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A Staff Issue Paper

LANDFILL CAPACITY EVALUATION

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August 1991

Publication No. 520-91-115

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BACKGROUND

The Metropolitan Council is required to review landfill capacity on an annual basis. The Council is also required to revise the landfill development schedule based on the abatement progress made during that year. The schedule includes information concerning facility closure and post closure care in addition to plans for the use of property prior to development and disposition of property rights no longer needed for disposal facilities. The schedule should also provide information on the capacity estimates for the current year and the projected landfill capacity required in the region for the future. The analysis in this report is one element used in the review of the landfill schedule, and was a component of the Solid Waste Policy Plan revision process.

The Council contracted with Martinez Corporation in November 1984, 1986, 1988, and 1990 for capacity estimates of the region's landfills. Martinez used aerial photography to determine existing landfill contours in order to compare them with final permitted contours of the facilities. The difference between existing and final contours provided the capacity estimates. The data about deliveries of waste to each site has been obtained from the MPCA and verified using Department of Revenue records. This information has been provided to supplement the estimates of landfill capacity consumed. The attached report evaluated landfill capacity and projects landfill space utilization.

This evaluation does not include any consideration of the location of landfill capacity. The existence of landfill capacity may not be in a location consistent with efficient solid waste management, and may not be consistent with recent changes in legislation.

INTRODUCTION

The analysis of landfill capacity and use rates is key to planning of future landfill capacity for the region. This report describes the existing capacity of area landfills as of November, 1990. Similar reports were prepared on landfill capacities for 1984, 1986, and 1988. This report provides information concerning the current use rate of landfill space and projects landfill use from 1991 through 2000. The report also provides a comparison of capacity currently available in the region to forecasted cumulative landfill capacity required in the region through the year 2000.

The report is divided into four sections. The first two, Aerial Flyover Data and Actual Landfill Capacities, provide an estimate of current landfill capacity and explain the results of Council investigations into landfill capacity. The second sections, Factors Affecting Landfill Capacity, and Landfill Capacity Consumption, provide information on the use rates for landfill capacity and the anticipated life span of existing landfill capacity.

The report offers conclusions related to policy considerations for the development of additional landfill capacity in the region.

AERIAL FLYOVER DATA

The Council has contracted with Martinez Corporation in 1984, 1986, 1988, and 1990 to aerially survey existing Metropolitan Area landfills and assess the landfill capacity remaining in the region. The results of this information is used by the Council in developing the landfill development schedule.

In 1984, the Martinez data showed remaining capacity in the metro area landfills to total 12,246 acre feet of airspace. The aerial photographs taken were used to compute the remaining capacities. From these photos, relief contours of the existing conditions were developed and compared to the final maximum fill level contours permitted by the MPCA. Appendix A explains the methodology and technical procedures used by the consultant. [Airspace is literally the airspace remaining between the existing surface contours of a particular landfill, and the final contours at the landfill as permitted by the Minnesota Pollution Control Agency (MPCA)]. Council staff then adjusted the estimated remaining capacity to January 1, 1985 for use in the Solid Waste Management Policy Plan/Development Guide. The result was an estimated 11,909 acre-feet of capacity remaining in metro area landfills. The Draft Solid Waste Plan (August 22, 1991) includes a comparison of the existing remaining capacity, with the anticipated use rate of area landfills. Figure 5, from the Draft Policy Plan (below) shows this comparison.

Table 1 shows the information on landfill capacity presented in the Martinez reports. The figures contained in this report reflect the remaining permitted airspace volumes expressed in cubic yards and acre-feet, and do not include adjustments for new rules, or configurations that may limit the actual usable remaining airspace. The total landfill capacity estimated by Martinez Corp. in November 1984 was 12,246 acre-feet; 9,229 acre-feet in October 1986; and 7,437 acre-feet in November 1988. the landfill capacity consumed between 1986 and 1988, according to the Martinez reports, was 1,792 acre-feet.

The figures above represented the most likely estimate of remaining capacity. The section of this report entitled, Actual Landfill Capacities, explains in detail the adjustments to, and caveats on, the capacities available at each landfill.

Of the eight landfills that were operating in 1984, only four remain open. Three (Freeway, Dakhue and Flying Cloud) closed with little or no permitted capacity remaining. Louisville landfill, however, closed with capacity remaining in its permitted area. This occurred primarily due to a 1988 change in the MPCA rule requiring all horizontal excavations be equipped with liners and leachate collection systems. The area left to excavate at Louisville was not sufficient to off-set the high cost of such a system.

