



Room Fogging

SUGAR FOG AND POLY-UREA COATING

Introduction

In order to meet the challenges posed by the cleanup and closure of the Rocky Flats Environmental Technology Site, the Kaiser-Hill Team continues to pursue the use and adaptation of innovative technologies from across the nation and the world. One such technology is a room fogging and coating technique to dramatically reduce airborne radioactive contamination levels in the most contaminated areas at the site. This technology involves the use of a sugar fog, called Capture Coating™; a fluorescent tracer, called Invisible Blue™; and a poly-urea coating, called Insta-Cote™ to capture and contain airborne radioactive contamination.

This unique application is yielding ten-fold reductions in contamination levels and is a tremendous breakthrough in decontamination and decommissioning activities for Site closure.

Challenge

Rocky Flats has dozens of contaminated rooms, hundreds of contaminated gloveboxes and miles of contaminated ductwork and piping. These areas, primarily contaminated with plutonium and uranium, present a unique decontamination and decommissioning challenge. Many of them have high airborne contamination levels, some so high that they cause standard hand-held radiation detection equipment to “peg out” indicating the highest level that particular equipment can measure. These areas, called “infinity” rooms, require supplied breathing air suits for entry,

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making work cumbersome and potentially dangerous and greatly limiting the amount of time a worker can stay inside. Initial efforts to decontaminate these so-called “infinity” rooms were time-consuming and required repeated entries into contaminated areas by the cleanup crews. In addition, the conventional methods (pressurized hot water spray) were not able to bring contamination levels down in some areas even after repeated applications. Rocky Flats needed a way to reduce airborne contamination levels to allow further deactivation and decommissioning of these highly contaminated areas.

Solution

Called Capture Coating™, the sugar fog was developed by a California company called Encapsulation Technologies and is being used at Rocky Flats in conjunction with Master Lee Hanford Corporation. Used at other U.S. Department of Energy sites and in the private sector, the Capture Coating™ had to be modified for a unique application at Rocky Flats.

Initially radiological control workers at the site identified concerns that the sugar aerosol would mask the alpha radiation emitted by plutonium, making it undetectable to radiation monitoring equipment used at the site. The concern was that workers in areas treated with the sugar fog might contaminate their clothing or equipment with plutonium trapped within the fog. Therefore, radiological control technicians working with project engineers and project management eventually reached a unique solution.

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They discovered that by adding a fluorescent tracer called Invisible Blue™ to the sugar fog, they could track potentially contaminated fog residues that might adhere to workers' clothing and equipment. Invisible to the human eye, the tracer can be seen only by shining a black light on it.

The aerosol treatment can be followed by spraying on a poly-urea coating called Insta-Cote™ developed and brought to market by Master Lee Hanford Corporation. Together, the two-step process removes the plutonium contamination from the air and then seals it in place on the floor and walls of the room. The poly-urea coating is impermeable and fire retardant.

How It Works

First the room is fogged for 30 to 40 hours using the fine aerosol sugar fog created by a machine using sound waves to make the droplets very small. The fog is then pumped into the room through a flexible duct, similar to the ducts used for residential clothes dryers. Radioactive particles in the air adhere to the fog and drop out of the air as the fog settles to the floors or walls. After



the fog is allowed to set and dry, a 1/8 inch to 1/4 inch layer of the Insta-Cote™ is applied to fix the contamination in place and provide a workable surface for future cleanup workers who will clean and dismantle the facility.

Results

The technology completed its first test run on Room 3559 in Building 371 in July 1998. Dubbed an "infinity" room, the room contained 13 plutonium nitrate solution processing tanks and was

contaminated by leaking acid from past production operations. Through the use of this new technology, contamination in the room was brought down from more than 90,000 derived air concentrations (DAC), a measure for the concentration of plutonium particles in the air, to less than 100 DAC.

Benefits

The benefits of the use of Capture Coating™ and Insta-Cote™ are multiple, the most important being greatly increased worker safety. The products yield tremendous results in terms of reducing and containing airborne contamination. In the past, workers used pressurized hot water spray to remove contamination from rooms such as 3559 – a process which involved workers actually going into the contaminated area multiple times using supplied breathing air suits.

The new process means a minimized amount of worker exposure and a decrease in the size of the work crew. The previous method required more than one dozen workers for a single entry into the room; this process requires only four people.

In addition, Insta-Cote™ may have additional uses in containing leaks or sources of contamination, trapping them inside its durable, impermeable coating.

Conclusion

Now that the technology has met with success, Capture Coat™ and Insta-Cote™, either together or separately, may be used to decontaminate a range of items at Rocky Flats such as Raschig ring tanks, gloveboxes, ventilation ducts, process piping, and other "infinity" rooms.



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Make It Safe. Clean It Up. Close It Down.



For further information about Rocky Flats

Contact DOE Communication at (303) 966-5993, or Kaiser-Hill Communication at (303) 966-2882, or toll free at (800) 269-0157 (press *82882# when you hear the automated attendant)

Also, additional information about Rocky Flats is available on the internet at: <http://www.rfets.gov>