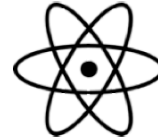


DECON SAFETM

CBRN Decontaminant



Safe, Effective Chemical, Biological, Radiological and Nuclear Decontamination for Military, Civil Defense and Emergency Services.

Independent Testing Summary: The purpose of this study was to explore optimal use conditions and methods of DECON SAFETM and to evaluate the effectiveness of DECON SAFETM against Technetium-99m (Tc-99m) and Glo GermTM (chemical and biological fluorescent simulant).

Tc-99m was utilized for all contamination testing. Iodine is more costly and presents a greater hazard for controlled testing situations, such as the current study. With a half-life ($t_{1/2}$) of 6.0067 hours, the radioactive hazard of Tc-99m is considered gone (below background) after 60 hours (~ 3 days). Thirty years of customer data shows DECON SAFETM is effective on a wide variety of isotopes. Testing on Steel, Z500 (HAZMAT suits) and safety masks was done with a liquid isotope, real work situations involving this type of contamination are rare. The nuclear fall out, chemical and biological simulate tests are closer to real world events. DECON SAFETM showed excellent results in all tests.

Key Findings:

Radioactive Contamination on steel

DECON SAFETM removed approximately 90% of the Tc-99m contamination from metal surfaces after a single application. Three applications of DECON SAFETM reduced Tc-99m contamination to near-background levels (99.2% reduction).

Radioactive Contamination Zytron 500 Fabric

Z500 is essentially an impermeable fabric used to make HAZMAT suits. During testing and over 72 hours after testing, no discoloration, peeling, or other damage was indicated on the samples that were tested with DECON SAFETM.

DECON SAFETM removed 85.6% of Tc-99m contamination after one application from Z500 fabric. *Since the Z500 samples were cut (4" x 4") from a Level-A ensemble suit made of Z500 fabric, it is highly likely that some of the Tc-99m absorbed into the inner fabric layer (at the cut ends) where it*

was not easily accessible for decontamination, leading to slightly lower initial removal levels. A full intact HAZMAT suit would not have this problem.

MIRA Safety Protective Mask

MIRA Safety CM-6M Tactical Gas Masks were contaminated on the face shield, solid shield seal, and rubber surround material with 10 minutes of contact with Tc-99m. During testing and over 48 hours after testing, no discoloration, peeling, or other damage was indicated on the masks that were tested with DECON SAFE™.

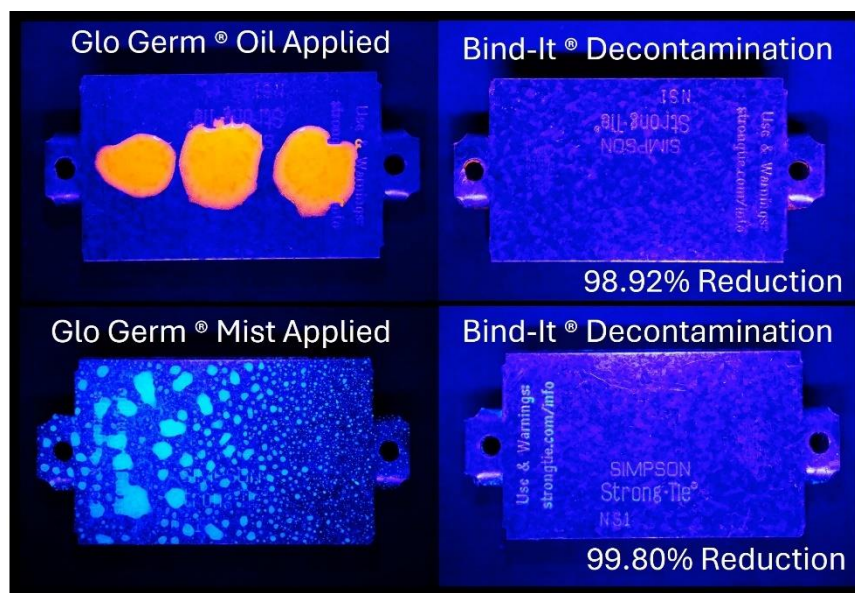
This was a challenging test for any decontamination method since there are many areas that the contamination can settle. Rinsing or wiping may not remove all of the residual contamination from liquid isotope contamination. Decontamination by submersion may be preferred in this situation. However, DECON SAFE™ removed approximately 82% of contamination after one application. In a fall out scenario, particulate contamination will not be able to creep into seals and crevices of a protective mask.

Chemical and Biological Simulant Tests

Glo Germ™ products are common in the Combating Weapons of Mass Destruction (CWMD) fields of study to visualize contamination and the spread of contamination during operational and decontamination processes. Glo Germ™ markets several variations of its products, one being an oil form, and another in a pressurized mist (wet aerosol) form. Glo Germ™ is colored to the naked eye but also visible under UV light.

DECON SAFE™ removed 98.6% (average of 3 tests) of the Glo Germ™ Oil and Mist contamination from metal surfaces after a single application. A sample of this fluorescence test is shown below. These tests do not imply chemical or biological neutralization or inactivation of actual chemical or biological agents, only removal.