During the course of evaluating landfill capacity, Council staff and Martinez employees discussed and verified with MPCA staff and representatives of the landfills the areas and limits of permitted landfill space at each site. In addition, areas of the landfills that had stockpiles of cover material in the permitted fill areas were identified. Stockpiling in areas of a landfill that have been completed is common practice. Consequently, the aerial interpretation and digitization can sometimes show these particular areas as being "over-filled" with waste. Once an area of stockpiled dirt is identified, its volume is subtracted so that the actual landfill space remaining is as accurate as possible.

TABLE 1
AERIAL SURVEY RESULTS
(in acre-feet*)

FACILITY	1984	1986	1988	1990
ANOKA	756	24	<20	661
BURNSVILLE	2566	2098	1220	1141
DAKHUE	207	<50	closed 1988	
FLYING CLOUD	250	174	closed 1987	
FREEWAY	201	43	<20	closed 1988
LOUISVILLE	595	504	758	closed 1990
PINE BEND	6797	5788	4783	3451
WOODLAKE	874	598	656	374
TOTAL	**12,246**	**9,229**	**7,417**	**5627**

* One acre-foot equals 1613.3 cubic yards

ACTUAL LANDFILL CAPACITIES

ANOKA

Since the last landfill capacity report (1989) Anoka landfill has requested and received approval for a vertical expansion of 635 acre-feet. One curiosity in reviewing the estimated capacity at Anoka was the fact that, despite receiving waste throughout 1989 and 1990, the amount of capacity remaining was nearly the same as the existing capacity in 1989 plus the expansion capacity. Council staff met with representatives of Anoka landfill and Martinez Corp. to determine where the apparent error was. After several meetings, a comparison was made between the existing contours from the 1988 aerial photos and the 1990 version. It was learned that a substantial area of the landfill had experienced settlement of more than ten feet. The area most affected has undergone final closure. The possibility of reopening this area, placing waste, and reclosing it is unknown at this time.

Therefore, some of the remaining capacity shown for the landfill may not be available to the region.

BURNSVILLE

Council staff routinely compare the receiving rate information for each landfill (as reported by the landfills to both the MPCA and the Department of Revenue) to the landfill space consumed. In

the case of Burnsville, the amount of landfill space changed little between 1988, and 1990 aerial photo information. Through the efforts of staff as well as representatives of Burnsville landfill and Martinez Corp., an error in calculation for 1988 was discovered. The digitizing and data calculations is based on measurements of mounds and depressions. These are referred to as "cut and "fill". In calculating the 1988 data, the measurements of a "cut" and a "fill" were reversed. The result was an indication that there was less airspace remaining than was actually the case. This error has been corrected, and the figures for Burnsville have been verified and confirmed by the parties involved.

PINE BEND

Pine Bend landfill has also experienced some minor settling. Although the settlement will not significantly affect the airspace figure for this report, Council staff will continue to review and evaluate these areas in future capacity reports. As with all the landfills, stockpiled areas were identified, measured, and added to the volume of remaining airspace.

WOODLAKE

The MPCA permitted capacity at Woodlake for four distinct areas. Area 1 was completed in 1986. Areas 2, 3, and 4 were excavated, liners installed, leachate collection systems installed, and began receiving waste in 1986. Since that time, areas 2 and 3 have been completed, and area 4 is receiving waste.

FACTORS AFFECTING LANDFILL CAPACITY ESTIMATES:

Lining of horizontal excavated areas

In November, 1988 the MPCA adopted new rules affecting solid waste disposal facilities. One aspect of the new rules required that all horizontal excavations at landfills have liners and leachate collection systems, unless waste was already in place. This requirement included areas of existing landfills that were permitted for waste disposal. In calculating remaining capacity prior to the implementation of the rule, all areas of landfills within the permitted boundaries were considered available capacity. The effect of the rule was to raise uncertainty regarding a relatively small area of Burnsville landfill that would need to be lined. Louisville landfill also experienced the influence of the rule, in that an area within the permitted limit of waste placement had not been excavated, and would need to be lined. The cost of constructing the area, coupled with the configuration necessary to install the liner and leachate collection system, was prohibitive. The landfill, therefore, closed prematurely, and reduced the anticipated landfill capacity available to the region. According to recent estimates by the Solid Waste Management Coordinating Board staff, as much as 1600 acre-feet of space will be consumed by final cover material in Regional landfills.

