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**Mayo Foundation
Medical Waste Incinerator
Final Environmental Impact
Statement**

June 1992

**Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155**

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**MAYO FOUNDATION MEDICAL WASTE INCINERATOR
FINAL ENVIRONMENTAL IMPACT STATEMENT**

Minnesota Pollution Control Agency

June 8, 1992

Responsible
Governmental Unit:

MINNESOTA POLLUTION
CONTROL AGENCY

Contact:

Kathryn Kramer
EIS Project Manager
Environmental Analysis Office
Minnesota Pollution Agency
520 Lafayette Road
St. Paul, Minnesota 55155
(612) 297-8236

Project Proposer:

MAYO FOUNDATION

Contact:

Jeffery Steiner
St. Marys Hospital
Facilities Engineering
1216 SW Second Street
Rochester, Minnesota 55902
(507) 255-7700

ABSTRACT: This Mayo Medical Waste Incinerator Final Environmental Impact Statement (EIS) supplements the Draft EIS for which a Notice of Availability was published on February 17, 1992. Certain portions of the Draft EIS have been revised; comments on the Draft EIS and responses are presented.

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1.0 INTRODUCTION AND SUMMARY

The Mayo Foundation is proposing to construct a medical waste treatment facility in Rochester. Under the rules of the Minnesota Environmental Quality Board (EQB), the Minnesota Pollution Control Agency (MPCA) prepared a Draft Environmental Impact Statement (EIS) on the project, which was published for public comment on February 17, 1992. The public comment period ran until March 25, 1992. A public meeting to receive comments on the Draft EIS was held in Rochester on March 11, and was attended by about 60 people. By the end of the comment period, the MPCA had received 30 comment letters to go along with six statements presented at the public meeting.

This Final EIS has been prepared in accordance with EQB rules, which require the MPCA, as the responsible governmental unit, to prepare responses to the timely, substantive comments on the Draft EIS consistent with the scoping decision for the project (Minn. Rules pts. 4410.0300 - 4410.7800). Chapter 1 includes the purpose and format of the Final EIS, a brief description of the proposed project, a description of the comments received on the Draft EIS, and brief descriptions of the Chapters 2 and 3, which are new and revised information on the project and responses to public comments.

1.1 PURPOSE AND FORMAT OF THE FINAL EIS

The purposes of the Final EIS are to: provide technical information supplementing or revising the Draft EIS; describe the potential impacts, commitments to mitigation and alternatives related to the project; and respond to comments on the Draft EIS. The Final EIS and the Draft EIS together form the basis for the MPCA Board's determination of adequacy.

1.2 PROPOSED PROJECT

The Mayo Foundation proposes to construct a medical waste treatment facility to replace its currently operating medical waste incinerator, which is nearing the end of its design life and will not be capable of meeting standards contained in proposed state or federal emission limits. The facility would incorporate many of the mitigation measures that were recommended in the Draft EIS. A description of the facility can be found in Section 2.1 of the Final EIS. The proposed facility would include:

- * Two steam autoclaves to decontaminate infectious waste;
- * Plastics recovery equipment;
- * One 25 ton per day incinerator instead of the two previously proposed;
- * Activated carbon injection to further control emissions; and
- * The stack would be coned, if necessary, to increase its effective height.

Mayo's original proposal, as described in its 1989 Air Emission and Solid Waste Facility Operating permit application, was to construct a facility with two incinerators with a permitted capacity of 50 tons per day. At the outset of the EIS process, Mayo down-sized its original proposal to a facility with two incinerators with a permitted capacity of 25 tons per day. After completion of the Draft EIS, Mayo further altered its original proposal by eliminating one of the two proposed incinerators and incorporating steam sterilization and plastics recovery into the facility.

The facility would be located on a 14.4-acre parcel within the city of Rochester, in Olmsted County. The site is northeast of the Rochester Municipal Airport near the junction of U.S. Highway 63 and County State Aid Highway 16. It would process waste primarily from Mayo Foundation affiliates. A small amount would be accepted from non-Mayo infectious waste generators in Olmsted and Dodge Counties.

1.3 PUBLIC MEETING AND COMMENTS ON THE DRAFT EIS

The Draft EIS was published for a public comment period that ran from February 17 through March 25, 1992. A public meeting to obtain comments on the Draft EIS was held in Rochester on March 11, 1992. The meeting was attended by about 60 people and testimony by six people was recorded. Thirty comment letters also were received during the public comment period.

In addition to letters from local concerned citizens, several environmental organizations and state agencies submitted comment letters. The environmental organizations included: Project Environment Foundation, Citizens for a Better Environment, National Audubon Society, and Clean Water Action. The state agencies commenting included: the Minnesota Department of Health (MDH), Minnesota Department of Transportation, Minnesota Department of Natural Resources (DNR), and Minnesota Historical Society. A Twin Cities-based organization of hospitals that is reviewing infectious waste disposal options for itself also submitted a comment letter.

The issues raised in the comments were wide-ranging. A few of the major themes related to: the potential environmental impacts, the estimated emissions and resulting risks, the need for the facility, the Mayo Foundation's waste management strategy, the adequacy of the proposed stack height, and the risks associated with the incineration of low-level radioactive waste. Many commenters voiced support for the use of an alternative technology for the treatment of infectious waste.

Comments received at the public meeting and in letters are presented in Chapter 3. The responses to comments, also presented in Chapter 3, have been prepared by the MPCA staff with assistance from consultants, the MDH, Olmsted County representatives, and with information provided by the project proposer.

1.4 ENVIRONMENTAL IMPACTS, MITIGATION, AND NEED FOR FACILITY

Chapter 2 of the Final EIS supplements the Draft EIS with technical information describing project modifications, emission estimates revised to represent the proposed modifications in the pollution control system, risk estimates based on revised emission estimates, additional mitigative measures, and the need for the project. This information parallels the issues of primary concern in public comments received on the Draft EIS. Key points are highlighted below.

Air Quality: Revised Emission Estimates

MPCA staff re-evaluated air emission estimates based on concerns raised over the methodology used in the Draft EIS. The revised information can be found in Section 2.2. There were two primary issues that necessitated the re-evaluation. Both relate to the risk estimates resulting from the emissions.

First, the MDH raised concerns about the statistical treatment of emissions data. Although the issue of uncertainties related to statistical methods was discussed in the Draft EIS, a full re-evaluation has been completed for the Final EIS.

Second, the emissions estimates used in developing risk estimates in the Draft EIS did not consider the removal efficiency of the proposed pollution control equipment. The revised emission estimates take into account the removal efficiency of the pollution control equipment (the dry sorbent injection/fabric filter system and the activated carbon injection system).

The emission rates for mercury, lead, cadmium, chromium, PCB, and dioxin/furan toxic equivalents were re-examined. These chemicals contributed most to the calculated risks in the Draft EIS. MPCA staff solicited comment and direction from MDH staff regarding the methodology for revising air emission estimates and risk estimates.

Air emission estimates for chromium increased, while the estimates for the other chemicals decreased, although the mercury emission estimate did not vary significantly from the original estimate.

The conclusion of the Draft EIS -- that it is unlikely that the Mayo incinerator would cause a significant impact on the existing background air quality levels-- remains valid. The purpose in re-evaluating the emission estimates was to allow recalculation of risk estimates in accordance with MDH comments on the Draft EIS Risk Assessment.

Public Health Risk Assessment

Several concerns relating to public health risk estimates from air emissions were raised during the comment period for the Draft EIS. Section 2.3 of the Final EIS provides revised risk estimates for several key chemicals.

Risk estimates based on the revised emission estimates are lower for cancer, unchanged for neurotoxicity, and higher for renal toxicity and respiratory toxicity than those presented in the Draft EIS. In all four cases, however, the risk estimates are below regulatory levels of concern. These results support the conclusion that chronic health risks from exposure to air emissions from the proposed Mayo incinerator are unlikely.

Revised emission rates for chemicals contributing the majority of risk were developed by MPCA staff. The revised emission rate estimates are based on the arithmetic mean of the data set and represent the removal efficiency of the proposed pollution control equipment.

The exposure pathway results from the Draft EIS risk assessment indicated that certain chemicals contribute the most to predicted cancer and noncancer risk estimates. Dioxin/furan exposures represented about 90 percent of the total cancer risk estimated. The largest noncancer risks were for renal toxicity, respiratory toxicity, and neurotoxicity, although those for respiratory and neurotoxicity are quite low. The chemicals that contributed the majority of noncancer risk were mercury, cadmium, lead, and chromium.

Risk estimates were recalculated in the Final EIS for both of the exposure scenarios described in the Draft EIS: the farm resident and the farm worker.

Cancer Risk Estimates

The revised cancer risks from revised emissions are about five and one-half per 1,000,000 for both the residential and the farm worker scenarios. This level is within the acceptable level of one per 100,000 established by the MDH.

The revised dioxin/furan emission rate estimate is about 15 percent of the emission rate estimate contained in the Draft EIS.

Renal Toxicity Estimates

The revised renal hazard index is below the level of regulatory concern for both scenarios modeled. The hazard index is well below one; one being the level at which toxic effects could potentially occur, according to generally accepted risk assessment principles.

Respiratory Toxicity Estimates

The revised respiratory hazard index is below the level of regulatory concern for both scenarios modeled. The hazard index is well below one.

Neurotoxicity Estimates

The revised neurotoxicity hazard index is below the level of regulatory concern for both scenarios modeled. The hazard index did not change from that estimated in the Draft EIS Risk Assessment and is well below one.

Public Health Impacts From the Incineration of Low-Level Radioactive Waste

The MDH has elaborated a policy for risk assessment of radioactive emissions. MDH estimates risks for cancer incidence and applies its negligible risk criterion of one in 100,000. The MDH criterion is more protective than the U.S. Environmental Protection Agency and the Nuclear Regulatory Commission criteria. Section 2.3.9 summarizes the results of the analysis conducted by MDH.

The analysis concludes that the risks to public health due to the emissions from the proposed facility resulting from the incineration of low-level radioactive waste are negligible. For risks resulting from the inhalation of airborne emissions of low-level radioactivity, there is at least a thousand-fold safety margin between air concentrations due to emissions of radionuclides from the proposed incinerator and significant cancer risk. For risks resulting from the ingestion of soil receiving fallout from emissions of the facility, radionuclide concentrations would be at least a million times less than those that would produce a significant health risk. For radioactivity in ash, the MDH concluded that the levels would be very small and not a significant health risk.

Respiratory Irritation Risk

MPCA staff re-evaluated the emission estimates and resulting local concentrations of sulfuric acid that were presented in the Draft EIS and concluded that Mayo's emissions of sulfur dioxide and sulfuric acid would not be expected to cause a local respiratory problem. The percent of sulfur dioxide converting to sulfuric acid was significantly overestimated in the Draft EIS.

This overestimation resulted in the erroneous conclusion presented in the Draft EIS that there was some potential for emissions to result in local concentrations of sulfuric acid in excess of acceptable ambient levels established under MPCA's Air Toxics Guidelines.

In addition, the Mayo incinerator is projected to contribute about 6 percent of the total ambient sulfur dioxide concentrations in the Rochester area. The amount of sulfur dioxide contributed by the incinerator to the environment, when compared with background concentrations, is small. Other combustion sources are contributing the remainder, and likewise are contributors of sulfuric acid. The proposed facility, with its superior pollution control system, would emit less sulfur dioxide and less sulfuric acid than Mayo's currently operating incinerator.

The issue would, however, continue to be evaluated during the permitting process and, if necessary, the stack of the proposed facility would be coned to improve dispersion and thereby lower ambient sulfuric acid concentrations.

Ecological Risk Assessment

The Draft EIS reported that, based on modeled emission and deposition rates, the estimated concentrations of mercury and PCBs in a nearby surface water body (Willow Creek Reservoir) would exceed the established Minnesota Water Quality Criteria (WQC) for aquatic organisms. Revised estimates of surface water impacts were developed based on revised air emissions estimates, which in the Final EIS account for the ability of the pollution control system to remove pollutants from the emissions.

Mercury And Minnesota Water Quality Criteria

The revised mercury emission estimate is not significantly different from that presented in the Draft EIS. The best estimate that MPCA staff can provide is that, based on revised emission rate estimates and accepted deposition modeling, the concentration of mercury in Willow Creek Reservoir resulting from the operation of the proposed facility could range from just below the Minnesota WQC to 10 times greater than the criteria. However, the science of estimating mercury concentrations in nearby surface water resulting from point sources is imperfect, and has not evolved to reliably quantify the problem.

Before further mitigation measures are discussed, a general discussion regarding mercury deposition and ecological impacts throughout the state is in order. Two points need to be made. First, mercury is transported long distances before being deposited. Second, because of this, deposition is quite similar throughout the state, but the ecological impacts differ between the northern and southern parts of the state.

Because of long-range transport, the deposition of mercury across the state is quite uniform. The concentration of mercury found in fish tissue, however, varies significantly between water bodies in the northern part of the state and those in the southern regions of the state. Southern water bodies appear to be less sensitive to ecological impacts from mercury deposition. A high degree of bio-accumulation of mercury in fish would not be expected in water bodies of the Rochester region.

Because mercury is subject to long-range transport, mercury deposition can only be reduced by a reduction in mercury emissions nationally and internationally. Therefore, an overall decrease in mercury emissions should be the primary objective. Because the proposed facility would be equipped with the best available technology for the control of mercury emissions, an overall decrease in mercury emissions can be expected if the proposed facility were constructed and Mayo's currently operating incinerator subsequently closed.

Mercury Emissions Mitigation

Mayo would be required to sample stack gas from the proposed facility for mercury upon start-up and every 90 days thereafter. The proposed facility would have to comply with the mercury emission limit that would be included in Mayo's Air Emission permit.

The activated carbon technology described in Section 2.1.4 is the most effective technology existing for the removal of mercury from the flue gas. However, if necessary, a further reduction in mercury emissions may be achieved by removing mercury-containing materials from the waste stream. Mayo could be required through its Air Emission permit to further inventory its waste stream to identify and remove sources of mercury.

PCB And Minnesota Water Quality Criteria

The revised emission estimate for PCB was less than that presented in the Draft EIS due to the PCB removal efficiency of the proposed pollution control system. Using the same deposition assumptions used in the Draft EIS, the surface water concentration is projected to be much less than that presented in the Draft EIS, but higher than the Minnesota WQC, although in the same order of magnitude. PCB emissions are still of concern but less so than originally presented in the Draft EIS.

PCB Emission Mitigation

Currently, little is known about the exact cause of PCB emissions from incinerators. PCBs may be present in the waste stream and are not completely destroyed by combustion. Or they may be created within the incinerator through incomplete combustion processes. In all likelihood, both factors contribute.

The PCB emission estimates for the proposed facility are based on data from existing medical waste incinerators. Unfortunately, nothing is known about the PCB content of the waste stream of these facilities. If we assume that PCBs in the waste contribute at least in part to PCB emissions, then efforts to remove PCBs from the waste stream (e.g. fluorescent light ballasts) should be considered as a means of mitigation.

Mayo has gone through the process of identifying and eliminating PCB containing material from its incinerated waste stream. The waste streams of facilities on which the PCB emission estimates have been based apparently contained PCB material. Mayo's incinerated waste stream may not. Therefore, the estimated air emission rates may not accurately reflect what would occur from the proposed facility.

Good combustion and the proposed dry sorbent injection/fabric filter system with activated carbon injection is the best demonstrated technology available for the removal of organics, including PCB.

Mayo would be required to sample stack gas from the proposed facility for PCBs upon start-up and every at least 36 months thereafter. If high levels of PCB are detected in the emissions, Mayo may be required to inventory its waste stream again and eliminate from it any additional PCB containing material.

Need For The Proposed Facility

Several concerns relating to the need for the facility were raised during the public comment period for the Draft EIS. Section 2.5 examines the available capacity at the Olmsted Waste to Energy Facility and Mayo's waste disposal capacity needs.

Olmsted Waste to Energy Facility (OWEF) Capacity

The proposed incinerator is not new capacity; it is replacement capacity. The theoretical waste processing capability of the currently operating Mayo incinerator units, when new, was 4,100 pounds per hour. Under a February 1989 stipulation agreement with the MPCA, these currently operating units were de-rated to combined throughput of approximately 1,600 pounds per hour. The proposed facility would be a 2,000 pound per hour unit. This represents essentially replacement capacity; it is not new capacity in Olmsted County.

According to the Olmsted County Solid Waste Manager, the OWEF is operating at capacity and any addition to the waste stream would be by-passed to the Olmsted-Kalmar landfill. Mayo has sent some of its waste to OWEF only during the last three years. Before a 1989 stipulation agreement, all Mayo-generated waste was incinerated at the currently operating Mayo incinerator.

Mayo has stated it would, on a continuing basis and when necessary, strongly consider diverting some of its general waste to OWEF to maintain OWEF at full burning capacity. The amount diverted, if any, would be small. It is important to note that during 1991 more than 6,000 tons of burnable waste was by-passed and landfilled because OWEF could not handle the volume. This amount, 6,000 tons, is almost twice the total volume of waste that Mayo would be sending to OWEF should the proposed facility not be built.

In addition, projections provided by the county indicate that, based on population growth estimates, waste generation would increase by about three percent a year even with waste reduction programs. The amount of waste incinerated and composted would remain at maximum capacity while the amount of waste recycled and by-passed to Olmsted-Kalmar would both increase.

Mayo's Waste Disposal Capacity Needs

The results of a waste stream analysis presented in the Draft EIS reported a waste generation rate of about 10 tons per day (70 tons per week) of burnable waste. Given the proposed operating schedule of 16 hours per day, five days per week, the incinerator would need to incinerate about 13 tons a day to handle 70

tons per week. If the plastics recovery system operates at an expected removal efficiency of 80 percent, the incinerated waste stream would be reduced by about 2.5 tons tons per day. The net effect would be a capacity need of about 10 tons per day, assuming the same operating schedule.

According to Mayo, the next smaller incinerator size available from the vendor is a 1,600 pound per hour unit. The smaller unit operating 16 hours a day could incinerate about 13 tons per day. This size would allow for little operating flexibility or room for growth and would not result in significant capital cost savings. However, this size would not sufficiently account for necessary down-time or for anticipated growth in the non-recyclable waste stream.

Incinerators generally operate at about 80 percent of the maximum operating capacity due to down time for repairs and routine maintenance activities. In addition, if the equipment to remove plastic from the general and decontaminated infectious waste stream weren't operating because of maintenance and repair needs, problems marketing the recovered plastic, or equipment design problems, the smaller unit may not provide enough capacity.

Even with increased efforts in waste reduction and recycling, some growth in Mayo's waste stream over the expected life of the incinerator must be assumed. With changing medical technology, growth within Mayo, and changes in federal, state, and local regulations, it is impossible to precisely answer the question of waste disposal capacity needs in the the year 2010. For planning purposes, it is prudent to assume that the non-recyclable waste stream will increase.

The proposed size is adequate to meet the Mayo Foundation's current and projected future needs, as well as those of a few Rochester hospitals and other small infectious waste generators within Olmsted and Dodge Counties.

2.0 PROJECT MODIFICATIONS, ENVIRONMENTAL IMPACTS AND MITIGATION

This section supplements the Draft EIS prepared for the Mayo Foundation medical waste incinerator proposal. It contains revised information on the project description, and on the potential environmental impacts and mitigation measures associated with air quality and public health and ecological risks.

2.1 PROJECT DESCRIPTION

Mayo's original proposal, as described in its 1989 Air Emission Permit application, was to construct a facility with two incinerators with total a permitted capacity of 50 tons per day. At the outset of the EIS process, Mayo down-sized its original proposal to a facility with two incinerators with a total permitted capacity of 25 tons per day. After completion of the Draft EIS, Mayo further altered its original proposal by eliminating one of the two proposed incinerators and incorporating steam sterilization into the facility. In addition, Mayo has committed to plastics recycling.

The Draft EIS described, in Chapter 10, measures that should be taken to reduce the identified pollutant emissions that resulted in estimates of unacceptable public health risks and ecological impact. Mayo has committed to incorporating into the design of the facility many of the mitigation measures that were recommended in the Draft EIS. Specifically, the facility as currently proposed would include:

- * Two steam autoclaves to decontaminate infectious waste;
- * Plastic recovery equipment;
- * One 25 ton per day incinerator instead of the two previously proposed;
- * Activated carbon injection to further control emissions; and
- * The stack would be coned, if necessary, to increase its effective height.

All of these components were described in varying detail in the Draft EIS. The autoclave technology and plastic recovery was discussed in Chapter 6 of the Draft EIS, the 25 ton incinerator was described in Chapter 4, and the activated carbon technology and stack coning were discussed in Chapter 10. Following is a detailed description of the facility as currently proposed.

2.1.1 Autoclave Technology (Steam Sterilization)

Autoclaving is widely used to treat red bag and other types of infectious waste. Direct contact of saturated steam with the waste and exposure of the pathogenic organisms to sufficiently high temperature for sufficient time result in the sterilization of the waste.

Two German made (Roland Industries) ZDA-M3 stationary steam autoclaves would be included in the facility design in lieu of the second 25 ton per day incinerator. The system is available as either a stationary unit or a mobile unit mounted on a truck bed. The process involves introduction of the waste material into a bin. The bin is covered and steam is injected into it. The material is then shredded into pieces one-quarter to one-half inch long and processed into a conveyor. As the material is processed along the slow moving conveyor, additional steam is introduced into the assembly. This results in

pressurization of the system and as the material moves through the system it is sterilized. On completion of treatment, the waste material is ejected by a hydraulic ram into a waste container. The volume reduction achieved is reportedly 80 percent. At the end of each operating day the equipment itself is completely sterilized.

The system requires a cold water supply but does not require connection to the sewer system. There is no discharge of waste water; all water is absorbed by the shredded waste or recycled back into steam. All air, steam, and vapor from the process would be filtered through banks of activated charcoal filters. No odors were associated with the truck mounted units that were inspected by Mayo representatives while in Germany.

At the German hospital visited by Mayo representatives, the waste was treated with 311 degree Fahrenheit steam for 20 minutes. The system had constant monitoring of effectiveness, both electronically and by periodically injecting micro-organisms into the conveyor and testing to see if they were being retrieved at the end of the sterilization process. Live bacteria had never made it through the system without sterilization.

The system handles approximately 600 pounds or 6.6 cubic meters per hour of material. Mayo would install two units to meet its needs.

Minn. Rules pt. 7035.9120, subp. 3 requires waste to be autoclaved at 250 degrees Fahrenheit at 15 pounds per square inch of gauge pressure for one hour or at least equivalent settings. Because the waste would be shredded prior to treatment and would be treated at a significantly higher temperature, the treatment time needed to sterilize the waste would be less than one hour. The treatment time can be adjusted as needed to reach an equivalent setting to that described in the rules.

2.1.2 Plastic Recovery

Shredded general waste would be combined with shredded sterilized red bag waste and processed through the plastics recovery equipment.

Roland Industries has developed a plastic recovery system that is capable of removing plastic from the waste stream and processing it to a consistency and composition suitable for injection molding of plastic products. The currently operating plastic recovery plant in Germany uses an air trammel to separate plastics from the waste stream. The end product is a shredded substance composed of about 65 percent plastic. This is used in the injection modeling of plastic products.

Mayo would present Roland with a performance specification for the production of an end product composed of about 80 percent plastics. The higher plastic content makes for a higher quality plastic for injection molding and results in a more stable and durable product. The Mayo Foundation is working with Roland Industry to customize a plastic recovery system suitable to Mayo's needs.

Marketing the recycled plastic product is an obvious challenge. Mayo has preliminary plans under consideration to develop a local market for the product.

2.1.3 One Incinerator

The facility would include a single 25 ton per day incinerator rather than the two 25 ton per day incinerators previously described in the Draft EIS. All of the discussion regarding facility design and operation in the Draft EIS was assuming that only one incinerator would be operating at any one time and the total permitted capacity would be 25 tons per day. Therefore all discussion contained in the Draft EIS is still relevant except for the described lock-out system that was to exist between the two previously proposed incinerators. All combustion system components, pollution control systems, heat recovery systems, the stack, ash generation and handling, and industrial wastewater descriptions accurately describe the current proposal of a single incinerator.

2.1.4 Activated Carbon Injection

Activated carbon has been widely used for the adsorption of pollutants from both water and air streams. Adsorption is a phenomena whereby hydrocarbons and other compounds are selectively adsorbed on the surface of the carbon. Activated carbon is an effective adsorbent because it contains a very large internal pore surface which can bond to a very broad range of substances. Chapter 10 of the Draft EIS recommended the use of activated carbon to control emissions of mercury, PCBs, and dioxin.

The pollution control system proposed includes the use of activated carbon injection with a dry sorbent injection/fabric filter system. As described in the Draft EIS Section 4.3.5, a spray of dry, hydrated lime would be directed into the flue gas stream, immediately downstream from the boiler into the flue gas stream. Activated carbon is typically injected into the same reaction vessel as the lime would be. Powdered carbon would be pneumatically fed to the chamber. Carbon adsorbs the pollutants (mercury and organics, including dioxin and PCB) and is trapped within the filter cake that develops on the bag filter surface. The fabric filter compartments would be cleaned regularly to maintain the filter's ability to efficiently cleanse the flue gas. The residue materials from the cleaning process would be collected in hoppers.

Chapter 4 of the Draft EIS describes the dry sorbent injection/fabric filter (DSI/FF) system in detail. The activated carbon injection process would be in addition to the previous proposed pollution control systems (the DSI/FF).

2.1.5 Stack Coning

If, upon further evaluation during the permitting process, it is determined that taking measures that would lower the ambient concentration of sulfuric acid are necessary, the mitigation measure recommended in Chapter 10 of the Draft EIS would be adopted. Mayo has agreed to cone the top of the stack to increase the exit velocity of the flue gas to improve dispersion of pollutants and thus lower the ambient concentration of sulfuric acid. (See section 2.3.10 for a discussion of estimated sulfuric acid concentrations and respiratory irritation).

2.1.6 Waste Flow Through The Facility

The lay-out of the proposed facility and the flow of waste through the facility are depicted in the following diagram. There would be separate delivery docks for general and infectious waste. General waste would be delivered to a waste

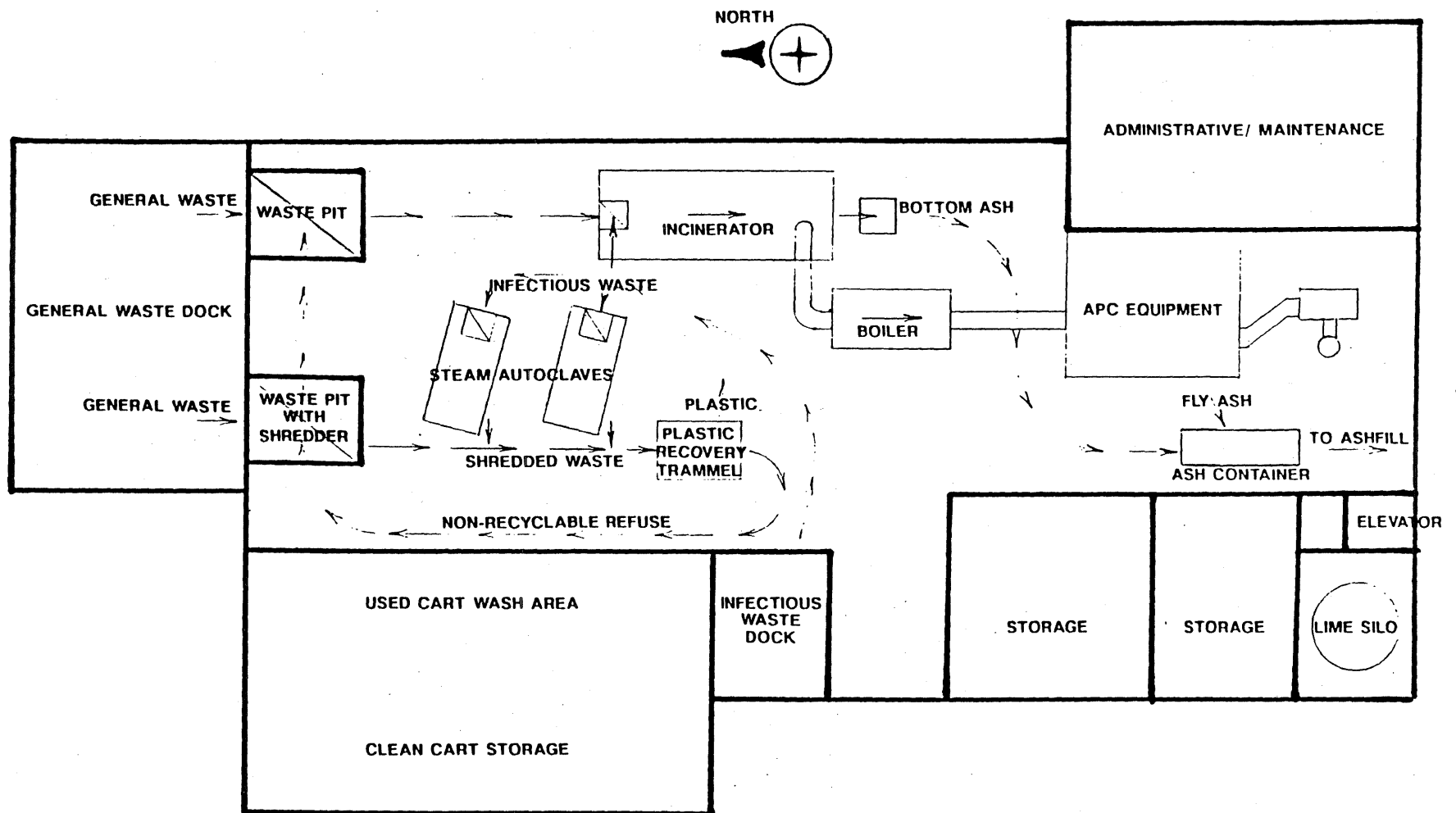
pit with a shredder installed inside. The general waste would be shredded and transferred to the plastic recovering system via a conveyor belt and combined with the sterilized waste coming out of the steam autoclaves. There would be a second waste pit to provide for times when the shredder was not operating due to maintenance or repair needs. When the general waste shredder was not operating, general waste would not be routed through the plastic recovery system. It would be delivered directly to the incinerator.

Infectious waste would arrive in closed containers and then be loaded into the steam autoclave units. As described in Section 2.1.1, the infectious waste would be shredded prior to treatment. The shredded sterilized waste would be transferred via a conveyor belt from the autoclave system following treatment and fed into the plastic recovery system in combination with shredded general waste.

The recovered plastic would be collected and stored on-site until transfer from the facility for further processing into molded plastic products. The non-recyclable refuse would be transferred to the incinerator.

Low-level radioactive waste would be stored for radioactive decay at a secured facility near the currently operating Mayo incinerator prior to incineration, as described in Chapter 7 of the Draft EIS. The low-level radioactive waste would be transferred from storage to the proposed facility. It would arrive at the infectious waste delivery dock and be transferred directly to the proposed incinerator.

Ash handling, storage, and disposal would be as described in the Draft EIS in Chapter 7.



2-5

FACILITY LAYOUT

2.1.7 Permits and Approvals

2.1.7.1 Air Emission and Solid Waste Facility Operating Permit

Mayo is in the process of revising its Air Emission and Solid Waste Facility Operating permit application in light of the proposed facility changes. The anticipated date for notice of the public comment period for the permit is July 1992.

2.1.7.2 Infectious Waste Management Plan

The incineration and autoclave technologies were approved for use in treating infectious waste in the Infectious Waste Rule (Minn. Rules pts. 7035.9100 - 7035.9159). Mayo must submit an Infectious Waste Management Plan to the MPCA staff for approval describing the autoclave system, the incineration system, and its waste handling practices. This plan is not due until the facility begins operation.

2.2 AIR QUALITY

The purpose of this section is to present revised emission estimates for use in assessing risk based on the currently proposed emission control system for the facility and the data treatment method recommended by the MDH. The emission control system and the data treatment method were both discussed in the Draft EIS and are developed further here.

2.2.1 Revised Air Emission Estimates

MPCA staff re-evaluated air emission estimates based on concerns raised over the methodology used in the Draft EIS. There were two primary issues that necessitated the re-evaluation. Both relate to the risk estimates resulting from the emissions.

First, the MDH raised concerns about the statistical treatment of emissions data. Emission estimates generated for use in the Draft EIS were based on the upper 95 percent confidence limit of the geometric mean of all datapoints for a pollutant. The MDH commented that the U.S. Environmental Protection Agency (EPA) Superfund Risk Assessment Methodology recommends use of the upper 95 percent confidence limit of the arithmetic average for risk assessment purposes. Basing the risk estimates on the 95 percent confidence limit of the arithmetic average will tend to increase the risk estimates. Although this issue was discussed in Section 8.5.7 of the Draft EIS, a full re-evaluation has been completed for the Final EIS.

Second, the emissions estimates used in developing risk estimates in the Draft EIS did not represent the removal efficiency of the proposed pollution control equipment. The revised emission estimates take into account the removal efficiency of the dry sorbent injection/fabric filter pollution control system, described in Section 4.3.5 of the Draft EIS, and the activated carbon injection system, described in Section 2.1.4 of this document. Basing the risk estimates on emission data which represent the removal efficiency of the dry sorbent injection/fabric filter system with activated carbon injection will tend to decrease the risk estimates.

2.2.2 Chemicals Selected For Re-evaluation

The chemicals that were selected for re-evaluation were, at a minimum, those recommended by the MDH (see Appendix E, comment letter number 20). The emission rates for mercury, lead, cadmium, chromium, PCB, and dioxin/furan toxic equivalents were re-examined. These chemicals contributed most to the calculated risks. MPCA staff solicited comment and direction from MDH staff regarding the methodology for revising air emission estimates and risk estimates.

2.2.3 Methodology Of the Re-evaluation of Air Emissions

The 95 percent upper confidence limit (95% UCL) on the arithmetic mean of the facility means was determined for both controlled and uncontrolled emissions for each pollutant. The arithmetic mean of other facilities for which emissions data was reasonably available was evaluated for comparison purposes. Emission rates were then ordered from highest to lowest; emission rates from facilities known to have dry sorbent/fabric filters were specifically identified in the analysis. This was done in order to ascertain what emission rates might reasonably be achieved by medical waste incinerators with this type of pollution control equipment. Removal efficiency estimates for the activated carbon were ascertained from the literature and interviews with EPA staff and technology vendors.

2.2.4 Summary Of Revised Emission Rates

Pollutant	Revised Emission Rates	Emission Rates Used in the Draft EIS Risk Assessment
Mercury	3.65E-3 lb/ton 4.78E-4 grams/second	3.8E-3 lb/ton 5.01E-4 grams/second
Cadmium	1.27E-4 lb/ton 1.67E-5 grams/second	1.5E-3 lb/ton 1.98E-4 grams/second
Lead	8.18E-4 lb/ton 1.07E-4 grams/second	2.6E-2 lb/ton 3.39E-3 grams/second
Chromium	3.30E-4 lb/ton 4.34E-5 grams/second	1.32E-4 lb/ton 3.62E-5 grams/second
Dioxin/Furan (in Toxic Equivalents)	5.53E-8 lb/ton 7.29E-9 grams/second	3.77E-7 lb/ton 4.99E-8 grams/second
PCB	6.82E-6 lb/ton 8.95E-7 grams/sec	2.3E-4 lb/ton 2.99E-5 grams/sec

- * These emission rates reflect the use of activated carbon injection with a dry sorbent injection/fabric filter system.
- * 1E-3 means .001, 1E-4 means .0001, etc.
- * lb/ton stands for pounds of pollutant emitted per ton of waste incinerated.
- * grams/second stands for grams of pollutant emitted each second during incineration.

As can be seen on the table above, emission estimates for chromium increased, while the estimates for all other chemicals decreased, although the mercury emission estimate did not vary significantly from the original estimate.

The conclusion of the Draft EIS--that it is unlikely that the Mayo incinerator would cause a significant impact of the existing background air quality levels--remains valid. The purpose in re-evaluating the emission estimates was to use them in recalculating risk estimates in accordance with MDH comments on the Draft EIS risk assessment. See Appendix A for details of the analysis of emission rates.

2.3 PUBLIC HEALTH RISK ASSESSMENT

Several concerns related to the risk assessment for air emissions were raised during the Draft EIS comment period. These concerns were generally related to the estimated emission rates and resulting risk estimates, the risk resulting from the incineration of low-level radioactive waste, and the estimated cancer risk.

2.3.1 How Does the MPCA Use The Risk Assessment?

The proposed Mayo incinerator would emit air pollutants, some of which have the potential to affect public health and wildlife. In order to evaluate the potential for these effects and the possible steps to mitigate them, a public health and ecological risk assessment was conducted. Such an assessment typically involves a process for selecting the chemicals most likely to cause adverse effects, a determination of the potential pathways by which such exposure may occur, the selection of human and animal receptors most likely to be exposed to these chemicals, an evaluation of the dose of each chemical which may produce an adverse effect, calculation of the levels of exposure, and characterization of the risk.

Risks are characterized in different ways depending on the type of effect. For potential chronic (long-term) carcinogenic (cancer-causing) effects, the risk is characterized as the incremental (increased) probability that a person would get cancer during their lifetime while living under circumstances which would maximize and, in some ways, magnify their exposure to the incinerator's emissions. This incremental lifetime cancer risk is deemed to be insignificant if, under these circumstances and for all chemicals evaluated, the summed risk is not greater than one in one hundred thousand (0.00001 or 1.0×10^{-5}).

If the summed incremental cancer risk is greater than the 1.0×10^{-5} criterion, or if other criteria for chronic noncancer human health effects, acute human health effects, or ecological effects are exceeded, the project proposed is required to evaluate emission control methods which could be applied to the chemicals which contribute significantly to the risk. This process allows risk managers and decision makers to evaluate the significance of the potential risk associated with a proposed project and its reasonableness given the available emission controls and the potential benefits.

Thus, the risk assessment, as employed by the MPCA, is not intended to accurately estimate a real medical outcome or a real ecological outcome. Rather, it is used as a regulatory tool to identify those air emissions which should be subjected to more intense regulatory scrutiny and control by virtue of their potential to cause significant health or ecological effects.

2.3.2 Chemical Emissions Evaluated in the Risk Assessment

Revised air emission estimates were developed by MPCA staff. (See Section 2.2 and Appendix A.) Since the proposed incinerator does not yet exist, its air emissions were estimated using data from currently operating medical waste incinerators around the country. These revised estimates are likely to be better for risk assessment purposes than those modeled by the MPCA contractor in the Draft EIS because:

- 1) Arithmetic mean-based upper confidence limits were considered, as suggested by MDH and according to guidance from EPA's Risk Assessment Guidance for Superfund. As stated in Section 8.5 of the Draft EIS, the arithmetic mean is sensitive to high values in the emissions data set and may provide toxicologists additional information with which to evaluate risks. The arithmetic mean better predicts a reasonable maximum toxic exposure.
- (2) More recent data were considered, in addition to data available when the air emission estimates for the Draft EIS were derived. A larger database should provide more reliable estimates.
- (3) Pollution control equipment similar to that proposed for the new facility was explicitly considered in the revised estimates. This was not done in the Draft EIS.

The exposure pathway results from the Draft EIS risk assessment indicate that certain chemicals contribute the most to predicted cancer and noncancer risk estimates. Dioxin/furan exposures represented about 90 percent of the total cancer risk estimated. The largest noncancer risks were for renal toxicity, respiratory toxicity, and neurotoxicity, although those for respiratory and neurotoxicity, are quite low. The chemicals that contributed the majority of noncancer risk were mercury, cadmium, lead, and chromium.

2.3.3 Methodology for Recalculating Risk Estimates

Health risk can be assumed to vary directly with emissions, i.e., doubling emissions gives twice the risk. Therefore, the ratio

revised emission rate / original emission rate in the Draft EIS

when multiplied by health risk results contained in the Draft EIS risk assessment, can be used as a scaling factor to estimate health risks under the revised emission rates. The ratio was used to develop scaling factors with which to multiply the numeric health risks reported in the Draft EIS risk assessment for mercury, cadmium, lead, chromium, and toxic equivalents of dioxin/furan (TEDF), the chemicals that contribute the most to the health risk estimates. (See Appendix B for additional detail.)

Risk estimates have been recalculated for both of the exposure scenarios described in the Draft EIS: the farm resident and the farm worker. The exposure pathways that were re-evaluated are also the same as those contained in the Draft EIS: inhalation of ambient air, ingestion of soil and dust, dermal absorption through soil contact, consumption of home grown produce, consumption of beef/dairy products, and consumption of breast milk by infants.

2.3.4 Cancer Risk Estimates

The revised cancer risks from revised emissions are about five and one-half per 1,000,000 for both the residential and the farm worker scenarios. This level is within the acceptable level of one per 100,000 established by the MDH.

The revised dioxin/furan emission rate estimate is about 15 percent of the original emission rate estimate in the Draft EIS. The residential and farm worker cancer risk estimates therefore decrease:

	Revised Risk Estimate	Draft EIS Risk Estimate
Resident Cancer Risk	5.4E-6	2.3E-5
Farm worker Cancer Risk	5.5E-6	2.4E-5

2.3.5 Renal Toxicity Estimates

The revised renal hazard index is below the level of regulatory concern for both scenarios modeled. The hazard index increased slightly from that estimated in the Draft EIS risk assessment, from 0.38 to 0.41 in the farm worker scenario and from 0.37 to 0.40 for the residential scenario. In both cases, the hazard index is well below one. A hazard index greater than one indicates that toxic effects could occur at the modeled exposures.

2.3.6 Respiratory Toxicity Estimates

The revised respiratory hazard index is below the level of regulatory concern for both scenarios modeled. The hazard index increased from that estimated in the Draft EIS risk assessment, from 0.04 to 0.10 in the farm worker scenario and from 0.03 to 0.09 for the residential scenario. In both cases, the hazard index is well below one.

2.3.7 Neurotoxicity Estimates

The revised neurotoxicity hazard index is below the level of regulatory concern for both scenarios modeled. The hazard index did not change from that estimated in the Draft EIS risk assessment. The revised hazard index estimate as well as the estimate presented in the Draft EIS for both residential and farm worker scenarios can be rounded to 0.03, well below one.

2.3.8 Summary of Public Health Risk Estimates

Risk estimates based on the revised air emission estimates were lower for cancer, unchanged for neurotoxicity, and higher for renal toxicity and respiratory toxicity than was presented in the Draft EIS. In all four cases however, the risk estimates are below regulatory levels of concern. These results support the conclusion that chronic health risks from exposure to air emissions from the proposed Mayo incinerator are unlikely. See Appendix B for further detail on the analysis.

2.3.9 Public Health Impacts From the Incineration of Low-Level Radioactive Waste

The MDH has elaborated a policy for risk assessment of radioactive emissions. The MDH estimates upper bound risks for cancer incidence, and applies its negligible risk criterion of one in 100,000. The MDH criterion is more protective than the EPA and the Nuclear Regulatory Commission criteria.

The MDH has calculated a negligible dose rate criterion of 0.05 mrem/year.

Radioactivity in Air: Application of the MDH negligible dose rate criterion indicates that there is at least a thousand-fold safety margin between air concentrations due to emissions of radionuclides from the proposed incinerator and significant cancer risk.

Radioactivity in Soil: Based on "slope factors" or dose to risk coefficients in EPA HEAST Tables, it was determined that soil concentrations of radionuclides would be less than a ten-millionth of an amount which might engender a significant health risk. Again, application of the MDH dose to risk coefficient indicates that radionuclide concentrations are at least a million times less than would engender a significant health risk.

Radioactivity in Ash: The MDH concluded that levels of radioactivity in ash would be very small and not of significant health risk.

Source: Minnesota Department of Health. Letter dated March 23, 1992.
(See Appendix E, comment letter number 20)

2.3.10 Respiratory Irritation Risk

The Drat EIS noted some potential for emissions to result in local concentrations of sulfuric acid in excess of acceptable ambient levels established under MPCA's Air Toxics Guidelines, and that without mitigation measures sulfuric acid emissions could present a risk of respiratory irritation.

The consultant retained by the MPCA to conduct the emission modeling that was presented in the Draft EIS, assumed that 15 percent of sulfur dioxide was converted to sulfur trioxide and that all of the sulfur trioxide was converted to sulfuric acid. The 15 percent assumption was apparently based on sulfur dioxide and sulfuric acid monitoring data from a waste-to-energy combustor in Florida. The sampling methodology was apparently not particularly exacting (Porter). MPCA staff have not seen this data and know nothing about the quality assurance/quality control of the sampling and analysis.

A MPCA staff-review of combustion literature on sulfur dioxide/sulfuric acid emissions disclosed rates ranging from 0 to 5 percent of sulfur dioxide converting to sulfur trioxide during the combustion process. Brunner (1985) reports that 0 to 5 percent of the sulfur dioxide in the flue gas converts to sulfur trioxide. McDonald (1980) reports that .5 to 1 percent of the sulfur dioxide in the flue gas converts to sulfur trioxide. And Wark and Warner (1981) report that 0 to 2 1/2 percent of the sulfur dioxide converts to sulfur trioxide. If it is assumed that all of the sulfur trioxide is converted to sulfuric acid, then 0 to 5 percent of the sulfur dioxide in the combustion gases will convert to sulfuric acid.

These percentages represent the concentration of sulfuric acid before the flue gas passes through the pollution control system (the acid gas scrubber which is the dry sorbent injection/fabric filter system). The pollution control system can capture at least 90 percent of the sulfuric acid; the acid gases react with the injected lime and are removed from the exit gas. The percent of sulfuric acid in the exit gas would be even less than the percentages described above.

Using a more defensible conversion estimate of 2 1/2, rather than the 15 percent used in the Draft EIS, the estimated ambient concentration of sulfuric acid is 4.5 micrograms per cubic meter ($\mu\text{g}/\text{m}^3$). This is less than the 6 $\mu\text{g}/\text{m}^3$ acceptable level (the no observable adverse effect level) established under the Air Toxics Guidelines.

Finally, the Mayo incinerator is projected to contribute about 6 percent of the total ambient sulfur dioxide concentrations in the Rochester area. The amount of sulfur dioxide contributed by the incinerator to the environment, when compared with background concentrations, is small. Other combustion sources are contributing the remainder, and likewise are contributors of sulfuric acid. The proposed facility with its superior pollution control system, would emit less sulfur dioxide and sulfuric acid than Mayo's currently operating incinerator.

Mayo's emissions of sulfur dioxide and sulfuric acid are not expected to cause a local respiratory problem. The issue would continue to be evaluated during the permitting process and, if necessary, the stack of the proposed facility would be coned to improve dispersion and thereby lower ambient sulfuric acid concentrations.

2.3.11 Other Toxicants That Could Be Emitted And Their Health Effects

Under Part II.B.6. of the approved EIS scope of work, the EIS was to develop a list of other toxicants which could potentially be emitted by the proposed facility.

