

National Aeronautics and
Space Administration

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



March 29, 2004

Reply to Attn of: QD(8010)

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

Subject: Report of Reactor Status for the NASA Plum Brook Reactor
(License No. TR-3, Docket 50-30) and the NASA Plum Brook
Mock-Up Reactor (License No. R-93, Docket 50-185)

Enclosed is the Annual Status Report, dated March 2004, for the Plum Brook Reactor (License TR-3) and the Plum Brook Mock-Up Reactor (License R-93). This report is for the reporting period January 1, 2003, through December 31, 2003. Submission of this annual report is in compliance with Technical Specification 6.12.1 of the current TR-3 and R-93 possess-but-not-operate licenses that became effective March 20, 2002.

Subject reactors are currently undergoing decommissioning.

Please note section 6, "Environmental Survey Results" provides sample results that validate the conclusion made in Section 3.3.1.4.5 of the NRC Safety Evaluation dated March 20, 2002 in support of the PBRF Decommissioning Plan approval.

A handwritten signature in black ink, appearing to read "Keith M. Peacock".

Keith M. Peacock
Senior Project Engineer, Plum Brook Reactor Facility

Enclosure

Approved:

A handwritten signature in black ink, appearing to read "Vernon W. Wessel".

Vernon W. Wessel
Director of Safety and Assurance

A020

cc:

USNRC Headquarters
Attn: Document Control
Washington, DC 20555

USNRC Headquarters
Attn: Mr. Patrick Issac
Operating Reactor Improvements Program
Mail Stop 012-G13
Washington, DC 20555-0001

Mr. Thomas F. Dragoun
USNRC Region I
475 Allendale Road
King of Prussia, PA 19406-1415

Mr. Ronald Nabors
Ohio EPA
Northwest District Office
347 North Dunbridge Road
Bowling Green, OH 43402

Mr. Eric Dennison
Ohio Department of Health, Bureau of Radiation Health
Post Office Box 118
Columbus, OH 43266-0118

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ANNUAL STATUS REPORT
FOR THE
NASA PLUM BROOK REACTOR AND PLUM BROOK MOCK-UP REACTOR

1. Introduction

The following Annual Status Report for the period January 1, 2003, through December 31, 2003, has been prepared pursuant to Technical Specification 6.12.1 of the Plum Brook Reactor Facility (PBRF) TR-3 and the Mock-up Reactor (MUR) R-93 Licenses, both effective March 20, 2002. These are possess-but-not-operate licenses, and the facility is operating in accordance with its Decommissioning Plan, also effective March 20, 2002.

2. Summary of Facility Activities

Decommissioning activities were ongoing in earnest during 2003. Reactor segmentation (both reactors) was begun, loose and fixed equipment was removed from across the site, and waste material was classified, size reduced, packaged, and sent off site for proper disposal. During the year approximately 1.3 million pounds of material was sent to one of three NRC licensed sites. These include Alaron in Wampum, Pennsylvania, Barnwell in Aiken, South Carolina, and Envirocare in Clive, Utah.

Characterization work continued across the site in support of classifying waste, developing the Derived Concentration Guide Lines, and validating the classification of areas for the Final Status Survey plan. Asbestos abatement took place across the site in advance of the removal of fixed equipment. Piping systems were vented and drained prior to removal in order to capture any last free liquid that remained. This liquid has been captured and is currently being stored on site in 55-gallon drums until a water treatment system is installed.

Removal, classification, and packaging of equipment stored in the Hot Dry Storage vault have begun. The material in this area represents the second largest source term on site, with about 1/3 the inventory of the main reactor.

3. Major Preventative and Corrective Maintenance Operations

No major preventative or corrective maintenance operations with safety significance were conducted this year.

4. Major Changes in Reactor Facility, Procedures, and Activities

Decommissioning has resulted in several major changes to the reactor facility.

The Mock-Up Reactor no longer exists. The entire reactor assembly and control room have been successfully segmented, packaged, and sent offsite for disposal. All that is left is the empty spot in Canal H where the reactor used to be. Decontamination of this area, as necessary, will be conducted along with similar activities across the rest of the Reactor Building.

Segmentation of the main reactor is well underway. The pressure vessel head has been removed, segmented, and sent off site for disposal. The three 20-ton shrapnel shields were removed, modified (an 8' diameter access hole cut in the center and an 18" ventilation hole cut in the side), and then reinstalled to provide shielding to the workers performing the segmentation. To this point several reactor internal components have been successfully removed, including the Horizontal Beam Tubes, the Horizontal Through Tubes, all of the instrumentation and control tubes from the above core region, the core box top roller guides, and the upper portions of the control rods and guide tubes. The removal of reactor internals has reduced the radiation field at the opening in the shrapnel shield from 1400 mr/hour to 700 mr/hour.

