

## RISK OF FORMALDEHYDE EXPOSURES REDUCED

Workers in mortuaries face a variety of occupational health hazards, including potential exposure to formaldehyde vapors. Formaldehyde, a component of embalming fluid, is a nearly colorless gas with a strong, suffocating odor. The primary symptoms of exposure to formaldehyde vapors are stinging eyes and irritation of the nasal passages, throat, and respiratory system including chest tightness, possibly followed by bronchitis, shortness of breath, coughing, and wheezing. The Occupational Safety and Health Administration (OSHA) and the American Conference of Industrial Hygienists (ACGIH) consider formaldehyde a suspect human carcinogen.



The primary mission of the mortuary facility at the U.S. Naval Hospital, Rota Spain is as a contingency center to process mass fatalities from Southern Europe and Africa prior to their return to the U.S. Under non-contingency conditions, the workload varies from about two to ten cases per year.



Components of preservation products include formaldehyde

There is a two-week preservation requirement to process and return the deceased from overseas to the continental U.S. Morticians could be at risk for exposure to formaldehyde from highly concentrated embalming fluid used to meet this preservation requirement.

The mortuary's autopsy/embalming room was originally designed with a general non-recirculating ventilation system that provided the space with 12 room air changes per hour for formalin vapor control. However, baseline screening and personal airborne



Original autopsy room had general ventilation system with 12 room air changes per hour

formaldehyde vapor levels measured from 1994 to 1995 by Rota's Industrial Hygiene staff showed this general ventilation was inadequate. Specifically, formaldehyde levels exceeded both the OSHA short-term exposure limits (STEL) and 8-hour permissible exposure limits (PEL). Immediate interim exposure control methods were implemented in accordance with the OSHA Formaldehyde Standard.

Morticians were enrolled in a respiratory protection program and were fitted with full face air-purifying respirators and cartridges approved for protection against formaldehyde. Issue of disposable "Nitrile" gloves and full rubber aprons completed their skin exposure personal protective equipment (PPE). In addition, the morticians were immediately enrolled in the medical surveillance program and received formaldehyde hazard awareness training.

As a long-term solution to morticians' potential overexposure to formaldehyde, the Naval Hospital Rota Industrial Hygiene Department recommended specific engineering controls designed to reduce formaldehyde vapor exposures to within acceptable levels.



Autopsy table without local exhaust ventilation



Locally exhausted autopsy table

Controls included procurement of specialized autopsy/embalming tables with lateral exhaust air slots to capture and remove formalin vapors before they could reach morticians' breathing zones. These exhaust units have hoods and side slots that enhance the capture of formaldehyde vapors at their source. The autopsy room's ventilation system was increased to 16 room air changes per hour, which also removed formaldehyde vapors more effectively.

The Naval Facilities Engineering Service Center (NFESC) reviewed the design of the facility's proposed industrial ventilation system and performed final field acceptance tests.



NFESC visual smoke tests demonstrate capture of vapors by autopsy table local exhaust system

The successful combination of general and local ventilation engineering controls reduced morticians' Time Weighted Average (TWA) formaldehyde exposures up to approximately 1/10th the OSHA PEL of 0.92 milligrams per cubic meter (mg/m<sup>3</sup>).

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Industrial hygiene sampling support from the NEPMU-2 AIHA-certified analytical lab in Norfolk VA was also a major factor in the ultimate resolution of this project.