

can be had rather economically by passing the makeup air through an evaporative cooler. This is not mechanical refrigeration, as used in air conditioning, which is vastly more costly and requires recirculation of room air—an arrangement that cannot be permitted when air contaminants are released in the workroom.

*Heat* is probably the cause of more genuine discomfort and complaint than any other environmental condition in industrial plants, and there are several common misconceptions about its control.

A person's thermal comfort depends on four factors: air temperature, humidity, movement or velocity of air around him, and—the one most commonly misunderstood—presence of hot objects or surfaces surrounding him. If these last are at a temperature of 95° or higher, heat will be radiated to the individual and will heat him up just as hot air does. However, we can't usually tell just by the "feel" if it's hot air or radiant heat that's making us uncomfortable. This is why a simple instrument, the globe thermometer, assumes great importance in evaluating industrial heat exposures, but is far less widely used than it should be.

Importance of radiant heat is that it is controlled in a totally different manner from what is used to drop the air temperature. Radiant heat is electromagnetic energy that does no heating whatsoever until it strikes some object, like a person, where it is absorbed. No relief from it whatsoever results from blowing air around. The only protection is to set up an invisible infrared "shadow." This can be done by placing any kind of opaque shield or screen between the man and the radiating surface. Unless the screen itself, however, reflects radiant heat, it will absorb the energy, heat up and re-radiate. Fortunately, commercial aluminum foil, aluminum sheets and corrugated aluminum siding are all highly reflective in the infrared—and are cheap. After locating the sources of radiant heat, shields placed between them and the employees will bring welcome relief.

High level noise is an environmental condition that has long been on the upturn, probably because each day we have more and faster machinery. Generally, noise is not the cause of complaints that heat is, but

noise can cause irreversible damage to what some feel is the most precious of all our senses, hearing. Exposure to high noise over a period of years damages the nerve endings of the inner ear, resulting in varying degrees of deafness which hearing aids cannot counteract. High noise makes speech, the giving and hearing of instructions, and warning signals sometimes impossible. Finally, it may produce fatigue, annoyance, and other effects on the nervous system that are no doubt real but as yet can't be measured.

From the nurse's standpoint, everyone entering on a job in a noisy plant, as well as those already working there, should be given an audiometric test of hearing as part of every complete physical examination. The testing area must be sufficiently quiet—most plant medical services are not. This should be achieved by buying a commercial prefabricated audiometric testing booth. Such a booth is nearly always satisfactory, whereas a plant-made "sound proof" room invariably does not lower the noise sufficiently and in the end costs more.

The audiometer may be a manual one for giving air-conduction tests only (bone conduction and masking are not used). However, the nurse's time will be saved, and a permanent graphic record will be obtained which is independent of the common variations in testing techniques of different operators, if a self-administering, or automatic, audiometer is acquired when the program is inaugurated. Audiograms should be given on job transfers, and on terminations either for job change or retirement.

There is a parallel between control of noise and control of air-borne dust: the noise may be lowered by a change in its source (for example, replacing a fan with excessively high tip speed by one of low tip speed); the source may be enclosed with a box or enclosure of high noise attenuation; isolation of the source may be accomplished by time (shortening the exposure period) or distance (sometimes with sound absorbing baffles hung from the ceiling to reduce spread of noise elsewhere in the room); or by personal protective equipment in the form of ear plugs or muffs.

When any occupational health hazard cannot be brought under control, personal protective equipment must be relied on. But this must always be regarded as a last re-