UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

1305

L-0911

6446.6

REPLY TO THE ATTENTION OF: SRF-5J

Mr. Johnny W. Reising
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

Subject: Technical Review Comments on "In-Situ Gamma Spectrometry Quality Control Measurements"

Dear Mr. Reising:

The United States Environmental Protection Agency (U.S. EPA) has reviewed the above-referenced document as part of its oversight activities for the Fernald Environmental Management Project (FEMP). The preliminary draft document, which is dated January 21, 1998, was prepared by Fluor Daniel Fernald for the U.S. Department of Energy. The document provides a procedure for performing the quality control measurements required when using in situ gamma spectrometry in support of FEMP remediation projects.

U.S. EPA's review of the document focused on assessing its level of completeness and technical adequacy. Because the document is incomplete, U.S. EPA's review was limited in nature. U.S. EPA's general and specific review comments are enclosed.

Please contact me at (312) 886-4591 if you have any questions.

Sincerely,

Gene Jablonowski
Remedial Project Manager
Federal Facilities Section
SFD Remedial Response Branch #2

Enclosure

cc: Tom Schneider, OEPA-SWDO
Bill Murphie, U.S. DOE-HDQ
John Bradburne, FERMCO
Terry Hagen, FERMCO
Tom Walsh, FERMCO

Recycled/Recyclable • Printed with Vegetable Oil Based Inks on 50% Recycled Paper (20% Postconsumer)

ENCLOSURE

TECHNICAL REVIEW COMMENTS ON
"IN-SITU GAMMA SPECTROMETRY QUALITY CONTROL MEASUREMENTS"

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

(Three Pages)

TECHNICAL REVIEW COMMENTS ON "IN-SITU GAMMA SPECTROMETRY QUALITY CONTROL MEASUREMENTS"

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

GENERAL COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not Applicable (NA) Page #: NA Line #: NA
Original General Comment #: 1
Comment: The document is a partial draft only. Therefore, no comments are presented below on the document's unfinished portions, irregular pagination, repeated section numbers, and other editorial inconsistencies. Instead, these comments address the substance of what is presented and relevant subjects that are omitted. It is expected that the next version of the document will address these issues.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 2
Comment #: The document lists preoperational checks for the high-purity germanium detector in Section 6.5 on Page 12 and in Attachment A on Page 30. Sections 6.3.1, 6.3.2, and 6.3.3 on Page 18 also note postoperational checks that duplicate some of the preoperational checks included in Section 6.5 and Attachment A. The document should be revised so that the postoperational checks in Sections 6.3.1, 6.3.2, and 6.3.3 are included in Section 6.5; Attachment A; and the "Real Time Instrumentation Measurement Program Quality Assurance Plan" (QAP), which was reviewed separately.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 3
Comment: The text implies that a background measurement is taken for the purposes of demonstrating quality control (QC) for in situ gamma spectrometry systems. If a relationship between true background level and the background measurement is to be established, this intended use should be clearly stated in the text. However, such a relationship is not a function of QC. If the background measurement is intended to be the functional equivalent of a blank measurement in chemical analysis, this intention should be stated in the text. The text should be revised

3

to provide additional information regarding the purpose of background measurements and their application to QC measurements.

SPECIFIC COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.2 Page #: 7 Line #: NA
Original Specific Comment #: 1
Comment: The text provides procedures for ensuring that the micro-R meter is operating properly. However, Subpart e of this section should be revised to include corrective action to address variations beyond plus or minus (±) 20 percent of the applicable range when using the check source as discussed in Subpart d.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4.2 Page #: 20 and 21 Line #: NA
Original Specific Comment #: 2
Comment: The text in this section discusses field measurements of elevated radon concentrations. However, the text regarding measurement of radium-226 raises an issue. Because a measurement exceeding the +3 sigma acceptance criterion does not necessarily mean that the instrument is faulty, an additional radium-226 measurement is taken to detect any elevated radon concentrations. If this second measurement exceeds the +3 sigma acceptance criterion, a determination may be made that it is a "bad radon" day. However, it is not clear whether a determination would ever be made that the instrument is faulty. The text implies that if radium-226 measurements show levels less than or equal to ±3 sigma, the instrument should be evaluated for noncompliance with acceptance criteria as it would be for measurement of other radionuclides such as uranium, thorium-232, and potassium-40. It is further implied that radium-226 measurements greater than +3 sigma would only indicate malfunction of the instrument if it is known that a "bad radon" day actually exists. However, the text does not discuss differentiating between a "bad radon" day and instrument error with regard to radium-226 measurements. The text should be revised to address this omission.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4.3 through 6.4.5 Page #: 21 to 24 Line #: NA
Original Specific Comment #: 3
Comment: The text in several parts of these sections and in Attachment A states that certain QC checks will be performed annually. As noted in

4

the comments on the QAP, quarterly performance of these checks is preferred. The text and Attachment A should be revised accordingly.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.4.3 Page #: 21 Line #: NA
Original Specific Comment #: 4
Comment: The text states that five measurements will be used to calculate minimal detectable concentrations (MDC). The standard analytical chemistry practice issued in 40 CFR Part 136, Appendix B, requires at least seven measurements. The text should be revised either to increase the minimum number of measurements for MDC calculations to seven or to demonstrate that the use of five measurements would provide similar results.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 6.5 Page #: 24 Line #: NA
Original Specific Comment #: 5
Comment: This section discusses construction and use of control charts. However, the text discusses only two uses of control charts: (1) for determining individual exceedances of the 3 sigma control limits and (2) for initiating corrective action after a failure to meet standards. Experience with use of control charts in industrial situations has resulted in generation of decision rules for detecting patterns that are precursors of serious problems or that reflect subtle problems not readily detected by cruder means. One source (Harrison M. Wadsworth, Jr., Editor, 1990, *Handbook of Statistical Methods for Engineers and Scientists*, McGraw-Hill Publishing Company, New York) presents seven such patterns:

1. 2 of 3 consecutive points on the same side of the center line exceeding the 2 sigma warning limit
2. 4 of 5 consecutive points on the same side of the center line exceeding 1 sigma
3. 8 consecutive points on the same side of the center line.
4. 15 consecutive points on either side of the center line, all less than 1 sigma
5. 8 consecutive points on either side of the center line, all exceeding 1 sigma
6. 14 consecutive points alternately up and down.
7. 6 consecutive points, all either increasing or decreasing.

Observation of any of these patterns should result in a proactive investigation and corrective action before the instrument's control range is exceeded. Some patterns, such as 1, 2, 3, and 7 above, indicate instrument drift that has not yet exceeded the control limit. Other patterns, such as 5 and 6 above, indicate environmental or operator effects, such as overadjustment of the instrument. The text should be revised to incorporate additional control measures such as decision rules in order to minimize the occurrence of serious problems.