Introduction

It has been 16 years since ASTM Committee C-7 on Lime sponsored a lime symposium, which was published as *ASTM STP 472*. That symposium featured a variety of technical subjects dealing with many lime uses—from mortar to steelmaking, but also including information on research and new test methods. The present symposium centers on just one phase of lime—its environmental uses.

Why schedule a symposium on such a narrow subject? Well, in the last decade or so man has become acutely aware of the deterioration of his environment. Waterways have become polluted, acid rain has tarnished the atmosphere in many parts of the world, causing damage to forests, lakes, and buildings, hazardous wastes have degraded ground water supplies. Words like polychlorinated biphenyl (PCB) and dioxin have become common place in our vocabulary. Paralleling the degradation of our environment has been the realization that lime, in either oxide or hydroxide form, is one of the key chemicals to help solve or at least alleviate the problem of air, water, and land pollution. Lime's high alkalinity and pH, its high surface area coupled with its relatively low cost and ready availability has led to its steady growth in this important field.

The accompanying graphs underscore this recent development. Figure 1 shows that the environmental uses of lime have grown steadily, reaching 3.5 million tons in 1984, representing a sevenfold growth since 1960. These environmental uses now comprise 23% of the lime market, a far cry from the 6% used in 1960. Figure 2 shows the three elements that constitute environmental uses: water treatment and sewage and industrial waste treatment have grown steadily during this period, declining only during the recent recession, whereas lime for scrubbing sulfur dioxide from power plant gases has grown rapidly since the inception of lime scrubbing in the mid 1970s. Continued growth is certainly expected, paralleling the increase in treatment required for the environmental cleanup. The growth will undoubtedly explode if and when acid rain legislation is passed in the next year or two. But the substantial increase will not occur until the early 1990s.

To cover the subject of this symposium, we have a number of technical papers to present. The first paper will give an overview of the many en-

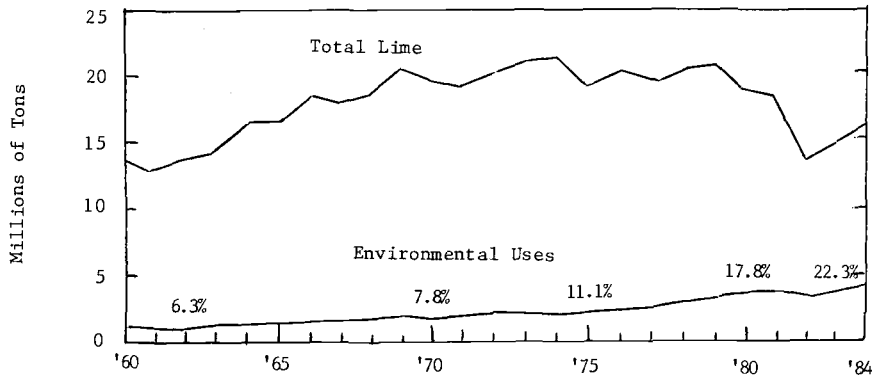

FIG. 1—*United States lime production versus environmental uses, 1960–1984.*

vironmental uses of lime, but in addition discuss various lime types and engineering considerations in the design of lime handling systems. Scrubbing of both carbon dioxide (CO_2) and sulfur oxides (SO_x) will be covered in three separate papers, the first dealing with a fascinating new use in preventing damage to apples during storage. The two papers on SO_x removal will demonstrate how research and development have led to the rapidly growing use of lime, particularly of thiosorbic quicklime.

Papers on hazardous waste will be presented by two authors, with one covering a large project in New Jersey where the waste was solidified with quicklime and lime kiln dust for burial. Another author will cover the growing use of lime and fly-ash for stabilizing scrubber sludges produced

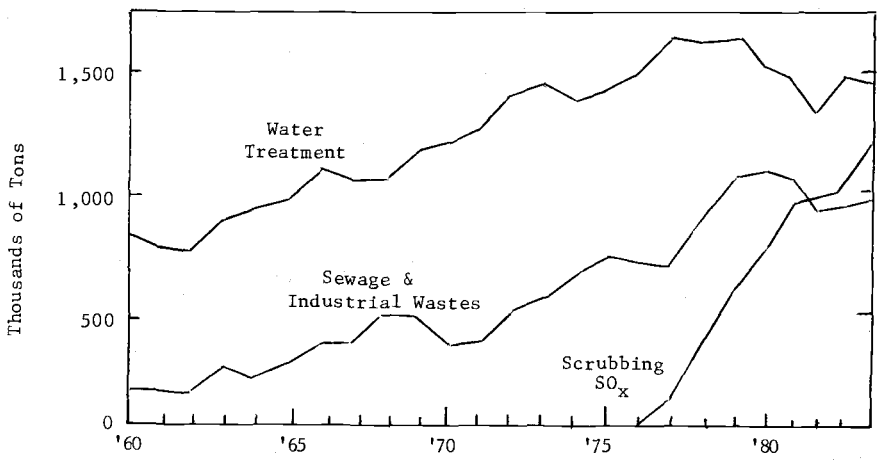

FIG. 2—*United States environmental uses of lime.*

in wet scrubbing installations at more than 20 power plants in the United States, thereby permitting safe disposal of the waste. Research on the use of lime for stabilizing sewage sludge for land fill disposal will be also discussed; this use of lime is effective not only in dewatering the sludge but also in causing bacteria removal and tying up of heavy metals. Another paper will cover the neutralization of calcium and magnesium calcium hydroxides through the use of carbon dioxide.

Finally there will be three papers on lime stabilization of expansive clays and silty clays for use in earth dams, irrigation canals, levees, etc. One paper will deal with dispersive soils which have caused considerable erosion damage of earth dams, particularly in the southern and southwestern parts of the United States. Another paper will demonstrate how lime stabilization has solved the problem of slides occurring in an irrigation canal in California; the stabilized canal lining has performed well for more than 12 years, even resisting erosion from wave action. The third paper will cover the use of lime in overcoming a serious problem with collapse-susceptible soils used in housing areas in an arid climate.

The sponsoring committee of this symposium hopes that the papers presented will stimulate additional research and development work on the use of lime for this growing environmental field. ASTM Committee C-7 would like to thank the authors for their diligence in preparing the many fine papers, and I personally would like to thank the members of the sponsoring committee who helped work up this fine program. In addition, the great assistance of the ASTM headquarters staff in presenting this symposium is appreciated.

Kenneth A. Gutschick
Technical director, National Lime Association, Arlington, VA; symposium chairman and editor.