National Aeronautics and
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Sandusky, OH 44870

February 9, 2007

Reply to Attn of: QD

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 February 2007 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, 2006, through December 31, 2006. 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.

Keith M. Peecook
NASA Decommissioning Program Manager

Enclosure

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

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1. Introduction

The following Annual Status Report for the period January 1, 2006, through December 31, 2006, 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

Since the beginning of the Decommissioning Project, about 95 percent of the fixed and loose equipment has been removed from the Plum Brook Reactor Facility. NASA estimates that 98 percent of the original radioactive source term has been removed.

Since the change in contractor staffing that occurred in late 2005, NASA has concentrated the past year's efforts on risk reduction activities. These activities have entailed work necessary to characterize the remaining work scope, to reduce the risk of migration of radioactive material, and to remove major risks to the cost and schedule of project completion. The focus has been to perform work that will provide necessary data and experience to select the overall approach to final project completion. The primary thrust of our efforts was to determine whether to proceed with a decontamination and release approach or a 'rip and ship' approach to project completion.

A major task undertaken was to decontaminate Hot Cell No. 1. This was the largest and most contaminated of the seven hot cells and was chosen to determine whether decontamination to decommissioning release criteria was feasible and cost effective. All equipment including the stainless steel cell liner, hardware, and the cell viewing window were removed. The 80-tons of concrete roof shields were decontaminated to free release levels. The remaining cell surfaces and about 1200-linear feet of piping and electrical conduit were decontaminated. Radiological surveys were performed to the criteria of our proposed Final Status Survey Plan and the cell was demonstrated to be radiologically clean.

This effort demonstrated that the Hot Cells can be cost effectively decontaminated to release for unrestricted levels. As a result of this successful effort, work has begun on decontaminating the remaining six Hot Cells.

Significant efforts were expended during the year on decontamination and cleaning of embedded piping. Access openings were cut where needed to insert equipment into embedded piping. The pipes were cleaned using a combination high flow vacuum cleaning devices, wire brushes, and abrasive grit blasting. Some piping (about 1000 linear feet) required high pressure water washing with a hydrolazer. To date, about 12,000 linear feet of pipe have been successfully decontaminated to levels that NASA believes will allow grouting and leaving in place after completion of Final Status Surveys.

Characterization studies have continued throughout the facility. It has included more detailed surveys of overhead areas, additional concrete core bore sampling of the Quadrants and Canals, core bore sampling of paved parking and roadway areas, and sampling and surveys of an area on Plum Brook Station formerly used for incineration of trash.

Characterization of Plum Brook has also continued. NASA has retained the services of a local hydro-geologist to assist in survey planning and sampling of Plum Brook and a marshy area where Plum Brook discharges into Sandusky Bay.

To date, about 1200 soil and sediment samples have been collected in a 1 ½ mile stretch of Plum Brook. Only about 20 of these samples have shown radioactive contamination above the proposed clean-up levels. NASA has proposed to use the on site soil DCGL in the proposed Final Status Survey Plan as the off-site soil remediation level.

3. Major Preventative and Corrective Maintenance Operations

During the last week of November 2006, work was in progress to clean silt and debris from the former Waste Effluent Monitoring Station (WEMS) pit to prepare it for final status surveys. Since this area still serves as a non-monitored discharge header for the facility storm drains and ground water drains, it was necessary to block the drains entering the pit and divert the normal inflow through an alternate pumping arrangement. On November 30 and December 1, an unusually heavy rain event occurred and overwhelmed the alternate pump system. Ground water backed up into the Services Equipment Building (SEB) and flowed through the Cold Pipe Tunnel into the Reactor Building. In response to the high sump level alarms, the lines into the WEMS pit were opened to allow normal water flow and stop the back up of water. Water that had flooded into the reactor building was isolated and a sample and analysis program was instituted to control the discharge of the water. Samples of pooled water were obtained prior to restarting sump pumps and the plant outfall was sampled hourly during pump-down operations. About 50,000 to 60,000 gallons of flood water were discharged out to the plant outfall during recovery. All water discharged to the environment was confirmed by laboratory analysis to be less than 10 percent of the 10 CFR 20, Appendix B, Table 2, Column 2 limits. The NRC staff assigned to inspection and project management of the facility were informed and kept apprised of the recovery operations as they progressed.