Chemicals are liberated, destroyed, and created during the process of incinerating waste. The types and amounts of chemicals liberated, destroyed, or created in the incinerator which are ultimately released to the atmosphere depends on several factors, including: the incineration temperature, the residence time of waste in the incinerator, the composition of the waste feed, and the compound-to-compound variation in the removal efficiency of the pollution control equipment. The risk resulting from compounds for which there was emission data available was evaluated in the risk assessment prepared for the Draft EIS. There may be many other compounds that could potentially be emitted from the proposed incinerator but there was not stack emissions data available to evaluate the risk resulting from these potentially emitted compounds.

Plastics have been singled out as a principal source of non-methane hydrocarbon (NMHC) emissions (trace organics). These trace organic compounds are of concern in the assessment of health risks resulting from the proposed incinerator. An extensive literature search was conducted looking for data regarding compounds that are emitted from the incineration of plastics. However, no data could be found that reasonably reflected possible emissions of NMHC from the proposed project.

An alternative to generating a shopping list of chemicals and asking the rhetorical question: "Are they emitted and in what concentration?" is to: 1) examine the expected total NMHC emissions from the system, 2) calculate the consequent exposure concentrations, and then, 3) ask the question "Are there any compounds that could conceivably be present as constituents of the total NMHC fraction of the stack gas that would be significant on a health-risk basis at the calculated exposure concentrations?"

The risk to human health resulting from exposure to these compounds, some which may be present in the emissions from the proposed facility, was evaluated. The analysis reveals that there would be no significant human health risks resulting from emissions of these NMHC at the point of reasonable maximum exposure. In fact, the analysis indicates that the exposure concentrations calculated for several highly toxic NMHC compounds are anywhere from 3,000 to 7.7 million times less than the Minnesota Allowable Ambient Levels; 3,000 to 7.7 million times less than the level that would be cause for concern. See Appendix D for details of the analysis.

If the plastics recovery equipment is successful in removing 80 percent of the plastic from the incinerator feed as anticipated, the emissions of these NMHC and the resulting health risks would be even less than estimated here.

2.4 ECOLOGICAL RISK ASSESSMENT

The Draft EIS reported that, based on modeled emission and deposition rates, the estimated concentrations of mercury and PCBs in a nearby surface water body (Willow Creek Reservoir) exceeded the established Minnesota Water Quality Criteria (WQC) for aquatic organisms. As discussed in Section 2.2, the emission estimates have been re-evaluated based on comments received on the Draft EIS.

2.4.1 Mercury And Minnesota Water Quality Criteria (WQC)

The method used to estimate concentrations in surface water for the Draft EIS was quite simple. Two alternative methods, also quite simplified, have been suggested to MPCA staff (HDR Engineering, 1992). All three methods ignore numerous factors that contribute to the concentration of mercury in surface waters that may result from the proposed facility. The science of estimating mercury concentrations in nearby surface water resulting from point sources is imperfect and has not evolved to reliably quantify the problem. The best estimate that MPCA staff can provide is that, based on revised emission rate estimates and accepted deposition modeling, the concentration of mercury in Willow Creek Reservoir resulting from the operation of the proposed facility could range from just below the Minnesota WQC to ten times greater than the criteria.

Before further mitigation measures are discussed, a general discussion regarding mercury deposition and ecological impacts throughout the state is in order. Two points need to be made. First, mercury is transported long distances before being deposited and, second, because of this, deposition is quite similar throughout the state, but the ecological impacts differ between the northern and southern parts of the state.

Because of long range transport, the deposition of mercury across the state is uniform and about 12 micrograms per square meter per year ($\mu\text{g}/\text{m}^2 \text{ yr}$). The concentration of mercury found in fish tissue, however, varies significantly between water bodies in the northern part of the state and those in the southern regions of the state. The reasons for this are not completely understood, but high mercury concentrations in fish are correlated to low alkalinity and stained water color. Northern lakes seem quite sensitive to mercury deposition and mercury concentrations in fish tissue are much higher in these lakes. The southern lakes typically have high alkalinity and less stained water color. The important point is that southern water bodies appear to be less sensitive to ecological impacts from mercury deposition. A high degree of bio-accumulation of mercury in fish would not be expected in water bodies of the region.

In addition, the Twin Cities metropolitan area is a major source of mercury emissions yet mercury contamination in fish from area lakes is not particularly elevated according to the Minnesota Fish Consumption Advisory(1992). A local impact seems not to be observed. This may be explained by long range transport as well as the higher alkalinity and less stained water color of metro-area lakes.

Because mercury is subject to long-range transport, mercury deposition can only be reduced by a reduction in mercury emissions nationally and internationally. Therefore, the overall decrease in mercury emissions should be the primary objective. Because the proposed facility would be equipped with the best available technology for the control of mercury emissions, an overall decrease in mercury emissions can be expected if the proposed facility were constructed and the currently operating Mayo incinerator subsequently closed.

2.4.2 Mercury Emissions Mitigation

Mayo would be required to sample stack gas from the proposed facility for mercury upon start-up and every 90 days thereafter. The proposed facility would have to comply with the mercury emission limit that would be included in Mayo's Air Emission permit.

The proposed facility would be equipped with the best control technology for the removal of mercury. The activated carbon technology described in Section 2.1.4 is the most effective technology existing for the removal of mercury from the flue gas.

If necessary, a further reduction in mercury emissions may be achieved by removing mercury containing materials from the waste stream. Mayo has already completely removed mercury containing batteries from its waste stream, as well as all other types of batteries (see response to comment number VI.5). Mayo could be required, through its Air Emission permit, to further inventory its waste stream to identify and remove sources of mercury.

2.4.3 PCB And Minnesota Water Quality Criteria

The revised emission estimate for PCB was less than that presented in the Draft EIS (see Section 2.2 of this document). Using the revised emission estimate and the same deposition assumptions as were originally used in the Draft EIS, results in an estimated surface water concentration much less than that presented in the Draft EIS but higher than the Minnesota Water Quality Criteria, although in the same order of magnitude.

Estimated Surface Water Concentration
in Willow Creek Reservoir

<u>Draft EIS</u>	<u>Revised Estimate</u>	<u>Minnesota WQC-Class 2B Waters</u>
3.0 x 10 ⁻⁶ mg/l	8.34 x 10 ⁻⁸ mg/l	2.9 x 10 ⁻⁸ mg/l

PCB emissions are still of concern but less so than originally presented in the Draft EIS.

2.4.4 PCB Emission Mitigation

Currently, little is known about the exact cause of PCB emissions from incinerators. PCBs may be present in the waste stream and are not completely destroyed by combustion. Or they may be actually created within the incinerator through incomplete combustion processes. In all likelihood, both factors contribute.

The PCB emission estimates for the proposed facility are based on data from existing medical waste incinerators. Unfortunately, nothing is known about the PCB content of the waste stream of these facilities. If we assume that PCBs in the waste contribute at least in part to PCB emissions, then efforts to remove PCBs from the waste stream (e.g., fluorescent light ballasts) should be considered as a means of mitigation. Waste stream control should, of course, be coupled with effective control devices to remove PCBs from the flue gases.

In the 1980s, Mayo went through the process of identifying and eliminating PCB containing material from its waste stream that is incinerated. Light ballasts were the primary item removed. The waste streams of facilities on which the PCB emission estimates have been based apparently contained PCB material. Mayo's incinerated waste stream may not. Therefore, the estimated air emission rates may not accurately reflect what would occur from the proposed facility.

Good combustion and the proposed dry sorbent injection/fabric filter system with activated carbon injection is the best demonstrated technology available for the removal of organics, including PCB.

Mayo would however be required to sample stack gas from the proposed facility for PCBs upon start-up and every at least 36 months thereafter. If high levels of PCB are detected in the emissions, Mayo may be required to inventory its waste stream again and eliminate from it any additional PCB containing material.

2.5 NEED FOR THE PROPOSED FACILITY

The proposed incinerator is not new capacity; it is replacement capacity. The theoretical waste processing capability of the currently operating Mayo incinerator units, when new, was 4,100 pounds per hour. Under a February 1989 stipulation agreement with the MPCA, these currently operating units were de-rated to a combined throughput of approximately 1600 pounds per hour. The proposed facility would be a 2,000 pound per hour unit. This represents essentially replacement capacity; it is not new capacity in Olmsted County. The following discussion evaluates the available waste disposal capacity at the Olmsted Waste to Energy Facility and examines the waste disposal capacity needs of Mayo.

2.5.1 Olmsted Waste to Energy Facility (OWEF) Capacity

According to the Olmsted County Solid Waste Manager, the OWEF is operating at capacity and any addition to the waste stream would be by-passed to the Olmsted-Kalmar landfill. Mayo has sent some of its waste to OWEF only during the last three years. Before a 1989 stipulation agreement, all Mayo-generated waste was incinerated at the currently operating Mayo incinerator.

Mayo has stated it would, on a continuing basis and when necessary, strongly consider diverting some of its general waste to OWEF to maintain OWEF at full burning capacity. The amount diverted, if any, would be small. It is important to note that during 1991 more than 6,000 tons of burnable waste was by-passed and landfilled because OWEF could not handle the volume. This amount, 6,000 tons, is almost twice the total volume of waste that Mayo would send to OWEF should the proposed facility not be built.

In addition, projections provided by the county indicate that, based on population growth estimates, waste generation would increase by about three percent a year even with waste reduction programs. The amount of waste incinerated and composted would remain at maximum capacity while the amount of waste recycled and by-passed to Olmsted-Kalmar would both increase.

Waste Stream Statistics (Source: Olmsted County Solid Waste Manager)

	(in tons)			
	1988	1989	1990	1991
Total Received at OWEF	70,864	72,455	74,587	68,739
Bypassed to Landfill	8,765	12,613	10,887	6,637
Burned	58,225	59,242	58,935	59,463

The OWEF is currently operating at 90 percent capacity. This means it is burning waste 90 percent of the time, which is better than is generally expected. For design purposes, it is assumed that most facilities operate at 80 percent capacity because of down-time for maintenance and repairs. Based on 90 percent efficiency, the approximate amount of waste that could be burned at OWEF is 59,130 tons per year (Olmsted County).

The following are waste disposal projections provided by the county:

Projections of Waste by Method of Disposal

	Recycling	Yard Waste Composting	Incinerate	Landfill	Percent Recycled
Est. 1992	22,333 tons	3,489 tons	59,130 tons	7,870 tons	24 %
1993	23,003	3,499	59,130	9,880	24 %
1994	23,693	3,502	59,130	11,950	24 %
1995	24,404	3,503	59,130	14,083	24 %
1996	25,136	3,500	59,130	16,279	24 %

(Source: April 6, 1992 Facsimile from Gene Mossing, Olmsted County Solid Waste Manager to Kathryn Kramer, MPCA staff)

The SCORE legislation incorporates county-specific recycling goals of 25 percent by 1993 and 30 percent by 1996 for Greater Minnesota. It appears that Olmsted County expects to just about meet the 1993 goal but to fall short of the 1996 goal. Even if the county were able to meet the 1996 goal of recycling 30 percent, the OWEF would still be operating at capacity; the amount by-passed to the landfill would still be about 10,000 tons per year by 1996.

2.5.2 Mayo's Waste Disposal Capacity Needs

As discussed in Section 2.1, Mayo's original proposal was to construct a facility with two incinerators with a permitted capacity of 50 tons per day. At the outset of the EIS process, Mayo down-sized its original proposal to a facility with two incinerators with a permitted capacity of 25 tons per day. After completion of the Draft EIS, Mayo further altered its original proposal by eliminating one of the two proposed incinerators and incorporating steam sterilization and plastics recovery into the facility.

The results of a waste stream analysis conducted by CDM during a week in June of 1991, reported a waste generation rate of about 10 tons per day (70 tons per week) of burnable waste (See Table 7-5 of the Draft EIS). Given the proposed operating schedule of 16 hours per day, 5 days per week, the incinerator would need to incinerate about 13 tons a day to handle 70 tons per week.

When the plastics recovery system is operational, it is anticipated that the waste stream would be reduced by about 2.5 tons per day. The net effect would be a capacity need of about 10 tons per day, assuming the same operating schedule.

According to Mayo, the next smaller incinerator size available from the vendor is a 1,600 pound per hour unit. This size would allow for little operating flexibility or room for growth and would not result in significant capital cost savings. The smaller unit operating 16 hours a day could incinerate about 13 tons per day. However, this size would not sufficiently account for necessary down-time or for anticipated growth in the non-recyclable waste stream.

Incinerators generally operate at about 80 percent of the maximum operating capacity due to down time for repairs and routine maintenance activities. In addition, if the equipment to remove plastic from the general and sterilized infectious waste stream wasn't operating because of maintenance and repair needs, problems marketing the recovered plastic, or equipment design problems, the smaller unit may not provide enough capacity.

Even with increased efforts in waste reduction and recycling, some growth in Mayo's waste stream over the expected life of the incinerator must be assumed. Thirty years ago, Mayo was able to incinerate all of its waste in a batch fed 500 pound per hour incinerator. Today it proposes to construct an incinerator four times that size to meet its needs. With changing medical technology, growth within Mayo, and changes in federal, state, and local regulations, it is impossible to precisely answer the question of waste disposal capacity needs in the the year 2010. For planning purposes, it is prudent to assume that the non-recyclable waste stream will increase.

The proposed size would allow Mayo to compensate for times when the facility is not operating due to scheduled or unscheduled maintenance. The incinerator could be operated three shifts until the "catch-up" is complete.

The proposed size is adequate to meet Mayo's current and future needs, as well as those of a few Rochester hospitals and other small infectious waste generators within Olmsted and Dodge Counties. It is not adequate to meet the medical waste disposal needs of the region. Mayo has stated in writing that it would not provide services to non-Mayo customers beyond the Olmsted/Dodge geographic boundary (see response to comment I.18).

Finally, the waste stream analysis, while providing valuable information, represents a snap-shot in time and the waste generation quantities reported should not be used alone for planning incinerator capacity needs. Planned expansion in research and health care services have to be considered. Changes in medical technology as well as changes in regulations that may effect the waste stream quantity and composition must be expected and planned for.

The proposer believes that the smaller sized incinerator may not take care of its current capacity needs and would allow for little or no operating flexibility or growth potential.

3.0 COMMENTS ON THE DRAFT EIS AND RESPONSES

A major purpose of the Final EIS is to present a forum for addressing public concerns and questions raised over the information contained in the Draft EIS. Comments on the Draft EIS were solicited by MPCA staff and received through letters and a public comment meeting held in Rochester. The comment period ended on March 25, 1992. All verbal and written comments have been summarized and are presented in Section 3.3, followed by the appropriate response.

3.1 SUMMARY OF PUBLIC MEETING

The public comment meeting was held in Rochester on March 11, 1992, and was attended by approximately 60 people. Brief informational presentations were made by MPCA staff members and the project proposer. Verbal comments were received from six individuals. The meeting was recorded by a court reporter. Verbal comments requiring responses have been summarized and are presented in Section 3.3 followed by appropriate responses.

PERSONS GIVING TESTIMONY AT THE PUBLIC COMMENT MEETING:

- A. Allan Doty
- B. William Kuisle
- C. Donald Guderian
- D. Norm Erickson
- F. Lisa Doerr, CBE
- G. Leslie Davis

3.2 Comment Letters Regarding The Draft EIS

A total of 30 comment letters were received from various governmental agencies, citizen's groups and individuals. Letters are numbered 1 through 30. Copies of all comment letters are contained in Appendix E.

Comment letters were received from:

1. Shirley and B.J. Kraemer
RR 3, Box 70
Stewartville, MN 55976
2. Jo W. Theye
7346 County Road 19 SE
Rochester, MN 55904
3. Darrell Luhmann
503 80th St. SE
Rochester, MN 55904

4. Darrell Luhmann
503 80th St. SE
Rochester, Mn 55904
5. Darrell Luhmann
503 80th St. SE
Rochester, MN 55904
6. Cynthia Boyd
HDR Engineering, Inc.
5401 Gamble Drive
Minneapolis, MN 55416
7. Paul Hess, Minnesota Healthcare Partners, Inc.
2550 University Avenue West
Suite 221 North
St. Paul, MN 55114
8. Norman Erickson
6230 NW 34 Avenue
Rochester, MN 55901
9. Ralph and Johanna Russell
5900 11th Ave. SW
Rochester, Minnesota 55902
10. David Anderson
44 County Road 16 S.E.
Rochester, MN 55904
11. Charlie Brown
104 5th Ave. NE
Stewartville, MN 55976
12. Edwin Doty
805 4th Avenue S.E.
Stewartville, MN 55976
13. Allen Doty
805 4th Avenue S.E.
Stewartville, MN 55976
14. Verla Jean Anderson
44 County Road 16 S.E.
Rochester, MN 55904
15. Michael Shurke
2026 Telemark Ct.
Rochester, MN 55901
16. Dewayne Mattson
5700 11th Avenue SW
Rochester, MN 55902

17. Kathleen Norlien
Project Environment Foundation
26 Exchange Street, Suite 206
St. Paul, MN 55101
18. Lisa Doerr
Citizens for a Better Environment
3255 Hennepin Avenue South
Minneapolis, MN 5408
19. Jeff Steiner
Mayo Foundation
Rochester, MN 55902
20. Judith Ball
Minnesota Department of Health
925 Delaware Street Southeast
Minneapolis, MN 55459
21. Senator Janet Johnson
Room 303, State Capitol
St. Paul, MN 55155
22. Isaac McCrary
MN Department of Transportation
Transportation Building
St. Paul, MN 55155
23. Thomas Balcom
MN Department of Natural Resources
500 Lafayette Road
St. Paul, MN 55155
24. Jim Soukup
5905 Hwy. 63 S.
Rochester, MN 55904
25. Ramona Kiehne
RT. 1 Box 679
Stewartville, MN 55976
26. Britta L. Bloomberg
Minnesota Historical Society
Fort Snelling History Center
St. Paul, MN 55111
27. Minnesota Department of Health
Fax Received 3/24/92
Revised Page 2 of Comment Letter
28. Don Arnosti
National Audubon Society
1313 5th Street S.E., Suite 321
Minneapolis, MN 55414

29. Valetine O'Malley
National Audubon Society
1313 5th Street S.E., Suite 321
Minneapolis, MN 55414

30. Guy Wolf
Clean Water Action
RR 1, Box 95
Stoddard, WI 54658

3.3 Comments and Responses

All written and verbal comments have been reviewed and condensed. Comments on specific issues which were made by more than one party have been summarized and stated in a composite form in order to facilitate the preparation of comprehensive responses. The numbers following the comments correspond to comment letters received or testimony received at the public meeting, as listed above. Responses are provided after each comment.

I. General Comments and Responses

1. **Comment:** Mayo's waste should go to the Olmsted Waste to Energy Facility (OWEF). County capacity issue. Surplus capacity exists at the OWEF and will grow as recycling picks up. (B, D, F, 1, 8, 9, 11, 12, 14, 15, 16, 17)

Response: Mayo would, on a continuing basis and when necessary, strongly consider diverting some of its general waste to OWEF to maintain OWEF at full burning capacity. It is important to note that during 1991 more than 6,000 tons of burnable waste was by-passed and landfilled because OWEF could not handle the volume. This amount, 6,000 tons, is almost twice the total volume of waste that Mayo would be sending to OWEF should the facility not be constructed.

According to the Olmsted County Solid Waste Manager, the OWEF is operating maximum at capacity and any addition to the waste stream would be by-passed to the Olmsted-Kalmar Landfill. In addition, projections provided by the county indicate that, based on population growth estimates, waste generation would increase by about three percent a year even with waste reduction programs. The amount of waste incinerated and composted would remain at maximum capacity while the amount of waste recycled and by-passed to Olmsted-Kalmar would both increase.

Waste Stream Statistics (Source: Olmsted County Solid Waste Manager)

	(in tons)			
	1988	1989	1990	1991
Total Received at OWEF	70,864	72,455	74,587	68,739
Bypassed to Landfill	8,765	12,613	10,887	6,637
Burned	58,225	59,242	58,935	59,463

The OWEF is currently operating at 90 percent capacity. This means it is burning waste 90 percent of the time, which is better than is generally expected. For design purposes, it is assumed that most facilities operate at 80 percent capacity because of down-time for maintenance and repairs. Based on 90 percent efficiency, the approximate amount of waste that could be burned at OWEF is 59,130 tons per year (Olmsted County).

The following are waste disposal projections provided by the county:

Projections of Waste by Method of Disposal

	Recycling	Yard Waste Composting	Incinerate	Landfill	Percent Recycled
Est. 1992	22,333 tons	3,489 tons	59,130 tons	7,870 tons	24%
1993	23,003	3,499	59,130	9,880	24%
1994	23,693	3,502	59,130	11,950	24%
1995	24,404	3,503	59,130	14,083	24%
1996	25,136	3,500	59,130	16,279	24%

(Source: April 6, 1992 Facsimile from Gene Mossing, Olmsted County Solid Waste Manager to Kathryn Kramer, MPCA staff)

The SCORE legislation incorporates county-specific recycling goals of 25 percent for 1993 and 30 percent for 1996 for Greater Minnesota. It appears that Olmsted County expects to just about meet the 1993 goal but to fall short of the 1996 goal. Even if the county were able to meet the 1996 goal of recycling 30 percent, the OWEF would still be operating at capacity; the amount by-passed to the landfill would still be about 10,000 tons per year by 1996.

Mayo has sent some of its waste to OWEF only during the last three years. Before a 1989 stipulation agreement, all Mayo-generated waste was incinerated at the currently operating Mayo incinerator (the IHF facility).

The theoretical waste processing capability of the currently operating Mayo incinerator units, when new, was 4,100 pounds per hour or about 49 tons per day operating on a continuous 24 hour per basis. Under a February 1989 stipulation agreement with the MPCA, these currently operating units were de-rated to a combined throughput of approximately 1600 pounds per hour.

The proposed facility would be a 2,000 pound per hour unit. This represents essentially replacement capacity; it is not new capacity in Olmsted County.

2. **Comment:** The proposed facility isn't a resource recovery facility. (D, 8, 15, 18, 21)

Minn. Statutes § 115a.03, subd. 27. "Resource recovery" means the reclamation for sale, use, or reuse of materials, substances, energy, or other products contained within or derived from waste.

Minn. Statutes § 115a.03, subd. 28. "Resource recovery facility" means a waste facility established and used primarily for resource recovery, including related and appurtenant facilities such as transmission facilities and transfer stations primarily serving the resource recovery facility.

Minn. Statutes § 115a.02(b) The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream. The following waste management practices are in order of preference:

(1) waste reduction and reuse; (2) waste recycling; (3) composting of yard waste and food waste; (4) resource recovery through mixed municipal solid waste composting or incineration; and (5) land disposal.

Plans for the Mayo incinerator include a waste heat recovery boiler. To date, Mayo has no customer for the steam produced other than to heat the incinerator building itself. This will likely change as Mayo pursues and finds customers. Mayo plans to operate an extensive recyclable material recovery system in conjunction with the incinerator. The non-recyclable material would be incinerated and the waste heat would be captured to produce steam. The proposed facility is, therefore, a resource recovery facility as defined above. See section 2.1 of this document for a complete discussion of the revised project description.

3. Comment: Given the MPCA turned down a request to build an incinerator in Dakota County, how can Mayo be allowed to build one in Olmsted County? (25)

Response: It is important to note that the proposed facility is not comparable to the proposed Dakota County incinerator. The following points highlight the differences.

First, Mayo's original proposal, as described in its 1989 Air Emission Permit application, was to construct a facility with two incinerators and a permitted capacity of 50 tons per day. At the outset of the EIS process, Mayo down-sized its original proposal to a facility with two incinerators with a permitted capacity of 25 tons per day. After completion of the Draft EIS, Mayo further altered its original proposal by eliminating one of the two proposed incinerators and incorporating steam sterilization into the facility. In addition, Mayo has committed to plastics recycling. The project proposal, as it now stands, incorporates the recommendations made in Draft EIS.

Second, the proposed incinerator is not new capacity; it is replacement capacity. The theoretical waste processing capability of the currently operating Mayo incinerator units, when new, was 4,100 pounds per hour. Under a February, 1989 stipulation agreement with the MPCA, these currently operating units were de-rated to a combined throughput of approximately 1600 pounds per hour. The proposed facility would be a 2,000 pound per hour unit. This represents essentially replacement capacity; it is not new capacity in Olmsted County.

Third, based on the most up to date information available, there are no feasible and prudent alternatives to including incineration in Mayo's waste management plan. Consider the following:

- @ There are no prudent and feasible alternatives to incineration for decontaminating pathological, residual chemotherapy waste, animal carcasses, and low-level radioactive wastes. Alternative technologies cannot treat these waste streams.
- @ These waste streams need to be incinerated with other waste types in order to attain good combustion.
- @ The existing Olmsted County incinerator (OWEF) does not have the capacity to handle Mayo's waste stream. (See response to comment I.1.)

- @ The OWEF permit does not allow acceptance of the quantities of infectious waste that Mayo generates.
- @ The county incinerator cannot accept some of the waste streams generated by Mayo: pathological, residual chemotherapy waste, animal carcasses, and low-level radioactive wastes.
- @ The no-action alternative is unacceptable. The currently operating Mayo incinerator (Institute Hills Farm) is not capable of meeting new emission limits that will soon be imposed. Furthermore, the equipment requires frequent repair; the integrity of the equipment cannot be maintained indefinitely.
- @ The non-recyclable residual from any alternative treatment technologies for infectious waste must still be disposed.
- @ The greatest reduction in the volume and toxicity of Mayo's waste would result from: decontamination of infectious waste, elimination from the waste stream (general and decontaminated infectious waste streams) of recyclables, incineration of the residuals, and landfilling of the ash.
- @ The cost of off-site disposal of just the low-level radioactive portion of the untreatable waste stream is currently estimated at \$1,880,000 annually compared to \$11,000 if it continues to be incinerated at a Mayo-owned and operated facility permitted by the Nuclear Regulatory Commission (NRC).
- @ As of January 1, 1993, Minnesota generators of low-level radioactive waste will not be able to ship their waste out of the six-state region. The catch, however, is that there are no disposal sites within the region and there will not be a disposal site within the region until 1997 or 1998, at the earliest.
- @ The proposed facility would have better pollution control equipment than either Mayo's currently operating combustor or OWEF.

4. **Comment:** Mayo and Olmsted County should cooperate to upgrade OWEF.
(B, C, 8, 9, 16)

Response: Mayo has demonstrated a willingness to work with the county as evidenced by the afore mentioned commitment by Mayo to consider diverting some of its general waste to OWEF so that OWEF could continue to operate at maximum capacity. Olmsted County has indicated that the OWEF is operating at capacity and is not able to accept Mayo's general waste or decontaminated infectious waste stream for incineration on a regular and reliable basis.

5. **Comment:** Minnesota Healthcare Partners (MHP) supports Mayo's efforts to manage its waste itself and to control its own destiny. MHP believes that the public interest is better served and the environment better protected by policies which encourage generators to manage their wastes themselves, rather than by policies which force generators to rely solely on commercial disposers.
(7)

Response: No response required.

6. **Comment:** What happened to the moratorium on incinerators? (1)

Response: There is not a moratorium on new incinerators in effect in Minnesota. The governor indicated in a March 2, 1991, news release that he did not support a moratorium on infectious medical waste incinerators. A moratorium has not been enacted by the Legislature. The MPCA has not taken steps to promulgate a moratorium on permitting incinerators.

7. **Comment:** Why not keep the incinerator where it is? (3)

Response: The Mayo Foundation cannot continue using its current facility, Institute Hills Farm (IHF). The IHF facility will not be capable of meeting expected state or federal emission limits. The issue of continued use of Mayo's IHF incinerator is discussed in the Draft EIS in section 4.1.

The Mayo Foundation cannot expand or rebuild at the IHF incinerator site. The area is not zoned appropriately and a variance to the zoning laws for this site is unlikely. This issue is discussed in section 6.4.2 of the Draft EIS.

8. **Comment:** Concern was expressed over the potential plane crashes due to the proximity of the proposed facility site to the Rochester airport. (5, 16)

Response: Please see responses to comments numbered II.3. and III.2.

9. **Comment:** Olmsted County and Minnesota Waste Management Strategies should both be stated. How the proposed facility supports these strategies should be explicitly explained. (8)

Response: The proposed project supports Olmsted County's waste management plan. This issue was discussed in Section 9.4 of the Draft EIS. The proposed project also supports the state waste management hierarchy. See response to comment number I.13.

10. **Comment:** It would be wise to wait for the Minnesota Legislature to complete its study of the medical waste problem. (12)

Response: The currently operating Mayo incinerator, Institute Hills Farm, cannot continue to operate. Mayo has upgraded the pollution control equipment. Mayo spends about \$100,000 annually on maintaining the incinerators refractory and breaching to keep it operational. Even with the improvements, the facility will not be able to meet emission limits to be included in the proposed combustor rules. It would not be prudent to delay.

Mayo has committed to incorporate steam autoclaving and plastic recycling into the facility. According to MPCA staff involved in the legislative study, the findings to date would support such a proposal.

11. **Comment:** A discussion of the Minnesota air quality rules for combustors should be included. The proposed dioxin limits are of special concern because of the plastics in the waste stream. (F, 18)

Response: The Air Quality Division has drafted standards of performance for waste combustors. Emission limits proposed for all pollutants reflect the degree of emission reduction achievable through the application of the best system of air pollution reduction. The application of this technology also takes into account the environmental and economic impacts of standards.

Good combustion and the proposed dry sorbent injection/fabric filter system with activated carbon injection is the best demonstrated technology available for the removal of organics, including dioxin and PCB.

In addition, the MPCA recently published the results of its study of air and ash emissions from medical waste incinerators (Torkelson, 1992). The study concludes that there is currently no support to the commenter's theory that a relationship exists between dioxin emissions and waste composition.

12. Comment: How will the new concerns over the hazards of dioxin by the U.S. EPA and others (Newhouse News Service article March 15, 1992) effect current efforts to write a state rule? How will they effect the MDH acceptable risk standards? (18)

Response: Standards for dioxin limits are proposed based on the ability of air pollution control technology to control dioxin emissions. The format of the standards is a total dioxin/furan limit rather than toxic equivalents. The standards are based on the performance of the control equipment. The emissions of dioxins/furans is controllable; the emissions of toxic equivalents is related to the total amount of dioxins/furans emitted.

Recent concern about dioxins/furans is related to its toxicity; the MPCA continues to use USEPA toxicity factors for dioxins/furans. If USEPA revises its toxicity factors based on recent data, the MPCA will follow suit.

The risk assessment for the Mayo medical waste incinerator evaluated emissions based on the toxic equivalents of the emissions. Emission limits established during permitting would consider the relationship between dioxins/furans toxic equivalents emissions and the total dioxins/furans emissions, and set total emissions to reflect the toxic equivalents.

13. Comment: Mayo ignores the state's waste hierarchy by placing incineration above landfilling? There are no plans for resource recovery? (F, 18, 21)

Response: The proposed waste management facility complies with the state's waste management hierarchy.

Minnesota Statute 115A.02(b) The waste management goal of the state is to foster an integrated waste management system in a manner appropriate to the characteristics of the waste stream. The following waste management practices are in order of preference:

- (1) waste reduction and reuse;
- (2) waste recycling;
- (3) composting of yard waste and food waste;
- (4) resource recovery through mixed municipal solid waste composting or incineration; and
- (5) land disposal.

Mayo's stated waste management priorities are, in order of importance: 1) waste minimization; 2) recycling; 3) incineration; and 4) landfilling. This coincides with the state's waste management hierarchy.

The facility would be a resource recovery facility as discussed in response to comment I.2.

14. **Comment:** With regards to the state policy discouraging the contamination of pristine ground water for one time use, is the proposed extraction of ground water and use for cooling, steam production, ash quenching, and other uses, a once-through system and does it fit current DNR policy? (18)

Response: State policy does not authorize "once through" cooling for air conditioning. Mayo's facility will not use once through cooling for air conditioning. Steam production is a closed looped process, requiring water for make-up from boiler blow down only. Ash quenching would use water only for make-up. Cooling of the ash quench water would be through a closed looped system.

15. **Comment:** The EIS should discuss local opposition to the project. (F, 2, 18)

Response: Copies of the comment letters received from concerned citizens are included in Appendix E of the Final EIS.

16. **Comment:** Executive Summary should include: (F, 18)
 Risk estimate based on the arithmetic mean;
 The fact that 85 percent of cancer risk is from estimated dioxin emissions; and
 Synergistic effects uncertainty should be included.

Response: See Sections 2.3 and 2.4 for revised risk estimates and Chapter 1 for the Final EIS Summary.

17. **Comment:** The Executive Summary incorrectly stated that "chronic exposure non-cancer risks did not exceed acceptable levels and that calculated risks were at least a factor of ten less than a level that would be considered significant." Yet, chapter 8 reports the renal toxicity hazard index as 0.3. However, a reasonable upper bound hazard index is about 0.5. (20)

Response: See Sections 2.2 and 2.3 of this document for revised emission and risk estimates.

18. **Comment:** Does Mayo have contracts with the Federal Medical Center, Olmsted Community Hospital, and Olmsted Medical Group to secure their waste? At what tipping fee? (30)

Response: There are no contracts in place for waste disposal services. The tipping fee has not been determined but is estimated to be between 10 and 15 cents per pound. Agreements would be entered into only after the proposed facility has received all necessary permits.

19. **Comment:** What will prevent Mayo from importing medical waste from other states? (30)

Response: Mayo has indicated that it would not accept non-Mayo generated infectious waste from anywhere other than from interested generators in Olmsted and Dodge Counties. The MPCA and Mayo would consider incorporating a condition to that effect into the permit.

20. **Comment:** Shouldn't the proposed facility be required to follow the more stringent emission and ash rules for MSW combustors? (30)

Response: The facility would be required to follow the emission standards and ash rules for MSW combustors. The MPCA is currently drafting proposed rules (Standards of Performance for Waste Combustors, Minn. Rules 7005.0600 - 7005.0695, and 7001.1210 - 7001.1219) which the proposed facility would be subject to. See Sections 7.2.5 and 8.2.1 of the Draft EIS for a discussion on the applicable regulations and response to comment I.11.

21. **Comment:** The proposed facility is not really a medical waste combustor. (30)

Response: Chapter 12 of the Draft EIS provides a definition for medical waste. The definition notes that there is no statutory definition for the term and goes on to define the term broadly as: essentially any waste generated by a health care facility. Infectious waste is a specific portion of the medical waste stream.

22. **Comment:** Why should Mayo be allowed to burn trace chemotherapy and radioactive waste? Will the MPCA endorse this activity at other medical waste burners? (30)

Response: Incineration is the recommended disposal method for residual chemotherapy waste. Residual chemotherapy waste is not a hazardous waste that needs to be disposed of in a hazardous waste facility; it is an infectious waste. Residual chemotherapy waste should be incinerated in combustors that operate at 1800 degrees Fahrenheit. The proposed facility would operate at this requisite temperature.

Low-level radioactive waste can be safely incinerated. Low-level radioactive material usage and disposal by the Mayo Foundation is regulated by the Nuclear Regulatory Commission (NRC). Handling and disposal of licensed material within the Mayo Foundation is conducted in accordance with NRC licensure for Mayo, and according to procedures established by the Mayo Radiation Safety Office. The NRC has established terms under which these materials can be incinerated and not generate radioactive concentrations in the air or ash which would exceed the maximum permissible concentrations found in Code of Federal Regulations (CFR), Title 10, part 20. Low-level radioactive waste is incinerated with other waste and levels are reviewed through the waste inventory program in the Mayo Radiation Safety Office.

23. **Comment:** New sources of mercury should not be permitted. (30)

Response: The commenter should note that construction of the proposed facility and subsequent closure of the currently operating Mayo facility would result in a decrease in mercury emissions in Olmsted County.

24. **Comment:** MDH agrees with the statement in the Executive Summary: "It is important to note that this risk characterization does not imply that the facility should or should not be built. It means that without appropriate pollution control or other mitigating measures, the cancer risk could exceed the MDH acceptable risk guideline." (20)

Response: No response required.

II. Facility Design And Operation Comments

1. **Comment:** The facility is over-sized. (18, 21, 30)

Response: Mayo's original proposal, as described in its 1989 Air Emission Permit application, was to construct a facility with two incinerators with a permitted capacity of 50 tons per day. At the outset of the EIS process, Mayo down-sized its original proposal to a facility with two incinerators with a permitted capacity of 25 tons per day. After completion of the Draft EIS, Mayo further altered its original proposal by eliminating one of the two proposed incinerators and incorporating steam sterilization into the facility. In addition, Mayo has committed to plastics recycling. The project proposal, as it now stands, incorporates the recommendations made in Draft EIS.

The proposed incinerator is not new capacity; it is replacement capacity. The theoretical waste processing capability of the currently operating Mayo incinerator units, when new, was 4,100 pounds per hour. Under a February 1989 stipulation agreement with the MPCA, these currently operating units were de-rated to a combined throughput of approximately 1600 pounds per hour. The proposed facility would be a 2,000 pound per hour unit. This represents essentially replacement capacity; it is not new capacity in Olmsted County.

The results of a waste stream analysis conducted by CDM during a week in June of 1991, reported a waste generation rate of about 10 tons per day (70 tons per week) of burnable waste (See Table 7-5 of the Draft EIS). Given the proposed operating schedule, the incinerator would need to incinerate about 13 tons a day to handle 70 tons per week.

When the plastics recovery system is operational, it is anticipated that the waste stream would be reduced by about 2.5 tons per day. The net effect would be a capacity need of about 10 tons per day, assuming the same operating schedule.

According to Mayo, the next smaller incinerator size available from the vendor is a 1,600 pound per hour unit. This size would allow for little operating flexibility or room for growth and would not result in significant capital cost savings. The smaller unit operating 16 hours a day could incinerate about 13 tons per day.

Incinerators generally operate at about 80 percent of the maximum operating capacity due to down time for repairs and routine maintenance activities. In addition, if the equipment to remove plastic from the general and sterilized infectious waste stream weren't operating because of maintenance and repair needs, problems marketing the recovered plastic, or equipment design problems, the smaller unit may not provide enough capacity.

Even with increased efforts in waste reduction and recycling, some growth in Mayo's waste stream over the expected life of the incinerator must be assumed. Thirty years ago, Mayo was able to incinerate all of its waste in a batch fed 500 pound per hour incinerator. Today it proposes to construct an incinerator four times that size to meet its needs long term. With changing medical

technology, growth within Mayo, and changes in federal, state and local regulations, it is impossible to precisely answer the question of waste disposal capacity needs in the the year 2010. For planning purposes, it is prudent to assume that the non-recyclable waste stream will increase.

The proposed size would allow Mayo to compensate for times when the facility is not operating due to scheduled or unscheduled maintenance. The incinerator could be operated three shifts until the "catch-up" is complete.

The proposed size is adequate to meet Mayo's needs as well as those of a few Rochester hospitals and other small generators within Olmsted and Dodge counties. It is not adequate to meet the medical waste disposal needs of the region. Mayo has stated in writing that it does not intend to provide services to non-Mayo customers beyond the Olmsted/Dodge geographic boundary (see response to comment I.18).

Finally, the waste stream analysis, while providing valuable information, represents a snap-shot in time and the waste generation quantities reported should not be used alone for planning incinerator capacity needs. Planned expansion in research and health care services have to be considered. Changes in medical technology as well as changes in regulations that may effect the waste stream quantity and composition must be expected and planned for.

The proposer believes that the smaller sized incinerator may not take care of its current capacity needs and would allow for little or no operating flexibility or growth potential.

2. **Comment:** The incinerator should be properly sized to operate full-time. (2, 17)

Response: Operating a smaller unit for 24 hours a day would not reduce waste quantities burned or emissions from the incinerator. By down-sizing the unit to operate 24 hours per day without an accompanying reduction in the amount waste incinerated, air emissions and ash generation would not decrease; they would be unchanged. The facility has been designed to operate 16 hours a day, five and one-half days each week. This would allow Mayo to dispose of 24 hours worth of unrecyclable wastes in 16 hours. Down-sizing would simply result in disposing of 24 hours of waste in 24 hours. The issue of down-sizing is discussed in section 6.5 of the Draft EIS.

It should be pointed out that it is impossible to operate an incinerator 24 hour per day every day 365 days per year. For design purposes, it is assumed that most facilities operate at 80 percent capacity because of down-time for maintenance and repairs.

A down-sized incinerator would inherently have a reduced ability to handle possible long term growth in waste stream volume, whether caused by planned increases in the numbers of patients, changes in the definitions of infectious waste, changes in procedures that affect waste generation, or other factors.

On a cost basis, a smaller unit would lower both capital and utility costs. Refractory damage may be less likely, since a continuously-operated unit would be subject to less thermal cycling. Also, continuous operation requires less auxiliary fuel.

On the other hand, the per-ton disposal costs may well be higher for a smaller incinerator. The decrease in incinerator size is not proportional to the decrease in capital cost; an incinerator half the size of the one being proposed does not cost half as much, it would cost more than half as much. An ironic consequence of down-sizing then is that the capital cost per ton of incineration capacity could possibly increase. This, in turn, raises the cost per ton of waste disposal.

Labor costs for operating the incinerator could be significantly higher because expanding the operating hours to 24 hours upon startup would require a larger staff to operate the facility and night shift operators would require a shift wage premium. This could also have a significant impact on per-ton disposal costs, since labor is a major component of these costs.

3. Comment: Concern was expressed about the adequacy of the proposed stack height. (A, B, 3, 9, 12, 13, 16, 30)

Response: This issue was addressed in section 4.3.7 of the Draft EIS. The stack height complies with regulations on Good Engineering Practices and has been approved by the Federal Aviation Administration.

As discussed in Section 2.1.5 of this document, Mayo has agreed to cone the stack, if necessary, to increase stack gas exit velocity, as recommended in Section 10, Mitigation Measures, of the Draft EIS. An increase in exit velocity would increase the effective stack height and lower ambient concentrations of sulfuric acid by improving dispersion.

4. Comment: Increasing stack height should not be necessary if carbon injection is used. (19)

Response: Section 2.3.10 of this document concludes that sulfuric acid emissions resulting in local concentrations exceeding the recommended levels are not expected and increasing the effective height of the stack through coning may not be necessary.

The effectiveness of activated carbon injection has been demonstrated for the removal of dioxins, mercury, and PCBs, as discussed in Section 10 of the Draft EIS. However, the MPCA staff is not aware of data indicating that it is also effective in removing sulfur dioxide from stack gases.

5. Comment: The pollution control equipment and stack should be sized so that only one burner can be operated at a time. (D, 8)

Response: The proposed facility now includes two steam autoclaves in lieu of one of the 25 ton per day incinerators originally proposed. The pollution control equipment and stack would be sized appropriately for one 25 ton per day burner.

6. Comment: What will the operating plan be if electrical power is lost? (D, 8, 15)

Response: The facility would have a backup generator capable of handing normal shut down activities. The electrical service extending to the facility would be underground and quite reliable because of its proximity to the airport.

7. **Comment:** Will waste be accepted from other than the Rochester Mayo Foundation and other Olmsted and Dodge County infectious waste generators. (12, 13, 16, 17)

Response: The Mayo Foundation has expressed no desire to provide disposal services to the non-Mayo Foundation medical community outside of Olmsted and Dodge Counties. The MPCA and Mayo would consider including language in Mayo's Air Emission permit restricting outside service to Olmsted and Dodge Counties exclusively.

Mayo may, however, offer very limited services to its clinics outside of Olmsted and Dodge counties. Cost effective medical waste disposal is available at all satellite clinics and hospitals, and medical waste disposal at Mayo-Rochester is currently not necessary. If it does become necessary, the volume of waste shipped would be quite small, in the hundreds of pounds per year range, according to Mayo.

8. **Comment:** Is radioactive waste going to be burned? (3)

Response: Low-level radioactive material usage and disposal by the Mayo Foundation is strictly regulated by the NRC. The Mayo Foundation is licensed by the NRC to dispose of low-level radioactive waste at its currently operating incinerator. Mayo would continue to dispose of low-level radioactive waste according to its NRC license and NRC regulations at the proposed facility. This issue is discussed in section 7.1.8 of the Draft EIS.

9. **Comment:** Why are different densities assumed for the general waste versus the red bag wastes? (6)

Response: According to HDR Engineering, the preparers of the information noted, the general waste would be compacted and thus more dense than red bag waste which would not be compacted.

10. **Comment:** The sum of all industrial waste water flows from the facility would be 5,678 gallons per day (gpd) not 5,688 gpd. (6)

Response: Please note that there was an additional error in the estimated volume of industrial waste water flows. There would be no discharge of ash quench water. The correct number is 3,566 gallons per day. (See Chapter 5: Draft EIS Errata)

11. **Comment:** How is gas composition determined from ash testing? (6)

Response: The word "ash" is a typographical error and should have been "flue gas". Section 4.3.11 of the Draft EIS: Proposed Facility Monitoring is corrected to read:

The Mayo Foundation anticipates that facility monitoring will occur during initial startup, as well as ongoing monitoring of operations, air emissions and ash characteristics.

Upon completion of initial start-up activities, the facility would undergo rigorous air emissions testing to demonstrate compliance with permit limitations, as well as to quantify emissions of pollutants for which no permit limitation might be set.

The Mayo Foundation anticipates the testing of ash flue gas during initial start-up to determine the concentrations of particulate matter, gas composition, trace metals, and dioxins and furans. The sampling program would be established during the development of an operating permit for the unit.

The ash would be tested to determine whether or not the ash has a characteristic of hazardous waste according to Minnesota hazardous waste rules. Both bottom and fly ash would be tested, separately and together.

The air emissions and operations of the incinerator units would be monitored by two means: continuous monitors and stack tests. Continuous monitors would be used to measure operating temperatures of the combustion chambers, heat exchangers, and the baghouse inlet. Continuous emission monitors would be used to monitor carbon monoxide, opacity, and possibly sulfur dioxide.

Stack testing for those pollutants which cannot be physically monitored continuously would be performed on a routine basis. Mercury emission testing is required by law to be performed every 90 days at incinerators which have mercury emission limits. Stack testing would be required at a minimum of once every 36 months for all pollutants with emission limits.

12. Comment: Incineration does not destroy the radioactive nuclides commonly found in medical waste. (15)

Response: Over time, all radioactive isotopes will decay into non-radioactive isotopes. Conditions of Mayo's NRC license and NRC regulations allow Mayo to hold for decay low-level radioactive materials with half-lives of less than 65 days.

Most of the combustible solids are stored for a period of up to 22 months prior to incineration to allow for decay of the radioactivity (some may be stored for a lesser period of time if their half-life is shorter). The waste is surveyed to determine that its radioactivity has decayed prior to incineration. The total radioisotopic activity incinerated shall in no case exceed the limits specified in the Code of Federal Regulations (CFR), Title 10, part 20.106.