The skyline of the facility has changed with the successful removal of the double water tower, the Fan House exhaust stack, the water treatment system precipitator, and the Gas Yard. Material from these structures was size reduced, packaged, and sent off site for disposal. In addition, the two large 34.5 kVA transformers from the site (56,000 pounds each) were successfully surveyed for unrestricted release and have been relocated to another NASA test facility on site at Plum Brook Station for continued service.

A significant item of new construction was an on-site Interim Storage Facility. This was done to provide a storage area on for any material that might be packaged but not be able to be shipped off site in a timely manner. Of particular concern was the potential for some of the items from within the core box to turn out to be Greater Than Class C, or some activated cadmium containing components in Hot Dry Storage to be Class B or above. In either of those scenarios there is no disposal path currently under contract. The location of the storage area is the south extension of the -25' level of the Reactor Building. The area, already essentially a dead end hallway with concrete and soil on three sides, was closed in on the fourth side with a 4' thick concrete wall. Access to the resulting vault is through an overhead plug in the grade level floor of the Hot Lab.

Another new system that was installed was the Canal Transfer System. This is a winch and cable driven cart that was set up to run in the bottom of the existing canals between the Containment Vessel and the back of the Hot Cells. It will be used to move loaded waste shipping liners from one area to the other as necessary to support decommissioning operations.

Finally, a Pump and Treat system was installed in the Service Equipment Building (SEB). This system is not part of the decommissioning, but was installed to support a closure plan approved by the Ohio EPA for a RCRA site

located just south of the SEB. This was the original location of a small underground storage tank that was used to hold waste oil and spent solvents. The tank was removed in 1989, and the site backfilled with clean soil from off site, but subsequent soil sampling showed volatile organic carbon (VOC) results that caused the EPA to direct the installation of a system to clean the groundwater in the area. The system consists of one new groundwater well in the original location of the tank, and a charcoal filter assembly. Water from the well and the preexisting SEB sumps is routed through the charcoal filter before it is allowed to leave site through the preexisting discharge path. This system is expected to run for at least one year. If it is required by the EPA to run beyond the time when NASA will be demolishing the building, then a new dedicated structure will need to be put in place and the Pump and Treat system will be relocated. Operation of the system will not impact decommissioning.

5. Release of Radioactive Effluents

There have been no uncontrolled releases from the site to the environs during this reporting period. This statement is based on the results of continuous local monitoring at the job site while work has been going on, and the results of offsite environmental monitoring as described in the next section.

6. Environmental Survey Results

NASA has continued extensive offsite environmental monitoring for the PBRF. This has included monitoring of direct radiation, air, ground water, surface water, and silt.

Airborne monitoring was done using six continuous air samplers (four at the facility fence line, one ½ mile upwind, one 1 mile downwind). Filter elements from the units are collected and counted weekly, and are then bagged and kept for future reference. There is an environmental TLD co-located with each of the four fence line air samplers. These are collected and read monthly.

Water and silt sampling is performed in several locations in potentially impacted surface streams. Samples are collected monthly, and sent off site for analysis. Background samples (i.e. from locations well upstream) are also collected and analyzed. Groundwater monitoring is done using a number of wells, both overburden and bedrock.

All of the observed levels remained consistent with those seen through the last 30 years of shutdown monitoring. The levels are indistinguishable from background levels. Detailed monitoring results are available in the PBRF Annual Environmental Report.

In addition to all of the regular environmental sampling a one time sampling event took place in May of 2003. Section 3.3.1.4.5 of the NRC Safety Evaluation dated March 20, 2002 discussed historic sampling results from Plum Brook, and the licensee's plans to perform additional sampling in the

future to validate and assess the impact, if any, from PBRF operations on Plum Brook. Those silt samples have been taken (from Plum Brook and from four other area streams from a different watershed than Plum Brook, therefore unimpacted by PBRF). A written report with the full results was provided to the NRC inspector during a site visit last year. Additional copies are available if desired. The results may be summarized as follows:

	<u>Gross Alpha</u> <u>(pCi/g)</u>	<u>Gross Beta</u> <u>(pCi/g)</u>
Plum Brook	19.8	22.7
Average of all 5 streams	32.5	31.7

As can be seen the silt from Plum Brook showed levels of gross alpha and gross beta that are well below the average for the 5 streams. In fact the levels are below those of any of the other streams. Based on the samples collected it has been validated that Plum Brook does not contain residual radioactivity above background and therefore was not impacted by past PBRF operations.