

National Aeronautics and  
Space Administration

**John H. Glenn Research Center**  
**Lewis Field**  
Plum Brook Station  
Sandusky, OH 44870



February 2, 2012

QD

Reply to Attn of:

U.S. Nuclear Regulatory Commission  
Attn: Document Control Desk  
Washington, D.C. 20555

Subject: Response to NRC Staff Comments on Final Status Survey Report Attachments 7, 8, 9, 10, 11, and 13, for the Plum Brook Reactor Facility, Licenses Nos. TR-3, Docket No. 50-30 and R-93, Docket No. 50-185

On December 22, 2011, the NRC Staff submitted questions via email related to staff reviews of our submittals of Attachments 7, 8, 9, 10, 11, and 13 of the Final Status Survey Report for the Plum Brook Reactor Facility.

Our responses to the staff's questions are contained in enclosure 1 to this letter.

Our review of your questions resulted in revisions to Attachments 7, 8, 9, and 13. Revision 1 to Attachment 13 was submitted under cover letter dated January 18, 2012. Revisions to Attachments 7, 8, and 9 are being prepared. These revisions are administrative in nature in that they provide additional notes and explanatory comments but do not impact the technical content of the documents. NASA expects to submit these revisions by late March 2012.

Should you have any questions or need additional information, please contact me at NASA Plum Brook Station, 6100 Columbus Avenue, Sandusky, Ohio 44870, or by telephone at (419) 621-3242.

A handwritten signature in black ink, appearing to read "P. Kolb", with a long horizontal line extending to the right.

Peter C. Kolb  
NASA Decommissioning Program Manager

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FSME20  
FSME

Enclosure

1. Response to NRC Staff questions on Attachments 7, 8, 9, 10, 11, and 13, Final Status Survey Report for the Plum Brook Reactor Facility

cc:

USNRC/C. J. Glenn (FSME)

USNRC/J. Webb (FSME)

USNRC/J. Tapp RIII/DNMS/DB

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bcc:

Q/Official File

**Response to NRC Staff questions on Attachments 7, 8, 9, 10, 11, and 13, Final Status Survey Report for the Plum Brook Reactor Facility:**

**Question 1 (Generic):** Generic Question:

NRC staff observed that the Section 5 discussion (Comparison with EPA Trigger Levels) in each FSSR attachment states "The PBRF license termination process includes a review of residual contamination levels in groundwater and soil, as applicable, in accordance with the October 2002 Memorandum of Understanding (MOU) between the US NRC and the US Environmental Protection Agency (EPA) [USEPA 2002]." In accordance with this MOU, NRC staff notes that NASA has appropriately compared Final Status Survey (FSS) results for residual contamination in soil against the applicable EPA trigger levels and found the residual contamination levels to be less than the trigger levels. The FSSR attachments may also note that since there is no groundwater associated with these survey units, a comparison against EPA Maximum Contaminant Levels (MCLs) is not applicable.

NRC staff does recognize that groundwater is not associated with these survey units. Although groundwater is outside the scope of these FSSR attachments, NASA needs to address any residual contamination in groundwater at the NRC licensed site. Before license termination, licensees with residual contamination in groundwater need to compare groundwater sampling results for radionuclides of concern against the EPA MCLs. Final status survey results should be provided for each individual well and residual contamination for radionuclides of concern compared against the applicable MCL. For a specific radionuclide, the combination of the proposed cleanup level plus the natural relevant background should be directly compared against the applicable MCL. NRC technical guidance on implementing this MOU is available in NRC's Agency-wide Documents Access and Management System (ADAMS) via (ML071700613). The MOU is also available in ADAMS via (ML022830208).

Prior to any request for license termination, NASA needs to identify any radionuclides of concern in groundwater and provide information comparing groundwater sampling results for each well against the applicable MCLs.

**NASA Response:**

NASA will prepare a Technical Basis Document (TBD) to address a dose analysis for ground water radionuclides. The document will be available for NRC Staff information. The conclusions and their bases, and a comparison to applicable MCL's will be addressed in the final main body of the Final Status Survey Report. The conclusions

**Question 1 (Specific):** Attachment 7, “*Storm Drains, Pipe Trenches & Other Sub-Surface Excavations*”, Section 2 (Pg. 2), Table 1(Pg. 6),and Figure 1 (Pg. 18):

Figure 1 is a location map that identifies the principle PBRF buildings and site layout including the survey units for this FSSR. Several discrete contaminated areas in these areas are identified in Table 1 (Spill Area Summary). This section does not include a map showing the location of these areas of discrete contamination making it difficult for the reader to determine the actual location of these areas on the PBRF site.

NASA should include a map showing the location of the discrete contaminated areas referenced in Table 1.

