
Solid Waste



Review of Activities of Major Firms in the Commercial Hazardous Waste Management Industry: 1981 Update

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REVIEW OF ACTIVITIES OF MAJOR FIRMS
in the
COMMERCIAL HAZARDOUS WASTE MANAGEMENT INDUSTRY

1981 Update

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REVIEW OF ACTIVITIES OF MAJOR FIRMS IN THE
COMMERCIAL HAZARDOUS WASTE MANAGEMENT INDUSTRY: 1981 UPDATE

In the spring of 1980, a survey of commercial hazardous waste management facilities was conducted to support the development of the Environmental Protection Agency's (EPA) initial hazardous waste regulatory policies. Because of significant changes at many commercial hazardous waste management facilities, EPA decided to update the survey. The update focuses on the largest firms in this small and fairly concentrated industry.

Telephone interviews were conducted with nine of the largest commercial waste management firms to determine the changes in their operations from 1980 to 1981. The firms were selected based on information obtained during the 1980 survey. Included in the survey were:

- . Chemical Waste Management
- . Browning-Ferris Industries
- . SCA Chemical Services
- . Rollins Environmental Services
- . IT Corporation
- . US Ecology
- . CECOS International
- . Conversion Systems
- . Chem-Clear.

Because of the small number of firms included in the survey, data is presented on a national basis only to avoid disclosure of confidential information. Seven of the nine firms supplied all of the required information for the survey. For the two firms that supplied only partial information, state and local governmental agencies were able to supply the missing data.

Only those facilities actively treating or disposing of hazardous waste for a fee are included in this study. Excluded are other facilities owned by these firms, such as transfer stations, brokering operations or facilities not currently accepting hazardous waste for treatment or disposal. The assumptions used to convert reported measures of volume and capacity into wet metric tons are the same as those used for the 1980 report and are shown in the appendix.

The remainder of this report presents the findings of the survey and discusses the changes reported by these firms in:

- . Industry structure
- . Volumes received
- . Permitted capacity
- . Prices.

1. THE NINE FIRMS REPORTED SUBSTANTIAL GROWTH FROM 1980 TO 1981 IN BOTH NUMBER OF FACILITIES OPERATED AND REVENUES

In 1980 the nine firms included in this study operated 36 of the total identified 127 facilities treating and disposing of hazardous wastes commercially.* In 1981 these same firms operated 46 facilities, an increase of 10. As shown in Exhibit 1, all but three were the result of acquisitions. Chemical Waste Management and SCA Services were particularly active in making acquisitions. Chem-Clear was the only company surveyed to open totally new facilities in 1981.

None of the firms reported that any of their facilities were completely closed during 1981, but several facilities had certain portions of their operations, such as landfill or landfarming operations, closed due to public opposition or compliance problems. However, the capacity represented by these operations was relatively modest. Some other facilities required major capital expenditures to comply with Federal or state regulatory requirements but were able to remain open.

Hazardous waste related revenues also grew substantially for these nine firms. Many reported 20 to 30 percent growth in revenues from 1980 to 1981. Most of this growth was attributed to the increase in the number of facilities operated but price increases and a growth in site cleanup services also contributed to the increase.

Based on the survey conducted in 1980, these nine firms accounted for about half of the revenues of the industry. In 1981 their share probably increased to over 60 percent according to several industry representatives but no accurate estimate can be made without more information on the revenues of the remainder of the industry.

2. THE OVERALL VOLUME OF WASTE TREATED AND DISPOSED BY THE NINE FIRMS IN 1981 WAS ABOUT THE SAME AS IN 1980

The nine firms included in the study managed 3.7 million wet metric tons (WMT) in 1980 or about 51 percent of the total treated and disposed at commercial facilities. In 1981 the amount managed was 3.6 million WMT. The reduction in volumes managed off site was more significant than these numbers suggest because the nine firms added 10 facilities from 1980 to

*Hazardous Waste Generation and Commercial Hazardous Waste Management Capacity, Environmental Protection Agency, SW-894, December 1980.

