METRO Agenda

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Meeting: Council Meeting

Date: September 22, 1987

Day: Tuesday

Time: 5:30 p.m.

Place: Council Chamber

Approx. Time*		Presented By
5:30	CALL TO ORDER ROLL CALL	
	1. Introductions 2. Written Communications to Council on Non-Agenda Items 3. Citizen Communications to Council on Non-Agenda Items 4. Councilor Communications 5. Executive Officer Communications	
5:55 (5 min.)	6. CONSENT AGENDA (Action Requested: Adoption of Resolution No. 87-808)	
	6.1 Consideration of Resolution No. 87-808, for the Purpose of Amending the FY 1988 Unified Work Program to Include Implementation of Public/ Private Task Force on the Future of Transit Finance in the Portland Region	Cotugno
6:00 (50 min.)	7. Consideration of Resolution No. 87-809, for the Purpose of Authorizing Entry into Memorandum of Understanding Negotiations with Systems Contractors Mass Composting and Refuse Derived Fuel Incineration Systems (Public Hearing) (Action Requested: Adoption of Resolution)	Owings/ Allmeyer/ Zier
6:50	BREAK	
7:00 (10 min.)	8. EXECUTIVE SESSION, Held Under the Authority of ORS 192.660(1)(e), Relating to the Purchase of Real Property for the Oregon Convention Center	Wilson

* All times listed on this agenda are approximate. Items may not be considered in the exact order listed.

(continued)

Approx. Time*			Presented By
	9.	CONTRACTS	
7:10 (10 min.)	9.1	Consideration of a Contract to Provide Environmental Testing Services on the Convention Center Site (Action Requested: Approval of Contract)	Wilson
7:20 (10 min.)	9.2	Consideration of an Intergovernmental Agreement with the Exposition-Recreation Commission for Marketing Services for the Oregon Convention Center (Action Requested: Approval of Contract)	Wilson
7:30 (15 min.)	9.3	Consideration of an Amendment to the Contract with Browning Ferris Industries for a Second Compactor at the St. Johns Landfill (Action Requested: Approval of the Contract Amendment)	Owings
7:45 (10 min.)	9.4	Consideration of a Contract with Sun Roofing and Gutters, Inc. for Zoo Roof Rehabilitation Projects (Action Requested: Approval of Contract)	Goff
7:55 (10 min.)	9.5	Consideration of a Contract with Forest Grove Industries for Phase II Modifications to the Zoo's Pachyderm House (Action Requested: Approval of Contract)	Goff
	10.	ORDINANCES (This legislative action is subject to the Executive Officer's veto)	
8:10 (15 min.)	10.1	Consideration of Ordinance No. 87-228, Adopting Investment Procedures, Establishing Chapter 2.06 of the Metro Code, and Declaring and Emergency (Public Hearing) (Action Requested: Adoption of Emergency Ordinance)	Phelps
	11.	RESOLUTIONS	
8:25 (10 min.)	11.1	Consideration of Resolution No. 87-807, for the Purpose of Amending Resolution No. 87-744 Revising the FY 1987-88 Budget and Appropriations Schedule (for Phase II of the Aquarium Feasibility Study) (Public Hearing) (Action Requested: Adoption of Resolution)	Sims

* All times listed on this agenda are approximate. Items may not be considered in the exact order listed.

(continued)

Approx. Time*			Presented By
	11.	RESOLUTIONS (continued)	
8:40 (10 min.)	11.2	Consideration of Resolution No. 87-797, for the Purpose of Authorizing Two New Positions (Construction Project Manager and Secretary), Amending the Pay and Classification Plans, and Amending the FY 1987-88 Budget and Appropriations Schedule (Action Requested: Adoption of Resolution)	Phelps
8:50	13.	COMMITTEE REPORTS	
9:00 (30 min.)	14.	EXECUTIVE SESSION, Held under the Authority of ORS 192.660(1)(h), for the Purpose of Discussing Litigation matters with General Counsel regarding the Clackamas Transfer & Recycling Center (CTRC)	Cooper
9:30		ADJOURN	

* All times listed on this agenda are approximate. Items may not be considered in the exact order listed.

amn
8175C/D3-3
09/16/87

METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

Date: September 24, 1987

To: Metro Councilors
Executive Officer
Interested Staff

From: Gloria Logan, Acting Clerk of the Council

Regarding: COUNCIL ACTIONS OF SEPTEMBER 22, 1987

Agenda Item	Action Taken
6.1 Resolution No. 87-808, Amending the FY 1988 Unified Work Program to Include Implementation of Public/ Private Task Force on the Future of Transit Finance in the Portland Region	Adopted (Kirkpatrick/DeJardin; 9/0 vote)
7.0 Resolution No. 87-809, Authorizing Entry into Memorandum of Understanding Negotiations with Systems Contractors of Mass Composting and Refuse Derived Fuel Incineration Systems	Adopted as amended (Knowles; Gardner; 7/3 vote). Motion carried to amend the Resolution by adding a new "be it resolved" paragraph to read: "4. That Metro will initiate an independent scientific review of the potential environmental and health impacts of a solid waste incineration project for the Metro area; this review will be conducted by Oregon citizens and scientists, including private citizens and public officials of St. Helens and Columbia County, and environmental and public health experts from, for example, Oregon Health Sciences University, Oregon State University, and the Department of Environmental Quality. The review should be completed by December 31, 1987." The original

Agenda Item	Action Requested
7.0 (continued)	paragraph #4 would be renumbered to #5. (Gardner/Kirkpatrick; 7/3 vote). Motion carried to amend the second "be it resolved" paragraph to read: "That the Metropolitan Service District will proceed to negotiate a Memorandum of Understanding with Combusion Engineering for a refuse-derived fuel facility capable of processing 350,000 tons per year of solid waste to be located in St. Helens, Oregon, and that those negotiations would require the proposer meet or better the air emissions standards of the state Department of Environmental Quality. (New language underlined.) (Kelley/ Hansen; 9/1 vote).
8.0 Convention Center Property Aquisition	Councilor Van Bergen moved, seconded by Councilor DeJardin, to approve the recommendation of the Portland Development Commission relating to the purchase of real property for the A vote on the motion resulted in all ten Councilors present voting aye. Councilors Cooper and Ragsdale were absent.
9.1 Consideration of a Contract to Provide Environmental Testing Services on the Convention Center Site	Contract approved. (Van Bergen/ Kelley; unanamious)
9.2 Consideration of an Intergovernmental Agreement with the Exposition-Recreation Commission for Marketing Services for the Oregon Convention Center	Contract approved. (Van Bergen/ Kelley; unanamious)
9.3 Consideration of an Amendment to the Contract with Browning Ferris Industries for a Second Compactor at the St. Johns Landfill	Contract approved. (Knowles/ Kirkpatrick; unanamious)

9.4	Consideration of a Contract with Sun Roofing and Gutters, Inc. for Zoo Roof Rehabilitation Projects	Contract approved. (Knowles/ Collier; unanamious)
9.5	Consideration of a Contract with Forest Grove Industries for Phase II Modifications to the Zoo's Pachyderm House	Contract approved. (Kirkpatrick/ Collier; unanamious)
10.1	Ordinance No. 87-228, Adopting Investment Procedures, Establishing Chapter 2.06 of the Metro Code, and Declaring an Emergency	Ordinance adopted (as recommended by Council Committee). (Gardner/ Hansen; unanamious vote as required for proposed emergency.) Council wishes to continue to receive all reports.
11.1	Resolution No. 87-807, for the Purpose of Amending Resolution No. 87-744 Revising the FY 1987-88 Budget and Appropriations Schedule (for Phase II of the Aquarium Feasibility Study)	It was moved that this be sent to the Council Management Committee for recommendation and then back to the full Council. (Bonner/Kirkpatrick; 9/0 vote)
11.2	Resolution No. 87-797, Authorizing Two New Positions (Construction Project Manager and Secretary, Amending the Pay and Classification Plans, and Amending the FY 1987-88 Budget and Appropriations Schedule	Revised resolution adopted (as recommended by the Council Management Committee) (Gardner/Hansen; 9/0 vote)
13.0	Committee Reports: Discussion regarding CTRC and efforts to restrict the facility to accepting no more than 700 tons per day	Motion carried to instruct General Counsel to meet with a Council subcommittee to develop legislation for Council consideration that would require joint Council and Executive Officer participation when initiating litigation. (Kirkpatrick/ Van Bergen; 9/0 vote). It was recommended the Presiding Officer appoint subcommittee members with legal backgrounds.
	North Portland Rehabilitation and Enhancement Committee	Councilor Hansen stated Committee would be bringing selected projects for funding to the Council in the very near future.

METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Agenda

Meeting: Council Meeting

Date: September 22, 1987

Day: Thursday

Time: 5:30 p.m.

Place: Council Chamber

CONSENT AGENDA

The following business item has been reviewed by the staff and an officer of the Council. In my opinion, this item meets with the Consent Agenda Criteria established by the Rules and Procedures of the Council. The Council is requested to approve the recommendation presented on this item.

6.1 Resolution No. 87-808, for the Purpose of Amending the FY 1988 Unified Work Program to Include Implementation of a Public/Private Task Force on the Future of Transit Finance in the Portland Region

Rena Cusma
Executive Officer

amn

AGENDA NOTES SEPTEMBER 22, 1987

Date: September 22, 1987

To: Richard Waker, Presiding Officer

From: Ray Barker, Council Assistant

CALL TO ORDER
ROLL CALL

1. INTRODUCTIONS

2. WRITTEN COMMUNICATIONS TO COUNCIL ON NON-AGENDA ITEMS

3. CITIZEN COMMUNICATIONS TO COUNCIL ON NON-AGENDA ITEMS none

4. COUNCILOR COMMUNICATIONS none

5. EXECUTIVE OFFICER COMMUNICATIONS

6. Consent Agenda (Action Requested: Approval of Consent Agenda)

   6.1 Consideration of Resolution No. 87-808, For The Purpose of Amending the FY 1988 Unified Work Program to Include Implementation of Public/Private Task Force on the Future of Transit Finance in the Portland Region

   a. Receive a motion to approve item listed on the Consent Agenda.

   b. Vote on motion to approve the Consent Agenda.

Executive Session

7. Consideration of Resolution No. 87-809, for the Purpose of Authorizing Entry into Memorandum of Understanding Negotiations with Systems Contractors Mass Composting and Refuse Derived Fuel Incineration Systems (Public Hearing)
(Action Requested: Adoption of Resolution)

   a. Explain that on September 10, 1987, the Executive Officer announced her recommendation for proposers with which to proceed into negotiations for Memorandums of Understanding to construct resource recovery facilities.

      On September 15, 1987, the Council Solid Waste Commiittee heard presentations by three resource recovery project proposers and received public testimony.

b. Explain the sequence of tonight's proceedings:

- The chairman of the Solid Waste Committee will explain the recommendation of the Committee.
- Each resource recovery project proposer will have eight (8) minutes to make a presentation to the Council. Each presentation shall be limited to the subject of the Solid Waste Committee's recommendations.
- Response by Harvey Gershman of GBB, Metro's lead negotiator.
- Public testimony will be received and will be limited to the subject of the Committee's recommendation. Each person's testimony should be limited to three (3) minutes.
- Staff and advisor's response to questions/comments.
- The Council will then consider the matter and make a decision regarding which proposer Metro will proceed with in negotiations for Memorandums of Understanding.

c. Have Jim Gardner explain the recommendation of the Solid Waste Committee.

d. Invite proposers to address the Council in the following order: (1) Schnitzer/Ogden; (2) Fluor/SEI; and (3) Combustion Engineering. Each proposer will be given eight (8) minutes and remarks should be limited to the subject on the agenda. Have Harvey Gershman respond.

e. Open the public hearing. Each person will be given three (3) minutes to speak and remarks should be limited to the subject on the agenda.

f. Close the public hearing.

g. Have staff and advisors respond to questions and comments.

h. Discussion: Council questions and comments.

i. Receive a motion to adopt Resolution No. 87-809.

j. Vote on the motion.

BREAK

8. EXECUTIVE SESSION

a. Announce that the Executive Session is being held under the authority of ORS 192.660(1)(e), and relates to the purchase of real property for the Oregon Convention Center.

9. CONTRACTS

9.1 Consideration of a Contract to Provide Environmental Testing Services on the Convention Center Site
(Action Requested: Approval of Contract)

(2)

a. Have Tuck Wilson present the staff report.

b. Receive a motion to approve the contract.

c. Discussion: Council questions and comments.

approved

d. Vote on motion to approve contract.

9.2 Consideration of an Intergovernmental Agreement with the Exposition-Recreation Commission for Marketing Services for the Oregon Convention Center
(Action Requested: Approval of Contract)

(1)

a. Have Tuck Wilson present the staff report.

b. Receive a motion to approve the Intergovernmental Agreement.

approved

c. Discussion: Council questions and comments.

d. Vote on motion to approve Intergovernmental Agreement.

9.3 Consideration of an Amendment to the Contract with Browning Ferris Industries for a Second Compactor at the St. Johns Landfill
(Action Requested: Approval of Contract Amendment)

(3)

a. Have Richard Owings present staff report.

b. Receive motion to approve the amendment to the contract.

approved

c. Discussion: Council questions and comments.

d. Vote on motion to approve the amendment to the contract.

9.4 Consideration of a Contract with Sun Roofing and Gutters Inc., for Zoo Roof Rehabilitation Projects
(Action Requested: Approval of Contract)

a. Have Allen Goff present staff report.

b. Receive a motion to approve contract.

c. Discussion: Council questions and comments.

d. Vote on motion to approve the amendment to the contract.

9.5 Consideration of a Contract with Forest Grove Industries for Phase II Modifications to the Zoo's Pachyderm House
(Action Requested: Approval of Contract)

10. ORDINANCES (This legislative action is subject to the Executive Officer's veto)

10.1 Consideration of Ordinance No. 87-228, Adopting Investment Procedures, Establishing Chapter 2.06 of the Metro Code and Declaring an Emergency (Public Hearing)
(Action Requested: Adoption of Emergency Ordinance)

a. Have the Clerk read the Ordinance by title only.

b. Have Ray Phelps present the staff report.

c. Receive a motion to adopt Ordinance No. 87-228. Indicate that this is an emergency ordinance, and only requires one reading prior to passage. The unanimous approval of all members of the Council at the meeting is required to adopt an emergency ordinance.

d. Open public hearing.

e. Close public hearing.

f. Discussion: Council questions and comments.

g. Vote on motion to adopt emergency Ordinance No. 87-228. Have the Clerk call the roll.

11. RESOLUTIONS

11.1 Consideration of Resolution No. 87-807, For The Purpose of Amending Resolution No. 87-744, Revising the FY 1987-88 Budget and Appropriations Schedule (for Phase II of the Aquarium Feasibility Study) (Public Hearing)
(Action Requested: Adoption of Resolution)

a. Have Jennifer Sims present staff report.

b. Receive a motion to adopt Resolution No. 87-807.

c. Open public hearing.

d. Close public hearing.

e. Discussion: Council questions and comments.

f. Vote on motion to adopt Resolution No. 87-807.

