



**NASA Glenn
Plum Brook Station**

**Monitoring Safety
During Reactor Facility Decommissioning**

This is one in a series of fact sheets prepared by NASA Glenn Research Center to provide the public with information on decommissioning the closed Reactor Facility at Plum Brook Station.

This fact sheet describes the strict safety limits and thorough evaluation processes NASA has developed to monitor what impact, if any, decommissioning activities are having on radiation exposure levels in workers as well as the cumulative radioactivity levels in the environment.

Monitoring Worker Radiation Exposure

NASA's focus on safety includes adhering to ALARA principles - conducting decommissioning activities with radiation exposures As Low As Reasonably Achievable taking into account social, technical, economic, practical and public policy considerations - the industry standard for minimizing radiation exposures to workers and others entering a potentially radioactive area.

Federal regulations place limits on the amount of radiation a worker may be exposed to in an occupational setting. NASA has gone a step further to protect decommissioning workers by establishing its own Administrative Limits. While federal regulations limit worker dose to 5,000 mrem over the course of a year, NASA has set its limit for a worker to 1,000 mrem annually. NASA's daily and weekly administrative limits enable close monitoring of cumulative dose while keeping safe decommissioning activities moving forward.

NASA's Administrative Limits	Regulatory Limits
100 mrem daily	none
250 mrem weekly	none
1,000 mrem annually	5,000 mrem annually

Monitoring Safety Each Step of the Way

NASA's Reactor Facility segmentation plan included an ALARA analysis that identified overall dose estimates (the calculated radiation exposure levels based on the time it would take a specified number of workers to complete a particular task in the radioactive environment), which were based on survey data available at the time. The ALARA analysis informed the approach to the segmentation - how the work would be sequenced and what engineering controls and personal protective equipment would be necessary to minimize exposure to workers.



A Radiation Professional takes actual dose field measurements during an early phase of segmentation.

With safety for workers as its top priority, NASA is monitoring segmentation progress every step of the way - routinely conducting formalized safety reviews to ensure that the most effective engineering controls and protective equipment are being used for current conditions and that work is proceeding according to ALARA principles. As part of this review, NASA analyzes how actual dose field measurements (direct radiation readings being gathered during work in process) compare with original dose estimates (identified in the segmentation plan). Paying close attention to these details ensures that work activities and safeguards are operating as planned.

Safety for workers is NASA's priority during each phase of segmentation and throughout decommissioning.

PHASE 0
Equipment set-up & testing

PHASE 1
Remove horizontal beam tubes

PHASE 1A
Remove internals above the reactor core

PHASE 2
Remove internals at the core

PHASE 3
Remove internals below the core

PHASE 4
Remove reactor vessel

PHASE 5
Clean up & demobilization

Monitoring Safety

Monitoring Radioactivity in the Environment

NASA has put in place numerous engineering controls and safety precautions to minimize the possibility for release of radioactivity from decommissioning activities and ensure that people “outside the fence” and the environment remain safe. The effectiveness of these controls is monitored through NASA’s Environmental Sampling Program. The program compares environmental conditions during decommissioning against the environmental conditions that existed before decommissioning began for evidence of any increased levels of radioactivity in air, surface water, sediments and groundwater.



Workers conduct environmental sampling.

Individual sampling results may fluctuate over time given varying background levels, physical sampling differences and seasonal variations. For instance, dry weather conditions can concentrate metals in sediment or wet weather conditions can dilute metals in surface water.

Federal regulations prescribe safety limits on any release of radioactivity that might be dispersed in air and water from all sources of radiation (natural and man-made), including decommissioning. In addition to these regulations, NASA established what they refer to as Project Specific Action Limits for air, surface water, groundwater, and sediments (for which no federal requirements exist). These limits were based on a variety of factors depending on the media but in all cases they serve as one more checkpoint that NASA’s decommissioning activities are being done in a safe and thorough manner.

Environmental sampling data is collected on a routine basis and if results begin to approach or exceed the Project Specific Action Limits, NASA investigates whether it is naturally occurring background radiation or from other sources. If, upon further analysis, NASA determines that the increased value is coming from decommissioning activities, NASA takes several possible actions:

Performing further radionuclide specific analyses and conducting additional sampling, where necessary.

Conducting a thorough review of existing decommissioning site operations to determine where the release might be coming from.

Identifying additional engineering and administrative controls that would eliminate the release.

Finally, if additional sampling results remain elevated, NASA halts decommissioning operations until a solution can be found.

NASA has established these monitoring procedures that go beyond regulatory requirements to provide for the protection of its workers and the continued well being of the public and the environment.

For more information

on Decommissioning the Reactor Facility at Plum Brook Station, Contact **Sally Harrington** at **216-433-2037** or Email **s.harrington@grc.nasa.gov**. or visit us at our Website at **www.grc.nasa.gov/www/pbrf** or call our toll-free number at **1-800-260-3838** for regularly updated progress reports.



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