

Alpha Gamma Hot Cell Facility



▲ Work stations of the AGHCF with shield windows and master-slave manipulators



▲ Transport containers moving the waste materials off-site

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Background Image:

A view into the cell through the shield window; note containers holding processed wastes to be disposed of

Continuous, Unattended Monitoring of the Alpha Gamma Hot Cell Facility with ARG-US RFID System



Overview

- ▶ Argonne National Laboratory's Alpha-Gamma Hot Cell Facility (AGHCF) is a Category-2 non-reactor nuclear facility being decommissioned. It is also used to support the de-inventory of other facilities on the Argonne site.
- ▶ As part of decommissioning, large quantities of radioactive material and waste are being processed and discharged from the hot cell, loaded into transport containers, and shipped away.
- ▶ These operations can result in elevated radiological risks to the facility and workers.
- ▶ ARG-US — meaning “watchful guardian” — can continuously monitor and track tagged packages containing nuclear and other hazardous materials during storage, processing, transportation, and disposal.
- ▶ ARG-US RFID tags with radiation detectors are being deployed in the facility to help AGHCF perform remote and continuous monitoring. The objective is to enhance facility safety and operation efficiency while reducing exposure of personnel to radiation.

ARG-US RFID System Deployment

- ▶ Six radiation-detector-enabled tags have been set up in the AGHCF:
 - Tag 3 monitors the Clean Transfer Area where materials packaging and egress occur.
 - Tag 6 monitors the high-efficiency particulate air (HEPA) filter in the cell's primary exhaust.
 - Other tags monitor the worker area.
- ▶ A seventh tag is being prepared on a mobile robot for surveillance inside the hot cell.



▼ ARG-US Tag



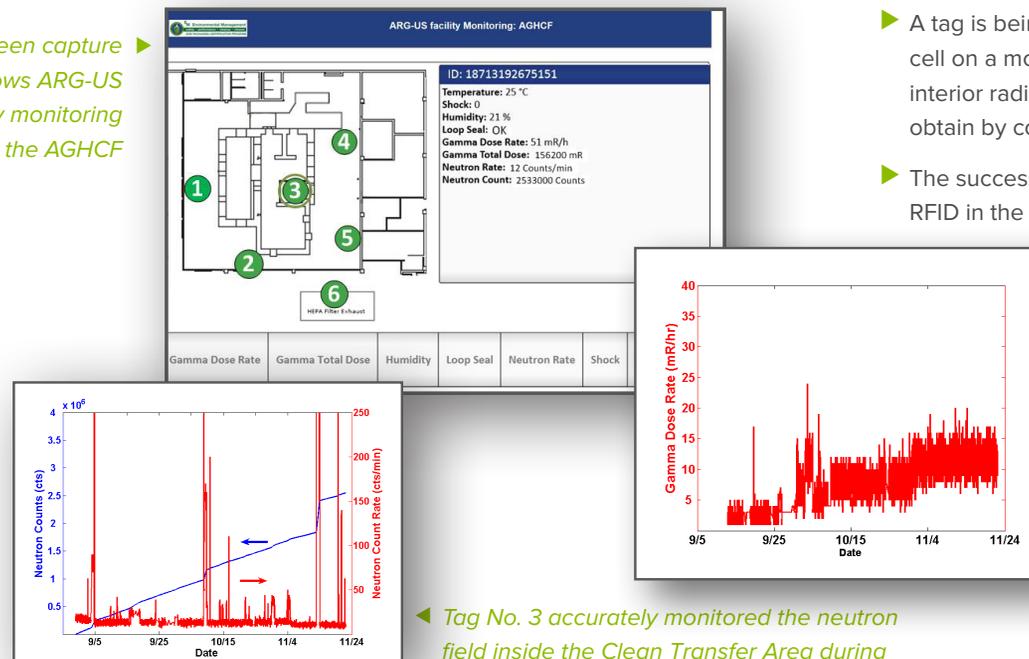
Gamma Dosimeter (top) and Neutron Detector

Motherboard and Antenna

10-year Battery

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Screen capture shows ARG-US facility monitoring at the AGHCF



▶ Tag No. 3 accurately monitored the neutron field inside the Clean Transfer Area during materials handling and loading.

technologies can and should be developed for and deployed in nuclear and radiological facilities to aid operation and reduce exposure of personnel to radiation.

◀ Tag No. 6 indicates that the exhaust HEPA filter is functioning normally. The radiation level gradually increases as airborne radioactive particulates are trapped by the filter.

ARG-US RFID Tags

- ▶ Operate at 433 MHz with >100-m read range
- ▶ House a suite of sensors (seal, shock, temperature, humidity, gamma radiation and neutrons)
- ▶ Feature long battery life (>10 yr)
- ▶ Store memories for content manifest, event log, and sensory data
- ▶ Disseminate alarm instantly when sensor threshold is violated
- ▶ Enable remote access to surveillance data via the local area network and a secure web site

Summary

- ▶ ARG-US RFID system has shown to be capable of continuous, unattended monitoring of a nuclear facility – system setup was simple and did not impact normal work activities.
- ▶ The deployed tags monitor the key radiological parameters of the AGHCF, including the high-activity packaging/transfer location, cell exhaust, and worker areas.
- ▶ A tag is being prepared to be deployed in-cell on a mobile robot. This tag will provide interior radiological data that are difficult to obtain by conventional means.
- ▶ The successful operation of ARG-US RFID in the AGHCF shows that advanced