Contaminated animal carcasses are held in cold storage for as long as practical to allow for decay of the radioactivity and incinerated. Carcasses containing long-lived low-level radioactive material are directly incinerated when regulatory limits will not be exceeded. Vials containing liquid scintillation cocktail with small amounts of low-level radioactivity are incinerated directly.

Low-level radioactive waste is incinerated with other waste and levels are reviewed through the waste inventory program in the Mayo Radiation Safety Office. Each month a waste disposal report is generated for review by the Radiation Safety Officer to ensure compliance with NRC regulations.

13. Comment: Worker safety and operator training were not mentioned in the Draft EIS. How will workers be protected from exposure to high levels of dioxins, furans, and heavy metals? (15, 17)

Response: Workers would not be exposed to high levels of dioxins, furans, and heavy metals. The only possible route of exposure for plant workers to low levels of those contaminants would be via ingestion, inhalation, or dermal absorption of ash.

The potential for exposure via these routes would be minimal. The incinerator would be equipped with an automatic and continuous bottom ash quenching and removal system. Ejected ash would fall from the bottom of the incinerator into the ash quench pit. Ash would be removed from the quench by a mechanism called an ash hoe. The ash hoe would intermittently reach into the ash pit and pull a load of ash up an inclined ramp that projects above the water level. Once the hoe is clear of the water it would stop, allowing water drained from the ash to be reused as ash quench make-up water. The removed ash would be dumped into an awaiting cart.

The fly ash from the scrubber residue is directed by a series of screw conveyors to a 24 cubic yard commercial roll-on/roll-off container which is parked inside the facility storage area. The bottom ash in the smaller containers would be moved with a fork lift and dumped into the roll-on/roll-off container which contains the scrubber residue.

The automatic ash system allows for a minimum of worker handling of ash. The possibility of dermal exposure to ash would therefore not be a significant concern. The ash would be wet and therefore not airborne. The possibility of inhalation or ingestion of ash would not be of significant concern. However, to minimize the potential further, according to Mayo, if staff did need to manually handle the ash, they would wear respiratory protection.

14. **Comment:** What is the cost of putting in the 1,000 feet of sewer and water lines? (18)

Response: According to the proposer, the cost of installing 1,000 feet of sewer and water lines would be \$55,000.

15. **Comment:** Will the wet mode be used any time the temperature is over 35°F? (22)

Response: The proposed facility would have an air-cooled, not a water-cooled condenser. There would be no "wet mode". The proposed Mayo incinerator would have a dry scrubber sorbent injection/fabric filter system with activated carbon injection. The flue gases are cooled in a boiler and used to generate saturated steam. Steam generated by the boiler would be directed to an air-cooled condenser. Unlike the more common cooling tower, no water vapor plume is formed by an air-cooled condenser. Icing and visibility problems would not therefore occur from the operation of the proposed incinerator.

16. **Comment:** What is the spill response plan (transportation spill response plan)? (22)

Response: The spill response plan is part of the MPCA's Infectious Waste Rules, part 7035.9120, subpart 6. It requires that transporters and facilities have spill kits available for use and lists appropriate contents, outlines response

procedures to spills, and outlines disinfection procedures for reusable containers and surface. The proposed facility must comply with all of these provisions.

Before transport to the proposed facility, sealed red bags would be placed into polyethylene carts with secure lids to prevent spillage. Sealed carts would then be placed into closed box trucks for transport to the incinerator. All trucks would have spill kits containing the items detailed in the Infectious Waste Rules. These kits are intended for smaller spills.

A larger transportation related spill would occur only in conjunction with a major traffic accident. In such an instance, a team of Mayo safety personnel would assume responsibility for decontaminating the site and recovering the waste for transfer to the incinerator facility.

III. Permits And Approvals Comments

1. **Comment:** An integrated solid waste management plan should be a part of the permit with concrete goals set to minimize waste. (17)

Response: Permit conditions must be enforceable; goals are not enforceable. Such permit conditions would therefore be ineffective.

MPCA staff believes that laws exist that strongly encourage solid waste managers to examine means of reducing, recycling or otherwise removing materials prior to incineration to reduce the quantity of potential hazardous components in the ash, as well as the overall quantity of ash. The proposed facility would be subject to these laws.

Minn. Stat. § 115A.97, subd. 6, requires that permit applications for waste combustors state how the applicant will "....achieve the goals in subdivision 1 of reducing the toxicity of incinerator ash....". Where subdivision 1 states that wastes combustors must be planned and managed to achieve to the maximum extent feasible and prudent: reduction of the toxicity of incinerator ash; reduction of the quantity of the incinerator ash; and reduction of the quantity of waste processing residuals that require disposal.

In addition, the soon to be proposed Standards of Performance for Waste Combustors (Minn. Rules 7005.0600 - 7005.0695 and 7001.1210 - 7001.1219) contain requirements for combustor permit applicants to describe the specific functions to be performed, the activities to be undertaken to remove or recycle wastes, the goals being: to reduce the total content and leachable level of contaminants in ash, including but not limited to lead and cadmium; to reduce the quantity of ash, including but not limited to the amount of noncombustibles in the waste stream; to reduce the amount of waste processing residuals that require disposal.

The MPCA staff believes that overall, there are very large incentives for waste combustors to try to reduce the quantity and level of toxic contaminants in ash as well as the nonprocessibles that result from the combustion of solid waste. If the level of toxicity can be reduced, long-term liabilities associated with the ash monofill can be better predicted and possibly reduced. Eliminating toxics that leach from the ash would reduce leachate treatment costs, thus

reducing ash disposal costs. This encourages solid waste managers to examine means of reducing, recycling, or otherwise removing materials prior to incineration to reduce the quantity of potential hazardous components in the ash, as well as the overall quantity of ash.

In addition, putting noncombustible waste through a waste combustor is undesirable because many noncombustibles (glass, metals, and concrete) are recyclable. There is no energy production or other environmental benefit to burning noncombustibles.

2. **Comment:** What happened to the law about not building within 10,000 feet of the airport and in an area with sink holes? (1)

Response: The MPCA staff is not familiar with building restrictions near airports and defer to the Federal Aviation Administration's (FAA) interpretation of its regulations regarding activities at and around the Rochester Airport. The FAA has approved construction of the facility at the proposed location.

Please see response to comment VI.1. regarding the existence of sink holes in the vicinity of the proposed site.

3. **Comment:** Wasn't a permit application submitted already? (6)

Response: The Air Emission and Solid Waste Facility Operating Permit application has been submitted but must be revised to reflect the current proposal and resubmitted to the MPCA Air Quality Division staff.

4. **Comment:** The permit should include monitoring requirements for stack emissions of PCBs, mercury, dioxins, and acid gases. Will this monitoring be done in accordance with 4.3.11 of the Draft EIS - Proposed Facility Monitoring? (17)

Response: A rigorous set of stack tests for the incinerator would be required once the incinerator is operating. These stack tests would include the air emissions of PCBs, mercury, dioxins, and acid gases. Once the facility is permitted, stack testing of these emissions will be required once every 90 days for mercury and at a minimum of once every 36 months for PCBs, dioxins, and acid gases.

5. **Comment:** What changes is Mayo planning to receive in its NRC permit? What will the new permit cover? How is it different than current operations? Will it allow Mayo to burn low-level radioactive waste for other facilities? (18)

Response: Mayo plans to seek an amendment to its Nuclear Regulatory Commission license to allow incineration of low-level radioactive materials at the proposed facility. No other changes in operations would be requested. No non-Mayo generated low-level radioactive waste would be accepted nor would it be allowed under the terms of the NRC license.

6. **Comment:** Mayo's NRC license number is 22-00519-03. (19)

Response: Comment noted.

7. **Comment:** Continuous monitoring of stack emissions for PCBs, mercury, dioxins and acid gases should not be necessary if the active carbon injection is used. (19)

Response: Stack testing will be required once every 90 days for mercury and at a minimum of once every 36 months for PCBs, dioxins, and acid gases. Continuous methods for monitoring PCBs, mercury, and dioxins do not currently exist.

8. **Comment:** What legal restrictions will Mayo be under which will prevent them from burning a capacity of 50 tons per day (tpd)? (30)

Response: Total capacity would be 25 tpd. The Air Emission Permit legally limits effective capacity.

9. **Comment:** What steps would Mayo have to go through to start using the second burner for additional capacity? (30)

Response: There would be just one incinerator. See Section 2.1 of this document.

IV. Project Alternatives Comments

1. **Comment:** An alternative technology should be used. (D, F, 7, 8, 9, 12, 14, 15, 18, 21, 24, 25, 29, 30)

Mayo has committed to installing two steam autoclaves in lieu of the second 25 ton per day incinerator. The technology would be used to sterilize infectious waste prior to recovering plastics for recycling and incineration of non-recyclable waste. See Section 2.1.1 of this document for a complete description of the proposed alternative technology.

2. **Comment:** Two non-burn technologies were identified as being acceptable for the Minnesota Healthcare Partners (MHP) hospital to site: microwaving and steam decontamination. It was also agreed that neither recommended technology was capable of handling human or animal anatomical remains or trace chemotherapy waste and that incineration currently was the only accepted means for treating such wastes, provided that sincere efforts are made to eliminate any unnecessary packaging and to reduce toxic materials in the packaging. The MHP would support the use of a combination of technologies to manage Mayo's waste. (7)

Response: No response required

3. **Comment:** What alternatives are being considered for approval by the state. (8)

Response: The alternatives being considered for use in the state include: autoclaving, microwaving, electro-thermal-deactivation (ETD), and chemical disinfection. All of these technologies went through the MPCA review and approval process and were determined to be feasible for the decontamination of infectious waste. Only one commercial facility is operating at this time in Minnesota that uses an alternative technology. The Browning-Ferris Industries Medical Waste Systems plant in St. Paul uses autoclaving to decontaminate infectious waste.

The review and approval process for off-site and/or commercial facilities is carried out by the MPCA Infectious Waste Program staff. The review and approval of on-site generator-owned and operated alternative technology proposals is carried out by the Minnesota Department of Health (MDH) Infectious Waste Program staff. Neither the MPCA nor the MDH have applications for other technologies under review at this time.

Steam sterilization (autoclaving) is a technology that has been approved for use in Minnesota. Mayo must submit a Management Plan to the MPCA Infectious Waste staff for approval of its proposed steam autoclave unit.

4. **Comment:** "I don't feel that reuse [of wastewater from chemical disinfection] is a realistic reuse option. (6)

Response: Reusing the wastewater from chemical disinfection is only experimental at this time. The reuse of waste water from a chemical disinfection process may not be a realistic option. MPCA staff is not aware of its being done anywhere.

5. **Comment:** A statement regarding the variety of types of plastics and recycling potential would help. (6)

Response: As described in Section 2.1 of this document, Mayo has committed to incorporating plastics recovery equipment into the proposed facility design. All types of plastic would be recovered from the waste stream for recycling. The following is a list of plastics likely to be found in Mayo's waste stream.

TABLE 1. PLASTICS COMMONLY FOUND IN MEDICAL WASTE STREAMS

Plastic Type	Waste Stream Item
Polypropylene	Drapes, Gown, Caps, Reinforced Scrub Towels, Bottles, Sterilization Wrap, Blood Tube, Syringe, Needle Sheath, Kidney Basins, Biohazard Bag, Pads, Swabs, Irrigation Bags, Suction Canister, Miscellaneous Plastic Equipment, Culture Transport Tubes, Ear Cones, Filters, Pipettes, Specimen Cups, Needle Sheaths
Polystyrene	Cuvettes, Blood Tube, Sharps Containers, Wrappers, Suction Canister, Culture Transport Tubes, Drainage Tubes, Specimen Cups, Petri Dishes
Polyethylene	Cuvettes, Caps, Tubing, Sterilization Wrap, Biohazard Bag, Pads, Irrigation Bags, Wrapper (e.g., Blister Packs), Suction Canister, Culture Transport Tubes, Drainage Tubes, Filters, Surgical Gloves, Pipettes, Specimen Cups, IV Bags, Grounding Pads
Polyvinyl Chloride	I.D. Cards, Tubing, Oxygen Mixers, IV Tubing, IV Bag Control Valves, IV Bag Clear Drip Chambers, Wire Insulation, Cauterizers, Suction Catheters
Polyurethane	Foam Sponges, Electrodes

Source: Torkelson, P. 1992. Minnesota Pollution Control Agency Fall 1990 Medical Waste Sort.

6. **Comment:** Why the contradiction as to whether red-bag waste is double or single bagged? (6)

Response: Typically, surgical waste is double bagged and all other waste is single bagged.

7. **Comment:** Table 6-2 of the Draft EIS listed capital cost for incineration at one million dollars. This conflicts with the \$10.6 million cost given in Section 9.3.2. (18)

Response: The total 1992 project cost estimate, \$10.6 million, was presented in section 9.3.2 of the Draft EIS. This estimate included the incinerators, the stack emission control equipment, ancillary equipment, the building, site work, the well, engineering design, and permitting and environmental review costs.

Table 6-2 of the Draft EIS presented the cost estimate for the incinerator units only. All of the cost estimates provided in Table 6-2 represent the vendor quoted prices for the basic equipment only; none include the cost of emission control equipment, ancillary equipment, the building, site work, or any of other project costs noted above.

The one million dollar estimate represents a 1987 estimate. The 1992 estimate is \$1.5 million.

8. **Comment:** Low level sealed source radioactive wastes are buried at a licensed radioactive waste facility out of state or returned to the manufacturer for disposal (Section 6.3.3 of Draft EIS). (19)

Response: Comment noted.

9. **Comment:** MDH agrees with the conclusions concerning alternatives; that other technologies for handling infectious waste are not applicable for treatment of radioactive waste, chemotherapy waste, pathological waste or large animal carcasses. The alternatives are means to render the waste non-infectious but are not alternatives to final disposal, i.e., incineration and landfilling. The methods are an additional step, with attendant occupational health risks and added health care costs for waste disposal. (20)

Response: No response required.

V. Solid Waste Generation And Management Comments

1. **Comment:** The proposed facility would reduce incentives to recycling and reduce waste. (D, 8)

Response: The MPCA has no indication that the proposed incinerator would reduce incentives to recycle and reduce. The proposed incinerator is half the capacity of what was originally proposed in 1989, which reflects, in part, the projected reduction in waste due to on-going recycling and waste reduction programs. The proposal to include plastics recycling to recover plastic from the general and sterilized infectious waste stream speaks towards Mayo's commitment to recycling. See response to comment number III.1.

2. **Comment:** Waste segregation, reduction, reuse, and recycling should be the center of the waste management program. (6, 25, 29)

Response: Mayo's stated waste management strategy, in order of importance is: 1) waste minimization; 2) recycling; 3) incineration; and 4) landfilling. Chapter 6 of the Draft EIS described some of Mayo's recycling and waste minimization efforts. In addition, please refer to the responses to comments III.1, V.6, and VI.5, as well as to the description of the plastics recovery proposal in Section 2.1.2 of this document, for further discussion regarding waste segregation, reduction, reuse, and recycling.

3. **Comment:** Concern was expressed over ash disposal. Do bottom ash and fly ash have to be managed separately? The cost of ash disposal should be examined. (2, 30)

Response: The bottom ash and fly ash do not have to be managed separately. The proposed facility design however does incorporate the option to manage bottom and fly ash separately if there is a desire to do so in the future. The disposal of ash generated by the proposed incinerator would be subject to regulation under the recently adopted ash rules (Minn. Rules pts. 7001.0040 to 7035.2915).

Ash would be disposed at the proposed ash monofill at the Olmsted County-Kalmar landfill. Olmsted County, through the planning and approval process, has included Mayo's ash in its landfill permit. The landfill would have a double composite liner (two layers of synthetic liner and clay barriers), leachate collection and leak detection systems, and an environmental monitoring system. The monofill would have a design operating life of more than 40 years. The design complies with the most protective design described in the ash rules and would be the most protective in the state.

The cost of ash disposal is currently \$75.00 per ton and is expected to remain at about this level at the Olmsted-Kalmar ash monofill. The exact pricing scheme will not be developed until the Olmsted-Kalmar ash monofill has been constructed and final costs known.

4. **Comment:** Is there any way to prevent fugitive emissions from the fly ash?
(6)

Response: Fly ash would be deposited into the same container as the moist bottom ash. This mixing throughout the day should effectively reduce fugitive emissions from the fly ash.

5. **Comment:** The waste stream analysis results with regards to waste food seems too low. (D, 8)

Response: Camp Dresser and McKee estimated that there was an average of 322 pounds per day of waste food in the waste stream during the seven-day waste stream analysis conducted under contract with the MPCA. We have no data to indicate that this is not a reasonable volume to expect. The number is consistent with the 1988 HDR Engineering waste study which estimated 311 pounds of food waste.

There are many dining establishments within easy range of the hospital and clinic for visitors. Most of the waste food is likely from patient meals. The Mayo Foundation has about 1,600 beds and 322 pounds per day of waste food does not seem implausible.

6. **Comment:** The EIS should thoroughly address source separation for the hospital waste, excluding the infectious waste stream. (17)

Response: The recyclable waste materials that are separated at the source are described in Section 6.3 of the Draft EIS. Mayo's battery collection program is described in response to comment VI.5. Also see response to comment III.1 for a discussion on permit applicant requirements regarding the disclosure of steps that would be taken to remove or recycle wastes from the waste stream, with the goal being to reduce the quantity and toxicity of ash.

7. **Comment:** Storage space should be provided within the new incinerator facility for temporary holding of recyclable materials. (17)

Response: When the facility begins operations, only plastics recovery and plastic storage would be within the facility. All other recycling activities and storage would continue at other existing Mayo facilities.

8. **Comment:** The potential recyclable materials and their quantities in the waste stream must be known. (17)

Response: Mayo records indicate that it is currently recycling 32 percent of its general waste stream and about 24 percent of its total waste stream (general, nonburnable, and red-bag waste). If plastics recovery is successful, its estimated that about another 25 percent of the waste stream would be recycled.

9. **Comment:** How will the Bloodborne Pathogen Rules effect the amount of infectious waste coming from Federal Medical Center, Olmsted Community Hospital and Olmsted Medical Group. (17)

Response: The Bloodborne Pathogen Rules could increase the amount of waste that would have to be segregated and handled as regulated infectious waste at some hospitals. This is primarily due to the definition that includes dried, caked, and flaked blood. Mayo does not anticipate that the OSHA standard will markedly affect volumes of infectious waste which may go to the Mayo incinerator. In the case of gauze or bandages, both are currently red-bagged. There are few instances where "items caked with dried blood or other potentially infectious materials capable of being release" may contribute to the infectious waste stream and in such cases the volumes of theses materials would not significantly affect waste volumes.

10. **Comment:** The comparisons, on p. 7-18 of the Draft EIS, are not necessarily what would occur because, although both HERC and the proposed facility use dry sorbent injection scrubbers, the medical waste stream and municipal waste stream vary widely. (17)

Response: Although the capacity of the Hennepin Energy Resource Corporation (HERC) facility is 48 times greater than the proposed facility and the plastics content of the waste streams may differ, the HERC pollution control equipment most closely mirrors that which would be in place at the Mayo facility.

The amount of fly ash generated (as a percent of total ash generation) and the composition of the fly ash would be expected to be similar to that generated by the proposed facility.

The ash test data from HERC was used to predict dioxin/furan concentrations in bottom and fly ash generated from the use of dry sorbent injection and fabric filters at the proposed medical waste incinerator.

No ash test data has been available during the conduct of the EIS that quantifies the concentration of dioxins/furans in both the bottom and fly ash from a medical waste incinerator with DSI/FF. Test data that quantifies bottom and fly ash separately is available from the HERC municipal waste combustor.

The mechanisms controlling the generation of dioxins/furans at a medical waste incinerator are the same as those controlling dioxin/furan generation at a municipal waste combustor. Therefore, the data from HERC was evaluated in order to predict the fate and quantity of dioxins in fly ash from a medical waste incinerator.

The HERC facility uses scrubbing primarily to control sulfur dioxide emissions, while at the proposed Mayo facility, scrubbing would be used to control hydrogen chloride emissions. Lime addition is used in both instances to control acid gas emissions. Sulfur dioxide however is more difficult to remove from the flue gas stream than hydrogen chloride, and requires the addition of more lime. Therefore, the amount of fly ash (as a percent of total ash production) produced at HERC would likely be at least as much as that that would be produced at the proposed facility. The ratio of fly ash to bottom ash generated at HERC can be used to adequately predict the quantities of ash generated at the proposed medical waste incinerator.

Data from HERC shows that the dioxin/furan concentrations in the fly ash will be higher than the concentrations in the bottom ash, at a ratio of about 10:1 (see table 7-9 of the Draft EIS). Bottom ash data from Mayo's currently operating incinerator units indicates dioxin concentrations, in toxic equivalents, of .041 in the larger unit and .016 in the smaller unit (Draft EIS Technical Work Paper 6: Ash Characteristics, Handling, and Disposal. Table 7). Using the relationship of the concentration of fly ash and bottom ash at HERC, the estimated combined ash dioxin concentration ranges from:

$$.85(.016) + .15(.016 * 10) = .038 \text{ parts per billion (ppb)}$$

to

$$.85(.041) + .15(.041 * 10) = .096 \text{ ppb}$$

This concentration is far below the 1 ppb level set by the Center of Disease Control as acceptable in soils. Its also important to note that analytical data indicates that, in an ash monofill environment, dioxin does not readily leach out.

11. **Comment:** Table 7-3 should be reported in REM as well as pounds. (18)

Note: The commenter uses the term "REM" in several questions. REM, or Roentgen Equivalent Man, is a unit used to indicate human biologic dose as a result of exposure to ionizing radiation. The questions where REM is used seem to be inquiring about the amount of radioactive material being incinerated, generated, emitted and in ash and air. REM is not the appropriate unit for this. The unit used to indicate the amount (activity) of radioactive materials is the Curie and the sub-units of millicurie (mCi) and microcurie (uCi). All responses are based on the assumption that where REM is used, activity in millicuries was intended.

Response: MPCA staff assumes that the commenter wants to know the amount of low-level radioactive material incinerated. Table 7-3 of the Draft EIS is intended to detail the weight of each waste stream by day for a typical week. Table 7-7 of the Draft EIS is intended to detail the volume and weight of

low-level radioactive waste disposed during calendar year 1990. Indication of radioactive material activity would not be appropriate for these tables. Please refer to table 7-8 of the Draft EIS to find that 207.356 mCi of all isotopes were incinerated during a representative 12 month period, May 90 to May 91.

12. **Comment:** There is no analysis of how much radioactive waste with a half-life greater than 65 days would be held "as long as practical and incinerated", as stated in section 7.2.2.8. Which radioisotopes does this include? How many REM will this emit? How does that effect air and ash levels? What is practical? Where will it be stored? Why isn't it held for the recommended 10 half lives to be at negligible levels? (18)

Response: To hold isotopes for decay "as long as practical" means just that. Several factors go into it, including: the half life, the activity, the volume, the generation rate, the resources available, NRC regulations, and good health physics practice.

The isotopes with half-lives greater than 65 days include but are not limited to C-14, H-3, Co-57, Ca-45, Na-22, Sc-46, and Sn-113. These have half lives ranging from 84 days to 5730 years. Storing these for between 840 days and 57,300 years is not practical and is not necessary to stay well below the maximum permissible concentrations (MPC) for these isotopes. In general, Mayo does store isotopes with lesser half lives for 10 half lives. That is practical.

Levels of radioactivity in the air and ash are monitored and kept below the MPC found in 10 CFR 20, in accordance with Mayo's NRC permit.

Storage of low-level radioactive decay is in a secured facility at Institute Hills Farm. The practice is to store waste as long as necessary to permit disposal within the regulations. This is in compliance with both NRC regulations and license conditions.

13. **Comment:** How many REM are now generated? How is it currently treated (on-site, shipped)? How many REM will be burned in new burner? How much shipped off-site? How may REM will be in air and ash emissions? (18)

Response: The amount of radioactive material generated varies due to workload. Generally, 2,000 mCi to 3,000 mCi would be expected during a 12 month period.

Storage for decay is the treatment for low-level radioactive waste prior to incineration. Sealed sources used in medical procedures and research are returned to the manufacturer after use.

The amount of the radioactive material incinerated is approximately 10 percent of that which is generated or 200 mCi to 300 mCi. This is due to decay in storage.

The only radioactive materials shipped off-site for disposal are the used sealed sources. These are returned to the manufacturers. None of the incinerable low-level radioactive waste is shipped off-site.

The amount of radioactive materials in air and ash are maintained at concentrations below the MPC for each isotope, as listed in 10 CFR 20.

The Draft EIS indicated that the amount of low-level radioactive waste incinerated during the period May 1990 to May 1991 constituted 23 percent of the allowable amount under the Mayo Foundation's NRC license.

Based on the percent of radioactivity retained in ash and the percent of radioactivity that is emitted in stack gas, of the 207.356 mCi incinerated during the period May 1990 to May 1991, 193.69 mCi would have been emitted in stack gas and 13.67 would have been retained in the ash over the entire year. This represents about one-quarter of the annual limit for activity in stack gas and about one-third of the annual limit for activity in ash. The limits are contained in 10 CFR 20. The activity in stack gas was due almost entirely to the Iodine-25 and the activity in ash was due primarily to Sc-36, Sr-85, and Sn-113. Mayo reports that by working with individual researchers, it has significantly reduced the use of Sc-46, Sr-85, Sn-113, and Co-57 in research studies as compared to the activities reported on table 7-8 of the Draft EIS. The isotopes substituted for these have shorter half-lives and can be decayed to even lower levels prior to disposal.

14. **Comment:** The amount of plastics making up the red bag waste stream may be higher than 34 percent because some materials may have been incorrectly classified as paper. (F, 18)

Response: MPCA staff believes the waste stream analysis provides sufficient information for planning purposes and facility design.

The average of 33.7 percent plastics reported on table 7-4 of the Draft EIS was estimated from visual observation of red bag contents and represents a **volume** rather than a weight. Thirty-four percent is an average of: St. Marys Hospital with 35.7 percent, Methodist Hospital with 44.5 percent, and the Mayo Clinic with 20.9 percent. The sampling methodology is described in Section 7.1.1.2 of the Draft EIS.

During the visual observation surgical drapes and gowns were classified as paper when in fact they may be from 45 percent to 100 percent plastic. The volume of the plastic component of the waste stream may therefore be higher than estimated.

It is difficult to conclude whether 33.7 percent by **volume** is too low. Very few item-by-item waste sorts have been conducted for infectious waste streams. Estimates found in the literature range from 20 to 30 percent plastic but the values were generally based on little data. The MPCA conducted waste sorts at three small (29 to 67 bed) non-metropolitan hospitals and found an average of about 45 percent plastics by **weight** in the medical waste streams. The Mayo Foundation includes St. Marys Hospital, Methodist Hospital, and the Mayo Clinic. It has 1600 beds and provides a much wider variety of medical services than the three non-metropolitan hospitals that were included in the MPCA study. Again, it is difficult to conclude whether or not the volume estimate is too low.

15. **Comment:** No data is given to substantiate assumptions made about the toxicity of ash. What supports the claim that increased scrubber efficiency will not "significantly increase the toxicity of the combined ash"? No data given to support the assertion that "ash from the proposed combustor is expected to be below MLCL's". (18)

Response: Tables A and B below show data for total composition concentrations for bottom, fly, and combined ash from a metropolitan mass-burn MSW incinerator with a dry scrubber system (technology similar to that proposed for the Mayo combustor). The combined ash from the mass burn facility has a 15 percent fly ash composition which is similar to the maximum expected from the proposed facility.

The concern is that the fly ash would have high concentrations of metals and would therefore raise the toxicity level of the combined ash. The data indicates that combined ash concentrations were: increased from the bottom ash concentrations with the addition of fly ash for arsenic, cadmium, selenium, zinc, silver, and mercury; but lowered by the addition of fly ash for boron, chromium, copper, manganese, and nickel. Tin, barium, and lead exhibited both an increase and decrease in total composition concentrations from the bottom ash concentrations with the addition of fly ash.

Tables C through F show two quarters of Method 1312 Synthetic Acid Rain Leach Test data from two incinerators that have dry scrubber systems. One is a mass-burn facility and the other is a refuse derived fuel (RDF) burning facility. The mass-burn facility has fly ash making up 15 percent of the total ash. RDF facility has a fly ash concentration of approximately 35 percent. Both facilities are much larger than the proposed facility; the mass-burn facility is 48 times larger and the RDF facility is 43 times larger.

The tables show that the bottom ash, fly ash, and combined ash leach test data are all well below the maximum leachable contaminant levels (MLCL) contained in the Permanent Rules Relating to Ash Management.

Data from these facilities is the best approximation available to MPCA staff to evaluate the potential contaminant levels in ash from the proposed facility. Even with the addition activated carbon injection technology and the resulting increase in the removal efficiency of pollutants from the stack gases, ash from the proposed facility is expected to be less than the MLCLs.

It should be noted that a mass-burn facility is expected to have much higher concentrations of metals in the waste stream than a medical waste incinerator due to the nature of wastes that each handles.

The proposed design of the Olmsted-Kalmar ash monofill is such that according to the ash rules, it will be able to accept ash that exceeds the MLCL, but cannot except ash which exceeds the toxicity levels described in the Minnesota hazardous waste rules. Even if ash from the proposed facility or the Olmsted County incinerator were to exceed one or more of the MLCLs it would not exceed the hazardous waste criteria and could therefore still be disposed in the Olmsted-Kalmar ash monofill.

TABLE A

MASS BURN FACILITY
 DRY SCRUBBER
 2ND QUARTER
 (April 16-29, 1990)

Total Ash Composition

<u>Parameter</u>	<u>Bottom Ash</u> (mg/l)	<u>Fly Ash</u> (mg/l)	<u>Combined Ash</u> (mg/l)
Arsenic	<1.2	26	4.9
Barium	82	220	102.7
Boron	328	103	294.3
Cadmium	5.7	115	22.1 ✓
Chromium	22	20	21.7
Copper	1173	285	1039.8
Lead	843	1200	896.6 ✓
Manganese	313	188	294.3
Mercury	1.1	32	5.7
Nickel	37	12	33.3
Selenium	1.6	3.0	1.8
Silver	<.075	.5	.14
Tin	23	230	54.1
Zinc	2900	5900	3350

Note: Concentrations are mean values (mg/l)

TABLE B

MASS BURN FACILITY
 DRY SCRUBBER
 3ND QUARTER
 (August 7-20, 1990)

Total Ash Composition

<u>Parameter</u>	<u>Bottom Ash</u> (mg/l)	<u>Fly Ash</u> (mg/l)	<u>Combined Ash</u> (mg/l)
Arsenic	19	32	21
Barium	453	118	402.8
Boron	127	86	120.9
Cadmium	9	103	23.1
Chromium	27	17	25.5
Copper	1230	258	1048.1
Lead	1225	1000	1191.3
Manganese	415	175	379
Mercury	.4	31	5
Nickel	96	13	83.6
Selenium	<3.6	<4.8	3.8
Silver	.4	.4	.4
Tin	59	193	79.1
Zinc	2225	4425	2555

Note: Concentrations are mean values (mg/l)

TABLE C

REFUSE DERIVED FUEL FACILITY
 DRY SCRUBBER
 2ND QUARTER
 (March 15-30, 1990)

1312 Leach Test

<u>Parameter</u>	<u>MLCL</u> (mg/l)	<u>Bottom Ash</u> (mg/l)	<u>Fly Ash</u> (mg/l)	<u>Combined Ash</u> (mg/l)
Arsenic	750	.100	.100	<.010
Barium	30,000	.300	2.767	.680
Boron	9,000	.050	.360	<.047
Cadmium	60	<.010	<.010	<.010
Chromium	450	<.010	<.010	<.010
Copper	15,000	.077	.017	<.010
Lead	300	.147	13	<.100
Manganese	9,000	<.010	<.010	<.010
Mercury	30	<.002	<.002	<.002
Nickel	2,100	.017	<.010	<.010
Selenium	300	<.010	<.010	<.100
Silver	300	<.010	<.010	<.010
Tin	60,000	N.T.	N.T.	N.T.
Zinc	21,000	.017	2.633	.010

N.T. = Not Tested

N.D. = Not Detected

Note: Concentrations are mean values (mg/l)

TABLE D

MASS BURN FACILITY
 DRY SCRUBBER
 2ND QUARTER
 (April 16-29, 1990)

1312 Leach Test

<u>Parameter</u>	<u>MLCL</u> (mg/l)	<u>Bottom Ash</u> (mg/l)	<u>Fly Ash</u> (mg/l)	<u>Combined Ash</u> (mg/l)
Arsenic	750	N.D.	<.050	<.050
Barium	30,000	.186	.982	1.120
Boron	9,000	.084	.222	.024
Cadmium	60	<.002	<.002	<.002
Chromium	450	.0052	.031	<.005
Copper	15,000	.038	.046	.266
Lead	300	.045	9.640	6.600
Manganese	9,000	.0018	.002	.0014
Mercury	30	.0002	.115	.0003
Nickel	2,100	<.002	<.002	.0026
Selenium	300	.050	<.050	<.050
Silver	300	N.D.	.0058	.0074
Tin	60,000	N.T.	N.T.	N.T.
Zinc	21,000	.028	2.50	1.860

N.T. = Not Tested

N.D. = Not Detected

Note: Concentrations are mean values (mg/l)

TABLE E

REFUSE DERIVED FUEL FACILITY
 DRY SCRUBBER
 3RD QUARTER
 (July 16-29, 1990)

1312 Leach Test

<u>Parameter</u>	<u>MLCL</u> (mg/l)	<u>Bottom Ash</u> (mg/l)	<u>Fly Ash</u> (mg/l)	<u>Combined Ash</u> (mg/l)
Arsenic	750	<.010	.018	.150
Barium	30,000	.550	1.317	1.383
Boron	9,000	.052	.102	.053
Cadmium	60	<.001	<.001	<.001
Chromium	450	.010	.028	<.010
Copper	15,000	.125	<.010	<.010
Lead	300	.065	.548	.0062
Manganese	9,000	<.010	<.010	<.010
Mercury	30	<.0002	<.0002	<.0002
Nickel	2,100	<.010	<.010	<.010
Selenium	300	<.005	.069	.020
Silver	300	<.010	<.010	<.010
Tin	60,000	N.T.	N.T.	N.T.
Zinc	21,000	.057	.202	.033

N.T. = Not Tested

N.D. = Not Detected

Note: Concentrations are mean values (mg/l)

TABLE F

MASS BURN FACILITY
 DRY SCRUBBER
 3RD QUARTER
 (August 7-20, 1990)

1312 Leach Test

<u>Parameter</u>	<u>MLCL</u> (mg/l)	<u>Bottom Ash</u> (mg/l)	<u>Fly Ash</u> (mg/l)	<u>Combined Ash</u> (mg/l)
Arsenic	750	<.050	<.050	<.050
Barium	30,000	.326	.728	.874
Boron	9,000	.128	.128	.0088
Cadmium	60	<.002	.002	<.002
Chromium	450	.0056	.033	<.005
Copper	15,000	.170	.059	.304
Lead	300	.0304	3.540	6.200
Manganese	9,000	<.001	<.001	<.001
Mercury	30	.0003	.078	.0004
Nickel	2,100	.0026	.003	<.002
Selenium	300	N.D.	N.D.	N.D.
Silver	300	.0034	.0062	<.003
Tin	60,000	N.T.	N.T.	N.T.
Zinc	21,000	.028	.550	1.008

N.T. = Not Tested

N.D. = Not Detected

Note: Concentrations are mean values (mg/l)

16. **Comment:** Plastics should not be burnt. (30)

Response: See Section 2.1.2 for a description of the plastic recycling proposal.

VI. Environmental Impacts Comments

1. **Comment:** Concern was expressed over the potential existence of sink holes and abandoned wells in the area of the "plume". (D, 8, 5, 30)

Response: Staff assumes the concern is regarding fallout from the incinerator and the potential for ground water contamination from the fallout.

Contaminants within the "plume" (the area of fallout) would in general, not be mobile; they would not leach readily from the soil. In addition, flue gas would be cleansed of most pollutants by the pollution control devices in the incinerator. The resulting fallout would then be quite low.

The probability of sinkhole development ranges from low to low-medium in the area of the plume according to the Minnesota Geological Society's (MGS) Geologic Atlas of Olmsted County. There are no areas of moderate or high probability or karst topography within the plume area.

A comparison between a MGS map of known sink holes and deposition plume maps revealed minimal intersection of known sinkholes with predicted contaminant deposition. No sinkholes were referenced in the area of the trace metals plume (Figure 5.2 in the Draft EIS Technical Work Paper 4: Unitized Mass-Weighted Deposition Rate Isopleths). The semi-volatile plume (Figure 5.3 in Draft EIS Technical Work Paper 4: Unitized Surface-Area-Weighted Deposition Rate₂ Isopleths) intersected known sinkholes only within the 0.01 gram/meter²/year isopleth, the lowest deposition rate that was mapped.

Regarding abandoned wells, again because of the low level of contaminant fallout and the general immobility of the contaminants in soil, ground water contamination via abandoned wells is unlikely. Properly abandoned wells would not be accessible to contaminants.

A review of available data bases maintained by the MGS, the MDH, and Olmsted County Health Department yielded no information on the location of potential improperly abandoned wells. Olmsted County Health Department reportedly will be conducting a well inventory during the summer of 1992. Improperly abandoned wells can then be located and properly abandoned.

Given the above information, staff believes that ground water would not be impacted by fallout from the proposed incinerator.

2. **Comment:** Concern was expressed over the potential cumulative effect of the proposed incinerator and the current Rochester Wastewater Treatment Plant sludge spreading activities on land surrounding the airport. (3, 12, 13)

Response: This issue is discussed in section 8.3.2.4 of the Draft EIS. The following is an excerpt from the Draft EIS:

An acid deposition analysis was conducted to evaluate the increase in the acidity of rain water, due to emissions from the proposed incinerator, and the resultant potential to leach out metals from the Rochester Wastewater Treatment Facility sludge application site. The proposed incinerator is expected to emit hydrogen chloride and sulfuric acid. The pH calculations for acid gas deposition indicate that the background precipitation pH value of 5.0 could decrease 0.08 pH increments. This small decrease in pH due to acid gas wash out resulting from the operation of the proposed incinerator would be within the range of normal rainfall. Because predicted acid gas pH level would not significantly decrease the background precipitation pH level, it is unlikely that an increase in leaching of pollutants from the nearby sludge application site would occur.

A complete description of the analysis is contained in Appendix B of Draft EIS Technical Work Paper 3: Cumulative Impact on Nearby Receptors.

3. **Comment:** Concern was expressed over the potential for surface water contamination. (3)

Response: Wastes would arrive at the facility in covered vehicles or in containers and would not come in contact with rainwater. All other wastewater both sanitary and industrial would either be discharged to the sewer system or treated and used as ash quench make-up water, and would have no impact on surface water quality.

The commenter questioned the potential for the creek that his cows drink from, that is located one mile southeast of the proposed facility site, to become contaminated from deposition of pollutants emitted by the proposed facility. As discussed in section 2.4 of this document, estimated mercury and PCB levels in nearby surface water may exceed the Minnesota Water Quality Criteria for aquatic organisms.

The basis on which WQC the standards for mercury and PCB were established was the risk to humans resulting from the consumption of fish caught in contaminated water. Mercury and PCB bio-accumulate or collect in fish tissue. The concentration of these compounds in fish tissue is higher than the concentration in the water in which they live. Humans eating the fish take in a higher doses of contaminants than they would take in from drinking the water. Because of the bio-accumulation effect, the WQC standard for mercury is much more restrictive than drinking water standards. The estimated concentration of mercury and PCB in surface water resulting from the operation of the proposed facility is far less than the maximum acceptable according to the drinking water standards for those compounds.

4. **Comment:** What is the basis for the mercury emissions contributions from the various sources in Olmsted County? (6)

Response: This was thoroughly described in the Draft EIS Technical Work Paper (TWP) 3: Cumulative Impact on Nearby Receptors, Appendix A. Emission data has been revised as discussed in Section 2.2 of this document. Appendix A of TWP 3 has been revised accordingly and is included as Appendix C to this document. Appendix C describes the basis for the mercury emissions contributions.

5. Comment: Are there battery recycling programs at any of the incinerators?
(6)

Response: Of the two major incinerators, OWEF and Mayo's currently operating incinerator at Institute Hills Farm, that were included in the review of mercury emissions, one has battery recycling and one does not.

Mayo practices source separation of batteries. No batteries are incinerated: all types of batteries are removed from the waste stream. Lead acid batteries are recycled. Household batteries are treated as hazardous waste; they are collected and disposed at a hazardous waste landfill. All mercury containing batteries are returned to the manufacturer. Nickel-cadmium batteries are returned to the manufacturer or recycled.

Olmsted County does not have a battery collection and recycling program. Batteries are not removed from the waste stream before incineration at OWEF.

Minnesota source reduction legislation limits the amount of mercury that can be in batteries sold in the state. It also requires the collection of rechargeable batteries by manufacturers and restricts the sale of some types of batteries.

The County terminated its battery collection program after the legislation passed, believing that the legislative mandates would be a much more effective means of source reduction than the collection program had been.

The OWEF will be the subject of an U.S. Environmental Protection Agency study to evaluate the effect of Minnesota's source reduction legislation on emission levels and ash residues at municipal waste combustors.

A preliminary proposal to assess the impact of these laws on metals emissions and ash residues from OWEF includes: conducting a waste sort, estimating the mercury content of batteries found during the sort, analyzing flue gas, analyzing bottom and fly ash, and assessing the type of batteries sold in county. No schedule for the study has been adopted.

6. Comment: Is it use of or disposal of electric lamps that generates Hg emissions? Or is it electrical generation result in Hg emissions? (6)

Response: It is the disposal of electric lamps. The following is excerpted from Appendix A of Technical Work Paper 3: Cumulative Impacts on Nearby Receptors (revised and presented as Appendix C to this document):

The US Bureau of Mines reports that in 1988, 65,630 pounds of mercury were used in the manufacture of lamps in the United States. It is assumed that half of the mercury was used to manufacture indoor lamps, and that 30 percent of the mercury is lost to the atmosphere during disposal. (WDNR) The other half is assumed to be used for outdoor lighting, and that 20 percent is lost to the atmosphere during disposal (WDNR).

Emissions are then adjusted based on Minnesota's population (1.75 percent of the national population) and Olmsted County's population. Mercury emissions from [the disposal of] electric lamps is estimated at seven pounds per year.

7. **Comment:** pg. 8-24 Mercury emission rate was calculated for the facility .0012 g/sec. However, page 8-23 states the emission rate of .0006 g/sec was used for the proposed facility. Which is correct? (6)

Response: With the addition of activated carbon to the pollution control system of the proposed facility, the correct emission rate is .00048 g/sec. Please see Section 2.2.4 of this document.

8. **Comment:** The overall environmental impact to this region from the various alternate sites should be considered. (11)

Response: The environmental impacts have been assessed for the proposed location. The other two sites, the OWEF site and the IHF site, are not being considered, as discussed in Section 6.4 of the Draft EIS. The IHF site is not a possibility due to zoning issues and the OWEF was not demonstrated to have any significant environmental advantages over the proposed site.

9. **Comment:** The EIS should contain a broader treatment of secondary effects to the roadside, air, and water quality in Olmsted county due to the removal of the Mayo Foundation waste steam from the OWEF. (11)

Response: Reports of road-side dumping in townships have increased. This may be due, in part, to increases in garbage disposal fees. This is an economic issue. Disposal bans on certain material may also be causing dumping of prohibited wastes along roadsides.

The issue of Mayo incinerating its own waste rather than sending it to OWEF is a capacity issue. The Olmsted County Solid Waste Manager has indicated that OWEF does not have the capacity to handle all of Mayo's waste. (See response to comment I.1.) Mayo has agreed to consider diverting enough of its general waste to OWEF after the proposed facility is operational so that OWEF could continue to operate at capacity. The amount diverted, if any, would be small. It is important to note that during 1991 more than 6,000 tons of burnable waste was by-passed and landfilled because OWEF could not handle the volume. This amount, 6,000 tons, is almost twice the total volume of waste that Mayo would be sending to OWEF should the facility not be constructed.

Road-side dumping may continue to increase as garbage disposal fees go up and disposal bans on certain material go into effect in Olmsted county and elsewhere.

Mayo will work with the county to help insure OWEF operates at capacity, therefore construction of the proposed facility would not be responsible for any increase roadside dumping.

Because the proposed facility would have more effective pollution controls than either OWEF or the currently operating Mayo incinerator (IHF), overall air pollutant emissions, and subsequent deposition on land and water in the county, would decrease if the proposed facility were built and IHF subsequently closed down.

10. **Comment:** The red bag wash down at the proposed site will go into a clay tile sewer line that goes within 800 feet of Quarve and Anderson Rock Quarry. The blasting at the quarry will likely damage the sewer line. Red bag wash may get into the ground water. The city of Rochester should televise the line to determine its condition. (16)

Response: MPCA staff assumes that the term "red bag wash" refers to the water discharged from the cart washing facility. The expected quality of the wash water is much like sanitary waste water from any other facility. It is appropriate for it to be discharged to the sanitary sewer.

The sewer branch that would service the proposed site runs 4,400 away from the Quarve and Anderson Rock Quarry. Blasting at the quarry would not effect the integrity of this line.

The closest sewer branch in the system to the Quarve and Anderson Rock Quarry runs 2,400 feet away from the blasting area that is, and has been, active for about 10 years. Based on the experience of the Rochester City Engineers Office staff, it is highly unlikely that blasting at the quarry would damage the sewer line. Last year the city had to conduct some blasting in the downtown area within 50 feet of sewer lines. No damage to the lines was incurred. In fact, the city measured vibration at the lines caused by the blasting and found it to be half what would be expected to cause damage. The city televised portions of this line in August 1991, and found no problems. They plan to televise the line this summer in the reach running under highway 63 near the quarry.

As noted above, the branch that would service the proposed site is much further away and one can expect that this line would be even less likely to be impacted by blasting at the quarry.

The city televises the system routinely and covers the entire sewer system over a period of 10 to 12 years.

Source: (Ronald Payne with the Rochester City Engineers Office, personal communication, April 16 and 17, 1992)

11. **Comment:** How many REM will this facility treat a year? (18)

Note: The commenter uses the term "REM" in several questions. REM, or Roentgen Equivalent Man, is a unit used to indicate human biologic dose as a result of exposure to ionizing radiation. The questions where REM is used seem to be inquiring about the amount of radioactive material being incinerated, generated, emitted and in ash and air. REM is not the appropriate unit for this. The unit used to indicate the amount (activity) of radioactive materials is the Curie and the subunits of millicurie (mCi) and microcurie (uCi). All responses are based on the assumption that where REM is used, activity in millicuries was intended.