11.2 Consideration of Resolution No. 87-797, for the Purpose of Authorizing Two New Positions (Construction Project Manager and Secretary), Amending the Pay and Classification Plans, and Amending the FY 1987-88 Budget and Appropriations Schedule
(Action Requested: Adoption of Resolution)

a. Have Ray Phelps present staff report.

b. Receive a motion to adopt Resolution No. 87-797 as amended.

c. Discussion: Council questions and comments.

d. Vote on motion to adopt Resolution No. 87-797 as amended.

13. COMMITTEE REPORTS

14. EXECUTIVE SESSION

a. Announce that the Executive Session is being held under authority of ORS 192.600(1)(e) and relates to litigation matters concerning the Clackamas Transfer & Recycling Center (CTRC).

ADJOURN

RB/sm-8196C/D3

STAFF REPORT

Agenda Item No. 6.1

Meeting Date Sept. 22, 1987

CONSIDERATION OF RESOLUTION NO. 87-808 FOR THE PURPOSE OF AMENDING THE FY 1988 UNIFIED WORK PROGRAM TO INCLUDE IMPLEMENTATION OF A PUBLIC/ PRIVATE TASK FORCE ON THE FUTURE OF TRANSIT FINANCE IN THE PORTLAND REGION

Date: September 14, 1987 Presented by: Andrew Cotugno

PROPOSED ACTION

To amend the FY 88 Unified Work Program to allow Metro to apply for a $300,000 Discretionary UMTA Section 8 planning grant ($240,000 federal share) to establish a public/private task force on the future of transit finance in the Portland region.

FACTUAL BACKGROUND AND ANALYSIS

The City of Portland developed a proposed effort to build upon regional transit plans and priorities developed through JPACT. The effort is intended to broaden the business sector's understanding of regional transit needs in order to develop recommendations on public and private finance mechanisms. The effort was designed to be undertaken as a cooperative regional process involving elected officials and business representatives from throughout the region. The study also includes consultant assistance to provide research on alternative service delivery and finance mechanisms.

At the recommendation of TPAC and JPACT, the proposal was revised as follows:

1. Metro would be the grant applicant with pass-through funding to Portland as lead agency.

2. The overall study would be regionally staffed with participation by various agencies, including Metro, the City of Portland, Tri-Met and ODOT.

3. The public/private task force would be established as a JPACT task force to make recommendations on transit finance. Portland will convene the task force and will appoint committee members in consultation with County Commissioners, Metro, Port of Portland, ODOT and Tri-Met. The committee will select the chair.

4. Coordination with local governments would be provided for.

5. Private composition of the task force could be expanded to include employers, not just the development community.

TPAC and JPACT recommended adoption of the resolution with the above amendment. The proposal as defined in the attached resolution includes the above changes.

EXECUTIVE OFFICER'S RECOMMENDATION

The Executive Officer recommends adoption of Resolution No. 87-808 as amended.

AC/sm
8097C/513
09/14/87

BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF AMENDING THE FY 1988 UNIFIED WORK PROGRAM TO INCLUDE IMPLEMENTATION OF A PUBLIC/PRIVATE TASK FORCE ON THE FUTURE OF TRANSIT FINANCE IN THE PORTLAND REGION	)	RESOLUTION NO. 87-808 Introduced by the Joint Policy Advisory Committee on Transportation

WHEREAS, The FY 1988 Unified Work Program was adopted by Resolution No. 87-754; and

WHEREAS, The Metropolitan Service District is seeking Section 8 Discretionary planning funds from the Urban Mass Transportation Administration for the purpose of initiating a cooperative public/private regional effort to develop transit finance recommendations for the region; and

WHEREAS, This proposal must be reflected in the region's FY 1988 Unified Work Program; now, therefore,

BE IT RESOLVED,

1. That the FY 1988 Unified Work Program is hereby amended to include the proposed program described in Attachment A.

2. That the grant applicant will be Metro with pass-through funding to Portland as the lead agency. Portland will convene the task force and will appoint committee members in consultation with County Commissioners, Metro, Port of Portland, ODOT and Tri-Met. The committee will select the chair.

3. That the proposal is not intended to compete with Tri-Met's grant for the financial analysis related to Sunset Light Rail Transit Preliminary Engineering.

4. That the proposed program is consistent with the continuing, cooperative and comprehensive planning process and is given affirmative Intergovernmental Project Review action.

5. That the Executive Officer is authorized to apply for, accept and execute grants required for this work program.

ADOPTED by the Council of the Metropolitan Service District this _____ day of _____, 1987.

_____
Richard Waker, Presiding Officer

AC/sm
8079C/513
09/14/87

ATTACHMENT A

SUMMARY

PUBLIC-PRIVATE TASK FORCE ON FUTURE TRANSPORATION FINANCE IN THE PORTLAND REGION

PROPOSED UMTA GRANT TO INVOLVE THE PRIVATE SECTOR IN TRANSIT DEVELOPMENT

I. INTRODUCTION

The inaugration of light rail transit services in Portland in September, 1986 represented a major accomplishment for this region. The completion of the Banfield LRT Project and the tremendous public enthusiasm are products of a successful transportation planning effort which began during the early 1970's. However, with the near completion of the Interstate Transfer Program to fund transportation projects in the Metro region, this area must face a new challenge for the 1990's - to identify innovative financial strategies to fund transportation projects . Additional transportation improvements, particularly transit, are needed to accommodate the increasing travel demands generated by the population and employment growth in the Portland Metropolitan area.

Also, this region, like the rest of the country, has experienced tremendous intra-suburban travel growth. Current transit strategies have not been able to keep up with this changing travel pattern. Innovative transit strategies are needed to address the transit needs in low density suburban areas. Suburban transit service will also be needed to feed future LRT lines.

The following is a grant proposal for a "Public-Private Task Force on Future Transportation Finance in the Portland Region." The task force would be composed of business community members and public officials representing the state and local jurisdictions in the Portland region. The task force will review and evaluate future implementation of transportation plans and projects and develop public/private financing options for them.

II. PROBLEM

While several projects enjoy strong support, neither Metro, the City of Portland, Tri-Met nor any other governmental body has been able to piece together an implementation strategy which examines the alternatives for financing, scheduling various phases of the projects, or linking development and highway activity. Developing these strategies is essential to future transportation development in the Portland region.

In 1984, UMTA established its fixed-guideway funding policy which would rate transitway projects according to the percentage of federal funds they require as well as their overall cost effectiveness. As a result, the Portland region must develop innovative financing solutions to assure private sector involvement in this region's strategy to finance transit projects.

Public and private funds must be clearly identified and committed for immediate preliminary engineering needs and for future construction efforts. Gaps between known resources and actual needs must be addressed to determine the feasibility of moving forward on projects. Revenue sources must be evaluated for stability and likelihood of implementation.

Interest and enthusiasm for addressing future transportation needs exist in the Portland community, particularly within the central business community. Private sector leaders are beginning to understand the need to be involved in transportation project development and cost sharing in the years ahead.

The opportunity now exists to examine this region's transit needs and develop solutions through a joint public-private sector partnership. The proposed task force will provide a cohesive framework to guide the future growth with transit investments.

III. TASK FORCE GOAL AND OBJECTIVES

A. Overall Goal Statement

The Task Force's principal mission is to develop a comprehensive program to coordinate transit projects with broader community needs. This will include integrating potential private sector contributions with governmental sources to maximize transit project's impacts on economic development opportunities. The net effect will be to leverage private sector interest in and financial support for transit planning and transit projects.

B. Transportation Planning Objectives

1. Establish a public-private framework or model which can be used to develop financial backing for regional transitway projects. This will be used as a framework to identify local government and private sector financial commitments to demonstrate a stable and dependable source to construct, maintain, and operate the system. The goal will be to identify funding sources which will contribute to a higher percentage of the capital costs. Detail work on each corridor will not be the focus. Instead, it will establish the model and outline, the characteristic and potential for each corridor.