Simulating nuclear fallout simulation



Shortly after a nuclear weapon detonation, nuclear fallout is residual radioactive material that is propelled into the upper atmosphere that "falls out" of the sky over a period of hours to months. If the fireball from a nuclear detonation touches or is near the ground, dirt and other particulate will aggregate with the residual radioactive material and form fallout particles due to the intense heat.

Fallout particles contain a wide range of radioisotopes and fission products (actinides) but Tc-99m was used in these tests for safety. Simulated nuclear fallout was created by adsorbing Tc-99m onto small beads. The beads were made of metal- organic frameworks (MOFs) in two different sizes 10-20 micrometer (μm) and 100-300 μm . These sizes are consistent with potential fallout particle sizes.

The small and large MOF beads were added to Tc-99m and mixed until the consistency of wet sand was achieved(Figure 4). The contaminated MOF was set out to dry for 3 hours. After drying, the two preparations were highly radioactive and appeared and behaved like sand or dirt (Figure 5). These preparations were used to simulate nuclear fallout and dispersed onto aluminum sheeting and left for one hour.

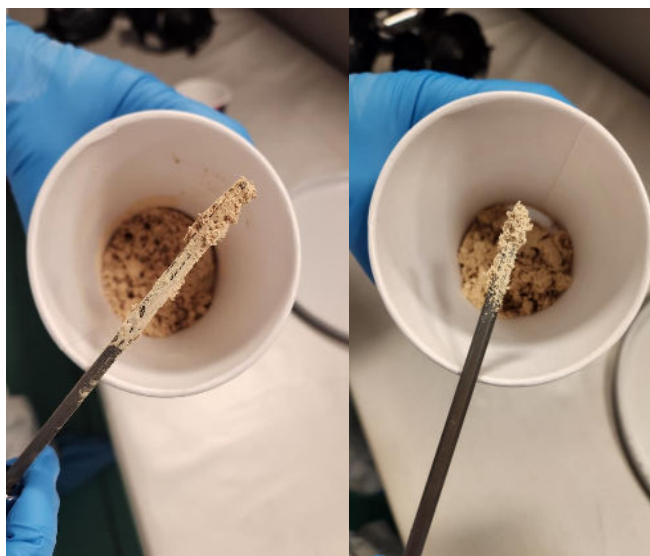


Figure 4. Preparation of Tc-99m contaminated MOF



Figure 5. Contaminated MOF before (top) and after (bottom) drying.

After one hour, the surface contamination was removed by sweeping, followed by one application of ready-to-use DECON SAFE™. Sweeping of gross contamination removed over 77% of the removable contamination but there was still a significant amount of residual contamination. One application of DECON SAFE™ removed all residual contamination (99.49%) and brought the radioactivity to background.

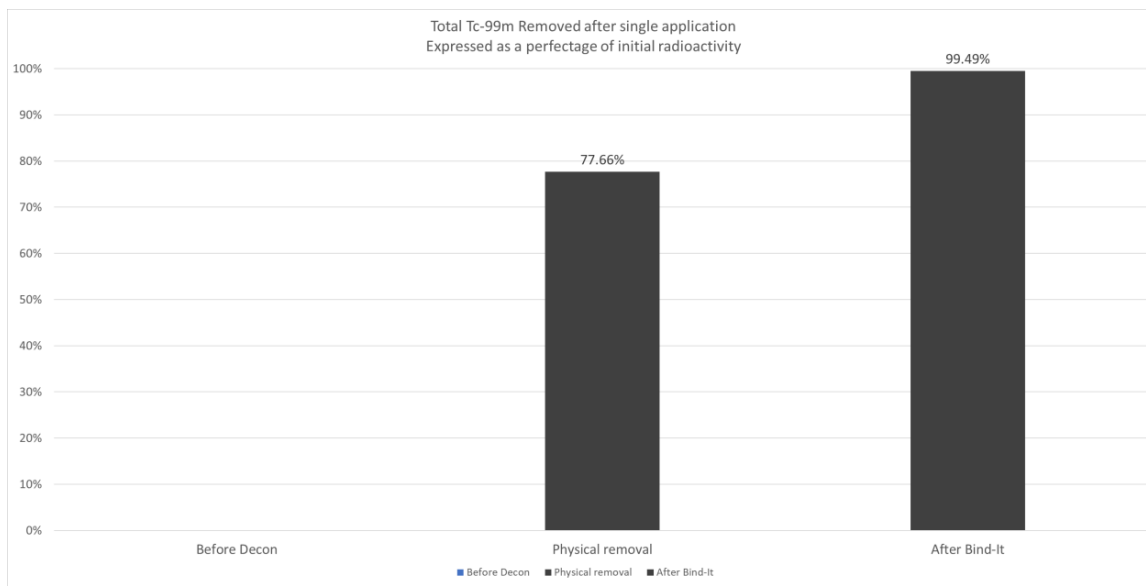


Figure 3. Bind-It removed 99.49% of particulate contamination.

Non-corrosive, Non-Toxic, with a pH of 6.5

DECON SAFE™ was not observed to have any discoloration or harmful effects on steel, aluminum, Kappler Zytron™ 500 fabric, Kappler Durachem™ 500 fabric, painted concrete, skin, butyl, nitrile, or acrylic materials.

The full 24 page test report is available upon request.