Georgia COUNTY GOVERNMENT

THE VOICE OF COUNTY GOVERNMENT THROUGH 74 YEARS Wimmer JUNE, 1988

ACCG President Charles Smith, Jr. of Rockdale County

Briefly . . .

Increasing technology places demands on education quality. America's living standard is at stake.

Shifting indigent health care costs to patients with insurance was never fair, now it's made next to impossible by new policies and care limitations. So who will pay?

Lynn Thornton, assistant to DCA Commissioner Jim Higdon, will head the new Office of Rural Development being activated in July. She is well known in county government circles, and knows about county issues.

DNR will concentrate less on municipal wastewater treatment systems in the future and more on siltation, storm runoff and toxic substances from small generation points.

Shortly the economics of waste disposal will make composting, resource recovery and energy-from-waste systems affordable for more communities. See "Landfill."

CALENDAR

August 6-9, 1988
NACo Annual Conference
Anaheim, California

October 19, 1988
Commissioners Training Program
Atlanta Marriott Marquis

October 20-21, 1988
BIPO Legislative Conference
Atlanta Marriott Marquis

January 26, 1989
Legislative Day
Georgia Railroad Depot

April 15, 1989
Commissioners Training Program
Jekyll Island

April 16-18, 1989
ACCG Annual Meeting
Jekyll Island

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LANDFILLS

Today's problem may be an opportunity for the 1990s

By DR. GREGORY N. RICHARDSON and
DR. JAMES L, WILLMER, *S & ME, Inc.*

A worsening garbage crisis in the Northeast coupled with the Environmental Protection Agency's failure to meet deadlines with new landfill regulations continue to attract attention in Congress.

While unique to the Northeast at present, the current garbage crisis there is a portent for us all. Disposal costs in many northeast communities now exceed $100 per ton, forcing service fees and local taxes higher. With the closing of many landfills in New Jersey and New York, the garbage crisis in this region grows greater with time. The trend is apparent for all landfills: higher disposal costs and decreasing capacity.

This article introduces some operational options (both income and non-income producing) available to landfill owners and operators. It also outlines the role of the environmental engineer and the challenge that solid waste disposal poses for local governments.

Regulatory environment

EPA is currently embroiled in an internal struggle to produce draft solid waste landfill regulations under Subtitle D of the Resource Conservation and Recovery Act (RCRA). These draft rules will not be made public until late spring this year, but they are expected to become law before the end of 1990.

The internal struggle at EPA is between the Office of Solid Waste Management (OSW) who desire strict categorical standards for landfills, and EPA's Office of Policy, Planning. and Evaluation (OPPE) who prefer performance standards and who would allow the states to have a role in setting these standards. At present it appears that the OPPE viewpoint has the support of EPA Administrator Lee Thomas. This will allow local governments greater flexibility in how they achieve the performance standards.

Performance standards proposed by OPPE require that there be no off-site ground water degradation beyond an established maximum contaminant limit. Under the draft rules, owners and operators of landfills must ensure that no hazardous waste goes into the landfill, must maintain a methane level below 25 percent of the explosive limit, maintain surface water control around the facility, stop accepting non-containerized liquid wastes, and conduct extended post-closure monitoring of the facility.

Specifics of the gas control and ground water monitoring systems are left to state discretion, but with the understanding that the maximum contaminant limit must not be breached. A landfill producing contamination of ground water in excess of the limit established must increase its ground water monitoring program and will be forced to remedy the excess contamination.

Each of these EPA concerns represents increased cost to the landfill owner/operator.

Under current Georgia Department of Natural Resources guidelines, new landfills must satisfy local zoning ordinances, avoid locations near airports, and meet minimum hydrogeologic criteria. The proposed federal criteria would provide actual performance criteria to augment the basic hydrogeologic guidelines currently provided. This would require a more detailed subsurface investigation of the proposed site and more rigorous analysis of the proposed landfill design.

Ground water monitoring under the proposed regulations would have to detect the presence of 46 specified toxic constituents. The frequency of monitoring would be a function of the site conditions, increasing as permeability of the subgrade soils increases.

If the levels of contamination of the base 46 constituents found in the wells exceed established background levels, then the operator must test for a greater number of specified constituents. This increase in monitoring can lead to a corrective action program intended to remedy the contamination.

