

THE ASSESSMENT OF WATER POLLUTION

A workable definition of the term "water pollution" is difficult to formulate simply because pollution problems are extremely variable and site-specific. The word pollute literally means to "render impure"; however a more acceptable definition of pollution must take factors into account such as the chemical, physical, and biological characteristics of natural water, the intended use of a receiving water, and an understanding of the nature and fate of a given pollutant after its introduction to a body of water. Regardless of how we choose to define it, water pollution involves the addition of quality characteristics to a water body which may render that water unfit for its intended utilization. Some of the more common forms of water pollution include oxygen demanding organic wastes and sewage derivatives, man-made organic compounds such as pesticides and some industrial wastes, inorganic toxic compounds, infectious disease producing agents, nutrients and sediments from land runoff, radioactive substances, oil and grease, and thermal discharges. In some instances, the combined effects of two or more contaminants are further enhanced by their interaction. These synergistic effects may result from a chemical reaction in the receiving water which yields a product more toxic than the reactants. For example, the discharge of an acid into a water containing a high concentration of CN^- radicals would produce HCN, an acid that is toxic to both aquatic organisms and man. In short, whether discharged from residences, institutions, or industries, each form of pollution has a characteristic effect on the water into which it is introduced. The receiving water may become unsightly, malodorous, a hazard to public health, and consequently its uses may be severely limited.

Methods used for the assessment of water quality generally fall into three main categories; chemical, physical, and biological. Chemical analyses may include the determination of pH and alkalinity in addition to the concentrations of various ions, metals, and dissolved gases such as oxygen, carbon dioxide and hydrogen sulfide. Physical parameters often measured are temperature, color, turbidity and flow characteristics. Biological methods may be categorized as either field surveys which are an attempt to ascertain the numbers and kinds of aquatic organisms associated with various water qualities, or laboratory studies in which bioassays are conducted to determine the levels of toxicity of different chemical parameters for a given test organisms.

The parameters listed above are measured in most water quality surveys conducted by the Massachusetts Division of Water Pollution Control. Although no bioassay studies are done by the Division, the biological section conducts macroinvertebrate surveys on selected rivers and streams throughout the Commonwealth. In addition, microscopic examinations are conducted on most surveys to determine the abundance