Intermediate cover in place

Intermediate cover is earth placed on an area of a landfill that is essentially full. It typically is one foot thick, and will eventually require an additional layer of highly compacted clay, or

synthetic barrier. In estimating the remaining capacity, the aerial photos and digitization include areas that have not received intermediate and/or final cover material. Therefore, the actual usable capacity at each landfill may be less than shown in the tables. This statement is particularly true of daily cover material required by MPCA rules, as daily cover consumes at least a small portion of the usable capacity at area landfills. With changes occurring daily at the landfills, it would be impractical to determine the extent of daily, intermediate and final cover for each landfill. The reader, then, should use some discretion in viewing the figures for the landfills as capacity for waste alone.

Final cover to be placed

Final cover is similar to the intermediate cover discussed above. Some areas of metro landfills have undergone final cover under the old MPCA rule, while other areas have been closed consistent with recent requirements for either a performance standard for permeability, or a design standard of (typically) two feet of impervious material covering the waste. In addition, some areas of all the active landfills have yet to receive intermediate or final cover. As with the discussion of cover material above, some of the remaining airspace shown in the tables will be consumed by final cover material.

Settling of portions of landfills

It is common for areas of landfills, particularly those that have been in existence for some time to experience settling of material. The compression by weight, together with decomposition of the waste leads to settling. For some landfills, such as Anoka, the settling can be substantial. Whether the areas that were once at the permitted final contours, and are now below them, is worth reopening or filling is a decision each landfill will need to make in conjunction with the MPCA and possibly local permitting or licensing governmental units.

LANDFILL CAPACITY CONSUMPTION

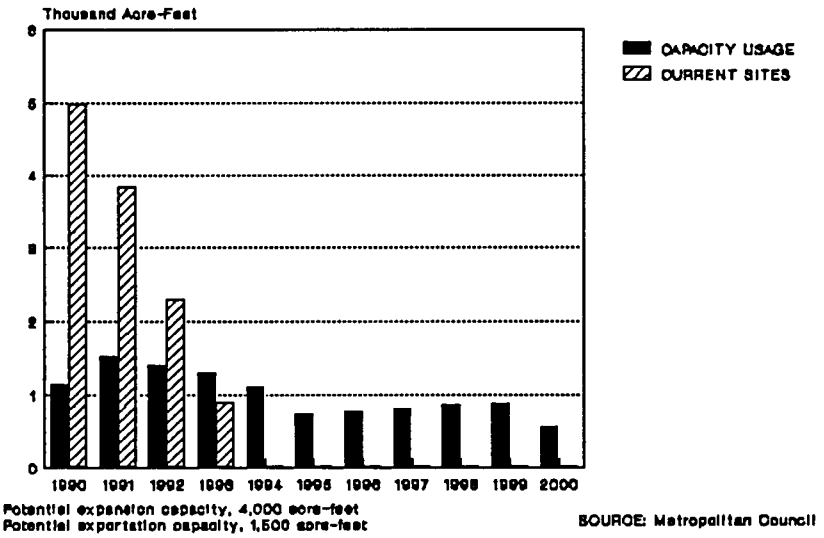
By using aerial photography data available from 1984 through 1990, together with receiving rates reported by the landfills to the MPCA and the Department of Revenue, it is possible to estimate the landfill airspace consumed in the Region in two-year time periods. Because the amount of settlement at area landfills varies greatly from landfill to landfill, and year to year, accurate assessments of space consumed is not possible. Table 2 shows the cubic yards of waste delivered to each facility for the two-year period from November 1988 to November 1990. Consumption rates for the area's landfills have been decreasing. Several factors have contributed to the reduction in the rate at which landfill space is being consumed. Foremost is centralized processing facilities that have come on-line in the past few years, and increases in recycling. An additional factor reducing landfilling in the Metro area has been the increase in landfilling of metro waste in non-metro landfills. Some of this has occurred under contracts with the processing facilities. NSP's Elk River RDF facility, for example, is sending the rejects and residuals from its facility to the Elk River landfill in Sherburne County. Another example is waste that has not yet come under the designation authority of Scott, Carver and Dakota Counties. Some of the waste generated in these counties is being landfilled outside the Metro Area. Figure 5, taken from the Draft Solid Waste Policy Plan, indicates actual and projected landfill space consumption compared to the amount of capacity currently available in the region's landfills.