Response: MPCA staff assume that the questioner wants to know the amount of low-level radioactive material that would be incinerated at the proposed facility on an annual basis. An example of the amount incinerated during a specific 12 month period is presented in Table 7-8 of the Draft EIS. During that period, Mayo incinerated 207 mCi of low-level radioactive material. Based on the Maximum Permissible Concentration (MPC), as established in Code of Federal Regulations (CFR), Title 10, part 20.106 for each isotope, about four

times this amount could have been incinerated without exceeding standards. Separate limits are established for each isotope for the ash and the stack gas using MPCs. These limits are dependent upon the weight of the ash generated and the volume of flow from the stack. Total activity incinerated each year varies depending upon the workload of research and clinical activities but is usually 1/4 to 1/2 of that which could be incinerated according to MPCs.

12. **Comment:** All emissions (not just mercury) in Olmsted County would decrease and less would be available for long range transport with construction of the proposed facility and closure of IHF. (19)

Response: Comment noted.

13. **Comment:** Emissions of sulfuric acid should be reduced through plastics recovery and active carbon injection. (19)

Response: MPCA staff have not seen data to indicate that removing plastics from the waste stream and using active carbon injection reduces sulfur dioxide in the stack gas.

14. **Comment:** Why weren't mercury and cadmium considered in the study of cumulative impacts? (30)

Response: County-wide mercury emissions were thoroughly evaluated in the Draft EIS Technical Work Paper 3: Cumulative Impact on Nearby Receptors and is summarized in Section 8.2.4.3 of the Draft EIS. Emission data has been revised as discussed in Chapter 2 of this document. Appendix A of TWP 3 has been revised accordingly and is included as Appendix C to this document.

Cadmium emissions were not estimated to be at levels to cause concern. In addition, data does not exist to allow MPCA staff to conduct an evaluation similar to that which was done for mercury.

VII. Risk Assessment Comments

1. **Comment:** Concern was expressed over emission limits and resulting risk numbers. (14, 23)

Response: As described in Section 2.3 of this document, the estimated public health risk based on the revised air emission estimates are below regulatory levels of concern.

In the Draft EIS, the emission estimates and resulting risk estimates were based on data from facilities operating with less effective pollution control equipment than is currently being proposed or no pollution control equipment at all. Section 10 of the Draft EIS detailed actions that should be taken to reduce emissions, and therefore estimated risks, to acceptable levels. As recommended in section 10 of the Draft EIS, Mayo has committed to incorporating activated carbon injection to reduce mercury, dioxin, and PCB emissions and to cone the stack, if necessary, to lower ambient sulfuric acid concentrations. See section 2.1.4 of this document for a discussion of the activated carbon injection system.

2. **Comment:** Concern was expressed over the estimated cancer risk. (4)

Response: The cancer risk estimate is due primarily to the estimated emission of dioxin compounds. As discussed in Section 2.3 of this document, with the addition of activated carbon injection to control dioxin emissions, the estimated cancer risk would be below the MDH recommended guideline of 5 in 100,000. Please refer to Section 2.1.4 for further discussion of the activated carbon injection technology.

3. **Comment:** page 8-41 1,1-dichloroethene and 1,1-dichloroethylene refer to the same compound, tetrachloroethene and tetrachloroethylene refer to the same compound, and trichloroethene and trichloroethylene refer to the same compound. (6)

Response: Please see errata in Chapter 5.

4. **Comment:** On page 8-43 of the Draft EIS, the RME should be 224 meters NE not NW of the stack. (6)

Response: Please see errata in Chapter 5.

5. **Comment:** On page 8-48 of the Draft EIS, the fact that there is no RfD or RfC for lead is not because lead wasn't investigated but because EPA has not issued one. The source of the information is not "-" but IRIS and HEAST. (6)

Response: Please see errata in Chapter 5.

6. **Comment:** On pages 8-54 and 8-55 of the Draft EIS, the ratios given are not the true hazard quotients calculated according to EPA guidance. Another term should be used when referring to these (e.g. risk quotients). (6)

Response: Please see errata in Chapter 5.

7. **Comment:** Are there limits or laws to protect against acute irritation? Concern was expressed over exposure to excessive levels of toxicants. (9)

Response: Limits do exist to protect public health and are discussed in Chapter 8 of the Draft EIS. Chapter 10 of the Draft EIS described several measures that should be taken to assure that exposure to excessive levels of toxicants would not occur. Mayo has incorporated many of the recommendations and, as is discussed in Section 2.3 of this document, the measures would sufficiently reduce emissions from the proposed facility to protect the public health.

8. **Comment:** The affected area used in the risk assessment was 14.4 acres. No consideration was given to the proximity of agricultural land to the proposed incinerator. (15)

Response: The study area for the risk assessment was a 10 kilometer (6.2 mile) radius from the incinerator, far more than the 14 acre site.

Much consideration was given to the agricultural land use of the area. The risk scenarios that were evaluated were specific to agricultural land use: a residential farm family and an adult farm worker. Both scenarios assumed that the people were living and working on a hypothetical farm located at the point of maximum impact from the proposed facility and eating produce, beef, and dairy products produced on that hypothetical farm.

9. **Comment:** What capacity was the HRA assuming? (17)

Response: As described in the Draft EIS, the permitted capacity of the proposed incinerator would be 25 tons per day. With the project modifications described in Section 2.1 of this document, 25 tons per day would still be the permitted capacity. This is the capacity that was used in the risk assessment.

10. **Comment:** The removal efficiency of carbon injection need to be numerically detailed in the EIS to assure the public that this system would in fact reduce health risk to acceptable levels. (17,19)

Response: See Sections 2.2 and 2.3 of this document and Appendices A and B for a complete discussion of emission estimates with the carbon injection technology in place and the resulting risk estimates.

11. **Comment:** Why wasn't radioactivity considered in the ecological risk assessment? (F, 18)

Response: The criteria used to drop radioactive nuclides from the risk assessment focused primarily on estimated source levels, as outlined in Section 3.3.4 of the Draft EIS Technical Work Paper #5: Risk Assessment. Based on available emissions data there is no possibility that any of the potential human or ecological receptors would receive significant exposure to radionuclides as a result of the Mayo incinerator. When an exposure pathway is not considered to be complete or significant, as the quantitative evaluation of radionuclide concentrations clearly demonstrates, quantifying that pathway is not appropriate.

12. **Comment:** What risk does radioactive emissions pose to the community?

Comment: The EIS should include a risk assessment for exposure to radiation.

Comment: A worst case scenario (regarding radioactivity) should be discussed in the uncertainty section. **Comment:** Recent studies (Biological Effects of Exposure to Low Levels of Ionizing Radiation (BEIR) V conclude that risks from exposure have been underestimated. These findings could lead to changes in the NRC guidelines and should be carefully assessed. (F, 18)

Response: The Minnesota Department of Health (MDH) has elaborated a policy for risk assessment of radioactive emissions. MDH estimates upper bound risks for cancer incidence, and applies its negligible risk criterion of 1 in 100,000. The MDH criterion is more protective than the U.S. Environmental Protection Agency and the Nuclear Regulatory Commission criteria.

MDH has calculated a negligible dose rate criterion of 0.05 mrem/year.

Radioactivity in air: Application of the MDH negligible dose rate criterion indicates that there is at least a thousand-fold safety margin between air concentrations due to emissions of radionuclides from the proposed incinerator and significant cancer risk.

Radioactivity in soil: Based on "slope factors" or dose to risk coefficients in EPA HEAST Tables, it was determined that soil concentrations of radionuclides would be less than a ten-millionth of an amount which might engender a significant health risk. Again, application of the MDH dose to risk coefficient indicates that radionuclide concentrations are at least a million times less than that which would engender a significant health risk.

Radioactivity in ash: MDH concluded that levels of radioactivity in ash would be very small and not of significant health risk.

Source: Minnesota Department of Health. Letter dated March 23, 1992. (See comment letter number 20 in Appendix E of this document)

14. Comment: The conclusion that PCB and mercury levels in surface water would exceed MN WQC is incorrect. The highest recorded value (in data set used, Appendix B in TWP 4) from a facility with a baghouse was more than ten times lower than the emission rate used for mercury and 100 times lower than the emission rate used for PCBs. The risk estimates should reflect removal efficiencies. (19)

Response: Mercury and PCB emissions and resulting potential for ecological impact have been recalculated. See Sections 2.2. and 2.3 of this document.

15. Comment: Incremental increases in blood lead from the Mayo Incinerator are expected to be small. Nevertheless, health risks from lead emissions should be discussed. MDH staff estimate that the facility would lead to a maximum increase of 3 percent of the safe blood lead level of 1 microgram/deciliter. (20)

Response: Comment noted. Emission estimates have been re-evaluated. Expected lead emissions are estimated to be .000818 pounds per ton, about 3 percent of what had been previously estimated. See Section 2.2 and Appendix A.

16. Comment: The Final EIS should contain more information about acute hazards. The hazard index for sulfuric acid₃ is 4.5, based on a maximum 1 hour ground level concentration of 27 microgram/m³ and a Minnesota criterion value of 6 microgram/m³. The maximum 1 hour ground level concentration is 45 percent of an amount observed to cause respiratory effects in exercising adolescents. This information should be included in the Final EIS. (20)

Response: Please see Section 2.3.10 for a revised assessment of the potential for public health impacts from sulfuric acid emissions.

17. Comment: The maximum 1 hour ground level concentration for sulfuric acid, 27 mg/m³ [µg/m³] (table H-1, TWP 5:Risk Assessment) is lower than the Lowest Observed Adverse Effect Level (LOAEL) of 35 mg/m³ for humans and 100 mg/m³ for animals. (19)

Response: Regulatory concentrations (e.g., standards, advisories, maximum allowed concentrations) for chemicals are generally lower than their experimentally derived LOAEL because they are one of many inputs that go into equations that are used to calculate a regulatory concentration. The Minnesota criterion value is 6 microgram/cubic meter (ug/m³) and was established based on a LOAEL of 61 ug/m³ (Adams, 1991).

18. **Comment:** Why wasn't the risk to employees working at the facility studied? (30)

Response: The risk assessment appropriately evaluated risk due to emissions from the proposed facility. As explained in response to this commenter's concern over worker safety expressed during the EIS scoping process, an operator training program would be detailed in the Air Emission Permit and U.S. OSHA-established standards to protect workers would be met at the facility.

19. **Comment:** The conclusions of the EIS are based on exposures calculated from upper confidence limits of geometric mean emissions. However, the U.S. EPA Risk Assessment Guidance for Superfund states that the upper confidence limit on the arithmetic average should be used. (20)

Response: As discussed in the Draft EIS, the MPCA agrees with the MDH that, without additional pollution control equipment, the proposed incinerator would have represented an unacceptable level of carcinogenic risks. This conclusion was based on the Draft EIS finding that the estimated carcinogenic risk from projected facility operations exceeded the MDH tolerable cancer risk threshold of one-in-one-hundred-thousand. Additional and sufficient pollution control measures are currently proposed for the facility. (See Section 2.1 of this document).

The upper confidence limits of the geometric mean of the emissions data was used in the Draft EIS risk assessment because MPCA staff felt that it better represented what average high emissions from a proposed facility may be. As stated in section 8.5 of the Draft EIS, the arithmetic mean is sensitive to high values in the emissions data set and may provide toxicologists additional information with which to evaluate risks. The arithmetic mean better predicts a reasonable worst case toxic exposure.

The MPCA staff re-evaluated emissions data and corresponding risk estimates based on the concerns raised by MDH staff regarding the statistical treatment of emissions data and the additional pollution control (activated carbon injection) that is currently proposed. MDH was provided a copy of the re-evaluation and comment was solicited before this document was finalized. (See Section 2.3)

20. **Comment:** Cancer risk estimates (primarily due to dioxin) were underestimated. (20)

Response: The MPCA staff re-evaluated emissions data and corresponding risk estimates based on the concerns raised by MDH staff regarding the statistical treatment of emissions data and the additional pollution control (activated carbon injection) that is currently proposed. MDH was provided a copy of the re-evaluation and comment was solicited before this document was finalized. See Section 2.3 of this document.

21. **Comment:** The statistical treatment of emissions data and the leach rates for metals in soil that were assumed tend to underestimate and overestimate the hazard indices for mercury and cadmium. (20)

Response: The MPCA staff re-evaluated emissions data and corresponding risk estimates based on the concerns raised by MDH staff regarding the statistical treatment of emissions data and the additional pollution control the are currently proposed. See Sections 2.2 and 2.3 of this document.

22. Comment: The statistical treatment of emissions data could have resulted in an underestimation of PCB and mercury levels in surface water. (20)

Response: The MPCA staff re-evaluated emissions data and corresponding risk estimates based on the concerns raised by MDH staff regarding the statistical treatment of emissions data and the additional pollution control the are currently proposed. See Section 2.4 of this document.

VIII. Economic, Employment And Sociological Impacts Comments

1. Comment: Revenue diverted from County is understated. How will Mayo compensate the County? (8, 30)

Response: The estimate of the annual loss in revenue to Olmsted County that was reported in the Draft EIS was provided in writing to the MPCA by representatives of Olmsted county (Mossing, Gene. Correspondence to Cindy Thomas, Thomas Research. August 1, 1991). The correspondence was included in the Draft EIS Technical Work Paper 7: Economic, Employment, and Sociological Analysis and is referenced here.

Mayo has agreed to consider diverting some of its general waste to OWEF after the proposed facility is operational so that OWEF could continue to operate at capacity. It is important to note however that during 1991 more than 6,000 tons of burnable waste was by-passed and landfilled because OWEF could not handle the volume. This amount, 6,000 tons, is almost twice the total volume of waste that Mayo would be sending to OWEF should the proposed facility not be built.

2. Comment: What did the real estate people interviewed for the Draft EIS base their opinion on? (9)

Response: The individuals interviewed for the property value section of the Draft EIS based their opinions on a knowledge of the Rochester real estate market. Their opinions were included in the Draft EIS in the absence of any established methodology for determining or quantifying the potential impact of the proposed incinerator on property values. Local real estate agents and appraisers were considered a good source of information available to staff.

In addition to the interviews, an extensive literature search was conducted to evaluate trends in property values at other waste management facilities.

The fact that the MPCA staff did not attach undue significance to the opinions of those interviewed is evidenced by the conclusions of the Draft EIS regarding property value impacts. The Draft EIS Section on property values (Section 9.2.2) concludes by saying that there is no clear pattern of impacts on property values due to the presence of a waste management facility and that it is extremely difficult to predict with any reliability the impact this facility would have on surrounding land values.

3. **Comment:** Property values would be negatively effected. (15)

Response: An extensive literature search was conducted by the MPCA contractor in an effort to predict the effect that construction of the proposed facility would have on property values in the vicinity. Section 9.2.2 of the Draft EIS summarizes the findings. The conclusion reached was that there is no clear pattern of impacts on property values due to the presence of a waste management facility.

It was not possible to conclude whether the presence of the facility would enhance or reduce property values in the vicinity.

4. **Comment:** A discussion of the potential revenue Mayo could generate with the excess capacity that would exist at the proposed facility should be included. (F, 18)

Response: As described in Section 2.1 of this document, the facility would consist of one 25 ton per day combustor and two steam autoclaves. Mayo does not plan to accept any non-Mayo generated waste from outside of Olmsted and Dodge counties. The facility is sized to accommodate Mayo's waste treatment needs now and in the future. Mayo does not plan to become a regional commercial facility. Such a cost analysis may be appropriate if Mayo were constructing a commercial, for-profit facility; however it is not.

IX. Mitigation Measures Comments

1. **Comment:** On page 10-2 of the Draft EIS, the removal efficiencies at the Swedish incinerator were given as 93 to 99 percent. Was this for all pollutants or for dioxins/furans only? (6)

Response: Overall removal efficiencies were 93 to 99 percent for dioxins and furans.

2. **Comment:** On page 10-4 of the Draft EIS, Section 10.4 discusses PCB emissions; however section 10.4.3 purports to address addition of activated carbon to reduce dioxins. Should be changed to "reduce PCBs"? (6)

Response: Please see errata in Chapter 5 of this document.

3. **Comment:** Hazardous materials as defined by RCRA would not be disposed in the incinerator. Remove this from the mitigation measures. (19)

Response: The point contained in the Executive Summary of the Draft EIS: "Complete removal of hazardous materials from the incineration waste stream" refers to the discussion found in Section 10.7 of the Draft EIS. Specifically, the recommendation was to identify and eliminate from the waste stream, disposable products that contain mercury, PCBs, or dioxin forming compounds. MPCA staff believe that this is a valid mitigation measure.

The Resource Conservation and Recovery Act (RCRA) regulates hazardous waste, not hazardous materials. The term hazardous waste was not used in the mitigation discussion specifically because MPCA staff did not want the reader to become confused with RCRA-regulated waste. As described in Section 7.1.9 of the Draft

EIS, the transporting and off-site disposal of RCRA hazardous waste is contracted with a private firm. It is not incinerated at IHF and would not be incinerated at the proposed facility.

4. **Comment:** The activated carbon technology described in the Draft EIS combined with other emissions controls appears to make achieving a negligible cancer risk possible. (20)

Response: See Sections 2.2 and 2.3 of this document and Appendices A and B.

X. Comments on the Draft EIS Technical Work Paper 5: Risk Assessment

1. **Comment:** It appears from Table 4-39 that the total estimated chronic daily intake via the dermal and soil ingestion pathways were calculated by summing infant, child, adolescent, adult resident, and adult farm worker. Thus the reasonable maximum exposed individual (RME) gets 122 years of exposure. Only one adult scenario should be factored into the exposure and contribute to the daily intakes. If both adult scenarios were included in the intake calculation, it leads to the question of whether they were also summed for the cancer risk estimation. Since these two pathways constituted approximately 50 percent of the intake (and risk), this one error may have had a "snowballing" effect. The cancer risk thus calculated would be an overestimation. (6)

Response: Table 4-39 does sum infant, child, adolescent, adult resident, and adult farm worker exposures and, thus, overestimates exposure to the extent that the adult receptors represent double counting. The purpose of this table, however, is to illustrate which pathways are responsible for the most exposure. The total CDIs on this table are not used in any subsequent calculations. Subsequent calculations use CDIs developed for individual receptors.

2. **Comment:** Soil concentrations of metals are based on soil loss constants which were apparently arbitrarily halved (Appendix D-5 of Draft EIS Technical Work Paper: Risk Assessment). This results in an overestimation of risks from direct soil exposures and from food chain exposures. The exposure to mercury in beef and from food chain exposures. The exposure to mercury in beef is overestimated by a factor of 2, while exposure to cadmium in beef is overestimated by a factor of 1.4 because, compared to mercury, a greater proportion of cadmium ingested by cows is directly deposited on hay and grass (Appendix F of Draft EIS TWP 5, pg. 5-10). However, since mercury contributes most to renal toxicity, the net effect is a reduction in the hazard index by a factor of 2. (20)

Response: Soil loss constants were not arbitrarily halved. Soil loss constants for metals decrease as total organic carbon (TOC) increases. Site-specific TOC values were not available. The local land use is primarily agricultural, however, and it was, therefore, assumed that TOC values would be high. Soil loss constants were halved to account for the expected high TOC values.

3. **Comment:** The risk assessment indicates that dermal absorption is the biggest contributor to cancer risk. This risk was also apparently overestimated. It was assumed that children and adolescents were exposed to soil on hands, arms and legs for eight months per year, while adults were exposed to soil on hands and arms for eight months per year (Variable Table 14).

If these exposures are adjusted so that it is assumed that only hands are exposed during 5 months of the year, then the dermal exposure is halved (pg. 4-47 through 4-50). If this is done, then the modeled cancer risk decreases from $2.3E-5$ to $1.8E-5$, and the calculated upper bound risk decreases from $26E-5$ to $20E-5$ ($2E-4$). (20)

Response: Dermal risks were recalculated using the following exposure assumptions:

Children/Adolescents

3 months - hands, arms, and legs
5 months - hands only

Adults

3 months - hands and arms
5 months - hands only

This reduced risks to dermal exposure by a factor of two. Thus, the risk from dermal contact with soil and dust was reduced in both scenarios from $9E-06$ to $4E-06$. This reduction did not, however, effect the total risk which remains at $2E-05$ as a result of "rounding up".

4. **Comment:** pg. 4-31 Inhalation CDI does not discuss any absorption factor, and none is shown in equation, yet tables 4-8 through 4-12 incorporate one for arsenic and TEDFs. (6)

Response: Page 4-31. Equation should read as follows:

$$CDI \text{ (mg/kg-day)} = \frac{CA \times IR \times EF \times ED \times ABS}{BW \times AT}$$

ABS = Absorption Factor

Absorption factors explained in Footnote f of Table 4-7.

5. **Comment:** The text (p. 4-31, bottom) states that table 4-13 presents soil ingestion exposure assumptions. Table 4-13 (p. 4-38) is titled "Assumptions used to Estimate Dermal Exposure while Swimming in Willow Creek Reservoir". The proper table should be inserted. (6)

Response: Table 4-13 is incorrect. The correct table, "Soil Ingestion Exposure Assumptions" is included in the errata.

6. **Comment:** pg. 4-35 Assumption for adolescents inhalation made on page 4-32 was $19 \text{ m}^3/\text{day}$; table 4-10 uses $20 \text{ m}^3/\text{day}$. (6)

Response: Table 4-7, Inhalation Rate, Adolescents should read " $20 \text{ m}^3/\text{day}$ ".

7. **Comment:** pg. 4-36 Assumption for adult exposure duration made on page 4-32 was 52 years; tables 4-11 and 4-12 use 17 years. (6)

Response: The adult exposure duration of 17 years cited on Tables 4-11 and 4-12 is a result of the fact that the incinerator will only operate for 35 years. When child and adolescent exposure durations (18 years) are subtracted from 35 years, the remaining adult exposure is 17 years.

8. **Comment:** pg. 4-45 Assumption for adolescents' skin surface area does not include exposed face? (6)

Response: Page 4-45, line 13 should read "exposure to forearms and hands using surface areas obtained...". Exposure to the face was not included for children or adults.

9. **Comment:** pg. 4-51 Should note that derivation for C_F (chemical concentration in food) is detailed in Appendix E of Draft EIS TWP 5. (6)

Response: Page 4-51, first paragraph. The following sentence should be added: The estimated chemical concentrations in these crops are derived in Appendix E of Draft EIS TWP 5.

10. **Comment:** pg. 4-82 Biomagnification/bioactivation may lead to underestimation; no mention is made that the deposition modeling used was for "worst case" year, and that exposure is set at site of maximum impact (which overestimates the risk). (6)

Response: Section 4.6.1 discusses uncertainties associated with the deposition modeling.

11. **Comment:** pg. 4-84 Should mention uncertainty regarding soil-to-plant uptake factors (and soil-plant-animal, and soil-plant-animal-human). (6)

Response: Cited uncertainties are discussed in Section 4.6.8.

12. **Comment:** pg. 6-9 through 6-22 Why isn't mercury included as a neurotoxin in the noncarcinogenic exposure hazard quotient? Its target organ (system) is the nervous system. (6)

Response: Exposure would be to inorganic mercury. In its inorganic form, mercury is a renal toxin.

13. **Comment:** pg. 6-33 through 6-35 These tables do not show the actual hazard quotients as described on page 6-1. Another term should be used when referring to these (e.g., risk quotients). (6)

Response: Tables 6-27 through 6-29 should use the term "Risk Quotient" rather than "Hazard Quotient" in order to avoid confusion with previous use of hazard quotient.

14. **Comment:** Appendix F, pg. F-3 The amounts of feed consumed by dairy cattle and beef cattle don't match the sum of their intakes. Dairy cattle consume 18 kg. of feed, but intake is 1 kg. of grain and 14 kg. of hay. Beef cattle consume 15 kg. of feed; this is made up of 6 kg. grain and 12 kg. hay. Also, under soil ingestion: 2 percent = 0.02 not 0.2. Ditto 1 percent = 0.01 not 0.1. (6)

Response: Page F-3, Line 7 should read "For beef cattle...". Line 8 should read "For dairy cattle...". Line 15 should read $15 \times 0.02 = 0.3$ kg/day. Line 17 should read $18 \times 0.01 = 0.2$ kg/day. Error in text only, calculations are correct.

15. **Comment:** Appendix F, pg. F-5 Why are the chemical concentrations in grain different than those in hay/grass? These concentrations match up with those in vine crops; doesn't seem appropriate. (6)

Response: Chemical concentrations in grain are different than those in hay/grass because grains are considered as a fruit.

16. **Comment:** Appendix H, pg. H-4 Body weight for a young child in rest of document in 14 kg; when the TEDF ADI is calculated, here 16 kg. was used. Also, the TLV for H_2SO_4 in the text is given as $10 \mu\text{g}/\text{m}^3$, but given as 1000 in table H-1. (6)

Response: The correct body weight for a child is 14 kg. The correct TLV for H_2SO_4 is 1000, as indicated on Table H-1. The value listed on Page H-4 (second line from the bottom) is the "adjusted" TLV. See Page H-4, paragraph 1 for an explanation of this adjustment.

4.0 REFERENCES

- Adams, Fred. MPCA Internal Memorandum. Regulatory Criteria for Potlatch-Cloquet Environmental Impact Statement. October 23, 1991.
- Brunner, Calvin R. Hazardous Air Emissions From Incineration. Chapman and Hall, 1985.
- Draft Environmental Impact Statement Technical Work Paper 1: Project and Site Description. HDR Engineering. 1992.
- Draft Environmental Impact Statement Technical Work Paper 2: Waste Composition Analysis. Camp Dresser and McKee. 1992.
- Draft Environmental Impact Statement Technical Work Paper 3: Cumulative Impacts on Nearby Land Uses. Camp Dresser and McKee. 1992.
- Draft Environmental Impact Statement Technical Work Paper 4: Air Quality Emissions and Deposition. Camp Dresser and McKee. 1992.
- Draft Environmental Impact Statement Technical Work Paper 5: Human Health and Ecological Risk Assessment. Camp Dresser and McKee. 1992.
- Draft Environmental Impact Statement Technical Work Paper 6: Ash Characterization, Handling and Disposal. Camp Dresser and McKee. 1992.
- Draft Environmental Impact Statement Technical Work Paper 7: Economic, Employment and Sociological Impacts. Camp Dresser and McKee. 1992.
- Draft Environmental Impact Statement Technical Work Paper 8: Alternatives Analysis. Camp Dresser and McKee. 1992.
- HDR Engineering. Memorandum from Mark Wollschlager to Anne Jackson, MPCA staff. April 23, 1992.
- Hennepin Energy Resources Corporation (HERC). Ash Analysis Data. April and August, 1990.
- McDonald, J.R. and Dean, A.H. A Manual for the Use of Electrostatic Precipitators to Collect Fly Ash. EPA-600/8-80-025, U.S. Environmental Protection Agency, Washington, D.C. 1980.
- Minnesota Department of Health. Comment Letter on the Draft Environmental Impact Statement. March 23, 1992.
- Minnesota Department of Natural Resources. Minnesota Fish Consumption Advisory. May, 1992.
- Minnesota Geological Survey. Hydrogeologic Atlas of Olmsted County. 1988
- Mossing, Gene. Correspondence to Cindy Thomas, Thomas Research. August 1, 1991

Mossing, Gene. Olmsted County Solid Waste Manager. Facsimile to Kathryn Kramer, MPCA staff. April 6, 1992.

Payne, Ronald. Rochester City Engineers Office, Personal Communication, April 16 and 17, 1992

Porter, Ray. Camp Dresser and McKee. Personal Communication. May 27, 1992.

Torkelson, Peter. Minnesota Pollution Control Agency Fall 1990 Medical Waste Sort. 1992.

United Power Associates (UPA)/Elk River. Ash Analysis Data. March and July, 1990.

Wark, K. and Warner, C.F. Air Pollution: Its Origin and Control. Second Edition. Harper & Row, New York. 1981.

5.0 ERRATA

The following section provides corrections for errors noted by MPCA staff or pointed out to MPCA staff during the public comment period on the Draft EIS. Many correction relate to typographical errors or inconsistencies noted in the Draft EIS and the Draft EIS technical work papers.

5.1 ERRATA FOR THE DRAFT EIS

1. page 4-22, Section 4.3.8: There would be no discharge of the quench water used to cool the ash discharged from the incinerator to the ash pit. The ash would absorb all water added. The total industrial waste water discharge would be 3,566 gallons per day rather than the 5,688 gallons per day noted.
2. pages 4-16 and 17, Section 4.3.2: The maximum possible on-site storage would be approximately 77,000 pounds rather than the 46,000 pounds noted in the Draft EIS. The capacity of the hoppers would be 58 cubic yards instead of the 20 cubic yards noted. The packer trucks provide an additional 46,980 pounds of storage capacity rather than the 16,200 pounds noted. There would be 3.8 days of total waste generation storage on-site rather than the 2.3 days noted.
3. page 6-5, Table 6-2: The capital cost for incineration should be \$1,500,000.
4. page 6-11: Low-level sealed source radioactive wastes are returned to the manufacturer for disposal rather than buried at a licensed radioactive waste facility.
5. page 7-12: Mayo's NRC license number is 22-00519-03.
6. page 7-18, Table 7-9: The table represents Total 2,3,7,8-TCDD Equivalents.
7. page 8-8: Reference to Table 8.2-6 is incorrect. The reference should be Table 8.2-8.
8. Page 8-16, Table 8.2-6: Delete this table.
9. page 8-30, Section 8.3.2.2 Surface Water Quality: Reference to Section 8.5.7.3 is incorrect. The proper reference is 8.4.6
10. page 8-41: 1,1-dichloroethene and 1,1-dichloroethylene refer to the same compound, tetrachloroethene and tetrachloroethylene refer to the same compound, and trichloroethene and trichloroethylene refer to the same compound.
11. page 8-43; The RME should be 224 meters NE not NW of the stack.
12. page 8-48: The fact that there is no RfD or RfC for lead is not because lead wasn't investigated but because EPA has not issued one. The source of the information is not "-" but IRIS and HEAST.
13. pages 8-54 and 8-55; The ratios given are not the true hazard quotients calculated according to EPA guidance. Substitute the term Risk Quotients to avoid confusion.
14. page 10-4 of the Draft EIS, section 10.4.3; Typographical error in title. Should be changed to "reduce PCBs". (6)

5.2 ERRATA FOR TWP 5: RISK ASSESSMENT

1. Page 8, Line 3 should read "estimated carcinogenic risks are close to or below MPCA's risk goal (1×10^{-5}) ...".
2. Table 4-7, Inhalation Rate, Adolescents should read "20 m³/day".
3. Table 4-13 is incorrect. The correct table, "Soil Ingestion Exposure Assumptions" is attached.
4. Page 4-31. Equation should read as follows:

$$\text{CDI (mg/kg-day)} = \frac{\text{CA} \times \text{IR} \times \text{EF} \times \text{ED} \times \text{ABS}}{\text{BW} \times \text{AT}}$$

ABS = Absorption Factor

Absorption factors explained in Footnote f of Table 4-7.

5. Page 4-45, line 13 should read "exposure to forearms and hands using surface areas obtained...". Exposure to the face was not included for children or adults.
6. Page 4-51, first paragraph. The following sentence should be added: The estimated chemical concentrations in these crops are derived in Appendix E.
7. Page 6-2, Line 5 should read "toxic effects.". Page 6-26, Line 12 should read "Toxic effects...".
8. Tables 6-27 through 6-29 should use the term "Risk Quotient" rather than "Hazard Quotient" in order to avoid confusion with previous use of hazard quotient.
9. Appendix E: Tables E-5 and E-2 and Variable Table 3 are correct and are the values used to calculate exposure point concentrations. Tables 4-4 and E-1 should be revised to match Tables E-5 and E-2, respectively.
10. Appendix F: Page F-3, Line 18 should read "at a soil depth of 20 cm as cattle are most likely to ingest soil associated root systems which they pull from the ground." All cited tables in Appendix F are correct. Table 4-5 should be revised to match Table F-9. Table F-9 was used to calculate exposure point concentrations.
11. Appendix F: On Table F-9, units should be deleted from the Uptake Factor column. See Baes 1984, pages 49-53. Derivation of uptake factors is based on a direct comparison of empirical data on intake rates versus tissue concentrations.
12. Appendix F: Page F-3, Line 7 should read "For beef cattle...". Line 8 should read "For dairy cattle...". Line 15 should read $15 \times 0.02 = 0.3 \text{ kg/day}$. Line 17 should read $18 \times 0.01 = 0.2 \text{ kg/day}$. Error in text only, calculations are correct.

13. Appendix H: pg. H-4 The correct body weight for a child is 14 kg. The correct TLV for H_2SO_4 is 1000, as indicated on Table H-1. The value listed on Page H-4 (second line from the bottom) is the "adjusted" TLV. See Page H-4, paragraph 1 for an explanation of this adjustment.

TABLE 4-13
ASSUMPTIONS USED TO ESTIMATE EXPOSURE VIA
INGESTION OF SOIL AND DUST

Parameter	Exposure
Frequency of Exposure ^(a)	240 d/yr
Period of Exposure ^(b)	
Adults	52 years
Adolescents	12 years
Children	5 years
Ingestion Rate ^(b,c)	
Adults	100 mg/day
Children	200 mg/day
Average Body Weight ^(b)	
Adults	70 kg
Children	14 kg
Fraction Contaminated	1.0
Averaging Time ^(a)	
Noncarcinogens	365 d/yr x (5,65) yrs ^(b)
Carcinogens	365 d/yr x (5,65) yrs ^(b)

^(a) Based on exposure occurring seven days a week as recommended by USEPA (1989a).

^(b) USEPA (1989a).

^(c) Includes ingestion of household dust as well as soil, as recommended by USEPA (1990).

APPENDIX A

REVISED EMISSION ESTIMATES FOR MAYO CLINIC HEALTH RISK ASSESSMENT

Prepared by: Anne Jackson, P.E.
MPCA Staff

Based on comments from MPCA staff and Dr. Rita Messing of the Minnesota Department of Health, I have examined available emission data for various pollutants for staff to use in re-evaluating risk estimates. Contained in this memo are revised recommended emission estimates for mercury, lead, cadmium, chromium, and dioxin and furan toxic equivalents. A description of how the emission estimates were derived follows the table for each pollutant.

SUMMARY OF EMISSION RATES

Pollutant	Revised Emission Rate	CDM Emission Rate
Mercury	3.64E-3 lb/ton*	3.8E-3 lb/ton
Cadmium	1.27E-4	1.5E-3
Lead	8.18E-4	2.6E-2
Chromium	3.30E-4	1.32E-4
Dioxin/Furan Toxic Equiv.	5.53E-8 lb/ton*	3.77E-7

*These emission rates reflect the use of activated carbon injection with a dry sorbent injection/fabric filter system.

BACKGROUND

Dr. Rita Messing, of the Minnesota Department of Health, raised concerns about the statistical treatment of emissions data. Emission estimates generated by CDM were based on the upper 95 percent confidence limit of the geometric mean of all datapoints for a pollutant, based on a paper prepared by Siebert et. al. Dr. Messing commented that the US EPA Superfund Risk Assessment Methodology uses the upper 95 percent confidence limit of the arithmetic average.

METHODOLOGY

The emission rates as identified in Technical Work Paper 4 (TWP 4) for mercury, lead, cadmium, chromium and dioxin/furan toxic equivalents were re-examined. The 95 percent upper confidence limit (95% UCL) on the arithmetic mean of the facility means was determined for both controlled and uncontrolled emissions for each pollutant. The arithmetic mean of other facilities for which emissions data was reasonably available was evaluated for comparison purposes. Emission rates were then ordered from highest to lowest; emission rates from facilities known to have dry sorbent/fabric filters were specifically identified in the analysis. This was done in order to ascertain what emission rates might reasonably be achieved by medical waste incinerators with this type of pollution control equipment.

Table 1. MERCURY EMISSIONS

Site	Emissions Rate, lb/ton
Durkee, 1991, DSI/FF outlet	2.4E-1
Skovde, Sweden, uncontrolled (Clarke)	6.76E-2
Mayo, controlled PM=.09 (Interpoll, 1990b)	4.26E-2
95% UCL, mean of means, controlled (TWP 4)	3.64E-2
95% UCL, mean of means, uncontrolled (TWP 4)	3.50E-2
MPCA 1991 Site B uncontrolled	2.3E-2
95% UCL, mean of means, all data pts. (Messing)	1.42E-2
Medical Safety Systems (DSI/FF) (Interpoll, 1991)	8.3E-3
Modeled, 95% UCL, Geo mean (TWP 3)	3.8E-3
MPCA 1991 Site C uncontrolled	1.09E-3
MPCA 1991 Site A uncontrolled	9.94E-4
Hamot (DSI/FF) (Lerner)	3.85E-4
Skovde, Sweden (DSI/FF w/act. carbon)(Clarke)	2.5E-4
Hershey (wet scrub, PM=.015)(Bianca)	9.1E-5

Durkee (1991) reports that at the medical waste incinerator (MWI) with DSI/FF, uncontrolled mercury emissions were lower for red bag waste than general waste. Lead emissions were 67 percent higher for red bag wastes than general wastes. Durkee then concluded that there was no difference between the metals uncontrolled emission rates for red bag and general wastes.

The 95 percent UCL mean of means uncontrolled emissions rate will reasonably estimate the emissions of mercury from a medical waste incinerator (3.64E-2 lb/ton). The mercury removal rate for the Skovde, Sweden medical waste incinerator (DSI/FF with act. carbon injection) was 99.6 percent. This removal rate is consistent with higher removal rates reported at municipal waste combustors using activated carbon. U.S. EPA has conducted emissions testing using activated carbon for mercury control at both municipal and medical waste incinerators. The pilot testing for medical waste incinerators indicated that mercury removals of 88 to 95+ percent is possible. (Eddinger).

A mercury emission rate of 3.64E-2 lb/ton should be used to represent the 95 percent UCL arithmetic average for a medical waste incinerator. Activated carbon injection with a DSI/FF system will remove 90 percent of mercury emissions, resulting in mercury emissions rate of 3.64E-3 lb/ton.

Table 2. CADMIUM

Site	Emission Rate, lb/ton
Mayo, controlled (Interpoll, 1990a)	1.27E-2
MPCA 1991, Site B uncontrolled	1.98E-2
MPCA 1991, Site A uncontrolled	8.98E-3
MPCA 1991, Site C uncontrolled	7.04E-3
95% UCL, mean of means, controlled (TWP 4)	4.57E-3
95% UCL, mean of means, uncontrolled (TWP 4)	4.43E-3
95% UCL, all datapoints (Messing)	3.9E-3
Modeled, 95% UCL, Geo mean	1.5E-3
Durkee 1991 (DSI/FF)	5.29E-5
Hamot (DSI/FF) (Lerner)	3.94E-5
Medical Safety Systems DSI/FF (Interpoll 1991)	3.4E-5
Cedar Sinai (Baghouse only)	5.16E-6

The modeled emission rate (95% UCL geometric mean) represents uncontrolled or poorly controlled cadmium emissions from medical waste incinerators. An emission rate of 1.27E-4 lb/ton more reasonably represents cadmium emissions from a medical waste incinerator controlled with a DSI/FF system.

Table 3. LEAD EMISSIONS

Site	Emission Rate, lb/ton
Mayo, controlled (Interpoll, 1990a)	1.04E-1
MPCA 1991 Site C	2.74E-1
MPCA 1991 Site A	9.74E-2
95% UCL, mean of means, uncontrolled (TWP 4)	8.18E-2
95% UCL, mean of means, all data (Messing)	6.15E-2
95% UCL, mean of means, controlled (TWP 4)	6.54E-2
MPCA 1991 Site B uncontrolled	4.5E-2
Modeled, 95% UCL, Geo. mean	2.6E-2
Hershey (Bianco)	4.82E-3
Durkee, 1991 (DSI/FF)	5.95E-4
Medical Waste Associates (DSI/FF) (Entropy)	2.2E-4
Cedar Sinai (Baghouse only)	9.9E-5
Hamot (DSI/FF)(Lerner)	5.53E-5

Data shows that with high particulate matter removal efficiencies, lead emissions are reduced by two orders of magnitude. (Cedar Sinai system consists only of a baghouse (no scrubbing), showing a high lead removal efficiency).

The emission rate used in the risk assessment ($2.6\text{E-}2$ lb/ton) is well above what lead emissions are expected from medical waste incinerators with DSI/FF. The emission rate of $8.18\text{E-}4$ lb/ton more accurately represents emissions from the Mayo Foundation facility.

Table 4. CHROMIUM

Site	Emission Rate, lb/ton
MPCA 1991 Site A	$6.5\text{E-}2$
MPCA 1991 Site C	$2.92\text{E-}2$
MPCA 1991 Site B	$7.26\text{E-}3$
Mayo Clinic, controlled, (Interpoll, 1990a)	$1.09\text{E-}3$
Medical Waste Association (DSI/FF) (Entropy)	$5.44\text{E-}4$
95% UCL, mean of means, uncontrolled (TWP 4)	$4.81\text{E-}4$
95% UCL, mean of means, controlled (TWP 4)	$3.30\text{E-}4$
Medical Safety Systems (DSI/FF) (Interpoll, 1991)	$2.36\text{E-}4$
Modeled, 95% UCL, Geo Mean	$1.32\text{E-}4$
Cedar Sinai (baghouse)	$1.09\text{E-}4$
Durkee, 1991 (DSI/FF)	$9.76\text{E-}5$
Hamot (Lerner)(DSI/FF)	$4.2\text{E-}5$
Hershey (Bianco)	$1.68\text{E-}6$

Durkee (1991) also included estimates of metals partitioning; chromium was shown to partition to ash, not air (two percent to air). The facility described in Durkee, Medical Safety Systems and Medical Waste Associates are regional infectious waste incinerators; Cedar Sinai, Hershey and Hamot are large medical campuses with on-site incinerators for infectious waste, patient care and general waste disposal. The results of Mayo are very close to the uncontrolled emissions concentration of Chromium reported in Durkee. It is therefore expected that a DSI/FF should achieve a Chromium emission rate at least at the range represented by the 95 percent UCL of the controlled emission ($3.30\text{E-}4$ lb/ton).

Table 5. DIOXIN/FURAN EMISSIONS

Site	Emission Rate, Toxic Equivalents, lb/ton
Mayo, controlled (Interpoll, 1990a)	1.66E-5
95% UCL, uncontrolled (TWP 4)	5.53E-6
95% UCL, all datapoints (Messing)	4.12E-6
Modeled, 95% UCL, Geo mean	3.77E-7
Medical Waste Systems (Interpoll 1991, MMT 1991a, MMT 1991b)	2.46E-7
Medical Waste Associates (Entropy)	1.26E-7
Skovde, Sweden (outlet, w/o act. carbon)(Clarke)	8.37E-8
Skovde, Sweden, act. carbon (Clarke)	6.7E-9

Results indicate that medical waste incinerators with DSI/FF should achieve dioxin/furan toxic equivalent emissions of 5.53E-5 lb/ton. The use of activated carbon will further reduce overall dioxin/furan toxic equivalent emissions by 99 percent. The Skovde, Sweden medical waste incinerator dioxin/furan toxic waste equivalent emissions were reduced by 93 to 99 percent when activated carbon was used in DSI/FF. US EPA testing shows that total dioxin/furan emissions were reduced by 96 to 98.5 percent. The higher carbon injection rates are associated with the higher removal rates at both facilities. (Eddinger)

The uncontrolled emission rate from TWP 4 database is 5.53E-6 lb/ton toxic equivalents. The use of activated carbon with a DSI/FF applied to this facility could achieve 99 percent reduction of dioxin emissions, or 5.53E-8 lb/ton toxic equivalents.

To check this emission rate, the dioxin/furan testing results presented in Durkee were further evaluated. Good combustion control results in the prevention or destruction of dioxin/furan. The results from this testing event indicates that uncontrolled emissions rate of 550 ng/dscm dioxin/furan (total) at seven percent O₂ can be achieved. A ratio of .0416 to one relationship between toxic equivalents and total was demonstrated at the Medical Safety Systems facility in Cannon Falls, (MMT, 1991a). Applying this ratio results in an uncontrolled toxic equivalent emission rate for the Durkee facility of 22 ng/dscm (1E-6 lb/ton), or about five times lower than that rate represented in the TWP 4 data, for uncontrolled dioxin/furan emissions. Application of a DSI/FF would result in air emission rate of 6E-7 lb/ton (about 40 percent removal).

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ADDENDUM TO APPENDIX A

Re: PCB Emission Rates Development

PCB emissions were re-evaluated first to recompute the emissions rate based on the arithmetic average, and then to account for the reduction in PCBs when activated carbon is used to control emissions from waste combustors.

The upper limit of the 95 percent confidence interval of the arithmetic average of uncontrolled PCB emissions was developed from the TWP 4 database. The table of emissions is attached.

	Revised Estimate	CDM Estimate
	-----	-----
PCB	6.82E-6 lbs/ton	2.3E-4 lbs/ton
	8.95E-7 gm/sec	2.99E-5 gm/sec

Clarke describes PCB removal efficiencies with the use of activated carbon to be 99 percent over five air emission tests at a solid waste combustor in Hamberg-Stapelfeld, Germany. Using activated carbon would reduce PCB emissions by 99 percent to 6.82E-6 lbs/ton, or 8.95E-7 gm/sec.

The concentration of surface waters depends on the deposition rate of PCBs. Modeling results (Draft EIS Technical Work Paper 4: Air Emission and Deposition Modeling) show a unitized depositional rate of .0284 (g/m²/yr)/(g/s).

CDM's formula for calculating surface water concentration is described in Section 7 of the Draft EIS Technical Work Paper 5: Risk Assessment.

Surface water concentration =

(Deposition)(Duration)/(Volume of the water body)

(8.95E-7 g/s * .0284 (g/m²/yr)/(g/s)) * (1 year)/305 liters of water
per square meter of Willow
Creek surface area

= 8.34E-11 g/l or 8.34E-8 mg/l.

Water Quality Standard 2.9E-8 mg/l.

