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FINAL ENVIRONMENTAL IMPACT STATEMENT

PINE BEND SANITARY LANDFILL EXPANSION

INVER GROVE HEIGHTS, MINNESOTA

June 25, 1980

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FINAL ENVIRONMENTAL IMPACT STATEMENT
PINE BEND SANITARY LANDFILL EXPANSION

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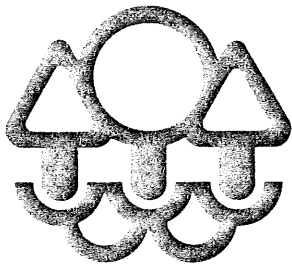
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DRAFT ENVIRONMENTAL IMPACT STATEMENT

PINE BEND SANITARY LANDFILL EXPANSION
INVER GROVE HEIGHTS, MINNESOTA

June 25, 1980

Metropolitan Council
Suite 300 Metro Square Building
Saint Paul, Minnesota 55101



Minnesota Pollution Control Agency

June 18, 1980

Paul Smith
Metropolitan Council
300 Metro Square Building
7th & Robert Streets
St. Paul, Minnesota 55101

Dear Mr. Smith:

Minnesota Pollution Control Agency staff have reviewed the draft EIS on the Pine Bend Sanitary Landfill expansion. Enclosed is a brief summary of the major concerns, followed by specific comments on a page-by-page basis. Also enclosed is an Appendix provided for inclusion in the EIS.

Sincerely,



for
Terry Hoffman
Executive Director

Enclosures

Pine Bend Sanitary Landfill
Draft EIS Comments
June 9, 1980

1. Hazardous waste incidents and household quantities disposed of at the landfill are not addressed.
2. There should be a thorough discussion of the leachate currently being generated, methods of handling, impacts and methods to mitigate any impacts.
3. There should be a more thorough discussion of leachate attenuation and the long-term rerelease potential.
4. There should be actual numbers for the additional rate of leachate generation and any changes in the time the landfill takes to reach field capacity due to the expansion.
5. There should be an evaluation of the current monitoring system to determine whether it monitors the effects of the pond seepage.
6. The kinds of cover material should be fully described and evaluated and a recommendation made for a cover material with a specific permeability to mitigate the identified impacts.
7. The effect or risk of contamination of existing wells and future wells should be better defined.
8. There should be more information on the landfill operational changes, their cost and comparative environmental effects. This should include shredding and bailing, differential charges for recycling vs. nonrecycling haulers, bans of certain materials from the landfill and recycling at the landfill (various methods of separation).
9. There should be discussions as to the beneficial impacts of increasing the projected landfill life by instituting material and energy recovery programs as well as waste reduction measures. This is particularly important to decision makers who would be responsible for implementation of such programs.
10. There should be data and an impact discussion related to landfill fires (i.e., what happens to the landfill if a fire occurs and large quantities of water are poured on it?).
11. There should be a discussion on long and short-term liability at the site.
12. The material recovery section should be greatly expanded to include a discussion of various amounts of materials recovered and the relative environmental benefits from instituting such a recovery program.
13. The landfill should be reviewed using the open dump inventory criteria.

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Draft EIS Comments
June 9, 1980

Page 10 - There is an indication that no hazardous waste or liquid wastes are accepted at the landfill; however, there have been incidents of hazardous waste disposal at this landfill. In addition, household quantities of hazardous waste are accepted on a routine basis at landfills. There should be a description of the previous hazardous waste incidents at the Pine Bend Landfill.

Page 13 - The existing monitoring wells are identified; however, the depth of the wells into ground water should be also included in order to determine what part of the aquifer is being sampled. Also, the aquifer being sampled should be identified (drift, Prairie du Chien, etc.). This can be done by showing a hydrogeologic cross section.

Pages 65, 93 - There are 18 wells identified as being in the zone of influence for leachate moving with ground water, while pages 162 and 181 indicate only 12 wells are in the area. This should be clarified.

Page 67 - Although Sunde estimates theoretical field capacity would not be reached for more than 20 years, leachate is being generated. Inspections by the MPCA have identified leachate seepage from side slopes. It appears that a false impression as to the current condition of the landfill is given by statements which indicate that leachate is not being generated. There should be a thorough discussion of the current leachate generation, methods of handling, and potential mitigating measures. In addition, leachate should theoretically be generated during the period prior to the landfill reaching its field capacity. The variability within the landfill of field capacity will determine the amount of leachate leaving the landfill initially. For instance, the area of the landfill which should reach field capacity first will be materials which were last placed in the landfill or the area in which the infiltrated water flows to. Therefore, the landfill will have varying percentages of water in it until the entire site reaches capacity. The nonhomogeneity of the waste creates conduits for flow which likely is the reason for the leachate seeps. At the point where the field capacity is reached, each additional gallon of water will yield a gallon of leachate that will leave the fill.

Page 74 - There is a discussion on the estimates of the landfill reaching field capacity which indicates that once field capacity is reached, a steady state flow of leachate should be produced. We are in agreement with this statement; however, prior to the landfill reaching field capacity, the flow of leachate should occur at a nonsteady state rate. Presumably, ground water impacts could occur at this time; however, it would be expected that maximum impacts would occur when field capacity was reached.

There is also a discussion on leachate attenuation which only addresses positive effects of the attenuation by ion exchange. We must recognize that as metals and other pollutants from leachate are attenuated by ion exchange, the capacity for additional exchange is diminished. Also, attenuation through ion exchange does not terminally bind those elements. In fact, the phenomena of ion exchange and rerelease of bound elements is not fully understood. Since the release of bound ion exchanged elements can occur at a later date, it is debatable whether ion exchange is in fact mitigating the environmental impacts, or just prolonging the release of elements into the ground water. It is recognized by EPA in the draft EIS on the proposed sanitary landfill guidelines that reliance on ion exchange to mitigate leachate impacts cannot replace the need for liners in leachate collection systems.

Page 83 - There is a discussion of the on-site catchment areas for surface runoff. It is recognized that the degraded conditions of the ponds is probably the result of leachate seeps that are occurring. Although these ponds are not affected by ground water, they do affect ground water through seepage. This should be discussed and some evaluation should be made on the effect of pond seepage.

Page 86 - This section discusses ground water standards. This discussion should clarify how the drinking water standards of WPC 14 can be applied to the ground water standards(WPC 22). There is in fact, only one ground water standard; however, the elements of purity for each drinking water parameter is listed in WPC 14. WPC 14 applies to surface waters. It contains drinking water standards for different classes of water. SW 6 is a standard which applies to the construction and operation of sanitary landfills. It also is not a ground water standard, but utilizes the standards contained in WPC 22. In addition, it should be noted that the more stringent of the standards may be applied.

Page 89 - There is a discussion about the lack of current ground water effects from the landfill. It is described that underlying ground water systems are not affected due to the fact that significant quantities of leachate have not yet been produced. It is, however, possible that leachate seeps from the side of a landfill are diverting leachate through the runoff systems to the ponds. The ponds offer dilution with surface runoff and precipitation into the pond. In addition, the pond seepage may not be adequately monitored by the existing ground water monitoring system.* Therefore, the question of current ground water effects is somewhat uncertain, based on the existing ground water monitoring system. As a mitigative measure, the EIS should recommend ways to adequately monitor this impact.

Page 169 - It is indicated that methane gas produced within the landfill will be vented through the cover material; however, it is advisable to place a cover material which is relatively impermeable in order to avoid excess infiltration and increased leachate generation. Therefore, by placing an impermeable cap of cover material, methane gas can build up within the landfill and may be vented in higher concentrations through cracks and fissures. This can be mitigated by providing appropriate venting at periodic intervals throughout the area of the landfill.

Page 173 - Leachate contamination in the on-site ponds may be considered minor if compared to the concentrations of raw leachate. However, we must recognize that contamination in the pond is diluted by substantial amounts of runoff. Sufficient evaluation has not been done to determine the degree of leachate contamination and the effects on ground water from seepage from the pond over prolonged periods of time.

It is also indicated that filling of the railroad area is a mitigating measure for surface runoff problems. Although this is correct, correction of the surface runoff problem can be done without filling this area with refuse. It appears that the justification for filling this area is to correct runoff problems, when runoff problems can be corrected without filling with refuse

*This section should also discuss the predicted travel time from the base of the fill to the monitoring wells. It is quite possible that any leachate generated would not have had time to reach the water table and move to the monitoring wells.

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Page 175 - Again, this section discusses ion exchange capacities and does not properly reflect the potential for rerelease of heavy metals through changes in the oxidization reduction reaction. The whole issue of ion exchange and effects should be addressed.

Page 176 - The increase in the rate of leaching as a result of the proposed expansion has not been calculated; however, it has been indicated that it is a very minor increase. It would be important to know how much this very minor increase is, when in fact, it has not been calculated.

Page 179 - The second paragraph discusses the very minor increase in leachate and indicates that what additional leachate is discharged over time because of the filling of the expansion area, will not influence the direction or time frame of its movement towards the river as described above. It is not clear what this means. Presumably, the landfill acts as a sponge and collects water. Secondly, the volume of landfill is a factor in determining the amount of material leachable. Theoretically, an increase in the surface area available for infiltration and the amount of material leachable would therefore proportionally increase the amount of leachate and the timing and length of time in which leachate will occur. A 42% increase in volume should increase the available material for leaching by 42%.

In conclusion, there is no basis for the use of the words "very minor increase" and the discharge should not be "much greater" until actual numbers are available. It is agreed, however, that the strength should not change from that beyond which is already currently occurring, or which would occur at the existing landfill.

Page 180 - The irreversible and irretrievable commitments of the resources section indicate the ground water system will eventually purge itself of contaminants generated from the landfill. While this is true, it may take hundreds of years for this to occur. It is indicated that landfills have been known to generate leachate as long as thirty to forty years after closure. It is theorized that landfills can generate leachate for hundreds of years; therefore, there will be a commitment of resources downstream of the landfill for perhaps hundreds of years. Considering the contamination of soils through leachate attenuation and the reintroduction of contaminants over time, it is conceivable that the release of metal ions will occur at a slow rate for thousands of years. With the ground water being impacted for thousands of years, the statement that the landfill should not adversely affect the long-term productivity of the ground water resources in the area is not true. Knowing that leachate will occur, and that it will be seeping into the ground water, it is inconceivable that the area would not be degraded and ground water uses not limited. Further investigation seems warranted in this area.

Page 181 - The cumulative impact section contains a description of the ultimate daily discharge rate. The discharge rate provided in this section assumes no increase as a result of a 42% increase in the volume of the landfill and an 8% increase in the area of infiltration. If one assumes that the 8% increase in the surface area of the landfill results in an 8% increase in the daily rate of discharge, there would be approximately 61,569 gallons per day of highly contaminated

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leachate leaving the landfill after field capacity is reached. This information is not presented in the EIS and should be provided so that proper descriptions would be provided to decision makers. In addition, the statement is made that the maximum combined rate of discharge from the Crosby-American balefill and the Pine Bend Landfill would most likely not equal the combined maximum individual rates. If landfills leach for (as the EIS indicated) thirty to forty years after closure, and the balefill was closed only a few years ago, it appears that the Pine Bend Landfill will reach its maximum rate of discharge during the period in which the balefill will be discharging at its maximum rate. Therefore, the statement and also the conclusion that cumulative effects on the ground water system should be negligible is not correct.

Page 183 - The cumulative impact section indicates that there would be no greater effect on the potential for the impact on the water supply from the combined effects of both landfills than already exists. This is not true since the combined effects will increase the rate of discharge of leachate to the ground water.

Page 191 - Since there will no longer be a railroad or a railroad right-of-way available for a railroad, there is an irreversible irretrievable commitment by filling that area. There are other uses that may no longer be available that should be mentioned, such as a ski hill, etc.

Page 192 - Although the area downstream of the landfill is not proposed for residential development, land use plans are only plans, and are subject to change. It should be recognized that housing, particularly if ground water will be used for the water supply, would not be a recommended land use and therefore an irreversible irretrievable commitment of resources is occurring.

Page 202 - Since we disagree with much of the rationale in determining the ground water impact, we also disagree with primary impacts described in the water quality section. Since the effects of attenuation by ion exchange are not fully understood, and the rate of discharge is, in our opinion, not appropriately calculated, we believe this section should be changed to more adequately reflect these facts.

Page 208 - The discussion on the significance of potential for risk from contamination at the existing wells should be identified.

Page 209 - The on-site soils apparently have a high percolation rate and would not prevent infiltration of surface runoff from leaching into the fill. There should be recommendations on how to mitigate this impact. On page 209, additional mitigative measures are suggested to minimize infiltration, i.e., two feet of clay overlain by six inches of sandy loam. Will the material, particularly the clay, be compacted to a certain density to better control infiltration? Consideration should be given to the expected infiltration and/or permeability rates of various cover methods and materials to determine what would be an acceptable final cover. It would be appropriate to recommend a specific type of final cover that is consistent with the impact analysis of the landfill and the expansion. For example, if leachate generation is identified as a potential threat to the ground water resource, instituting mitigative measures which prevent or control leachate is appropriate.

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Page 221 - There is heavy emphasis given to the fact that by filling the railroad right-of-way, the drainage problem will be solved. This should not be confused with the fact that the drainage problem could be corrected without filling the land with refuse. This should not be used as a justification for filling.

Page 223 - There are indications that shredding and baling reduces the potential for leachate contamination and substantially increases the life of a landfill. In addition, shredding allows for the removal of certain recoverable materials. Although the U.S. E.P.A. is doing research on balefills, there is a significant amount of information available and this option should be fully evaluated in the EIS. This operational change should be discussed with cost and effect data included so that it can be considered by approval authorities. We would like to see an evaluation on the effect of separating the municipal organic-type wastes from demolition wastes, thereby removing gas generation and leachate potential from at least part of the fill area.

Page 227 - The discussion on waste charge indicates a charge at the landfill. The potential for waste charges being levied by volume of waste generated by the consumer is not discussed and should be discussed as a waste reduction measure to mitigate the impact caused by reduced landfill life from landfilling everything.

Page 228 - On page 12, there is reference made to the fact that disposal costs have resulted in reduction in certain materials being disposed at the landfill. This should be a discussion in the section on bans, including what effect banning disposal of certain materials in the landfill would have. An example would be to ban the disposal of leaves in the landfill. Estimates indicate that 12% to 15% of volume at the metropolitan landfills is leaves and grass clippings. The section on bans should be expanded to describe bans of certain materials being placed in the landfill and the results of that.

Page 229 - The estimates of the MPCA indicate that waste reduction impacts on the waste stream by 1985 could be as high as 4% to 5%, rather than 2% to 3%.

Page 231 - The case for differential rates charged at the landfill is not developed or even discussed. The EIS should examine this method of waste reduction and stimulation of resource recovery possibilities. (A differential rate charge could require waste haulers that are not involved with recycling to pay a larger tipping fee at the landfill than waste haulers that do recycle.)

Although materials recovery is not an alternative for all of the waste that will potentially be buried in the Pine Bend expansion, materials recovery is definitely a viable alternative to filling as proposed. Additionally, materials recovery constitutes a long-term alternative for approximately 33% of the waste to be disposed in the expansion. Since a 33% increase in the life of this fill reduces impacts of new sites down the line, it should be fully discussed in the EIS. It is also apparent from the environmental impacts presented in the attached Table A that a materials recovery program should be strongly considered in conjunction with the proposed landfill expansion. The methods for implementing a materials recovery program may not fall within the scope of the permitting process for the Pine Bend landfill expansion, but does provide information to decision makers on how to minimize some of the impacts of the need for new sites. A discussion on materials recovery which applies to the discussion on page 234 follows.

Environmental Impacts Resulting from not Recovering Recyclable Wastes in the Landfill Expansion

Primary Impacts

When recyclable resources such as aluminum, glass, ferrous, and paper are buried rather than used by primary industries, virgin raw materials are refined and processed to replace the unavailable buried materials. Material recycling processes reduces environmental impacts more than virgin material manufacturing processes because recycling generally uses less energy and less raw materials while generating less solid waste, air pollution and water pollution. A comparison of Scenario #1 and Scenario #2 on Table A demonstrate the potential environmental improvement resulting from increasing recycling.

Table A depicts three different scenarios for waste management in conjunction with the proposed landfill expansion.

Scenario #1 assumes the status quo which means that materials recovery programs will not increase recovery during the operating life of the landfill expansion.

Scenario #2 assumes that well-managed source separation programs will be established and these programs will proportionately recover the same quantities that are currently being recovered by voluntary curbside programs in Madison, Wisconsin, and Brooklyn Center, Minnesota. See Appendix for specific recovery rates.

Scenario #3 assumes that local communities served by Pine Bend will obtain higher recovery rates for recyclables through effective public education programs and with the support of an ordinance requiring citizen participation in the recycling program. Recovery rates attained in Marblehead, Massachusetts, and Boca Raton, Florida, are applied. See Appendix for specific recovery rates.

Economics of Source Separation

Based on national data and data from Minnesota recycling programs, it is apparent that well managed source separation and recycling do provide net economic benefits to society and should be considered, in part, as a viable alternative to landfill expansion. The following cost benefit analysis demonstrates the net economic benefits or costs to society from recycling programs.

Most drop-off centers in Minnesota rely on voluntary labor. For the purposes of this analysis, it is assumed that all labor is paid and that the recycling centers are operated as businesses. Only Recycling Unlimited of St. Paul would not currently operate profitably if it were operated as a business. In the case of Recycling Unlimited, this recycling center has the equipment and labor to recover substantially larger quantities of material. The profits would substantially increase if the volume of recyclables was at the level achievable. Recycling Unlimited represents an available alternative to the current solid waste management network in that it has the capacity and is available to manage recyclables that otherwise would be lost in the landfill.

COST BENEFIT ANALYSIS OF
VARIOUS RECYCLING AND SOURCE SEPARATION PROGRAMS

Program	Tons Recovered	Program Costs (\$/ton)	Revenues (\$/ton)	Collection & Disposal Savings (\$/ton)	Net Economic Benefit (\$/ton)
Boca Raton, Fla.					
Newsprint	3000	27.39	27.27	77.00	36.77
Edina					
Newsprint	694	13.06	18.00	36.90	41.84
Glass	218	13.06	8.03	36.90	31.87
Ferrous	70	13.06	5.00	36.90	28.84
Aluminum	2	13.06	200.00	36.90	223.84
Owatonna					
Newsprint	176	49.20	14.50	24.41	10.29
Glass	1096	49.71	30.00	24.41	4.70
Ferrous	733	43.71	20.00	24.41	.70
Aluminum	0.7	40.47	340.00	24.41	323.94
Davis, California					
Newsprint	N/A	48.00	32.00	31.38	15.38
Recycling Unlimited St. Paul					
Newsprint	180	110.42	7.50	27.63	-75.29
Corrugated	60	110.42	7.50	27.63	-75.29
Glass	94	111.69	38.46	27.63	-45.60
Ferrous	192	110.42	3.13	27.63	-79.66

Description of Potential Source Separation Financing Programs

There are several methods by which source separation and recycling programs can be implemented. The results of the following analysis clearly indicates that source separation provides an existing reasonable and prudent alternative to land disposal of recoverable materials. The following discussion provides summaries for potential financing mechanisms aimed at increasing cost effective materials recovery.