2. Establish a framework to address suburban transit needs. Examine alternative concepts with private sector participation in the delivery of transit service, including being the provider of transit service in suburban areas.

3. Establish a public-private framework to fund incremental transit improvements. This will be used as a framework to identify and construct incremental transit improvements in the region, which are operationally feasible.

4. Establish a framework to improve Tri-Met's operating financial needs. Identify the relationship between Tri-Met's financial condition, the population growth and economic development dependencies in transit in the region's economic and transportation plans. Tri-Met must improve its ability to fund its operating costs in order to expand service to meet the future demands assumed by the region.

IV. MEMBERSHIP

A. The task force will be convened by Portland as a JPACT Task Force. Portland will appoint the membership in consultation with County Commissioners, Metro, the Port of Portland, ODOT and Tri-Met. The committees will select the chair.

B. Private sector membership will be drawn from the development community, utilities, financial institutions, employers and others who will be interested in future transportation projects. The Port of Portland, Oregon Transportation Commission, Metro, Tri-Met and C-Tran will each be represented by a board member who also is a member of the business community.

C. Elected officials on the Task Force will include Counties of Washington, Clackamas, Multnomah, and the City of Portland.

V. TIMING, COST AND AGENCY RESPONSIBILITIES

The Task Force work would be completed in six months. The proposed budget is $300,000 ($240,000 federal share), principally for acquiring the professional expertise necessary to assist the decision-making process and conduct the special studies and analyses necessary to address the appropriate issues. Follow-up implementation strategies will require an additional six months.

The grant applicant is Metro with pass-through funding to Portland as the lead agency. The overall study will be regionally staffed with participation by various agencies, including the City of Portland, Metro, Tri-Met and ODOT.

METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

Agenda Item No. 7

Meeting Date Sept. 22, 1987

Date: September 15, 1987

To: Metro Councilors

From: Debbie Allmeyer

Regarding: COUNCIL CONSIDERATION OF DECISION TO PROCEED ON M.O.U. NEGOTIATIONS WITH RESOURCE RECOVERY VENDORS

On September 10, 1987, the Executive Officer presented her recommendation to the Council on firms with which to continue negotiations. On September 15, 1987, the Council Solid Waste Committee will meet to consider the matter before making a recommendation to the Council for consideration at its September 22, 1987 meeting.

Copies of the staff report presented at the September 10th Council meeting will be available at the meeting September 22nd.

DGA/jfs

BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF AUTHORIZING ENTRY INTO MEMORANDUM OF UNDERSTANDING NEGOTIATIONS WITH SYSTEMS CONTRACTORS OF MASS COMPOSTING AND REFUSE-DERIVED FUEL INCINERATION SYSTEMS	))))))	RESOLUTION NO. 87-809 Introduced by the Executive Officer

WHEREAS, The Metropolitan Service District has evaluated five proposals received January 30, 1987, as a result of issuing two Request for Proposals for mass composting, mass incineration and refuse-derived fuel technology systems in November 1986; and

WHEREAS, The evaluation criteria have been met, as evidenced in the Resource Recovery project Final Evaluation Report; and

WHEREAS, The Council of the Metropolitan Service District has committed, through Ordinance No. 86-201, to negotiate with selected firm(s) for the procurement of a resource recovery system if Council adopted criteria are met; and

WHEREAS, Metro's Resource Recovery Negotiating Team conducted preliminary negotiations with Combustion Engineering, Flour/SEI, Riedel/DANO, and Schnitzer/Ogden from August 11 - 13, 1987, to request information on siting the facility at St. Helens, Oregon, and to request improvements in the proposals; and

WHEREAS, Combustion Engineering and Riedel/DANO have been recommended by the Executive Officer for further consideration; now, therefore,

BE IT RESOLVED,

1. That the Metropolitan Service District will continue to negotiate a Memorandum of Understanding with Riedel/DANO for a mass

composting facility capable of processing 160,000 tons per year of solid waste, to be located at N.E. Columbia Boulevard in Portland, Oregon.

2. That the Metropolitan Service District will proceed to negotiate a Memorandum of Understanding with Combustion Engineering for a refuse-derived fuel facility capable of processing 350,000 tons per year of solid waste to be located in St. Helens, Oregon.

3. That should negotiations with Combustion Engineering fail to yield a Memorandum of Understanding that meets the Metropolitan Service District's criteria within 60 days, negotiations will be conducted with Schnitzer/Ogden, and failing those, with Flour/SEI.

4. That upon completion of Memorandum of Understanding negotiations, a "system of analysis" will be conducted that will yield comparative cost data on a landfill based system and a system that includes resource recovery prior to authorizing contract negotiations.

ADOPTED by the Council of the Metropolitan Service District this _____ day of _____, 1987.

_____
Richard Waker, Presiding Officer

DA/amn
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09/15/87

METRO

2000 S.W. First Avenue
Portland, OR 97201-5398
503/221-1646

Memorandum

Date: September 18, 1987

To: Metro Council

From: Jim Gardner, JG Chairman
Council Solid Waste Committee

Regarding: COMMITTEE REPORT ON SEPTEMBER 22, 1987, COUNCIL MEETING AGENDA ITEMS

Agenda Item 7. Consideration of Resolution No. 87-809, for the Purpose of Authorizing Entry into Memorandum of Understanding Negotiations with Systems Contractors for Mass Composting and Refuse Derived Fuel Incineration Systems

Committee Recommendation

The Committee recommends two things to the Council on this matter:

1. Adoption of Resolution No. 87-809 which does the following:

   a. Continues the negotiation of an MOU with Riedel/DANO for a mass composting facility capable of processing 160,000 tpy.

   b. Proceed to negotiate an MOU with Combustion Engineering for an RDF facility located in St. Helens, Oregon, capable of processing 350,000 tpy.

   c. Sets a 60-day period for achieving an acceptable MOU with Combustion Engineering. If that fails, negotations will commence with Schnitzer/Ogden, and if that fails negotiations will commence with Fluor/SEI.

   d. Upon completion of the MOU require a system cost analysis comparing a landfill-based system with a system which includes resource recovery project(s) prior to authorizing contract negotiations.

2. Immediately start an independent evaluation of the health effects of a burner in the St. Helens area utilizing impartial Oregon-based experts. This evaluation should run parallel with the MOU negotations.

Discussion

The Committee spent approximately 3-1/2 hours on this issue. The Committee heard the staff report and Executive Officer recommendation, testimony from each of the vendors as well as testimony from approximately 10 citizens, a representative of the Port of St. Helens and a Columbia County Commissioner. A representative from DEQ appeared to answer questions regarding air quality matters. Material received by the Committee is attached as Exhibit A.

The Committee agreed with the Executive Officer's recommendation primarily because Combustion Engineering provided the lowest cost proposal, has a strong credit rating and equity contribution, provided excellent business and performance guarantees, exhibited a strong willingness to negotiate and guaranteed to meet state and federal air quality standards.

Mr. Joe Schultz, a St. Helens Port Commissioner, strongly suggested that Metro in cooperation with St. Helens area opponents and proponents of the project commence an independent evaluation of the health effects of a burner project. He suggested establishing an independent panel of Oregon-based experts (possibly from the universities and the medical school) who could review the proposal and the technical information regarding burners and report findings to Metro and the St. Helens community prior to a decision on construction of the facility. The Committee agreed with this suggestion.

Finally, Councilor Kelley opposed the motion to approve Resolution No. 87-809. She proposed that Metro enter into MOU negotiations simultaneously with CE and one of the "mass burn" vendors. By doing so, Metro will obtain better information about the strengths and weaknesses of the different technologies. The Committee did not support this suggestion because it would substantially increase the time and expense to complete the MOU phase.

Agenda Item 9.3 — Consideration of an Amendment to the Contract with Browning Ferris Industries for a Second Compactor at the St. Johns Landfill

Committee Recommendation

The Committee recommends approval of the amendment to the contract.

