

Decommissioning Moving Forward

Getting To The Source: Levels & Locations

As part of decommissioning planning, NASA collected data on how much radioactivity was remaining at the Reactor Facility and where it could be found. A set of detailed radiological surveys or **characterization**, was conducted on every material present including concrete, structural metal, and loose and fixed equipment inside the Reactor Facility and on the grounds of the entire 27-acre site.

Detection Methods

Several testing methods were used for characterization.

▶ Direct radiation readings

▶ Physical samples

Two types of physical samples were collected and analyzed on-site or sent to an off-site certified lab for analysis.

Smears (swiping a surface using a dampened cloth)

Bulk samples (soil samples, concrete borings)



Workers used hand-held radiation detection devices, called "friskers" to read the radiation field - the combined results of any fixed and loose contamination.

▶ Activation Analysis

The expected composition of metals and estimated current radioactivity of reactor pieces that may have become activated during the Reactor Facility's operation, based on:

What the original metal was,

How close it was to the core,

How much power was used and for how long,

How much time has passed for natural decay to occur.

Types of Radioactivity

Activated - When a material such as the metal or concrete located close to the reactor core was exposed to a high enough radiation level, the original material was changed into something that became radioactive.

Fixed contamination (embedded in the material)

Loose contamination (like surface dust)

Any combination of the above

All nuclear fuel was removed in 1973 when the Reactor Facility was closed.

CHARACTERIZATION RESULTS ARE USED TO:

- ▶ Identify the types, amounts and mix of isotopes (radioactive atoms) present in each area and for each item,
- ▶ Plan decontamination methods,
- ▶ Develop safe removal procedures and equip workers with proper personal protective equipment,
- ▶ Plan for safe and appropriate waste packaging, type of shipping containers, and ultimate destination for disposal,
- ▶ Support the final site survey that completes decommissioning and terminates NASA's license with the Nuclear Regulatory Commission (NRC).



The highest level of radioactivity was found in the reactor core and internals (37,000 curies).

The Highest Levels The First To Go

NASA's characterization efforts determined that roughly sixty percent of the radioactivity remaining at the Reactor Facility site existed in components attached inside the reactor and in the vessel walls. NASA determined that removing the internal components first followed by systematically taking apart the reactor vessel walls (called segmentation) would greatly reduce the remaining on-site radiation source from the start.

Reactor internals are any structural component, equipment and piping fastened inside the reactor vessel.

Segmentation minimizes the volume of the reactor vessel for packaging, transport and disposal.



Reactor internals