

INDUSTRIAL HYGIENISTS CLEAR THE AIR AFTER PENTAGON TERRORIST ATTACK

Industrial hygiene is the science that is dedicated to prevention of occupational illnesses and injuries.



Navy industrial hygiene clearance sampling followed clean up of Pentagon after the terrorist attack

Industrial hygienists evaluate the risks of exposure to chemical and physical hazards in the workplace. The industrial hygienist also develops methods for eliminating or controlling those hazards. In a way, industrial hygienists are detectives, workplace Sherlock Holmes clones, who search out and identify health hazards that could harm workers. They also hunt down the sources of work-related illnesses.

An important responsibility for industrial hygienists is ensuring that everyone in a work area is protected from exposure to chemicals and other known or suspected contaminants. Following decontamination, industrial hygienists carry out *clearance sampling*, a method of ruling out the presence of health-hazardous levels of specific toxins before allowing employees and others to reenter previously contaminated locations.

The September 11, 2001 terrorist attack on the Pentagon put a new spin on industrial hygiene clearance sampling. After the plane crash and fire destroyed part of the Pentagon's structure, health-hazardous residues and dusts were released into the



Aerial view of Pentagon September 11, 2001 crash scene

crash zone and adjacent areas. These contaminants included by-products of combustion, lead, asbestos and other toxins. The resulting hazard meant that clean up crews needed to wear full-body protective suits and respiratory protection, as shown in photos at right and below, while decontaminating and getting ready to rebuild the damaged portions of the Pentagon. During clean up, it was necessary to periodically assess whether a previously contaminated area had been decontaminated sufficiently to allow construction crews, Pentagon workers, and others to enter the area without wearing full-body personal protective equipment and respiratory protection.



Clean up crews wore full-body protection and respirators

Washington, DC area industrial hygienists based at the National Naval Medical Center (NNMC) were assigned to provide technical expertise to the Pentagon clean up project and were integrated into a Department of Defense team spearheaded by the Army's Special Medical Augmentation Response Team (SMART). Five additional industrial hygienists from NNMC's northern group also participated.



Taking a break from long hours of hard work

From September 15, 2001 through September 22, 2001 Navy industrial hygienists worked long hours to expedite the recovery portion of the Pentagon restoration project. The team brought their sampling equipment and prepared for any contingency that might require industrial hygiene assistance. Team members also brought along their full-body protective clothing and respiratory protection to safeguard them from any air and surface contaminants they might encounter at the crash site.

The primary duties of the industrial hygiene team were to collect indoor environmental samples and continually assess the site for health

hazards. The Navy industrial hygienists collected and analyzed *air samples* and *wipe samples* in the crash zone and adjacent areas of the Pentagon to identify or rule out the presence of hazardous substances. They used calibrated air-sampling pumps to collect air samples and took wipe samples by wiping down surfaces on which potentially health-hazardous dusts or chemical residues had



Pentagon office damaged in September 11, 2001 terrorist attack

accumulated. After clean up of the crash zone and adjacent sections of the Pentagon, additional wipe and air samples were analyzed to ensure that these areas were sufficiently restored to protect persons entering those areas from health risks due to contaminants. After *clearance sampling* confirmed that surfaces and the air in those areas were free of contamination, site clean up workers and others were free to enter those areas without full-body and respiratory protection.

Because the site was a crime scene, and not a typical work environment, the industrial hygienists faced several logistical challenges. Getting to the Pentagon itself was a lengthy and complicated process. The parking lots that surround the Pentagon building had been closed, and security was extremely tight. Each team member and all equipment were inspected top to bottom every time the industrial hygienists entered and left the Pentagon grounds. The lack of



Pentagon terrorist attack crime scene

electrical power and lighting were also obstacles that were overcome by snaking extra long power cords long distances to run the air sampling pumps. Team members used flashlights in the mostly dark and disordered areas where they needed to take wipe and air samples.

Frequently, they had to climb over and around rubble, lopsided flooring, and collapsed sections of the damaged building.



Many areas of clean up site lacked electrical power and lighting

In addition to measuring levels of surface and airborne contaminants in the crash area and determining when each area was safe for reentry without special protection, the industrial hygiene team investigated the trail of contamination from the fire to establish how far adjacent areas may have been affected. Team members collected

numerous air and wipe samples to determine whether contaminants had migrated into areas of the building where employees were scheduled to return to work. Where contamination was found, the industrial hygienists provided recommendations for decontamination. After decontamination, they scheduled follow up clearance sampling to verify the success of decontamination. Following a clearance survey that found no contaminants, the workforce safely entered that location.



Entrance to Pentagon crash scene

By Saturday, September 22, 2001, the industrial hygiene assistance team had completed their mission. Supervisor Nancy Davis stated, “The commitment and professionalism of these industrial hygienists was exemplary. We had more volunteers than we needed. All were more than eager to serve, unselfishly providing their expertise to get the Pentagon up and running again. Because of these selfless individuals, Navy industrial hygiene met the Pentagon's emergency needs while still servicing our regular customers.”

Added Gil Clouser, a member of the industrial hygiene team, “We did a lot of walking, climbing, and crawling in dark and dirty places. The days



Navy industrial hygiene expertise helped to safely return Pentagon employees to work

were long and physically demanding. But we made a difference; we played an important role in restoring the Pentagon and calming fears of lingering health hazards.”

The NNMC Industrial Hygiene Service did not end their work on September 22, 2001. Jeff McClafin, an industrial hygiene team member, developed a composite report using input from the industrial hygienists who participated in the Pentagon clean up project. The report consolidated information that will help industrial hygienists in evaluating occupational health risks after other major disasters.

Navy industrial hygienists used their expert knowledge in the dangerous and unpredictable environment of the Pentagon recovery and restoration project. The industrial hygiene team provided the data that showed the absence of health risk factors, protecting the health of construction

crews and permitting the safe return of Pentagon employees to their work areas.

Point of Contact: Martin J. Dubin, Industrial Hygiene Supervisor,
National Naval Medical Center, Philadelphia Division
Telephone: Commercial 215-897-6115, DSN 443-6115
Email: mjdubin@bethesda.med.navy.mil