Discussion

While the amendment would substantially increase operating costs at the landfill, approximately $590,504 over a three-year period, the

Committee found this to be a cost-effective way to extend the life of the landfill as compared to diverting waste to another landfill or disposal facility.

Agenda Item 14. EXECUTIVE SESSION, Held under the Authority of ORS 192.660(1)(h), for the Purpose of Discussing Litigation matters with General Counsel regarding the Clackamas Transfer & Recycling Center (CTRC)

Committee Recommendation

The Committee was unable to make a recommendation on appealing Oregon City's decision to reject Metro's request to change the Conditional Use Permit because General Counsel was not available to advise the Committee on this matter. The Committee asked that General Counsel advise the Council on Metro's standing to appeal and the likelihood of success of such appeal. The Committee also requested General Counsel to discuss with the Oregon City attorney the possibility of using binding arbitration as a method to resolve this matter.

Subsequent to the meeting, staff has informed the Chair that the Oregon City Council has not yet adopted its findings and order on Metro's request. Thus, the 21-day appeal period has not commenced. The City's adoption of such order will not likely take place until some time in October.

The Committee adopted a motion recommending to the Council that Metro meet the conditions in the Conditional Use Permit and that staff be instructed to develop a program for the District to comply.

DEC/gl
8205C/D3

AGENDA ITEM 7
(Received 9/17/87)

RESPONSE TO REPORT ON PRELIMINARY NEGOTIATIONS AND RECOMMENDATIONS TO THE METROPOLITAN SERVICE DISTRICT COUNCIL'S RESOURCE RECOVERY PROJECT

September 16, 1987

Schnitzer Steel Products Company and Ogden Martin Systems, Inc., would like to thank the Solid Waste Committee of the Metro Council for this opportunity to comment on the latest recommendations that have been put before you by your consultants, led by Gershman, Brickner & Bratton, Inc. We would like to make it clear to you that our comments are not the words of just another out-of-town bidder but the concerns of a major Portland corporate citizen as well as the experience of the leading vendor in the resource recovery industry. We would not normally interject ourselves this way, but there are so many factual inaccuracies and omissions in this report that we have a moral obligation, if nothing else, to inform Metro and the citizens of the Portland metropolitan region and Columbia County as to the environmental and financial risks they would be accepting if they or you follow this recommendation.

1. Evaluation of Credit Ratings. The consultants have stated that the CE proposal will offer an advantage, when and if financed, of 60 cents per ton versus Schnitzer/Ogden. In simple fact, this number is make-believe! The credit rating of your project can only be determined once the total project structure is determined and risks placed upon the various

parties. The assumption that the Schnitzer/Ogden project would be lower rated is unfounded given factual and demonstrable history. As a case in point, Ogden's Kent County, Michigan, project just received the industry's first AAA rating without credit support. No bond insurance, no backup letter of credit, no credit enhancement of any kind. Further, we note that should credit enhancement be recommended for the RDF option proposed by CE, several insurers and letter of credit banks have repeatedly stated their unwillingness to participate unless they are fully secured by the sponsoring community. This position was based upon the dismal history of RDF projects primarily regarding reliability and environmental compliance.

2. Equity Infusion by the Vendor. Your consultants have stated that CE's equity infusion of $24,992,651 at the end of their 30-month construction period is superior to Schnitzer/Ogden's equity infusion of $23,103,148 which is invested pro-rata during each month of construction. This method of equity infusion is described as "lowering the tip fee by approximately $2.91/ton." A simple present value analysis demonstrates this conclusion by your consultants to be erroneous. If one uses an 8.5% discount rate (which is the going rate for tax-exempt money) the present value of CE's equity is approximately $20,200,000, and the present value of S/O's equity is approximately $20,600,000. Since timing of the equity infusion does not produce the claimed result, why would the statement be made?

Further, your consultants purport CE's deferred equity to be innovative. We would point out that this form of equity investment was utilized years ago in this industry and was found to be beneficial only to the vendor, not the community. It is unclear to us why such a proposal would or even could be beneficial to Metro. The report does admit that CE's obligations on its equity are less than clear in the face of an uncontrollable circumstance. What happens if there is an uncontrollable circumstance during construction? Why should you have to accept any risk with a supposedly superior equity offer?

3. Federal and State Tax Credits. As we have consistently stated, we are prepared to share benefits from state or federal tax sources should they materialize, as we did successfully in Marion County, Oregon. However, the risks to Metro, and ultimately the citizens, for certain "indemnifications" required by CE and Fluor are likely to be extensive. Your consultants for some reason have only chosen to tell you about the potential "$8 million gain" and not about the constitutional problems, the tax problems, and the fact that a worse case risk to Metro under a lease could be $25 to $35 million higher than a vendor-ownership financing. These are facts which you should be aware of in order to make an informed decision.

A further point, not disclosed to Metro, is that the state tax benefits are only usable by an Oregon taxpayer who

owns the facility. Only the Schnitzer/Ogden proposal fulfills this requirement. We have said we would share these tax benefits, and we are the only vendor clearly able to have something concrete to share. No mention is made of this by GBB or credit given on our tip fee. Instead, the report implies that you should look to CE's offer to share 100% of what they don't have as being of significant value.

4. Recovered Material. GBB does not provide adequate disclosure to you regarding the enormous differences in the material recovery guaranties given by the vendors. First, let us point out that Schnitzer/Ogden have agreed to remove 80% of the ferrous metals and have guaranteed a market for their sale. CE has guaranteed 90% removal of ferrous metal and 30% removal of aluminum. However, CE guarantees no market for these products. In the waste-to-energy industry, the usual mode for evaluating materials recovery is to assign no market value or potential unless the vendor guarantees the market. Why? Because what happens if CE cannot sell the recovered steel? The cost to Metro will increase over $1 per ton of incoming waste! This results from the lost assumed sales revenues and the cost to landfill the ferrous. Shouldn't this have been considered and disclosed by your consultants?

Next, consider that GBB believes a sales value of roughly $250,000 per year will be realized by CE's revised proposal to recover 30% of the aluminum in the refuse. This is amazing given that the current market price for aluminum

together with this revenue projection requires a conclusion that the aluminum content of Portland's waste is higher than experienced elsewhere in the country and is higher than shown in your own waste studies. This is particularly curious given Oregon's successful bottle bill. GBB apparently used at least a .5% aluminum content percentage for the Metro waste stream in crediting CE's proposal while your own waste studies based on actual inspections show a percentage of .1 to no more than .2%.

5. Willingness to Negotiate. We have in the past, and we continue to point out our intention to negotiate fairly and professionally, if selected. Our willingness to negotiate and to conclude negotiations in a mutually acceptable manner is borne out in the eleven plants in eleven different municipalities we presently operate or are building.

6. Technological Reliability. The statement that a single line RDF plant is as reliable as multi-unit mass burn facilities is technically illogical. First, no operating data available from any similarly-sized operating RDF facility proves such a point. Second, why are CE's facilities under construction elsewhere multi-line facilities? Given that CE has never operated a facility of this type or size, it is curious how the redundancy specified by GBB in your RFP can now be so easily dismissed. This is the classic situation in which redundancy is demanded by consultants for the protection of their clients. The assertion by your consultants that a single line RDF facility is "as reliable" as a two unit mass burn

facility is plainly without technical merit nor is it based on any operating information. Historically in fact, even multi-unit RDF plants have experienced low relative reliability.

7. Track Record. Your consultants point out that "within two months, CE will be operating an RDF facility." Never before have they operated such a facility. In addition, by CE's own admission, the project referred to is behind schedule. Your consultants go on to downplay Ogden's two years of operating experience. They ignore the fact that none of Ogden's facilities are behind schedule, nor do they point out that Ogden has five currently operating plants in the United States, six more under construction, and that there are 133 Martin plants worldwide, many operating for 20 or more years. The facts are clear, CE has no track record and utilizes an unproven technology. Ogden's track record for early completion, on or under budget construction, and proper operations is unparalleled in the industry!