	PCB'S	PCB's (Mn of Mn)
St. Agnes (unc)		
St. Agnes (unc)		
St. Agnes (unc)		
Cedars (con)		
Cedars (con)		
Cedars (con)		
stanford (unc)		
stanford (unc)		
stanford (unc)		
stanford (con)		
stanford (con)		
stanford (con)		
Mayo (con)		
Mayo (con)		
Kaiser (unc)	9.70E-05	
Kaiser (unc)	1.26E-04	
Kaiser (unc)	1.12E-03	4.48E-04
Kaiser (con)	1.18E-04	
Kaiser (con)	1.11E-04	
Kaiser (con)	1.31E-04	1.20E-04
Med Waste (unc)	9.90E-06	
Med Waste (unc)	5.67E-06	
Med Waste (unc)	8.12E-06	7.90E-06
Average Unc		2.28E-04
Stand Dev Unc		2.20E-04
95% UCL		6.82E-04

APPENDIX B

EFFECT OF ALTERNATE POLLUTANT EMISSION RATES
ON HEALTH RISK ASSESSMENT
MAYO FOUNDATION MEDICAL WASTE INCINERATOR
DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS)

Prepared by: George Bollweg
MPCA Staff

SUMMARY

The issue of potential emission rate underestimation in the human health risk assessment used for the Draft EIS was reviewed. Revised emission rates for chemicals contributing the majority of risk reported in the risk assessment were developed. Since health risks are assumed to be directly proportional to emissions, scaling factors (revised emission rate/modelled emission rate) were used to approximate risks under the revised emission rate assumptions.

Estimates for four toxicity endpoints (cancer, renal toxicity, neurotoxicity, respiratory toxicity) showing highest numeric risks in the risk assessment were revised with the scaling factors. Risk estimates under the revised emission assumptions were lower for cancer and neurotoxicity, higher for renal toxicity and respiratory toxicity, but in all four cases remained below regulatory levels of concern.

These results support the conclusion that chronic health risks from exposure to air emissions from the proposed Mayo incinerator are unlikely.

BACKGROUND

The issue of appropriate pollutant emission rates for risk assessment purposes arose during review of the Mayo Draft EIS.

Since the proposed Mayo facility does not yet exist, its emissions were estimated with surrogate data from existing medical waste incinerators. In the Draft EIS Technical Work Paper (TWP) 5: Risk Assessment, Camp Dresser and McKee Inc. (CDM) used the 95 percent upper confidence limit (UCL) on the geometric mean of available test results to compute emission rates. In comments in a March 23, 1992, letter to MPCA staff from Judith Ball of the Minnesota Department of Health (MDH), Rita Messing of MDH argued that this method could underestimate resulting exposures and subsequent risks.

Revised estimates were developed in a May 7, 1992, memorandum from Anne Jackson to George Bollweg titled "REVISED EMISSION ESTIMATES FOR MAYO CLINIC HEALTH RISK ASSESSMENT". These estimates are likely to be better for risk assessment purposes than those modeled by CDM in TWP 5, since:

- (1) arithmetic mean-based UCLs were considered, as suggested by MDH, based on guidance from U.S. EPA's Risk Assessment Guidance for Superfund;
- (2) more recent data were considered, in addition to data available when the estimates for TWP 5 were derived. A larger database should provide more reliable estimates; and
- (3) control equipment similar to that proposed for the new facility was explicitly considered in the revised estimates, which was not done in TWP 5.

The exposure pathway results from TWP 5 indicate that certain chemicals contribute the most to predicted cancer and noncancer risk estimates. Since health risk can be assumed to vary directly with emissions, i.e., doubling emissions gives twice the risk, the ratio

revised emission rate / modeled (CDM) emission rate,

when multiplied by CDM's health risk results, can be used as a scaling factor to estimate health risks under the revised emission rates. I used the revised emission estimates for chemicals listed in the May 7, 1992, memorandum to compute this ratio. The chemicals listed in that memorandum contribute the most to the health risk estimates reported in the risk assessment.

METHOD

An exposure pathway analysis (i.e., chemical exposure estimates) had been developed in TWP 5, December 1991, second version. It received extensive review and was revised for acceptability. Emission estimates were obtained from the May 7, 1992, memorandum from Anne Jackson to George Bollweg titled "REVISED EMISSION ESTIMATES FOR MAYO CLINIC HEALTH RISK ASSESSMENT" as described above.

The numerator and denominator of the ratio

revised emission rate / modeled (CDM) emission rate

were obtained from page 1 of the May 7, 1992, memorandum. The ratio was used to develop scaling factors with which to multiply the numeric health risks reported in CDM's TWP 5 (Section 6.0) for mercury, cadmium, lead, chromium, and toxic equivalents of dioxin/furan (TEDF).

These chemicals were chosen since TWP 5 shows them to be the major contributors to health risks for both cancer and noncancer effects. For example, TEDF exposures represented about 90 percent of total cancer risk estimated in TWP 5. For noncancer risk, the TWP 5 pathway analysis (p. 8-56, Draft EIS; p. 6-25, TWP 5) shows that the largest hazard indexes are for renal toxicity, respiratory toxicity, and neurotoxicity, although those for respiratory and neurotoxicity, 0.03, are low. Unless emissions are assumed to be ~1000-fold greater than assumed in TWP 5, the Decreased Survival/Weight Gain and Dermal Toxicity Hazard Indexes can be ignored. The chemicals that contributed the majority of noncancer risk were mercury, cadmium, lead, and chromium.

Thus, the influence of revised emission estimates were of greatest interest for cancer risk, renal toxicity, respiratory toxicity, and neurotoxicity. The health risk estimates for these endpoints were modified by the scaling ratio described above.

SPREADSHEETS

Four spreadsheets were completed, one for each endpoint considered (cancer, renal toxicity, respiratory toxicity, and neurotoxicity). The spreadsheets sum the cancer and noncancer risk estimates for each chemical considered by exposure pathway, as reported in Section 6.0, TWP 5 (Risk Characterization). The effect of the emission estimate scaling factor on the "bottom line" for chemicals that contribute the most to each pathway (mercury, cadmium, lead, chromium, and TEDF) is shown on the spreadsheet.

RESULTS

1. Cancer Risk Estimates

The spreadsheet titled "Mayo Revised Cancer Risk Estimates 5/19/92" shows the effect of the revised TEDF emission estimate on cancer risk. Since the revised emission rate is about 15 percent of the emission rate used by CDM, the residential and farmworker cancer risk estimates decrease:

CDM estimated residential cancer risk:	2.3E-5
Revised residential cancer risk:	5.4E-6
CDM estimated farmworker cancer risk:	2.4E-5
Revised farmworker cancer risk:	5.5E-6

2. Renal Toxicity Estimates

The spreadsheet titled "Mayo Revised Renal Hazard Indexes 5/19/92" shows the effect of the revised emission estimates on the renal hazard index. The revised renal hazard index increased slightly from that estimated by CDM (from 0.38 to 0.41 in the farmworker scenario), but is still below 1.0, the level of regulatory concern. For the residential scenario, the revised emission assumption changed the hazard index from 0.37 to 0.40.

3. Respiratory Toxicity Estimates

Because of the lack of emission data for other chronic respiratory toxicants, the respiratory hazard index computed in TWP 5 was based entirely on chromium emissions. The revised hazard indexes on the spreadsheet titled "Mayo Revised Respiratory Hazard Indexes 5/19/92" reflect the 2.5-fold increase in chromium emissions under the revised emission estimate assumption (0.04 to 0.10 in the farmworker scenario, 0.03 to 0.09 in the residential scenario). Revised hazard indexes under both scenarios remain below 1.0.

4. Neurotoxicity Estimates

The spreadsheet titled "Revised Mayo Neurotoxicity HIs - 5/19/92" shows slightly decreased revised neurotoxicity hazard indexes for both scenarios, compared to those estimated by CDM. The revised and CDM hazard indexes for both residential and farmworker scenarios can be rounded to 0.03, well below the 1.0 level of regulatory concern.

Mayo Revised Cancer Risk Estimates 5/19/92

	A	B	C	D
1	PROPOSED MAYO INCINERATOR-PATHWAY ANALYSIS - CANCER RISK			
2				Cancer risk from
3		page from TWP5	TEDF cancer risk	all other carcinogens
4	BREAST MILK INGESTION			
5	infant	p. 6-22	1.0E-8	~0
6		breast milk residential total	1.0E-8	~0
7		breast milk farmworker total	1.0E-8	~0
8				
9	AIR INHALATION			
10	infant	p. 6-3	3.9E-8	1.5E-8
11	child	p. 6-4	1.0E-6	4.0E-7
12	adolescent	p. 6-5	9.7E-7	4.3E-7
13	adult	p. 6-6	8.4E-7	3.6E-7
14	farm worker	p. 6-7	1.3E-6	5.0E-7
15		air inhalation residential total	2.8E-6	1.2E-6
16		air inhalation farmworker total	3.3E-6	1.3E-6
17				
18	SOIL INGESTION			
19	child	p. 6-9	3.1E-7	3.0E-8
20	adolescent	p. 6-10	1.2E-7	1.0E-8
21	adult	p. 6-11	3.2E-7	3.0E-8
22	farm worker	p. 6-12	6.5E-7	6.0E-8
23		soil ingestion residential total	7.5E-7	7.0E-8
24		soil ingestion farmworker total	7.5E-7	1.0E-7
25				
26	PRODUCE INGESTION			
27	child	p. 6-13	3.0E-8	9.0E-9
28	adolescent	p. 6-14	2.7E-8	9.0E-9
29	adult	p. 6-15	7.9E-8	2.1E-8
30	farm worker	no separate table-adult value used		
31		produce ingestion residential total	1.4E-7	3.9E-8
32		produce ingestion farmworker total	1.4E-7	3.9E-8
33				
34	DAIRY INGESTION			
35	child	p. 6-16	7.2E-7	1.1E-7
36	adolescent	p. 6-17	6.7E-7	1.0E-7
37	adult	p. 6-18	1.9E-6	3.0E-7
38	farm worker	no separate table-adult value used		
39		dairy ingestion residential total	3.3E-6	5.1E-7
40		dairy ingestion farmworker total	3.3E-6	5.1E-7
41				
42	BEEF INGESTION			
43	child	p. 6-19	1.0E-6	1.0E-7
44	adolescent	p. 6-20	1.1E-6	~0
45	adult	p. 6-21	2.8E-6	2.0E-7
46	farm worker	no separate table-adult value used		
47		beef ingestion residential total	4.9E-6	3.0E-7
48		beef ingestion farmworker total	4.9E-6	3.0E-7
49				
50	DERMAL CONTACT			
51	child	p. 6-29	1.9E-6	5.0E-8
52	adolescent	p. 6-30	3.0E-6	9.0E-8
53	adult	p. 6-31	3.9E-6	1.1E-7
54	farm worker	p. 6-32	3.9E-6	1.1E-7
55		dermal contact residential total	8.8E-6	2.5E-7
56		dermal contact farmworker total	8.8E-6	2.5E-7
57				
58		residential grand total	2.1E-5	2.4E-6
59		farmworker grand total	2.1E-5	2.5E-6
60				
61		RESIDENTIAL CANCER RISK PER CDM	2.3E-5	
62		FARMWORKER CANCER RISK PER CDM	2.4E-5	
63				
64				

Mayo Revised Cancer Risk Estimates 5/19/92

	A	B	C	D
65	REVISED CANCER RISK ESTIMATES			
66				
67			Cancer risk	
68	RESIDENTIAL SCENARIO			
69	TCDD residential grand total		2.1E-5	
70	revised TCDD emission estimate scaling factor		0.147	
71	TCDD scaling factor x grand total		3.0E-6	
72	2.4E-6 from other carcinogens		2.4E-6	
73	REVISED residential cancer risk		5.4E-6	
74				
75				
76	FARMWORKER SCENARIO			
77	TCDD farmworker grand total		2.1E-5	
78	revised TCDD emission estimate scaling factor		0.147	
79	TCDD scaling factor x grand total		3.0E-6	
80	2.5E-6 from other carcinogens		2.5E-6	
81	REVISED farmworker cancer risk		5.5E-6	

Mayo Revised Renal Hazard Indexes 5/19/92

	A	B	C	D	E
1	PROPOSED MAYO INCINERATOR - PATHWAY ANALYSIS				
2	RENAL HAZARD INDEXES (HIs)				
3					
4		page from TWP5	Cd HI	Cr(VI) HI	Hg HI
5	BREAST MILK INGESTION				
6	infant	p. 6-22	5.7E-8	7.2E-10	4.8E-6
7					
8	AIR INHALATION				
9	infant	p. 6-3	NA	7.3E-3	not listed
10	child	p. 6-4	NA	3.7E-2	not listed
11	adolescent	p. 6-5	NA	1.5E-2	not listed
12	adult	p. 6-6	NA	9.3E-3	not listed
13	farm worker	p. 6-7	NA	1.4E-2	not listed
14					
15					
16	SOIL INGESTION				
17	child	p. 6-9	2.0E-5	6.0E-6	9.1E-5
18	adolescent	p. 6-10	3.2E-6	9.8E-7	1.5E-5
19	adult	p. 6-11	2.0E-6	6.0E-7	9.1E-6
20	farm worker	p. 6-12	3.9E-6	1.2E-6	1.8E-5
21					
22					
23	PRODUCE INGESTION				
24	child	p. 6-13	2.2E-4	4.0E-7	1.3E-3
25	adolescent	p. 6-14	8.3E-5	1.5E-7	4.9E-4
26	adult	p. 6-15	5.5E-5	1.0E-7	3.3E-4
27	farm worker	no separate table-adult value used			
28					
29					
30	DAIRY INGESTION				
31	child	p. 6-16	3.3E-3	2.7E-6	9.6E-4
32	adolescent	p. 6-17	1.3E-3	1.0E-6	3.7E-4
33	adult	p. 6-18	8.3E-4	6.7E-7	2.4E-4
34	farm worker	no separate table-adult value used			
35					
36					
37	BEEF INGESTION				
38	child	p. 6-19	4.1E-2	2.7E-6	1.3E-1
39	adolescent	p. 6-20	1.8E-2	1.2E-6	5.8E-2
40	adult	p. 6-21	1.1E-2	7.1E-7	3.5E-2
41	farm worker	no separate table-adult value used			
42					
43					
44	RESIDENTIAL SCENARIO				
45			Cd HI	Cr(VI) HI	Hg HI
46		infant	5.7E-8	7.3E-3	4.8E-6
47		child	4.5E-2	3.7E-2	1.3E-1
48		adolescent	1.9E-2	1.5E-2	5.9E-2
49		adult	1.2E-2	9.3E-3	3.6E-2
50		SUMMED HIs	0.08	0.07	0.23
51		CDM renal HI (Cd + Cr + Hg)	0.37		
52					
53		revised emission rate scaling factor	0.085	2.5	0.958
54		scaling factor x summed HIs	0.01	0.17	0.22
55		REVISED renal HI (Cd + Cr + Hg)	0.40		
56					
57					
58					
59					
60					
61					
62					

Mayo Revised Renal Hazard Indexes 5/19/92

	A	B	C	D	E
63	FARM WORKER SCENARIO		Cd HI	Cr(VI) HI	Hg HI
64		infant	5.7E-8	7.3E-3	4.8E-6
65		child	4.5E-2	3.7E-2	1.3E-1
66		adolescent	1.9E-2	1.5E-2	5.9E-2
67		farm worker	1.2E-2	1.4E-2	3.6E-2
68		SUMMED HIs	0.08	0.07	0.23
69		CDM renal HI (Cd + Cr + Hg)	0.38		
70					
71		revised emission rate scaling factor	0.085	2.5	0.958
72		scaling factor x summed HIs	0.01	0.18	0.22
73		REVISED renal HI (Cd + Cr + Hg)	0.41		
74					
75	NA = not applicable				

Mayo Revised Respiratory Hazard Indexes 5/19/92

	A	B	C
1	PROPOSED MAYO INCINERATOR - PATHWAY ANALYSIS		
2	RESPIRATORY HAZARD INDEXES (HIs)		
3			
4		page from TWP5	Cr(VI) HI
5	AIR INHALATION		
6	infant	p. 6-3	7.3E-3
7	child	p. 6-4	2.7E-3
8	adolescent	p. 6-5	1.5E-2
9	adult	p. 6-6	9.3E-3
10	farm worker	p. 6-7	1.4E-2
11			
12			
13	RESIDENTIAL SCENARIO		
14	infant	p. 6-3	7.3E-3
15	child	p. 6-4	2.7E-3
16	adolescent	p. 6-5	1.5E-2
17	adult	p. 6-6	9.3E-3
18		SUM	0.03
19		CDM respiratory HI	0.03
20			
21		revised emission rate scaling factor	2.5
22		scaling factor x summed HIs	0.09
23		REVISED respiratory HI	0.09
24			
25			
26	FARM WORKER SCENARIO		
27	infant	p. 6-3	7.3E-3
28	child	p. 6-4	2.7E-3
29	adolescent	p. 6-5	1.5E-2
30	farm worker	p. 6-7	1.4E-2
31		SUM	0.04
32		CDM respiratory HI	0.04
33			
34		revised emission rate scaling factor	2.5
35		scaling factor x summed HIs	0.10
36		REVISED respiratory HI	0.10

Revised Mayo Neurotoxicity HIs - 5/19/92

	A	B	C	D	E
1	PROPOSED MAYO INCINERATOR - PATHWAY ANALYSIS				
2	NEUROTOXICITY HAZARD INDEXES (HIs)				
3					
4		page from TWP5	As HI	Pb HI	Hg HI
5	BREAST MILK INGESTION				
6	infant	p. 6-22	8.8E-10	NA	not listed
7					
8	AIR INHALATION				
9	infant	p. 6-3	NA	NA	2.8E-3
10	child	p. 6-4	NA	NA	1.5E-2
11	adolescent	p. 6-5	NA	NA	5.9E-3
12	adult	p. 6-6	NA	NA	3.6E-3
13	farm worker	p. 6-7	NA	NA	5.1E-3
14					
15	SOIL INGESTION				
16	child	p. 6-9	1.6E-5	NA	not listed
17	adolescent	p. 6-10	2.6E-6	NA	not listed
18	adult	p. 6-11	1.6E-6	NA	not listed
19	farm worker	p. 6-12	3.2E-6	NA	not listed
20					
21	PRODUCE INGESTION				
22	child	p. 6-13	2.9E-6	NA	not listed
23	adolescent	p. 6-14	1.1E-6	NA	not listed
24	adult	p. 6-15	7.4E-7	NA	not listed
25	farm worker	no separate table-adult value used			
26					
27	DAIRY INGESTION				
28	child	p. 6-16	5.8E-7	NA	not listed
29	adolescent	p. 6-17	2.2E-7	NA	not listed
30	adult	p. 6-18	1.5E-7	NA	not listed
31	farm worker	no separate table-adult value used			
32					
33	BEEF INGESTION				
34	child	p. 6-19	5.1E-6	NA	not listed
35	adolescent	p. 6-20	2.2E-6	NA	not listed
36	adult	p. 6-21	1.4E-6	NA	not listed
37	farm worker	no separate table-adult value used			
38					
39			As HI	Pb HI	Hg HI
40	RESIDENTIAL SCENARIO	infant	8.8E-10	0.0E+0	2.8E-3
41		child	2.5E-5	0.0E+0	1.5E-2
42		adolescent	6.1E-6	0.0E+0	5.9E-3
43		adult	3.9E-6	0.0E+0	3.6E-3
44		SUMMED HIs	0.00	0.00	0.03
45		CDM neurotoxicity HI (As + Pb + Hg)	0.03		
46					
47		revised emission estimate scaling factor	1	0.031	0.958
48		scaling factor x summed HIs	0.00	0.00	0.03
49		REVISED neurotoxicity HI (As + Pb + Hg)	0.03		
50					
51	FARM WORKER SCENARIO	infant	8.8E-10	0.0E+0	2.8E-3
52		child	2.5E-5	0.0E+0	1.5E-2
53		adolescent	6.1E-6	0.0E+0	5.9E-3
54		farm worker	5.5E-6	0.0E+0	5.1E-3
55		SUMMED HIs	0.00	0.00	0.03
56		CDM neurotoxicity HI (As + Pb + Hg)	0.03		
57					
58		revised emission estimate scaling factor	1	0.031	0.958
59		scaling factor x summed HIs	0.00	0.00	0.03
60		REVISED neurotoxicity HI (As + Pb + Hg)	0.03		
61					
62	NA = not applicable				

APPENDIX C

CUMULATIVE MERCURY EMISSIONS

Prepared by: Anne Jackson, P.E.
MPCA Staff
REVISED MAY 1992

Mercury emissions and the subsequent long range transport of mercury were concerns expressed about the proposed incinerator, and were addressed in Technical Work Paper (TWP) 3. Since the preparation of TWP 3, comments were received about how mercury emission rates were predicted. Because of those issues, the cumulative impacts of mercury need to be re-examined.

Mercury emissions were evaluated within the framework of current Olmsted County mercury emissions in TWP 3. First, total mercury emissions in Olmsted County were estimated in pounds per year. The percent contribution from various sources was calculated. Table A summarizes these findings, including the revisions to the mercury emissions from Mayo Foundation's Institute Hills Facility. An explanation of the procedure used to calculate each estimate and the sources consulted can be found in Attachment I.

Mercury emission estimates for the proposed facility were then compared with the estimated mercury emissions that would occur from continued use of the existing IHF facility and with the mercury emissions that would occur from the incineration of Mayo's waste at the Olmsted County Waste to Energy Facility (OWEF).

No ambient monitors for mercury are available, therefore modeling was used to estimate the resulting ambient mercury concentration in the vicinity of the proposed project from the four largest mercury emission sources in Olmsted County.

OLMSTED COUNTY MERCURY EMISSIONS, 1988
POUNDS PER YEAR (ROUNDED TO 2 SIG. DIGITS)

<u>Source</u>	<u>Quantity</u>	<u>Percent of Total</u>	<u>Ambient Annual Conc. ($\mu\text{g}/\text{m}^3$)</u>
Coal Combustion			
Utility	22	4	
Industrial/Commercial	6	1	
Oil Combustion			
Distillate	5	1	
Residual	12	2	
Incineration	349	59	
Olmsted WEF			.0001
Mayo Institute Hills			.00105
Others			
Crematories	1	<1	
Landfill Emissions	40	8	.0006
Consumptive			.0001
Paint Application	110	20	
Labs 10	2		
Electric Lamps	20	4	
Fungicide	10	2	
TOTAL	585 lbs/yr	100%	.00185 $\mu\text{g}/\text{m}^3$

Screening modeling was done for the three largest sources of mercury in Olmsted County--incineration, landfilling and consumptive uses of mercury. Incineration sources are considered "point sources" (the emission source is a "point") while landfill emissions and consumptive uses are "area sources" (emissions occurs from a large area). The screening model used to estimate area sources allows for the modeling of sources up to 1000 meters by 1000 meters, and was used for landfills and consumptive mercury modeling. The predicted annual ambient air mercury concentration in the High Forest Township area is .00185 $\mu\text{g}/\text{m}^3$.

Two tests for mercury emissions from the Institute Hills Facility (IHF) has been conducted, one in January 1990 and one in August 1990. Because of field blank contamination, results from the January stack testing was not used to generate emission estimates for the proposed incinerator at High Forest Township. In order to make appropriate comparisons, the investigation of cumulative impacts from mercury emissions needed to be revised to eliminate the January 1990 results from the analysis. The emission rates in August 1990 were used to determine IHF facility's contribution to atmosphere mercury in Olmsted County.

Given the emission estimates in Attachment I and estimates of ambient air concentrations of mercury contained in Attachment II and Table A, the following observations can be made regarding mercury emissions from the proposed facility.

The IHF incinerator emits 115 pounds per year of mercury. IHF currently contributes 33 percent of the mercury released in Olmsted County, while the OWEF contributes 63 percent of the total mercury released to the air. Actual emissions of mercury from the High Forest Township facility is projected to be about 17 pounds per year, based on an operating schedule of 4576 hours per year (52 percent capacity). County-wide mercury emissions would decline 100 pounds to 482 lbs/year at this level. If the High Forest Township facility were operated at 80 percent capacity, much like the OWEF is operated, mercury emissions would be about 30 pounds per year, or less than six percent of the total county mercury emissions.

Modeling conducted to estimate the impacts of the proposed facility was used to predict mercury ambient air concentrations from the proposed facility. The maximum annual mercury concentration from the proposed facility would be .00103 $\mu\text{g}/\text{m}^3$, or about the same as the IHF incinerator current contributes to annual mercury ambient air concentrations.

Given the air pollution control equipment currently in use at OWEF and IHF, as well as the proposed incinerator, incinerating Mayo's waste at OWEF would not reduce overall mercury emissions, and could possibly increase overall mercury emissions. OWEF uses electrostatic precipitators (ESPs) for control of particulate matter. OWEF has demonstrated the operation of the ESPs to be very efficient for the control of particulate matter and metals associated with control of particulate matter. However, mercury removal efficiencies at ESPs typically is near zero to 30 percent.

The proposed Mayo Foundation facility would use dry sorbent injection and fabric filters with the addition of activated carbon for control of air pollutants. Scrubbing the flue gases with dry sorbents and capture of reactants with a fabric filter has been demonstrated to be the most efficient for the control of all pollutants from waste combustors, including mercury. The activated carbon assists in the capture of mercury, and could control emissions by 90 percent or better (Clarke, 1991).

And finally, emissions from paint application processes (and other consumptive uses) and landfills throughout the county contribute equally to ambient air concentrations. These sources of atmospheric mercury account for a relatively high contribution to local ambient concentrations, due to the very low source of emissions and the low gas velocity rates. Both of these characteristics of the emission source do not provide for dispersion of mercury, and is reflected in the ambient concentrations.

ATTACHMENT I
Mercury Emissions Methodology

The following describes the methodology used to derive the emission estimates presented in Table A. Note that, where only statewide information was available regarding a particular source, the figures were adjusted to represent Olmsted County based population estimates. The 1990 census reports a population of 106,470 for Olmsted County, or 2.4 percent of Minnesota's population.

COAL COMBUSTION

Coal is a heterogeneous solid originating from plant material. Nearly all of the elements, along with every mineral, can be found in coal. Because the material is heterogeneous, mercury emissions varies greatly.

Utilities Boilers

Rochester Public Utility reports that in 1988, 80,000 tons of Southern Illinois coal were combusted in its boilers (Hensel). Interior coal beds have a mean mercury concentration of .14 micrograms per gram ($\mu\text{g/g}$) of coal (WDNR).

Emissions from Rochester PUC is estimated at 22 pounds in 1988.

Commercial/Industrial Boilers

In 1988, Minnesota combusted one million tons of coal in commercial and industrial boilers (MN Department of Public Service). It is assumed that western coals are combusted, with a mercury concentration of .125 $\mu\text{g/g}$ (WDNR).

Emissions of mercury from commercial/industrial boilers, adjusted by population for Olmsted County, is estimated at 5.6 pounds in 1988.

OIL COMBUSTION

Distillate and residual oils also contain mercury. Distillate fuel oil is used by all economic sectors (residential, commercial/industrial, utilities, agricultural, and transportation) (MN Department of Public Service). Distillate oil has a mercury content of .066 ppm (WDNR).

Adjusted by population, the emissions of mercury from the combustion of distillate oils is 5.32 pounds in 1988.

Residual oil is combusted primarily by the commercial/industrial sector of Minnesota's economy (MN Department of Public Service). Residual oil has a mercury content of .13 ppm, similar to coal.

Adjusted by population, the emissions of mercury from residual oil combustion in Olmsted County is 12 pounds per year (WDNR).

INCINERATION

Three sources have been estimated; Olmsted County's Waste to Energy solid waste combustor; Mayo Foundation's Institute Hills medical waste combustor, and commercial/industrial incinerators operated throughout the county.

Olmsted County Waste to Energy

Olmsted County Waste to Energy waste combustor accepts municipal solid waste from Dodge and Olmsted counties. Air pollution control equipment consists of electrostatic precipitators.

In 1990, 59,000 tons of municipal solid waste was combusted at OWEF. Emissions from OWEF were measured to be .056 pounds/hour (PACE). This emission is equal to 220 pounds.

Mayo/Institute Hills (Revised, April 1992)

The Mayo Foundation owns and operates two modular incinerators at their Institute Hills facility. Testing was conducted in January and August of 1990. Problems with field blank contamination of the metals test in January caused the data to not pass the QA/QC validation process during preparation of emission estimates for the proposed facility (TWP 4).

August 1990 results show the average emission rate from IHF to be .0426 lbs/ton of waste incinerated. The resulting total emissions from IHF, combusting 1350 pounds per hour, with an operating schedule of 16 hours/day, five days/week, 50 weeks per year, results in mercury emissions of 115 pounds.

Mayo/High Forest Township

The High Forest Township facility is predicted to have a mercury emissions rate of $3.64\text{E-}3$ lbs/ton of mercury ($3.79\text{E-}3$ lbs/hr). The incinerator is projected to operate 4576 hours per year (TWP 1). Actual emissions would be 17.3 pounds per year. If the facility operated at 80 percent capacity (7008 hours/year), total mercury emissions would be 27 pounds per year.

Commercial/Industrial Solid Waste Incinerators

The MPCA estimates that there are 1200 on-site incinerators in Minnesota. These on-site incinerators are located at grocery stores, retail stores, schools, apartment complexes, nursing homes etc.

The MPCA conducted emissions testing of three small hospital's on-site incinerators. Mercury emissions were estimated to be $4.18\text{E-}6$ pounds per pound of waste combusted. These facilities are assumed to operate 1248 hours per year. Adjusting for population, solid waste incinerators in Olmsted County emit 14 pounds of mercury.

CREMATION

Cremation occurs with nineteen percent of the 35,000 deaths in Minnesota each year (Schwietz). During cremation, amalgam used to fill cavities decomposes to release its mercury. It is assumed that an adult has eight cavities, and the amalgam is 50 percent mercury (Mills). Adjusting for population, the emissions of mercury from cremation in Olmsted County is 1.4 pounds.

LANDFILL EMISSIONS

Olmsted and Dodge counties share a landfill for municipal solid waste bypassed at the OWEF. Mercury emissions at landfills in Sweden have been reported by Lindqvist et. al. at .8 metric tons per year. The population of Sweden is roughly the same as Minnesota. Adjusting to short tons and population, mercury emissions from landfilling (occurring in Dodge County) are 40.5 pounds.

CONSUMPTIVE EMISSIONS

Mercury is used as fungicides in paint, and in turf applications at golf greens. Mercury is used to manufacture fluorescent, mercury vapor, metal halide, and high pressure sodium lamps. The lamps are used in street light, high ceiling rooms, film projectors, heat lamps, and other applications.

Electric Lamps

The US Bureau of Mines reports that in 1988, 65,630 pounds of mercury were used in the manufacture of lamps in the United States. It is assumed that half of the mercury was used to manufacture indoor lamps, and that 30 percent of the mercury is lost to the atmosphere during disposal (WDNR). The other half is assumed to be used for outdoor lighting, and that 20 percent is lost to the atmosphere during disposal (WDNR).

Emissions are then adjusted based on Minnesota's population (1.75 percent of the national population) and Olmsted County's population. Mercury emissions from electric lamps is estimated at seven pounds per year.

Paint Application

The US Bureau of Mines reported that in 1988 434,188 pounds of mercury was used to manufacture paints. Sixty-five percent of the mercury used in paints is volatilized (WDNR). Adjusting for population, mercury emissions from paints in Olmsted County are estimated at 11 pounds per year.

The EPA in 1990 banned the manufacture of indoor paints containing mercury.

Laboratories

Mercury is used in labs in instruments, as reagents, and as catalysts for certain reactions. The US Bureau of Mines reports that 55,100 pounds of mercury was used by this application. Adjusting for population, and assuming that 25 percent of the mercury is lost to the atmosphere, labs account for 5 pounds of mercury in Olmsted County.

Fungicides

Turf fungicides are 73 percent by weight mercury compounds (Perotti). The use of fungicides depends on rainfall. Fungicides are lost to the atmosphere, run-off and soil. In 1988, 690 pounds of the fungicide was sold in Minnesota, which contain about 428 pounds of mercury. It is assumed that 20 percent of the fungicide is lost to the atmosphere during application, use and disposal of grass clippings. It is also assumed that 690 pounds of fungicide was used in 1988 in Minnesota. Adjusting for population, emissions of mercury from fungicide is estimated at ten pounds in Olmsted County.

ATTACHMENT II

Derivation of Ambient Air Concentrations

Screening modeling was used to estimate ambient air concentrations for all sources but for the High Forest Township facility. The results of modeling presented in TWP 4 were used to represent emissions from the High Forest Facility.

The distance from the emission point to High Forest Township was assumed for each emission source type, and provides a one-hour ambient concentration. The modeling results are multiplied by .10 to obtain an annual ambient concentration (MPCA 1991).

Olmsted Waste to Energy (8000m)

$$\text{Emission Rate} = .0072 \text{ lbs/hr (PACE)} = .0009 \text{ g/s}$$

$$(.10) \times (1.936 \text{ } \mu\text{g/m}^3 \text{ per } 1 \text{ g/s}) \times (.0009) = .0001 \text{ } \mu\text{g/m}^3$$

Institute Hills (8000m)

$$\text{Emission Rate} = .042 \text{ lbs/ton} \times 1350 \text{ lbs/hr burned} \rightarrow .0036 \text{ g/s}$$

$$(.10) \times (2.925 \text{ } \mu\text{g/m}^3 \text{ per } 1 \text{ g/s}) \times (.0036) = .00105 \text{ } \mu\text{g/m}^3$$

High Forest Township

$$\text{Emission Rate} = .0364 \text{ lb/ton}$$

$$\text{Activated Carbon w/DSI/FF} = .00364 \text{ lbs/ton}$$

$$(3.64 \times 10^{-3} \text{ lbs/ton}) \times (25 \text{ tons/day}) \times (\text{day}/24 \text{ hours}) \times (\text{hr}/3600 \text{ sec}) \\ \times (454 \text{ g/lb}) = .00048 \text{ g/s}$$

$$\text{Ambient Conc at High Forest Township (from TWP 3 modeling)} =$$

$$(2.16 \text{ } \mu\text{g/m}^3 \text{ per } 1 \text{ g/sec}) \times (.00048 \text{ g/s}) = .00103 \text{ } \mu\text{g/m}^3$$

Paint Application (8000m)

$$\text{Emission Rate} = .0004 \text{ g/s}$$

$$(.10) \times (.1364 \times 10^{-2} \text{ } \mu\text{g/m}^3) = .0001 \text{ } \mu\text{g/m}^3$$

Landfill Emissions (4000m)

$$\text{Emission Rate} = .0005 \text{ g/s}$$

$$(.10) \times (.631 \times 10^{-2}) = .00063 \text{ } \mu\text{g/m}^3$$

ATTACHMENT III

REFERENCES

Hensel, Joseph, Rochester Public Utility. Telephone conversation with Anne Jackson. Coal consumption in 1988. November 21, 1991.

Interpoll 1990a. Results of the January 1990 Air Emission Compliance Tests on the Mayo Foundation Institute Hills Facility Hospital Waste Incinerators in Rochester, Minnesota. April 1990.

Interpoll, 1990b. Results of the August 1990 Mercury Emission Tests on the Mayo Foundation Institute Hills Facility Hospital Waste Incinerators In Rochester, Minnesota. October 1990.

Lindqvist, O. et. al. Mercury in the Swedish Environment-Recent Research on Causes, Consequences and Corrected Methods, Industry Mercury Group and National Environmental Protection Board, Draft June 1990.

Mills, Allan. "Mercury and Crematorium Chimneys" Nature, Vol. 346 August 16, 1990, p. 615.

Minnesota Department of Public Service. Minnesota Energy Data Book Energy Trends from 1960 Through 1988. January 1990.

Minnesota Pollution Control Agency. Air Toxics Source Review Guide, Version 2.1. February 1991.

PACE. Letter to Duane Tupper, Olmsted County. Mercury Analyses. March 23, 1990.

Schwietz, David, Minnesota Department of Health. Telephone conversation with Anne Jackson, December 6, 1990.

White, David L, Kristina L. Nebel, and Michael Johnston. "Municipal Waste Combustors; A Survey of Mercury Emissions and Applicable Control Technologies" in Municipal Waste Combustion Conference Papers and Abstracts for the Second Annual International Specialty Conference, VIP-19. Air and Waste Management Association, 1991.

Wisconsin Department of Natural Resources. Mercury Emissions to the Atmosphere in Wisconsin. PUBL-AM-014, June 1986.

Perotti, Richard, Grace-Sierra Co. Letter to Dr. Greg Pratt, MPCA. Sales in Minnesota and mercury content of turf fungicides. November 6, 1990.

APPENDIX D

OTHER TOXICANTS POTENTIALLY EMITTED
FROM THE PROPOSED MEDICAL WASTE INCINERATORPrepared by: Kathryn Kramer
MPCA Staff

Chemicals are liberated, destroyed, and created during the process of incinerating waste. The types and amounts of chemicals liberated, destroyed, or created in the incinerator which are ultimately released to the atmosphere depends on several factors, including: the incineration temperature, the residence time of waste in the incinerator, the composition of the waste feed, and the compound-to-compound variation in the removal efficiency of the pollution control equipment. The risk resulting from compounds for which there was emission data available was evaluated in the risk assessment prepared for the Environmental Impact Statement (EIS). There may be many other compounds that could potentially be emitted from the proposed incinerator but there was not stack emissions data available to evaluate the risk resulting from these potentially emitted compounds.

Plastics have been singled out as a principal source of non-methane hydrocarbon (NMHC) emissions (trace organics). These trace organic compounds are of concern in the assessment of health risks resulting from the proposed incinerator. An extensive literature search was conducted looking for data regarding compounds that are emitted from the incineration of plastics. However, no data could be found that reasonably reflected possible emissions of NMHC from the proposed project.

An alternative to generating a shopping list of chemicals and asking the rhetorical question: "Are they emitted and in what concentration?" is to: 1) examine the expected total NMHC emissions from the system, 2) calculate the consequent exposure concentrations, and then, 3) ask the question "Are there any compounds that could conceivably be present as constituents of the total NMHC fraction of the stack gas that would be significant on a health-risk basis at the calculated exposure concentrations?"

The risk to human health resulting from exposure to these compounds, some which may be present in the emissions from the proposed facility, was evaluated. The following analysis reveals that there would be no significant human health risks resulting from emissions of these NMHC at the point of reasonable maximum exposure. In fact, the analysis indicates that the exposure concentrations calculated for several highly toxic NMHC compounds are anywhere from 3,000 to 7.7 million times less than the Minnesota Allowable Ambient Levels; 3,000 to 7.7 million times less than the level that would be cause for concern.

DETAILED DESCRIPTION OF THE ANALYSES

I. Assume:

1. Stack gas generation rate = $4.82 \text{ m}^3/\text{second}$.

From: Mayo EIS Technical Work Paper 4: Air Quality Emissions and Deposition

2. An unitized emission rate of 1.0 gram/second results in an annual average ground level concentration of 2.16 ug/m^3 at the point of reasonably maximum exposure (RME).

From: Dispersion modeling presented in the Mayo EIS Technical Work Paper 4.

3. One ton of NMHC compounds would be emitted per year by the proposed facility.

From: A review of operating test data from medical waste incinerators. Assume a reference NMHC molecular weight of 30.

4. Any single NMHC compound would constitute a maximum of 1 percent of the total NMHC fraction of the stack gas.

From: A review of data from mass spectrometer screening of NMHC indicated that, for a mixed waste system such as the proposed facility, no single compound is present in large concentrations. Rather, one sees a broad spectrum of organic chemistry. It is not unreasonable therefore to suggest that the absolute maximum annual average fraction of any one compound in the NMHC fraction is less than one percent of the total NMHC. Indeed, it is more likely that the "correct value" for any one compound is orders of magnitude smaller. The one percent maximum therefore represents a "worst case scenario".

II. Then:

1. Stack gas generation rate x weight conversion factors =
Weight of annual flue gas

155,000 tons/year

2. $\frac{\text{Weight of annual NMHC emission}}{\text{Weight of total annual flue gas}} = \text{weight fraction of NMHC}$

$\frac{1 \text{ ton}}{155,000 \text{ ton}} = .00000645 \text{ or } 6.45 \text{ parts per million (ppm)}$

3. Dilution occurring in distance between the stack and the point of RME =
96,050 times or approximately 100,000

4. Ground level concentration of the total NMHC fraction =

$\frac{6.5 \text{ ppm}}{100,000} = .0000645 \text{ ppm or } 6.45 \times 10^{-5} \text{ ppm}$

5. Ground level concentration of any single NMHC =

$$1 \% \text{ of above} = .000000645 \text{ ppm or } 6.45 \times 10^{-7} \text{ ppm}$$

6. Select several NMHC that have low Allowable Ambient Levels (that is, compounds to which exposure at low levels would pose a health concern):

hexachlorobenzene
actophenone
acrolein
1,3-butadienen
1,2-dibromoethane
vinyl chloride

7. Calculate exposure concentrations to these compounds (based on their actual molecular weight) and compare to Minnesota's Allowable Ambient Levels.

Chemical	Molecular Weight	Max. Exposure	AAL(b)	Safety
Concentration(a)	$\mu\text{g}/\text{m}^3$	Factor(c) $\mu\text{g}/\text{m}^3$		
hexachlorobenzene	284.8	.000000068	.0002	3,000
actophenone	120.15	.00000016	.02	125,000
acrolein	56.06	.00000035	.1	286,000
1,3-butadienen	54.09	.00000036	.036	100,000
1,2-dibromoethane	187.88	.00000010	.046	460,000
vinyl chloride	62.5	.00000031	2.4	7,740,000

(a) Maximum concentration was calculated as follows:

$$\frac{\text{molecular weight of reference NMHC (30)}}{\text{molecular weight of specific compound}} \times 6.45 \times 10^{-7} = \text{exposure concentration}$$

(b) Minnesota Allowable Ambient Level for toxic pollutant in air.

Source: Minnesota Pollution Control Agency. 1991. Air Toxics Source Review Guide Version 2.1. page 35.

(c) Safety Factors were calculated as follows:

$$\frac{\text{Allowable Ambient Level for compound}}{\text{maximum exposure concentration for compound}} = \text{Safety Factor}$$

REFERENCES:

Minnesota Pollution Control Agency. 1991. Air Toxics Source Review Guide Version 2.1. page 35.

Niessen, Walter. Camp Dresser and McKee Inc. Memorandum to MPCA staff. January 14, 1992.

APPENDIX E

Comment Letters Received

During the Draft EIS

Public Comment Period

Kathryn Kramer
PCA

RECEIVED - 18-92

FEB 20 1992

1

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

What happened to the moratorium on the incinerator - crematoriums that the Mayo Clinic wants to build by the Rochester (Mayo Clinic) airport? And what happened to the law about not building them within 10,000 feet of the airport and with sinkholes in the area? People all over the country are fighting these. They could be built at Institute Hills and also a former commissioner said that the county incinerator could take all the waste the Clinic has.

Now we know why the PCA has helped people commit crimes against us.

Since Nov. 1980 Hildebrandt, of the SCS helped Berber drain pesticides and commercial fertilizer from a continuous cornfield into our land and stream by ^{planning the} building of deep dikes which has poisoned our animals (a lot of them suffered really bad and many died) and ruined part of our land & road. The ASCS paid it, the town board and county approved it, and the PCA and DNR allowed it. In 1990 a trench was dug from where it was drained ~~into~~ our land - where there are no sinkholes - to the end of that field. That same year his erosion

(2)

~~was~~ filled in the town road ditch which the town board cleaned out about three years before and filled in the trench part way up the field. Because of all this the pipes in our well were ate out twice in 10 years as well as the holding tank and our well collapsed. No one would test for pesticides or look at the runoff coming in on our land.

also, Berbers and/or the people they hire spray pesticides and ammonia towards us every year in high winds and one of their relatives (Miller) dumped pesticides into another of our pastures one year which poisoned some of our animals then. They have also deliberately damaged the fences and part of Berber's line fence was washed out by his poison water and then the town board switched the line fence. The trench is also dug along the fence he is supposed to have but the town board switched. The town board before and now Berber have blocked the drainage on our farm.

The Rochester - Mayo Clinic airport has been torturing us since 1977 with the worst filthy polluting planes they could find. They buzzed us

(3)

all day and most of the night year round for many years and still torture us some. They come as low and loud as they can. These are huge NW cargo planes, military, all kinds of jets, etc. a for awhile a Kenya Airways plane. When they don't buzz us they don't go at all. They damage our crops, trees, pastures and our and animals' health (like the pesticides) and damage our buildings.

My mother wrote to the PCA to come and look at the crop damage and to stop the torture but was completely ignored. After that I went to the Cities with samples of crops and tree leaves and they said we were too insignificant to bother with and should go back locally.

Now we called locally and Marshall Cole said we should contact the PCA in the Cities. They said they would burn (in the crematoriums) mainly in N or NW winds so we would have most of the pollution from that too. Also people have said it's very bad for dairy cattle as well as other animals and people.

No wonder Gerber and Landherr of the PCA tried to force us to have a feedlot for the few animals that

(4)

have survived the chemical holocaust.

The county is also trying to force us to have a city address. Most other farmers don't. We also couldn't afford to plant our crops last year because of these crimes against us over the years. This is how the government and others run innocent hard-working people off their land.

We are women and organic.
Because of all these evil people
our mother got a stroke in 1986.

Shirley Kraemer
R.R. 3 Box 70
Stewartville, MN 55977

copy to Gov. Carlson

B.J. Kraemer
RR. 3 Box 70
Stewartville, Mn.

March 17, 1992

RECEIVED

MAR 20 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Kathryn Kramer
EIS Project Manager
Environmental Analysis Office, MPCA
520 Lafayette Road N.
St. Paul, MN 55155

Dear Kathryn Kramer,

Thank you for sending me a copy of the Mayo Medical Waste Incinerator Draft Environmental Impact Statement. I have read much of it and also attended the public meeting.

Many of my concerns regarding the EAW have been addressed more thoroughly such as the stack height and effects on ground water. Siting alternatives leave something to be desired. Conservation would be better served if the incinerator were sited by a Mayo building, hospital, enterprise or our own OCEF. I must say that the high-handed annexing of the site which was opposed by the township of High Forest and the local residents still rankles. In this EIS the site is described as 'an airport, sewage sludge land-spreading area, and agricultural land designated as industrial and commercial development and an industrial park'. This description only became a reality with the hostile take-over. As airport and sewage-sludge fields, it is flat and open and in no-way offensive to the eye. A few small, low businesses have developed along the highway but it still looks basically like farmland. Permitting the big tall incinerator will be the force that drives the area toward industrial and commercial development and away from homesteads and agriculture.

Because I was worried that the OCEF might be losing either dollars solid-waste fuel and/or both I talked to Bob Irelan at OC Public Works who assured me that the county has more solid waste than it can handle with the present facility.

I was pleased to read about the recycling program finally instituted at Mayo. I hope that having this new facility will not reduce the instinct to be 'politically correct' and that they will contribute to the effort to pressure suppliers to control packaging and to institute non-polluting manufacturing technologies.

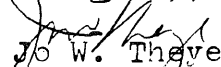
It's my understanding that incinerator ash could be considered hazardous in future and that producers of such ash are liable. Consequently bottom ash and fly ash should be handled separately. Is that still so? Is it possible that Mayo is asking to be per-

permitted before the rules for hospital incinerators are enforceable in order to avoid the hazardous ~~as~~pects of ash disposal?

