

Digging out from under

The problems of solid waste disposal are multiplying faster than the ideas available to deal with them

by Edward Gross

Like the Four Horsemen of the Apocalypse, three modern horsemen ravage the land today. Two of the riders are well known. They are pollutants of air and water. The third, solid waste, largely pollutes the land.

Federal statutes were enacted 13 years ago to fight air pollution and 21 years ago to fight water pollution. But it wasn't until 1965 that Congress passed the Solid Waste Disposal Act, giving the Department of Health, Education and Welfare and the Department of the Interior \$4.3 million for a national research and development program to solve the problem.

But not much has happened yet.

"We're very early in the development of technology that would improve the state of the art," says Director Richard D. Vaughan of HEW's Bureau of Solid Waste Management. "The real black eye is how well we're doing—the state of practice. We're doing a poor job in this country."

Although still not as popular an issue as air and water pollution, which they also produce, solid wastes have generated a mountain of statistics almost as voluminous as the problem itself.

Any expert in the field can rattle off the facts:

- The total amount of all types of solid waste generated in the United States yearly is 3.5 billion tons.

- The amount of refuse collected per person per day is about 5 pounds, or a total of 190 million tons a year.

- By 1975 the amount collected annually will be 225 million tons, and by 1980 it will reach 340 million tons.

- Each year about 55 billion cans, 23 billion bottles, 60 billion metal and plastic bottle caps and 7 million junked autos are discarded.

- The country's total annual trash bill: \$4.5 billion.

The most apparent aspect of the problem is the refuse and garbage generated by households, businesses, industry and municipalities.

But these wastes, created by an affluent society that casually discards whatever it no longer needs, have produced a domino effect. Communities are running out of places to dump their refuse, and are destroying irreplaceable resources in the frantic effort to stay ahead of the flood. A prime example is San Francisco Bay, a dumping site for years, which is now filling up to the point where conservationists fear it may one day disappear (SN: 8/2, p. 102).

San Francisco, forced to recognize the problem by pressure to save the bay, was considering a plan to haul refuse by train to a desert area. But that plan collapsed in August when contract negotiations failed. Other cities, Philadelphia for one, are considering railhaul as an answer to the trash problem, but costs and local residents' objections stand in the way.

Since European and Asiatic countries must be frugal with their resources, it is not surprising to find these countries ahead of the United States in the art of waste utilization. Some European countries, for example, use the heat from incinerator plants to produce steam for electricity. The outstanding example is the Issy-les Moulineaux project near Paris, where the electricity produced is fed into a national grid.

Montreal also plans constructing such a plant.

The United States is further behind. New York City may some day have a \$110 million plant, and the Combustion

Power Company of Palo Alto, Calif., is designing a fluidized bed incinerator that burns solid wastes at high pressure to produce hot gases to power a turbine.

A recent development by the Japanese combines trash disposal and the development of building material. They compress trash into rock-hard blocks, which are coated with asphalt or cement (SN: 5/19, p. 49).

But in the United States the primary method of getting rid of refuse is open dumping; it is also the most condemned method. The reasons are legion: odors, rats, flies, roaches and runoff that pollutes ground and surface water, and air pollution when the refuse is burned.

A recent HEW report states that 94 percent of the 12,000 disposal sites are unacceptable and threaten diseases, pollution and blight.

But, says BSWM Director Vaughan, "now the country is starting to wake up to the problem. Several states have passed laws that prohibit open burning dumps and approve new facilities. New technology is starting to come off the shelf. We've still got a long way to go, though."

Logically, one solution would be to bury the trash in a sanitary landfill, rather than dump. Vaughan calls the landfill "the most important disposal method, and consequently a great deal of effort is being made to improve this technique."

But it too has drawbacks, stemming largely from packaging materials of paper and plastics that do not readily compact, thereby shortening the life span of a landfill and reducing its effectiveness. Rapidly biodegradable materials would be a blessing here, but the current trend in packaging is away from them.