EXHIBIT 1
 Number of Hazardous Waste Management Facilities
 Operated in 1980 and 1981 by Nine Major Firms

Firm	Number of Facilities		Acquisitions	New Sites
	1980	1981		
Chemical Waste Management	10	14	. Kansas Industrial Environmental Services . GROWS, Pennsylvania . Arapahoe, Colorado . Vulcanus (incinerator ship)	
Browning-Ferris Industries	9	9		
Rollins Environmental Services	4	4		
SCA*	3	5	. Recycling Industries, Massachusetts . Adams Landfill, Indiana	
IT	2	2		
US Ecology	3	3		
CECOS	2	2		
Conversion Systems	2	3	. WesCon, Idaho	
Chem-Clear	1	4		Baltimore, Maryland Cleveland, Ohio Chicago, Illinois
Total	36	46		

*SCA acquired the Hyon incinerator in Chicago in 1981 but will not operate until 1982.

Source: Booz, Allen & Hamilton Inc.

1981. The industry's decline in volumes was attributed to a number of factors:

- . Recession. Waste generation is directly related to industrial production. As the economy became depressed in 1981, the amount of waste generated by industry declined. Furthermore, many of the industries hardest hit by the recession, such as the auto, steel and the metal fabricating industries, are also major users of commercial treatment and disposal.
- . Waste reduction. Many generators have responded to price increases with various methods of reducing the amount of hazardous waste they generate. Many waste reducing options that were only economically marginal in 1979 were clearly economic in 1981 after some off-site management prices had almost doubled. Now that prices have increased sharply, generators are more careful to segregate hazardous from non-hazardous waste for disposal. Other generators have been able to reduce their waste generation by raw material substitutions.
- . Selected shifts from off-site to on-site management. Many of the large chemical companies have reduced their reliance on off-site facilities substantially over the past several years and are striving for 100 percent internal management. These firms cite liability protection, control over production processes and price of off-site service as the principal reasons for the shift.
- . Waste Delisting. Some of the major generating industries were successful in delisting some large volume waste streams such as certain paint sludges and certain pickle liquor sludges.

Acting against these forces were factors which tended to increase off-site volumes, such as the effectiveness of the manifest system, a clearer definition of what is considered a hazardous waste, and site cleanups. However, the clear direction in volumes for the industry in 1981 was a decline.

The types of wastes accepted by facilities also did not change much from 1980 to 1981. Although some wastes are restricted by permit at certain facilities, the types of wastes that can be accepted at landfills cannot be generalized. The accept/reject decision by the facility operator usually depends on tests performed prior to accepting the waste stream for treatment or disposal.

The changes in volumes as well as the factors influencing these changes are discussed below for each of the major categories of treatment and disposal. A summary by waste management option is shown in Exhibit 2.

(1) Landfill

In 1981 as in 1980, landfills were used to dispose of a wide spectrum of organic and inorganic wastes. The quantity of waste disposed at licensed landfills is highly concentrated among the nine firms surveyed. In 1980 these nine firms accounted for 81 percent of all volumes received at hazardous waste landfills. In 1981 their share probably increased because of acquisition. Nevertheless, overall volumes received by these firms still declined by 10 percent. On an individual firm basis the trend varied. A few firms reported very substantial reductions, especially at particular landfills, while other firms reported modest increases in volumes.

In addition to the recession and waste reduction by generators, several additional factors caused the decline in landfill volumes. Some firms reported up to a 50 percent drop in business at certain sites when the ban on landfilling of liquids went into effect in November 1981. In addition, two New York landfills were closed during certain months of 1981 while new permits were being negotiated.

(2) Land Treatment/Solar Evaporation

Land treatment and solar evaporation continues to be an economic method of dewatering liquid organic wastes and disposing of biodegradable organic sludges. The nine firms surveyed accounted for about 56 percent of all waste managed by this method in 1980. Overall, firms reported a decline in volumes of about 6 percent, but volume changes varied geographically. The types of wastes received for land treatment and solar evaporation in 1981 was very similar to that received in 1980.

(3) Incineration

The largest firms in the industry do not account for a large portion of incineration volumes. In 1980 the nine firms included in this survey accounted for only 21 percent of wastes incinerated at commercial facilities. Although the largest firms do not dominate incineration in general, these firms do dominate rotary kiln incineration. Rotary kiln incinerators are able to burn solids and sludges as well as liquid wastes. Rollins and SCA own four of the five commercial rotary kilns.