8. Environmental Considerations. Clearly, the environment is the most important area of concern to the Council and the citizens of the region. In this latest report, only 3 1/2 lines have been allocated to this most important issue. Perhaps that would have been enough if the issues were succinctly identified. Unfortunately, that is not the case. GBB would have you believe that RDF technology is environmentally superior because "NOx producing waste" will be removed prior to burning. Given that yard waste and food waste

are the largest waste stream contributors to NOx formation, and given that the proposed RDF process purportedly separates only inert materials and ferrous and aluminum, how is the claimed result achieved? If one examines a document prepared by GBB to support this "lower NOx" hypothesis, it bases its conclusions on an RDF plant that recovers only 90% of the waste stream combustibles to burn and leaves 35% of the total waste stream as residue to be landfilled. The use of these assumptions in GBB's economic analysis would result in an increase in CE's tip fee by approximately $1.50/ton due to reduced energy production (515 v. 550 kwh/ton) and increased residue haul and disposal costs. Instead, we see environmental benefits claimed on the one hand but the operating assumptions that are supposed to support those claims ignored on the other. We would ask GBB to give you scientifically sound advice and to be internally consistent in their claims. We would also ask why they have been silent on the most serious health concern of all.

Far more important than NOx is the issue of dioxin. This critical pollutant has been the subject of major health risk assessments. One of the things GBB's NOx report fails to tell you is that when you operate at conditions that depress NOx formation, you increase dioxin levels. They didn't give you a table comparing mass burn and RDF for dioxin. It's quite revealing. The following table gives published results from dioxin tests on several RDF plants and also Ogden's Tulsa, Oklahoma and Marion County, Oregon, facilities. No results are given for a CE plant since no operating facility exists.

TABLE I
DIOXIN EMISSIONS FROM OPERATING
WASTE-TO-ENERGY FACILITIES

		Nanograms Per Cubic Meter at 12% CO2
Marion County-mass burn		1 - 2
Tulsa, Oklahoma-mass burn		30 - 40
Low RDF	Albany, New York (Sheridan Ave)	300 - 700
Mid-range RDF	Niagara, New York (Occidental Chemical) Akron, Ohio Lawrence, Massachusetts	850 - 3500
High	Hamilton - Wentworth	9000 - 20000

Sources: US EPA Report to Congress
Weston's Worldwide Data Base

It is amazing to note the difference between RDF and mass burn regarding dioxin production. In fact, Ogden began construction in January, 1987 on a facility in Haverhill, Massachusetts, which is to replace a 1300 ton per day single boiler RDF facility. That RDF facility is only 2 years old, has experienced less than 60% availability, and was shut down by the state for excessive dioxin emissions.

In fact, there is not an operating RDF facility in the United States which has ever tested within an order of magnitude of Ogden's Marion County, Oregon, facility for dioxin. Further, do not be misled that scrubbers and baghouses

reduce dioxin emissions. This is simply not true. They merely put the dioxin in the ash instead of in the air. The way to control dioxin is not to produce it. Will CE put a corporate guaranty behind a 2 nanogram per cubic meter dioxin level? Ogden will!

Also, do not be misled by statements that your RDF plant won't have the traditional problems because "CE is a large engineering oriented company." The Boeing Company designed and constructed the RDF disaster in Haverhill, Massachusetts, and the boiler was by Babcock & Wilcox. Both are certainly large engineering companies.

The NOx issue raised by GBB is a red herring. The data from our Haverhill plant is public information. It proves categorically through actual test results that the basic approach of burning RDF is environmentally flawed. Another point which GBB has failed to bring out is that two of the three RDF projects which CE now has under construction are shrouded in litigation or permit revocation on environmental issues. Those projects are Detroit and Honolulu. Of Ogden's five operating and six construction projects, none has any environmental difficulties, litigation, or remands.

The points we have raised are important considerations and are fundamental to your making an informed decision. If, with all of the facts clearly and accurately portrayed, Metro

chooses to select an inferior environmental product such as RDF, then that is your choice. We, however, could not let such a choice be made without full disclosure of the facts.

It is time for this project to press forward. In the last four months, the long-term cost of the project has increased over $15,000,000 due to interest rate increases alone. It is time for this project to move forward in the most environmentally sound and economically feasible fashion available. We believe that the Schnitzer/Ogden proposal remains the most favorable alternative being considered by Metro. However, in no event should your citizens be asked to accept a greater health risk as a trade-off for a questionable financial analysis.

Res. 87-809

M E M O R A N D U M

TO: Rena Cusma, Metro Executive Officer

FROM: Resource Recovery Negotiating Team

DATE: September 10, 1987

RE: Report on Preliminary Negotiations and Recommendations

BACKGROUND: On June 30, 1987, Metro Council directed the negotiating team to conduct preliminary negotiations with the three waste-to-energy proposers and to begin negotiations with Riedel for the purpose of addressing key issues and making each proposal more advantageous to Metro. Council's goal was to select one waste-to-energy proposer for Memorandum of Understanding (MOU) negotiations and to determine whether to continue with Riedel for a composting project.

RECOMMENDATION: Based on these preliminary negotiations, the negotiating team recommends that Metro enter into full MOU negotiations with Combustion Engineering (C-E) for a waste-to-energy project and that negotiations with Riedel continue. We recommend Schnitzer Steel/Ogden-Martin Systems, Inc. (S/O) and Fluor/Southern Electric International (F/S) be second and third ranked, respectively, for the waste-to-energy MOU negotiations if negotiations with C-E do not proceed satisfactorily.

I. RESULTS OF PRELIMINARY WASTE-TO-ENERGY NEGOTIATIONS:

1. Tip Fee: During preliminary negotiations, each proposer significantly reduced its proposed tip fee. The C-E proposal offers the lowest tip fee - approximately $38.81/ton. This is approximately $2.11/ton less than F/S and $3.93 less than S/O.

	Before Negotiations:		After Negotiations:	
	Tip Fee/Ton:*	Total Cost:**	Tip Fee/Ton:*	Total Cost:**
C-E	$47.76	$334,320,000	$38.81	$271,670,000
F/S***	$49.13	$343,910,000	$40.92	$286,440,000
S/O	$45.53	$318,710,000	$42.74	$299,180,000

*Using average deflated costs in 1987 dollars and PGE's lower rates based on its current avoided costs estimates.

**20 year cumulative tip fee in 1987 dollars.

***Without haul cost to St. Helens, Tip Fee/Ton is $43.62 and Total Cost is $305,340,000.

2. Financial Guarantees/Ratings: Based on information provided to Metro, C-E would be rated "A" and S/O "BBB+". While F/S potentially has the strongest credit rating due to the assets of Southern Company, Southern Company is legally unable to fully guarantee the F/S obligations at this time nor has F/S secured a binding commitment for an acceptable surety or letter of credit. As a result, F/S is treated as a "BBB" credit.

Ratings directly affect bond interest rates. Based on historical spreads between "A", "BBB+" and "BBB" interest rates, the C-E rating will result in an advantage over S/O of approximately 60¢/ton and an advantage over F/S of approximately 90¢ to $1.05/ton.

EQUITY: Metro received equity proposals of $23,103,148 from S/O and $15,500,000 from F/S, both based on equity contributed periodically during construction. C-E proposed that its equity of approximately $24,992,651 be contributed in a lump sum upon completion of the plant rather than periodically during construction. C-E's lump sum contribution is superior and lowers the tip fee by approximately $2.91/ton.