**NASA Response:**

NASA will revise Attachment 7, “*Storm Drains, Pipe Trenches & Other Sub-Surface Excavations*”, by including a map of the discrete contamination areas referenced in Table 1. These changes will be included in a formal revision to the attachment and copies will be resubmitted to the US NRC.

**Question 2, (Specific):** Attachment 8, “*Hot Laboratory (Building 1112)*”, Section 5.3, Table 12(Pg. 35):

A summary of the investigative static measurements and results are shown in Table 12. NRC staff notes that for many of the measurements noted in Table 12, the final disposition/outcome of the investigation was incomplete or blank. Also, some survey units under the “Comments/Results” column show that an Elevated Measurement Comparison (EMC) was performed, but did not indicate whether the survey unit failed or passed.

NASA should clearly identify the final resolution/outcome of all investigations, and address this concern in Table 12 and the conclusion section. NASA should also consider adding a footnote to Table 12 that refers to relevant information in Table 14 (EMC and EMT Calculations and Results).

**NASA Response:**

NASA will revise Attachment 8 to provide additional clarification. The column titled “Comments/Results” in Table 12 will be expanded to indicate the outcome or final resolution. In addition, a footnote citation will be added that refers to Table 14 when EMC/EMT were performed. These changes will be included in a formal revision to the attachment and copies will be resubmitted to the US NRC.

**Question 3, (Specific):** Attachment 9, “*Embedded Piping*”:

This FSSR attachment appears to include embedded pipe (EP) associated with structures. Are there other EP FSS results, not associated with structures?

In a previous NASA response to comments (ML102990335), NASA stated that the attachment on EP “... will include an inventory of EP which remains on the PBRF at the time of the FSS. It will be a compilation of the measurement results in the EP release records. **It is noted that most, but not all the EP sections are associated with structures.**”

NASA should clarify if this attachment includes all EP at the NASA PBRF site. If there are other EP FSS results, not associated with structures, describe where those EP results will be reported including a statement on whether or not they have been grouted.

**NASA Response:**

Embedded piping, as stated in section 3.3 of the Final Status Survey Plan for the Plum Brook Reactor Facility, Revision 1, dated February 2007, is “*any pipe situated below the minus three (-3) foot elevation that is totally encased in concrete or piping directly beneath building floors that may not be totally encased in concrete, but contained within the structural foundation of the building*”.

All embedded piping for the PBRF is included in the Final Status Survey Report, Attachment 9.

The statement, “*It is noted that most, but not all the EP sections are associated with structures*” appeared in a previous response under ML102990335. This statement is erroneous and was intended to refer to buried piping and other piping located in structures that do not meet the PBRF Final Status Survey Plan (FSSP) definition of embedded pipe. These piping systems will be reported in Attachment 17, “Buried and Miscellaneous Piping”.

**Question 4, (Specific):** Attachment 9, “*Embedded Piping*”, Section 5.2, Tables 7&8 (Pgs 19-26):

NASA stated that as a result of this remediation and survey campaign, 167 runs of EP were remediated, surveyed and grouted in compliance with the NASA FSSP. Table 7 and Table 8 provide a summary of the EP survey results. The tables are divided into piping where Co-60 is the nuclide of concern (Table 7) and Piping where Cs-137 is the nuclide of concern (Table 8). NRC staff reviewed Table 7 and Table 8 and observed that for all EP piping, the average annual EP doses were less than 1 mrem/yr with the exception of EP1.11 and EP 1.12. The annual average dose from these two EPs

was 1.009 and 1.366 mrem/yr respectively. These two EPs are not shown in Table 7 and Table 8.

NASA needs to explain why these two EPs are not shown in Tables 7 and Table 8. Although these survey units are discussed in Appendix D, EP 1.11 and EP 1.12 need to be included in Table 7 and Table 8, or explain why they should not be included.

**NASA Response:**

The PBRF 24-inch diameter reactor coolant piping (ID numbers EP 1.11 & EP 1.12) were surveyed using beta scintillating detectors mounted on an in-situ variable geometry pipe sled rather than the primary methodology of using gamma detectors windowed to detect either Cs-137 or Co-60. This information is discussed in Section 3.7 of Attachment 9, which states as follows:

*"The 24" primary cooling lines are surveyed using a different method from that described above due to circumstances as described in Appendix D to this attachment. These surveys utilize scintillating beta-gamma detectors mounted on an in-situ, variable geometry, pipe sled. This sled allows the detectors to traverse elbows and risers while assuring a consistent geometry for each survey measurement. 100% assay by scan survey of all accessible surfaces and static radiological measurements at specified increments are assessed to demonstrate compliance with the EP dose goal. These surveys are detailed in Appendix D of this attachment"*

Since the methodology for surveying the 24-inch diameter reactor coolant piping was distinctly different than surveys performed in other piping systems, NASA elected to describe the survey methodology and provide results in Appendix D in an attempt to minimize confusion. Tables 7 and 8 provide survey results for embedded piping surveyed with the gamma detectors windowed for either Cs-137 or Co-60. Piping EP 1.11 and EP 1.12 were surveyed with beta detectors and it was more appropriate to include the results in a separate table under Appendix D.