Differential Disposal Rates Charged at the Landfill Gate

Pine Bend Sanitary Landfill, in cooperation with the government sector could establish a differential disposal rate schedule that would adjust the individual hauler's tipping fee according to the level of source separation service provided to his/her customers. Lower drop charges would apply to those haulers who participate in some form of a source separation program. It is possible that each county could be required to periodically assess the recycling efforts by haulers. This assessment would be published and submitted to operators of the Pine Bend Landfill

who would apply the drop fees accordingly.

This method of financial incentive would directly support source separation. Implementation could be phased in over the next two to three years to allow for a shakedown period to make this transition.

Legislative Mandate

The state, regional, county or municipal level of government could adopt a policy or law that would require all recyclable materials which have established markets to be recovered through source separation programs. Mandatory source separation would have to be phased in over a period of time to allow the haulers and other businesses to develop their service. Materials covered under this method would have to be restricted to marketable materials.

It should be noted that mandatory source separation programs across the country have shown much higher participation rates than voluntary programs.

Direct Studies

The government could directly subsidize material recovery organizations through a grant or a loan program. This subsidy would best be administered at the state or regional level. The potential sources of revenue for the subsidy program include the following:

- General Revenue - Appropriations from the state's general fund or from the Metropolitan Council's newly established bonding authority.

Waste Charge - Direct tax on all landfills.

Product Charge - Tax applied to any industry manufacturing products which are ultimately landfilled.

Pollution Enforcement Fines - Revenue from air, land and water pollution fines returned to a nonpolluting recycling program within the affected community.

Secondary Materials Price Support - The state or federal government could supplement the revenue recyclers receive from markets through direct price supports similar to milk supports.

Handicapped Labor and Employment Subsidies - Human services could be emphasized as the funding priority while assisting recycling efforts at the same time. Handicapped workers, sheltered workshops, and youth employment programs could be provided with additional subsidies to stimulate recycling programs.

Increased Public Education - All governmental units could be required to step up their public education programs in support of existing and potential recycling efforts. The objective would be to increase recovery rates through more public participation on a voluntary basis.

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Ban on Land Disposal of All Recoverable Materials - If methods and markets exist for recovery of materials being landfilled, these specific materials could be banned from all landfills.

Drop-Off and Picking Service at Transfer Stations - Phoenix, Incorporated, is ideally suited for participation in increased materials recovery efforts through their transfer stations. Two recovery systems are readily available. First, Phoenix could provide centrally located drop-off points for recyclable materials as brought in by the public and haulers. This would simply be a matter of setting up some separate and secure bins, such as roll-offs or dumpsters. Phoenix could then serve as a broker for the materials. Second, Phoenix could upgrade the picking operations at its two transfer stations and at the landfill itself.

Page 232 - Under the discussion of yard waste, not only leaves but also grass clippings should be considered as potential compost materials.

Page 233 - There is a statement that markets are not large enough to incorporate all the waste materials presently available. At this time, the MPCA does not know of any markets that would be saturated by recycling of all recyclable materials from the waste that would be disposed of at the Pine Bend Landfill. In addition, there are outstate markets which may be economical for marketing recyclable materials. Plastics are recyclable and markets for plastics are available. There is information available on plastics recycling, and it should be provided in the impact statement. With regard to composting, the product is a form of a soil enhancer and fertilizer-like material. It serves as a carbon source to plants and supplies moderate quantities of nitrogen, phosphorus and potassium. There are markets which include mines, nurseries, golf courses, sod farms, forestry and recreational areas, state parks, flower growers, county fairs, highway departments, and general contractors. At the present time, composted materials are not available to satisfy market demand. Market demand is now being satisfied by a somewhat nonrenewable black dirt resource.

A recent Minnesota Pollution Control Agency study has identified over 250 individual markets in the seven-county metropolitan area. Because little information is provided in the EIS on biological treatment and recovery methods and since these methods are an alternative to landfill expansion, the following additional information should be contained in this EIS.

Biological Treatment and Recovery

Research and demonstrations of anearobic and aerobic treatment of solid waste have increased substantially in the last five years. Anearobic treatment produces methane gas and humus. Aerobic treatment on the other hand, produces a sterilized humus or compost. These biological treatment methods can reduce the weight of solid waste by 50%. Aerobic treatment or composting can be applied to several different kinds of solid waste. These kinds of waste include: 1) leaf waste, 2) source separated organics, and 3) mixed waste. The cost of curbside leaf collection and composting through the windrow method can vary between \$4.75 to \$7.35 per ton. Since collection and land disposal costs in the Twin Cities vary between \$20.00 and \$35.00 per ton, leaf composting has a substantial net benefit to society.

Source separated organics can be collected from citizens that separate solid wastes and nonrecyclable paper from other components of solid waste. Source separated organics provide an excellent feed stock for composting since the material is relatively free of glass, metal, and plastics which reduce the value of compost. Approximately 8,000 people in Portland, Oregon, currently participate in such a program. Residents place food waste and other organics in plastic pails with sealable tops. The pails are then taken to a site where the organics are composted. When the compost is ready, area citizens use the compost for gardening. In August, 1980, a similar program may begin in neighborhoods of Columbia Heights, Minnesota.

Composting of mixed waste is also feasible as an alternative to the landfill expansion. Altoona, Pennsylvania, and about ten other cities in the United States currently compost mixed waste. Mixed waste includes not only food wastes and yard wastes but undesirable materials such as glass, metal and plastic. Mixed waste and source separated organics are both suitable for composting with sewage sludge. Solid waste is a good bulking agent for sludge and the sludge enhances the overall nutrient value of compost.

Technologies

Windrowing - A biological process of composting based on aerobic decomposition through frequent turning of the long rows of organic material. Windrow turning can be accomplished through a variety of methods utilizing special machinery.

Aerobic Chambers - A variety of aerobic chambers are used throughout Europe to compost solid waste. While this compost technology is more capital intensive than windrowing, aerobic chambers speed up material processing because moisture, oxygen and temperature levels can be controlled. Two of the most notable processes are the Dano drum developed in Europe and the Metro Process developed in Texas.

Anaerobic Digestion - This technology controls the temperature, oxygen level, and moisture levels of organics in solid waste to optimize the recovery of methane gas. Pomona Beach, Florida, is currently testing a large scale anaerobic digester to recover methane from mixed solid waste.

Clay Digester - This technology requires shredding of all solid waste. The shredded wastes are placed in a clay lined cell that is designed to hold one years worth of waste. The bottom of the cell is sloped to one end so that leachate can be easily collected. A clay top is placed on the waste to prevent oxygen from entering the cell. Perforated paper is placed in the cells and pumps are used to extract methane and carbon dioxide from the waste material. Water pipes are also placed in the cell to increase moisture content and increase the methane yield. After ten years of methane recovery, the material in the cell could be aerated and then distributed as a humus. With such a management practice, cells could be reused and would provide an alternative to landfill expansions.

Landfill Methane Recovery - This technology is similar to the clay digester except that shredding and landfill design are not as important. Seven landfills in the United States are currently recovering methane. Landfill methane recovery is not an alternative to landfill expansion unless shredding is employed or if humus is recovered from the landfill.

Page 241 - It should be noted that if none of the other landfills were granted their expansion, it would substantially affect Pine Bend's life. Resource recovery can have a substantial effect on sanitary landfill life. The theoretical waste stream reductions of up to 80% have been predicted by MPCA through a combination recycling, waste reduction, energy recovery, composting, and conservation practices. Although this figure is unrealistic for today, it could be reached within 20 years. Realistically, by 1985 we may be able to remove an additional 15% of the waste through materials recovery. If there was a total commitment to implementing resource recovery rather than the siting of new landfills as a means for handling solid waste in the metropolitan area, the maximum scenario provided by Pope-Reid in their Interim Study II does not reflect the potential. There are markets available for energy produced from solid waste, the technologies are available and the economics are favorable, but the institutional barriers and resistance to change from the landfill ethic appear to favor the maximum scenario schedule. If the public demanded alternatives to landfills, it is conceivable that waste reduction in resource recovery could eliminate 80% of the projected needs by year 2000. Because resource recovery and waste reduction measures reduce the volume to be landfilled, there is a beneficial effect in that new landfills will not be needed. The effect of future resource recovery and waste reduction programs should be identified to give decision makers the information needed to implement programs that minimize the impact of this landfill by extending its life.

Page 261 - Although it is projected that it will take ten to fifteen years for resource recovery, waste reduction and source separation programs to have a substantial effect on the solid waste stream, we believe that this can be accelerated through a dedicated effort. The impact of this landfill can, therefore, be reduced by implementing these measures more quickly.

General - In general, the major comments on the impact statement relate to the discussion of ground water impacts and the projections on leachate generation. The on-site treatment ponds effect on ground water is not determined. Upon first reading the EIS, it does not appear that the potential for fires is discussed, including the air quality impacts, the effects of dumping substantial quantities of water to kill fires, etc. With the recent events at the Flying Cloud Landfill, it would seem appropriate to provide substantial discussion of the potential for fires at the landfill, and what effect a fire has on the prediction of 20 years to reach field capacity.

The long-term care of the sanitary landfill is not adequately discussed. Recognizing that leachate may be generated for hundreds of years, there should be a discussion of the responsibility, the cost for monitoring, etc. This should include the long-term legal responsibilities or liability. Perhaps a discussion with the Attorney General's office would help answer this question.

No data was made available on the soils to be used for daily cover and for final cover. Soils determine, in part, the infiltration rate; thus, the amount of leachate generated and time in which it reaches field capacity should be added to the EIS.

As an alternative, there should be discussions on practices that could take place at the sanitary landfill, such as shredding and baling, prohibition of the disposal of certain of the recyclable commodities, and development of composting for leaves and grass clippings at the landfill.

If possible, it is important to determine what concentrations may be expected at the well sites between the landfill and the river. Final release of leachate to the river may well be inconsequential due to the large indicated dilution potential of the river. If there is any dilution potential by the ground water, it should be addressed.

APPENDIX

Pine Bend Sanitary Landfill

All environmental impacts calculated for Table A have been extrapolated from data presented in Resource and Environmental Profile Analysis of Nine Beverage Container Alternatives: Final Report, EPA/530/SW-91c and Environmental Impacts of Production of Virgin and Secondary Paper, Glass and Rubber Products, EPA SW-128c. The latter document has been used to determine environmental impacts for newprint, office paper and corrugated production. The former document has been used to determine production impacts of ferrous cans and aluminum. The latter document has been used to calculate air, water and energy impacts of glass production. Each of these documents provides a detailed list of assumptions and sources. The following are additional assumptions that are made for the purpose of this Pine Bend landfill expansion environmental impact statement.

1. Air emissions listed in the category "Other" include: aldehydes, other organics, ammonia, hydrogen fluoride, lead, mercury and chlorine.
2. The following water emissions have been listed as suspended solids: sulfides, waterborne chemicals, chromium, iron, aluminum, nickel, mercury and lead.
3. Water emissions listed as "Other" include: fluorides, dissolved solids, phenol, oil, acid products, metal ion, cyanide and alkaline products.
4. The environmental impacts for one ton of bi-metal can production has been quantified to include: iron ore mining, limestone mining, coal mining, lime manufacturing, oxygen manufacturing, recycling of post-industrial waste, steel strip manufacturing, petroleum production, three-piece can fabrication, aluminum closure, transportation, and disposal of industrial wastes.
5. The environmental impacts for one ton of aluminum container production include: bauxite mining, a caustic soda system, a lime system, a petroleum products system, bauxite refining, aluminum smelting, aluminum rolling, can fabrication, transportation, recovery of used aluminum, and industrial waste.
6. The raw material and industrial waste impacts for one ton of glass containers include: glass sand mining, limestone mining, lime manufacturing, soda ash mining, salt (brine) mining, soda ash manufacturing, feldspar mining, glass container fabricating, transportation, recycled glass recovery, industrial waste disposal, and transportation. These impacts have been estimated from information in Resource and Environmental Profile Analysis of Nine Container Alternatives: Final Report.
7. Industrial wastes listed in Table A include: wastes in manufacturing, in fuel combustion, and in mining.
8. Energy usage estimates include: energy used in the manufacturing process, in transportation, raw material extraction, and in energy production.
9. Glass recycling activities do not include glass crushing or processing at recycling centers. Only transportation 100 miles by truck is assumed.
10. Air emissions of H₂S, RSH, RSR, RSSR, and odorous sulfurs from all paper mills have been listed as reduced sulfurs.
11. It is assumed that all waste office paper will be recycled into tissue paper which is the primary market in Minnesota. Therefore, all calculations concerning office paper assume that office paper recovery prevents environmental degradation caused at virgin tissue mills.

APPENDIX (continued)

Pine Bend Sanitary Landfill

12. The following represents the percentage that specific components of solid waste represent in the waste that will be buried at the Pine Bend landfill:

Aluminum	.7%
Glass	9.4%
Corrugated	10.5%
Ferrous	7.8%
Newsprint	7.2%
Office Paper	4.4%

13. 1.875 million tons of solid waste will be buried in the proposed landfill expansion.

Scenario #1 (status quo case)

Without materials recovery and waste reduction, it is expected that the 1.875 million tons of solid waste to be buried in the landfill expansion will include:

Aluminum	13,125 tons
Glass	176,250 tons
Ferrous	146,250 tons
Office Paper	82,500 tons
Newsprint	135,000 tons
Corrugated	196,875 tons

It is assumed that 13,125 tons of aluminum will have to be manufactured at 25% recycled rather than a higher percent recycled. No post consumer glass cullet will be used to replace the 176,250 tons that will not be recovered through scenario #1. Raw material from 100% virgin resources are assumed to be used with the exception of aluminum. It is also assumed that in-plant scraps will be reused in the manufacturing process. Environmental impacts have been estimated using impact per ton of product estimates that are presented at the end of this Appendix.

Again, source and assumptions for the per ton of product impacts are contained in Resource and Environmental Profile Analysis of Nine Beverage Container Alternatives: Final Report and Environmental Impacts of Production of Virgin and Secondary Paper, Glass and Rubber Products.

APPENDIX (continued)
Pine Bend Sanitary Landfill

Scenario #2 assumes that recovery rates that have been attained by efficient voluntary curbside programs that already exist in Minnesota can be applied to all recyclable materials generated in the area served by the Pine Bend landfill. The following is the assumed recovery rates and expected tons to be recovered.

<u>Material</u>	<u>Percent Recovered</u>	<u>Tons to be Recovered</u>
Newsprint	30	40,500
Office Paper	40	33,000
Corrugated	60	118,125
Glass	23	40,537.5
Ferrous	15	21,937.5
Aluminum	10	1,312.5

Scenario #3 assumes that recovery rates that have been attained by efficient mandatory curbside programs can be accomplished in the area served by the Pine Bend landfill. Specific recovery rates used have been attained by Marblehead, Massachusetts, Boca Raton, Florida, or Hoerner Waldorf in St. Paul. The following is the assumed recovery rates and expected tons to be recovered.

<u>Material</u>	<u>Percent Recovered</u>	<u>Tons to be Recovered</u>
Newsprint	67	90,450
Office Paper	50	41,250
Corrugated	70	137,812.5
Glass	47	82,837.5
Ferrous	39	57,037.5
Aluminum	26	8,793.8

IMPACTS FOR ONE TON OF ALUMINUM CONTAINER PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Existing Containers (25% Recycled)</u>	<u>75% Recycled Aluminum</u>
Air Emissions (total)	pounds	1,219.593	573.103
Hydrocarbons		197.217	122.910
Sulfur Oxides		470.771	205.396
Particulates		210.486	90.097
Nitrogen Oxides		229.147	109.549
Reduced Sulfurs		-	-
Carbon Monoxide		106.027	42.787
Other		5.945	2.364
Water Emissions (total)	pounds	225.155	106.437
Biological Oxygen Demand		5.898	2.085
Suspended Solids		40.550	22.551
Chemical Oxygen Demand		77.442	25.873
Other		101.265	55.928
Raw Materials (total)	pounds	7,542.117	2,657.664
Limestone		374.976	124.992
Salt		379.859	126.620
Bauxite Ore		6,279.407	2,093.151
Other		507.875	312.901
Energy	million BTUs	289.986	146.161
Water	thousand gals.	58.711	32.904
Industrial Waste	pounds	10,243.632	3,840.117

IMPACTS OF ONE TON OF CORRUGATED BOXBOARD PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Virgin Boxboard</u>	<u>45% Boxboard</u>
Air Emissions (total)	pounds	63.94	54.92
Hydrocarbons		.98	.66
Sulfur Oxides		30.90	31.54
Particulates		5.96	4.80
Nitrogen Oxides		14.86	12.32
Reduced Sulfurs		8.60	3.44
Carbon Monoxide		2.58	2.14
Other		.06	.02
Water Emissions (total)	pounds	14.74	8.76
Biological Oxygen Demand		8.40	4.38
Suspended Solids		6.34	4.38
Chemical Oxygen Demand		-	-
Other		-	-
Raw Materials (total)	pounds	6,004.00	3,804.00
Roundwood		6,004.00	3,804.00
Energy	million BTUs	37.623	29.127
Water	thousand gals.	18.67	19.27
Industrial Waste	pounds	356.42	448.20

IMPACTS OF ONE TON OF NEWSPRINT PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Virgin Newsprint</u>	<u>100% Newsprint</u>
Air Emissions (total)	pounds	40.36	45.92
Hydrocarbons		.84	.4
Sulfur Oxides		20.36	31.62
Particulates		3.04	1.06
Nitrogen Oxides		12.04	11.44
Reduced Sulfurs		1.66	-
Carbon Monoxide		2.10	1.34
Other		.32	.06
Water Emissions (total)	pounds	11.00	22.00
Biological Oxygen Demand		5.00	10.00
Suspended Solids		6.00	12.00
Chemical Oxygen Demand		-	-
Other		-	-
Raw Materials (total)	pounds	4,324.00	-
Roundwood (timber)		4,324.00	-
Energy	million BTUs	22.90	17.608
Water	thousand gals.	20.69	20.77
Industrial Waste	pounds	305.00	449.42

