3. Assign a point value to each of the possible data evaluations (i.e., acceptable, acceptable with warning, or unacceptable). Different point values may be assigned based on the significance of each matrix and analyte.
4. Establish the minimum percentage or total points that must be scored for acceptable performance. Different minimum requirements may be specified based on the significance of each matrix and analyte.

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5. Determine the minimum time frame that a laboratory has to perform acceptably in both the QAP and MAPEP before it is deemed approved for use.
6. Establish criteria for suspending a laboratory from further sample analyses based on unacceptable performance.
7. Establish criteria for reinstating a laboratory suspended for unacceptable performance.

The methodology specified above is applied to all full service radioanalytical laboratories serving the Fernald site. Each laboratory is required to successfully participate in two consecutive rounds of both the QAP and MAPEP before it can be approved for use. To maintain its approval, a laboratory must continue to perform successfully in the QAP and MAPEP. A laboratory failing two consecutive rounds of either the QAP or MAPEP may be suspended from further radioanalytical work until they demonstrate successful performance in two consecutive rounds of both the QAP and MAPEP. In lieu of suspending a laboratory after two consecutive failures of either the QAP or MAPEP, a laboratory may be permitted to analyze blind "standard" samples provided by Fernald or purchased from an approved source. The evaluation of these blind sample analyses may replace the most recent failed intercomparison round.

Fernald has used this methodology for assessing laboratory performance for over eight years. The original performance requirements were somewhat unrealistic for many of the laboratories to meet. However, during the time frame that this methodology has been in use, only two modifications to the performance requirements have been necessary.

The authors believe that laboratories providing analytical services need to be critically evaluated for their analytical performance using evaluation criteria that are stringent, straight forward, and appropriate to each facility's operational history to ensure that decisions based on the data are reliable and defensible. The QAP and MAPEP laboratory intercomparison programs provide a cost-effective means of evaluating the capability of laboratories throughout the country to meet the analytical requirements at individual radioactive material facilities.

ATTACHMENT 1

WORKSHEET QAP-1

Seller Laboratory Name: _____ Date: _____
 Task Order Identification: _____ DOE QAP ID: _____

[Acceptable Performance*, "A" = 3 points ----- Acceptable with Warning*, "W" = 1 point]

<u>Analyte</u> _____	<u>WATER</u>	<u>SOIL</u>	<u>AIR</u>
U-234	_____	_____	_____
U-238	_____	_____	_____

U-μg	_____	_____	_____	
Total Uranium Points	_____	+	_____	+
	_____		_____	= _____ (Total)
Sr-90	_____		_____	
Cs-137	_____		_____	
Th-234	<u>N/A</u>		<u>N/A</u>	
Pu-238	_____		_____	
Pu-239	_____		_____	
Total non-Uranium Points	_____	+	_____	+
	_____		_____	= _____ (Total)

[If a majority of the results reported by the laboratories participating in the DOE/EML-QAP indicate that the EML assigned value for a particular analyte/matrix combination may be in error, then a consensus value would be calculated from the reported results and used in place of the EML value for determining acceptable performance.]

FERMCO reserves the right to redefine the requirements for acceptable performance based on the DOE/QAP results for 1998 and subsequent years.

* The Acceptable Performance, "A," and Acceptable with Warning, "W," are defined in the DOE/EML-QAP Publication EML-564, January 3, 1995.

Evaluation (Both Criteria must be acceptable):

Criteria 1. (Achieved > 50% of the maximum possible points):Acceptable Yes ☐ No ☐

[If all uranium analytes listed above were included in the DOE/EML QAP samples, 27 points are the maximum possible.]

Criteria 2. (Achieved > 50% of the maximum possible points):Acceptable Yes ☐ No ☐

[If all non-uranium analytes listed above were included in the DOE/EML QAP samples, 39 points are the maximum possible.]

ATTACHMENT 2

WORKSHEET MAPEP-1

Seller _____ Laboratory _____ Name: _____
Date: _____

Matrix (Circle the correct one.): Soil Water MAPEP
ID: _____

Uranium Points Possible

[Acceptable Performance*, "A" = 3 points --- Acceptable with Warning*, "W" = 1 point]

<u>Analyte</u>	<u>Points</u>
U-234 -----	_____
U-238 -----	_____

Non-Uranium Points Possible

[Acceptable Performance*, "A" = 2 points ----- Acceptable with Warning*, "W" = 1 point]

Sr-90 -----	_____
Cs-137 -----	_____
Pu-238 -----	_____
Pu-239/240 -----	_____

Total Number of Points ----- _____

[If a majority of the results reported by the laboratories participating in the MAPEP indicate that the MAPEP assigned value for a particular sample may be in error, then a consensus value may be calculated from the reported results and used in place of the MAPEP value for determining acceptable performance.]

Fluor Daniel Fernald reserves the right to redefine the requirements for acceptable performance based on the MAPEP results for 1999 and subsequent years.

* The Acceptable Performance, "A," and Acceptable with Warning, "W," are defined in the MAPEP publication "Handbook for the Department of Energy Mixed Analyte Performance Evaluation Program (MAPEP)," dated July 25, 1996. This publication may be acquired from the U.S. Department of Energy, Radiological and Environmental Sciences Laboratory, 850 Energy Drive, MS-4149, Idaho Falls, ID 83401.

Evaluation (Achieved > 75% of the maximum possible points): Acceptable Yes ☐ No ☐
[Fourteen (14) points are the maximum possible.]