Earlier EPA-OSW guidelines would have required a synthetic liner for landfills in most eastern states, while the EPA-OPPE rules allow individual states discretion in requiring synthetic liners. For most coastal and Piedmont locations within Georgia, the soil profiles and ground water elevations will force new landfills to rely on a dual liner system consisting of a minimal thickness (typically three feet) of compacted clay and a synthetic liner.

Such liners are not required in such states as Pennsylvania and California, but are used in Georgia only for hazardous waste impoundments. Ordinarily, the liners are 30 to 60 mils in thickness

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Rich as landfills are in recoverable resources, no mining or energy conversion operation will be successful without markets for the products recovered.

Fertilizer from composting is rarely ready for direct application to the land. Usually it is transported to a fertilizer manufacturing or blending firm which adds nitrogen and other chemicals for proper nutrient balance. Once processed, however, the compost has enjoyed steady demand from growers where it is available.

Another plus is that compost conditions and restores topsoil, a major concern of agronomists.

Methane gas from landfills is not pure enough for bottling or piping to industrial furnaces. It can, however, be used on site to produce steam or to co-generate electricity for an industrial park.

The most successful resource recovery systems at landfills have active market support from government entities. To encourage paper recycling, some states require that their own paper purchases consist of a minimum of 50 percent recycled paper. Environmental groups can be effective in encouraging private industries to do likewise.

Having collection points readily available for newsprint, aluminum and glass (at firehouses, schools and other public buildings, for instance) will encourge citizens to separate recyclable materials at the source. Some cities have newspaper racks welded onto their garbage trucks. Others have designated days when paper, glass or aluminum will be collected at curbside.

and made of PVC or HDPE. In all applications, the membrane polymer must be shown to resist chemical attack from the leachate generated at the landfill. Typical costs for these installed liners range from 30 to 60 cents per square foot.

If these or similar regulations are adopted by EPA as anticipated, they will impose more intensive monitoring of the landfill site and more separation between the waste and ground water. To the owner/operator, they will represent a considerable investment in improvements which are not self-funding.

Sources of additional income

Greater costs at the landfill must be offset by either an increase in local taxes, tipping fees, or by income derived from waste by-products.

Typical household waste contains nearly 37 percent paper, 9 percent metal (mostly ferrous), and nearly 35 percent food and yard wastes. Such waste has a potential heat content which may be tapped to provide additional income to the landfill. Four of the most common methods for claiming the BTU energy in waste are described below:

☐Mass burning of the entire waste stream within a water-walled boiler to produce steam. This method requires supplemental fuels and may create air quality problems. Economic feasibility depends on a nearby market for the steam such as for industrial use or production of electricity.

☐Refuse-derived fuel is created by sorting the waste and removing metals and other nonflammable or toxic components.

☐Methane generation from the anaerobic decomposition of the waste is promoted, and the resulting methane gas is mixed and sold or used to generate electrical power which is sold.

☐Compost production from the aerobic decomposition of the waste is promoted and the resulting compost is sold as fertilizer.

The most profitable "mining" technique is dependent on the waste constituent profile and local energy needs. All four methods provide initial benefits from shredding waste so that moisture barriers like plastic garbage bags are destroyed and the surface area of the waste is increased.

The mass burning method requires the least processing of raw waste, but it produces the greatest amount of toxicity of waste ash.

Waste processing facilities that produce refuse-derived fuel are simply sorting facilities which remove and salvage ferrous metals, glass, and other noncombustibles from the raw waste. Cities such as Baltimore process over 1,000 tons of raw waste daily and derive income from recovery of ferrous metals and production of refuse-derived fuel.

Wastes that cannot be processed must be disposed of in a landfill. In its final form, refuse-derived fuel may simply be solid waste that is shredded and sorted, or it may be pressed into pellets that resemble animal feed. Since the expense of pelletization has frequently been excessive, first consideration should be given to direct utilization of the shredded waste.

A locality can enhance refuse-derived fuel production simply by encouraging segregated trash pickup. Many major cities now require both residential and commercial customers to maintain segregated waste storage. Usually, three categories are separated: food, paper products, and the balance being metals, plastics and glass. Some cities, such as Seattle, have actually provided color coded waste containers for such use with door-to-door pickups. Nonsegregated waste will not be picked up and fines will be imposed to encourage conformance with the waste segregation policy.

Plan ahead
1989 ACCG Annual
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Segregated waste collection practices can produce quality fuel with only minor processing. Fuel production from waste has the added economic advantage of reducing the volume of landfill air space required on a daily basis. With an ever decreasing number of landfill sites available, this alone is a bonus to communities that generate fuel from wastes.

