

TECHNOLOGY@ROCKY FLATS

Demonstration & Deployment Summary

Passive Aerosol Generator reduces worker risk during decontamination activities

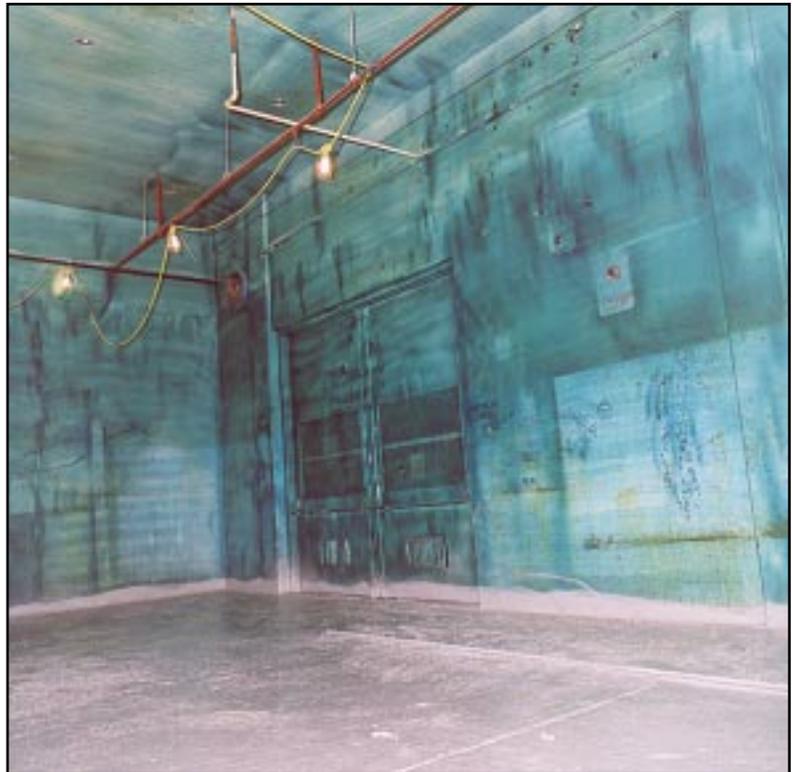
Summary

Since Rocky Flats began operations in 1952, many of the buildings that handled, processed or fabricated nuclear weapons parts became contaminated. Some of the rooms in the former plutonium or uranium buildings are so highly contaminated that, to enter the contaminated rooms for decommissioning or decontaminating activities, workers have to wear large, cumbersome PremAire suits which provide supplied air.

Workers would first enter the contaminated room and apply fixates to all surfaces with an active spraying system before decommissioning could take place. The use of a passive aerosol delivery system would essentially apply a temporary fixative by fogging a room. Workers could then enter the room with the less bulky Powered Air Purifying Respirators (PAPRs) to apply a permanent fixative.

The Need

Rocky Flats has dozens of contaminated rooms, primarily contaminated with plutonium and uranium, which have high airborne contamination levels. Some of the rooms have airborne contamination levels so high that they cannot be measured by standard hand-held radiation detection equipment. These “infinity” rooms require supplied breathing air suits for entry, making work potentially dangerous and time-



The Size Reduction Vault in Building 776 had such high airborne contamination levels that workers had to wear bulky supplied-air suits to enter the now empty room. The green fixative on the walls, applied through room fogging, reduces the risk to workers decommissioning and decontaminating the former “infinity room.”

consuming because of the limited amount of time a worker is allowed in a contaminated room.

In the past, workers had used pressurized hot water spray to remove contamination but still could not bring contamination levels down even after repeated applications. In 1998, the site began using a two-step process to remove the contamination from the air and then seal it in place on the floor and walls of the room. An aerosol sugar fog called Capture Coating was dispersed

with a machine that used sound waves to make the droplets very small. After the radioactive particles in the air were fixed to the surfaces by the fog as it settled, up to a 1/4-inch layer of poly-urea coating called Insta-Cote would then be sprayed on to permanently seal the contamination in place.

Capture Coating has been successfully used at Rocky Flats to significantly reduce the Derived Air Concentration (DAC), a measure for the concentration of plutonium particles in the air, in several infinity rooms including Room 3559 in Building 371 and Room 114 in Building 771. However, an improved method of reducing the DAC in very large rooms is needed because the existing fogging equipment is not capable of uniformly coating all the contaminated surfaces in extremely large rooms sufficiently enough to downgrade the respiratory protection requirements. The desired system would not only maximize dispersion and coverage of a fixative but may reduce required respiratory protection requirements.

The Technology

The passive aerosol generating equipment used for sugar fogging a large room focuses ultrasonic parabolic transducers to create the encapsulating aerosol. The aerosol fog consists of sugar, glycerin and water with an added fluorescent tracer to track potentially contaminated fog residues that might adhere to workers' clothing and equipment.

For each application, the size of the room, distance from the generator to the surface being coated, temperature, humidity, and properties of the coating medium can all vary. To ensure the aerosol droplet size for each application is optimal, the distance from the transducer array to the surface of the encapsulating medium can be precisely adjusted. By optimizing the droplet size, the liquid aerosol behaves more like a gas, ensuring a more complete coating of the contaminated surfaces.

The Project

A passive aerosol system was procured and successfully demonstrated in the Building 776 Advanced Size Reduction Facility (ASRF) and the Size Reduction Vault (SRV), both infinity rooms. Prior to fogging the room, the SRV's derived air

concentration (DAC) peaked at 180,000. After the temporary, green fixative was applied with the aerosol generator, the room's DAC measured less than 50.

The Results and Benefits

Due to the continued success of room fogging, countless hours of potential worker

exposure to high airborne radioactivity have been avoided. A cost savings has also been realized as the requirements for room entry have been downgraded after the fixative is applied. A lower DAC eliminates the need for multiple entries in the more expensive PremAire suits.



Use of the aerosol fogging equipment is intended to downgrade the Personal Protective Equipment (PPE) requirements for room entry from PremAire suits to standard Powered Air Purifying Respirators



Technology Supporting the Path to Closure

For more information about Technology at Rocky Flats, contact David Maloney, Kaiser-Hill Company, (303) 966-7566, or Gary Huffman, DOE, Rocky Flats Field Office, (303) 966-7490