EXHIBIT 2
 Comparison of Volumes Received in 1980 and 1981 For Nine Major Firms
 (Thousand Wet Metric Tons)

Type of Waste Management	Received By All Firms In 1980	Received By Nine Firms In 1980	Received By Nine Firms In 1981	% Change in Volumes For Nine Firms
Landfill	2,699	2,182	1,965	-10
Land treatment/solar evaporation	537	300	282	- 6
Incineration	398	85	80	- 6
Chemical treatment	2,346	544	734	+35
Resource recovery*	424	83	83	0
Deep well injection	788	475	475	0
Total	7,192	3,669	3,619	- 1

*Resource recovery is included only for those facilities also offering treatment or disposal services.

Source: Booz, Allen & Hamilton Inc.

From 1980 to 1981, substantial changes occurred in the incineration market both in the volumes and types of wastes received. The nine firms reported a drop-off of about 6 percent in incineration volumes from 1980 to 1981. In addition to the general factors cited above, several additional factors caused incineration volumes to decline:

- . Major generators of incinerable wastes such as chemical companies or pharmaceutical companies are burning more wastes in boilers and relying more on on-site incineration.
- . Cement kilns and light aggregate manufacturers are now accepting substantial amounts of blended waste solvents as fuel supplements. For example, one light aggregate manufacturer meets 100 percent of its fuel needs with blended solvents at several of its plants. The manufacturer now accepts more than 2 million gallons of waste liquids per year as a substitute for fuel.

In addition to the general decline in volumes sent to off-site incinerators, operators also report that the waste mix is changing. Wastes sent to commercial incinerators are more difficult to handle and have lower Btu content.

(4) Chemical Treatment

The nine firms accounted for 23 percent of all chemical treatment volumes in 1980. Chemical treatment includes a host of unit processes for biological, chemical, and physical treatment of wastes. Although it is difficult to generalize across all of these processes, the volumes managed at individual facilities in 1981 tended to be about equal to 1980 volumes. However, due primarily to the addition of several new facilities in 1981, the volumes managed by these nine firms by various treatment technologies increased 35 percent. According to facility operators, in 1981 wastes were more concentrated and had a higher solids content than wastes in 1980.

(5) Resource Recovery

The nine firms included in this study accounted for only 20 percent of resource recovery volumes in 1980. However, the 1980 survey included only those recovery facilities owned by firms who also offered treatment or disposal services. Resource recovery is primarily the recovery of solvents and fuels blending operations and these types of services have historically been provided by small firms often operating only a single site. Facilities operated by the nine firms did not experience any

significant change in volumes or types of wastes received from 1980 to 1981.

(6) Deep Well Injection

In 1980 the nine firms accounted for 60 percent of deep well injection volumes. For 1981, no change in volumes deep well injected was reported. In 1981 as in 1980, approximately 475 thousand wet metric tons or about 125 million gallons were injected at facilities operated by the nine firms. Deep well injection continues to be used to dispose of large quantities of aqueous wastes.

3. FROM 1980 TO 1981 MANY OF THE NINE FIRMS WERE ABLE TO EXPAND PERMITTED CAPACITY SUBSTANTIALLY BY ACQUIRING EXISTING SITES AND ADDING ACREAGE TO EXISTING LANDFILLS

The vast majority of additions to capacity for the nine firms came from acquiring sites owned by others in 1980 and by permitting adjacent acreage at existing landfills. Permitted capacity includes landfills for which state permits have been granted. Although the increase in capacity for these firms is substantial, the additions do not do much to alleviate the regional capacity shortfalls present in 1980. Acquisitions are simply transfers of ownership and the new acreage permitted is principally in regions that already had substantial capacity. Changes in capacity and capacity utilization reported for each of the major treatment and disposal options are discussed below and are summarized in Exhibits 3 and 4.