**Question 5, (Specific):** Attachment 9, "Embedded Piping", Section 5.2, Tables 7&8:

NRC staff observed that the DCGLs in Table 7 and Table 8 were not consistent with the DCGLs identified in Table 1a (Pg. 7) and Table 5(Pg.12), and in some cases, the Derived Concentration Guideline Level (DCGL) had a higher value in both Table 7 and Table 8 than what was reported in Table 1a and Table 5.

NASA needs to explain this difference.

**NASA Response:**

The DCGLs included in Tables 7 and 8 are the calculated beta surrogate DCGLs, which are based on the radionuclide fractions of residual contamination remaining in each piping system. The DCGLs identified in Tables 1a and 5 are the radionuclide specific beta DCGLs for each radionuclide of concern based on the embedded piping dose goal of 1 mrem/yr. NASA will provide clarification by adding a note to Tables 7 and 8 to identify these DCGLs as the surrogate DCGLs. These changes will be included in a formal revision to the attachment and copies will be resubmitted to the US NRC.

**Question 6, (Specific):** Attachment 9, "Embedded Piping", Section 5.2, Tables 7&8

NRC staff observed that Table 7 and Table 8 included maximum and mean activity values for each embedded piping identified. NRC staff could not determine from this report if the EP piping doses were computed based on the mean activity or the maximum activity. If the EP doses were computed based on the mean activity, NRC staff cannot determine the impact of the dose from the maximum activity.

NASA should review all maximum activities reported for each embedded piping identified in Tables 7 and 8, and evaluate the impact of the maximum activity briefly in this section.

**NASA Response:**

Embedded Pipe dose was calculated based on the mean activity. This information is included in the second paragraph within Section 5.2, which states as follows:

*"Tables 7 & 8 identify those pipes which utilized Co-60 or Cs-137 as the surrogate nuclide. Each pipe run is identified with the label applied to the pipe run, a short description of the pipe run, the pipe run's length and the number of survey measurements acquired in the pipe run. For each pipe run the appropriate DCGL, maximum activity, mean activity and standard deviation of the survey measurements for that pipe run is listed. It should be noted that background is not subtracted from EP surface activity measurements; therefore, the results are conservative. Each pipe run's dose as represented by the pipe run's average activity is listed along with a statement that confirms the average dose and the survey measurements supporting that dose are less than DCGL (emphasis added)."*

NASA will provide clarification by adding a note to Tables 7, 8, and Appendix D (Table 2) to identify the mean activities as the values used to estimate the EP dose.

All maximum activities listed in Tables 7 and 8 are less than the DCGL, which is based on the PBRF FSS Plan dose goal of 1 mrem/yr. Therefore, no maximum activity

exceeds the 1 mrem/yr dose goal. NASA will provide clarification by adding a note to Tables 7 and 8.

These changes will be included in a formal revision to the attachment and copies will be forwarded to the US NRC.

**Question 7, (Specific):** Attachment 13, "Primary Pump House (Building 1134)", Section 5.3, (Pgs. 26-27):

A total of 7 survey units exceeded the scan investigation level and the licensee conducted static measurements at these locations. The size of the elevated areas was equal to or less than  $100 \text{ cm}^2$ . The static measurement in one survey unit (PH-1-16) was  $25,000 \text{ dpm}/100 \text{ cm}^2$ . This exceeded the  $\text{DCGL}_w$  which was  $23,713 \text{ dpm}/100 \text{ cm}^2$ . The licensee calculated the  $\text{DCGL}_{\text{emc}}$  for this elevated area using an area factor of 40.2 and the average residual activity concentration which was  $1943 \text{ dpm}/100 \text{ cm}^2$ . The licensee computed a  $\text{DCGL}_{\text{emc}}$  based on the average residual activity ( $1,943 \text{ dpm}/100 \text{ cm}^2$ ) and the area factor. The correct calculation should be the area factor times the  $\text{DCGL}_w$  which is  $23,713 \text{ dpm}/100 \text{ cm}^2$  and not  $1,943 \text{ dpm}/100 \text{ cm}^2$ . The  $\text{DCGL}_{\text{emc}}$  of  $9.53 \times 10^5 \text{ dpm}/100 \text{ cm}^2$  is correct.

NASA should correct this calculation error in any revision to this attachment.

**NASA Response:**

NASA agrees with your comment, the calculation on page 27 is in error. The calculation has been corrected and Revision 1 to Attachment 13, dated January 4, 2012, was submitted by cover letter dated January 18, 2012.