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

Decommissioning continues to generate major changes in the reactor facility.

Fixed and loose equipment removal has been completed in most areas of the site. To date 95 percent of the equipment has been removed from the facility and about 98 percent of the radioactive source term has been either removed and disposed, or is packaged awaiting transportation to a disposal facility. About 8 million pounds of low level radioactive waste has been disposed, about 10 million pounds of slightly contaminated soil has been disposed, and about 1 million pounds of material have been surveyed and free released. In addition, about 80 tons of concrete shield blocks have been removed from the Hot Cell roofs, cleaned, surveyed, and free released.

Hot Cell number 1 has been successfully decontaminated to the proposed free release criteria. The Reactor Office and Laboratory Building and the Services Equipment Building have been decontaminated and are being prepared for Final Status Survey. In addition, about 12,000 linear feet of embedded pipe has been cleaned and surveyed. The pipe is expected to meet the free release criteria and will be grouted in place after NRC approval of the criteria proposed in our Final Status Survey Plan.

Seven activated control rods from Plum Brook Reactor are in safe storage in a commercially available dry storage cask located on the Plum Brook Station property away from the Reactor Facility. NASA is pursuing proposals for macro-encapsulation of the rods and disposal at the DOE Nevada Test Site.

There were no changes to the facility or to procedures, nor were there any tests or experiments conducted requiring safety evaluation pursuant to 10CFR50.59.

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.

During year 2006, water accumulated from system draining, ground and rain water infiltration into building areas not drained by operable sumps, and from flushing of embedded piping has collected and treated by filtration. This water was batch released by hauling to a Publicly Owned Treatment Works (POTW) for disposal into the sanitary sewerage system.

The water was isolated and sampled prior to discharge and was confirmed by offsite laboratory analysis to meet the discharge limits specified in 10 CFR 20, Appendix B, Table 3. About 15,750-gallons of water was released in this manner over the one year period. The total activity released was comprised of 9.3 E+3 μCi of H-3 (Tritium), 14.1 μCi of Cs-137 (Cesium-137), 6.2 μCi of Sr-90 (Strontium-90), and 4.7 E-4 μCi of Am-241 (Americium-241).

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, and building sumps that collect ground water in-leakage.

The following is a synopsis of the sampling from November 2005 through December 2006:

- Fence-line air filters results were below Project Specific Action Levels (PSAL's) for the reporting period. Fence-line metal samples were similar to the background up-wind and down-wind results thus concluding no impacts from PBRF operations.

- Sediment samples were above PSAL for gross beta at STA 1, STA 3, STA 4, and STA 5 in November 2005. However, the results showed no PBRF-associated radionuclides. Sediment samples at STA 3 in June 2006, November 2006, and December 2006) were also above the PSAL for gross beta and had small amounts of Cesium (Cs-137) and Cobalt (Co-60). STA 3 resides in an area of known "legacy" contamination that surrounds the sampling points. It is extremely likely that small amounts of higher-than-background levels of Cesium and Cobalt, from the "legacy" contamination were included in the samples. No activity that could have caused a release was performed during those periods, leading to the conclusion that "legacy" contamination was the cause of the elevated readings.

- All other samples (surface water, sediment, or groundwater) with results above the PSAL's have shown no presence of any site-specific radionuclides (alpha: Plutonium, Americium, Curium; beta-gamma: Cesium, Cobalt, Strontium).

Therefore the elevated results for surface water, sediment, and groundwater samples can be attributed to either Naturally Occurring Radioactive Material (NORM), or other-than-PBRF sources.

All other 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 both the PBRF Annual and Semi-Annual Environmental Reports.

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