(1) Landfill

The nine firms included in this study controlled the vast majority of permitted landfill capacity in 1980, accounting for 93 percent of all permitted capacity. In 1981 these firms were able to increase permitted lifetime capacity by 46 percent from 25.7 million tons to 37.4 million tons. By increasing capacity, these firms were able to increase the lifetime remaining from 11.8 to 19 years for their landfills assuming current level of utilization continues. Although this is a substantial increase, much of it represents either acreage that was owned by one of the nine firms in 1980 but was not permitted, or permitted capacity owned by other firms. It should be understood that the measure of capacity used in the 1980 survey included only acreage permitted at that time. It did not include any estimate of the potential for permitting adjacent acreage at existing landfills.

EXHIBIT 3
Comparison of Capacity For 1980 and 1981 For Nine Major Firms
(Thousand Wet Metric Tons.)

Type of Waste Management	Capacity In 1980 of All Firms	Capacity In 1980 Of Nine Firms	Capacity In 1981 Of Nine Firms*	% Change in Capacity For Nine Firms
Landfill (lifetime)	27,604	25,672	37,372	+46
Land treatment/solar evaporation	2,437	1,447	1,400	- 3
Incineration	670	102	102	0
Chemical treatment	3,921	1,105	1,305	+18
Resource recovery**	1,069	341	341	0
Deep well injection	4,657	1,095	1,095	0

*Includes acquisitions, expansion at existing sites and new sites. Vast majority of increase is expansion at existing sites.

**Resource recovery is included only for those facilities also offering treatment or disposal services.

Source: Booz, Allen & Hamilton Inc.

EXHIBIT 4
Comparison of Capacity Utilization For 1980 and 1981 For Nine Major Firms
(Percent of Capacity)

Type of Waste Management	Capacity Utilization in 1980	Capacity Utilization in 1981
Landfill	11.8 years (lifetime at 1980 volumes)	19.0 years (lifetime at 1981 volumes)
Land treatment/solar evaporation	21%	20%
Incineration	83%	78%
Chemical Treatment	49%	56%
Resource Recovery	24%	24%
Deep Well Injection	43%	43%

During 1981 several of the nine firms were successful in permitting additional acreage, thus substantially increasing the capacity of their landfills. In addition, some of the largest firms made acquisitions of existing landfill sites such as Chemical Waste Management's purchase of the GROWS landfill, SCA's purchase of Adams Sanitary Landfill, and Conversion Systems purchase of the WesCon site in Idaho.

Although capacity controlled by these firms increased 46 percent, the potential regional capacity shortfalls reported in 1980 have not been diminished significantly. Much of the capacity additions were transfers of ownership and expansions at existing sites in regions with the greatest capacity to begin with. Many of the firms surveyed continue to pursue new landfill sites but report that public opposition remains as intense as in the past.

(2) Land Treatment/Solar Evaporation

The largest firms in the industry control over half of commercial land treatment/solar evaporation capacity. In 1980 the nine firms accounted for 59 percent of capacity. These firms reported a modest decline of 3 percent from 1980 to 1981 in capacity due to closure of operations at one site. As was reported in 1980, most land treatment/solar evaporation facilities were not operating at full capacity and operators did not have future plans for expansion. In 1981 capacity utilization did not change significantly. Since these facilities are still operating well below capacity no major expansions are planned.

(3) Incineration

The firms included in this study controlled only 15 percent of incineration capacity in 1980. In spite of some fairly aggressive expansion plans reported in 1980, no significant incineration capacity was added by these firms in 1981. Some of the plans for incineration have been postponed until the outlook for incineration improves. Capacity utilization for these nine firms dropped from 83 to 78 percent from 1980 to 1981. Although no additions were made during 1981, several major additions have occurred in 1982. Chemical Waste Management has started to operate the incinerator ship Vulcanus out of the Gulf Coast for PCB incineration and SCA has purchased and upgraded the Hyon incinerator in Chicago.

The outlook for future additions to incineration capacity is uncertain. The inroads made by cement kilns and light aggregate manufacturers as well as the increased use of industrial boilers for waste disposal have made the

liquids market more competitive and operators report that more stringent regulation of landfills may be required to make incineration more cost competitive.

