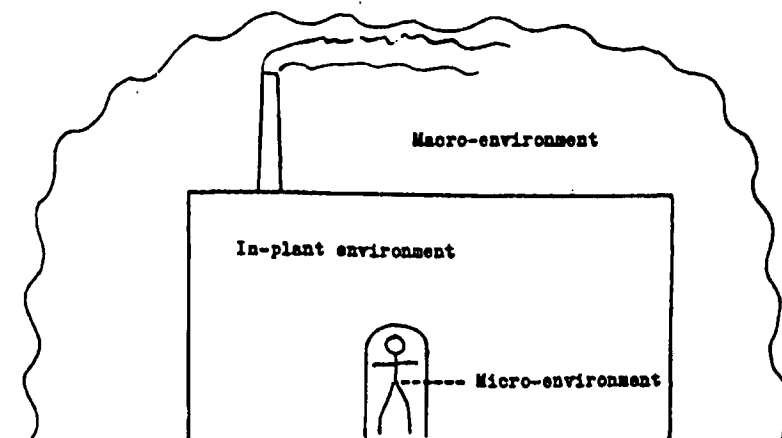




The *Clean Air Act* of 1967, and its amendments, likewise details the standards for ambient air quality governing the "macro-environment" or outer plant. In this regard, it is particularly important to be aware of the state and local air pollution control laws that prevail.

The control of the in-plant environment is specifically directed at providing respirable air and a clean "micro-environment" for the worker (see accompanying illustration). (Control on the macro-environment entails not only health but other considerations—both ecological and aesthetic.)

Control of both the macro- and micro-environments are equally important, however. But the controls exercised for each are not totally compatible with each other. For example, one can provide effective individual environmental control, and thereby a clean micro-environment for the worker, at the expense of contaminating the outside air to excessive levels. Merely sweeping the ashes under the rug, so to speak, or sweeping contaminants up the chimney is not the total answer. However, air pollution control is a total subject in itself.

The scope of this article is limited to the control of respiratory hazards in the "in-plant environment." Even so, the subject is extremely broad, and only basic principles and guidelines are presented here.

The primary objective is to reduce or eliminate respiratory hazards at their source by means of sound engineering control methods. The process development, equipment selection, and plant design stages

are the "opportunity stages" where the possibility of airborne effluents should first be considered, and means of reduction and control should be instituted. The industrial hygienist and safety engineer should participate as members of the process development and plant design team, along with other specialists in ventilation and process control. Ideally, process consideration should include the selection of raw materials of the lowest toxicity and of equipment with built-in contamination controls whenever possible. Moreover, during the plant design and layout stage, consideration should be given to isolation and encapsulation of the critical process units most likely to contribute to air contamination. Likewise, prevailing topography and meteorological conditions might suggest safer locations for the critical process units to reduce exposure to other

plant areas and personnel in emergency situations.

Because the "opportunity stages" generally knock but once, we are confronted mostly with the control of existing operating processes and equipment. In any case, assessment of the hazard relative to type, concentration under various conditions, and other pertinent characteristics—such as particle size, flammability, etc., is requisite to the selection of the proper control methods.

In addition to substitution with less toxic materials, isolation, and encapsulation, the basic control methods include *local exhaust ventilation* and *collection of contaminants at the source*. *Dilution ventilation* is not as effective due to the large volumes of air generally required and the high cost of its conditioning. Also, dilution ventilation may disperse the contaminants to other working areas. Suggested methods of control according to the type of hazard are listed in Table 1.

Common Control Devices

Oxygen deficiency control

Oxygen deficiency can occur in confined spaces due to displacement of air by other gases and vapors and due to consumption of oxygen through metabolic or oxidation processes.

Immediate ventilation with fresh air is the most expeditious solution. Fan blowers and venturi-type air movers can be used effectively for this purpose.

TABLE 1

Hazard Control Methods	
Hazard	Types of Control
Oxygen Deficiency	Ventilation Oxygen Supply
Gaseous Contaminants	Ventilation Scrubbers Sorbent Bed Combustion
Particulate Matter	Ventilation Inertial Separators Centrifugal Separators Electrostatic Separators Scrubbers Fibrous Filters