

National Aeronautics and
Space Administration
John H. Glenn Research Center
Lewis Field
Plum Brook Station
Sandusky, OH 44870



June 7, 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 17,
for the Plum Brook Reactor Facility, Licenses Nos. TR-3, Docket No. 50-30 and R-
93, Docket No. 50-185

On May 1, 2012, the NRC Staff submitted questions via email related to staff reviews of our
submittal of Attachments 17, "Buried and Miscellaneous Piping", 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 response to your questions will result in a Technical Basis Document (TBD) addressing a
radiological dose assessment for buried and miscellaneous piping. In addition, a revision is
being written to Attachment 17 to address the application of the Sign Test and Elevated
Measurements Tests. The TBD and Revision 1 to Attachment 17 are currently in preparation
and will be submitted for NRC Staff review following our internal review and approval
process. NASA expects to submit these revisions by mid June 2012.

Should you have any questions or need additional information, please contact me a 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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FSME

Enclosure

1. Response to NRC Staff questions on Attachment 17, 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

ODH/M. J. Rubadue

bcc:
Q/Official File

Response to NRC Staff comments on the Plum Brook Reactor Facility Final Status Survey Report, Attachment 17, Revision 0, Buried and Miscellaneous Piping (ML 12090A600)

The NRC Staff submitted the following comment by electronic mail:

NASA submitted Attachment 17 which represents the results of the final status radiological surveys of the Plum Brook Reactor Facility (PBRF) Buried and Miscellaneous Piping (BP/MP). The survey measurement results and supporting information are presented to demonstrate that residual contamination levels in each buried or miscellaneous pipe survey unit of the PBRF are below the respective DCGLs. The DCGLs are derived concentration guideline levels that are equivalent to 10 CFR 20 Subpart E that demonstrates that the residual contamination will not result in radiation dose greater than 25 mrem per year.

In February 2007, NASA submitted the Final Status Survey Plan (FSSP) Revision 1 to the NRC for review and approval. The purpose of the FSSP is to describe the methodology and approach to performing the Final Status Survey (FSS) of the Plum Brook Reactor Facility. The plan replaces the description of the FSS methodology provided in the Decommissioning Plan and provides the description of the planned final radiation surveys as required by 10 CFR 50.82(b)(4)(iii). The survey program described by this plan will demonstrate that the facility has been decontaminated to the levels required for release of the facility for unrestricted use as prescribed by 10 CFR 20 Subpart E.

The FSSP is based on guidance provided in NUREG-1575 (MARSSIM), NUREG-1757 (Consolidated NMSS Decommissioning Guidance), NUREG-1727 (NMSS Decommissioning Standard Review Plan) and DG-4006 (Demonstrating Compliance with the Radiological Criteria for License Termination).

In Section 3 of the FSSP, NASA states that site specific dose assessments were performed to calculate the DCGL for surface soil, structures, and embedded piping. NASA further states that RESRAD 6.21, RESRAD 6.0, RESRAD-BUILD 3.22, and the Microshield code were used for these dose assessments. NRC staff has determined that the software codes RESRAD (6.0 and 6.21), RESRAD-BUILD, and Microshield are acceptable computer codes used to evaluate the dose to man from soils through various environmental pathways, evaluate the dose to man from surface structures, and evaluate an exposure rate (and photon flux) from different photon energies from various selected radionuclides (radionuclides that emit photons), respectively.

NASA states the following in Section 3.4 of the FSSP, DCGL for Other Media:

Other media that will undergo FSS include subsurface soil, concrete foundation pads, and buried pipes. The DCGL for foundation pads and buried piping will be the same as the structure DCGL values. Buried piping is any piping buried in soil and situated outside the structural foundation of a building, such as storm drains. The DCGL for sediment (e.g., stream or ditch silt) will be the same as the surface soil. The DCGL for subsurface soil will be the same as surface soil.

The submittal of Attachment 17 includes MP. In Attachment 17, NRC staff observed in Table 6 that the number of measurements for MP ranged from 2 to 1103 and the maximum activity ranged from 3,073 to 995,990 dpm/100 cm². The mean activity for MP ranged from 1,270 to 33,143 dpm/100 cm². In Section 5.6 of Attachment 17, NASA concluded that all survey unit mean fixed measurement results are below the DCGL_w. NRC staff observed in Table 6 of Attachment 17, that in several survey units, the maximum value was significantly above the DCGL_w and NRC staff could not determine if other measurements may be above the DCGL_w. MARSSIM indicates that a statistical test is necessary if the average measurement (Sign Test) or the difference between the average survey unit and reference area measurements (WRS) is below the DCGL_w and any measurement is greater than the DCGL_w (NUREG-1575 Table 8.2). NRC staff observed in Attachment 17 that several survey units had maximum activity that was above the DCGL_w. NRC staff has determined that a statistical test is necessary and NASA did not provide sufficient information about the statistical distribution of the results for NRC staff to reach the conclusion that a statistical test is not necessary.