(4) Chemical Treatment

The largest firms do not dominate the field of chemical treatment services. The firms included in this study controlled only 28 percent of chemical treatment capacity in 1980, but they reported an 18 percent increase in 1981 in their capacity. This was largely due to the addition of several new facilities by Chem-Clear. The nine firms reported that they continue to pursue expansion plans for treatment facilities and expect several new facilities to begin operation in 1982. Capacity utilization increased from 49 to 56 percent from 1980 to 1981, although some facilities reported drops in capacity utilization.

(5) Resource Recovery

Capacity utilization at most recovery facilities remained low in 1981, according to operators. Therefore no new capacity was added by the nine firms surveyed. Furthermore, none had plans for adding any new capacity.

(6) Deep Well Injection

Approximately 24 percent of all deep well injection capacity was controlled by the nine firms. No additions to capacity were reported by these firms, although some modest additions to capacity are planned for the future.

4. ON AVERAGE, PRICES INCREASED 10 TO 15 PERCENT FOR HAZARDOUS WASTE SERVICES FROM 1980 TO 1981, A MUCH SLOWER RATE THAN THE PREVIOUS YEAR

Prices for treating or disposing of hazardous wastes can vary substantially depending the level of regional competition, the cost of treating or disposing of the waste, and the risk of handling the waste.

During 1979 and 1980 prices for hazardous waste management services increased sharply. At certain facilities prices increased over 50 percent. During 1981 this rate of increase declined and prices held fairly constant throughout the second half of the year. Typical prices charged for treatment, disposal and transportation of hazardous waste for 1980 and 1981 are shown in Exhibit 5. The trends in prices for each waste management option are discussed below.

EXHIBIT 5
 Comparison of Hazardous Waste Management
 Quoted Prices For All Firms in 1980 and
 For Nine Major Firms in 1981¹

Type of Waste Management	Type of Form of Waste	Price		\$/Metric Ton ²	
		1980	1981	1980	1981
Landfill	Drum	\$25-\$35	\$35-\$50	\$120-\$168	\$168-\$240
	Bulk	\$40-\$50/ton	\$50-\$75/ton	\$44-\$55	\$55-\$83
Land treatment	All	\$.02-\$.09/gal.	\$.02-\$.09/gal.	\$5-\$24	\$5-\$24
Incineration	Relatively clean liquids, high Btu value Liquids	\$.20-\$.90/gal.	\$(.05) ³ -.20/gal.	\$53-\$237	\$(13) ³ -\$53
		\$.20-\$.90/gal	\$.20-\$.90/gal.	\$53-\$237	\$53-\$237
		\$1.25-\$2.50 gal.	\$1.50-\$3.00/gal.	\$330-\$660	\$395-\$791
Chemical treatment	Acids/alkalines	\$.06-\$.30/gal.	\$.08-\$.35/gal.	\$16-\$79	\$21-\$92
	Cyanides, heavy metals, highly toxic wastes	\$.20-\$2.00/gal.	\$.25-\$3.00/gal.	\$53-\$528	\$66-\$791
Resource recovery	All	\$.19-\$.80/gal.	\$.25-\$1.00/gal.	\$50-\$211	\$66-\$264
Deep well injection	Oily wastewaters	\$.06-\$.15/gal.	\$.06-\$.15/gal.	\$16-\$40	\$16-\$40
	Toxic rinse waters	\$.50-\$1.00/gal.	\$.50-\$1.00/gal.	\$132-\$264	\$132-\$264
Transportation			\$.15/ton mile		

¹ Interviews were conducted in May of 1980 and February of 1982.

² Factors used to convert gallons and tons into metric tons are described in the appendix.

³ Some cement kilns and light aggregate manufacturers are now paying for wastes.

(1) Landfill

The prices charged for landfilling hazardous wastes generally increased about 25 to 40 percent from 1980 to 1981. This was the highest reported increase for any treatment or disposal option. However, considerable regional variation does exist. Landfill prices are usually based on whether the material is received in drums or bulk and whether solidification is required prior to landfilling. Drum disposal prices typically ranged from \$35 to \$50 per 55 gallon drum in 1981. Solidification may add \$10 and up to drum disposal costs depending on the volume increase after solidification. The price charged to dispose of bulk waste ranged from \$50 to \$75 per ton.