At the time the OCEF was being built I served on the county recycling task force. As I recall the efficiency of an incinerator is optimal when it is brought up to speed, then used continuously for an extended length of time (i.e., 2 or 3 months, ~~24~~ hours per day) then shut down completely for maintenance and repair. Such operation wasn't discussed in this EIS.

Thank you for the second opportunity to comment. I do hope that the state will make every effort to direct the priorities of solid waste management toward the goal as written in the RCRA of '76: source reduction, direct reuse of products, recycle, incinerate and then bury.

Sincerely,


Jo W. Theve

7346 County Road 19 SE
Rochester, MN 55904

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MAR 20 1992

3-18-92

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Kathryn Kramer:

1. In Jeff Steiners' statement he said they had to own their own Incinerator, but in the paragraph "Purpose of Proposed Project" it says they have examined other Incinerators options but wish to retain control over treatment of its own medical waste, so why not keep the Incinerator where it's at?
2. You also said that the stack was 75' tall & was to be 125'. I want to know if this is the only stack you have shortened or have you just done this for Mayo in order to get it put up because it was too high for the airplanes?
3. There are also 7 70' wells south of it less than 1 mile away that will eventually be contaminated.

Where if it were to stay as is - you'd have city water.

4. I also heard that Red Wing had radio active waste, is this going to be burned up here also?

5. We have also had sewage dumped on the airport for 10-15 yrs.

They knife this on except when the ground freezes or is too soft they use irrigation & pump it on at least 4" deep & when they get stuck they disconnect the hoses & let it run. Plus there is already incinerator ashes in it. Isn't that enough pollution, wouldn't it be a little wiser to spread it out a little?

6. Jeff Steiner has lived here only 3 short years & already he's the expert! He'll no doubt move if it gets put in. You know most of

us are farmers that have
been here 35-40 years
along with some of the
home owners in the area.
He can make a living elsewhere
if need be - what is our choice

Darrell Luhnmann
503-80th St. S.E.
Rochester, MN
55904

We also have a creek running
through our farm which is the
only source of water they have
during the day in the summer.
My question is we are less
than $\frac{1}{4}$ mile away - how long
will it be before their water
is contaminated. Sewage also
runs in this.

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4

MAR 20 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

3-19-92

all I seemed to hear at the meeting was we need a incinerator but nobody wants it in there back yard. I would like to requote that they ~~don't~~ don't want it in there back yard they want it in ours I don't know what it takes to get something through peoples heads but you can't dump all your waste such as the sludge & an incinerator fall out in one place before something goes wrong with the Environment.

I ~~do~~ want to know how they can put it up when the total calculated cancer risks from modeled emissions are approximately two per 100,000 for both the residential and the farm worker scenarios. this level exceeds the acceptable guideline of one per 100,000 established by the Minnesota Department of Health

on page 9-4 you said property values jumped from \$8,000 to \$65,000 an acre this was not a incinerator nobody wants to live by one by choice unless its pushed down their throats like your doing to us. you couldn't get us to let you put

it up so you moved to Rochester
and took it from us. you want
all the money that comes to the
city plus outside the city ~~plus~~
which ~~it~~ is \$737 million but you
want ~~to~~ all the waste that comes
~~from this~~ dumped on high forest what
a convenience

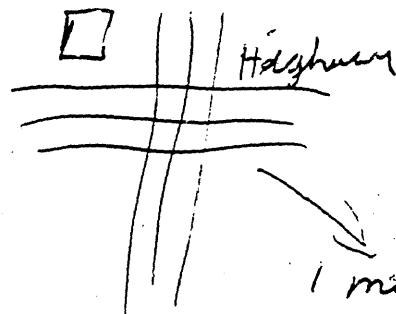
In 1989 that site was zoned
Highway Commercial how could you
rezone to General Industrial so
easy just so you could get the incineration
in, things seem to fall into place
to ~~make~~ easy for Mayo. Their suppose
to be fighting cancer not promoting it.

I can't understand why some of
this stuff can't go N-E or W of
Roch. instead of always South!!

What's this
farm worth
now?

Danell Lubman
503 80th St
South East

incinerator



creek my cows drink from

would you buy it

340 acres

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MAR 27 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

3-24-92

You say you have surveyed the sight & said it's a good one, but there are sink holes to the SE & NW of it. The ones to the SE have already leaked Lasso & Atrex into a well owned by Paul Gerber.

You also own a Graham farm by the Truck stop, what's wrong with that sight, it's closer to town.

The Airport sight already has your Sludge & Airplane Pollution. Why add more to this damn thing? Don't you think we have enough of Rochester's garbage out here already?

Rochester Public Utilities had already started digging poles in for power & Bill made them stop. Are you that dirty that you don't even need permits??!

Rochester also dug a well cut at the dump north of town which was supposed to be the

perfect sight. People told them about the sink holes but nobody listened, they had to pour countless tons of concrete to even grout it. This was all done very hush hush & now the dump closed.

Several others around here are against the incinerator but won't say anything because they work for the Clinic & have a fear of losing their job if they do.

What would ever happen if by some act of God a plane would crash & land on this thing? That's one reason houses can't be built that close to the airport - but YOUR INCINERATOR can !!!!

Darrell Kuhlmann

RECEIVED

MAR 24 1992

TO: KATHY KRAMER
FROM: CYNTHIA BOYD *CB*
DATE: MARCH 23, 1992
SUBJECT: COMMENTS ON MAYO MEDICAL WASTE INCINERATOR EIS/HRA
HDR Project Number 06564-004-164

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

HEALTH RISK ASSESSMENT

There was one "major" and several "minor" problems with the risk assessment. It appears from table 4-39 that the total estimated chronic daily intake via the dermal and soil ingestion pathways were calculated by summing infant, child, adolescent, adult resident, AND adult farm worker--thus the RME gets 122 years of exposure. Only one adult scenario should be factored into the exposure and contribute to the daily intakes. If both adult scenarios were included in the intake calculation, it leads to the question of whether they were also summed for the cancer risk estimation. Since these two pathways constituted approximately 50% of the intake (and risk), this one error may have had a "snowballing" effect. The cancer risk thus calculated would be an overestimation.

The minor problems in the risk assessment are detailed below.

page 4-31 inhalation CDI does not discuss any absorption factor, and none is shown in equation, yet tables 4-8 through 4-12 incorporate one for arsenic and TEDFs.

page 4-31 statement made that table 4-13 presents soil ingestion assumptions; in my copy of document table 4-13 presents assumptions for exposure via swimming.

page 4-35 assumption for adolescents inhalation made on page 4-32 was 19 m³/day; table 4-10 uses 20 m³/day.

page 4-36 assumption for adult exposure duration made on page 4-32 was 52 years; tables 4-11 and 4-12 use 17 years.

page 4-45 assumption for adolescents' skin surface area does not include exposed face?

page 4-51 should note that derivation for C_f (chemical concentration in food) is detailed in Appendix E.

page 4-82 biomagnification/bioactivation may lead to underestimation; no mention is made that the deposition modeling used was for "worst case" year, and that exposure is set at site of maximum impact (which overestimates the risk).

page 4-84 should mention uncertainty regarding soil-to-plant uptake factors (and soil-plant-animal, and soil-plant-animal-human)

- page 6-9 through 6-22 why isn't mercury included as a neurotoxin in the noncarcinogenic exposure hazard quotient? Its target organ (system) is the nervous system.
- page 6-33 through 6-35 THESE TABLES DO NOT SHOW THE ACTUAL HAZARD QUOTIENTS AS DESCRIBED ON PAGE 6-1. ANOTHER TERM SHOULD BE USED WHEN REFERRING TO THESE (e.g., risk quotients).
- page F-3 the amounts of feed consumed by dairy cattle and beef cattle don't match the sum of their intakes. Dairy cattle consume 18 kg of feed, but intake is 1 kg of grain and 14 kg of hay. Beef cattle consume 15 kg of feed; this is made up of 6 kg grain and 12 kg hay.
Also, under soil ingestion $2\% = 0.02$ not 0.2
ditto $1\% = 0.01$, not 0.1
- page F-5 Why are the chemical concentrations in grain different than those in hay/grass? These concentrations match up with those in vine crops; doesn't seem appropriate.
- page H-4 body weight for a young child in rest of document in 14 kg; when the TEDF ADI is calculated here 16 kg was used. Also, the TLV for H₂SO₄ in the text is given as 10 ug/m³, but given as 1000 in table H-1.

ENVIRONMENTAL IMPACT STATEMENT

- page 4-16 Why are different densities assumed for the general wastes vs. the red bag wastes? If anything, I would have guessed the heavier density for the red bag waste. The basis for the different densities should be identified.
- page 4-18 The second paragraph discusses the cart washing facility, and mentions a bar code on the carts. This is the first place this bar code is noted. Could the bar codes have been discussed earlier (e.g., page 4-16)?
- page 4-22 The sum of all industrial wastewater flows from the facility= $2112 + 1334 + 1032 + 1200 = 5678$, not 5688 g/d.
- page 4-24 Under the Proposed Facility Monitoring, ash testing is discussed. In this discussion, testing for gas composition is mentioned. How is gas composition determined from ash testing?
- page 5-1 The air emission and solid waste facility operating permit status is listed as "in preparation". Wasn't this document submitted by HDR? Is a new document, based on modeling done for the EIS, being prepared?
- page 6-4 Under Chemical Disinfection, it is noted that there is a potential for reuse of the wastewater as a laundry

process water. With increased suspended solids and organic compounds in the water, I don't feel reuse in the laundry is a realistic reuse option.

page 6-10 General hospital wastes make up approximately 42% of Mayo's waste. Of this, 35% (by weight) is plastic. If I've done my math correctly, it appears that over one ton per day of plastics are discarded. I don't see any plastics recycling program noted, or any discussion of substitution/reduction of use. A statement regarding the variety of types of plastics and recycling potential would have helped.

page 6-15 Under Waste Reduction, it is noted that red bag wastes are single-bagged under new policies (Mayo, 1989). Page 4-16 states that red bag wastes are double-bagged. Why the contradiction?

page 7-21 Is there any way to prevent fugitive emissions from the fly ash (e.g., using covered containers or enclosed area)?

page 8-23 What is the basis (size, pollution control equipment, etc.) for the mercury emissions contributions from the various sources in Olmsted County? Are there battery recycling programs at any of the incinerators? I wasn't aware that use of electric lamps would generate mercury emissions (table 8.2-10). Do you mean to say that disposal of electric lamps generates Hg emissions, or electrical generation results in Hg emissions?

page 8-24 A mercury emission rate of 0.0012 g/sec was calculated for the proposed facility; however, page 8-23 states the emission rate of 0.0005 g/sec was used for the proposed facility. Which was used, and why the differing rates?

page 8-39 A statement indicating that Technical Work Paper 5 is the detailed, full Health Risk Assessment should be included. Section 8.5 in the EIS is only a summary.

page 8-40 The sentence discussing terrestrial species within the study area was poorly worded, leaving me with the impression that white-tailed deer are predators.

page 8-41 Unless my memory of organic chemistry fails me, I believe that 1,1-dichloroethene and 1,1-dichloroethylene are the same compound. Ditto tetrachloroethene and tetrachloroethylene, and trichloroethene and trichloroethylene.

page 8-43 The first statement under Exposure Assessment notes the location of the RME is 224 meters northwest of the stack. Should be 224 meters northeast.

page 8-48 The fact that there is no RfD or RfC for lead is not because lead wasn't investigated but because EPA hasn't issued one. The source of the information is not "-", but IRIS and HEAST.

page 8-54 through 8-55 SEE THE COMMENT MADE ABOVE FOR PAGE 6-33 THROUGH 6-35. THESE ARE NOT THE TRUE HAZARD QUOTIENTS CALCULATED ACCORDING TO EPA GUIDANCE.

page 10-2 The removal efficiency at the Swedish incinerator was given as 93 to 99 percent. Was this for all pollutants or for dioxins/furans only?

page 10-4 Section 10.4 discusses PCB emissions; however, section 10.4.3 purports to address addition of activated carbon to reduce dioxins. Should be changed to "reduce PCBs"?

There are the bulk of my comments. If you'd like to discuss any of them further, please feel free to give me a call at 592-5462.

**Minnesota
Healthcare
Partners, Inc.**

7

RECYCLED PAPER 



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MAR 23 1992

**MPCA ENVIRONMENTAL
ANALYSIS OFFICE**

March 20, 1992

Paul Taylor Hess, J.D.
Executive Vice President

Kathryn Kramer
EIS Project Manager
Environmental Analysis Office
Administrative Service Division
MINNESOTA POLLUTION CONTROL AGENCY
520 Lafayette Rd
St. Paul, MN 55155

RE: Comments on Mayo Foundation Draft Environmental Impact Statement

Dear Ms. Kramer:

Minnesota Healthcare Partners Inc. (MHP) wishes to offer comments regarding the Draft Environmental Impact Statement (EIS) prepared by the MPCA for a medical waste incinerator proposed by the Mayo Foundation.

Before outlining MHP's comments, let me first offer a brief background about MHP and what its hospitals' activities have been to date in managing their medical waste. This background provides the context for MHP's specific comments on the Mayo EIS.

Background on MHP

MHP is a collaborative effort of 18 Twin Cities hospitals, organized and incorporated in January 1990 to develop and implement collective solutions for common operational problems shared by hospitals. MHP, a for-profit corporation, is wholly owned by the Council of Hospital Corporations (CHC), a trade association of non-profit Twin Cities hospitals.

Hospitals participating in MHP include: Abbott-Northwestern, Fairview hospitals (Ridges, Riverside and Southdale), HealthEast hospitals (Divine Redeemer, Midway, St. John's and St. Joseph's), Health One hospitals (Mercy/Unity, Children's Hospital of St. Paul, and United), Lakeview Memorial, Methodist Hospital, Minneapolis Children's Medical Center, Ridgeview Medical Center, St. Francis Regional Medical Center, St. Paul-Ramsey Medical Center, and the University of Minnesota Hospital and Clinic.

Based on an extensive medical waste study in 1989, CHC hospitals concluded that they needed to work together to shut down their outdated incinerators and underwrite the construction of one new, facility to handle just non-recyclable, infectious and pathological waste. Not only was it seen as protecting public health and the environment, but it was also viewed as the best means to control their own destiny, limit their liability as waste generators, and manage their long term disposal costs.

In early 1990, CHC created MHP and asked it to site and build an incinerator to handle only infectious and pathological waste. Six months later, facing growing opposition from environmentalists and others, MHP was forced to withdraw its incinerator proposal. After re-evaluating their options, MHP hospitals agreed in July to sponsor a first-of-its kind feasibility study of non-burn technologies and siting and invited representatives from key environmental organizations, hospitals, community groups, academia, and state regulators to participate.

The mission of the study was to determine whether one or more non-burn technologies could adequately treat infectious and pathological waste and to recommend a process for siting an acceptable non-burn technology. Disposal of low level radioactive waste was not part of the study's mission. Study attendants have included: Abbott-Northwestern, Audobon Society, Clean Water Action Project, Citizens for a Better Environment, Fairview, HealthEast, Health One, Methodist Hospital, MN Citizens for a Clean Environment, MN Department

of Health, MPCA, Project Environment, St. Paul-Ramsey Medical Center, Dr. William Stephens, the University of MN, and Donald Vesley from the School of Public Health.

As part of the Study, MHP surveyed Twin Cities hospitals to review the approximate quantities and material types of infectious and pathological waste requiring disposal. Numerous companies also were contacted by MHP to obtain the latest information on alternative treatment technologies. Twenty companies representing ten different technologies responded with information. Alternative technologies reviewed by the Study Group included: chemical/mechanical treatment, electron beam, electro-thermal deactivation, microwaving, plasma torch, pyrolysis, and steam sterilization.

After reviewing summary reports on each technology, the study participants selected three technologies to study further: chemical/mechanical, microwaving, and steam sterilization. Vendors offering each technology were chosen to present detailed information on their technology. Presentations were given in December 1991. In January 1992, a presentation on electro-thermal deactivation was requested.

Based on agreed-upon criteria, the study participants evaluated the four technologies and recommended two non-burn technologies as being acceptable for the MHP hospitals to site: microwaving and steam decontamination. Participants also agreed that neither recommended technology was capable of handling human or animal anatomical remains or trace chemotherapy waste and that incineration currently was the only accepted means for treating such wastes provided that the hospitals remained committed to waste and toxics reduction.

Comments on the Mayo EIS

The comments below are made by MHP based upon information obtained during the feasibility study. Study participants have not been asked to review and comment on the EIS as part of the study. Consequently, MHP's comments below can not be attributed to each of the organizations that have participated in the study.

Except for comment #1, the remaining comments are confined to "Chapter 6: Alternatives Analysis" in the EIS.

1. Mayo Foundation should be commended for taking leadership in its attempt to manage its own waste stream. As a waste generator, Mayo clearly recognizes that it has a responsibility as well as liability for properly disposing of its wastes. Mayo has formulated a proposal which permits it to manage each of its waste streams by itself except for its hazardous waste. Unlike many other waste generators, Mayo is not attempting to shift the responsibility for proper management to others, be they commercial waste disposers or local government. Mayo's motive in managing its waste itself appears not to be profit making. Mayo's proposal appears to reflect an attempt to do what it perceives to be best for the environment as well as its patients and public health in general.

MHP supports Mayo's effort to manage its waste itself and to control its own destiny. MHP believes that the public interest is better served and the environment better protected by policies which encourage generators (e.g., hospitals) to manage their wastes themselves, rather than by policies which force generators to rely solely on commercial disposers.

2. Over all, MHP concurs with the general thrust of the EIS analysis on alternative technologies. MHP and the information obtained by its Study over the past eight months confirm that the most promising alternatives to incineration are: steam sterilization, microwaving, electro-thermal deactivation and chemical disinfection. Since no scientific reason necessitates sterilization and state law currently does not require it, sterilization is not required to make infectious waste safe to handle. Consequently, any of these technologies can adequately decontaminate most infectious wastes, making them safe for handling. As the EIS correctly notes, electro-thermal deactivation is not for sale. Consequently, the only three viable choices for Mayo to consider incorporating in its facility are: steam sterilization, microwaving, and chemical disinfection.

3. The MPCA has approved chemical disinfection as an acceptable treatment technology for disinfecting infectious waste at an off-site location. It also has noted, however, that an EAW may be required to site the technology. MHP and the information obtained during its Study confirm that chemical disinfection generally appears to have a greater impact on the environment than the other two alternative technologies due to the effect of residual treatment chemicals in water emissions and in the treated residue. MHP Study participants, therefore, have recommended microwaving and steam sterilization.

4. MHP agrees that none of the alternative treatment technologies cited in the EIS are recommended to handle radioactive waste, chemotherapy waste and anatomical waste. Chapter 7 of the EIS suggests that these waste represent about 3376.2 pounds per week of Mayo's waste. (Radioactive 2112.5 lbs; chemotherapy 70 lbs; and pathological 2.7% or 2300 lbs. of anatomical and trace chemotherapy waste per week.

5. MHP concurs with EIS statements that the only accepted method for treating trace chemotherapy and anatomical waste (human and animal tissue) is to burn it. None of the non-burn, alternative technologies are recommended to handle these wastes. MHP and the recommendations of its Study support the incineration of trace chemotherapy and anatomical waste, provided that sincere efforts are made to eliminate any unnecessary packaging and to reduce toxic materials in the packaging.

6. The recommendations from the MHP Study to date support the use of a combination of technologies to manage infectious waste. MHP would support Mayo in considering the use of a combination of technologies to manage its waste. Specifically, MHP agrees that:

a. Hospital waste should be properly segregated, e.g., recyclable, hazardous, radioactive, infectious, anatomical, trace chemotherapy, and general solid waste. General solid waste should be managed through waste reduction, composting, land filling, etc.. Recyclable materials such as aluminum, glass, ferrous metals, paper, and corrugate should be removed from the general waste stream. And reduction programs should be implemented to reduce the overall volume of general hospital waste.

b. Only that waste which is defined as infectious and pathological should be segregated and placed in "red bags". Packaging and other non-infectious waste should not be placed in "red bags" and treated as infectious or pathological waste.

c. Infectious and pathological waste other than trace chemotherapy and anatomical waste can be treated with an alternative treatment technology such as steam sterilization or microwaving. To the extent that it is economically feasible and that adequate markets exist, some plastic and metals could be recycled from the treated residue before disposal. One benefit of using an alternative technology, noted by many of the participants in MHP's Study, is that one retains the ability to recycle or remove some plastics and metals in the future.

d. Trace chemotherapy and anatomical waste should be incinerated provided packaging and toxics are minimized.

Summary

MHP's efforts to date and the information obtained during its Study on Non-Burn Alternative Technologies and Siting are consistent with the Alternative Analysis section of the EIS. MHP's Study supports the use of a combination of technologies to manage infectious waste; consequently, MHP would support the Mayo Foundation in considering the use of a combination of technologies to manage its waste. Specifically, MHP and its Study also confirm: (a) a non-burn treatment technology such as steam sterilization or microwaving can adequately decontaminate most infectious and pathological waste; (b) trace chemotherapy and anatomical (human or animal) waste are not recommended for treatment by any of the cited alternative non-burn

technologies; and (c) incineration is the only accepted method for treating trace chemotherapy and anatomical waste provided efforts are taken to reduce packaging and toxics.

Currently, the Minnesota Department of Health indicates that it can not approve alternative, non-burn treatment technologies until after its infectious waste rules have been promulgated. Consequently, it is not prudent for a hospital to install a non-burn treatment technology to process infectious waste on hospital grounds.

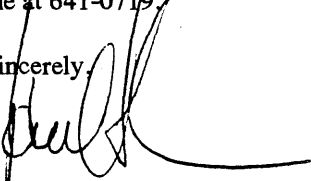
A Mayo facility using a combination of technologies would be the only facility in the upper Midwest that could, at one location, treat infectious waste with a non-burn alternative and incinerate trace chemotherapy and anatomical waste. It also would be the only non-commercial facility in Minnesota permitted to use a non-burn technology to handle infectious waste.

Today, a hospital that wishes to shut down its incinerator and use a non-burn treatment technology has only one choice: It must ship its waste off-site to the only Minnesota facility using a non-burn treatment technology. This commercial facility currently sends its residue to a land fill high on the Superfund cleanup list and the chemotherapy and anatomical waste to an out-of-state incinerator that does not meet air emissions standards as stringent as Mayo would have to meet.

The Mayo Foundation's goals in managing its waste appear virtually identical with those of the MHP hospitals: both wish to control their own destiny, manage their long-term disposal costs, and minimize future liabilities. Neither's primary motivation is to profit from the management of their waste. Both wish to see their waste handled safely and responsibly. Given these common goals, MHP is interested in working closely with Mayo as it considers the use of a combination of technologies to manage its waste.

Thank you very much for the opportunity to comment on the EIS. Should you have any questions, please call me at 641-0719.

Sincerely,



Paul T. Hess
Executive Vice President

RECEIVED

MAR 23 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Comments and Concerns

Mayo Incinerator Environmental Impact Statement

**to: Kathryn Kramer, EIS Project Manager
Environmental Analysis Office, MPCA
520 Lafayette Road North
St. Paul, MN 55155**

**from: Norman C. Erickson
6230 NW 34 Ave.
Rochester, MN 55901**

March 21, 1992

General Comments:

1. Incineration is an old technology. It is wasteful. An aggressive program of waste reduction, reuse and recycling ought to be the centerpiece of Mayo's waste management strategy. Incineration gives them a cheap and easy out from more responsible actions. Mayo's rather recent entry into the world of recycling has plenty of room for additional improvement. The EIS states that the amount of red-bag waste generated has remained about constant at 6030 pounds per day from 1988 to 1991. Medical Center Hospital of Vermont in Burlington VT is separating "clean" pre-op waste from its operating room waste stream, reported in the December 1991 *Hospital Materials Management* magazine, page 16.
2. It is not appropriate to bypass the Olmsted County Waste to Energy Facility and the societal benefits of electrical co-generation. There is no stated commitment in the EIS to use the thermal energy produced, just a suggestion that a laundry or some other business might locate nearby at some indefinite future time.
3. It is inappropriate to permit a facility that will remove incentives for Mayo and other area medical facilities to pressure the medical supply industry to design and package medical products for waste minimization, reuse or recycling. Reference sidebar in attached article.
4. The Mayo Incinerator Draft EIS conveys a deep and frequently stated concern by the Mayo Foundation regarding its desire to have direct control over the handling of its wastes. The wish to "have control" is irrelevant to the purpose of the EIS. That stated desire or suggestion should be deleted from the entire document. Every person and business would like to control things that they cannot, for one reason or another. That's life, that's business.

Hazardous wastes regulated by the Resource Recovery and Conservation Act (RCRA) and sealed source radioactive wastes are handled by vendors, and no concern was expressed in the EIS about those relationships.

5. The capital cost of the incinerator is estimated to be about \$10.6 million dollars. The cost ought to include the cost of the money over the life of the incinerator with a normal return on investment in market instruments, or expected financing costs. The real cost may be closer to 20 to 30 million dollars. Is that the best use for that amount of capital in the community?

Consideration ought to be given to joint development with the Olmsted County WEF to minimize capital costs, IF incineration capacity MUST be added to the area at some future time.

6. The EIS document does not state that there is any great urgency in getting the incinerator permitted and constructed. They state that their Institute Hills Farm incinerator meets current emissions standards.

There is a great deal of research and work on medical waste processing going on around the world. Several references to other facility's success with incinerators were made, but there was relatively little said about new technologies. Reference my weekly commentary column of March 20, 1992 (enclosed).

Waste disposal technologies will evolve rapidly in this decade because waste disposal problems are pervasive. The construction of a new incinerator now will lock the Mayo Foundation into an obsolete and wasteful technology for decades.

What other alternatives are being considered for approval in Minnesota?
What other alternatives have merit and look promising?

7. The engineering study of abandoned wells and sinkhole potential seems to have been limited to the 14+ acre site on which the facility would be constructed. The entire plume drop area should be examined for possible leakage to aquifers.

8. The EIS does not state how the stack, combustion and draft blowers, pollution controls and waste heat removal components will be sized. It should clearly state that all incinerator support systems will be sized to support the operation of only one incinerator burn unit at a time. The concurrent operation of both incineration units will become too attractive to resist if the facility is designed to support that option.

9. What is the operating plan in the event that the electrical supply fails in the middle of a burn, perhaps with the feed ram retracted for a feed cycle? Will there be risk to equipment and personnel? Olmsted County's WEF unit has continuous power available from its generators to maintain operations in the midst of a power outage.

10. It is probable, that as recycling continues to gain acceptance and as the market for recycled materials matures, surplus capacity will develop at the Olmsted WEF. As tipping fees escalate, competition will increase for the waste materials. New businesses may charge less for tipping wastes if they learn how to recover useful materials in the waste stream. That could further reduce the Olmsted WEF flow of combustible waste and "add" capacity.

11. There are many references to the use of activated charcoal to capture dioxins, furans, mercury and other toxins before combustion gases reach the stack. There is no stated commitment to use it in the proposed facility. The EIS states that the Mayo incinerator would have lower noxious emissions than the OWEF facility. Perhaps Mayo and the county could mount a joint effort to install the sprayed activated charcoal into the OWEF so that the county would enjoy the health benefits all wastes.

12. The EIS states that wastes would be accepted from more than just the local Mayo Foundation ventures, e.g. other hospitals, medical, dental and veterinary clinics in Olmsted and Dodge counties. Will potential customers in other counties, Mayo affiliates or not, be excluded from becoming a customer of the proposed new incinerator? The EIS does not preclude the possibility of accepting wastes from any potential customer with a bag of garbage.
13. The incineration of low level radioactive wastes and the subsequent dumping of contaminated water and burial of radioactive ash is inherently unappealing!
14. With no energy recovery and with an estimated waste stream content of only one-third red-bagged medical waste, the proposed facility is just a high tech garbage burner.
15. Is there really only 322 lb/day of waste food and soap from Mayo, Methodist and St Mary's? That seems extraordinarily low. The Olmsted County Waste Characterization Study from December 1988 states that over 11% of the non-recyclable wastes received at the Olmsted County WEF was food wastes. It further states that those wastes would better be disposed of by garbage disposal into the municipal sewage treatment system where the wastes are digested and methane gas is captured and used to generate electricity. The Mayo Foundation could chose to eliminate food wastes from its waste stream.
16. On page 6-14 the statement that the Olmsted County Waste to Energy Facility(OWEF) was operating at full capacity in 1990 and would not have been able to accept additional red bag or general hospital waste from the Mayo Foundation is probably misleading if not outright false. The OWEF has had peak periods of waste input that resulted in some MSW being bypassed to the county landfill. The waste stream has been reduced somewhat by the recycling programs mandated by county ordinance. Months now pass when no wastes are bypassed to the landfill. I believe that a deal between Mayo and the OWEF folks could be struck whereby no red-bag wastes are ever bypassed to the landfill. The EIS does not state that an effort has been made to negotiate such an arrangement.

As a matter of fact, on March 9, 1992, I was personally told by a county commissioner that Mayo suggested that it would compensate the county for medical wastes removed from the county's waste stream to the Olmsted WEF. I think that that is tantamount to bribery. It is buying support for the Mayo Incinerator. A statement regarding the Mayo Foundation's position on compensation to the county for the waste stream taken from the OWEF should be made in the EIS.

17. Section 9.4.2, par 5. This data ought to be updated to reflect the tipping fees and service charges now in effect in 1992, and further, should be extended through the expected life of the Mayo incinerator, including expected tipping fee escalation. That number ought to be included in Section 2.6. The revenues diverted from the county are grossly understated.

18. The Olmsted County and Minnesota Waste Management Strategies should both be stated in a summary form, and the how the proposed Mayo Foundation incinerator proposal supports those strategies should be explicitly explained. There are two or more places where the Draft EIS states that "The proposed project appears to be consistent with the policy objectives for waste-to-energy, recycling and landfilling programs for Olmsted County as presented in the county's Solid Waste Plan." How so?

Thank you for the opportunity to provide input to the next draft of the Mayo EIS. I look forward to change and improvement in the final version, and ultimate rejection of the project.

RECEIVED

9-13-91

MAR 25 1992

There IS good environmental news

It is great to find some good news among the usual environmental data. Here is some good news. USX Corp., while searching for a safe way to dispose of toxic wastes, developed a technology called Catalytic Extraction Processing (CEP).

The process uses a liquid metal bath with catalytic additives to dissolve and reduce hazardous waste molecules into elemental atomic components. Solid, liquid and gaseous wastes can be treated using the process.

The temperatures and added reactants cause the dangerous molecules to come apart. The product of the CEP may include hydrogen, carbon monoxide, sulphur, phosphorus, nickel and simple chlorine compounds. Toxic waste, now transformed into salable products.

The extracted products result in the molten metal being continuously regenerated. The company, MMT of Cambridge, Mass., has been testing a 25,000-ton-per-year demonstration system and has successfully treated 40 different waste streams — everything from PCBs to sewage to high-sulphur petroleum pitch and low-level radioactive waste.

The EPA has reviewed the system and said that it is almost too good to be true. The technology will enter the market in mid-1992. The capital costs will be about one-half of that required for conventional incineration systems, and operating costs will be one-third to one-half. One great benefit is reduction of the large waste volume associated with conventional incineration systems.

Wasn't that good news? Here is another goody.

Environment Canada's Office of Waste Management estimates that about one-third of Canada's landfill waste stream is from construction and demolition (C&D) activities. The Council of Construction Associations noted that industry members agree that about 50 percent of the debris can be recycled.

Canagro Agricultural Products Ltd, in Elmira, Ontario, had been using about 1,000 tons of raw gypsum powder a year in fertilizers. They have started to use



Norm Erickson

gypsum from recycled drywall to replace some of the virgin material. They also use gypsum chips to make cat litter, as it is an excellent absorbent for odors and liquids.

The scrap paper from shredding the drywall is separated and sold for livestock bedding.

They are now having trouble meeting demand for these recycled products. The company hoped to recycled about 2,500 tons of gypsum in 1991, but is having difficulty obtaining enough material.

These two examples of environmentally friendly new businesses are by nature best suited for a distributed, rather than centralized structure. Drywall is heavy and bulky, expensive to handle and transport. The construction company can save waste disposal costs by recycling, if transportation is not too expensive, or waste haulers could do the separation and remarketing of useful waste.

Area codes further limiting the disposal of recyclable wastes would accelerate the reduction of landfill space and spur area efforts to recycle.

Economic assistance to help businesses get into the recycling business could be a valuable assist to the area economy. It would create area jobs, recirculate money, reduce area "imports," conserve resources and reduce our solid waste stream problems.

It would create a closed loop in the use of some basic raw material, and move us a tiny step closer toward sustainability in our world. If the energy for heating the metal, transporting the wastes,

powering the recovery system and redistributing the recovered elements came from a renewable energy source, it would be another significant step toward a sustainable society.

Of course the ultimate would be not to create the waste in the first place. Many companies are aggressively examining their manufacturing processes to see if elimination or modification could reduce negative effects on our environment.

Businesses have been delighted to discover that manufacturing efficiencies and waste reduction can contribute to profitability and environmental responsibility ... clearly a Win-Win combination.

Environmental protection laws create opportunities for companies to become better Earth citizens through process improvement. The alternative is to face mounting waste disposal costs and litigation risks. The greatest progress in the last decade may be in the chemical industry. Dow, Dupont and others have been making major capital investments and process improvements to reduce environmental damages. They seem to have adopted a new vision of themselves and have become aggressively active in environmentally friendly change. Not "clean" yet, but they are improving rapidly.

There is hope, so let's keep pushing for improvement. Most of the objections to environmental legislation originate in selfish, short term business or political considerations, yesterday's attitudes and me-now-today priorities.

Environmentalism requires the same optimistic view of the future that we associate with tree planting, high-quality construction, water-quality plans and zoning ordinances. They all assume that there is a future and that we have a responsibility to act today of behalf of the citizens of tomorrow.

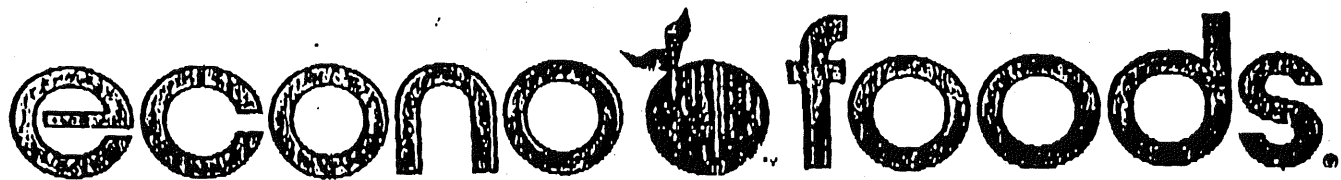
Norm Erickson is a member of the Rochester Energy Action Committee. He has had a long time interest in energy, the environment and forestry. He uses the most current information available and the opinions expressed are his.

3-22-91

Kathryn, I meant to include this article with the other information previously mailed to you.

[Signature]

9



The Big Name For Value

1200 Sixteenth Street SW
Rochester, MN 55902
(507) 201-0320

FACSIMILE TRANSMITTAL SHEET

DATE 3-25-90 TIME 4:40

COPIES MUST GO TO: WPCA

WE ARE TRANSMITTING 3 SHEETS, INCLUDING THIS ONE.

TRANSMITTAL NUMBER 617 291-1611

PERSON TRANSMITTING Johnnie Russell

March 24, 1992

ATTN: Kathryn Kramer

REF: PROPOSED MAYO CLINIC MEDICAL WASTE INCINERATOR EIS

Dear MPCA:

We are concerned citizens opposed to the construction of the proposed Mayo Clinic Medical Waste Facility.

Our concerns are:

- 1) LOCATION & STACK HEIGHT: The stack height, originally 125 ft., was reduced to merely 74 ft. upon learning, after the fact, that the chosen site was less than ideal due to airport restrictions (not esthetic reasons). With all the environmental concerns before us today, a stack should be used that would assure maximum protection to the environment, the community and, especially the people. Those nearby will be more so affected. My husband and I, with our six children, live approximately 1 mile Northeast of the proposed site. We have lived here 23 years. When the prevailing wind is from the Southwest, we will be exposed to the higher level of pollution (more so due to the lower stack). No one knows what is a safe level. No one wants to be exposed to chemical, of any kind or amount, if there is an alternative. Laws have been passed to protect the health of non-smokers from smokers of tobacco. We feel that a moratorium should be placed on Medical Waste Incinerators. Why are there no laws against causing irritation in breathing for certain segments of the community. Why should we be exposed to excessive levels of sulfuric Acid, for example, and other chemicals at any time, along with the existing pollution problems in this area. Who has the right to infringe on another's air space with health hazards? Certain levels of pollution will occur even with "state of the art" technology as better air pollution controls transfer more toxins into the ash. So, hence, another set of problems!
- 2) ADJACENT LAND VALUES: As a nearby resident of the proposed site, this also is of concern. The EIS referred to statements made by 3 realtors and an appraiser in the Rochester area. In checking the references in the EIS, the identity of the individuals was omitted. In a phone call to the MPCA by us, we were informed that they preferred to remain anonymous. This is wrong!! Any input or opinion entered into the study of this EIS, whether pro or con, is done willingly and should be required to stand by it with their name or it should not be considered. How can we assess their competence? What did they base their opinion on when very little has been sold in the immediate

region for sometime. Currently, 5 acre plots are for sale within 1 mile of the proposed facility. The realty indicated via a telephone inquiry that none had been sold. What did the supposedly experts on real estate in the EIS base their opinion on? As a matter of fact, if they say it was lack of concern by prospective buyers, that would not be accurate. Personally, a person told me they were going to look at these plots until they realized they were near the proposed site. I asked if they approached the realtor and they said, "No, we were not interested after we realized their proximity to the incinerator site". So this particular realtor, at least, does not even know about his lost potential buyer. Therefore, I know my home value and land would be affected by the proposed incinerator. Also, a reference regarding land value and Power Plants is dated 1974. I'm sorry, but the public is much more environmentally conscious today than in 1974. It would be seriously outdated and not reflect current opinion and not accurate. Because of public knowledge and opposition to incineration, several states have called a moratorium on incineration and projects have been cancelled. This project should also be cancelled.

NEED: Rochester, population of approximately 70,000, has a Waste-to-Energy Facility. A large portion of Mayo's waste is garbage. There is no need for two 25 ton capacity burners. Rochester does not need more incinerators. An agreement was made with Olmsted County to burn if the county built an incinerator. The rest of the citizens would have to pay higher garbage fees to make up the excess of \$140,000 loss to the county. There is also room for expansion at the facility. With recycling and expansion capabilities, Mayo should stay and continue to contribute as a member of the community like everyone else. Other alternatives are available for the med-waste. Possibly, not as economical as "throw away", but with new technology on the horizon and other methods currently available, lets not set ourselves up for a "20 year burn". We've got to do something about our pollution problem when we have the power to do it. If not for ourselves, for our children. Nothing is "State of the Art" with the amount of "unknowns" related to this project.

We have not even explained our concerns regarding the food chain and water contamination. So much needs to be addressed.

Sincerely

Ralph and Johanna (Jo) Russell
5900 11th Ave SW
Rochester, Minnesota 55902
(507)288-3014

March 26, 1992

MPCA

ATTN: Kathryn Kramer

REF: Proposed Mayo Clinic Medical Waste Incinerator ETS

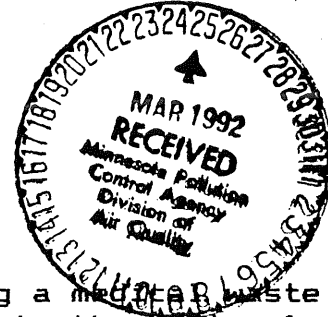
ADDENDUM: Letter dated March 24, 1992 from Ralph and
Johanna (Jo) Russell

These 2 sentences were inadvertently omitted from the end
of 1) LOCATION & STACK HEIGHT

Mayo Clinic has repeatedly stated that they want
to build their own incinerator in order to be
responsible for their own waste management. If
this is true, why are they willing to use a county-
owned landfill for their toxic ash but not a
county-owned incinerator?

RECEIVED

MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE44 County Road 16 S.E.
Rochester, MN 55904
March 23, 1992Ann Jackson
Permit Unit Supervisor
Air Quality Division, MPCA
520 Lafayette Road N.
St. Paul, MN 55155

Dear Ms. Jackson:

I am writing to add my voice to those opposing a medical waste incinerator south of Rochester. I have listened to the rationale presented by the Mayo Foundation for three years and have heard only one argument presented by them: "We want control."

By now it must be clear that this is neither the time nor the place to build an incinerator. No matter how clean their process may be, it adds to air pollution. We must use methods that do not add to air pollution. Other medical facilities recognize this need. The Mayo Foundation can too. Other areas are halting the construction of incinerators. So should we.

The Mayo Foundation is trying to force a hasty decision because it knows its proposal will not stand up to informed discussion. The Foundation may delay so long in finding alternatives that it cannot meet the new, more stringent standards. It must be possible for you to grant a short term variance, a procedure far more desirable than hanging a twenty year albatross around your neck. You have other options. You must not be rushed into approval. You have not created the crisis, if indeed one exists. The Mayo Foundation has, and it is fully capable of finding a solution if it is firmly and clearly directed to do so. In fact, it has more human, technical, and financial resources to devote to the problem of waste disposal than any other organization in the state. You must make your stand here and now. If you do not turn down this obviously flawed request, you will establish a precedent from which you will be unable to escape and you will have lost your credibility. You will no longer have a basis for turning down anyone's request.

Requests like this one are precisely the reason for your existence. While plenty of people in the Rochester community oppose the incinerator, they cannot speak out. An agency such as yours can consider the issue from a distance, independently and unemotionally. You certainly are aware of the power of the Mayo Foundation throughout the state, but you also have an obligation to perform your duty. An incinerator should not be built at this time.

Nor is this the place to locate an incinerator. When an organization asks for approval to build a large incinerator less than ten miles from another large incinerator, no amount of pressure or rationalization can justify its approval.

When zoning ordinances which exist at the proposed site limit the stack to seventy-five feet, an automatic and resounding "No" is in order.

When both your organization and the Mayo Foundation refuse to acknowledge the inherent danger of building this facility next to an airport, we have reason to be skeptical. How many warnings of the hazardous nature of an airport are necessary? Isn't last night's tragedy at LaGuardia enough? Isn't the crash-landing of a private plane near the Rochester airport a few months ago enough? What about the National Guard plane that crashed in Evansville, Indiana, while practicing touch-and-go landings. "It looked like Pearl Harbor." "The whole world was on fire." What about the company jet which crashed a few years ago when its wings iced up? It was just a few hundred yards from the site of the proposed incinerator and apparently on a direct line towards that site when it crashed. Or the commercial airliner diverted to Sioux City whose pilot miraculously got the plane down despite the loss of almost all controls. Should he have had an incinerator to avoid also? Or the commercial jetliner that nosedived just short of the Colorado Springs airport. "Year's probe fails to explain what led to 10 seconds of terror." You might read the description of that crash before approving an incinerator at the airport site. The Rochester airport has averaged a crash landing every four to five years. It has private planes, company jets, National Guard planes practicing touch-and-go landings, and commercial jets creating a very busy and diverse activity. Why would anyone gamble with an incinerator near an airport when it is so unnecessary? Have you determined the environmental impact of a plane crashing into the incinerator? You are negligent if you have not.

The Mayo Foundation is presently playing a power game. It is not above putting expediency ahead of common sense. However, it may react positively if its request is turned down firmly and courteously. Given a chance, common sense often wins out. I suspect everyone will breathe a sigh of relief if you demonstrate the fortitude and strength necessary to reject the Mayo Foundations's request.

Sincerely yours,

David Anderson

March 22 1992

104 5th Ave NE
Stewartville MN 55976

RECEIVED

MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Ms Kathryn Kramer
EIS Project Manager
Environmental Analysis Office, MPCA
520 Lafayette Road N
St Paul MN 55155

Subj: Comments on Mayo Foundation Medical Waste Incinerator
Draft Environmental Impact Statement

Dear Ms Kramer,

I have read the above document and will leave any comments on its technical aspects to those more knowledgeable than I in these areas. My remarks will center more on the rather brief consideration given to Alternative Incinerator Sites in Section 6.4. In particular, I hope to bring out some points for further investigation associated with the use of the Olmsted Waste-to-Energy Facility. I believe there are some possible secondary environmental impacts to the area which merit further consideration.

I agree with your statements in Section 6.4 that there are two alternative sites, the Olmsted Waste-to-Energy Facility (OWEF) and the current Institute Hills Farm (IHF).

I further agree with the conclusions you reach in Section 6.4.2 regarding the IHF site being unusable due to the various factors mentioned in the 1989 letter report to the Consolidated Planning Department from McGhie & Betts.

I am, however, concerned about minimal consideration given to the use of OWEF. It seems that this alternative was dismissed out of hand for several reasons:

- Because "the Mayo Foundation has chosen not to pursue development of their own facility at the OWEF site, nor to pursue modifications to the existing OWEF incinerator."

- Because "The OWEF was operating at full capacity in 1990 and would not have been able to accept additional red bag or general hospital waste from the Mayo Foundation."
- Because "the OWEF was not demonstrated to have any significant environmental advantages over the proposed site."

Regarding the first point mentioned above, whether or not Mayo Foundation chooses to pursue development does not seem to be a valid reason for removing a site from further consideration. It seems to me that the more appropriate consideration for this report is the overall environmental impact to this region from the various alternate sites.

Coming then to the second item above, it is true that the OWEF was operating at capacity in 1990. However the county's recycling program had not been in effect for any period of time and waste haulers had not yet started separating recyclables from the waste stream to any great extent. Once this activity began in earnest, significant excess capacity developed at OWEF. The size of this unused capacity in fact necessitated an increase in tipping fees at the OWEF. It should be noted that this capacity is in addition to that required for Mayo Foundation general waste as the OWEF is currently handling this waste and deriving approximate \$140,000 per year from this activity.

In Section 6.5 significant coverage was given to various aspects of waste reduction relating specifically to the Mayo Foundation waste steam. I believe that a similar analysis should have been conducted regarding the OWEF. The results of both of these studies should be merged and used as a basis for projecting long term capacity requirements and environmental impacts associated with a joint OWEF/Mayo operation.

Regarding the third point, the air and water quality impacts of the proposed Mayo Incinerator were covered in great detail in this report, and rightly so. However, I believe that there are some secondary environmental effects which should also have been covered.

Despite the statement that the OWEF was operating at capacity in 1990, residents of Olmsted and surrounding counties have seen recent increases in their waste disposal bills due specifically to under-utilization of the OWEF. One speaker at the March 11 meeting mentioned that townships were seeing increasing amounts of garbage and debris dumped along the roadsides. I believe that these two items are directly related and both have an impact on the environment which was not adequately considered in the Draft EIS.