IMPACTS FOR ONE TON OF TISSUE PAPER PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Virgin Tissue</u>	<u>100% Recycled Tissue From De-inked Office & Printing Paper</u>
Air Emissions (total)	pounds	78.42	63.00
Hydrocarbons		.94	.74
Sulfur Oxides		42.44	40.70
Particulates		7.54	1.90
Nitrogen Oxides		16.84	16.70
Reduced Sulfurs		5.46	-
Carbon Monoxide		3.60	1.86
Other		1.60	1.10
Water Emissions (total)	pounds	21.00	22.00
Biological Oxygen Demand		11.00	10.00
Suspended Solids		10.00	12.00
Chemical Oxygen Demand		-	-
Other		-	-
Raw Materials (total)	pounds	7,618.00	-
Roundwood		7,618.00	-
Energy	million BTUs	42.12	27.03
Water	thousand gals.	53.51	35.98
Industrial Waste	pounds	528.56	707.58

IMPACTS FOR ONE TON OF BIMETAL CAN PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Existing Cans</u>	<u>100% Steel Can With Aluminum Top</u>
Air Emissions (total)	pounds	356.012	355.751
Hydrocarbons		72.356	77.857
Sulfur Oxides		107.406	112.947
Particulates		84.238	67.781
Nitrogen Oxides		53.353	58.674
Reduced Sulfurs		1.840	-
Carbon Monoxide		30.724	36.734
Other		6.095	1.758
Water Emissions (total)	pounds	54.905	63.336
Biological Oxygen Demand		.941	.944
Suspended Solids		10.738	19.823
Chemical Oxygen Demand		12.748	12.756
Other		30.478	29.813
Raw Materials (total)	pounds	4,593.156	1,503.528
Limestone		776.553	226.609
Iron Ore		2,520.800	25.950
Salt		60.191	60.191
Bauxite Ore		1,033.064	1,033.064
Other		202.548	157.714
Energy	million BTUs	85.978	70.690
Water	thousand gals	56.853	23.517
Industrial Waste	pounds	10,707.682	2,257.555

IMPACTS FOR ONE TON OF GLASS CONTAINER PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Existing Containers (15% Cullet</u>	<u>100% Recycled Cullet</u>
Air Emissions (total)	pounds	1,152.586	1,133.679
Hydrocarbons		179.612	175.835
Sulfur Oxides		276.384	429.590
Particulates		328.887	216.570
Nitrogen Oxides		207.654	188.192
Reduced Sulfurs		37.112	37.844
Carbon Monoxide		106.548	78.846
Other		16.389	6.802
Water Emissions (total)	pounds	240.057	254.518
Biological Oxygen Demand		87.740	89.691
Suspended Solids		85.063	69.795
Chemical Oxygen Demand		.282	.574
Other		66.972	94.458
Raw Materials (total)	pounds	29,977.232	492.599
Limestone		8,648.840	72.191
Salt		4,541.077	-
Glass Sand		13,067.869	131.999
Natural Soda Ash		1,534.472	-
Feldspar		1,494.863	-
Other		690.113	288.409
Energy	million BTUs	285.497	354.765
Water	thousand gals.	158.034	121.010
Industrial Waste	pounds	11,131.118	3,053.886

IMPACTS FOR ONE TON OF GLASS CONTAINER PRODUCTION

<u>Summary of Environmental Impacts</u>	<u>Units</u>	<u>Existing Containers (15% Cullet</u>	<u>100% Recycled Cullet</u>
Air Emissions (total)	pounds	12.07	10.90
Hydrocarbons		.59	.53
Sulfur Oxides		4.92	3.97
Particulates		1.71	1.24
Nitrogen Oxides		4.51	4.62
Carbon Monoxide		.34	.54
Other			
Water Emissions (total)	pounds	.44	.23
Biological Oxygen Demand		.13	.07
Suspended Solids		.31	.16
Raw Materials (total)	pounds	29,977.232	492,599
Limestone		8,648.840	72.191
Salt		4,541.077	-
Glass Sand		13,067.869	131.999
Natural Soda Ash		1,534.472	-
Feldspar		1,494.863	-
Other		690.113	288.409
Energy	million BTUs	15.67	13.16
Water	million gals.	.79	.41
Industrial Waste	pounds	11,131.118	3,053.886

ENVIRONMENTAL IMPACTS RESULTING FROM BURIAL OF
RECYCLABLES IN PINEBEND SLF EXPANSION

<u>Environmental Impacts</u>	<u>Units</u>	<u>Scenario # 1 Status Quo</u>	<u>Scenario # 2 Realistic S.S.</u>	<u>Scenario # 3 Potential S.S.</u>
Air Emissions (total)	tons	47,358	46,883	45,485
Hydrocarbons		6,832	6,831	6,804
Sulfur Oxides		17,543	17,523	17,727
Particulates		8,794	8,784	7,816
Nitrogen Oxides		8,776	8,779	8,524
Reduced Sulfurs		1,318	970	722
Carbon Monoxide		3,517	3,483	3,469
Other		578	513	423
Water Emissions (total)	tons	8,590	8,595	8,724
Biological Oxygen Demand		1,738	1,656	1,657
Suspended Solids		2,520	2,676	2,919
Chemical Oxygen Demand		1,440	1,406	1,352
Other		2,892	2,857	2,796
Raw Materials (total)	tons	4,789,430	3,289,650	2,395,030
Limestone		821,424	641,388	450,079
Salt		407,076	314,865	218,556
Bauxite Ore		116,751	114,004	109,610
Glass Sands		1,151,606	889,415	691,324
Feldspar		131,735	101,445	69,826
Iron Ore		184,333	156,967	113,184
Roundwood		1,197,132	897,248	610,078
Soda Ash		135,225	104,126	71,671
Other		64,150	70,189	60,705
Energy	trillion BTU's	33.11	30.95	27.59
Water	billion gals.	33.89	29.40	26.30
Industrial Waste	tons	1.90	1.66	1.34

APPENDIX A

Summary of Public Meeting Comments
Comments Submitted for the Public Record
Staff Responses to Public Comments
Recommendations for Changes to Final EIS

(1) Rodent Control

After the filing of the Draft EIS, it has come to our attention that rats have been a problem at the homes of nearby residents to the landfill. Mrs. Shirley Pike, of 11025 E. Courthouse Blvd. and some adjacent neighbors, submitted comments complaining of rats at their homes. They are located northeast of the landfill about 2500 feet. They believe the landfill could be a contributor to the rat problem. Comments submitted by the City Council of Inver Grove Heights also pointed out this problem.

Staff Analysis

Metropolitan Council staff and University of Minnesota staff conducted an investigation into the rat problem on June 2, 1980. Staff surveyed the Pine Bend Landfill, the Crosby American Landfill, a portion of the Chicago and Northwestern Railroad tracks, Shirley Pike's backyard and adjacent homes. No evidence of rat activity, rat harborage or rat predators were observed at the Pine Bend Sanitary Landfill.

However, staff from the University did point out that the Crosby American fill area appeared to be a good harborage area for rats and that the nearby Chicago and Northwestern railway tracks were also a good harborage area for rats. Considerable amounts of grain were found on the tracks which could provide a food source for the rats. It has also been pointed out by MPCA staff that the Crosby American Landfill has been in violation of its weekly cover requirement since November 1979.

The University staff also pointed out that even though rats may be brought into the Pine Bend Landfill area by compactor trucks, the activity at the landfill (i.e., operation of equipment and movement of refuse tracks) would provide enough stress on the rats that they would not harbor there. It was further pointed out, that once rats located a good harborage and food source area they would not migrate beyond 150 feet of that area.

Based upon available information, the rat problem the residents are experiencing is not caused by the Pine Bend Landfill.

University staff stated that extermination of rats is only a temporary measure and that a more permanent measure should be undertaken. University staff believe there is a permanent reservoir of rats in the area possibly near the railway. They stated that an extensive field investigation survey of the area, possibly as long as 2 months, is necessary to determine the exact location of this reservoir. This would probably have to include some experimental trapping. This could be done possibly by a couple of University students.

Contributing to the problem could possibly be the lack of weekly cover at the Crosby American Landfill. It should be verified as to whether or not this landfill is providing a harborage area for the rats. This could also be done as part of a field investigation-survey. MPCA has notified American Hoist of the problem and undertaken steps to enforce weekly cover at the site.

The field investigation-survey should be able to locate the main harborage areas for the rats. Extermination measures could then be undertaken.

Recommendations

It is recommended that the above staff analysis regarding the rat issue and the discussion of mitigating measures be appended as part of the final EIS.

(2) Litter

Comments submitted by Shirley Pike of 11025 E. Courthouse Blvd. and nearby neighbors have indicated that litter is a problem from refuse trucks and trailers going into the landfill area. Mrs. Pike and her neighbors are located along Highway 55 a route heavily traveled by traffic going to the landfill. They have noted that on occasion litter is scattered by this traffic and there appears to be a lack of enforcement over the problem.

Staff Analysis

Litter along the highway coming from refuse vehicles is primarily an enforcement problem. The problem appears to be caused by overloaded compactor trucks and uncovered trailers and pickup trucks going to the landfill. MPCA regulations state that vehicles or containers used for the collection and transportation of any solid waste shall be covered when necessary to prevent the blowing of material. MPCA regulations also state that where spillage does occur, the material shall be picked up immediately by the collector or transporter and returned to the vehicle or container and the avenue properly cleaned. As a result of meeting with Mrs. Pike and her neighbors and MPCA staff, the State Highway Patrol and County Sheriff's Office were notified of this problem and instructed to take proper enforcement actions when necessary.

Operation of the Pine Bend Landfill does not appear to be a cause of the litter problem. Traffic going to the landfill is the main cause of the problem. Measures to alleviate the problem include (1) increased awareness of the problem by law enforcement officials, (2) increased awareness of the problem by refuse haulers going to the landfill, and (3) refusal by the landfill operator to except refuse that is uncovered.

Frank Rauschnot, Vice President of the St. Paul Hauler's Association, met with Council staff and the neighbors complaining about the litter problem. Mr. Rauschnot agreed to alert haulers to this problem. Mr. Rauschnot further indicated that the litter problem is most likely caused by private individuals taking refuse to the landfill in open trailers and vehicles such as pick-up trucks.

Recommendations

It is recommended that the above staff analysis regarding the litter issue and the discussion of mitigating measures be appended as part of the final EIS.

(3) Noise

Mrs. Shirley Pike of 11025 E. Courthouse Blvd, and other nearby neighbors have complained about noise from operations of the landfill. Most notable noise has been noticed late at night (9 p.m.-10 p.m.) during the summer months.

Staff Analysis

The landfill is operated from 6 a.m. to 8 p.m., Monday through Friday and daily cover material is in place by 10 p.m. The site is operated from 6 a.m. to 4 p.m. on Saturday's and daily cover material should be in place by 5-6 p.m. It appears that noise is not a great problem, but more of an annoyance particularly during the summer months. An obvious solution to the problem would be to shorten operating hours of the landfill, however, this may cause considerable problems with refuse haulers who need to dispose of their refuse at facility's with adequate operating hours. It is recommended that this issue would be further explored with the landfill operator and area haulers. If nearby residents suffer from noise by landfill activities after permitted operating hours, they should contact MPCA and the Agency should immediately respond taking necessary enforcement action.

Recommendation

It is recommended that the above staff analysis regarding the noise issue be appended as part of the final EIS.

(4) Odor

Mrs. Shirley Pike of 11025 E. Courthouse Blvd. and other nearby neighbors have submitted comments regarding odor problems at the landfill. According to Mrs. Pike "on hot summer evenings when the humidity is high, wind at a minimum, the air is stagnant with the smell of garbage." After meeting with Metropolitan Council staff, Mrs. Pike and her neighbors stated that odors have been noticed to have occurred on rare occasions. It does not appear to be a major problem with the operation of the landfill. With the application of daily cover material and sufficient controls on preventing wind-blow litter, odors should not be a problem. It is, however, recommended that the MPCA respond immediately to complaints of odors by nearby residents. Such complaints may indicate improper operation of the landfill.

Recommendation

It is recommended that the above staff analysis regarding the odor issue be appended as part of the Final EIS.

(5) Aesthetics

Mrs. Shirley Pike of 11025 E. Courthouse Blvd. and other nearby neighbors have submitted comments concerning the visual impacts of the landfill. Generally working areas of the landfill are visible only when they are at the top elevations of the landfill. Expansion of the landfill will not raise final elevation of the landfill above presently permitted elevations. Presently Mrs. Pike and her neighbors have a very limited view of the landfill operation. There may, however, be a greater visual impact as higher elevations are attained. A suggested mitigative measure would be to seed completed portions of the landfill as soon as practicable in order to facilitate vegetative growth which will lessen the visual impact to nearby homes as higher elevations are reached.

Recommendation

It is recommended that the above staff analysis regarding the issue of aesthetics be appended as part of the Final EIS.

(6) Methane Gas

Comments have been submitted concerning the draft EIS's discussion of methane gas at the landfill. According to comments submitted by the City of Inver Grove Heights average methane gas concentrations cannot be assured at all locations of the landfill. The City further states that high methane gas concentrations are likely to occur at various locations in the landfill without a gas control system. MPCA has submitted comments stating that it is advisable to place a cover material on the landfill which is relatively impermeable in order to avoid excess infiltration and increased leachate generation. MPCA further stated that by placing an impermeable cap of cover material, methane gas can build up within the landfill which may be vented in higher concentrations through cracks and fissures. MPCA also states that this can be mitigated by providing appropriate venting at periodic intervals throughout the area of the landfill.

Staff Analysis

According to the Draft EIS the proposed new expansion area has the potential for adverse methane gas impacts. The Draft EIS further stated that it may be necessary prior to closure of the facility, to install a gas monitoring system to evaluate any future requirements for on-site and perimeter gas control measures. Such a monitoring program will also help determine future use of the property and whether new structures should be placed on the property.

Staff, however, agrees with the comments submitted by the City and MPCA regarding this issue. Improving leachate control through the application of an impermeable cover material will impede gas movement. Gas venting or barrier systems, or combinations thereof, may be necessary to restrict gas movement to specific paths or areas. The primary methane gas control methodologies involve physical channelling or containment of the gas itself. The draft EIS states that the landfill cover can result in venting of the decomposition gases directly into the atmosphere. However, further discussion concerning leachate control dictates that a more impermeable cover material may be necessary at the landfill, and thus the potential for adverse gas impacts will be increased unless gas control is implemented.

Gas control systems include impermeable barriers, vertical risers, permeable trenches, gas collection systems, and a variety of combination systems. Perhaps the most practicable system with respect to the Pine Bend Landfill is a combination of permeable trenches and vertical risers. Permeable, gravel-filled trenches are usually located on the perimeter of a landfill or incorporated between daily wells. Thus, trenches operate by intercepting laterally migrating landfill gas and by providing a low resistance path to the atmosphere. These trenches should normally extend to at least the bottom of the landfill. Gravel-filled trenches equipped with vertical perforated pipes functioning as methane vents have been shown to reduce the effect of temporary covers such as ice or snow.

Vertical risers consist of perforated pipe vents or gravel-filled well systems. The most effective control occurs when a closely spaced grid of vents is installed. Induced exhaust wells equipped with a pump or blower can also be used and at the same time recover exhaust gases.

Comments submitted by Phoenix state that a portable gas monitoring program is proposed for the landfill for the purpose of identifying any methane concentrations that might occur at detectable levels. Their program will greatly assist in assessing the need for any post-closure program that might be implemented.

Recommendations

It is recommended that the above staff analysis regarding the issue of methane gas control be appended as part of the final EIS.

(7) Socio-Economics

The City of Inver Grove Heights does not agree with that portion of the draft EIS which states that there are adequate park facilities available until the Pine Bend Landfill area is completed, assuming the expansion is approved. The City further states that it is presently seeking appropriate areas for active park use and is awaiting the possible use of the westernly portion of the presently approved site. Regarding land use, the City points out that north of the landfill is large lot residential or proposed large lot residential land uses.

MPCA has submitted comments stating that since there will no longer be a railroad or a railroad right-of-way for a railroad, there is an irreversible irretreivable commitment by filling that area and that there are other uses that are no longer available for the site such as a ski hill. MPCA also points out that although the area downstream of the landfill is not proposed for residential development, land use plans are only plans, and are subject to change. It should be recognized that housing according to MPCA, particularly if ground water will be used for the water supply, would not be a recommended land use and therefore an irreversible irretreivable commitment of a resource is occurring.

Staff Analysis

Staff agrees with the comments submitted by the City. The City's statements concerning adequate park facilities and the proposed residential area north of the landfill should be appended to the final EIS.

Staff does not agree, however, with the comments submitted by the MPCA concerning the railroad right of way or the end use of that area. It may have been in the best interest of the railroad (Chicago and Northwestern) to abandon use of this segment of the track. Staff would not necessarily regard this as an irreversible commitment of a resource until further investigation is undertaken. With respect to the facility's end use, expansion of the landfill would appear to enhance its end use as a ski hill area. Expansion of the landfill does not appear to limit other final uses of the property.

Staff agrees with MPCA concerning their comments regarding potential contamination of water supply wells located east of the landfill and within the leachate zone of influence as identified in the draft EIS. Unless public water supplies are installed, housing should be restricted within this area. (The City has zoned most of this area general industrial use). From a taxing point of view, this would not be a loss of a resource as MPCA has indicated. The City can usually collect more in property tax revenues from industrial uses of land than residential uses.

Recommendation

It is recommended that the above staff analysis regarding land use be appended as part of the Final EIS.

(8) Surface Water Drainage

A considerable number of comments were submitted by the City of Inver Grove Heights concerning surface water drainage at the landfill. The City stated that the proposed expansion area will significantly increase the potential for contamination of on-site and nearby off-site ponds due to the greater potential for surface erosion resulting from an increase in average fill heights. According to the City, surface drainage in the railroad track area can be made adequate by very minor grading of the existing ground. The City further states that the draft EIS has given insufficient attention to the problem of increased surface erosion due to increased surface run-off quantity and rate and there is no assurance that natural vegetative growth will sufficiently stabilize the final fill surface. The City also states that the entire landfill, including the fill surface, is not graded and/or provided with drainage facilities too minimize run-off to thus prevent erosion or washing of the cover material. According to the City, the proposed expansion will increase the average height of the landfill, which in turn will increase surface erosion potential. The City is also concerned whether the capacity of the holding ponds is adequate to accommodate surface water run-off from the completed landfill surface. Ponding on the landfill surface requires infiltration control through the use of impermeable cover in the ponding areas.

The MPCA also submitted comments concerning surface water run-off. According to the MPCA, correction of the surface run-off problem can be done without filling the abandoned railroad right-of-way with refuse, similar to the comments submitted by the City. MPCA also stated that it is recognized that the degraded conditions of the ponds is probably the result of leachate seeps that are occurring and that although these ponds are not affected by ground water, they do effect ground water through seepage. MPCA further stated that leachate contamination in the on-site ponds may be considered minor if compared to the concentrations of raw leachate, however, it must be recognized that contamination in the ponds is diluted by substantial amounts of run-off.

Comments regarding the drainage ponds and surface run-off at the landfill were also submitted by Phoenix Inc., owner and operator of the site. According to Phoenix, the on-site ponds have been designed and permitted as surface water retention areas with the purpose of collecting surface water run-off and sediment and that any increased siltation of these catchment areas due to the proposed expansion should not be looked upon as a negative impact, but as the retention areas performing their intended permitted engineered purpose. Phoenix further states that the tone of discussion in the draft EIS is very negative regarding the potential for contamination of the on-site and off-site ponds and that from a practical point of view it is not known that any of the off-site ponds are contaminated.

Staff Analysis

Important concerns have been raised both by the City of Inver Grove Heights and the MPCA. As correctly pointed out, surface drainage in the abandoned railroad track area can be made adequate by minor grading of the existing ground. It is not necessary to fill the abandoned railroad right-of-way with refuse to correct surface drainage problems in the valley area and this should not be viewed as a mitigating measure.

Staff calculated soil losses at the landfill under varying conditions to determine the degree of erosion that might occur. These calculations were done using the universal soil loss equation, a recommended procedure by the U.S. EPA. It was determined that for the landfill including the expansion area without controls or surface run-off 2.4 tons per acre of soil per year would be lost due to erosion. If terracing to reduce the velocity of run-off at the landfill is implemented the amount of soil loss can be substantially reduced. For instances, if 4 terraces are implemented the amount of soil loss would be 1.2 tons per acre per year and if 6 and 9 terraces are implemented the amount of soil loss would be respectively 0.96 and 0.80 tons per acre per year. It was also found that with the implementation of a clay cap over the top of the landfill including the expansion area (2 to 20 percent slopes) the amount of soil loss due to erosion would be 2.34 tons per acre per year assuming no surface run-off controls and 1.2, 0.9 and 0.8 tons per acre per year with the implementation of respectively 4, 6, and 9 terraces. With a clay cap over the entire landfill including the expansion area (213 acres), soil loss would be 1.30 tons per acre per year with the implementation of respectively 4, 6 and 9 terraces. Generally speaking, two tons of soil loss per acre per year is not visible; it corresponds roughly to 1/100 of an inch of soil per acre. Erosion becomes visibly noticeable at 5-10 tons of soil loss per acre per year. It is important to point out that the universal soil loss equation does not account for any gulleying. Visible gulleying involves large amounts of soil erosion and this loss must be added to the results of the equation. Gulleying has occurred at the landfill, most noticeably on completed north slopes.

Surface drainage systems at the Pine Bend Landfill should incorporate design features that help control erosion of cover material. Filling of the expansion area will increase surface run-off quantity and the rate of run-off. The expansion area will also have longer slope lengths than that permitted for the existing landfill area. These factors have the potential for causing significant soil erosion at the landfill. A suggested mitigating measure would be the construction of berms or terracing at the landfill. Berms or terraces would reduce run-off velocity and minimize erosion across the landfill surface by decreasing the slope of the flow. While berms do not divert surface run-off, a series of berms can decrease flow velocities and are particularly useful on long back slopes. One berm or terrace every 100 feet of slope would be effective in reducing the erosion problem at the landfill. This is probably preferable than controlling surface water run-off by ponding as suggested by the City.

Staff also calculated the capacity of the catchment ponds at the landfill. The total available space for the two northeast ponds, the southeast pond, the southwest pond and the northwest pond is 1.5×10^7 cubic feet. The total space available for run-off exceeds both the total volume of one year of run-off (2.7×10^6 cubic feet) and the total volume of a ten year frequency storm (3.3×10^6 cubic feet). These calculations assume a worst case situation with no infiltration at the landfill and no evapotranspiration or seepage at the ponds.

As pointed out by the draft EIS, some of the closer off-site ponds could be affected by leachate seepage particularly those ponds receiving surface water run-off. The draft EIS also points out that degraded conditions at the northeast ponds appear to have resulted from leachate seeps that occurred at the landfill. Finally, the draft EIS states that the northeast and southeast catchment ponds most likely have increased suspended sediment as a result of receiving surface drainage and minor erosion of the fill surface.

Recommendation

It is recommended that the above staff analysis be appended as part of the final EIS.

(9) Ground Water Quality

Several comments were submitted concerning the effect of the existing landfill on ground water quality and the effect of expanding the landfill. Most of these comments were offered in the form of statements rather than questions. The City of Inver Grove Heights stated that the daily rate of leachate discharge is likely to increase substantially because of the increased amount of flat slopes overlying the fill area, which in turn will affect the ground water system. While much of the landfill site will have steep (4:1) slopes, the proposed expansion will add approximately 25 acres of area at the top of the landfill mass with an average slope of less than 3 percent. According to the City, component strengths and leachate production period, will increase due to the greater average thickness of the landfill; and filling of the proposed expansion area will add to the potential of leachate contamination over that from the existing landfill operation. The City further states that there should be a comparison of landfill leachate with other waste streams (i.e., sewage) and that the listing of typical contaminants in leachate (pg 208 of the draft EIS) is very incomplete. The City also states that ground water surface gradients shown are based on insufficient data and that the likelihood of northerly flow cannot be discounted. The City states that residential development is occurring immediately to the north of the landfill, overlying the buried valley region and that these wells may come within the influence of leachate contamination, particularly if leachate duration is increased by the proposed expansion. The residential area lying northerly of the landfill would readily fall within the area of influence with slight variation in the 750 foot contour just north of the landfill. The City also states that elevated phenol contents as shown in Table III-24 of the draft EIS is a likely indication of the presence of leachate in the ground water system and that because of the extremely high phenol content in typical leachate, small amounts of leachate produced in the landfill would be sufficient to affect phenol content measurements in the groundwater.

The MDOH also expressed concern about the affect on ground water quality from the landfill operation. They are recommending that the following points be incorporated into the EIS. (1) There is major concern about the potential impact of leachate on groundwater supplies east of the landfill. (2) It appears that the St. Lawrence confining unit is absent and the Franconia formation may be hydrologically connected to the bedrock valley. Since the hydraulic condition of the Franconia in this area is unknown, groundwater may flow into this aquifer from the valley fill. (3) Some wells in the area are multi-aquifer well open to a number of bedrock units down to the Mt. Simon-Hinckley aquifer. Since the hydraulic potential of the Prairie du Chien-Jordan aquifer is higher than the Mt. Simon-Hinckley (730'-780'vs 665'), waters from the Prairie du Chien- Jordan aquifers will flow downwards, effectively creating an injection well. (4) Another concern is the inevitable contamination of shallow wells east of the landfill. Alternative water supplies will be necessary for these users.

The Minnesota Dept of Natural Resources submitted comments concerning ground water contamination. MDNR is concerned that the draft EIS does not present enough details describing the extent of the problem or what measures might be taken to mitigate the adverse effects. According to MDNR, the document does not discuss what measures would be taken to correct the problem of contamination of nearby wells should this occur.

MPCA submitted a number of comments concerning ground water quality. Some of those comments were submitted in the form of general statements and they are used in the staff's analysis below. MPCA is concerned about leachate seeps presently occurring at the landfill, field capacity calculations of the draft EIS, and the daily rate of discharge of leachate from the landfill.

Staff Analysis

Important concerns have been raised by the City, MDOH, and MPCA. The following discussion and recommendations hopefully will deal with those issues and is suggested as an appendix to the final environmental impact statement.

Leachate is presently being produced in the landfill most likely in small quantities. Inspections by the MPCA have identified leachate seepage from the side slopes of the landfill. The variability within the landfill of field capacity will determine the amount of leachate leaving the landfill initially. The landfill will have varying percentages of water in it until the entire site reaches field capacity. The nonhomogeneity of the waste creates conduits for flow which likely is the reason for the leachate seeps. Prior to the landfill reaching field capacity the flow of leachate should occur at a non-steady state rate. Ground water impacts could occur at this time, however, it would be expected that maximum impacts would occur when field capacity is reached.

Presumably, the landfill acts as a sponge and collects water. Theoretically, an increase in surface area available for infiltration and the amount of material leachable would therefore proportionally increase the total volume of leachate eventually generated at the site and the timing and length of time in which leachate will occur. A 42 percent increase in volume should increase the available material for leaching by 42 percent. Similarly, the total volume of leachate eventually generated at the facility should increase by 42 percent.

With undisturbed conditions, leachate generated from the landfill will be confined strictly to the bedrock valley since the hydraulic potentials are higher in the Prairie du Chien-Jordan aquifer than the valley fill, resulting in continuous flow towards the bedrock valley. This is true on a regional scale. However, some wells in the area (i.e., Mid-America Pipeline) are open to the Prairie du Chien-Jordan system and are high capacity wells. With heavy withdrawals, there is a strong possibility of flow reversal of

groundwater towards local pumping centers. Although regional flow patterns would appear to restrict leachate to the valley, the impacts of local wells may result in changes in the groundwater flow regime.

As correctly pointed out by MDOH, some wells in the area are multi-aquifer wells open to a number of bedrock units down to the Mt. Simon-Hinckley aquifer (i.e. Cenex). Since the hydraulic potential of the Prairie du Chien-Jordan aquifer is higher than the Mt. Simon-Hinckley (730'-780' vs 655'), waters from the Prairie du Chien-Jordan aquifer will flow downwards, effectively creating an injection well. If leachate contamination were to enter the Prairie du Chien-Jordan aquifer system, deeper aquifers may be threatened. Although it appears that any leachate would be confined to the fill of the bedrock valley based on regional gradients, local artificial changes in the ground water flow regime may result in leachate entering the Prairie du Chien-Jordan aquifer system or deeper aquifers.

Should high capacity wells be installed east of the landfill, hydraulic gradient changes would result in causing contaminated water to be directed to the wells rather than to the river. Accordingly appropriate attention should be given to this potential problem in future groundwater appropriation permit applications to the Department of Natural Resources.

We estimated the effect of installation of wells in the proposed residential subdivision to the northwest of the American Hoist Bale Fill. To do this, we used a worst case analysis assuming that the entire subdivision would be serviced by one well located near to the bale fill border. The rate of pumping for one hypothetical site well is the equivalent of 20 average residential wells. Assumptions for the well and groundwater system at the site were as follows:

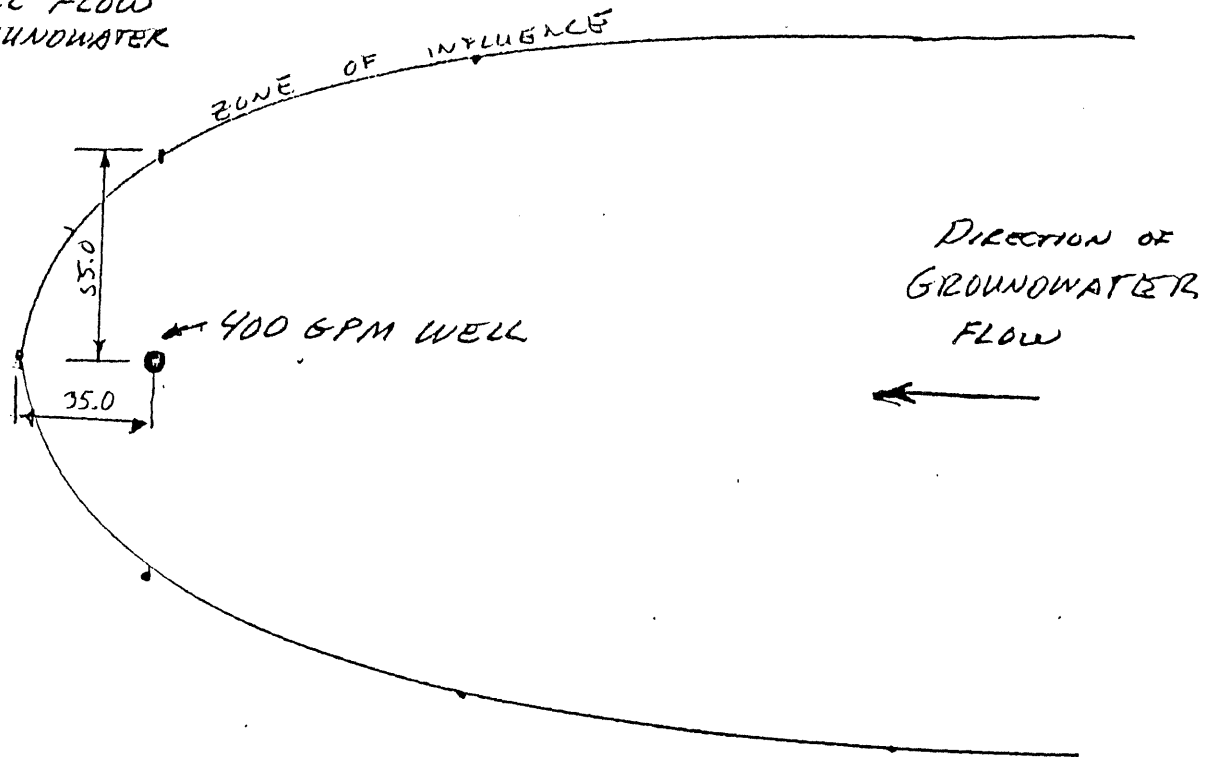
Well pumping rate (steady)	=	400 gpm
Hydraulic conductivity of aquifer	=	130 ft/day
Groundwater gradient	=	.0106 ft/ft.
Thickness of aquifer	=	250 ft.

The hydraulic conductivity is from the groundwater study for the landfill (Sunde, 1978). The groundwater gradient is an average of the gradient cited in the above study and estimates by John Curry of gradients in the subdivision area.

The method of analysis used is from Harr (1962).

The attached figures shows a schematic zone of well influence for the above well based on the assumption cited. Note that because of the relatively steep groundwater gradient and the permeable nature of the aquifer that the well will draw water from only a limited distance down gradient or at right angles to the direction of groundwater flow. The water flowing to the well will be from up-gradient.

NOTE: WATER WITHIN THE ZONE
OF INFLUENCE WILL FLOW
TO THE WELL. GROUNDWATER
OUTSIDE WILL NOT



ZONE OF WELL INFLUENCE

SCALE 1" = 50'

Due to the extremely localized zone of influence of the proposed subdivision well or wells, the potential for groundwater contamination from the landfill is nonexistent. See diagram.

Future well development in the area particularly to the east of the landfill, must be done with considerable study and caution. The Minnesota Water Well Construction Code 7 MCAR 1.217 C, provides that:

2. The safe distance that a well should be located from a waste landfill or waste stabilization pond (lagoon) cannot be assigned a fixed number because of the varieties of hydrologic and geologic parameters associated with the undetermined types and amounts of materials that may be carried by groundwater from leachates discharged from the waste landfill or waste stabilization ponds (lagoons). It is recommended that wells not be located in an area between the landfill or waste stabilization ponds (lagoons) sites and the point of groundwater discharge to a surface water source.
3. Any well that may intercept leachates from a waste landfill or waste stabilization pond (lagoon) by water withdrawal from the well shall not be used for potable water.

Water balance calculations for the present permitted areas of the landfill show that about 7793 cubic feet per day of leachate should be produced after the site reaches field capacity. The expansion will add about 12 percent to this figure. As pointed out under the discussion of leachate strength, if a leachate plume does reach a nearby well, its constituent values are assumed not to have changed significantly from the point of the first leachate entering the ground water.

Recommendation

That the above staff analysis be incorporated as part of the final EIS.

(10) Leachate Control

Several comments were submitted regarding leachate control at the landfill. The City of Inver Grove Heights states that the ground water monitoring system at the landfill does not add anything to the protection of groundwater from leachate contamination and that leachate control should be a current consideration, not something for the future. The City further points out that presently there is no leachate control at the landfill and there are no barriers and/or collection systems under the landfill. The City also points out that final cover material is not impervious at the landfill and that it should be emphasized that the landfill, either existing or the proposed expansion, does not utilize clay for leachate movement control. According to the City, final cover of two feet of clay overlain by six inches of sandy loam topsoil is an additional mitigative measurement that must be implemented.

MPCA submitted comments stating that the on-site soils have a high percolation rate and would not prevent infiltration of surface runoff from leaching into the fill. MPCA recommends that impervious final cover material be used at the facility.

Phoenix submitted comments stating that using clay as final cover will reduce infiltration but that it will prevent the uniform venting of methane gas through the cover into the atmosphere. Phoenix also states that clay would have to be imported from off-site at a large expense. Phoenix suggests that the term "relatively impermeable" be used instead of clay when referring to cover material requirements. Phoenix has submitted further comments that the cost of a clay liner and leachate collection system would be between \$2,457,000 and \$2,542,000 and with a leachate treatment system total costs would be between \$2,542,000 and \$3,142,000.

Staff Analysis

Water balances on the landfill were recalculated taking into account surface area and the variability of slopes with and without the expansion area. An analysis of slopes at the landfill shows that the amount of surface area with lesser slopes will increase by filling the expansion area as proposed. The final landfill slopes (with the expansion) vary from a minimum of 2 percent to a maximum of 25 percent (four horizontal to one vertical). MPCA regulations allow a maximum of 25 percent. The following table lists landfill slope areas for three slope ranges: 2 to 10 percent, 10 to 20 percent, and 20 to 25 percent. The areas were measured from the approved plans for the existing permitted landfill and the proposed final contours with the expansion using horizontal projections of the slope areas. The increased area for the amended plan includes added area

<u>Contour Range</u>	<u>Area in Acres</u>	
	<u>Existing Fill</u>	<u>Amended Plan</u>
2 to 10 percent	60.5	84.6
10 tp 20 percent	24.0	31.7
20 to 25 percent	111.9	97.5
Total Fill Area	196.4	213.8

to be covered by refuse in the abandoned railroad right-of-way plus changes in setbacks from property lines. For example, when the abandoned railroad right-of-way was in place, a minimum setback was required from the property line. This can now be filled. Similarly, the setback from the C & NW beltline tracks changes slightly due to Phoenix's acquisition of the 50 feet of land along those tracks. Using variability of slopes and an 8 percent increase in surface area with the expansion (this is the total area of the railroad right-of-way relative to the total land area of the presently permitted fill), it was determined that the daily rate of leachate discharge from the landfill after the site reaches field capacity should increase from about 7793 cubic feet per day to 8845 cubic feet per day, a 12 percent increase.

If a clay cap is incorporated over the top of the landfill including the expansion area (2 to 20 percent slopes), the daily leachate production will be reduced to about 7442 cubic feet per day, about a 5 percent reduction over the leachate projected to be produced from the existing landfill (7793 cubic feet per day). If a clay cap is incorporated over the entire landfill including the expansion area, daily leachate production will be reduced to about 3189 cubic feet per day, about 59 percent reduction from existing conditions.

Staff does agree, for the most part, with the comments submitted by the City of Inver Grove Heights and the MPCA. There is presently no leachate control at the landfill other than the application of final cover, compaction, grading and revegetation. The present cover materials used at the landfill are primarily silty sand and would tend to be impervious. There is a ground water monitoring system at the site, however, this system will only provide advanced warning of contamination problems. If the monitoring system indicates that contaminants are entering the ground water system while the landfill is being operated, perhaps operational changes could be made at the landfill to mitigate the problem. However, after the facility is closed, the monitoring system will in effect only tell us what is occurring; it will not mitigate contamination from the facility.