(2) Land Treatment/Solar Evaporation, Deep Well Injection

Operators reported virtually no price increase for land treatment/solar evaporation and deep well injection. These options remain among the lowest cost methods of disposing of liquid wastes but they are limited to certain regions of the country. Commercial deep well services are available only in the Midwest and Gulf Coast. Land treatment/solar evaporation is concentrated in the Gulf Coast and West Coast due to the climate requirements.

(3) Incineration

Incineration prices were relatively stable from 1980 to 1981 as shown in Exhibit 5. Prices charged for incineration are determined by a number of factors:

- . Regional competition
- . Physical state (liquids vs. solids/sludge)
- . Degree of halogenation
- . Btu content
- . Drum vs. bulk
- . Ash content.

Because of these factors, prices for incineration vary tremendously but generally fall into three categories.

- . At the low end of the spectrum, waste generators are often paid \$.05 per gallon and up for high Btu waste liquids, such as relatively clean spent solvents, that can be used as a fuel supplement in cement kilns and light aggregate manufacturing.
- . For waste liquids that cannot be used as fuel, generators may pay from \$.20 to \$.90 per gallon for disposal.

- . For solids and sludges received in drums, prices are considerably higher due to handling problems. Currently only a handful of incinerators in the country have the capability to handle drums. Typical prices may range from \$1.50 to \$3.00 per gallon of waste disposed.

(4) Chemical Treatment and Resource Recovery

Prices charged for chemical treatment and resource recovery also vary considerably depending on the unit processes used to treat the waste. However, in general, prices for both waste management options increased 10 to 25 percent from 1980 to 1981. This was the result of higher operating costs for treatment facilities and higher residual disposal costs.

APPENDIX

The same assumptions and definitions used in tabulating the data for the 1980 report were also used for this update.

The estimates for volumes presented in this report refer to the estimated quantities of hazardous wastes actually treated or disposed of by the hazardous waste management industry. The estimates for capacity refer to the estimated maximum amount of hazardous waste which could be treated at existing facilities without undertaking major capital expenditures. Since the actual capacity of a facility often depends on the types of wastes being treated or disposed, the current mix of hazardous waste is assumed in defining capacity. Several additional assumptions were made during the course of this analysis which are important to the proper interpretation of the results. These assumptions are necessary to convert data to a consistent basis, wet metric tons (WMT), when conversion factor estimates were not available:

- . Volumes reported in gallons are transformed into wet metric tons assuming that the waste has the density of water at 8.34 pounds/gallon or 0.00378 metric tons/gallon. This conversion assumption is also used by several firms in the industry.
- . Volumes reported in cubic yards are converted into wet metric tons assuming that the waste has the density of water at 62.4 pounds/cubic foot or 0.76 metric tons/cubic yard. Here the density was suggested by several landfill operators to make the necessary conversion.¹
- . Volumes reported to be disposed in landfills are assumed to be bulk material unless specific distribution between drums and bulk was stated.
- . Capacity reported in acres is converted to wet metric tons by assuming each acre has 430,000 cubic feet of available capacity and 12,100 WMT can be disposed of in each acre. In general, four interrelated factors influence the capacity, as measured in wet metric

¹Some other industry participants suggested using a higher conversion factor (up to 0.90 metric tons/cubic yard or up to 18 percent higher than the conversion factor applied). However, because landfills currently handle such a wide variety of waste types, the more universally accepted estimate of 0.76 is applied.

tons, that can be disposed of per acre:

- The overall size of the landfill. This defines how much can be utilized for disposal and how much must be used as buffer. The smaller the landfill, the greater the proportion of acreage which must be used as buffer.
- The size of the trenches. A typical trench may have surface dimensions of 100 by 200 feet and have an average depth of 30 feet.
- The percentage utilization within a trench. The percentage of the trench utilized for hazardous waste disposal depends on the materials being disposed and the spacing practices of the operator.
- The density of the material. There is significant variability depending on the actual wastes being disposed.

The assumption of 12,100 WMT per acre is based on the advice of several landfill operators rather than explicit assumptions about each of the parameters that affect landfill capacity.