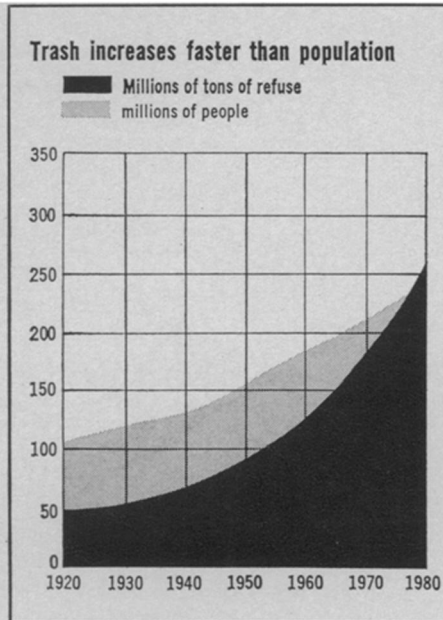


Susan Landor

Mountains of trash accumulate near San Francisco Bay.



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ACS

The trash explosion exceeds the population explosion in the United States.



HEW

Vaughan: "We're doing a poor job."

The landfill also does not eliminate the problems of ground water and surface water pollution and adds the problem of hazardous methane buildup and dust. And as population increases, space for landfills will be harder to get and more expensive.

A cousin to the sanitary landfill is composting, in which waste organic material is used as a soil conditioner. Unfortunately, no great agricultural market has opened for the method, mainly because of the economic difficulty of separating metal, plastic and glass from organic matter, and competition from commercial fertilizers.

"Compost is not really fertilizer," explains Clyde J. Dial, staff engineer at BSWM. "It's a soil conditioner, and so



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Incineration helps, leaves residues.

it can't compete with chemical fertilizers because it doesn't have the nutrients they do. We are finding composting depends on local conditions. You can't make a blanket statement on composting. Houston has a composting plant, which the city pays for handling its waste, and it's a successful operation." Dial points out that compost can be modified to provide needed nutrients, and so might be made practical.

As a garbage disposal method, dumping at sea has been largely discontinued because much of the material is washed ashore. Nevertheless, ocean dumping of refuse such as chemicals and oil refinery wastes is on the upswing, though pressure is building against it, too (SN: 9/13, p. 213).

Though it draws the sharpest opposition from clean-air advocates, incineration is the best weight and volume reducer of the lot.

The Bureau of Mines is testing a junk car incinerator in Salt Lake City that burns off all combustible materials, such as upholstery and plastics, leaving only steel hulk. Metals with melting points lower than that of steel will, it is hoped, melt off and be collected. Until recently, incineration techniques were inadequate to deal with these contaminant metals.

In July, the American Gas Association announced plans for a \$1.5 million natural gas pilot plant to be built in New York State. It will convert every item of household refuse, from the kitchen sink to the television set, into a clear, gravel-like residue.

But residues must still be disposed of and so remain an incinerator problem. The Bureau of Mines has a continuous processing plant in the pilot stage on the University of Maryland campus. The plant could make salvage a reality by removing metals and glass that account for 75 percent of residue weight.

In addition, since municipal incinerators in the United States don't have sophisticated air pollution control devices, such as electrostatic precipitators and scrubbers, they contribute to air pollution. Plastics in incinerators create a special problem because they often give off chlorides and fluorides, which eat away the incinerator lining and in large amounts could be harmful to people.

"There is no problem in getting them out of the stack effluent," points out Edward Higgins, special adviser at BSWM's Cincinnati branch. "A caustic solution can do that. The problem is in the incinerator itself. There is no real solution available at present to solve that problem."

In addition to refuse and garbage, the U.S. economy produces more than one billion tons of mineral wastes from mines, mills, smelters, refineries and foundries and two billion tons of agricultural (animal and crop) waste.

The solution to the entire solid wastes problem calls for a combined, full-scale attack by chemistry, engineering (mechanical, civil, chemical and sanitary) plus social and political action.

The outlook isn't promising. "We need support," cries one Administration official. "It's been pretty short because of the Vietnam War. Funds have leveled off and this year they are decreasing."

"We're losing," simply states Charles B. Kenahan, staff metallurgist at the Bureau of Mines. "We're literally being buried by our solid wastes. But there is a way out from beneath the pile through research and proper solid waste management." ◇