Staff concurs with the comments submitted by Phoenix stating that the term "relatively impermeable" should be used instead of clay when referring to cover material requirements. The use of clay soils at the site for final cover is admittedly a mitigating measure; however, it may be possible to achieve a similar degree of impermeability at the landfill with the use of other soil types. It may also be possible to mitigate leachate production at the landfill by attenuation in the underlying soils. Staff believes it is important that a combination of mitigating alternatives be considered at the landfill facility for leachate control rather than specifying strict control measures at this time. Further, work should be done to determine the attenuating capacity of the soils at the landfill. As previously discussed under methane gas control, it may be necessary to install methane control facilities at the landfill if an impermeable cover is placed on the landfill.

Recommendations

It is recommended that the above staff analysis be incorporated in the final EIS.

(11) Leachate Strength

There was concern expressed over the draft EIS's statement that leachate strength will decrease with the age of the landfill and age of the leachate. The City of Inver Grove Heights has stated that leachate attenuates only due to dilution by infiltration water passing through the landfill. According to the City, this happens with time, but that time begins with the production of leachate from the landfill. The City states that there will be no reduction in leachate strength prior to leachate moving into the ground water system.

The Minnesota Dept. of Health also expressed the same concern. According to MDOH, leachate does not become more dilute by simply being retained in the landfill. MDOH states that once the field capacity of a landfill is exceeded, a steady-state flow of leachate is achieved and the first leachate released is the strongest. MDOH further states that from this point on, leachate will become weaker both in terms of the leachate being released from the landfill and leachate traveling further from the source.

Concern has also been expressed over the degree of attenuation that will occur at the site. MDOH states that it is difficult to estimate the extent and magnitude of leachate migration. According to MDOH there is little data on the attenuation properties of the valley fill. MDOH states that for a medium having a high attenuation character, the concentration of leachate will tend to be reduced but the duration of leachate migration will be extended as desorption releases previously immobilized leachate from the medium.

Regarding attenuation MPCA states that it must be recognized that as metals and other pollutants from leachate are attenuated by ion exchange the capacity for additional exchange is diminished. MPCA also states that attenuation through ion exchange does not terminally bind those elements. Since the release of bound ion exchange elements can occur at a later date, it is debatable whether ion exchange is in fact mitigating environmental impacts, or just prolonging the release of elements into the groundwater. According to MPCA, considering the contamination of soils through leachate attenuation and the re-introduction of contaminants over time, it is conceivable that the release of metal ions will occur at a slow rate for thousands of years.

Staff Analysis

Impact analysis of leachate from sanitary landfills must distinguish between the effects from leachate production rate and leachate concentrations. Once the field capacity of any landfill is exceeded, a steady-state flow of leachate is achieved and the production rate volume can also be assumed to be stable. However, it has been shown

through field and laboratory analysis that the first leachate produced from a fixed amount of refuse undergoing anaerobic decomposition will have the highest concentrations. Assuming no new refuse material is added, and no change in state of decomposition, leachate strength will decrease from the time the first leachate is released.

Once produced from the bottom of a landfill, leachate constituent concentrations may potentially be reduced by the following attenuation mechanisms: absorption, ion-exchange, chemical precipitation, oxidation-reduction, biodegradation, and dilution. It is difficult to estimate the exact degree of leachate attenuation that will occur within the soils underlying a landfill. Several factors affect the extent of leachate attenuation including soil type, soil permeability, original leachate concentrations, amount of unsaturated soil, and reversibility or permanence of each specific attenuation mechanism. In general, clays have the highest attenuation; silts have a moderate attenuation. Fractured bedrock and highly porous gravels do not attenuate leachate in most instances.

Although no attenuation studies have been conducted on the soils underlying the Pine Bend Sanitary Landfill, information collected from other field and laboratory experiments does have some applicability to this situation. The soils under Pine Bend are silty sand with intermittent clay lenses. The dominant clay mineral is montmorillonite (Ca^{++}). Approximately 80 to 130 feet of this soil lies between the bottom of the landfill and the ground water. Based on this subsurface information and studies done by the Illinois Geological Survey, the leachate attenuation potential at Pine Bend may be very good for most of the heavy metal constituents, moderate for ammonium, silicon and potassium and low for chloride and organics (COD).

Given this assumed potential for soil attenuation at Pine Bend, several points must be kept in mind. First, these are qualitative assumptions based on data from other landfills. The exact attenuation properties of the valley fill in this area have never been measured. Second, any soil will have a specific attenuation capacity so that attenuation potential diminishes with continuous leachate contact. Third, some of the soil attenuation mechanisms, such as adsorption or ion-exchange, are partially reversible or temporary so that some of the leachate constituents attenuated by the soil may be released through a desorption process into the water. The effect is that the period of leachate migration through the soil will be extended.

The last attenuation mechanisms potentially influencing leachate concentrations once it has passed through the soils are diffusion and dispersion. Diffusion is the movement of dissolved solids from regions of high concentrations to regions of low concentrations. Since such movement is very slow, the spread of contaminants by diffusion is very slow. If groundwater flow rates are moderate to high (as is the case at Pine Bend), then dispersion will predominate. Dispersion is the mixing of dissolved solids by flow around pores and through fractures in aquifers. In general, the higher the groundwater velocity, the higher the dispersion rate will be.

Studies of attenuation in saturated flow have shown that the primary mechanisms for leachate attenuation are chemical precipitation and adsorption. The degree of attenuation appears to be governed by particle size and particularly by the percentage of clay in the aquifer. It has recently been discovered that heavy metals may adsorb to sand particles in an aquifer: however, after the initial high concentration of contamination has passed, sand grains begin to desorb the heavy metals, and the sand becomes a weak but long-term source of groundwater contamination.

In summary, leachate that enters groundwater does flow in definite pathways and is attenuated by processes similar to those in unsaturated flow together with the dilution processes of diffusion and dispersion. A lateral ground water flow has been depicted underneath Pine Bend Sanitary Landfill, but it is uncertain whether this movement would provide sufficient turbulence to dilute any leachate plume generated from the landfill. Therefore, if a leachate plume does reach a nearby well, the concentrations are assumed not to have changed significantly from the point of first entering the ground water. The attached table shows typical leachate toxicity values including those observed for the Burnsville and Freeway Landfills.

The effect of the proposed expansion on leachate concentrations is unknown. Even though leachate production rate may increase slightly (approximately 12 percent) due to the expansion, average concentrations generated may not change at all. Present studies and field data indicate that the flow of contaminated groundwater to lakes, streams and water wells follows definite pathways. Therefore, contaminated groundwater will not be diluted by the entire mass of groundwater flowing beneath a source of pollution. Because it is uncertain at what time the existing fill area or the expansion will reach field capacity, and it is uncertain when leachate concentrations will be greatest, it is virtually impossible without additional field testing to predict whether the expansion will have an additive or diminutive effect on leachate concentrations. Further work, including field testing, should be done on the underlying soils at the Pine Bend Landfill to determine their attenuating capacity.

Recommendation

It is recommended that the above staff analysis regarding leachate strength and attenuation be appended as part of the Final EIS.

TYPICAL VALUES OF LEACHATE CONSTITUENTS

Parameter ^{a,b}	Raw Leachate	Diluted Leachate	Treated Leachate	Burnsville Landfill Leachate ^c mg/l	Freeway Landfill Leachate ^c mg/l	MPCA Water Quality Standard
pH	6.3-7.8	6.6-7.5	-	6.0*	6.9*	6.5-8.6
5-Day Biochemical Oxygen Demand (BOD ₅)	120-2,980	-	-	1500	35*	-
Chemical Oxygen Demand (COD)	730-4,720	110-1,900	100-117	4490	408*	-
Total Carbon	930-1,830	154-620	-	-	-	-
Total Organic Carbon (TOC)	810-1,600	30-300	-	7200*	-	-
Total Solids	3,190-6,490	750-4,800	-	-	-	-
Total Volatile Solids	1,092-2,930	-	-	-	-	-
Total Dissolved Solids (TDS)	-	-	-	5346	5346	700
Acidity (as CaCO ₃)	185-790	72	-	-	-	-
Alkalinity (as CaCO ₃)	1,350-3,510	337-1,280	53-80	1225	1225	250
TKN	8.7-494	-	11.6-16.8	-	-	-
NH ₃ -N	< 0.3-427	7.5-38	-	350*	77*	1.5
Total N	-	-	-	-	-	-
Total P	0.8-4.7	0.1-0.5	0.02-0.07	-	-	-
Chloride	125-2,400	190-2,200	203-250	1610*	1620*	100.0
Sulfide	< 0.02-30	-	-	-	-	-
Fluoride	0.27	0.14-0.22	-	0.4	0.4	1.5
Cyanide	-	-	-	0.028	0.028	0.02
Sulfate	5.3-250	7.6-80	-	1090*	153	10.0
Nitrate	-	0.01-0.03	-	-	-	-
Tanninlike Compounds	62.4	-	-	-	-	-
Na	128-840	120-1,200	40-44	357	357	60% total cations meq/l
K	51-600	12-63	16-18	-	-	-
Ca	164-1,065	86-410	19-22	-	-	-
Mg	39-128	20-150	6.3-7.9	-	-	-
Al	0.27-1.26	-	-	-	-	-
As	0.006-0.038	-	-	0.0	0.0	0.05
Ba	0.08	-	-	2.25	2.25	1.0
Be	0.025	-	-	-	-	-
B	4.5-7.4	-	-	3.0*	4.7	0.05
Cd	< 0.001-0.004	< 0.01	-	0.03	0.03	0.01
Cr	0.026-0.085	< 0.02-0.04	-	0.05	0.033*	0.05
Cu	< 0.01-0.05	-	-	0.05	0.044*	0.01
Fe	1.6-30.3	1.8-4.2	0.07-0.13	-	-	-
Pb	0.023-0.065	< 0.02-0.04	0.025-0.036	0.10	0.10	0.05
Mn	0.6-7.8	2.0-4.4	0.05-0.06	-	-	-
Hg	-	-	-	-	-	-
Nb	0.013	-	-	-	-	-
Ni	< 0.002-0.069	< 0.01	-	-	-	-
Ti	-	-	-	-	-	-
V	-	-	-	-	-	-
Zn	0.43-1.32	0.08-0.82	0.14-0.16	12.0*	-	-
Toxicity	7.7-4.2	100-175	100	-	-	-

^aAll parameters expressed as mg/l except for pH and toxicity (96-hr TL_m expressed as % V/V)

^bMetals expressed as total metal concentration.

^cValues are both measured and literature vlaues.

*Actual measurements from landfill leachate seeps.

(12) Liability

A number of agencies (MPCA, MDOH, MDNR) expressed concern that the draft EIS does not discuss liability issues. Questions such as the following have been asked: Who is responsible if nearby wells are contaminated? Who is responsible for the long-term care of the facility? Would the owners of contaminated wells be compensated? Who would provide the owners of contaminated wells with a public water supply system?

We were not prepared to discuss liability issues as part of the EIS's. Solid Waste Program staff believe this is a major issue, involving a number of complex legal issues and that new legislation will be needed to deal with the problem. The Council is required to report to the new legislative commission regarding this as part of the new Waste Management Act (Section 473.149, Subd.2c).

The following staff analysis addresses the extent of liability with respect to landfill operations in accordance with present laws.

Liability

Under present law, the allocation of liability for contamination of wells by solid waste disposal facilities, including landfills, is governed by the common law of negligence and of nuisance. Either theory could be utilized by a property owner ("owner") in a suit against the landfill owner and others to recover damages for pollution of a well on his property.

In order to hold a defendant liable, the owner of the polluted well must prove that the defendant owed the owner a duty of care, that the defendant failed to exercise the care required, that the defendant's action or inaction caused the pollution of the well, and the amount of damages, expressed monetarily.

It is likely that landfill operators owe the owners of surrounding property the duty of care. A more difficult problem would be establishing whether the landfill operator exercised the amount or type of care required. This is the problem of establishing a standard against which the operator's procedures and actions would be measured. The standard of care would probably be defined by the use of experts in the field of landfill operations. If the operator has conducted landfill operations in a manner based upon the current state of the art, the operator is not liable, even if the owner's well is polluted.

The owner must prove a causal link between the landfill operator's actions or inaction and the damage caused to the well. Such a link could pose expensive and perhaps insurmountable proof problems. The land owner must show that the pollution was caused

more likely than not by the operation of the landfill, not merely that the landfill could have caused the pollution. The defendant would attempt to show that the actions of others were responsible for the pollution, especially in a situation arising subsequent to the closing of the landfill.

Finally, the owner must establish the dollar amount of his damages, generally consisting of his expenses incurred to repair the damage or replace the water source.

In a nuisance suit, the land owner need only show that the operator's actions constituted a nuisance which interfered with the owner's right to use and enjoyment of his property, including his well. The courts do not presume that landfills are always nuisances. Liability will be imposed only where there is proof that a substance, which is unnatural to the land and which has a natural tendency to cause harm if it escapes, has escaped and harmed another's land. Negligent or careless operation need not be proved, nor does proof of nonnegligent operation excuse the defendant. The measure of damages in a nuisance suit is the depreciation in the market value of the owner's property, because of the pollution.

Either a public or private landfill operator could be held liable for damages in a negligence or nuisance suit. A problem with a private defendant might be that he or his assets cannot be found or that he is without sufficient assets to satisfy the judgment. The negligence liability of political subdivisions is limited in terms of dollars by statute. This limitation may or may not apply to nuisance suits. The liability probably persists even after the land has been transferred to another person or entity.

If a landowner could preliminarily show substantial damage being caused by a currently operating landfill, a court might temporarily enjoin the continued operation of the landfill pending a liability determination or permanently enjoin its operation, unless the operator can comply with the terms of the injunction. Compliance with the terms of an injunction could be very expensive. Such an injunction suit could be brought pursuant to the common law, or to the Environmental Rights Act, Minn. Stat. 116B (1978). In case of the latter, a citizens' suit could be maintained even though no damages are claimed. Minnesota law also provides for the imposition of criminal and civil penalties for violation of the state's Water Pollution Control Act and the Act establishing the Pollution Control Agency.

The issues of the period of time after a landfill is closed during which an operator may remain liable and of liability upon sale or reuse of used landfill sites have not been addressed.

If the private defendant is found to be liable, but is either unavailable or without assets, the owner is essentially left remediless. If the pollution problem is severe or widespread and is causing a threat to the public health, the taxpayers will

likely bear the burden of the cleanup by default. If the city's water supply has been polluted and no solvent defendant is available, the taxpayers again will have to bear the financial burden of the cleanup. Plainly, as in the case with closure and post-closure liability for pollution caused by hazardous waste facility owners, the situation regarding solid waste site operator liability could appropriately be addressed by legislation providing for financial assurance of closure and post-closure care on the part of the operators. The Waste Management Act of 1980, Laws 1980, Ch. 564, Art. X, Subd. 2C requires the Council to report to the legislative commission on the problem of compensating localities for the risks associated with solid waste disposal facilities. Thus, the legislature has recognized the limitations of existing law with regard to the problem of paying for the cleanup of pollution caused by defendants who are unavailable or without assets.

Recommendation

It is recommended that the above staff analysis be appended as part of the final EIS.

(14) Landfill Moratorium

The City of Inver Grove Heights has submitted public hearing comments on the EIS stating, "we believe that any decision to expand the landfill site should be delayed until the new landfill siting-abatement process is completed." "As long as there is a place for deposit of garbage by landfilling, there is not sufficient pressure to develop abatement alternatives at the earliest possible date."

The following discussion concerns whether the Council could impose a landfill moratorium in the Metropolitan Area based on the Council's new responsibilities under the Waste Management Act of 1980.

Staff Analysis

Moratorium

The Solid and Hazardous Waste Act, Laws 1980, Ch. 564, does not specifically empower the Council to declare a moratorium on the expansion of pre-existing landfill sites, either until the new solid waste disposal facility siting is completed or until the occurrence of any other event. The permit process for landfill expansion was not altered by Ch. 564 nor was it suspended. Metropolitan Area permits are obtained by landfill operators from the PCA, subject to a finding by the Council of consistency between the proposed expansion and our solid waste policy plan. Council authority thus is limited to policy plan consideration.

In terms of Council obligations, the new law presents the Council with a series of responsibilities, commencing with the adoption of an estimate of added solid waste disposal capacity, due by July 1, 1980. The ensuing legislative scheme simply does not permit the Council (or PCA) to halt the existing permit process.

Accordingly, it would be inappropriate for the Council to discuss the pros and cons of such a moratorium, as it is powerless to implement the same. Of course, this does not preclude a municipality from declaring a moratorium on development, provided that such a declaration is consistent with state law on the subject.

Recommendation

It is recommended that the above staff analysis be appended as part of the final EIS.

(13) ALTERNATIVES

No Action Alternative

The City of Inver Grove Heights submitted comments concerning the validity of comparing the continued use of Pine Bend Landfill to the cost of a new 120 acre site. The City stated that the comparison is invalid because the Pine Bend site does not have a bottom liner, leachate collection and treatment system or complete chain link fence which may be required for any new landfill facility. The City stated that a new site with such a leachate control and treatment system appears to be a reasonable alternative, particularly if the synthetic liner were replaced with a clay liner that is substantially less costly.

Phoenix Inc. submitted comments stating that a significant indirect impact of not granting the expansion would be the necessity to site a new landfill in the metro area one to two years earlier. Another significant indirect impact of not granting the expansion would be rerouting of waste to other landfills. The longer haul distance and higher rates would significantly increase refuse hauler's operational costs, increases which will ultimately be passed on to area residents.

Site Specific Design Alternatives

The Minnesota Pollution Control Agency submitted written comments requesting more information concerning the benefits of shredding and baling systems used prior to landfilling.

Waste Reduction

The MPCA suggested that the estimated potential benefits of waste reduction programs is closer to four to five percent reduction of the total waste stream by 1985.

Materials Recovery

The MPCA also requested that additional materials recovery information be included in the Draft EIS concerning: waste charges, markets, source separation programs, prohibition of the disposal of certain recyclable commodities, development of a composting operation at the landfill for leaves and grass clippings, environmental and economic impacts of increased materials recovery, and specific implementation mechanisms for these alternatives.

STAFF ANALYSIS

NO ACTION ALTERNATIVE

The cost and time involved in the process of siting a new landfill facility must be considered when evaluating the no action alternative. Even though it is difficult to put an economic value on potential environmental degradation,

comparisons of the economic as well as environmental impacts of granting versus not granting the expansion are certainly a part of the data needed to make well informed decisions. The draft EIS already contains cost information on siting a new landfill using a 120 acre site as an example of the range of costs involved. The draft EIS also contains a description of secondary socio-economic impacts such as increased hauling distances and resultant collection fees.

