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March 6, 2003

Reply to Attn of. 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 2003, 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, 2002 through December 31, 2002. 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.

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

Keith M. Peacock  
Senior Project Engineer  
Plum Brook Decommissioning Office

Enclosure

Approved:

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

Vernon W. Wessel  
Director of Safety and Assurance Technologies

A020

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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, 2002, through December 31, 2002, 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**

Activities at the PBRF have been focused on preparing the site for full decommissioning, and beginning some actual removal of loose and fixed equipment.

Characterization of the site was ongoing, from both a radiological and industrial health (IH) point of view. Radiological surveys, including Part 61 characterization, were conducted throughout the year. Work started in the Reactor Building, and then moved out into the other structures on site. IH surveys were conducted for such substances as asbestos, lead, PCBs, and beryllium. Lead and asbestos abatement were carried out in those areas necessary to support other work.

There were several efforts involving the installation of new support systems needed for fixed equipment removal and reactor segmentation. Installation began on the Cask Transfer System, a Temporary Containment Vessel (CV) Ventilation System, and a Temporary Power System during this year. They are described in more detail in Section 4.

The legacy 'Lock Out/Tag Outs', some of which had been in place for over twenty years, were all reviewed. Existing Tag Outs that were still needed were replaced with new Tag Outs issued under the new Tag Out procedure. Additional new Tag Outs were issued through the year as necessary to support ongoing work.

An entry was made into the Reactor Tank (RT) for investigative purposes. This involved removing the three 20-ton shrapnel shields from the top of the RT, each of which represented a 100% lift for the CV polar crane. A work platform was put in place over the RT, and the 36" hatch in the center of the tank lid was opened. The investigation included observing and filming the current physical condition of the

tank and its internals (clean and dry, as expected), checking the inventory of reactor internals, taking direct radiation readings, checking airborne contamination levels, and collecting a piece from the end of one of the aluminum components for off-site evaluation of the contamination level inside the tank (extremely low). The results of this investigation were fed back into the design of the planned segmentation work, resulting in the need to reengineer that activity. Upon completion of the investigation it was determined that, based on actual radiation levels, only the innermost shrapnel shield needed to be reinstalled.

The removal and packaging (into B-25s and Sealand containers) of loose equipment, predominantly from inside the CV (including the Quadrants and Canals), and the Reactor Building was ongoing for most of the year. In the late fall removal of fixed equipment from the CV Quadrants began. To this point fixed equipment removal has not involved opening any of the primary systems. That will require the CV Ventilation System to be operational.

**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**

The PBRF and MUR licenses were approved on March 20, 2002. The new Technical Specifications, designed to support the execution of decommissioning, became effective at that point. One result was the formalization of the Project Safety Committee (PSC)(TS 6.8), and the requirement that it review and approve all new procedures. The PSC has not only been doing this on new procedures, but went back and reviewed all existing procedures as well. All procedures currently in use have been reviewed and approved by the PSC.

Installation began on three new systems during the year. These new systems were the Cask Transfer System (CTS), the Temporary CV Ventilation System, and the Temporary Power System. Each of these systems resulted in a change to the Containment Vessel, which is a key part of the PBRF approach to maintaining containment, as required by TS 4.2, "Containment". The PSC reviewed each of these designs and determined that these facility changes could be made without prior NRC approval IAW the provisions of 10CFR 50.59.

The CTS involved the installation of a set of rails, transfer cart, and winch system that will be used to move a shipping cask (or other large item, such as a Sealand container) from outside, through the Reactor

Building, and into the Containment Vessel. This required the removal and back filling of the cryogenic pipe trench, the cryogenic storage tank (all located outside the building), the enlargement of the Reactor Building roll up door, the bracing of the floor of the Reactor Building, and the replacement of the existing CV truck door with a 'barn door' type arrangement that is sufficient to meet the TS requirements for achieving containment. This work was 90% complete by the end of the reporting period.

The Temporary CV Ventilation System is intended to replace the legacy ventilation system, which will not be returned to service. It consists of three large supply fans, which pull air from the Reactor Building into the Containment Vessel, and a large exhaust fan and 16 element HEPA filter system, which pulls air from the CV and discharges it back into the Reactor Building. The installation of this system involved cutting several holes (about 4 ft<sup>2</sup> each) in the CV wall. Installation of this system was 90% complete by the end of the reporting period.

The Temporary Power System will replace the legacy electrical distribution system throughout the PBRF. All power will be routed through this easy to identify, clearly marked system. All other preexisting wiring and conduit will be deenergized, in a 'cold-and-dark' approach, to better enable the safe removal of fixed equipment that has electrical components. (Note – despite the name 'cold-and-dark', gas heat will be maintained in the facility for the foreseeable future). This effort was 75% complete by the end of the reporting period

#### **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. In the last 18 months monitoring has expanded in both the number of locations and, in some cases, frequency.

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 29 years of shutdown monitoring. The levels are indistinguishable from background levels. Detailed monitoring results are available in the PBRF Annual Environmental Report.