Put decay to work

As solid waste decays anaeorbically (that is, without exposure to oxygen laden air), methane and carbon dioxide are produced. In the past, studies were conducted to find how to minimize methane gas production in the landfill. It was learned that methane generation increased with the moisture content of the waste, with leachate re-circulation, buffering to maintain phosphorus control, and with the addition of nutrients. Waste allowed to decay in this manner becomes inert in three to five years.

The focus in the 1970s was to use impermeable caps and daily cover to reduce the rate of moisture infiltration to the waste and thus reduce generation of methane gas. Such efforts are obviously not appropriate for the commercial "mining" of methane, but the same liners and caps do create an airtight system that promotes anaerobic digestion.

Composting is faster

While the lack of air is essential to the production of methane, a rich supply of air is required for composting solid waste. Thus a composting facility will produce little methane gas. The aerobic decomposition of waste for composting offers the advantage of speed. Complete decomposition of the waste can occur in as little as two years. Economically, the compost created can be mined and sold as fertilizer, and the 90 to 140 degree temperatures that accompany composting offer the possibility of heat recovery.

Impact on design

The commercial mining of methane or compost takes advantage of the fact that the heavily lined and capped landfills of the future will allow precise control of their interior air space. Using the landfill as a large digester will require a means of controlling moisture within the cell, however. This, in turn, will require both a collector system beneath the waste material for gathering leachate, and a combined water distributor/gas collection system on top of the waste.

Initial draft regulations proposed by EPA-OSW would have banned leachate re-circulation and would have impacted methane generation detrimentally. The revised draft regulations do not contain such a limitation.

Methane and compost mining require the initial construction of a landfill designed for maximum daily volumes. Daily operations must provide for shredding of the waste to minimize moisture and gas barriers, primarily plastic garbage bags, and the use of a permeable daily cover.

In methane mining, the air space volume occupied by the waste will also significantly decrease as the quantity of gas generated by the landfill cells decreases with time. Concurrently, the amount of leachate re-circulated is reduced, and possibly redirected to a newer cell, until the air space occupied by the waste is minimal. How much reduction in air space can be achieved? While there is no pat answer, volume reductions of 80 percent are feasible.

One promising concept is to then construct a new landfill over the mined-out old landfill. With the composting method, the operator would physically excavate the decomposed waste and process it for sale as fertilizer. Both methane mining and composting provide supplemental cost savings in that they eliminate the need for additional landfill sites where expensive hydrogeology studies and ground water monitoring would have to be duplicated. Such perpetual sites would also eliminate political problems associated with siting a new landfill.

Engineering's role

Successful protection of ground water and economic mining of a landfill require new technologies and a new breed of engineering professionals to support them.

For instance, much of the new technology designed to protect the natural ground water and soils beneath a landfill are based on the use of synthetic liners in addition to natural clay liners. These synthetic liners belong to a family of commercial products commonly referred to as geosynthetics. Additional geosynthetic products include drainage nets used to collect leachate and fabrics used to prevent contamination of collector systems from the waste or cover soils. The design, selection and installation of these geosynthetic components require specialized engineering services not available even five years ago.

From the comprehensive hydrogeologic evaluation of the site to control of daily waste mining operations, successful landfills of the future will require a wide range of engineering specialists.

Government's challenge

Certainly the disposal of household waste is rapidly entering a new era. The landfill owner/operator of the future must learn to think of waste as a resource that can be mined for economic return. With the possibility of future disposal costs reaching $100 per ton here in the South as it has elsewhere in the nation, the waste itself must be mined to reduce the impact of such disposal costs on the public.

Innovation and sound business practice will be required for successful operation of future landfills. Local governments must soon choose between developing these skills using specializing consultants or contracting out their entire waste operation to private firms that will specialize.

Beyond the landfill, local government can learn much from European practices of recycling wastes. Such recycling results in production of one-sixth the waste per capita we have in the United States. Additional benefits from waste are derived from innovative government practices that require no tax support.

England, for instance, requires 50 percent of all paper used in government printing to be recycled paper stock. Such measures ensure a market for waste pulp and boost the economic success of local landfills without adding to the tax burden.

Successful landfilling of the future will require cooperation between government at all levels and sound business practices by the private or governmental owner/operators of landfills. County commissioners are on the front line of this battle and must demand legislative support of economically sound waste disposal policies. □