TABLE 2
CUBIC YARDS OF WASTE DELIVERED*
November 1986 - November 1990

	'86 -'88	'88 -'90
ANOKA	950,878	365,883
BURNSVILLE	2,171,793	1,327,184
DAKHUE	closed	
FREEWAY	200,857	73,894
LOUISVILLE	1,543,858	763,837
FLYING CLOUD	57,969	closed
PINE BEND	5,766,774	4,016,056
WOODLAKE	1,106,606	714,250
TOTAL	11,798,735	7,261,104

* As reported by each landfill to the MPCA.

Figure 6
IMPLICATION OF PROJECTED LANDFILL USE ON EXISTING CAPACITY



OTHER DISPOSAL CAPACITY OUTSIDE OF THE METROPOLITAN AREA

Approximately 3,100 acre feet of capacity remains at landfills within about 30 miles beyond the Metropolitan Area. About one-half of the capacity of these landfills have typically been filled with MSW from the Metropolitan Area. Therefore, approximately 1,550 acre-feet of the remaining capacity may assume to be available to the region. This space is estimated to increase the region's remaining capacity by less than two years, until sometime during late 1995. If the Burnsville expansion is taken into account, the region would have available MSW capacity until about 2000.

The draft Policy Plan says that utilization of nonmetropolitan landfills is acceptable provided that the landfills meet legislative and MPCA requirements for environmental protection. New legislation now requires that no Metropolitan Area generated mixed MSW be disposed of in unlined landfills outside the Metropolitan Area effective Jan. 1, 1992. Since it may not be possible for these landfills to meet such standards, this provides added pressure on the Metropolitan Area landfills that meet these standards to be available to receive wastes.

However, there may be some expansions of these landfills that provide acceptable disposal capacity for Metropolitan Area generated MSW. The McLeod Landfill appears to be proposing a 6,500,000 cubic yards (4,000 acre-feet) vertical expansion, but this would not be acceptable since it would not utilize a liner system. The Elk River Landfill appears to have a 40 acre parcel available for expansion, although no formal proposal has been made to the MPCA. This proposal would not be subject to lengthy environmental review requirements (i.e., Environmental Assessment Worksheet (EAW) or EIS), since it would be a phased development within the existing permitted landfill. This potential area could have a volume of approximately 3,500,000 cubic yards (2,170 acre-feet), and it is anticipated to be available in 1996. The Yonak Landfill has indicated its intent to the MPCA to expand, and an initial estimate of its capacity is approximately 600,000 cubic yards (372 acre-feet). Both the Elk River and Yonak expansion would utilize liner systems. If it is assumed that one-half (1,271 acre-feet) of the Elk River and Yonak Landfills' potential expanded capacity is available to the Metropolitan Area generated MSW, this would add about two years of life to the regional system, or enough capacity to last through 1997. If the Burnsville expansion is taken into account, the region would have available MSW disposal capacity through 2003.

The draft Policy Plan says that nonmetropolitan landfills should be located within a distance that makes the combined cost of disposal and transportation acceptable to the metropolitan counties likely to use them. The Policy Plan also encourages the development of multiple disposal cells and multiple access routes to provide disposal capacity in different parts of the region that ensures economical haul distances. The costs to improve the nonmetropolitan landfills to comply with new environmental requirements may encourage landfill operators to seek large volumes of waste to ensure their viability. However, the location of these facilites, particulary Elk River north of the Metropolitan Area since it has the most potential to continue to serve the region, supports the need for landfill capacity in the southern part of the Metropolitan Area.

There is a possibility that the counties or State may impose surcharges on Metropolitan Area waste going to these facilities, which may restrict their usage.

Sites Developed Through the Metropolitan Siting Process

In accordance with requirements of the Waste Management Act of 1980, the Council and seven metropolitan counties have completed an inventory of eligible candidate landfill sites within the Metropolitan Area. The draft Policy Plan identifies the following eight candidate sites for further evaluation by the counties.

Candidate Site	Location
Site D	Oak Grove, Anoka Co.
Site P	Ramsey, Anoka Co.
Site Q	Coon Rapids/Andover, Anoka Co.
Site B	Dayton, Hennepin Co.
Site D	Greenfield, Hennepin Co.
Site E	Corcoran, Hennepin Co.
Site J	Independence, Hennepin Co.
Site G	Lake Elmo, Washington Co.

The draft Policy Plan directs that the counties proceed to implement 8,726 acre-feet of additional capacity by 1994. The Policy Plan says that the development of expanded capacity at existing landfills could be used in lieu of these facilities.

However, the 1991 Minnesota Legislature placed a moratorium on the landfill siting process. Instead, the metropolitan counties, in consultation with the Council and the Office of Waste Management, are required to develop a replacement siting process, or demonstrate there isn't a need for an MSW disposal site, and to report to the Legislative Commission on Waste Management (LCWM) by December 1, 1991. The Legislature has the option of enacting a new siting process, resurrecting the 1980 process, or doing nothing. If the Legislature does nothing, the 1980 siting process is automatically repealed effective August 1, 1992.

It is likely that the lack of a deadline for completion of the regional landfill siting process makes it impossible for the Council to assure that adequate landfill space will be available through the candidate siting process. Moreover, landfill capacity through a new siting process or continuation of the 1980 siting process is not likely to be developed before the mid-1990s. The completion of environmental review, selection of final sites, land purchase, obtaining permit approvals and site development and preparation will take an estimated three to four years to complete.

SUMMARY

The Council's Solid Waste Management Development Guide/Policy Plan discusses the capacity remaining in Metro Area landfills, as well as the need for landfill space. According to the Plan, projected total demand for landfill space is about 2,500 acre-feet for calendar 1991. The forecast of needed landfill capacity for the period 1991-1995 is over 10,800 acre-feet, of this total, approximately 5,600 acre-feet is needed for MSW, and 530 acre-feet for ash. For 1996-2000, 8,700 acre-feet of landfill capacity is the projected need, 3,880 acre-feet of which is MSW and ash. It is clear from these estimates that the Region will need additional capacity in the near future. Burnsville landfill is proposing to expand by approximately 3,800 acre-feet. In addition to the Burnsville expansion, capacity exists in non-Metro landfills. The 1991 legislature limited the disposal of metropolitan area MSW (after January 1, 1992) to lined landfills only. Currently, the

only non-metro landfill within a reasonable distance that is lined is the Elk River landfill. Historically, the Council has maintained that at least three mixed waste landfills should be operational at all times until ash disposal options are less uncertain and a large waste disposal facility with an emergency back-up cell is available to serve the region. Assuming the availability of nearby nonmetropolitan landfills, regional system capacity would be exhausted by about late 1995. Potentially expanded capacity at the nonmetropolitan landfills would extend the life of the regional system through 1997. Although it is not certain when these proposed expansions would occur, it is reasonable to assume the continued use of nonmetropolitan landfill space at lined facilities. The Burnsville expansion, coupled with the proposed nonmetropolitan landfill expansions, would extend the regional system until 2003.

APPENDIX 1

The following discussion documents the procedure and methodology used in calculating gross remaining air space for four metropolitan area landfills. The sites involved and the corresponding dates of aerial photography are:

1) Anoka - 11/7/90
2) Burnsville - 11/13/90
3) Woodlake - 11/13/90
4) Pine Bend - 11/7/90

Final grade plan maps of each site were supplied by the Minnesota Pollution Control Agency. The areas of concern were outlined and used as limits for the volume computations.

1988 planimetric/topographic maps were updated utilizing photogrammetric methods. During the compilation of these maps, only the areas that experienced changes in either planimetry and/or topography were updated. These updated areas, when incorporated into the 1988 maps created existing/1990 grade maps. The volumes were then computed using digital data generated from both the 1990 grade maps and the supplied final grade plan maps.

Digital files for the existing/1990 grades and the supplied final grades were collected in the following manner:

Digital files of the existing/1990 grade terrain were generated on a three dimensional stereoplotter mapping instrument. Contours -lines of equal elevation - were compiled for each of the sites. Point lists were generated from each of the contour files which provided an x, y, and z value for every point in the file. These points make up the existing/1990 grade digital data.

Using the supplied final grade maps, parallel lines called profiles were drawn on each final grade plan. Points were selected along those profiles and elevations were interpolated and digitized. This phase utilized a digitizing tablet and assigned x, y, and z values to each point. These points make up the final grade digital data.

Using the limits determined by the Minnesota Pollution Control Agency for volume computations, limit lines were digitized. These limit files could then be inserted into both the existing and final grade files enabling us to work with only the areas of concern. This also ensures that the exact same areas were used on both the existing and final grade. We used the same technique to establish the limits of any stockpiles that fell within the active fills.

Using the digital data for each site, the remaining gross air space volume was calculated. The determination of remaining gross air space is based on a volume program that runs on the "PakSoft" software package. This package generates digital terrain models from the point lists and then compares surface to surface to figure volume.

Volume computations were tailored for each of the landfill sites to provide data which would be most useful to the user. There were Stockpile areas within some of the landfills which are areas that were considered separately from the rest of the fill. The following is a summary of how the data has been separated for each site.