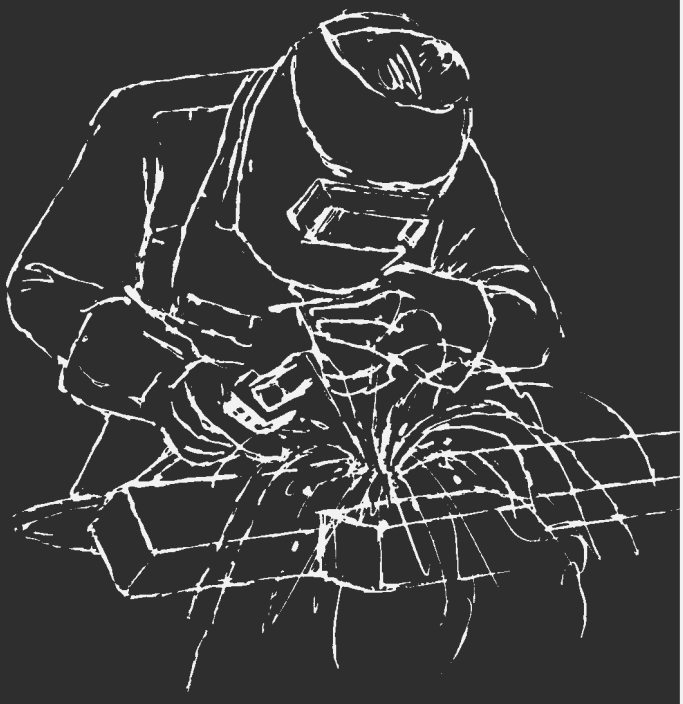

PREVENTING ACCIDENTAL OZONE POISONING IN WORKERS

Ozone is a form of oxygen. At ordinary conditions it is a colorless or pale blue gas and has a characteristic pungent odor. In high concentrations it is extremely flammable and in liquid form it becomes a dangerous explosive.

As a strong oxidizing agent, ozone has many uses. Its greatest use is in the suppression of mold and bacterial growth, such as in the treatment of drinking water supplies and industrial wastes, and the sterilizing of food products. Other uses of ozone include the rapid aging of wood, the aging of liquor, rapid drying of varnishes and printing ink, production of peroxides, bleaching of oils, waxes, textiles and papers, and deodorizing of feathers.

Despite its usefulness, ozone is acutely and chronically toxic to humans, and workers in enclosed spaces where ozone is produced or used should be on guard against its potential hazards to which they may be accidentally exposed.

WHERE THE HAZARDS ARE

There are two general sources of exposure to ozone. Ozone is produced by the discharge of high tension electrical current in air or oxygen, such as from electrical equipment, welding operations, ultraviolet light spectrographs and plasma jet operations. Exposure to ozone may also occur from ozone generators developed for use in industrial processes. Examples of this type include ozone produced for use as a disinfecting germicide, or to control growth of fungus, molds and bacteria in food processing.

HEALTH INJURIES FROM OZONE

There is no exposure to ozone without some risk to health. On this basis, all unnecessary exposure of humans to any concentration, however small, should be avoided. The danger of undesirable health effects far outweighs any benefits presumed to be derived from the industrial or institutional use of ozone for control of odors or bacteria in air.

Even in low concentrations, inhaled ozone may cause dryness of the mouth, throat irritation, coughing, headaches, and pressure or pain in the chest, followed by difficulty in breathing. Varying in individuals, and depending upon the concentration of ozone and the period of exposure, ozone can produce many other injuries. It impairs the sense of smell, disguises other odors with a continuous odor of ozone, alters taste sensation and reduces the ability to think. Ozone also depresses the nervous system, thus slowing the heart and respiration and producing drowsiness and sleep.

Exposure to relatively small concentrations for an hour can cause serious cough and fatigue. Exposure to sufficient quantities for two hours results in a marked reduction in the capacity of the lungs. Exposure for four hours can cause the lungs to fill with fluid and start bleeding. Inhaled in concentrations not acutely injurious, ozone may bring on, hasten, or increase the severity of disease of the respiratory tract. It is a special hazard to people who already have heart or respiratory problems.

Exposure to high concentrations of ozone or continuous exposure will greatly increase the danger to the worker and can cause death.

CONTROL OF EXPOSURE

Control of ozone exposure in industry is mainly an engineering problem, and preventing the health injuries which result from exposure depends, primarily, upon keeping inhabited spaces as free from ozone as possible. However, medical control and employee training have an important part in avoiding the hazards of exposure. Even with the best of controls, accidents can happen through the faulty operation of a machine, through the buildup of the concentration of ozone in enclosed spaces, or through the failure of employees to take the proper precautions.

Process control. General ventilation is not sufficient to prevent the escape of ozone into inhabited spaces, and local exhaust ventilation should be provided. Enclosure of hazardous processes is the most efficient method of control, but the nature of the operation may often prohibit enclosure. Hazardous processes should be isolated from the general work area in order to expose as few people as possible.

Personal protective devices. In cases of emergency when it is necessary to enter areas containing high concentrations of ozone, a *supplied air mask* should be used. Filter, cartridge or canister respirators will not protect against ozone.

MEDICAL SUPERVISION

For workers exposed to ozone, medical supervision, including preplacement and periodic medical examinations, is a necessity. All prospective workers should be given a complete preplacement medical examination, including chest X-ray. Those with preexisting diseases of the lungs or heart, and those

highly susceptible to respiratory infections, should not be exposed to ozone. Workers repeatedly exposed to ozone should have yearly medical examinations, including a chest X-ray.

First aid after exposure. The injured worker should be removed from exposure immediately. He should lie down, remaining at rest until he can be seen by a physician. In cases of acute exposure, the examining physician may hospitalize the worker until the danger of severe lung damage or possibly pneumonia has passed. When small amounts of ozone are inhaled, the symptoms usually disappear after the worker is removed from exposure. The worker should be examined by a physician, but frequently no treatment is required.

EMPLOYEE TRAINING

The physician and the work supervisor can help to prevent health injuries by informing employees of the hazards of ozone and how to avoid them. Each work supervisor has a definite responsibility to inform the workers in his area, to post warning signs, and to enforce protective measures.

TO PREVENT HEALTH INJURIES TAKE THESE PRECAUTIONS

1. Observe warning signs and instructions alerting you to the hazards of ozone and to the precautions that you should take to protect yourself.

2. Watch for the early symptoms of ozone poisoning—mouth, throat and chest irritation; coughing and breathing difficulty; and headaches.

3. Cooperate with your plant physician. Inform him of any previous or present respiratory disease, heart damage, or eye irritation. Keep appointments for your medical checkup. If no plant physician is available, check with your private physician before working in areas where ozone exposure may occur.

4. For specific problems within your own work environment, contact the Industrial Hygiene Division of your State Health Department.

HIS No. 136
PHS No. 1526

U.S. DEPARTMENT OF
HEALTH, EDUCATION AND WELFARE
Public Health Service
Division of Occupational Health

☆ U.S. GOVERNMENT PRINTING OFFICE: 1973 —759-578/1455