

We also have under way a plant-size study of safely and economically composting municipal refuse and raw sewage sludge. This is a joint undertaking of the Public Health Service's Office of Solid Wastes, the Tennessee Valley Authority, and Johnson City, Tennessee. TVA is designing and will construct and operate a plant to process Johnson City's daily output of about 60 tons of refuse and untreated sewage sludge. The plant is expected to be completed early next year at a cost of about \$750,000 and will cost around \$100,000 a year to operate. TVA has had long experience in soil conditioning and fertilizing and an effort will be made to lower the project cost by finding an economic use for the product. The Office of Solid Wastes will carry out detailed pathogen studies and other health-related projects in conjunction with the Johnson City operation.

Another promising composting project has been launched under a demonstration grant from the Office of Solid Wastes. This project will test a recently developed mechanical composting plant for disposing of solid wastes quickly and without environmental health hazards. The plant is to process about 130 tons a day of refuse, garbage, sewage solids, and other solid wastes from the City of Gainesville, Florida, the University of Florida, and Alachua County. This is a cooperative industry-government venture under a nonprofit Florida corporation on which the city government, the university, and a private firm are represented. The firm developed and will build and operate the plant for the nonprofit organization.

Solid wastes technology needs improvement in at least one important area which has not yet been discussed. This is collection. Taking solid wastes from home, or industry, or farm and bringing them to their final destination represents from 70 to 80 percent of total disposal costs. This obviously is a segment of the management problem in which savings opportunities are very great. Aspects of the problem are being worked on under a research grant and as part of a demonstration project. This is where bold and imaginative innovation certainly can pay off, and we are looking at several promising ideas, including the so-called "dry sewers" for conveying solid wastes to disposal sites.

It doubtless has occurred to members of this Subcommittee that solid waste management is an extraordinarily complex problem. In fact it does not seem possible to exaggerate the complexity of interrelated factors on which judgments have to be made. Water and air pollution problems, urban and industrial development trends, recreational land use, administrative considerations, and political developments have to be weighed. Values must be assigned scientific and engineering determinations in nearly all of the disciplines. Recognition has to be given to social factors involved and the needs and resources of local, State, and Federal Governments and all elements of the private sector concerned with waste and related problems. Then there are the complexities of waste streams and seasonal and regional variations in their content. And this does not conclude the list of complications.

Fortunately, a technology of decision-making has been developed in recent years with which this Subcommittee doubtless is familiar and which should have great usefulness in developing efficient, salutary, and comprehensive waste disposal systems. The technology is management science or systems analysis, involving the use of automatic data processing, some sophisticated mathematics, and other intelligence tools. Up to now, however, despite considerable effort, it has not been possible to devise tangible inputs for systems analysis which will represent adequately some highly intangible factors—the most crucial factors of the entire equation. They may be described as social values—what the public has at stake in solid waste pollution abatement. These involve a complexity of community-wide human relationships which thus far have defied tangible expression, through systems analysis.

We have been seeking assistance in adapting systems analysis techniques to solid wastes systems development. A few months ago, for instance, the First National Conference on Solid Wastes Management considered this problem under the joint sponsorship of the Public Health Service and the University of California at Davis. We also have a research project under way with the University of California at Berkeley which we expect will provide us with some answers. In addition, we have been working with the National Academy of Engineering to develop a mechanism through which we can have the assistance of this highly competent technical organization.