

This section on ALARA activities is a vehicle to document successes and to point all DOE sites to those programs whose managers have confronted radiation protection issues and used innovative techniques to solve problems common to most DOE sites. DOE program and site offices and contractors who are interested in benchmarks of success and continuous improvement in the context of Integrated Safety Management and quality are encouraged to provide input to be included in future reports.

1.1 Analytical Research Laboratory (ARL) at the Idaho National Laboratory (INL) Material and Fuels Complex

All three projects discussed below include fundamental ALARA principles of time, distance and shielding being utilized prior to and during the project to limit the dose to personnel performing the work. Extensive remote decontamination, de-inventory of radioactive sources, and radioactive material movement restrictions reduced loose surface contamination, airborne radioactivity, and radiation levels in the cell for the remainder of the project.

1.1.1 Hot Fuel Examination Facility (HFEF) Decontamination Cell Entry

Mission Statement

Equipment and components in the Decontamination Cell (Decon Cell) of the HFEF were in need of maintenance and repairs but could not be performed remotely.

Project Description

Entry was made into the Decon Cell to perform needed maintenance, troubleshooting, repairs of in-cell equipment and to remove unused materials and equipment. Activities included opening the Decon Cell door and inner metal door, installing a temporary door, radiological characterization surveys of items/equipment to be worked on, repairing the receiver tray for rabbits (inter-building parts shuttle), repairing the large lock door/hatch hinge pin, removal of unused Annular Linear Induction Pump equipment, upgrading small transfer lock, troubleshooting and repairing the 2 inch pneumatic transfer system, removing unused equipment inside the decontamination spray chamber, polishing the inside window of 6D, and repairing the spray chamber lower door latch.

Radiological Concerns

The Decon Cell is utilized primarily for waste segregation and processing, material and equipment transfers to and from the main Cell/Hot Repair Area/Cask Tunnel, and in-cell equipment decontamination using the spray chamber. The cell is normally not accessible and is posted as an Airborne Radioactivity Area, High Contamination Area and Very High Radiation Area when in use.



Exhibit 1. Decon Cell – inner vestibule.



Exhibit 2. Decon Cell – temporary door configuration.

How the Process Implemented ALARA Techniques

Temporary shielding was used extensively in the areas in which work was to be performed. Staging of materials outside of the area prior to entry reduced time that personnel were in the cell and remotely monitoring telemetry by HPTs outside of the cell aided in directing activities to reduce personnel dose. A temporary inner herculite door was designed and installed to control airflow and prevent contaminated air from flowing back into the vestibule between the cell and the operating corridor on the main floor. The pre-job collective dose estimate was 11,300 person-mrem, but due to the effective application of ALARA principles, the measured collective dose for the project was 3,750 person-mrem.

Lessons learned from this entry will be implemented during the next entry planned for CY 2020.

1.1.2 HFEF Manipulator Repair Glovebox Refurbishment

Mission Statement

The glovebox is used to address functional issues and vulnerabilities of the system and to repair slave ends of the master-slave manipulators by the Manipulator Repair Group (MRG). The glovebox itself was in need of repairs, maintenance, and upgrades after years of use.

Project Description

Maintenance, repairs, and upgrades completed during this project included replacement of windows, installation of a smear counter station, upgrade of oval glove and gauntlet ports, and replacement of the monorail used to assist in loading slaves for repairs.

Radiological Concerns

The glovebox used by MRG was posted as an Airborne Radioactivity Area, High Contamination Area and Radiation Area/High Radiation Area when in use. This system was utilized to repair highly contaminated master-slave manipulator slave ends used to perform destructive and non-destructive examinations of hot fuel in the main cell as well as waste processing and material movements in the Decon Cell. This project required removal and replacement of the windows that function as the primary safety barrier for the system.

How the Process Implemented ALARA Techniques

A fixative was used on the inside of the glovebox to fix contamination in areas that were inaccessible for decontamination. The glovebox was isolated from the Hot Repair Area through the installation of a cover on the opening used to pass slaves into the enclosure. A HEPA filtered air mover was connected to the end of the glovebox to provide ventilation as windows were removed. Airflow tests in the glovebox were performed to ensure proper airflow on top of the glovebox and around the cover to ensure a positive seal. Administrative controls were implemented to ensure the windows were removed and replaced in a specific order to ensure airflow moved away from personnel performing the job at all times. Additionally, smoke tests were performed as windows were removed to ensure adequate ventilation was maintained as they were removed. The pre-job collective dose estimate was 520 person-mrem, but due to the application of ALARA principles, the measured collective dose for the project was 52 person-mrem.



Exhibit 3. Manipulator repair glovebox refurbishment - interior view.



Exhibit 4. Manipulator repair glovebox refurbishment - exterior.



Exhibit 5. Manipulator repair glovebox refurbishment - roof opening.

1.1.3 Hot Fuel Examination Facility (HFEF) Small Cask Transfer Station Installation

Mission Statement

Installation of the HFEF Small Cask Transfer Station will allow transfer of samples remotely rather than by personnel using reach tools. Use of this remote system is expected to result in a reduced dose to personnel.

Project Description

The HFEF Small Cask Transfer Station was installed in the shielded wall of the Hot Repair Area. Installation of the Transfer Station required removal of lead shielding in the wall, cutting the hollow block wall, installing the Transfer Station insert, pouring grout around the Transfer Station insert, and reinstalling the lead shielding. Additionally, the project includes the installation of manipulators to remotely load the samples into the cask.

Radiological Concerns

The Hot Repair Area was posted as an Airborne Radioactivity Area, High Contamination Area and Radiation Area/High Radiation Area. This area of the facility used to move material and equipment (including

slave ends of master-slave manipulators) to and from the Decontamination cell and Main cell. Routine use of the Main cell to destructively examine hot fuel, causes high levels of contamination and elevated dose rates.

How the Process Implemented ALARA Techniques

Tents were installed on the inside and outside of the Hot Repair Area at the location in which the Transfer Station was installed, as well as on the outside of the Hot Repair Area where the holes were bored through the wall to install the manipulators. HEPA filtered air movers were utilized to maintain appropriate airflow.

The pre-job collective dose estimate was 340 person-mrem, but due to the effective application of ALARA principles, the measured collective dose for the project was 12 person-mrem.



Exhibit 6. Small cask transfer station installation – installed.



Exhibit 7. Small cask transfer installation – inside tent.