In Section 5.2 of Attachment 17, NASA states that all of the dose pathways in this model assume an individual is present in the survey unit. NASA further states that since it is not physically possible for a dose receptor to occupy a BP/MP survey unit, the calculated activity is extremely overestimated and only serves as an upper bound to indicate that the survey unit meets the release criteria. NRC staff has determined that this methodology/approach is not discussed in the FSSP. Further, this methodology and approach is not consistent with the location of the receptor point and geometries as provided in the FSSP for embedded piping (and buried piping). In Attachment 9, for embedded piping (EP), NASA demonstrated compliance by showing the EP dose was below the approved dose goal in the FSSP. Attachment 17 results are not consistent with the results used in Attachment 9 for embedded piping.

Also, in Section 5.6 of Attachment 17, NASA acknowledged that the classification of MP is not defined in the FSSP and that MP was surveyed using the same criteria as BP. NASA indicated in Section 5 that if any individual measurement exceeds the unity value (>1.0), an area factor (AF) is calculated based on the actual size of the elevated measurement area (EMA) and an elevated measurement comparison (EMC) is performed as described in the FSSP, Section 8.3. This information described in Attachment 17 is not discussed in the FSSP and NRC staff cannot determine if this methodology and approach is acceptable. NRC staff has determined that this may be an un-reviewed safety question.

NRC staff identified two major concerns with Attachment 17:

1. The introduction of the MP is outside of the scope of the FSSP and this may be an un-reviewed safety issue requiring a license amendment.
2. NASA has not provided an adequate description of the methodology and approach for MP. Thus, NRC staff cannot determine if MP meets 10 CFR 20 Subpart E criteria for unrestricted use.

The NRC Staff proposed the two following options as a suggested resolution of the issue:

NRC identifies the following path forward for resolving NRC concerns:

Option 1

Perform a dose assessment for BP and MP. The dose assessment should take into consideration all potential geometries and receptor points for both BP and MP and bound the calculations consistent with the approach used for EP. NASA should describe the method in substantial detail for NRC staff to make the determination that the methodology and approach is consistent with the FSSP and meets 10 CFR 20 Subpart E criteria for unrestricted use.

Option 2

Use the current approach in Attachment 17. The current approach should take into consideration the following:

- the identification and justification of the receptor points,
- the use of the mean fixed measurements as an adequate technical basis for passing a survey unit in lieu of a statistical test,
- describe what computer model was used to demonstrate that the DCGLs for BP and MP meets 10 CFR 20 Subpart E criteria for unrestricted use, and
- provide justification for using EMC for piping.

NASA should describe the method in substantial detail for NRC staff to make the determination that the methodology and approach is consistent with the FSSP and meets 10 CFR 20 Subpart E criteria for unrestricted use.

NASA Proposes the following actions as resolution of the identified issues:

NASA will prepare a Technical Basis Document (TBD) to address dose assessments for buried piping (BP) and miscellaneous piping (MP). The dose assessment will take into consideration all potential geometries and receptor points for both BP and MP. The most conservative piping configurations will be used to develop the conceptual dose models. That is, piping systems containing the highest concentrations of BP/MP and/or highest levels of radioactivity will be used to calculate dose to the receptor. The objective will be to demonstrate that use of structural DCGLs (Table 3-2 of the PBRF Final Status Survey Plan (FSSP)) for BP and MP is an acceptable approach for all piping remaining after building demolition and site restoration. NASA will describe the method in substantial detail for NRC staff to make the determination that the methodology and approach is consistent with the PBRF FSSP and meets 10 CFR 20 Subpart E criteria for unrestricted use.

In addition to the dose assessment, NASA will apply the Sign Test and Elevated Measurements Test (EMT) for any survey unit having a concentration greater than the $DCGL_w$ and an average concentration of less than the $DCGL_w$. The Test will be performed in accordance with the methodology provided in the PBRF FSSP. The objective will be to demonstrate that all BP and MP survey units meet the release criterion when both the Sign Test and EMT are applied.

A revision to Attachment 17 will be submitted to the NRC for review. The revision will include results of Sign Tests and EMTs and a summary of the dose assessments performed for BP and MP. The revision will also include elimination of all survey unit results for MP systems removed during building demolition. Piping systems containing no detectable radioactivity will be released from the site as scrap steel in accordance with site procedure RP-008, "*Radiological Release of Equipment, Material, and Vehicles*". Piping containing positive radioactivity will be packaged and shipped to an offsite radioactive waste disposal facility (i.e., Energy Solutions).