As the current OWEF facility ages, technology changes and new regulations are enacted, there will be an increasing need for maintenance and improvements to the

OWEF physical plant. Due to the county's current fiscal policies, these will need to be funded by increasing user fees. Allowing a major customer of the OWEF to take its business elsewhere will only exacerbate the problem. In fact, faced with some funding shortfalls, the county may be forced to make less than optimum improvements to its facility which could result in some degradation to air quality in the area as well as increasing the roadside pollution as mentioned above.

With fees increasing above the current levels it will make it even more unfeasible for rural residents to use commercial collection for their waste. At the least this will result in no improvement to air quality in this area due to non-point sources of air and water pollution throughout the region.

In addition, with fees increasing and precedent set, other companies in the area could argue for removal of their waste (and fees) from the OWEF, only making the problem worse.

From the above discussion, I would ask that the final EIS contain a much broader treatment of the secondary effects to the roadside, air and water quality in the Olmsted County area due to the removal of the Mayo Foundation waste stream from the OWEF.

A handwritten signature in cursive script that reads "Charlie Brown". The signature is written in dark ink and is positioned above the printed name.

Charlie Brown

EDWIN L. DOTY
805 4TH AVENUE S.E.
STEWARTVILLE, MINNESOTA 55976
PHONE 507-533-4880

RECEIVED

MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

3-23-92

Kathryn Kramer
EIS Project Manager
MPCA Environmental Analysis Office
520 Lafayette Rd.
St. Paul, MN 55155

Dear Ms. Kramer:

This letter is regarding and to comment on the Mayo Clinic proposed incinerator at Rochester, MN and the draft EIS on this project. Some of my concerns are:

Building double the capacity needed? Future sale or lease to a private operator may double the volume of toxic emissions and depositions if they operate both proposed burners - or will Mayo bring in medical waste from their Florida and Arizona facilities?

Stack height? The proposed 74 ft. stack height when G.E.P. (good engineering practices) call for a minimum of 112.5 ft. height would mean greater pollution concentration close to the site. Is visual appearance more important than adjacent area residents health?

Decreased volume to the Olmsted County incinerator will mean higher costs to area residents because of higher tipping fees. Recycling is reducing volume. In 1991, tipping revenues were \$184,000 lower than 1990, despite a rate increase.

The Minnesota legislature is studying the medical waste problem now. It would be wise to wait for their study results.

The proposed site is adjacent (less than 1/4 mile) to land used for Rochester city sludge disposal - land over Karst topography which makes the ground water extremely susceptible to pollution from toxic materials applied to or precipitated upon the surface. The MPCA permit for sludge application allows much more toxic materials than do other agencies - up to 70 lbs. per acre of cadmium compared to 3 lbs. per acre maximum allowed by the Pennsylvania Dept. of Environmental Resources. Precipitation from this incinerator with its substandard stack would spread toxic heavy metals over land already contaminated.

The MPCA and Mayo should be aware that the federal government (USDA) is paying farmers in the area surrounding the Rochester airport (High Forest township) and three other townships surrounding Rochester, to take land out of crop production and place in the CRP (Conservation Reserve Program) to protect ground water quality for Rochester and area. Toxic depositions from sludge and an incinerator adjacent seem more hazardous to ground water quality than does crop production, in my opinion.

A "state-of-the-art" incinerator now may not be that next year or beyond. Too little is known about organics and plastics materials burning, and the emissions recombining into potentially different and more toxic compounds than those trying to dispose of.

I believe alternative methods such as sterilization of the medical waste portion (red bag), and continued use of the Olmsted County incinerator for Mayo's general waste is more environmentally desirable than the current Mayo proposal.

Sincerely,

Edwin Z. Doty

EDWIN L. DOTY
805 4TH AVENUE S.E.
STEWARTVILLE, MINNESOTA 55976
PHONE 507-533-4880

3-23-92

RECEIVED

MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Attn. Paul Hoff

~~Kathryn Kramer~~
~~EIS Project Manager~~
MPCA Environmental Analysis Office
520 Lafayette Rd.
St. Paul, MN 55155

Dear Ms. Kramer:

This letter is regarding and to comment on the Mayo Clinic proposed incinerator at Rochester, MN and the draft EIS on this project. Some of my concerns are:

Building double the capacity needed? Future sale or lease to a private operator may double the volume of toxic emissions and depositions if they operate both proposed burners - or will Mayo bring in medical waste from their Florida and Arizona facilities? *Iowa & Wisc. in future?*

Stack height? The proposed 74 ft. stack height when G.E.P. (good engineering practices) call for a minimum of 112.5 ft. height would mean greater pollution concentration close to the site. Is visual appearance more important than adjacent area residents health?

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Precipitation from this incinerator with its substandard stack would spread toxic heavy metals over land already contaminated.

Was this really covered in EIS???

The MPCA and Mayo should be aware that the federal government (USDA) is paying farmers in the area surrounding the Rochester airport (High Forest township) and three other townships surrounding Rochester, to take land out of crop production and place in the CRP (Conservation Reserve Program) to protect ground water quality for Rochester and area. Toxic depositions from sludge and an incinerator adjacent seem more hazardous to ground water quality than does crop production, in my opinion.

WQIP program in six Area Townships around Rochester
*Call local SCS for more info

*EIS it lowered to meet FAA permits?
Not something good to have 1/4 mile from Airport!
The Rochester Airport is also being looked at by M&E
to relieve congestion @ Mpls. Airport in future - this will lead to.

A "state-of-the-art" incinerator now may not be that next year or beyond. Too little is known about organics and plastics materials burning, and the emissions recombining into potentially different and more toxic compounds than those trying to dispose of.

I believe alternative methods such as sterilization of the medical waste portion (red bag), and continued use of the Olmsted County incinerator for Mayo's general waste is more environmentally desirable than the current Mayo proposal.

Sincerely,

Ed Doty, Allen Doty

Paul, I talked to you at meeting in Rochester! Thanks for your time - I do hope you will look and consider this letter and also share with your co-workers!

Thanks Again

Allen Doty

P.S. Dad did send same letter to Kathy Kramer

44 Co. Rd. 16 SE
Rochester, MN 55904
March 23, 1992

RECEIVED

MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Kathryn Kramer
EIS Project Manager
Environmental Analysis Office, MPCA
520 Lafayette Road N.
St. Paul, MN 55155

Dear Ms. Kramer:

While the draft EIS on the Mayo Foundation's proposed incinerator addresses scientific issues concerned with the environment, the MPCA Citizen's Board and staff should not overlook the issues of what is sensible and reasonable as well.

It is not sensible to build a second gigantic incinerator within ten miles of the Olmsted County incinerator. Duplication is wasteful.

It is not sensible to allow toxic pollutants exceeding standards to fall on an agricultural/residential area.

It is not sensible to allow waste disposal by incineration to occur so near an airport. Each air crash reported in the media should be a warning against locating lethal elements in such a potentially dangerous situation.

It is not sensible to allow the Mayo Clinic to use a disposal technology which has been rejected by Twin Cities medical institutions as being out-dated.

It is not sensible to locate an incinerator on a parcel of land just because the Mayo Clinic happens to somehow have acquired it.

It is not sensible to allow the Mayo Clinic become a waste disposal business for a large area of Minnesota and Iowa.

It is reasonable and sensible to expect the Mayo Clinic to be a leader in recycling, re-using and recovery.

It is reasonable and sensible that the clinic use part of the funds intended for incinerator construction to support research and development of alternative disposal technologies. Its medical reputation and financial resources should be used to lead the way, not to follow old methods.

It is reasonable and sensible that the clinic also use part of the intended construction funds to update and improve the Olmsted County facility, to become a partner with the County, and to use the existing facility for the small percentage of waste that actually must be burned.

The numbers in the EIS point out that the proposed incinerator would not meet safety standards for pollutants falling on the surrounding area. Reason and good sense show that there are a number of other reasons for not permitting the incinerator to be built.

Sincerely yours,

A handwritten signature in cursive script, appearing to read "Verla Jean Anderson".

Verla Jean Anderson

RECEIVED

MAR 25 1992

Kathryn Kramer
 EIS Project Manager
 Environmental Analysis Office, MPCA
 520 Lafayette Road N.
 St. Paul, MN 55155

**MPCA ENVIRONMENTAL
 ANALYSIS OFFICE**

This letter represents my opinion on the proposed medical waste incinerator funded by the Mayo Foundation and its corresponding MPCA Environmental Impact Statement (EIS).

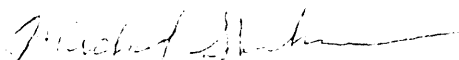
If the whole purpose of the study on, and the construction of, the proposed incinerator was to aid in minimizing the public health risk of medical waste disposal; why are we still considering an outdated technology? The designed lifetime estimates for the proposed incinerator seem very difficult to pinpoint even if we assume there will be no change in existing state and federal emissions limits. Incineration does not destroy the radioactive nuclides commonly found in medical waste. This would not be a waste to energy facility. These may be reasons why the state rates incineration low on the scale of waste management practices.

The site location and ecological setting data doesn't accurately represent the area effected by the proposed incinerator. A figure of 14.4 acres was used in the EIS. The fallout from the plume of an incinerator who's stack height is 125 feet, which was used questionably in the EIS, would cover an area far greater then 14.4 acres. No consideration was given to the proximity of agricultural land to the proposed incinerator. Dairy Farming is a major economic source in southern Minnesota and permit levels on milk quality are very strict. What recourse would a dairy farmer have if his cows produced milk that wouldn't be marketable? The economic effect on the surrounding area is certainly going to be unfavorable to land owners (ie property values).

An outline of the plants safety systems are missing. What happens in the case of a power loss to the plant? A worst case scenario should have been included in the EIS along with workers safety description.

The reasons behind the need for a two burner capability were not fully addressed. Medical waste disposal is a billion dollar a year business. Also information is incomplete on why the Mayo Foundation should be exempt from the existing solid waste ordinance in Olmsted county. These factors should have been accounted for in the EIS. The Mayo foundation is a world leader in health care so let's help promote leadership in medical waste disposal by adopting currently accepted and approved alternatives.

sincerely,



De Wayne P. Mattson

Phone (507) 289-3098

Attorney-At-Law
5700 11th Avenue SW
Rochester, Minnesota 55902

March 21, 1992

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MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Kathryn Kramer
EIS Project Manager
MPCA Environmental Analysis Office
520 LaFayette Road
St. Paul, MN. 55902

IN RE: Mayo Foundation's proposed Medical Waste Incinerator
in Rochester, MN.

Dear Ms. Kramer:

Thank you for sending me the February 1992 EIS on the above matter.

Some of the additional salient reasons for the PCA and the MPCA Citizens Board to deny the Mayo Foundation a permit for an incinerator at the proposed location are:

- 1) The proximity of the proposed incinerator stack to the airplane flight zone is extremely close and thus there will be a dangerous downdraft caused by the airplanes, the number of which will increase greatly in the years to come. Also, there may be a potential hazard from the steam or fog coming out of the stacks.
- 2) The short height (74 ft.) of the stack is a questionable height for good engineering practice. A stack of 213.24 ft would be a much better operation for all concerned.
- 3) The traffic count at the proposed site (U.S. Highway #63 and County Road #16) approximates 20,000 vehicles per day along with all of the air pollution from the airplanes at a busy airport which will only expand in the future - thus adding much additional pollution. The airport location is also the dumping ground for the sludge from the City of Rochester Sewage Disposal Plant.
- 4) The continuous permanent operation of an asphalt mixing plant 2 miles from the proposed site and the second additional asphalt mixing plant within 1 mile (occasional special permit) only adds to the problems of locating an incinerator at the proposed site.

- 5) The red bag wash down at the proposed site will go into a clay tile sewer line that goes within 800 ft. of Quarve and Anderson Rock Quarry. There has been for years, and will be for years, an extremely active blasting operation which has in the past (and will probably in the future) resulted in court actions recovering damages to foundations of homes caused by the blasting up to 1 mile away. This quarry is located about 1/4 mile from the proposed site. This clay tile is vulnerable and probably already is damaged. Therefore, red bag wash may get into the groundwater. The City of Rochester should TV the line and determine the condition of the sewer line.
- 6) In view of the fact that Olmsted County has an incinerator with a good stack height a second incinerator in the City of Rochester, and particularly at the proposed location, would seem unnecessary. A joint venture by Mayo Foundation and the county would seem logical and practical, especially when the county incinerator is located on the east edge of the city and the prevailing winds are in favor of the city residents. Even another contiguous smaller incinerator at the county site, owned and operated wholly by the Mayo Foundation, for specific medical waste materials would be feasible. Mayo's other garbage could be burned at the same location - the county incinerator.
- 7) As regulations become more strict, it will be almost certain that other institutions producing medical waste will want to use Mayo's facility and for economic reasons there will be an unwanted and dangerous expansion at a bad site.

Respectfully submitted,

DeWayne P. Mattson

PROJECT ENVIRONMENT FOUNDATION

Advocates For Minnesota's Environment

*Received 3/25/92
3:50 PM PRL*

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MAR 25 1992

MPCA ENVIRONMENTAL
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March 25, 1992

Ms. Kathryn Kramer
EIS Project Manager
Environmental Analysis Office
Administrative Service Division
Minnesota Pollution Control Agency
520 Lafayette Rd.
St. Paul, MN 55155

Dear Ms. Kramer:

Project Environment Foundation (PEF) wants to take this opportunity to comment on the Draft Environmental Impact Statement (DEIS) for the medical waste incinerator proposed by the Mayo Foundation in Rochester, Minnesota. PEF is a non-profit organization which provides legal and scientific advocacy to protect Minnesota's environment and the health of its people. PEF seeks positive, long-term solutions to the most critical environmental issues facing Minnesota today.

PEF commends the Minnesota Pollution Control Agency (MPCA) on the work they have completed thus far for the Mayo Foundation Medical Waste Incinerator Draft Environmental Impact Statement. This latest DEIS is much improved over the first draft and PEF supports the MPCA in the manner in which the health risk assessment (HRA) data is laid out in an easy to follow manner. We look forward in continued work with MPCA staff in developing health risk assessment formats to be used in future EIS's.

PEF still has some concerns which need to be addressed before this DEIS is finalized.

PEF agrees that Mayo does need to replace the Institute Hills Farm Incinerator, which is currently taking Mayo's medical waste, with a state-of-the-art facility. Incineration of infectious waste is a viable option to sterilization/disinfection technologies which often use tremendous amounts of energy and water. General medical waste may also be incinerated but **only after** source separation has taken

place to keep recyclables, non-combustibles, and hazardous materials out of the waste stream to be incinerated.

According to Marjorie Clarke, "the goal to state-of-the-art incineration is to burn waste as cleanly as possible, producing the least air pollution, the least toxic ash, and the lowest amount of ash. The three fundamental steps to achieving these goals are: 1) keeping wastes that can be reused or recycled, that do not burn well, or that contain toxic material or pollutant precursors out of the incinerator, and sizing the incinerator appropriately; 2) employing incineration technologies and practices that minimize the formation of pollutants during combustion; and 3) using pollution control systems that maximally prevent pollutants that are produced from entering the environment."¹

1. THE DEIS FOR THE PROPOSED MAYO INCINERATOR SHOULD MORE THOROUGHLY ADDRESS SOURCE SEPARATION FOR THE HOSPITAL WASTE, EXCLUDING THE INFECTIOUS WASTE STREAM

By keeping wastes that can be reused or recycled, that do not burn well, or that contain toxic material or pollutant precursors out of the incinerator, one may successfully lower the amount of air pollution produced, and lower both the toxicity and the quantity of the ash produced from this incinerator.² An integrated solid waste management plan should be a part of the final permit with concrete goals set to minimize the volumes of general hospital waste produced in the future. Without these stated goals for reduction, PEF questions whether or not Mayo is as committed to waste minimization and recycling as they say they are in the DEIS. General hospital waste could be minimized and waste reduction/ minimization programs should be required within the final permit.

PEF believes that storage space should be provided within the new incinerator facility for temporary holding of recyclable materials. This designation of space would give credence to Mayo's stated priorities for waste management which is found on page 2-2 of the DEIS.

2. APPROPRIATE SIZING OF THE INCINERATOR

A general, overriding principle for designing a solid waste incinerator is to determine the correct size for the amount of anticipated waste since combustion is most efficient when an incinerator consistently burns the quantity and quality of garbage it was constructed to burn.³ If an incinerator is oversized, then it may operate less than full-time. Each start-up and shutdown causes unsteady burning conditions, resulting in reduced overall efficiency. Such unsteady conditions tend to increase generation of products of incomplete combustion and particulates. Building an oversized plant also has economic implications. Burning less than full-time decreases the amount of energy

produced and sold by waste-to-energy plants. More importantly, a plant that is oversized for the amount of waste available to burn has higher per ton disposal costs.

Just as with oversizing a facility, undersizing may cause problems as well. If an incinerator is undersized, too much garbage may be loaded into the furnace. Overloading an incinerator can result in increased generation of products of incomplete combustion, as well as an increase in the volume of unburned matter and ash. An undersized incinerator that is not overloaded will necessitate additional expenditures of alternative methods of waste disposal or recycling.

Information about projected population growth and future trends in the volume and composition of the waste stream is just as critical as current waste data, especially in this time of changing solid waste management methods. It is vital for communities to **plan for increased source reduction and recycling before an incinerator is built**, since incinerators are typically designed for at least a 20 year lifetime and since recyclables may constitute large percentages of the waste stream. Financial arrangements for incinerators often include long-term contracts for the quantity of garbage to be delivered to the plant or for the quantity of energy to be sold which may preclude a community from undertaking aggressive source reduction or recycling later on. Knowing what potentially recyclable materials are in the waste stream, and in what quantities, is essential. Unfortunately, PEF does not believe that all of these issues were addressed within the DEIS to accurately size the proposed Mayo incinerator.

PEF supports Mayo accepting medical waste from Mayo Clinic, St. Mary's Hospital, and Methodist Hospital in Rochester, MN and infectious wastes from the Federal Medical Center, Olmsted Community Hospital, and Olmsted Medical Group. We believe that regional areas should take care of their own infectious wastes in state-of-the-art facilities. The latest Bloodborne Pathogens Rules will inevitably increase the mass and volume of infectious waste produced.⁴ However, these rules should not have any effect on amounts of waste generated by the Mayo Clinic, St. Mary's Hospital, and Methodist Hospital as both infectious and general hospital wastes will be designated for the proposed incinerator. The new Bloodborne Pathogen Rules will only effect the categorization of the waste from Mayo and its associated hospitals. The amounts of infectious waste from the Federal Medical Center, Olmsted Community Hospital, and Olmsted Medical Group can be expected to increase in the future due to these rules. Regardless of which way these changes will go, **an accurate review of estimated waste has not been completed and needs to be included within the DEIS.**

PEF could also support the newly proposed Mayo incinerator becoming a regional facility to handle infectious waste from medical facilities outside of Olmsted County. However, if Mayo plans to do this, they must be upfront about it and address these issues in the DEIS.

additionally, because the Olmsted County Incinerator is currently willing to accept medical waste,

and possibly even infectious waste, the current capacity of the Olmsted Waste to Energy Facility must be accurately characterized as there has been some disagreement on the amount of capacity currently available, and estimated future capacity for this facility. Why build a new incinerator if Olmsted County has plenty of capacity left and is willing to take infectious waste? Minnesota doesn't need to enter into garbage wars.

The sizing issue must be revisited in the final EIS so as to account for both source reduction and recycling actions in the future instead of simply assuming that there will be increases in volumes of medical waste to be incinerated. More details about this process as it relates to municipal solid waste are provided in an INFORM book titled *Burning Garbage in the U.S. Practice vs. State of the Art*, by Marjorie J. Clarke, Maarten de Kadt, Ph.D., and David Saphire. (1991 by Library of Congress). I would be willing to lend this resource out to interested parties.

3. EMPLOY INCINERATION TECHNOLOGIES AND PRACTICES WHICH MINIMIZE THE FORMATION OF POLLUTANTS DURING COMBUSTION

Although Mayo Foundation thoroughly addressed the issue of plant operation and how the infectious/medical wastes would be handled within the plant, there was no mention of worker safety and operator training. The training of incinerator operators is crucial to proper operation of the incinerator performance. In a state-of-the-art facility, workers need to understand the effects of variation in the composition and moisture of the waste stream on the combustion system, the emissions control systems, and environmental performance. They must be trained to recognize upsets in the system and know how to quickly restore steady-state operations of the incinerator.

4. USE OF POLLUTION CONTROL SYSTEMS THAT MAXIMALLY PREVENT POLLUTANTS THAT ARE PRODUCED FROM ENTERING THE ENVIRONMENT

Clarity needs to be provided for the health risk assessment as it was not clear whether or not the HRA was completed with the assumption of the proposed facility operating at 25 tons per day (tpd) or 50 tpd capacity. Whichever capacity the HRA was calculated should be the final capacity which is allowed at this facility unless another HRA is completed for that specific capacity.

According to the completed health risk assessment, the total calculated cancer risks from modeled emissions are approximately two per 100,000 for both the residential and the farm worker scenarios and the levels of sulfuric acid may be high enough to cause acute risks to area residents, particularly for sensitive subpopulations. PEF has learned that Mayo Foundation has offered to utilize a carbon injection system in conjunction with the proposed dry sorbent injection/scrubber/fabric filter pollution control system. PEF realizes that the ultimate effect of this

addition should further drive down emissions of oxides of nitrogen as well as acid gases, mercury, and dioxins. PEF supports the use of the carbon injection system for this facility, however, the use of the carbon injection system needs to be numerically detailed within the finalized EIS to assure the public that this system will in fact reduce health risk to acceptable levels.

Mercury and polychlorinated biphenyl (PCB) levels have been modeled and the results show both mercury and PCB levels will exceed the Minnesota Water Quality Criteria. The above exceedences need to be addressed, taking into account the rated efficiency of reductions as a result of utilizing carbon injection for emissions control. In conjunction with the use of carbon injection, the Mayo permit should include stipulations for monitoring of stack emissions for PCBs, mercury, dioxins, and acid gases. Will this monitoring be done in accordance with *4.3.11-Proposed Facility Monitoring*?

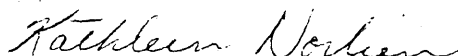
Although both HERC and the proposed Mayo Incinerator use dry sorbent injection scrubbers, the medical waste streams of medical waste and municipal solid waste have been shown to vary widely (see MPCA waste sorts). Therefore, the comparisons on p. 7-18 are not necessarily what will occur. This issue needs to be addressed in the final EIS.

PEF supports the use of continuous air monitors for carbon monoxide, opacity, and sulfur dioxide.

Additionally, PEF fully supports Mayo Foundation's decision to dispose of the residual ash stream within an ash only landfill despite the fact that ash from medical waste is not required by law to be disposed of in an ash monofill. On March 24, 1992, MPCA Citizen's Board passed new MSW ash disposal rules. These rules will provide environmental protection when municipal solid waste combustor ash is disposed. PEF believes Mayo is being responsible with their plans to dispose of the ash residual in an ash only monofill.

Thank you for the opportunity to comment upon this DEIS. Enclosed is a copy of an article taken from the *Journal of the Air & Waste Management Association*. I hope MPCA and the Mayo Foundation will find this article useful in further planning pre-sorting strategies for non-infectious medical waste at this facility. If you have any further questions regarding my comments, feel free to contact me at 223-5969.

Sincerely,



Kathleen Norlien
Staff Scientist

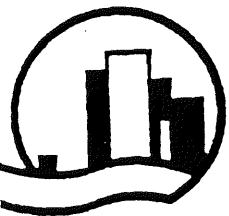
FOOTNOTES

1 Clarke, Marjorie J. De Kadt, Maarten; Saphire, David. Burning Garbage in the U.S. Practice vs. State of the Art. INFORM, 1991. p. 41

2 Clarke, Marjorie J. De Kadt, Maarten; Saphire, David. Burning Garbage in the U.S. Practice vs. State of the Art. INFORM, 1991. p. 45-46

3 Clarke, Marjorie J. De Kadt, Maarten; Saphire, David. Burning Garbage in the U.S. Practice vs. State of the Art. INFORM, 1991. p. 43-44

4 Bloodborne Pathogens Rule: found in Federal Register Vol. 56, No. 235 published on Friday, December 6, 1991.



**Citizens for a
Better
Environment**

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18

MAR 25 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

March 25, 1992

Lisa Doerr - CBE Minnesota State Director

Kathryn Kramer
EIS Project Manager - MPCA
520 Lafayette Road
St. Paul, MN 55155

Dear Ms. Kramer,

Citizens for a Better Environment (CBE) appreciates the opportunity to present comments on the:

Mayo Foundation Medical Waste Incinerator
Draft Environmental Impact Statement.

CBE is a nonprofit environmental research and community organizing group with more than 25,000 supporters in Minnesota.

Introduction

Much of CBE's work focuses on developing a long term, environmentally sound, non-burn medical waste management strategy for Minnesota. CBE staff have been active on the issue since 1989. We are currently serving on the state's Legislative Medical Waste Task Force, which was created by a law CBE helped draft and pass in 1991.

We are also working with the Minnesota Healthcare Partners (MHP) as they design a non-burn strategy for the 3 million pounds of infectious waste generated by its 18 Twin City hospitals. This work is especially exciting for CBE because it shows what could be possible for Mayo.

CBE first became involved with MHP in 1990 during its attempts to build a medical waste incinerator in Cambridge and Rush City. After intensive debate, both of those proposals were defeated by an overwhelming margin. CBE has also supplied technical and organizational support for citizens fighting burner proposals in Watkins and Boyd, as well as High Forest, the proposed site of Mayo's burner.

Over time, it has become clear that Minnesotans have grave concerns about incineration. This does not mean that people are against the healthcare industry. Most people see the medical industry as a vital part of Minnesota's high standard of living. They accept the fact that this industry, like any, produces waste. They do not accept the idea that this waste should be burned.

3255 Hennepin Avenue South, Minneapolis, MN 55408
(612) 824-8637

MHP deserves credit for recognizing these concerns and taking actions to treat their infectious waste with non-burn methods such as steam sterilization and microwaving. Mayo's plan, on the other hand, writes off these possibilities. Worse yet, Mayo is ramrodding this burner down the people of High Forest's throat after the project was overwhelmingly rejected by referendum 188 to 36. This opposition was squelched when Mayo engineered the hostile takeover of High Forest's property by Rochester.

Those tactics would not be necessary if Mayo was proposing a non-burn alternative. Public opposition to incineration, not medical waste, was shown during 1991 when Browning Ferris, Inc. successfully sited a regional, commercial steam sterilization facility in St. Paul. Local residents took a long and careful look at the proposal and voted to support it. Mayo could see similar results, instead of the long struggle now in progress, if it chose a similar track.

Instead, we see a plan to burn 99 percent of Mayo's waste because 1 percent of it -- low level radioactive and pathological waste -- can not be treated with the alternative methods studied in the Environmental Impact Statement (EIS). If Mayo needs a low level radioactive waste treatment facility, let's direct the discussion at that issue, instead of using it as a cover to build a backyard mass burn unit.

Other concerns, such as wanting control over costs and liability, are no different from those of the 18 hospitals belonging to MHP. And yet, those concerns have not stopped MHP from pursuing a non-burn solution.

The disregard this proposal shows for state policy is glaring. This burner is not a resource recovery facility. That means it has no place in the state's waste management hierarchy. The plan to contaminate 70 million gallons a year of pristine groundwater for cooling and ash quench contradicts the spirit of new once-through laws. Finally, this plan goes against the legislature's policy focus on non-burn treatment alternatives for medical waste. In fact, it may well threaten all efforts to institute non-burn alternatives in the state. The project would permit Mayo to burn 10 million pounds a year more than it generates. That roughly equals the state's entire annual infectious waste stream.

Mayo is a key member of the community and an important leader in the medical industry. The recycling programs for office paper, glass, and cans started in the last year are excellent steps in the right direction. But Mayo should "Get a second opinion" from Twin Cities' hospitals now pursuing a non-burn strategy. It's time for the world's most famous clinic to leave dinosaur incineration technologies behind and join state policy leaders and healthcare industry colleagues on a non-burn path.

There are many specific areas of concern raised by the EIS to be addressed in these comments, including:

- 1.) Incomplete analysis of radiation
- 2.) Incomplete analysis of economic effects.
- 3.) No discussion of flux in air quality rules
- 4.) Disregard for state policy
- 5.) Underrepresentation of plastics in "red-bag" wastestream
- 6.) Ash
- 7.) Lack of history on local opposition
- 8.) Overcapacity
- 9.) Problems with EIS executive summary

As a general comment, CBE would like to commend MPCA staff for its efforts to publish a document which is far easier to access than those in the past. It is obvious that a good deal of effort went into creating this work product.

1.) Incomplete analysis of radiation.

Mayo's plans to incinerate low level radioactive waste are very poorly presented by the EIS. Even such simple questions as "How many REM will this facility treat a year?", and "What risk does that pose to the community?", remain unanswered.

While this waste is regulated by the federal Nuclear Regulatory Commission (NRC), Minnesota will decide if Mayo can burn it in High Forest. Minnesotans need a thorough analysis of this issue included in the study, especially in light of recent findings from the National Academy of Sciences committee on Biological Effects of Exposure to Low Levels of Ionizing Radiation (BEIR) V.

Five areas of special concern are discussed below:

A. No risk assessment was done for radiation exposure.

The Mayo EIS should include a risk assessment for exposure to radiation. Section 8.5.3 dismisses the need for a risk assessment based on the fact that Mayo's emissions were "significantly" below NRC's maximum permissible air concentrations. This is a different criteria than that used to drop chemicals from the risk assessment.

There is also no discussion of radiation included in the uncertainty analysis found in section 8.5.7. Issues raised about synergistic effects may be of special concern here. A worst case scenario should be discussed. It would also be interesting to see if Mayo's emissions are below 50 percent of maximum permissible concentrations (MPC), which is the level Mayo has made an arbitrary decision never to exceed, as stated in sections 6.3.3 and 7.2.2.8.

There is no discussion included in section 8.4.2 of the need for an ecological risk assessment to include radiation. This also needs further clarification.

B. No discussion of current flux in radioactive waste.

Also blatantly missing from this EIS is any discussion of the current flux in regulation of low level radioactive waste. Recent findings from Biological Effects of Exposure to Low Levels of Ionizing Radiation (BEIR) V conclude that risks from exposure have been underestimated. The likelihood of getting cancer after exposure to low doses of radiation is three to four times higher than earlier thought. These findings could lead to changes in NRC guidelines and should be carefully assessed by Minnesota. Ironically, Mayo's own decision not to exceed 50 percent of the MPC points to the level of concern on this issue.

C. No discussion of changes needed in Mayo's NRC permit.

Also of concern, is a lack of information on exactly what changes in its NRC permit Mayo plans to receive. Our only clue is found in section 5.0, where Mayo lists an amendment to its current materials license as in process. What will the new permit cover? How is it different than current operations? Will it allow Mayo to burn low level radioactive waste for other facilities?

D. Radioactive materials quantified by pounds instead of REM.

One of the reasons the analysis of radiation is so poor is the lack of data on exactly how much radiation will be run through this facility. Amounts are reported in table 7-3 in pounds instead of REM. This makes it impossible to have any real understanding of the risks involved. Wherever pounds of radioactive waste are noted it should be converted to REM so that human impacts can be evaluated.

There is also no analysis of how much radioactive waste with a half-life greater than 65 days will be held "as long as practical and incinerated," as stated in section 7.2.2.8. Which radioisotopes does this include? How many REM will this emit? How does that effect air and ash levels? What is practical? Where will it be stored? Why isn't it held for the recommended 10 half lives to be at negligible levels?

E. No flow analysis for radioactive material is included.

Also confusing the picture is a lack of discussion on how proposed practices may differ from current ones. We need a materials flow analysis done that clearly lays out:

*How many REM are now generated;

- *How it is currently treated (i.e. onsite, shipped);
- *How many REM will be burned in new burner;
- *How much shipped offsite;
- *How many REM will be air and ash emissions.

2.) Incomplete analysis of economic effects.

The analysis of economic impacts in section 9.3.4 is missing a key discussion on the potential revenue Mayo could generate with a 25 ton a day capacity. Under the current proposal, one of Mayo's two burners will be permitted to burn 18 million pounds a year. Mayo wants to burn 8 million pounds, leaving great potential for this facility to become a regional burner. At current prices of \$400 a ton, Mayo could make \$2 million a year incinerating infectious waste. Use of the second burner could produce additional revenue of \$3.6 million a year.

The cost of putting in the 1,000 feet of sewerage and water lines outlined in section 4.3.10 are also not calculated.

3.) No discussion of flux in dioxin and combustor rules.

No discussion is included of the current state of Minnesota's air quality rules for combustors. This is in contrast with section 7.2.5, which outlines regulatory considerations on ash. Current drafts of the combustor rules set lower standards on dioxins and furans for small burners such as Mayo's than large burners. This is of special concern for the Mayo burner because of the high levels of plastics in the wastestream.

Discussion of the debate over the dangers of dioxin should also be included. According to a March 15, 1992 Newhouse News Service article, "an 'explosion' of new information on the dangers of dioxin has prompted key government scientists to again raise warnings that the contaminant poses serious health threats no matter how low the exposure." This may be of special concern with the Mayo burner because the presence of dioxins and furans make up over 85 percent of the total cancer risk estimates. How will these new concerns by the Environmental Protection Agency effect current efforts to write a state rule? How will they effect the Minnesota Department of Health's acceptable risk standards?

4.) Disregard for state policy.

This proposal goes against the grain of three important state environmental policies. Information on these policies should be added to the final EIS.

A. Mayo ignores the state's waste hierarchy by placing incineration above landfilling.

This is not a waste-to-energy facility. There are no plans for resource recovery included in the project as outlined in sections 4.3.4 or 9.4.2. Mayo's own hierarchy as presented in section 6.3.4 lists incineration above landfilling. This puts Mayo at odds with Minnesota statute 115A.02 which establishes a hierarchy of waste management practices. That hierarchy places resource recovery above land disposal and does not even include plain incineration.

B. Mayo ignores state policy discouraging once-through use of groundwater.

According to section 8.3.2.3, Mayo will appropriate 70 million gallons of groundwater a year from the St. Peter - Prairie du Chien - Jordan aquifer. This water will be used for cooling, steam production, ash quenching, and other processes.

While the EIS does mention the need to get a permit from the Department of Natural Resources (DNR), there is no discussion of state policies discouraging the contamination of pristine groundwater for one time use. Is this a once-through system? Does it fit current DNR policy?

C. Legislative focus on non-burn treatment technologies.

The Mayo proposal is also in direct opposition to recent actions by the legislature to develop a non-burn medical waste strategy in Minnesota. As mentioned above, the 1991 legislature has asked the medical industry to design a non-burn policy for the state. This proposal will severely undermine any efforts to move the healthcare industry away from its dependency on burning.

5.) Underrepresentation of plastics in "red-bag" wastestream.

One of the most valuable parts of the EIS is Mayo's analysis of the infectious wastestream. Based on data recently compiled by the MPCA, however, there may be an underreporting of the plastics waste stream.

The amount of plastics making up the "red bag" waste stream in table 7-4 may be higher than 33.7 percent because of misclassification of plastics as paper. According to table 3-8 of the Technical Work Paper No.2: Waste Composition Analysis, typical components of the Mayo's redbag paper wastestream include surgical masks, booties, gowns, and drapes. However, according to the MPCA's Assessment of Operation and Emissions of On-site Medical Waste Incinerators, these types of materials are made up largely of polyester and polypropylene. After investigating

their content, agency staff classified them as plastic. Mayo's data should be reexamined to more accurately reflect the composition of the paper wastestream.

6.) Ash.

No data is given to substantiate assumptions made about the toxicity of ash in two sections of the EIS. In section 7.2.2.5, no data is given at all to substantiate the claim that increased scrubber efficiency will not "significantly increase the toxicity of the combined ash." Again in section 7.2.5, no data is given to backup the assertion that "ash from the proposed combustor is expected to be below MLCLs."

7.) Lack of history on local opposition.

No discussion of Rochester's hostile annexation of this site from High Forest Township is included in Section 4.2.1 or the executive summary. It is of historical significance to note that the people of High Forest voted 188 to 36 not to allow this facility to be built.

8.) Overcapacity.

The issue of capacity is not well addressed. This proposal would permit Mayo for a capacity of 18 million pounds a year. Mayo plans to burn a total of 8 million pounds. That leaves excess permitted capacity of 10 million pounds -- more than all of Minnesota's non-Mayo infectious waste stream. Such overcapacity could destroy any incentive for other generators in the region to look for non-burn alternatives. By permitting the second 25 ton a day burner which Mayo now says will sit idle, capacity would be nearly three times Minnesota's generation.

9.) Problems with EIS executive summary.

- A. Cancer risk cited in section 8 is 10 times higher than stated in executive summary.

Mayo's executive summary fails to mention that the cancer risk from air emissions is 2 per 10,000 instead of 2 per 100,000 if the arithmetic mean is calculated instead of the geometric mean. This information should be in the executive summary instead of buried in section 8.5.7 and table 8.5-14.

B. Executive summary doesn't report that 85 percent of the total cancer risk estimates come from dioxins and furans.

The words dioxin and furan are not even used in the executive summary. Section 8.5.6 does state that emissions of dioxins and furans account for more than 85 percent of the total cancer risk estimates. The debate surrounding dioxin is a major concern for the public. This information should be up front in the executive summary.

C. Possibility of greater risk from synergistic effects.

Finally, no mention is made in the executive summary that there is a possibility that the cancer risk could be even higher depending on how chemicals interact. Section 8.5.7 states that, according to toxicological literature, synergistic effects may occur at 10 to 100 times greater levels than predicted in the health risk assessment. Again, this information should be up front.

10.) Misc. - inaccurate cost comparison of alternatives, worker safety.

A. Cost comparison of non-burn alternatives is inaccurate.

Table 6-2 gives a cost comparison of six treatment technologies including incineration. The capital cost for incineration is listed at \$1 million. No documentation is given for this number. It is also a very different figure than the \$10.6 million figure given in section 9.3.2. This gives an inaccurate assessment of alternative treatment costs and should be modified.

B. No discussion of worker safety.

The issue of worker safety is left totally unaddressed by the EIS. This is particularly relevant considering Mayo's poor record of operations at the Institute Hills Farm facility. How will workers be protected from exposure to high levels dioxins, furans, and heavy metals?

Mayo Clinic

Rochester, Minnesota 55905 Telephone 507 284-2511

March 13, 1992

RECEIVED

MAR 27 1992

Ms. Kathy Kramer
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155-3898

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Re: Response to Draft Environmental Impact Statement for Mayo
Medical Waste Incinerator, Dated February 1992

Dear Kathy,

Overall, the Draft Environmental Impact Statement supports the decision to incinerate, the size of the burner and the proposed location. This offers the encouragement that we are moving in the appropriate direction.

For your information, several facility design changes have been made since the Environmental Impact Statement process began. These changes result in a significant step forward in support of (1) the state and county hierarchy of waste disposal, (2) the flexibility to accommodate changes in future regulations and public concerns, and (3) the environment.

The changes are highlighted below:

- Mayo will be incorporating active carbon injection into the facility design. As a complement to traditional pollution control equipment, stack emissions can be significantly reduced. Through extensive testing in Europe, it is clear that the use of active carbon to reduce the emissions of mercury and dioxins as well as many other pollutants from incinerator emissions is well on its way to becoming a new state-of-the-art. Tests show that pollutant emissions can be reduced 10 to 100 times lower than what can be achieved by a dry scrubber baghouse filter alone.
- Mayo will be incorporating two German made ZDA-M3 steam autoclaves into the facility design in lieu of the second 25 TPD incinerator. This technology will be used to compliment the incinerator and provide redundancy when the incinerator is not operational.
- Mayo will be incorporating plastic recovery equipment into the facility design. Once redbag waste is sterilized, it will be mixed with shredded general waste and processed through the plastics recovery equipment. According to the waste volumes contained in the DEIS (all values are

converted to 5 day work week), Mayo has 8,820 pounds of redbag waste and 18,700 pound of general waste that would be processed in this manner per day. Approximately 9,150 pounds of plastic could be recovered and the 18,400 pounds of residue would be burned in the Mayo incinerator or bypassed to the Olmsted County facility (OWEF). Low level radioactive waste, pathological waste and animal carcasses will be incinerated directly without pretreatment.

These changes result in emissions 10 to 100 times lower than the values stated in the DEIS. Of specific note should be dioxins and furans because they contribute to 85% of the risk estimate. Properly designed facilities have been proven to achieve 99+ percent removal efficiency. Removal of plastics, approximately 1,000 tons per year, supports Mayo's recycling efforts and results in lower acid gas emissions, minimizes the toxicity of the ash and stack gases and increases the useful life of the equipment. If Mayo is successful in our plastic recovery effort, annual volumes recycled will exceed 2,500 tons per year. Using the DEIS figures, this equals 43% of our total waste stream. This total only includes paper, newsprint, aluminum cans, steel cans, cardboard, glass, plastic and styrofoam. It does not include items such as x-ray solution and film, printer toner cartridges, batteries, surgical clothing, construction materials, etc., which will further increase the percent of total waste recycled.

Specific comments on the DEIS:

Executive Summary, P.2-3,4 and Section 6.3.2, P.6-10: Reference to Spring Grove Resource and Recovery is not necessary, any permitted facility is allowed. Mayo's NRC license number is 22-00519-03. The last paragraph under "Alternatives for Treatment" may be more appropriately worded as:

"The disposal alternatives for low level radioactive waste are storage for decay followed by incineration or shipment to a NRC licensed facility. The disposal cost ratio of off-site to on-site incineration is reportedly about 100:1."

Executive summary, P.2-7: It is safe to say that "there would be an overall decrease in all emissions in Olmsted County, which would also make less airborne pollutants available for long-range transport." Total emissions are further reduced by activated carbon injection.

Executive summary, P.2-7,2-8: For the human health risk, estimates were 2 per 100,000 for both the residential and farm worker scenarios. Based upon the risk estimate uncertainty (P.2-9) and our decision to use active carbon injection, this

risk is too high. Is it possible to estimate removal efficiencies, recalculate the risk estimate and use the new number? But, if this will extend the determination of adequacy of the final EIS beyond May/June, this argument could be addressed under risk estimate uncertainty.

Executive summary, P.2-8: Sulfuric acid emissions. We agree that under the scenario presented, this pollutant might cause a temporary respiratory problem in sensitive subpopulations. But, it should also be noted that the maximum 1-hour ground level concentration 27 mg/m³ (table H-1, TWP-5) is lower than the lowest Observed Adverse Effect Level (LOAEL) of 35 mg/m³ for humans and 100 mg/m³ for animals. The emissions of sulfuric acid should also be significantly reduced through plastics recovery and the use of active carbon injection.

Executive summary, P.2-8: Ecological risks - the DEIS states that "estimated concentrations of mercury and polychlorinated biphenyls (PCBs) in surface waters exceed the Minnesota Water Quality Criteria." Using the data in appendix B, emission rate calculations, I plotted the test data for both mercury and PCBs. For mercury, the highest recorded value from a facility with a baghouse was more than ten times lower than the emission rate used. For PCBs, the highest value from a facility with a baghouse was more than 100 times lower than the emission rate used. Using the appropriate removal efficiencies makes the aforementioned conclusion incorrect.

Executive summary, P.2-10: Mitigation measures -

- * Hazardous materials as defined by RCRA are not disposed of in the incinerator. This should be deleted as a mitigation measure.
- * Factoring in appropriate removal efficiencies and lower emissions from active carbon injection, continuous monitoring of stack emissions for PCBs, mercury, dioxins and acid gases should not be necessary. These compounds are already included in the acceptance stack gas tests.
- * Mayo will be incorporating non-burn technology to facilitate plastic recovery. This item could be deleted.
- * If the proposed control technology and corresponding removal efficiencies are factored into the health risk, increasing stack height should not be necessary. Mayo will cone the top of the stack to increase exit velocity of the stack gases.
- * Mayo will be using activated carbon injection and this statement can be deleted.

Section 4.3.1 Facility Design P.4-11: See previous statements about facility design changes.

Section 4.3.4 Heat Recovery System P.4-19: It is anticipated that Mayo would provide steam, as available, to future commercial/ industrial activities in LC industrial park. This would decrease the use of the air cooled condenser and categorize this facility as a waste-to-energy facility.

Section 4.3.5 Air Pollution Control System P.4-19: The use of activated carbon injection should be incorporated into this section.

Section 6.3.3 Radioactive Wastes, P.6-11: The following statement should be added to the third paragraph, "or returned to the manufacturer for disposal."

Section 6.3.4 Recyclable Materials P.6-12: A new category "Plastic" could be added to this section.

Section 6.4.1, OWEF, Scenario 1, P.6-13: Solvents cannot be incinerated at either IHRF or OWEF.

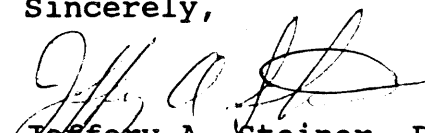
Section 8.4.6 Conclusions Regarding Ecological Risks P.8-35: Using appropriate control efficiencies and emission rates for PCBs and mercury, this conclusion will change.

Section 8.5.6 Conclusions Regarding Risks P.8-51: Using active carbon injection will change this conclusion. Total cancer risks highlighted in Tables 8.5-8 through 8.5-13 will change.

Conclusion:

Incorporating the impact of active carbon injection and plastic recovery, the narrative and conclusions of most sections in the DEIS will change. As was mentioned earlier, if the modification of the DEIS to incorporate these specific items will delay the publication of the final EIS beyond the existing schedule, Mayo will entertain other ideas to incorporate the information. If you have any questions, please call me at (507) 255-7700.

Sincerely,


Jeffery A. Steiner, P.E.
Facilities Engineer

/td

pc: Bryan McSweeney
Duane Miedtke
Dr. Richard Vetter
Dave Senjem



Minnesota Department of Health

Division of Environmental Health
925 Delaware Street Southeast
P.O. Box 59040
Minneapolis, MN 55459-0040
(612) 627-5100

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March 23, 1992

Kathryn Kramer
EIS Project Manager
Environmental Analysis Office
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155

Dear Ms. Kramer:

Minnesota Department of Health (MDH) staff has reviewed the Draft Environmental Impact Statement (DEIS) on the medical waste incinerator proposed to be built by the Mayo Foundation in Olmsted County. Comments prepared by Dr. Rita Messing of the Health Risk Assessment Unit in the Division of Environmental Health are enclosed.

Staff notes that the DEIS understates health risks for cancer and for chronic noncancer effects. Staff suggests that more discussion should be devoted to exposures to lead from incinerator emissions. Also, insufficient consideration has been given to acute hazards, which were found to be significant. Staff has provided additional comments related to concerns about mitigation, alternatives, and radioactive waste.