S/O requires reimbursement of its equity only if an uncontrollable circumstance causes plant shutdown and Metro decides to repair and operate the facility, a position which provides the least risk to Metro. C-E's obligation to commit equity will vary with the consequences of the uncontrollable circumstance, while F/S requires reimbursement of its equity if certain changes in law occur.

SHARING FEDERAL TAX BENEFITS: C-E is willing to negotiate a sharing of any "windfall" resulting from the sale of federal tax benefits, which could be up to $8 million in today's dollars. C-E's willingness to share is not conditioned on Metro's acceptance of a smaller equity contribution if federal tax benefits are less than expected. Rather, the equity amount is guaranteed. S/O and F/S are not willing to offer a similar arrangement, but will only share if Metro accepts less equity if federal tax benefits are less than expected.

STATE TAX CREDITS: Subject to changes made during DEQ's upcoming rulemaking regarding the revised Oregon Pollution Control tax credits statutes, preliminary discussions suggest that the available state tax credits could range from $375,000 to $600,000 annually for ten years, depending on which technology is chosen and if construction is completed by December 31, 1990. This could lower tip fees $1 to $2/ton during the ten-year period. An RDF facility should be eligible for more Oregon tax credits than a mass burn facility, while most capital costs of a composting facility should qualify.

C-E and F/S will pass through to Metro 100% of the state tax benefits if realized. S/O wants to negotiate a sharing formula.

BUSINESS/PERFORMANCE GUARANTEES: All proposers provide similar guarantees with respect to through-put, environmental compliance, utility and lime consumption, residue composition and quality, and escalation of operating and maintenance costs. With respect to the business and performance guarantees set forth below, C-E's guarantees and revenue sharing proposals, on balance, are more substantial and offer Metro greater potential for additional reductions in the tip fee.

Extension of Fixed Capital Cost Price. F/S has extended its fixed price to January, 1988, and C-E to October 27, 1987. S/O did not extend its deadline.

Price. S/O reduced its Capital Cost Price from $105,401,000 to $102,901,000. F/S's and C-E's Capital Cost Prices stayed the same but C-E lowered its annual operation and maintenance (O&M) expense by $655,000.

Construction Guarantee. C-E guarantees completion in 30 months, as opposed to 35 months for F/S and 32 months for S/O. A shorter construction period offers a better chance to utilize the State tax credits.

Recovered Materials/Revenue Sharing. S/O guarantees 80% ferrous recovery and its sale. F/S (Shaneway) guarantees 70% recovery and C-E 90%. C-E guarantees aluminum recovery of 30%. S/O returns no revenue to Metro. C-E shares 90% of ferrous revenues and F/S shares 100%.

Recovered Energy. C-E guarantees 550 KWh/Ton, F/S is 450 KWh/Ton and S/O is 470 KWh/Ton.

Energy Revenue Sharing. C-E passes through 100% to Metro, F/S - 100% up to the guarantee and 50/50 above the guarantee, and S/O shares 90% the first year, reduced 2% each year until Metro's share is 80%.

WILLINGNESS TO NEGOTIATE: C-E made the most substantial movement of the proposers by (a) reducing annual O&M, (b) extending its Capital Cost Price and O&M to October 27, 1987, (c) adding aluminum recovery, and (d) offering a mass burn proposal. On the other hand, F/S increased its equity contribution from $12 million to $15.5 million and extended its fixed price construction cost to January 30, 1988, while S/O reduced its Capital Cost Price.

Based on the limited negotiations and on prior meetings, discussions and phone conferences with each proposer, we believe C-E is, by a significant margin, the proposer most willing to negotiate reasonable solutions (from Metro's standpoint) to the issues that have yet to be resolved.

4. RELIABILITY: Based on the waste supply Metro can deliver, the analysis provided by C-E adequately demonstrates that a single line system can have the identical availability of a two line system. In addition, C-E is willing to build a second processing line and/or steam generator at no cost to Metro if the facility does not meet performance standards.

TRACK RECORD: In two months (before Metro makes a binding decision) C-E will be operating a major RDF facility. S/O's oldest plant has a 2 year operating history while Fluor is 2 years away from operating a plant. No proposer has extensive operating experience. If, after Metro tours C-E's RDF plant in operation, Metro is not satisfied with RDF, C-E will build a mass burn facility at a price which will result in approximately the same tip fees as RDF.

5. EMISSIONS: It appears that C-E's RDF facility will emit less thermal NO_x due to its potential for more rapid cooling of gases and will have a greater ability to extract NO_x producing waste prior to burning.

6. HIERARCHY: With respect to Metro's hierarchy, C-E is superior. C-E, F/S and S/O are equivalent as to steam and electric production. The ferrous removal position of each proposer is very close, although S/O's guarantee not to landfill ferrous is best, with C-E's removal of pre-incinerated ferrous second and F/S's Shaneway system last. The pivotal hierarchy factor is C-E's aluminum recovery proposal which should yield to Metro a tip fee reduction of approximately 70¢/ton.

II. STATUS REPORT ON NEGOTIATIONS WITH RIEDEL

Negotiations with Riedel focused on the status of Riedel's efforts to secure private financing and whether Riedel Resources would guarantee Riedel's obligations.

Although we were pleased that Riedel was able to obtain a preliminary financing commitment from a reputable bank, the terms were unacceptable. Riedel is optimistic that reasonable terms can be obtained.

Riedel cannot obtain a guaranty from Riedel Resources. The team believes that, in order for this proposal to be acceptable to Metro, Riedel must secure a third party willing and able to fully guarantee all financial and performance obligations.

BEFORE THE COUNCIL OF THE
METROPOLITAN SERVICE DISTRICT

FOR THE PURPOSE OF AUTHORIZING ENTRY INTO MEMORANDUM OF UNDERSTANDING NEGOTIATIONS WITH SYSTEMS CONTRACTORS OF MASS COMPOSTING AND REFUSE DERIVED FUEL INCINERATION SYSTEMS	Introduced by Executive Officer

WHEREAS, Metro has evaluated five proposals received January 30, 1987, as a result of issuing two Request for Proposals for mass composting, mass incineration and refuse-derived fuel technology systems in November 1986; and

WHEREAS, the evaluation criteria have been met, as evidenced in the Resource Recovery Project Final Evaluation Report; and

WHEREAS, this Council has committed, through Ordinance No. 86-201, to negotiate with selected firm(s) for the procurement of a resource recovery system if Council adopted criteria are met; and

WHEREAS, Metro's Resource Recovery Negotiating Team conducted preliminary negotiations with Combustion Engineering, Fluor/SEI, Riedel/DANO, and Schnitzer/Ogden from August 11-13, 1987, to request information on siting the facility at St. Helens and to request improvements in the proposals; and

WHEREAS, Combustion Engineering and Riedel/DANO have been recommended by the Executive Officer for further consideration; now, therefore,

BE IT RESOLVED,

1. That Metro will continue to negotiate a Memorandum of Understanding (MOU) with Riedel/DANO for a mass composting facility capable of processing 160,000 TPY of solid waste, to be located at N.E. Columbia Boulevard in Portland, Oregon; and

2. That Metro will proceed to negotiate a Memorandum of Understanding with Combustion Engineering for a Refuse Derived Fuel (RDF) facility capable of processing 350,000 TPY of solid waste to be located in St. Helens, Oregon; and