SITE SPECIFIC DESIGN ALTERNATIVES

Shredding and Baling

Shredding and baling as volume reduction techniques also have additional benefits for potential reduction of leachate contamination. By increasing the density of the refuse material the moisture absorption process may be slowed considerably. Infiltration within shreddfills is usually decreased due to reduced permeability of the refuse. However, there is at least a potential for increased infiltration within balefills through voids between stacks. Although volume of leachate may increase, preliminary research has indicated balefills result in reduced leachate concentrations relative to a standard landfill.

Since balefills can obtain densities of approximately 1800 lbs/cu.yd., and Pine Bend currently is getting up to 1400 lbs/cu.yd. using present compaction procedures, it is possible that a balefill system if implemented could result in a 25 to 30 percent savings in landfill space.

A secondary benefit from shredding includes the possibility for recovery of certain materials before landfilling.

WASTE REDUCTION

SUMMARY

Although a maximum of 15 percent of the total waste stream could potentially be reduced through full implementation of a comprehensive waste reduction program, a more realistic estimate of the impact of such a program is around four to five percent reduction of the waste stream.

MATERIALS RECOVERY

Although materials recovery is not a permanent alternative for all of the waste that will potentially be buried in the Pine Bend expansion, materials recovery is definitely a viable alternative to immediate expansion. Additionally, materials constitute a long term alternative for approximately 33% of the waste to be disposed in the expansion. It is also apparent from the beneficial environmental impacts that a material recovery program should be strongly considered in conjunction with the proposed landfill expansion.

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Encompassed within the analysis of materials recovery alternatives to the proposed action is a more general consideration of alternatives to land disposal of specific materials. Some of the methods analyzed for implementing a materials recovery program probably fall outside the scope of the permitting process for the landfill expansion.

SYSTEM TYPES

Recycling Centers

This type of material recovery system is presently widespread throughout the Metropolitan Area. Recycling centers are either operated as drop-off depositories, taking in one or more types of recyclable material, or as redemption centers where cash is paid for the more valuable materials such as aluminum or corrugated cardboard. Typically the neighborhood drop-off centers are organized and operated by non-profit civic or church groups. Redemption centers are combined with existing metal salvaging facilities, private hauling firms or actual secondary materials markets and are operated as profit-making businesses. Recently there has been an emergence of new aluminum redemption facilities in the Region due to the increasing market price and intent of the beverage container industry to provide an alternative to potential mandatory deposit legislation.

There are currently 135 recycling centers in the Region as listed in the Metropolitan Council's May 1980 edition of the "Recycle It!" directory. Approximately 70 percent of these are operated by non-profit organizations. There is no reliable data concerning the total quantity of materials processed by these facilities. However, it is reasonable to assume that the vast majority of materials recycled from municipal waste in the Region are handled by recycling centers. The balance is accounted for by personal reuse, used furniture and clothes exchanges, and other similar recycling systems.

Source Separation

Source separation is defined as the separating of materials for individual storage at the source of generation for later pick-up and processing or reuse. Source separation is a very meritorious materials recovery system because of its inherent flexibility and cost-effectiveness. It differs from most other forms of solid waste processing in that it is decentralized and relies heavily on the continuous participation of the individual generator.

There are many types of source separation including: office paper recycling programs, mandatory or voluntary "curb-side" pick-up of recyclables complementing mixed municipal refuse collection, leaf pick-up (see composting) and other commercial and industrial programs aimed at specific materials. There are

currently several aggressive but relatively limited source separation programs in the Region. Several paper processing firms have on-going office paper recycling campaigns aimed at capturing the higher quality white office bond grade material. Four non-profit recycling centers also provide curb-side pick-up service for recyclables on a voluntary basis. One independent hauler has combined his refuse removal service with a newspaper pick-up service for his customers and may expand to include other materials in the near future. One independent scrap processor/redemption center provides a curb-side pick-up service for all recyclable materials in five neighborhoods in Minneapolis on a voluntary basis.

Picking

Picking is the process of removing valuable materials from the mixed waste stream for later sale or reuse. Picking is typically an unstructured materials recovery system that can occur at any point along the collection and disposal route. Frequency of picking activities and recovery rates directly correspond to the materials market prices.

Picking is a common practice throughout the collection and disposal industry. However, organized programs are rare because of the cost of labor and complex and fragmented structure of the Region's solid waste management system. Picking is often used in combination with mechanical separation technologies at the front end of refuse-to-energy facilities. Some transfer stations and landfills currently pick out materials on a more random basis. In California, large scale picking crews are employed at sanitary landfills as mixed refuse is dumped. Valuable items are retrieved using a conveyor system before the refuse is buried.

Mechanical Separation

Mechanical separation methods capable of segregating solid waste into valuable components have developed based on techniques used in mining and paper industries. Although still somewhat experimental, there are two basic approaches to mechanical material separation: wet processing and dry processing. Both approaches utilize a series process that begins with size reduction using a shredder (see SITE SPECIFIC DESIGN ALTERNATIVES: Shredding and Bailing), then classifies the stream into light and heavy fractions, and final processing to recover marketable materials using magnetic separators and other equipment. Mechanical separation often precedes incineration within refuse-to-energy facilities. Ferrous-aluminum magnetic separators are used throughout the Region at larger scale recycling centers and scrap metal processors, and at material market facilities. In general, only ferrous metal recovery is currently technically and economically feasible in terms of a mechanical separation technology.

Biological Treatment and Recovery

Research and demonstrations of anaerobic and aerobic treatment of solid waste have increased substantially in the last five years. Anaerobic treatment produces methane gas and humus. Aerobic treatment produces a sterilized humus or compost. These biological treatment methods can reduce the weight of solid waste by 50 percent. Aerobic treatment or composting can be applied to several different kinds of solid waste including leaf waste, source separated organics such as food waste, and mixed waste. The cost of curbside leaf collection and composting through the windrow method can vary between \$4.75 to \$7.35 per ton. Since collection and land disposal costs in the Twin Cities vary between \$20.00 and \$35.00 per ton, leaf composting has a substantial net benefit to society.

Source separated organics can be collected from citizens that separate solid wastes and nonrecyclable paper from other components of solid waste. Source separated organics provide an excellent feed stock for composting since the material is relatively free of glass, metal and plastics which reduce the value of the final compost product. Approximately 8,000 people in Portland, Oregon currently participate in such a program. Residents place food waste and other organics in plastic pails with sealable tops. The pails are then taken to a site where the organics are composted. When the compost is ready, area citizens use the compost for gardening. In August, 1980, a similar program may begin in neighborhoods of Columbia Heights, Minnesota.

Composting of mixed waste is also feasible as an alternative to the land disposal. Altoona, Pennsylvania and about ten other cities in the United States currently compost mixed waste. Mixed waste includes not only food wastes and yard wastes but undesirable materials such as glass, metal and plastic. Mixed waste and source separated organics are both suitable for composting with sewage sludge. Solid waste is a good bulking agent for sludge and the sludge enhances the overall nutrient value of compost.

There are several examples of successful composting operations currently in progress within the Region. Hennepin County and St. Paul operate leaf composting sites as a free service to the public. Leaves and lawn trimmings are deposited in the fall and compost mulch is available for pick-up in the spring. The City of Roseville provides free leaf, curb-side pick-up service for their residents using specialized vacuum trucks. Their municipal composting site is also available for drop-off and pick-up similar to the St. Paul and Hennepin operations. The Metropolitan Waste Control Commission has also been windrowing filter cake sewage sludge from their Metro plant and reports excellent success and more than adequate market demand for the compost product. In general, composting has excellent potential as an alternative to landfilling organic wastes. Yard waste typically represents 14 percent of the total waste stream by volume, and food waste 15 percent and wood and paper up to 45 percent by weight.

Existing sytems for biological treatment and recovery of solid waste include the following technologies:

Windrowing -- A biological process of composting on aerobic decomposition through frequent turning of the long rows of organic material. Windrow turning can be accomplished through a variety of methods utilizing special machinery.

Aerobic Chambers -- A variety of aerobic chambers are used throughout Europe to compost solid waste. While this compost technology is more capital intensive than windrowing, aerobic chambers speed up material processing because moisture, oxygen and temperature levels can be controlled. Two of the most notable processes are the Dano drum process developed in Europe and the Metro Process developed in Texas.

Clay Digester -- This technology requires shredding of all solid waste. The shredded wastes are placed in a clay lined cell that is designed to hold one year's worth of waste. The bottom of the cell is sloped to one end so that leachate can be easily collected. A clay cap is placed on the waste to prevent oxygen from entering the cell. Perforated paper is placed in the cells and pumps are used to extract methane and carbon dioxide from the waste material. Water pipes are also placed in the cell to increase moisture content and increase methane yield. After ten years of methane recovery, the material in the cell could be aerated an then distributed as a humus. With such a management practice, cells could be reused and would provide an alternative to landfill expansions.

Landfill Methane Recovery -- This technology is similar to the clay digester except that shredding and landfill design are not as important. Seven landfills in the United States are currently recovering methane. Landfill methane recovery is not an alternative to landfill expansion unless shredding is employed or if humus is recovered from the landfill.

Tree Waste Utilization

The disposal of diseased shade tree waste in the Region has historically been an additional burden on the landfills. In the past two to three years, however, landfill operators have purposely raised the drop charge for tree waste to the point that it is now prohibitively expensive. Also, the recovery rate of this valuable wood resource has increased through the use of tree chippers and sawmills and firewood production. Still, small amounts of wood waste are being landfilled which could be potentially utilized.

CURRENT MARKET CONDITIONS

The condition of the secondary materials markets vary depending on the specific material, its demand and other related factors such as current stability of the overall economy. Newsprint and ferrous markets have been subject to substantial fluctuations while aluminum, copper, brass, glass, office paper and corrugated markets, especially in this Region, are relatively stable.

There are some indications that at least some of the materials markets have begun to stabilize. There are, however, some contrary indications that the current recession is causing a slight decline in even the supposedly stable market prices such as aluminum. Energy economics and demand for virgin materials have profound influences on secondary materials markets. Secondary materials processing enjoys the advantage of significantly higher efficiencies over processing raw materials. Geographic location of markets plays a key role in materials recovery economics because of limiting transportation costs.

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The following summaries describe current materials market conditions in the Twin Cities area.

Waste Paper

The newsprint market has had a poor record of extreme price fluctuations. Many recycling programs died out after the market peak and subsequent drop in 1974 due to economic recession. Since then, many new paper recovery efforts have been established and have been operating somewhat more consistently. The cellulose insulation industry has been very active after a slump from two years ago due to bad publicity concerning fire hazards, although the present building slowdown is having some effect. Also, the U.S. Department of Agriculture projects that wood fiber demand within the next five years will exceed timber production. Regional demand for waste paper from a new newsprint mill in Ontario may also be favorably influencing the Twin Cities market. So, even though the current newsprint market in this Region is unstable with only moderate demand, there are indications for improvement, especially if a new newsprint mill were to locate in this area.

The Region's corrugated and office paper markets are excellent. Hoerner Waldorf, Division of Champion International, estimated that 70 percent of the corrugated generated in the Metro Area is presently being recovered. Also, the demand for office paper from the Wisconsin mills is far in excess of what the midwest region generates.

Glass

Market prices for waste glass on a national level have remained relatively stable since 1970. In the Twin Cities, the two large glass manufacturing firms provide excellent market conditions

for cullet. Midland and Brockway Glass Companies could essentially double their processing volumes without adding new capacity.

Aluminum

Aluminum prices have also remained stable since 1970 and have recently shown slight increases. Aluminum markets in the Twin City area are considered to be excellent.

Ferrous

Ferrous markets in the Region are generally good but subject to price fluctuations. Little data is available on the market capacity.

Compost

Compost a secondary material is form of a soil enhancer and fertilizer-like material. It serves as a carbon source to plants and supplies moderate quantities of nitrogen, phosphorous and potassium. The existing compost markets include mines, nurseries, golf courses, sod farms, forestry and recreational areas, state parks, flower growers, county fairs, highway departments, and general contractors. At the present time, composted materials are not available to satisfy market demand. Market demand is now being satisfied by a somewhat nonrenewable black dirt resource. A recent MPCA study has identified over 250 individual markets in the seven county area.

Other Materials

Currently the market situation for tree waste products is very good and improving. Wood chip boilers and pelletizing plants provide a more than adequate demand.

The market for tires is uncertain. Experiments are continuing to determine the suitability of shredded tires as an alternate fuel.

There is presently a few markets available for waste plastics.

ENVIRONMENTAL IMPACTS FROM INCREASED MATERIALS RECOVERY

When recyclable resources such as aluminum, glass, ferrous, and paper are buried rather than used by primary industries, virgin raw materials are refined and processed to replace the buried secondary materials. Material recycling processes reduce environmental impacts more than virgin material manufacturing processes because recycling generally uses less energy and less raw materials while generating less solid waste, air pollution and water pollution. A comparison of Scenario #1 and Scenario #2 on Table VI-A.1 demonstrates the potential environmental improvement resulting from increasing recycling. (More detailed results and information concerning method of analysis available from the Metropolitan Council).

Table VI-A.1

ENVIRONMENTAL IMPACTS RESULTING FROM BURIAL OF
RECYCLABLES IN PINEBEND SLF EXPANSION

<u>Environ Impacts</u>	<u>Units</u>	<u>Scenario #1</u> <u>Status quo</u>	<u>Scenario #2</u> <u>Realstc SS</u>	<u>Scenario #3</u> <u>Potentl SS</u>
Air Emis (TL)	tons	47,358	46,883	45,485
Hydrocarbons		6,832	6,831	6,804
Sulfur Oxide		17,543	17,523	17,727
Particulates		8,794	8,784	7,816
Nitrogen Ox.		8,776	8,779	8,524
Reduced Sulfur		1,318	970	722
Carbon Monox.		3,517	3,483	3,469
Other		578	513	423
Water Emis (TL)	tons	8,590	8,595	8,724
Bio Oxy Demand		1,738	1,656	1,657
Suspd Solids		2,520	2,676	2,919
Chem Oxy Dmnd		1,440	1,406	1,352
Other		2,892	2,857	2,796
Raw Mtrls (TL)	tons	4,789,430	3,289,650	2,395,030
Limestone		821,424	641,388	450,079
Salt		407,076	314,865	218,556
Bauxite Ore		116,751	114,004	109,610
Glass Sands		1,151,606	889,415	691,324
Feldspar		131,735	101,445	69,826
Iron Ore		184,333	156,967	113,184
Roundwood		1,197,132	897,248	610,078
Soda Ash		135,225	104,126	71,671
Other		64,150	70,189	60,705
Energy	trillion BTU's	33.11	30.95	27.59
Water	billion gals.	33.89	29.40	26.30
Indtl Waste	tons	1.90	1.66	1.34

Table VI - A.2 shows the relative composition and quantities of recoverable materials that are predicted to be buried within the Pine Bend expansion. The quantities of materials are based on the estimation that the 1.875 million tons of mixed solid waste will be buried in the landfill expansion.

Table VI - A.2
RELATIVE COMPOSITION AND QUANTITIES OF
RECOVERABLE MATERIALS TO BE BURIED WITHIN
PINE BEND EXPANSION WITH NO ADDITIONAL
RECOVERY

<u>Material</u>	<u>Relative Percent of Total Waste Stream by Weight</u>	<u>Quantity to be Buried Within Expansion-tons</u>
Aluminum	0.7	13,125
Glass	9.4	176,250
Corrugated	10.5	196,875
Ferrous	7.8	146,250
Newsprint	7.2	135,000
Office Paper	4.4	82,500
Yard Wastes	9.0	168,750

Table VI - A.1 depicts three different scenarios for waste management in conjunction with the proposed landfill expansion:
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Scenario #1 assumes the status quo which means that materials recovery programs will not increase recovery during the operating life of the landfill expansion. All of the quantities listed in Table VI - A.2 will continue to be buried.

Scenario #2 assumes that well managed source separation programs will be established and these programs will proportionately recover the same quantities that are currently being recovered by voluntary curbside programs in Madison, Wisconsin and Brooklyn Center, Minnesota. Table VI - A.3 below lists the assumed recovery rates and quantities for Scenario #2.

Table VI - A.3

Recovery Rates Assumed for Scenario #2

<u>Material</u>	<u>Assumed Recovery Rates</u>	<u>Tons Recovered</u>
Newsprint	30%	40,500
Office Paper	40%	33,000
Corrugated	60%	188,125
Glass	23%	40,537
Ferrous	15%	21,937
Aluminum	10%	1,312

Scenario #3 assumes that local communities served by Pine Bend will obtain higher recovery rates for recyclables through effective public education programs and with the support of an ordinance requiring citizen participation in the recycling program. Recovery rates attained in Marblehead, Mass. and Boca Raton, Fla. are applied. Table VI - A.4 below lists the assumed recovery rates and quantities for Scenario #3.

Table VI - A.4

Recovery Rates Assumed for Scenario #3

<u>Material</u>	<u>Assumed Recovery Rates</u>	<u>Tons Recovered</u>
Newsprint	67%	90,450
Office Paper	50%	41,250
Corrugated	70%	137,812
Glass	47%	82,838
Ferrous	39%	57,038
Aluminum	26%	8,794

ECONOMIC IMPACTS OF INCREASED MATERIALS RECOVERY

To determine the net economic benefit or cost of various recycling or source separation programs, the total system costs were considered including the total program costs and revenues and the collection and disposal savings. Table VI-A.5 indicates the results of survey conducted on the costs of collection and disposal in selected metropolitan municipalities. These data were used to calculate collection and disposal savings due to recycling in Table VI-A.6 which shows the results of the economic analysis. The total program costs included operating, annualized capital, other operating specialized and transport costs. Although most recycling programs use voluntary labor, for purposes of this analysis it is assumed that all labor is paid and the recycling centers are operating as businesses. Therefore, labor is included within operational costs. (More detailed information on analysis methodology is available from the Metropolitan Council.)

The results shown on Table IV-A.6 indicate that there is a definite economic benefit when considering the entire waste management system from most of the recycling programs surveyed. The extent of the economic benefit is obviously dependent on the specific material recovered because of the wide range in revenues from the individual materials. The one exception to the results is the Recycling Unlimited program, a small family run, non-profit, recycling center and pick-up service in St. Paul. The reason for the disparity in results is because Recycling Unlimited has the equipment and labor for much higher capacity than the volumes they are processing.

