1. Avoid working with ozone, or processes that generate ozone, in unventilated, confined spaces.
2. Be sure that the ventilation system is working.
3. Wear recommended protective equipment.
4. Cooperate with management in medical programs and in taking the periodic physical examinations.
5. Report early symptoms of ozone poisoning to plant management.
6. If ill for any reason, always tell the physician that you work with ozone and return to your work only after his approval.

U.S. DEPARTMENT OF
HEALTH, EDUCATION, AND WELFARE
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industrial exposure to OZONE

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INDUSTRIAL EXPOSURE TO OZONE

Ozone is a form of ordinary oxygen. It occurs naturally in the upper atmosphere and is formed in some polluted lower atmospheres. Under ordinary environmental conditions, it is a colorless gas with a characteristic pungent odor that is described, for various concentrations, as like musty hay, chlorine-like, or having an "electrical odor." The odor is sufficiently distinctive and penetrating to warn of the presence of ozone.

In the liquid form ozone is a dark blue, highly explosive material. It is readily detonated by electrical sparks, shock, the presence of organic matter, or sudden changes in temperature and pressure.

Ozone is a powerful oxidizing agent that deteriorates many materials, such as rubber, textiles, and pigments. It is an effective disinfectant and is used to suppress the growth of fungus, mold, and bacteria in water supplies, industrial wastes, and prepared food products. Other uses include aging wood rapidly, aging liquor, drying varnish rapidly, producing peroxides, bleaching oils, and deodorizing feathers.

Useful as it is, ozone is acutely and chronically toxic to humans, acting primarily on the lungs and resulting in death if the concentration is sufficiently high. Workers, particularly those working in enclosed or poorly ventilated spaces where ozone is produced, must be protected from excessive exposure.

Where the Hazard Is

Ozone is produced from oxygen by an electrical discharge in the air, such as can occur at high-voltage electrical equipment or electrical switches, or by photochemical reactions resulting from ultraviolet radiation. In industry it is produced by arc welding operations, high voltage spectrographic equipment, and plasma torch cutting operations. It may be generated to a lesser extent by such electrical equipment as copying machines, ultraviolet lamps, and electronic air filters. Exposure to ozone may also occur near ozone generators used in industrial processes.

How Ozone Can Affect You

Exposure to ozone is a health risk and unnecessary exposure to any concentration, however small, should be avoided. The danger to the health of workers from intentionally created ozone, such as for the industrial or institutional control of odors or bacteria, may far outweigh any benefits derived.

Breathing ozone in low concentrations may cause dryness of the mouth, irritation of the throat, headaches, coughing, and pressure or pain in the chest, followed by difficulty in breathing. The ozone impairs the sense of smell, disguises other odors, alters tastes, and reduces the ability to think clearly. It also depresses the nervous system, slowing the heart and respiration and producing drowsiness and sleep.

Ozone is a special hazard to people who already have heart or lung problems; breathing it may bring on, hasten, or increase the severity of existing lung disease. Prolonged exposure or exposure to high concentrations can cause even healthy lungs to fill with fluid and start bleeding.

How to Control Exposure

Preventing harmful exposure to ozone requires an awareness of the potential health hazard and the institution and continued utilization of effective protective measures. The latter include engineering, processing, environmental, medical, and hygienic protective measures.

An adequate ventilation and exhaust system is a fundamental engineering control. General ventilation alone may be insufficient to prevent the accumulation of ozone in inhabited spaces, and local exhaust ventilation should not be permitted to contribute to outdoor air pollution. In some cases the use of enclosures to isolate ozone processes can eliminate or reduce worker exposures. Occasional situations may require the use of a respirator for brief periods. A supplied-air respirator should be used in these emergencies, as filter, cartridge, or canister respirators will not protect against ozone.

All workmen exposed to ozone should have medical supervision that includes preplacement and periodic medical examinations. Those with pre-existing disease of the lungs or heart and those highly susceptible to respiratory infections should not be exposed to ozone at all. Workers repeatedly exposed to ozone should have an annual medical examination, including a chest x-ray.

What Symptoms to Report

Workers experiencing symptoms of mouth or throat irritation, chest pain, coughing and breathing difficulties, or headaches should report such disturbances to the supervisor or medical personnel, depending upon the plant procedures. Where ozone is a part of the work process, they could be signs of ozone exposure. If another clear and immediate explanation is lacking, the worker should be removed from continued exposure until a medical examination can be made and any necessary protective measures taken.

Management's Responsibility

Management has the primary responsibility for instituting ozone hazard controls and for maintaining a proper medical program. The plant physician should be on the alert to relate any symptoms to possible industrial exposure. In addition, a progressive educational program should be administered to inform workers of possible ozone hazards. Safety signs and posters can be used to emphasize the importance of personal health habits and the need to follow safety regulations.

The Employee's Responsibility

Each employee should be aware of the health and safety problems associated with ozone and should follow these general rules, as well as other safety rules made to protect him on the job: