

IMPROVED LOCAL EXHAUST VENTILATION PROTECTS WELDERS AT PWC PHILADELPHIA

Public Works Center (PWC), Norfolk Detachment, Philadelphia, PA, has a welding shop at the Naval Inventory Control Point (NAVICP) for repairs to its Heating Ventilation and Air Conditioning (HVAC) system. Depending on the size of a job, welders may spend several hours a day welding pipes or other HVAC system parts. Some pipes and parts contain steel alloys - mixtures that include other metals that may release health-hazardous *fumes* when heated. Overexposure to some metal fumes can result in mild respiratory discomfort, or, rarely, more serious ailments.



Welders wear protective clothing and depend on a good ventilation system that controls both the airflow quantity and distribution.

Program. Welders who pass their medical surveillance examinations continue to work in their job classification. Those who do not are provided the necessary medical treatment and are reassigned to other jobs.

Welders wear protective clothing to protect them from the hot welding torch, hot metals, and ultraviolet light exposure. When needed, welders also use respiratory protection that is specifically designated to protect them from inhaling smoke and fumes that may be generated during welding.

Some welding rods and solvents can contain metals or chemical components that may create an inhalation hazard during welding. Components of welding rods and solvents may also react with ultraviolet light generated during arc welding to form a visible smoke, commonly called *welding smoke*. *Welding smoke* can irritate the eyes and respiratory tract.

Because welding emissions can be health hazardous, Navy employees who are at risk of overexposure to welding smoke and metal fumes participate in a Medical Surveillance

General room ventilation alone is not sufficient to remove welding smoke and fumes and may spread contaminated air throughout the workplace instead. To protect them from inhalation hazards, welders use *local exhaust ventilation* when welding indoors to remove smoke and fumes at their source. Until recently, the canopy hood shown in the photo at right provided local exhaust ventilation in the NAVICP welding shop. The canopy hood was not appropriate for welding, because it drew the welding smoke and fumes directly into the welder's face, forcing him to wear respiratory protection to avoid the risk of inhaling air contaminants generated during welding. In addition, the welder had to maneuver large and awkward objects to be welded directly under the immovable canopy, and some parts were too large to fit under the canopy at all.



Immovable canopy hood drew welding smoke and fumes directly into the welder's breathing area.

The National Naval Medical Center (NNMC) Industrial Hygiene Office routinely monitors NAVICP's welding shop to verify that welders and others are adequately protected from welding hazards. Trina Redford, the NNMC industrial hygienist assigned to NAVICP, concluded from her observations and air samples that the welding shop would benefit from an upgraded local exhaust ventilation system. NAVICP applied for Navy Hazard Abatement Program funding to pay for the new system. The Chief of Naval Operations' Hazard Abatement Fund is administered by the Naval Facilities Engineering Services Center (NFESC) to assist Navy commands to eliminate workplace hazards. Mechanical engineers with NFESC's Occupational Safety and Health



One of two flexible arms on air extraction unit is placed directly over welding area. Second arm (foreground) is available for use by another welder.

Occupational Safety and Health Air Branch visited the NAVICP welding shop. They agreed with NNMC's findings that the shop would greatly benefit from a local exhaust ventilation system that the welder could adjust for maximum removal of welding emissions without it getting in his way.

A new local exhaust ventilation system was installed with two air extraction units on flexible arms that are placed directly over the area to be welded as shown in the photo above left. The welding shop installed two articulating extractor arms on the local exhaust ventilation system so that two welders can use the local exhaust system at the same time. PWC Philadelphia also purchased a portable air extraction unit for situations when welding repairs must be made on site.



Articulating arm allows welder to easily maneuver parts for welding under air extraction unit

Using the flexible arms, welders can protect themselves from inhalation hazards while working on objects of any shape or size. Once the welder places an air extraction arm where he needs it, the unit removes welding smoke and fumes at their point of origin before they can be inhaled and without interfering with the welder's work. When only one welder is working, a damper closes off the unused arm.

After installation of the new local exhaust ventilation system, Martin Dubin, Industrial Hygiene Supervisor in NNMC's Industrial Hygiene Office, resurveyed the welding shop to assess the new system's effectiveness. Air samples collected during welding procedures verified that the air extraction system was extremely efficient in removing welding emissions. According to welder, Ben Kletchek, "The new ventilation system is easy to use and works really well. It used to be difficult to get objects to be welded under the old hood. Now, all I have to do is put the object on the welding table and guide an extractor arm over to where I need it."

Thanks to the new local exhaust ventilation system, the NAVICP welding shop is protecting its welders and others from the risks of overexposures to air contaminants, and welders no longer need to wear respiratory protection for most welding jobs. NNMC's Industrial Hygiene Office played a pivotal role in identifying the disadvantages of the previous local exhaust ventilation system,



Portable air extraction unit is used for welding tasks performed on site.

recommended a suitable alternative, and verified the adequacy of the welding shop's new and improved local exhaust ventilation system.

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