Thank you for the opportunity to review this DEIS. If you need to discuss the comments, please call Dr. Messing at 627-5052.

Sincerely,

Judith A. Ball
Environmental Review Coordinator

Enclosure
JAB:sdr

cc: Rita Messing, Ph.D.

REVIEW OF DEIS ON THE PROPOSED MAYO FOUNDATION MEDICAL WASTE
INCINERATOR IN OLMSTED COUNTY.

1) The Executive Summary (p. 2-8) states that the "calculated cancer risk from modeled emissions are approximately two per 100,000 for both the residential and the farm worker scenarios." This calculated risk is not an upperbound cancer risk estimate. A reasonable upper bound cancer risk estimate is about 10 times higher. A cancer risk estimate of 2 per 10,000 is twenty times the negligible risk criterion of one per 100,000 used by the Minnesota Department of Health (MDH).

2) The Executive Summary (p. 2-8) states that chronic non-cancer risks "were at least a factor of ten less than a level that would be considered significant." This conclusion is belied by the finding in Chapter 8 (Table 8.5-11, p. 8-56) that the renal toxicity hazard index is 0.3. However, a reasonable upper bound hazard index is about 0.5. A hazard index of less than one will not by itself engender health effects. However, a hazard index of this magnitude could add significantly with hazards caused by any extant exposures. Thus, there is a possibility that the incinerator could contribute to adverse chronic health hazards.

3) Incremental increases in blood lead from the Mayo Incinerator are expected to be small. Nevertheless, since virtually everyone is already exposed to lead at significant levels, health risks from lead emissions should be discussed.

The major conclusions of the Health Risk Assessment for cancer and chronic effects are based on modeled emissions estimates that were too low. In fact, modeled emissions are generally below best estimate values. However, the methods for calculating soil concentrations of metals, and dermal absorption of carcinogens overestimate exposures, albeit by lesser amounts than emissions estimates underestimate exposures. These issues are discussed in detail in sections I., II. and III.

4) The Executive Summary (p. 2-8) states that: "For sulfuric acid, some potential may exist for emissions to result in local concentrations in excess of acceptable ambient levels established under MPCA's Air Toxic Guidelines. Thus, for sensitive subpopulations, without mitigation measures, sulfuric acid emissions could present a risk for respiratory irritation." This statement is correct as far as it goes. However, the EIS should contain more information about acute hazards. This is also discussed in more detail in IV.

5) Nevertheless, MDH agrees with the statement in the Executive Summary (p. 2-8): "It is important to note that this risk characterization does not imply that the facility should or should not be built. It means that without appropriate pollution control or other mitigating measures, the cancer risk could exceed the MDH acceptable risk guideline. Available and feasible mitigation measures are discussed in the last chapter of the EIS." Effective mitigation of baseline carcinogenic risks and chronic hazards is discussed in V.

March 23, 1992

6) Additionally, MDH agrees with the conclusions concerning alternatives in the Executive Summary (p. 2-2), that other technologies for handling infectious waste are not applicable for treatment of radioactive waste, chemotherapy waste, pathological waste or large animal carcasses. Thus, these are really not alternative methods.

It should also be noted that the methods discussed, namely autoclaving, microwave disinfection or electrothermal deactivation, do not remove the necessity for further processing of the waste, i.e. for landfilling or incineration. Again, these methods are not alternatives. The methods discussed add another step, with attendant occupational health risks and expense. It is worth mentioning in this context that increasing expenses for medical waste disposal might result in increased costs of health care, thus begetting a negative impact on health. It is therefore important to consider the costs of medical waste disposal and the health risks of different methods, in the wider context of disease prevention, and of health care costs.

Increased use of nondisposable materials (e.g. syringes, surgical kits, laboratory supplies), is not specifically discussed in the EIS. Use of disposable materials decreases the risk of transmission of infectious agents, decreases laboratory error rates, and decreases labor costs. Thus, certain categories of waste should probably not be included in waste reduction and recycling strategies discussed in the EIS (p. 6-16).

7) Finally, while radioactive emissions from the proposed incinerator will be negligible, MDH wishes to comment on these emissions. MDH's position on this issue was developed during preparation of a health risk assessment of radioactive emissions for the Final EIS on NSP's proposed Prairie Island Independent Spent Fuel Storage Installation for high level radioactive waste. In the Prairie Island EIS, subsequent evidentiary hearings on NSP's Application for a Certificate of Need before the Minnesota Public Utilities Commission, and preparation of Comments of Minnesota Agencies on the Nuclear Regulatory Commission (NRC) Generic EIS for nuclear power plant license renewal, MDH has articulated a risk assessment policy for radioactive waste that is different from that of federal agencies (NRC and Environmental Protection Agency--EPA). MDH's position is consistent with Minnesota and EPA risk assessment policy for carcinogenic chemicals. Detailed comments on radioactive emissions appear in VI.

I. Emissions Estimates

The EIS states (p. 8-39): "U.S. EPA's Risk Assessment Guidance for Superfund was used as the basis for conducting this investigation...a Reasonable Maximum Exposure (RME) scenario is used to calculate facility related chemical emissions risks. According to U.S. EPA, an RME is defined '...as the highest exposure that is reasonably expected to occur at a site...'"

Nevertheless, the conclusions of the EIS (cf. Executive Summary) are based on exposures calculated from upper confidence limits of geometric mean emissions (p. 8-7). Contrariwise, the U.S. EPA Risk Assessment Guidance for Superfund [1] states (underlining in original): "the upper confidence limit (i.e. the 95 percent upper confidence limit) on the arithmetic average will be used for this variable."

This discrepancy, which was pointed out in a memo from MDH on November 20, 1991 [2], and reiterated in a memo from MDH on December 23, 1991 [3], resulted in modeled emissions that are well below what might reasonably be expected from a best estimate analysis, let alone an upper bound estimate based on arithmetic means. It is not enough, in answer to the two memos, for the EIS to include an "add-on" uncertainty analysis (Table 8.5-14, p. 8-60), and a statement that higher emissions estimates result in a ten-fold increase in calculated cancer risks, and hazard quotients for chronic effects of less than 1 (p. 8-59).

MDH detailed the reasons it agrees with the EPA policy [2,3]. A short summary of that argument is presented here. Envision two scenarios. In Scenario One, on 3 successive days you inhale 1, 1 and 100 picogram of dioxin, or alternatively 1, 1 and 100 micrograms of lead (mercury) are deposited in soil (water). The geometric mean emission is the antilog $[0 + 0 + 2 = 2/3 = 0.667]$ or 4.6. The arithmetic mean is 34. Now envision Scenario Two, in which 34 picogram of dioxin are inhaled for 3 successive days, or alternatively 34 micrograms per day of lead or mercury are deposited on three successive days. The total amount inhaled or deposited is identical in the two scenarios, as is the biological effect. In fact, the biological effect is related to the total emitted to the environment or to the arithmetic mean of emissions. The geometric mean, by "unweighting" high values, seriously underestimates impacts: in the above example 4.6 vs. 34.

The effect of using upper confidence limits on geometric mean emissions for the Mayo incinerator was calculated from information in Appendix B of Technical Work Paper 4 [4], and is detailed in Table 1 (attached), which shows data for 2,3,7,8 dibenzo-p-dioxin toxic equivalents (dioxin), mercury, lead and cadmium.

The modeled value for dioxin (i.e. an upper bound of the geometric mean) is exceeded by 3 of 7 incinerators; it is 4 percent of emissions from Mayo's present incinerator; it is 9 percent of an upper bound (confidence limit) estimate and 23 percent of a best (mean of means) estimate. Furthermore, even an upper bound estimate, based on data for 7 incinerators, is only 45 percent of present Mayo emissions, which might serve as an alternative upper bound emissions estimate.

The modeled value for mercury is exceeded by 3 of 6 incinerators; it is 69 percent of emission from Mayo's present incinerator; it is 27 percent of an upper bound emissions estimate and 59 percent of a best estimate. The EIS discussion of the magnitude of mercury emissions (pp. 8-20-24) is misleading, because the underlying assumption that emissions will be less if the proposed facility is built (p. 8-24) appears to depend, at least partially, on the faulty estimate based on geometric mean emissions.

The modeled value for lead is exceeded by 5 of 9 incinerators; it is 38 percent of an upper bound emissions estimate and 67 percent of a best estimate. The modeled value for cadmium is exceeded by 5 of 8 incinerators; it is 38 percent of an upper bound emissions estimate and 65 percent of a best estimate.

MDH has two other concerns about the emissions estimates.

- 1) They were calculated as upper bound estimates based on individual data points. Thus, for instance, for dioxin 35 data points were used, rather than 7 incinerators. This procedure has the effect of unduly weighting emissions from incinerators (e.g. Stanford) with lots of data points. But inspection of the raw data indicates that emissions are not independent of the incinerator, i.e. there is more variance between incinerators than within incinerators. This was confirmed for both dioxin and mercury by analysis of variance (by George Bollweg, MPCA Air Quality Division).

- 2) A two-tailed test for the upper confidence limit was used. This has the effect of producing a 97.5 percent upper confidence limit (with 95 percent of the cases falling between the lower and upper bounds of the confidence interval, and 2.5 percent of the cases falling outside the interval at the low and high ends). For the Mayo incinerator this concern is moot, since this potential overestimation of the confidence limit was more than overridden by the use of geometric means.

A. Cancer Risk

For the cancer risk estimate of the EIS ($2E-5$, or two in one hundred thousand) to be achieved, the new incinerator would have to reduce dioxin emissions by 96 percent compared to present Mayo emissions. An upper bound cancer risk estimate based on the 95 percent confidence limit of the arithmetic mean of dioxin emissions is $2E-4$ (two per ten thousand); this risk level results if present dioxin emissions are reduced by 55 percent when the new incinerator is built. A best estimate of cancer risk to the maximally exposed individual, based on the arithmetic mean of incinerator emissions, is $8E-5$ (eight in one hundred thousand). To achieve this, future emissions would have to be reduced to less than $1/4$ of current emissions. Thus, best estimate and upper bound estimate cancer risks are 8 to 20 times the MDH criterion for negligible cancer risk of $1E-5$ (one per one hundred thousand). (Note: These risk estimates take into account overestimation of cancer risk from dermal exposures, explained in III.)

B. Chronic Effects and Mercury Emissions

Tables 8.5-11-13 (pp. 8-56-58) of the EIS contain chronic non-cancer hazard indices. The highest of these is for renal toxicity, and occurs via exposures to mercury and cadmium in beef. Tables 6-16-18 (pp. 6-19-21) of Technical Work Paper 5 [5] show a hazard index of 0.223 for mercury and 0.07 for cadmium. Dividing the mercury value by .27 and the cadmium value by .38 (i.e. by the ratios of modeled values to upper bound values) and adding the results gives an upper bound hazard index of 1.0 (see I. above and attached Table). However, this index should be adjusted downward to 0.5 because leach rates for metals in soil were underestimated by a factor of two (see II.). This hazard index is likely an overestimate. Studies of mercury uptake into deer that grazed in an area heavily contaminated with mercury in the vicinity of the Twin Cities Army Ammunition Plant failed to show mercury in deer meat (detection limit = 0.01 ppm). Therefore, assumptions underlying metal accumulation analyses in beef might be reexamined.

The EIS Ecological Risk Assessment also noted that mercury and PCB emissions could have a significant effect on surface waters (pp. 8-35-37). While fishing is not expected at the modeled location, even small increments in mercury or PCB deposition at more distant locations could have significant impact on edibility of fish. Modeled mercury emissions were 27% of upper bound values, so that the surface water impact could have been underestimated by as much as a factor of 4. (The modeled emissions estimate for PCB's was $2.3E-4$ lbs/ton, based on data from 2 incinerators. Mean emissions from Kaiser, the higher emitter of the two incinerators, were somewhat higher than the modeled value, at $2.8E-4$ lbs/ton.) PCB's and mercury have been detected in significant quantities in fish in both Zumbro Lake and River. Therefore, mercury and PCB's have been shown to accumulate in water bodies in the general area of the proposed incinerator.

C. Lead

There is no risk assessment for lead included in the EIS. Technical Work Paper 5 [5, pp. 6-36-43] used the EPA Integrated Uptake/Biokinetic Model [6] to assess the effects of subchronic exposure to lead for children up to age 7, and concludes that lead emissions from the proposed incinerator would result in an increase in blood lead levels of no more than 0.02 microgram/deciliter. However, modeled emissions were 38 percent of an upper bound value, while leach rates were underestimated (see II.). Therefore, the EPA Integrated Uptake/Biokinetic Model was rerun using upper bound lead inputs. The maximum increase in blood lead was found to be 0.03 microgram/deciliter during the seventh year. Mean increases in blood lead levels during years 1-7 were found to be 0.02 microgram/deciliter.

March 23, 1992

These results need to be evaluated in the context of the EOB Lead Report [7], and the corresponding MDH Guidelines for Low Level Lead Exposures [8]. As described in the report, the Centers for Disease Control action level for blood lead was revised from 25 microgram/deciliter to 10 microgram/deciliter in October, 1991. Accordingly, "the Minnesota Department of Health (MDH) has specified a safe blood level of 1 ug/dl for use in risk assessment for environmental review, permitting, or standard setting in relation to new sources that may result in lead emissions in air or water. Nearly every person already exceeds the 1 ug/dl safe level, and the population at or near the 10 ug/dl level is also large. Thus, any activity which results in increased environmental lead deposition could result in toxic effects. Therefore, such activities should be critically reviewed. In particular, a relative source contribution factor may also be applied on a program- or project-specific basis, so that only a portion of the 1 ug/dl safe blood lead level is the result of a single activity."

Thus, we note that the Mayo incinerator will lead to a maximum increase of 3 percent of the safe blood lead level of 1 microgram/deciliter.

II. Soil Concentrations

Soil concentrations of metals are based on soil loss constants which were apparently arbitrarily halved [5, p. D-3]. This results in an overestimation of risks from direct soil exposures and from food chain exposures. The exposure to mercury in beef is overestimated by a factor of 2, while exposure to cadmium in beef is overestimated by a factor of 1.4 because, compared to mercury, a greater proportion of cadmium ingested by cows is directly deposited on hay and grass [5, pp. F5-10]. However, since mercury contributes most to renal toxicity, the net effect is a reduction in the hazard index by a factor of 2 (see I.B.).

III. Dermal Absorption

The EIS (p. 8-53) lists dermal absorption as the biggest contributor to cancer risk. This risk was also apparently overestimated. It was assumed that children and adolescents were exposed to soil on hands, arms and legs for eight months per year, while adults were exposed to soil on hands and arms for eight months per year [5, Variable Table 14]. If these exposures are adjusted so that it is assumed that only hands are exposed during 5 months of the year, then the dermal exposure is halved [5, pp. 4-47-50]. If this is done, then the modeled cancer risk decreases from $2.3E-5$ to $1.8E-5$, and the calculated upper bound risk decreases from $26E-5$ to $20E-5$ ($2E-4$).

IV. Acute Hazards

The hazard index for sulfuric acid is 4.5, based on a maximum 1 hr ground level concentration of 27 microgram/m³ [5, Table H-1, p. H-2] and a Minnesota criterion value of 6 microgram/m³ [9]. The maximum 1 hr ground level concentration is 45 percent of an amount observed to cause respiratory effects in exercising adolescents. This information should be included in the EIS.

V. Mitigation

MDH has calculated an upper bound cancer risk of 2E-4, or 20 times the MDH negligible risk criterion. This risk estimate is based on an upper bound emissions estimate for dioxin that is less than half of Mayo's present emissions (see I. above). To achieve emissions which engender a negligible cancer risk of 1E-5, dioxin emissions would have to be cut by 98%. The activated carbon technology described in the EIS (pp. 10-2-4) combined with other emissions controls appears to make this an achievable goal. If this technology is used, emissions of mercury and PCB's will also be reduced significantly.

VI. Cancer Risk from Radioactive Emissions

The MDH has elaborated a policy for risk assessment of radioactive emissions; a detailed statement of risk assessment policy and procedures appears in the Health Risk Assessment of the Final Environmental Impact Statement of the Prairie Island Independent Spent Fuel Storage Installation [10] and in Comments and Recommendations of the Minnesota Agencies before the NRC [11]. The policy is that the risk assessment for carcinogenic effects of radioactive emissions should be done according to the same principles which are applied for risk assessment of carcinogenic chemicals. The reasons for this policy are that 1) the endpoint, cancer, is the same, and 2) in order to compare carcinogenic risks of chemicals and radiation comparable risk assessment procedures should be used. Therefore, MDH estimates upper bound risks for cancer incidence, and applies its negligible risk criterion of 1E-5.

In contrast, EPA estimates cancer risks using best estimates of cancer fatalities [12,13]. EPA has stated that a desirable criterion level of risk for protection of the public is 1E-4, although its regulatory dose rate limits do not necessarily achieve that level [14]. In contrast, NRC maintains very high dose rate limits for regulatory purposes (limits that engender best estimate cancer fatality risks well over 1E-3), but seeks to reduce exposures to the general public by application of the ALARA Principle: a requirement that radioactive emissions should be As Low As Reasonably Achievable [15,16].

Based on an upper bound estimate of cancer incidence risk and application of the $1E-5$ negligible risk criterion, MDH has calculated a negligible dose rate criterion of 0.05 mrem/year. NRC's dose rate limit for public exposures from a single licensed activity is 25 mrem/year (500 times higher). EPA HEAST Tables [12] contain "unit risk factors" for radionuclides which are based on a best or central estimate of cancer fatalities of 400 cancers per one million persons exposed to 1 rem of radiation [13]. As discussed elsewhere by the NRC [15] and by MDH [11], this estimate is outdated, and a more authoritative estimate is 800 cancers per one million, or twice as high. The MDH upper bound estimate of cancer incidence is 2600 per one million people exposed to 1 rem, or 6.5 times higher than the EPA risk coefficient. {Note: this is equivalent to 1840 cancers per 100,000 people exposed to 0.1 rem/year for 70 years, as contained in [10]}.

The NRC limits for emissions of radionuclides, as discussed in Technical Work Paper 4 [4, Table 3-5, p. 3-18] are based on a dose rate limit of 25 mrem/year for a member of the general public [4, p. 1-5]. Tritium, sodium-22, tin-113 and iodine-125 emissions are 2/100,000 to 4/100,000 of the permissible NRC stack concentrations. All other radionuclides are emitted in much lower quantities.

The health impacts of these air emissions are evaluated in Technical Work Paper 5 [5, pp. 3-20-23]. Radioactive nuclide air concentrations would be diluted by at least an order of magnitude for any receptor downwind of the stack. Thus, it was concluded that there would be at least a millionfold safety margin between NRC limits and air concentrations. Application of the MDH negligible dose rate criterion indicates that there is at least a thousandfold margin between air concentrations of radionuclides and significant cancer risk.

Based on "slope factors" or dose to risk coefficients in EPA HEAST Tables [12], it was determined that soil concentrations of radionuclides would be less than a ten millionth of an amount which might engender a significant health risk ($1E-5$) [5, p. 3-23]. Again, application of the MDH dose to risk coefficient (6.5 times the EPA value) indicates that radionuclide concentrations are at least a million times less than would engender a significant health risk.

There will also be radionuclides in ash, as discussed in the EIS (p. 7-18-19). The radionuclides have fairly short half lives. The longest is cobalt-57 (half life 270 days). Thus, in less than 3 years, cobalt radioactivity will decline by 96 percent. Other radionuclides will undergo similar decay in periods ranging from 2 months to 2 years. Levels of radioactivity in ash will be very small. Table 7-10 (p. 7-19) suggests a maximum of 1.5 mCi/day in 3.75 tons of ash). However, Table 7-8 (p. 7-14) shows a total of 207 mCi/year for disposal. Most of this, (approximately 173 mCi/year) is long-lived tritium and carbon-14, which will be emitted to air. The remainder (34 mCi) is less than 0.1 mCi/day, and some of this will also be air emissions. Thus, radionuclides in ash are not of significance.

References

- [1] U.S. EPA. Risk Assessment Guidance for Superfund. Vol. 1. Human Health Evaluation Manual (Part A), Interim Final. EPA/540/1-89/002.
- [2] Messing, R.B., MDH Section of Health Risk Assessment. Memo to Kathryn Kramer, Environmental Analysis Office, Minnesota Pollution Control Agency. November 20, 1991. (91-ER-002)
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- [4] Camp, Dresser & McKee, Inc. Technical Work Paper 4. Air Quality Emissions and Deposition. Mayo Foundation Incinerator. Minnesota Pollution Control Agency, December, 1991.
- [5] Camp, Dresser & McKee, Inc. Technical Work Paper 5. Risk Assessment. Mayo Foundation Incinerator. Minnesota Pollution Control Agency, December, 1991.
- [6] U.S. EPA. Integrated Uptake Biokinetic Model for Lead. Version 0.5, December, 1990.
- [7] Minnesota Environmental Quality Board. State Agency Compliance with State and Federal Lead Regulations. January, 1992.
- [8] Section of Health Risk Assessment, MDH. Guidelines for Low Level Lead Exposure. November, 1991. (91-ER-003)
- [9] Adams, F., Minnesota Pollution Control Agency Air Toxics Program. Memo to Craig Affeldt, Environmental Analysis Office, October 23, 1991.
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- [13] U.S. EPA. Risk Assessments Methodology. Environmental Impact Statement. NESHAPS for Radionuclides. Background Information Document--Vol. 1. September, 1989. EPA/520/1-89-005.
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- [16] U.S. Nuclear Regulatory Commission. Below Regulatory Concern Policy Statement. July 3, 1990.

TABLE 1. EMISSIONS ESTIMATES FOR MAYO INCINERATOR

Toxic Equivalent Factor for 2,3,7,8 TCDD		
<u>Incinerator</u> (lb/ton)	<u>No. of Data Points</u>	<u>Arith. Mean</u>
Cedars Sinai	6	2.10E-7
Stanford	8	5.25E-8
Mayo	6	9.14E-6
Kaiser	6	4.83E-7
Med. Waste Assoc.	3	2.61E-10
Sutter	3	1.67E-6
Brookville	3	5.19E-8

Mean of Means: 1.7E-6 Conf. Limit: 4.1E-6 Modeled: 3.8E-7

Mercury		
<u>Incinerator</u> (lb/ton)	<u>No. of Data Points</u>	<u>Arith. Mean</u>
Mayo	2	5.5E-3
Kaiser	6	2.4E-2
Med. Waste Assoc.	3	1.2E-3
Hamot	3	3.9E-4
Hershey	3	9.5E-5
Brookville	3	7.2E-3

Mean of Means: 6.4E-3 Conf. Limit: 1.4E-2 Modeled: 3.8E-3

Lead		
<u>Incinerator</u> (lb/ton)	<u>No. of Data Points</u>	<u>Arith. Mean</u>
St. Agnes	3	4.33E-2
Cedars Sinai	3	9.90E-5
Stanford	6	4.85E-2
Kaiser	6	7.88E-2
Med. Waste Assoc.	1	6.61E-4
Hamot	3	5.53E-5
Hershey	3	4.82E-3
Brookville	3	1.39E-1
Sutter	6	2.81E-2

Mean of Means: 3.8E-2 Conf. Limit: 6.7E-2 Modeled: 2.6E-2

Cadmium		
<u>Incinerator</u> <u>Mean</u> (lb/ton)	<u>No. of Data Points</u>	<u>Arith.</u>
St. Agnes	3	3.19E-3
Cedars Sinai	3	5.16E-6
Stanford	6	1.76E-3
Kaiser	6	6.31E-3
Hamot	3	7.60E-6
Hershey	3	3.12E-5
Brookville	3	5.07E-3
Sutter	6	2.11E-3

Mean of Means: 2.3E-3 Conf. Limit: 3.9E-3 Modeled: 1.5E-3

JANET B. JOHNSON
 Senator 19th District
 37955 Bridge Road
 North Branch, MN 55056
 Phone: (612) 674-8561
 and
 Room 303, State Capitol
 St. Paul, MN 55155
 Phone: (612) 296-5419

Senate

State of Minnesota

March 24, 1992

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MAR 27 1992

Ms. Kathryn Kramer
 EIS Project Manager
 MN Pollution Control Agency
 520 Lafayette Road
 St. Paul, MN 55155

MPCA ENVIRONMENTAL
 ANALYSIS OFFICE

Dear Kathryn:

Please find enclosed my comments on the Mayo Foundation Medical Waste Incinerator Draft Environmental Impact Statement.

The issue of medical waste incineration is of special interest to me. One of the towns in my district, Rush City, was chosen by the Minnesota Healthcare Partners (MHP) as the site for a medical waste incinerator in 1990. The proposal was defeated by an overwhelming margin after intensive debate.

Watching that process unfold, I learned that incineration is a key concern for Minnesotans. The view I hear is not that people are against the health care industry. Quite the contrary, the medical industry is vital to Minnesota's economic and social well being. It is incineration that Minnesotans oppose.

In response to these concerns, I authored a 1991 bill creating the state's Legislative Medical Waste Task Force. This task force is charged with designing a statewide medical waste management strategy which focuses on non-burn alternatives for disposal. That report is due to the legislature in the Fall of 1992.

In the mean time, great progress has been made by the health care industry to find alternatives to the backyard burning that has been so typical. MHP has given up plans to build a burner, investing considerable time and resources studying viable non-burn decontamination methods. Browning Ferris Inc. has begun operation of a commercial steam sterilization facility in St. Paul capable of treating a huge portion of Minnesota's infectious waste.



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COMMITTEES • Vice-Chair, Economic Development and Housing • Vice-Chair, Veterans and General Legislation • Environment and Natural Resources • Health and Human Services



Helping these efforts is recent action taken by the Minnesota Pollution Control Agency to get hospitals operating burners in compliance or shutdown.

Mayo's proposal is out of step with these efforts. While new recycling programs for office paper, glass and cans are an excellent step in the right direction, plans to build a burner with a 50 ton per day capacity are not. Mayo is a leader in both the Minnesota and world community. This plan does not reflect the type of creative problem solving that we expect from that kind of leader.

Of special concern is Mayo's argument that all of its waste must be burned because one percent of it -- low level radioactive and pathological waste -- can not be treated with the alternative methods studied in the Environmental Impact Statement (EIS). This one percent appears to be where the focus is needed. Mayo's other concerns, such a wanting control over costs and liability, are no different from those of the 18 hospitals belonging to MHP. And yet, those concerns have not stopped MHP from pursuing a non-burn solution.

In conclusion, I would like to comment specifically on four areas in the draft Environmental Impact Statement (EIS) which I believe need further study. These include:

1) Lack of information on low level radioactive waste.

The EIS includes no discussion of the possible health and environmental impacts from incineration of 2000 pounds of radioactive waste a week. While this waste is regulated by the Nuclear Regulatory Commission, it is the state what will decide if Mayor can burn it in High Forest. Minnesotans deserve to have a thorough analysis of this issue included in the study, especially in light of recent findings by the Biological Effects of Exposure to Low Levels of Ionizing Radiation (BEIR) V.

2) High cancer risk levels

The risk assessment done for the EIS graphically portrays the reasons that Minnesotans are wary of incineration. Risk levels of 2 per 10,000 are 20 times higher than the Minnesota Department of Health's acceptable levels. Mayo's claims that mitigation will bring risk levels down to a "safe" level need much further substantiation.

Page 3
March 24, 1992

3) Noncompliance with Minnesota's waste hierarchy

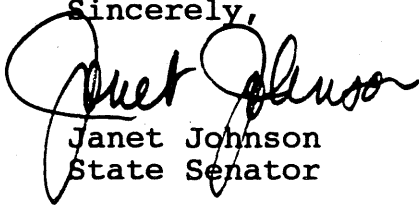
Mayo's proposed incinerator is not a waste-to-energy facility. There are no plans for resource recovery included. This puts Mayo at odds with Minnesota law which establishes a hierarchy of waste management practices. That hierarchy places resource recovery above land disposal and does not include simple incineration.

4) Overcapacity

The issue of capacity is not well addressed. This proposal would permit Mayo a capacity of 18 million pounds a year. Mayo has a total of 10 million pounds. That leaves excess permitted capacity of 8 million pounds, or all of Minnesota's non-Mayo infectious waste stream. Such overcapacity could destroy any incentive for other generators in the region to look for non-burn alternatives.

Thank you for the opportunity to comment on this project. I look forward to your response and plan to track the process.

Sincerely,



Janet Johnson
State Senator

JJ:md



Minnesota Department of Transportation

Transportation Building, St. Paul, MN 55155

March 24, 1992

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MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Kathryn Kramer
EIS Project Manager
Environmental Analysis Office, MPCA
520 Lafayette Road
St. Paul, MN 55155

DEIS: MAYO FOUNDATION MEDICAL WASTE INCINERATOR

Thank you for the opportunity to review this DEIS, Ms Kramer. We have a couple of comments.

Icing and Visibility, Page 8-62. Will the wet mode be used any time the temperature is over 35°F? If late morning and afternoon temperatures are over 35° and the wet mode is used, the roads could become wet and icing could occur if the evening or night temperature then falls below 35°. Perhaps the wet mode should only be used when nighttime temperatures stay above 35°.

Waste Transportation, Page 8-61. What is the spill response plan?

If you have any questions about these comments, please contact Dale Grove, project manager in our Rochester office, on (507) 285-7353.

Isaac Mc Crary, Jr.

ISAAC MC CRARY, JR.--ENVIRONMENTAL COORDINATOR

IM:jm



STATE OF
MINNESOTA

DEPARTMENT OF NATURAL RESOURCES



10

DNR INFORMATION
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March 24, 1992

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MAR 27 1992

Kathryn Kramer, EIS Project Manager
Environmental Analysis Office
Administrative Services Division
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

RE: Mayo Foundation Medical Waste Incinerator
Draft Environmental Impact Statement (DEIS)

Dear Ms. Kramer:

The Department of Natural Resources has reviewed the DEIS for the proposed Mayo Foundation Medical Waste Incinerator. We offer the following comments for your consideration.

The proposed incinerator should not pose a threat to the natural resources of the state if proper design precautions are taken to insure emissions of toxic agents are reduced to levels that will not significantly alter current surface water quality. The DNR recognizes the uncertainties associated with ecological risk assessment. Therefore, we place great weight on reducing toxic outputs to the lowest levels possible through system design.

Thank you for the opportunity to review this document. We look forward to receiving the final EIS for this project. Please contact Joe Stinchfield of my staff, at (612)297-4313, if you have any questions regarding this letter.

Sincerely,

Thomas W. Balcom

Thomas W. Balcom, Supervisor
Natural Resources Planning and Review Section
Office of Planning

c: Bill Johnson, Region V
Steve Colvin
Tom Lutgen
Jeffrey Steiner, Mayo Foundation

#910044-03/Mayocin.doc

3/24/92

MAR 27 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

it may concern -

I hope that you take a very close look at the Mayo Clinic incinerator proposal. In view of the alternative methods of tackling the medical waste problems an incinerator is simply outdated. The existing Rochester incinerator could be used for most of Mayo's waste.

Don't let Mayo Clinic get its way again. Having lived in Rochester

for over 30 years I have watched Mayo Clinic get what they want no matter how much opposition.

Thank You

Yours Truly
James A. Saubay

3-21-92

Kathryn Krumer
 EIS Project Manager
 Environmental Analysis Office
 Adm. Serv. Div.
 MPCA
 520 Lafayette Rd
 St Paul, MN 55155

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MAR 27 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Re: Mayo Clinic Proposed Incinerator

Dear Ms Krumer,

I wish to state that I am extremely opposed to the Mayo Incinerator. I live about 5-6 miles west of site on a farm.

Please read Mr. Erickson's article that appeared March 20, 1992 in the Rochester Post Bulletin. I believe he has some strong points. It is enclosed with this letter.

Recently the PCA turned down a request for an incinerator to be built in Dakota Co. How come Mayo should be allowed to build one in Olmsted County??

I sincerely believe they should be cutting their waste ~~and~~ using Olmsted County one. Incinerators are not a thing of the future. Please ~~don't~~ refuse the permit for

Mayo as you did for Dakota County
permit. Mayo has the resources
available to cut down, find an
alternative + to use the one in Olmsted
County.

I do not feel Mayo should
be granted "special privileges".

Sincerely

Ramona Kiehne

Rt 1 - Box 679

Stewartville, MN
55476



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26

March 12, 1992

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MAR 17 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE

Mr. Paul Hoff
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, Minnesota 55155-3898

Dear Mr. Hoff:

Re: Mayo Foundation medical waste incinerator; Rochester, Olmsted County
MHS Referral File Number: 89-0992

Thank you for the opportunity to review and comment on the above project. It has been reviewed pursuant to the responsibilities given the State Historic Preservation Officer by the National Historic Preservation Act of 1966 and the Procedures of the Advisory Council on Historic Preservation (36CFR800).

There are no reported historic or archaeological properties in the project area, and we feel that the probability of any unreported properties is low. Therefore, based on available information, we conclude that no properties eligible for or listed on the National Register of Historic Places are within the project's area of effect.

Please contact Dennis Gimmestad at 612-726-1171 if you have any questions regarding our review of this project.

Sincerely,

Britta L. Bloomberg
Deputy State Historic Preservation Officer

BLB:dmb

MDH Comments on Mayo EIS

Page 2

March 23, 1992

27

6) Additionally, MDH agrees with the conclusions concerning alternatives in the Executive Summary (p. 2-2), that other technologies for handling infectious waste are not applicable for treatment of radioactive waste, chemotherapy waste, pathological waste or large animal carcasses. Thus, these alternatives are limited in their ability to handle the total infectious waste stream.

It should also be noted that the methods discussed, namely autoclaving, microwave disinfection or electrothermal deactivation, do not remove the necessity for further processing of the waste, i.e. for landfilling or incineration. The methods are alternatives for rendering the waste non-infectious but are not alternatives to final disposal. The methods discussed are an additional step, with attendant occupational health risks and added health care costs for waste disposal.

Increased use of nondisposable materials (e.g. syringes, surgical kits, laboratory supplies), is not specifically discussed in the EIS. Use of disposable materials decreases the risk of transmission of infectious agents, decreases laboratory error rates, and decreases labor costs. Thus, certain categories of waste should probably not be included in waste reduction and recycling strategies discussed in the EIS (p. 6-16).

7) Finally, while radioactive emissions from the proposed incinerator will be negligible, MDH wishes to comment on these emissions. MDH's position on this issue was developed during preparation of a health risk assessment of radioactive emissions for the Final EIS on NSP's proposed Prairie Island Independent Spent Fuel Storage Installation for high level radioactive waste. In the Prairie Island EIS, subsequent evidentiary hearings on NSP's Application for a Certificate of Need before the Minnesota Public Utilities Commission, and preparation of Comments of Minnesota Agencies on the Nuclear Regulatory Commission (NRC) Generic EIS for nuclear power plant license renewal, MDH has articulated a risk assessment policy for radioactive waste that is different from that of federal agencies (NRC and Environmental Protection Agency--EPA). MDH's position is consistent with Minnesota and EPA risk assessment policy for carcinogenic chemicals. Detailed comments on radioactive emissions appear in VI.

I. Emissions Estimates

The EIS states (p. 8-39): "U.S. EPA's Risk Assessment Guidance for Superfund was used as the basis for conducting this investigation...a Reasonable Maximum Exposure (RME) scenario is used to calculate facility related chemical emissions risks. According to U.S. EPA, an RME is defined '...as the highest exposure that is reasonably expected to occur at a site...'"



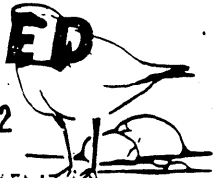
National Audubon Society
Minnesota Audubon Council

1313 Fifth Street S.E., Suite 321
Minneapolis, Minnesota 55414
(612) 379-3868 FAX: (612) 379-3869

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MAR 30 1992

MPCA ENVIRONMENTAL
ANALYSIS OFFICE



28

March 25, 1992

Kathy Kramer
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Dear Ms. Kramer:

We believe that the Draft Environmental Impact Statement inadequately examines the attached proposed alternatives to the incinerator proposed by the Mayo Foundation. More information on these alternatives must be provided in the Final Environmental Impact Statement.

We urge serious consideration of these alternative waste management approaches, and that the Minnesota Pollution Control Agency not proceed to permit the proposed incinerator without this consideration.

Sincerely,

Don Arnosti
Audubon Representative

Minnesota Chapters of National Audubon Society:

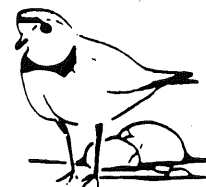
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Minnesota River Valley Mississippi Headwaters St. Paul White Pine Wild River Wilderness Heritage Zumbro Valley



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1313 Fifth Street S.E., Suite 321
Minneapolis, Minnesota 55414
(612) 379-3868 FAX: (612) 379-3869

29



March 25, 1992

Kathy Kramer
Minnesota Pollution Control Agency
520 Lafayette Road
St. Paul, MN 55155

Dear Ms. Kramer:

The Minnesota Audubon Council of the National Audubon Society wishes to comment on the Draft Environmental Impact Statement (DEIS) prepared by the Minnesota Pollution Control Agency (MPCA) regarding a medical waste incinerator proposed by the Mayo Foundation.

I have been the Audubon representative on a committee established by Minnesota Healthcare Partners Inc. Representatives from environmental organizations, hospitals, state agencies, community groups and academia participated in a feasibility study of non-burn technologies. The purpose of the study was to determine whether or not non-burn technologies could adequately decontaminate infectious and pathological waste.

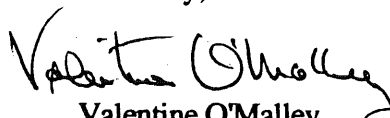
After months of review and evaluation of several non-burn technologies, two were recommended as environmentally acceptable: microwaving and steam sterilization for the infectious and pathological waste. For anatomical and trace chemotherapy incineration was considered the only acceptable method.

The objections to incineration has been discussed repeatedly in the recent past and the National Audubon Society concurs with the objections.

The Society therefore recommends that the MPCA and the Mayo Foundations consider:

- 1) A combination of technologies:
 - a) A non-burn technology such as steam sterilization or microwaving for the decontamination of infectious and pathological waste;
 - b) trace chemotherapy and anatomical waste be incinerated.
- 2) Continue emphasis on programs for the segregation, reduction and recycling of medical waste.

Sincerely,


Valentine O'Malley

Minnesota Chapters of National Audubon Society:

Agassiz Albert Lea Austin Central Minnesota Duluth Fargo-Moorhead Grand Forks Minneapolis
Minnesota River Valley Mississippi Headwaters St. Paul White Pine Wild River Wilderness Heritage Zumbro Valley

Kathryn Krammer
 EIS Project Manager
 Environmental Analysis Office
 MPCA
 520 Lafayette Road
 St. Paul, MN. 55155

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MAR 30 1992

MPCA ENVIRONMENTAL
 ANALYSIS OFFICE

Dear Ms. Krammer,

The following are areas of concern that Clean Water Action has with the Draft EIS for the Mayo Foundation Medical Waste Incinerator Project. These are our preliminary concerns, a more formalized description of our concerns will be submitted at a later date. The short period of time given to respond to these concerns limits our ability to secure indepth analysis from our national office and experts across the nation. Thank you for the opportunity to respond to the Draft EIS.

AREAS OF CONCERN

Waste Generation

Infectious waste from the Federal Medical Center, Olmsted Community Hospital, and Olmsted Medical Group is estimated to be about 45 tons per year. Does the Mayo facility have contracts from this facility to secure this waste? At what tipping fee? What impact will the loss of this waste have on the overall cost per lb. at Mayo to incinerate? Will not the proposed Mayo incinerator also have the ability to accept non-infectious msw and infectious waste from medical facilities as well as any other commercial or residential waste? What legal restrictions will Mayo be under which will prevent them from burning a capacity of 50 tpd? Can you clearly outline what steps that Mayo Hospital will need to preform in order to begin use of the second 25tpd burner? Will an additional EIS be required? Comments on 2-6 of the Draft indicate that maximum capacity is considered in ash generation figures.

There may be no limitations on Mayo's ability to import medical waste from within the State of Minnesota or from locations outside the State. Because waste is governed under Federal Interstate Commerce Laws what will prevent Mayo from importing medical waste including low level radioactive waste, radioactive animal carcasses, chemotherapy wastes from other states? Is it not true that the importation of these wastes will allow Mayo Hospitals to financially benefit from such arrangements (given that national financial figures on medical waste disposal can average anywhere from \$100-\$400 per ton)?

According to Draft Environmental Impact Statement (2-5), general hospital waste comprises 40%, 24% recyclable waste, and 13% non-burnable waste. Given that fully 80% of the waste is in fact non-infectious are we not then building a garbage burner which will handle infectious waste? Is this in fact not similar to infectious waste that is currently burned at the Quadrant MSW Incinerator in Perham, MN.? Should not then this incinerator be required to follow the more stringent emission and ash rules for msw combustors?

Emissions

Why were Mercury and cadmium not considered in the study of cumulative impacts of the proposed facility on local conditions, when in fact national research (ie. California Air Resources Board) indicate that these two metals posed some of the greatest risks from medical waste incinerators?

Chronic exposure non-cancer risks were calculated for a farm worker and a residential exposure. Why did not the study include workers at the facility, those people who risks is potentially the greatest? Why is it that we allow the state's largest medical facility and one of the nation's most prestigious medical facilities to burn waste that creates emissions at double the state standard for industry?

Health Risk Assessment.

The US EPA at Research Triangle Park in North Carolina recently concluded that emission estimates based on industry pollution control equipment were substantially under operating conditions of such equipment. The MPCA's concern that mathematical modeling on computers may "overestimate" actual risks and "risk estimates that are based on the pollution control equipment operating at removal efficiencies less than what can be expected by the proposed dry sorbent injection/scrubber/fabric filter pollution control system", may in fact be inaccurate. Emissions must be weighed by actual operational studies of these systems and not by industry estimates..

Geology

"Sink hole formation at the proposed site is low to moderate". A "walk through reconnaissance" was conducted and no sink holes were present. While this maybe one measure of geological surveying it is not good science from which we should draw conclusions.

Stack Heights

The MPCA list mitigation measures that could be used to avert potentially adverse impacts from the operation of the

proposed Mayo incinerator. We strongly urge that the measure to increase stack height be required.

Alternatives

The MPCA's assumption that "incineration at a facility which it (Mayo) owns and operates would give the Foundation direct control over potential liability for disposal practices" clearly belittles the entire incinerator ash debate. Given the current legal designation battle of ash being special or hazardous waste occurring in federal courts, the liability for ash disposal could skyrocket. Incineration institutionalizes landfilling. In addition, the current ash rules for Minnesota, based on the opinion of an administrative law judge, will cost municipalities in Minnesota millions of dollars in new ash disposal costs.

Microwaving and or steam sterilization could easily be accompanied by incineration of pathological waste at the current burner. Why was this option given so little attention in the study on alternatives? The pathological waste could easily be burned with the use of natural gas at the current burner.

If the MPCA is serious about the emissions of medical waste facilities, it should not be advocating the burning of plastics which contain a great percentage of the cadmium and mercury in the waste stream as found in national studies on medical waste incineration (ie. California Air Resources Board).

ONEF

It is stated on numerous occasions in the draft EIS that the ONEF is currently operating at full capacity. If this in fact is true then why was it reported by Olmsted County Recycling Coordinator Janine Pothoff on September 28, 1991, (Rochester Post Bulletin) that, "Increased recycling will raise garbage rates" and "Recycling is so successful, we're losing money". The county loses revenue because it not able to charge the tipping fee it normally would on the waste. The result according to the Post Bulletin is, "an increase in monthly garbage bill of 50 cents to \$1 in 92". Recycling is already costing the County.

The reported loss in County revenue from waste being diverted from its burner to Mayo's is not just \$138,000 per year. If in fact, recycling is already putting financial pressure on repaying the County's financial obligations to pay off its burner, the additional \$138,000 will add to that burden and act as a direct incentive against further recycling in the County. Additionally if waste flow control ordinances are held to be unconstitutional (as a recent federal court decision by Judge Magnuson in St. Paul found),

Olmsted County could soon be financially at risk from additional waste leaving the County incinerator.

And, even though a waste flow control ordinance is in effect currently in the County, waste haulers from LaCrosse WI, currently ship msw from Olmsted County to LaCrosse County where the tipping fee is \$55 per ton. No new burner permit should be given to a waste facility until such time that this decision on waste flow is settled. The economic risk to an existing incinerator and to recycling rates may be endangered by the issuance of a permit to Mayo.

Actions Suggested by Clean Water Action

1) That medical waste management through use of available non-burn technologies, maximization of detoxification, reduction, reuse, recycling, and composting be examined more thoroughly.

Because no discussion of reduced emissions, greatly reduced capital costs, potential for maximization of recycling, reuse, reduction, and composting was compared between the non-burn alternatives to incineration, we request that such a study be done.

2) Ash disposal and its costs must be reevaluated in light of recent court and legal decisions in MN and Chicago.

3) This facility is only a medical waste facility in name. In fact, by waste generation it is a msw mass burn garbage incinerator. Why are we burning msw when in fact this is a medical waste facility?

4) Why should Mayo Hospital be allowed if but only for financial reasons to burn radioactive wastes and chemotherapy drugs at the incinerator? Is this the policy the MPCA will endorse for the State's remaining medical waste burners?

5) The impacts on the OWEF are not only financial, in excess of \$138,00 per year, but will further impact Olmsted County's ability to recycle its waste. Given the unconstitutionality of the current "waste flow designation ordinance" in effect in Olmsted County, the MPCA should not place the existing burner at further risk.

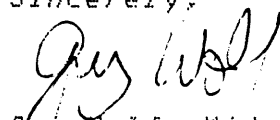
6) There does not appear to be any solid legal evidence prohibiting Mayo Hospital to import waste from other locations (as already mentioned in the plan) or from outside the State. Since Mayo Hospital could greatly benefit financially from its proposed waste incinerator by importing waste it should not be allowed to build the second 25tpd burner and the remaining 25tpd burner should be downsized.

The oversizing of this facility accentuates the problem of over reliance in incineration in this State. Doesn't this sound familiar to our current dependency on msw incineration in the State. Downsizing should be a mandatory requirement.

7) Mercury emissions from this facility are diminished in concern by the argument that by building the new facility and subtracting the older facility will mean a reduction in 20lbs. per year of mercury emissions for the County. However, this point will become mute if the 50tpd are allowed to operate. And, the addition of activated carbon on the burner would greatly reduce overall mercury and dioxin emissions. This was a requirement for the proposed Dakota County Incinerator and potentially HERC, why will it not be required on this facility? We are already at the saturation point of mercury emissions problems in MN waters. Why should we be permitting new sources?

If you have any further questions please feel free to call.

Sincerely,



Guy Wolf, Midwest Rural Organizer
Clean Water Action