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Table VI-A.6
SOLID WASTE COLLECTION AND LANDFILLING COSTS
IN SELECTED MUNICIPALITIES IN THE METROPOLITAN AREA
(\$/ton)

<u>Municipality</u>	<u>Cost of Collecting and Landfilling</u>
Edina	36.90
St. Paul	27.45
Stillwater	24.76
Shoreview	25.84
West St. Paul	31.52
Wayzata	23.66
Brooklyn Center	27.70
Brooklyn Park	30.40
St. Anthony	30.24
White Bear Lake	25.68
Woodbury	24.43
Brooklyn Center	27.70
Brooklyn Park	30.40

Source: MPCA

Table VI-A.7

Comparison of Various Recycling-Source Separation Program Costs

(\$/TON)

<u>Program Savings</u>	<u>Capacity Tons Per Year</u>	<u>Total Program Costs</u>	<u>Total Revenue</u>	<u>Collection & Disposal Savings</u>	<u>Net Economic Benefit (cost) to Community</u>
Edina:					
Newsprint	694	13.06	18.00	36.90	41.84
Office Paper		13.06	-0-	36.90	23.84
Glass	218	13.06	8.03	36.90	31.87
Ferrous	70	13.06	5.00	36.90	28.84
Aluminum	2	13.06	200.00	36.90	223.84
Owatonna:					
Newsprint	176	49.20	14.50	24.41	10.29
Glass	1096	49.71	30.00	24.41	4.70
Ferrous	733	43.71	20.00	24.41	0.70
Aluminum	0.7	40.47	340.00	24.41	323.94
Recycling Unlimited					
Newsprint	180	110.42	7.50	27.63	(75.29)
Corrugated	60	110.42	7.50	27.63	(75.29)
Glass	94	111.69	38.46	27.63	(45.60)
Ferrous	192	110.42	3.13	27.63	(79.66)
Boca Raton, Florida (Newsprint Only)	3000	27.39	27.27	77.00	36.77
Davis, California		48.00	32.00	31.38	15.38

The second type of material recovery system analyzed was leaf composting. Results of this analysis indicate that the total cost of operating a leaf composting site and curb-side pick-up program can vary from \$4.75 to \$7.35. Compared to collection and disposal costs data on Table VI-A.5, there would probably be a net economic benefit to the community from such a composting program. There would also be the additional benefit of a usable end product.

SECONDARY IMPACTS OF INCREASED MATERIALS RECOVERY

In addition to environmental benefits and economic savings realized by these material recovery systems, there are several secondary benefits to the community. Briefly, these benefits include conserved material resources, conserved energy, increase public awareness of solid waste management problems and a potential increase in employment. The most important benefit may indeed be saved landfill space.

METHODS OF IMPLEMENTING SOURCE SEPARATION PROGRAMS

There are several various methods by which source separation and recycling programs can be implemented. The results of the materials recovery analysis clearly indicate that source separation provides an existing reasonable and prudent alternative to land disposal of recoverable materials. However, some of the methods analyzed for implementing a materials recovery program probably fall outside the scope of the permitting process for the landfill expansion.

This section of the materials recovery alternative analysis provides an exhaustive list of potential implementation mechanisms. Once the criteria for permit conditions and recommendations are established during the permit review process, the following discussion can provide a list of potential implementation mechanisms to be evaluated.

Differential Disposal Rates Charged at the Landfill Gate

Pine Bend Sanitary Landfill, in cooperation with the government sector could establish a differential disposal rate schedule that would adjust the individual hauler's tipping fee according to the level of source separation service provided to his/her customers. Lower drop charges would apply to those haulers who participate in some form of source separation program. It is possible that each county could be required to periodically assess the recycling efforts by haulers within their county. This assessment would be published and submitted to Pine Bend landfill who would adjust the drop fees accordingly.

This method of financial incentive would directly support source separation. Implementation could be phased in over the next two to three years and also allowing time for a shakedown period.

Legislative Mandate

The state, regional, county or municipal level of government could adopt a policy or law that would require all recyclable materials which have established markets to be recovered through source separation programs. Mandatory source separation would have to be phased in over a period of time to allow the haulers and other businesses to develop their service. Materials covered under this method would have to be restricted to marketable materials.

Mandatory source separation programs across the country have shown much higher participation rates than voluntary programs.

Direct Subsidies

The government could directly subsidize materials recovery organizations through a grant and loan program. This subsidy would best be administered at the state, regional, or county level. The potential sources of revenue for the subsidy program include the following:

General Revenue -- Appropriations from the state's general fund or from the Metropolitan Council's newly established leading authority.

Waste Charge -- Direct tax on all landfills.

Manufacture's Production Charge -- Tax applied to any industry manufacturing products which are ultimately land-filled.

Pollution Enforcement Fines -- Revenue from air, land and water pollution fines returned to a non-polluting recycling program within the affected community.

Secondary Materials Price Support

The state or federal government could supplement the revenue recyclers receive from markets through direct price supports similar to milk supports.

Handicapped Labor and Employment Subsidies

Human services could be emphasized as the funding priority while assisting recycling efforts at the same time. Handicapped workers, sheltered workshops, and youth employment programs could be provided with additional subsidies to stimulate recycling programs.

Increased Public Education

All governmental units could be required to step up their public education programs in support of existing and potential

recycling efforts. The objective would be to increase recovery rates through more public participation on a voluntary basis.

Ban on Land Disposal of All Recoverable Materials

If methods and markets exist for recovery of materials being landfilled, these specific materials could be banned from all landfills. One specific type of material that would most easily be banned from landfills is yard waste. There are presently several alternative methods of disposal including composting, mulching of grass rather than collecting it in bags, and chipping of brush and tree trimmings. This type of ban has been considered in various parts of the country and could potentially result in a seven to fourteen percent savings in landfill space.

Drop-Off and Picking Service at Transfer Stations and Landfills

Phoenix Inc. is ideally suited for participation in increased materials recovery efforts through their transfer stations. Two recovery systems are readily available. First, the transfer stations could be adapted to provide centrally located drop off points for recyclable materials as brought in by the public and haulers in the future. This would simply be a matter of setting up some separate and secure bins, such as roll-offs or dumpsters. Phoenix could then serve as a broker for the materials. Second, Phoenix could upgrade the picking operations both at the transfer stations and at the landfill itself. Certain recoverable materials could be removed before burial for storage and later pick-up. The landfill operations could also incorporate a composting program on site but separate from the working face area. This would require allocation of additional personnel and equipment but could potentially result in a savings of landfill space of up to 10 percent.

Although this type of picking system is considered as a reasonable and prudent alternative to the burial of these materials in the landfill expansion, consideration must also be given to the sorting method. The present receiving volumes at Pine Bend may preclude efficient dumping and compaction simultaneous with sorting.

RECOMMENDATION

It is recommended that the above staff analysis be included as an appendix to the final EIS document.

(15) Editorial Comments

A number of editorial comments were submitted particularly by Phoenix Inc. It is recommended that the following editorial changes are incorporated in the Final EIS.

Page 4 Socio-Economics

In this paragraph, the fifth line, the dates should be changed from "1988 and 1992" to "1987 to 1989."

Page 157 Methane Gas

At the top of the page, in the first paragraph, the second sentence is very confusing. It should read "Methane has the potential of being explosive in concentrations of 5 to 15 percent."

Page 180 Irreversible and Irretrievable Commitments of Resources

In this paragraph, the last sentence and the first two sentences should be reversed. It makes much more sense to have the initial sentence state the fact that there are no irretrievable and irreversible resources.

Page 181 Primary Impacts

In the first paragraph, the third line, between "the" and "zone," insert "probable." The zone of influence of leachate from the landfill is a "probable" zone based on certain theoretical considerations in the hydrogeologic study of the Pine Bend Sanitary Landfill (Sunde 1978).

Page 210 Table V-1

The headings of the two columns should be reversed to correspond with their respective subjects.

Page 71 State Regulations

It is recommended that the following discussion of SW-6 be added to the text of the Final EIS. SW-6 is a state solid waste regulation which requires that the fill and trench areas of a sanitary landfill be at least 1,000 feet from the normal high water mark of a lake, pond, or flowage and at least 300 feet from a stream. There exists four off-site ponds, two east of the landfill, one south and one west of the landfill that are within 1,000 feet of the landfill borders. However, SW-6 was passed in 1973 after the existing landfill had been permitted and is therefore not applicable to these ponds.

Page 84 Table III-20

It is recommended that the following discussion concerning WPC 14 be added to the text of the Final EIS. WPC 14 are water quality standards for intrastate waters for use classifications 2B, 2C, 3B, 3C, 4A, 4B, 5 and 6. These water quality standards cannot be applied to surface waters wholly within permitted landfill areas. Table III-20 of the draft EIS compares parameter testing results of two on-site ponds with WPC 14 standards. WPC 14 standards are given only to serve as a comparison guide for the parameters listed. These standards do not apply to the parameters measured from the ponds. The quality of the water in these two ponds does not exceed any state standards as no standards apply.

Page 86 Ground Water Standards

This section discusses ground water standards. The following discussion should clarify how the drinking water standards of WPC 14 can be applied to the ground water standards (WPC 22). There is in fact, only one ground water standard (WPC 22); however, the elements of purity for each drinking water parameter is listed in WPC 14. WPC 14 applies to surface waters. It contains drinking water standards for different classes of water.

Recommendation

It is recommended that the above editorial changes be appended to the final EIS.

:dll

APPENDIX B

Written Public Agency Comments
Written Comments from Private Citizens

COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT
FOR THE
PINE BEND SANITARY LANDFILL EXPANSION
BY THE
CITY OF INVER GROVE HEIGHTS

June 9, 1980

The City Council of Inver Grove Heights, at its regular meeting of June 9, 1980, adopted the following comments on the Draft Environmental Impact Statement - Pine Bend Sanitary Landfill Expansion - April 29, 1980:

- A. The entire document contains numerous statements in the form of opinions favorable to the expansion of the landfill that are unsupported by facts.
- B. In instances where opinions probably cannot be supported by fact because necessary facts are not available, no range of opinion is offered.
- C. The following specific comments are addressed at this time (because of the extremely large number of questionable statements in the Draft EIS, it is possible for the City to discuss only these points at this time.)

1. Page 2 - Air Quality and Noise

It is not understood how "improved surface runoff" will result in better methane gas control.

2. Page 2 - Water Quality

The proposed expansion area will significantly increase the potential for contamination of on-site and nearby off-site ponds due to the greater potential for pile surface erosion.

Surface drainage in the railroad track area can be made adequate

CITY OF INVER GROVE HEIGHTS

by very minor grading of the existing ground. Infiltration into filled areas will increase as a result of the proposed expansion; it will not decrease.

Insufficient attention is given to the problem of increased surface erosion due to increased surface runoff quantity and rate. There is no assurance that natural vegetative growth will sufficiently stabilize the final fill surface.

Daily rate of leachate is likely to increase substantially because of the increased amount of flat slopes overlying fill area, which in turn will affect the ground water system. Component strengths will increase due to the greater average thickness of landfill. Filling of the proposed expansion area will add to the potential of leachate contamination over that from the existing landfill operation.

A ground water monitoring system does not add anything to the protection of ground water from leachate contamination. Leachate control should be a current consideration, not something for the "future".

3. Page 4 - Socio-Economics

The City does not agree that there are adequate park facilities available until the Pine Bend Landfill area is completed, assuming the expansion is approved. In fact, the City is presently seeking appropriate areas for active park use and is awaiting the possible use of the westerly portion of the presently approved site.

CITY OF INVER GROVE HEIGHTS

4. Page 4 - Reasonable Alternatives

The City feels that future resource recovery projects can be implemented as early as 1985 to the extent that the proposed expansion may not be required.

Other alternatives do exist, such as a modification to the expansion proposal and new sites developed with more attention to leachate control.

5. Page 13 - Leachate Control

There is no leachate control at the Pine Bend Landfill. There are no barriers and/or collection systems under the landfill and final cover material is not impervious. "Minimizing" surface water infiltration by the use of the granular on-site material as final cover is inadequate leachate control.

6. Page 15 - Surface Water Drainage

The entire landfill, including the fill surface, is not graded and/or provided with drainage facilities to minimize run-off to thus prevent erosion or washing of the cover material. Hills of refuse with fairly steep uniform slopes maximize run-off and thus maximize erosion potential. The proposed expansion will increase the average height of the landfill, which in turn will increase surface erosion potential.

7. Page 15 - Vector Control

While vectors may not be a problem at the site, nearby residents have complained of rat problems.

8. Page 15-17 - Air Quality

Average methane gas concentration cannot be assured at all locations. High methane concentrations are likely to occur at various locations in a landfill without a gas control system.

CITY OF INVER GROVE HEIGHTS

9. Page 18 - Post-Closure

The City of Inver Grove Heights does not feel at this time that any bond amount would be adequate to provide assurance of corrections to post-closure defects.

10. Page 45 - Leachate Movement

Filtering and absorption is, for the most part, limited as to capacity.

11. Page 45 - Control of Leachate Movement

Somewhere, it should be emphasized that the Pine Bend Landfill, either existing or proposed expansion, does not utilize clay for leachate movement control.

12. Page 46 - Table III-11

The listing of typical contaminants in a leachate is very incomplete (See 208 Study, Page 4). There should also be a comparison of landfill leachate with other waste streams (eg. sewage).

13. Page 47 - Surface Water Runoff

Statement on surface water runoff control is totally inadequate as it relates to erosion.

14. Page 62 - Figure III-9

Groundwater surface gradients shown are based on insufficient data. The entire premise of easterly flow to the river depends on the projection of data in Figure III-9. The likelihood of northerly flow cannot be discounted.

15. Page 63 - Surface Water Hydrology

The capacity of the holding ponds relative to the runoff from the completed surface is not discussed. The capacity of these ponds becomes important because any quality degradation due to

CITY OF INVER GROVE HEIGHTS

eroded material being carried to the ponds may not be contained therein if the ponds overflow.

16. Page 64 - Figure III-10

Strictly on a visual basis of area ratios, the surface water ponding areas appear inadequate to contain stormwater runoff from the completed landfill surface.

17. Page 65 - Local Water Supply

Residential development is occurring immediately to the north of the landfill, overlying the buried valley region. These wells may come within the influence of the leachate contamination, particularly if leachate duration is increased by the proposed expansion.

18. Page 65 - Site-Specific Water Budget

While much of the landfill site will have steep (4:1) slopes, the proposed expansion will add approximately 25 acres of area at the top of the landfill mass with an average slope of less than three percent (3%). This flat area at the top has been consistently overlooked in the EIS discussion.

19. Page 82 - Figure III-14

The residential area lying northerly of the landfill would readily fall within the area of influence with slight variation in the 750 foot contour just north of the landfill. Specific evidence to establish the accuracy of this critical 750 foot contour should be cited.

20. Page 91 - Regulatory Compliance

This section points out that studies show leachate strength to diminish with age, with 17 year old leachate found by one investigation to be 0.01 percent to eight percent of the

CITY OF INVER GROVE HEIGHTS

strength of two year old leachate. The section further points out that at steady state, most Pine Bend Landfill leachate will be more than 20 years old.

The above cited analysis is strictly in error. Leachate attenuates only due to dilution by infiltration water passing through the landfill. This happens with time but that time begins with production of leachate from the landfill. There will be no reduction in leachate strength prior to leachate moving into the ground water system.

There is offered no basis for discarding the 8,789 cubic feet/day leachate production in earlier Metropolitan Council studies in favor of the 6,265 cubic feet/day estimated by Sundae that same year.

21. Page 97 - Table III-24

The analytical data shown indicates that all the wells tested had excessive phenol content up to approximately 40 times permissible Class A amounts.

22. Page 98 - Regulatory Compliance

The elevated phenol content is a likely indication of the presence of leachate in the ground water system. Because of the extremely high phenol content in typical leachate, small amounts of leachate produced in landfill life would be sufficient to affect the phenol content measurements in the ground water. It is therefore likely that significant contamination will occur after the landfill reaches field capacity.

CITY OF INVER GROVE HEIGHTS

23. Page 113 - Land Use

The entire area immediately north of the landfill is large lot residential or proposed large lot residential.

24. Page 173-176 - Primary Impacts

The proposed expansion will significantly increase potential for contamination of on-site and nearby off-site ponds because of the increased erosion potential due to an increase in average fill height.

Filling the proposed expansion area will substantially increase infiltration into filled areas due to the large, relatively flat area created at the top of the landfill expansion.

Increased average thickness of the landfill will tend to lengthen the leachate production period and increase the average strength of the leachate.

Again, as on Page 91, the indication that leachate strength will reduce in strength during the "holding" period, is in error.

25. Page 179 - Primary Impacts

It is unproven that contaminants entering the ground water system will not reach deeper underlying aquifers.

26. Page 207 - Surface Water Quality

No evidence has been offered that natural vegetative growth will stabilize fill surface areas, particularly with the increased erosion potential of the proposed expansion configuration.

CITY OF INVER GROVE HEIGHTS

27. Page 207 - Ground Water Quality

No evidence has been offered that current operational procedures will mitigate adverse ground water quality effects.

Water quality monitoring does not constitute a ground water protection plan. Reliance should not be placed on "future leachate control", rather, that control should be assured by present design.

CITY OF INVER GROVE HEIGHTS

28. Page 209 - Closure and Post-Closure

Final cover of two feet of clay overlain by six inches of sandy loam topsoil is an additional mitigative measurement that must be implemented.

29. Page 218 - No Action Alternative

The comparison of continued use of the Pine Bend Landfill site to the cost of a new 120 acre site is invalid because the Pine Bend site does not have the site liner, leachate collection system, leachate treatment system or chain link fencing shown in the cost of a new alternative site.

Such a new site with the included leachate control system appears to be a reasonable alternative, particularly if the synthetic liner were replaced with a clay liner that is substantially less costly.

30. Page 221 - Site Specific Design Alternatives

Grading to promote surface runoff to minimize rainfall penetration into the fill also increases surface erosion potential.

Control of surface runoff requires ponding and controlled discharge of runoff from the landfill surface. Ponding on the landfill surface requires infiltration control through the use of impermeable cover in the ponding areas.

Exception is taken to the entire section as presented, both relative to leachate and surface runoff.

CITY OF INVER GROVE HEIGHTS

31. Page 265 - The New Act And Expansion Of The Pine Bend Landfill

We believe that any decision to expand the landfill site should be delayed until the new landfill siting-abatement process is completed. As long as there is a place for deposit of garbage by landfilling, there is not sufficient pressure to develop abatement alternatives at the earliest possible date.

June 2, 1980

COMPLAINTS
REGARDING PINE BEND SANITARY LANDFILL
BY
INVER GROVE HEIGHTS CITIZENS

We, the people who live close to the above facility have several complaints we feel are legitimate and deserve some immediate attention.

It seems that letters, phone calls, and personnal contact with the Phoenix represenative at the Inver Grove City Council meetings, namely, Miss Barbara Kelly, have failed to bring any response. We have been told that, "we have never received any letters" by the Metro Council and Miss Kelly was to have someone from Phoenix either call us or come and see us. The latter, was last Fall and to date, we have never heard from anyone. A sample of our complaints and concerns are listed below and some possible solutions to rectify these conditions are also listed.

1. Rats! In our homes and outside on our lawns.
 - a. Have the Phoenix Corporation have exterminators exterminate homes with rats at their expense.
(One neighbor alone had 22 dead rats dragged up on her steps by the family dog after their next door neighbor had exterminators in her home. The individuals in question are the Ohmanns and Cardins) They are just one example of the rats in the area.
 - b. Have periodic checks at the landfill at night, when rats are more prevalant.
2. Litter! Along the highway, and on our lawns.
 - a. Rubbish haulers have their trucks so over-loaded that bags fall off and break open scattering litter all over the highway and it blows up on our lawns for us to clean up.
 1. Make the Rubbish Haulers Association responsible for cleaning up this litter along our highways and yards. It is bad enough live in a City that gets most of the Metro garbage but do we have to look like it too?
 2. A point of interest. One afternoon, I saw a trash hauler drop several bags of trash

and I, Shirley Pike, called the Landfill to inform them to have that driver come back and pick it up. I was insulted and degraded and told as much to "go to hell".

- b. Approximately three-four weeks ago when we were experiencing high winds, dust by the clouds were blowing off the mountain where they were dumping trash. According to the "Draft Enviromental Impact Statement," page 15 under Air Quality, it states, "In addition, a 2,000 gallon tank truck is kept on site. Water from this tank is sprayed on roads for dust control. If dust continues to be a problem, calcium Chloride (CaCl_2) is spread on the unpaved roads to hold moisture." Where was the water truck when we were experiencing these high winds?
 - c. From the living room of one landowner who lives directly East from the site, one can see refuse haulers unloading from the top of the large dirt mountain working face and not at the bottom as so many states in the Impact Stayerment. Also, it was our understading from the presentation given at the City Council meetings from Miss Kelly that the contour of the surrounding landscape would not be altered. This is untrue as the dirt mountain continues to grow higher and higher each day.
3. Noise! During the summer months when residents have their windows open, this presents a problem. Twelve hours per day should be adequate. (6:00 a.m. to 6:00 p.m. weekdays and 6:00 a.m. to noon on Saturdays)
4. Air Quality! On hot summer evenings when the humidity is high, wind at a minimum, the air is stagnant with the smell of garbage.

This is only the beginning of some of the concerns we citizens have. This touches on some of the immediate problems we have saying nothing about the long range future problems that may occur such as water quality. But we finally got someone to listen to us.



Minnesota
Department of Transportation
Transportation Building
St. Paul, Minnesota 55155

Phone 296-1636

June 4, 1980

Mr. Paul Smith
300 Metro Square Building
7th and Robert Streets
Saint Paul, Minnesota 55101

Re: In Reply Refer to : 702
Pine Bend Sanitary Landfill Expansion
Inver Grove Heights, Minnesota
Draft Environmental Impact Statement

Dear Mr. Smith:

The Minnesota Department of Transportation (Mn/DOT) has reviewed the Pine Bend Sanitary Landfill Expansion Draft Environmental Impact Statement for potential impacts to state transportation facilities. Our review reflects that primary access to the landfill site will be provided by local streets under municipal jurisdiction. As such, we anticipate no significant impacts to Mn/DOT facilities as a result of landfill expansion. However, you may wish to continue to coordinate planning with the local units of government in the project area to assure consideration of any local transportation concerns.

Sincerely,


Randall K. Halvorson
Manager
Environmental Planning Section



PHOENIX, INC.

SUITE 207
7900 XERXES AVENUE SOUTH
MINNEAPOLIS, MINNESOTA 55431
PHONE (612) 835-1005

May 27, 1980

Mr. Paul Smith
Senior Environmental Planner
Metropolitan Council
300 Metro Square Building
St. Paul, Minnesota 55101

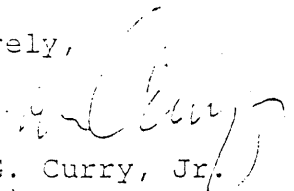
Dear Mr. Smith:

Attached, for your consideration, are Phoenix's comments on the Draft Pine Bend Sanitary Landfill Expansion EIS.

For the record, these comments are submitted as the technical portion of Phoenix's testimony for the public hearing on May 29th, at the Metropolitan Council.

If you have any questions regarding our comments on the draft EIS, please call this office.

Sincerely,


John G. Curry, Jr.
Geologist

JGC/MES

Enclosure:



minnesota department of health

717 s.e. delaware st. minneapolis 55440

(612) 296-5221

May 29, 1980

Mr. Paul A. Smith, AICP
Senior Environmental Planner
Solid and Hazardous Waste Management Program
300 Metro Square Building
7th and Robert Streets
St. Paul, Minnesota 55101

Dear Mr. Smith:

Our staff has reviewed the Water Quality Section of the Pine Bend Landfill Environmental Impact Statement and has identified some concerns which should be recognized and addressed. We recommend that these points and information be incorporated into the Environmental Impact Statement.

A major concern is the potential impact of leachate migration on groundwater supplies east of the landfill. With undisturbed conditions, leachate will be confined strictly to the bedrock valley since the hydraulic potentials are higher in the Prairie du Chien-Jordan aquifer than the valley fill, resulting in continuous flow towards the bedrock valley. This is true on a regional scale. However, some wells in the area (i.e. Mid-America Pipeline) are open to the Prairie du Chien-Jordan system and are high capacity wells. With heavy withdrawals, there is a strong possibility of flow reversal of groundwater towards local pumping centers. Although regional flow patterns would appear to restrict leachate to the valley, the impacts of local wells may result in changes in the groundwater flow regime.

Secondly, it appears that the St. Lawrence confining unit is absent and the Franconia formation may be hydrologically connected to the bedrock valley. Since the hydraulic condition of the Franconia in this area is unknown, groundwater may flow into this aquifer from the valley fill. In general, deeper bedrock aquifers in the Metropolitan area have lower hydraulic potentials and if a connection exists, groundwater tends to flow from upper formations to lower formations.

Thirdly, some wells in the area are multi-aquifer wells open to a number of bedrock units down to the Mt. Simon-Hinckley aquifer (i.e. Cenex). Since the hydraulic potential of the

Mr. Paul A. Smith, AICP
May 29, 1980
Page 2

Prairie du Chien-Jordan aquifer is higher than the Mt. Simon-Hinckley (730' - 780' vs 665'), waters from the Prairie du Chien-Jordan aquifer will flow downwards, effectively creating an injection well. If contamination were to enter the Prairie du Chien-Jordan system, deeper aquifers may be threatened.

Although it appears that any leachate would be confined to the fill of the bedrock valley based on regional gradients, local artificial changes in the groundwater flow regime may result in leachate entering the Prairie du Chien-Jordan aquifer system or deeper aquifers.

Should high capacity wells be installed in the vicinity, hydraulic gradient changes would likely result in causing contaminated water to be directed to the wells rather than to the river. Accordingly appropriate attention should be given to this potential problem in future groundwater appropriation permit applications to the Department of Natural Resources.

Further examination must be given to the migration and sinking effect of leachate through other wise uncontaminated water having a lower specific gravity.

Future well development in the area must be done with considerable study and caution. The Minnesota Water Well Construction Code 7 MCAR 1.217 C, provides that:

2. The safe distance that a well should be located from a waste landfill or waste stabilization pond (lagoon) cannot be assigned a fixed number because of the varieties of hydrologic and geologic parameters associated with the undetermined types and amounts of materials that may be carried by groundwater from leachates discharged from the waste landfill or waste stabilization ponds (lagoons). It is recommended that wells not be located in an area between the landfill or waste stabilization ponds (lagoons) sites and the point of groundwater discharge to a surface water source.
3. Any well that may intercept leachates from a waste landfill or waste stabilization pond (lagoon) by water withdrawal from the well shall not be used for potable water.

It should be noted that leachate, when produced, would be a violation of WPC-22.

Mr. Paul A. Smith, AICP
May 29, 1980
Page 3

A fourth concern is the inevitable contamination of shallow wells east of the landfill. Alternative water supplies will be necessary for these users in order to safeguard their health. As of this date, no definite alternative supplies have been identified.

The impact of leachate contamination of groundwater supplies on human health is not known. There is a need for health risk assessment, particularly when one realizes that groundwater is the sole source of supply for residents in the area.

It is difficult to estimate the extent and magnitude of leachate migration. There are little data on the attenuation properties of the valley fill - adsorption coefficients, dispersion coefficients, ion exchange ratios, redox levels, chemical precipitation reactions. For a medium having a high attenuation character, the concentration of leachate will tend to be reduced but the duration of leachate migration will be extended as desorption released previously immobilized leachate from the medium.

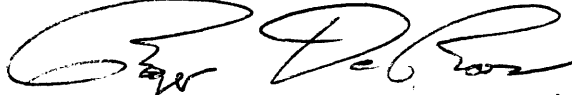
In addition to those points outline above, we recommend two classifications to the present Environmental Impact Statement. Firstly, the data in Table III-14 (Page 54) should be corrected to show "less than" values as indicated in the original data sheet for the following parameters - coliform group organisms, arsenic, barium, cadmium, chromium, lead, mercury, selenium, and silver.

Secondly, the discussion on leachate strength as a function of age is unclear. The Environmental Impact Statement states that 17 year old leachate may have 0.01 - 8% of the composition of 2 year old leachate. Does this mean leachate derived from an older source or leachate that has had a longer travel time? Leachate does not become more dilute by simply being retained in the landfill. Once the field capacity of the landfill is exceeded (20 years in your estimation), a steady-state flow of leachate is achieved and the first leachate released is the strongest. From this point on, leachate will become weaker both in terms of the leachate being released from the landfill and leachate traveling further from the source.

Mr. Paul A. Smith, AICP
May 29, 1980
Page 4

If you wish to discuss these points, please feel free to contact Mr. Ed Ross at 296-5338 or Mr. Mike Convery at 296-5297 of my staff.

Sincerely yours,

A handwritten signature in dark ink, appearing to read 'Roger L. DeRoos', written in a cursive style.

Roger L. DeRoos, Ph.D., Director
Division of Environmental Health

cc: Environmental Quality Board
Enclosures

Advisory to Village of Inver Grove Heights, April 19, 1973
Minnesota Code of Agency Rules Department of Health Public
Water Supplies, 1978 Edition, 7 MCAR § 1.145



STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155

Rompson
Ray
Paul

June 13, 1980

ROUTING
JUN 16 1980

Admin. _____
P. R. ✓ _____
H. R. _____
CS/PIO _____

For your information _____
Take appropriate action _____
Please reply _____
Prepare reply for Chairman _____

Mr. Charles Weaver
Chairman
Metropolitan Council
Metro Square Building
St. Paul, MN 55101

RE: Pine Bend Landfill Draft EIS

Dear Mr. Weaver:

The Department of Natural Resources has reviewed the above referenced document and offers the following comments for your consideration.

Our major concern with this project is the potential for groundwater contamination by leachate from the landfill. The Draft Environmental Impact Statement (DEIS) did not present enough details describing the extent of this problem or what measures might be taken to mitigate the adverse effects.

The document does not present enough information on what the condition of the leachate is or its rate of movement into the underlying geologic structures and aquifers. If this information is not available, a monitoring program should be recommended that would provide it. Establishment of monitoring wells close to the edge of the landfill and through the landfill would serve this purpose. Samples should be tested for PCBs and heavy metals in addition to COD, pH, nitrates, chlorides, and specific conductivity.

The soils in the area are generally well-drained and sandy. They include the following:

1. Kingsley series (sandy loam)
2. Dickinson series (sandy loam and loamy sand)
3. Wadena series (sandy loam and sand)
4. Estherville series (sandy loam and loamy sand)
5. Kannabec series (silt loam)

Because of their relatively high permeability (2 to 20 inches/hour), these soils have severe limitations for sanitary landfill development. For the same reason, the soils are not well suited for providing a daily cover. Clay is a good material for lining and daily cover to reduce or mitigate the leaching problem. The DEIS should have included a more complete description of why clay is not being used for these purposes.

Mr. Charles Weaver
June 13, 1980
Page Two

The DEIS acknowledges that nearby wells could be affected by the leachate from the landfill. However, the document did not discuss what measures would be taken to correct the problem if it occurs. Would the owners be compensated for loss of their wells? Other measures to prevent well contamination, such as constructing wells under the landfill and trenches along the sides to collect the leachate, should have been addressed.

The DEIS should have addressed the potential for groundwater contamination from stormwater runoff into the two catchment ponds. These ponds may be recharge areas for the underlying aquifer.

The project, as proposed in the DEIS, does not require any DNR Division of Waters permits. The catchment ponds are designated as public waters.

The document should address the cost effectiveness of the resource recovery alternative.

Thank you for the opportunity to comment on this project.

Sincerely,



Thomas W. Balcom
Environmental Review Coordinator

TWB:DB:mp

cc: Karen Loechler
Ron Harnack
Earl Huber

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June 12, 1980

Mr. Paul Smith
Senior Environmental Planner
Metropolitan Council
300 Metro Square Building
St. Paul, Minnesota 55101

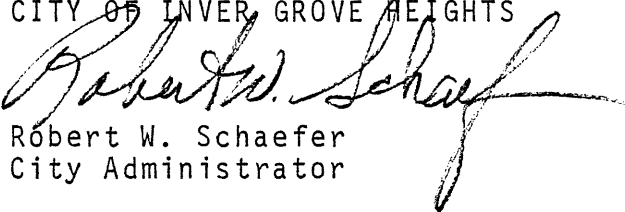
Dear Mr. Smith:

Enclosed are comments made by the City of Inver Grove Heights on draft "Pine Bend Sanitary Landfill Expansion" Environmental Impact Statement.

These comments were adopted by the City Council of Inver Grove Heights at their June 9, 1980 meeting as the City Position on the Draft EIS.

Very truly yours,

CITY OF INVER GROVE HEIGHTS


Robert W. Schaefer
City Administrator

RWS:co

Enclosure

PHOENIX'S COMMENTS ON THE DRAFT ENVIRONMENTAL IMPACT STATEMENT

FOR THE

PINE BEND SANITARY LANDFILL EXPANSION

SECTION I

Page 2 - Water Quality

In the first paragraph the distinction should be made between the purpose of the retention areas and the impact on surface water. With the exception of the southeast wetland area, the on-site "ponds" have been designed and permitted as surface water retention areas with the purpose of collecting surface water runoff and sediment. Therefore, any increased siltation of these catchment areas due to the proposed expansion should not be looked upon as a negative impact, but as the retention areas performing their intended permitted engineered purpose.

Page 4 - Socio Economics

In this paragraph, the fifth line, the dates should be changed from "1988 and 1992" to "1987 to 1989".

SECTION III

Page 71 - State Regulations

In the first paragraph, reference is made to the application of SW 6 to the offsite ponds. However, on page 76, in the last paragraph, the application of SW 6 appears questionable since the rule was passed two years after the site was permitted. What is the application of SW 6 to the offsite ponds? Can a distinction be made in the EIS?

Page 84 - Table III - 20

Even though WPC 14 does not apply to surface waters wholly within the permitted area of the landfill it is still being used as a comparison. This comparison, if reviewed by a non-technical reader, could easily be misconstrued.

Page 157 - Methane Gas

At the top of the page, in the first paragraph, the second sentence is very confusing. It should read "Methane has the potential of being explosive in concentrations of 5 to 15%".

SECTION IV

Page 176 - Surface Water Quality (from page 173)

In the second paragraph, the tone is very negative regarding the potential for contamination of the on-site and off-site ponds. From a practical point of view it is not known that any of the off-site ponds are contaminated. It seems a bit presumptuous to say that the ponds are probably already degraded from previous seeps.

In the third paragraph, the last sentence - this sentence should be tightened up, the tone is very loose and should not be used in a technical document of this sort. Also, the statement that "these ponds may probably already be degraded to some degree" is purely conjecture, since there is no basis for this statement.

Under, Direct or Indirect Effects..., the last paragraph, the comment that applies to the section under water quality on page 2 can also be applied to here.

Page 180 - Irreversible and Irretrievable Commitments of Resources

In this paragraph, the last sentence and the first two sentences should be reversed. It makes much more sense to have the initial sentence state the fact that there are no irretrievable and irreversible...resources.

Page 181 - Primary Impacts

In the first paragraph, the third line, between the and zone, insert "probable". It should be noted the zone of influence of leachate from the landfill is a "probable" zone based on certain theoretical considerations in the Hydrogeologic Study of the Pine Bend Sanitary Landfill, (Sunde 1978).

Page 202 - Water Quality

The second paragraph should be deleted, it has no particular relevance to the Human Health section.

SECTION V

Page 209 - Closure and Past Closure

The concern in this section is to using the word clay in number one. Using clay as final cover will reduce infiltration but will prevent uniform venting of methane gas through the cover into the atmosphere. Clay would have to be imported from off-site at a large expense. The suggestion is made to rather consider the term "relatively impermeable" instead of "clay".

Page 210 - Table V-1

The headings of the two columns should be reversed to correspond with their respective subjects.

Page 211 - Air Quality

In the second paragraph, it should be noted that a portable gas monitoring program is proposed for the Landfill for purposes of identifying any methane concentration that might occur at detectable levels. This program will greatly assist in assessing the need for any post-closure program that might be implemented.

SECTION VI

Page 220 - Environmental Impacts

A significant indirect impact of the "no action" alternative would be the necessity to site a new landfill in the metro area 1 year (assuming Burnsville and Freeway expansions are granted to 2 years- if Burnsville and Freeway expansions are not granted) earlier. If none of the presently requested metro area expansions are granted, a new landfill would have to be sited 4 years earlier.

Another significant indirect impact of the "no action" alternative would be the rerouting of waste to other landfills. The longer haul distance and higher rates would significantly increase refuse hauler's costs operation, increases which will ultimately be passed on to area residents.

Page 221 - Leachate Control

In the first paragraph, the last sentence, it should be noted the requirement for liner installation is unnecessary.

Page 222 - Leachate Control (from page 221)

In the first paragraph, regarding the discussion on estimated costs, add a statement that says "the liner and leachate collection system would be another \$2,457,000 to \$2,542,000, for a total cost of between \$2,542,000 and \$3,142,000". Also, in the sixth line of this paragraph delete "no" and insert "having a".

Page 223 - Compaction

In this paragraph, the second line from the bottom, delete, "1600 pounds per acre-foot" and insert "1400 pounds per cubic yard".

SECTION X

Page 261 - Review Criteria

In the fourth paragraph, add "studies to date (Pope-Reid-MICA Report, Metropolitan Council Solid Waste Policy Plan) show that the Pine Bend expansion represents less than 4% of the regions future landfill needs over the next 20 years. In order to maintain a safe margin of disposal capacity for the region, it would not be reasonable to deny the expansion permit based on possible future resource recovery or new landfill facility options.

Page 265 - The New Act and Expansion of the Pine Bend Landfill (from page 264)

It is difficult to consider the relevance of statements as written in paragraphs three and four, especially in light of statements (like the one on page 196 under Direct or Indirect Effects...Be Avoided) that accurately depict the the need for future regional land disposal capacity. Also, the comment made regarding page 261 (Review Criteria) should be added to the end of this section on page 265.