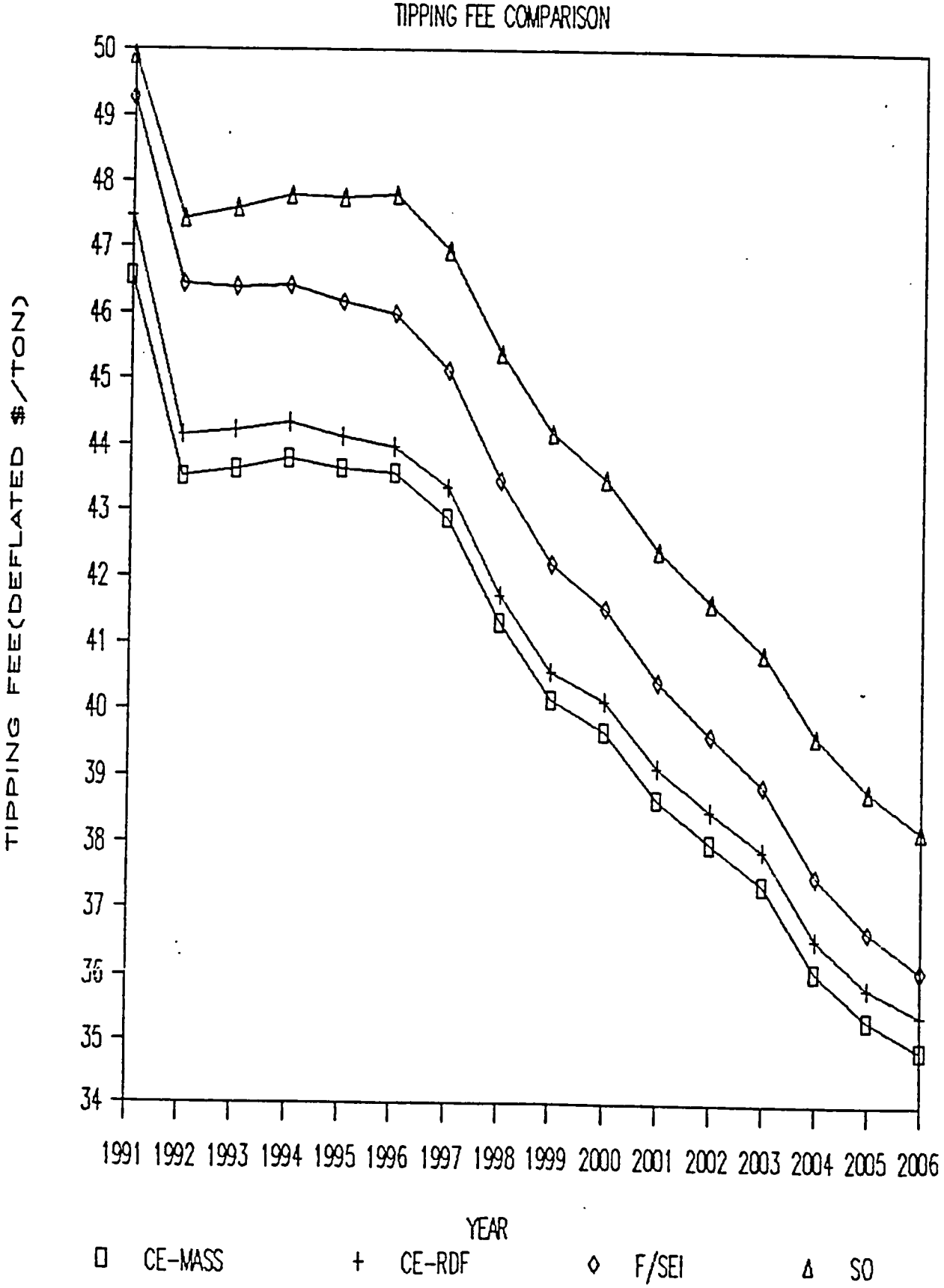
3. That should negotiations with Combustion Engineering fail to yield a Memorandum of Understanding that meets Metro's criteria, within 60 days, negotiations will be conducted with Schnitzer/Ogden, and failing those, with Fluor/SEI; and

4. That upon completion of MOU negotiations a "system cost analysis" will be conducted that will yield comparative cost data on a landfill based system and a system that includes resource recovery prior to authorizing contract negotiations.

ADOPTED by the Council of the Metropolitan Service District this _____day of _____, 1987.

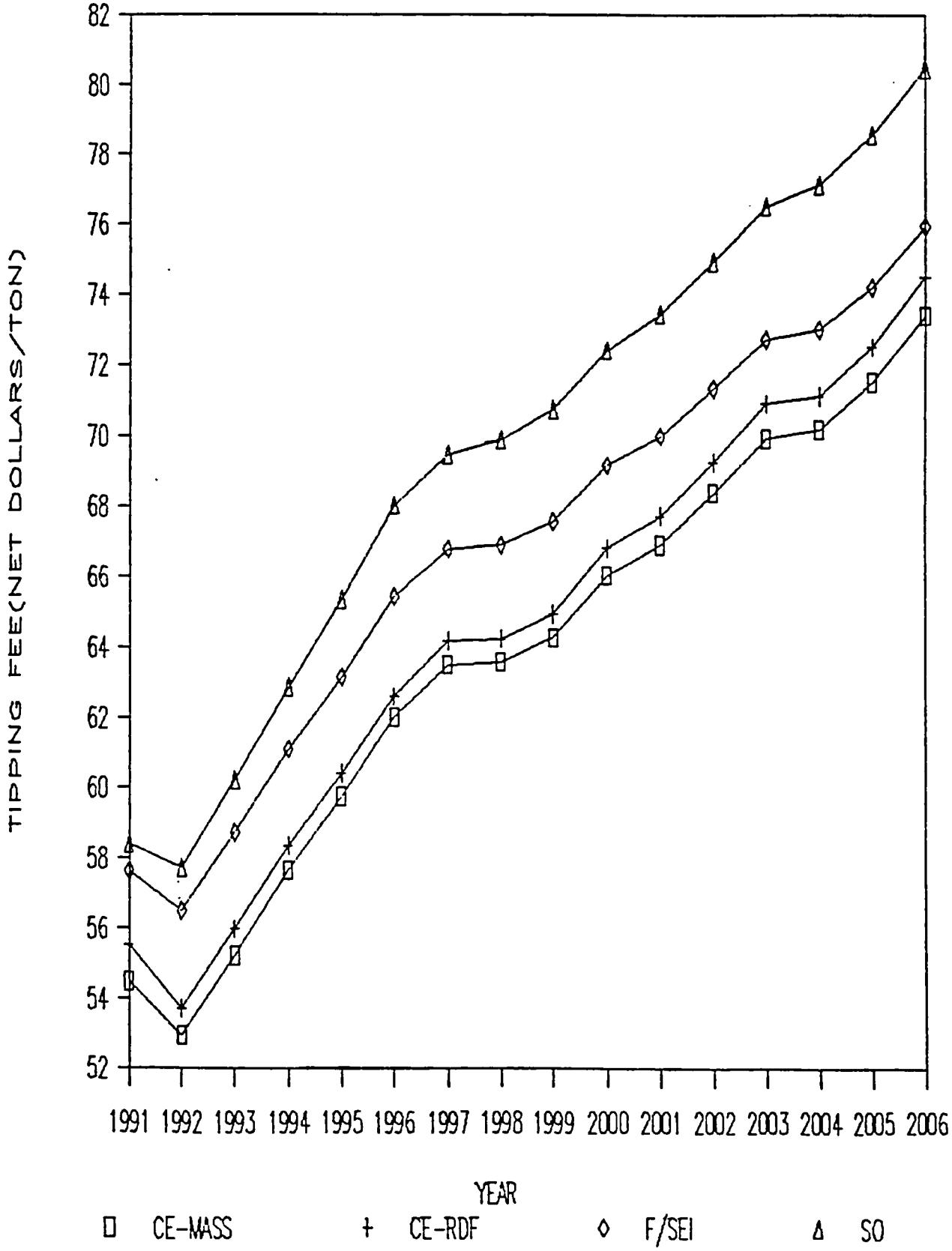
_____
Richard Waker, Presiding Officer

PORTLAND METRO PROJECT



PORTLAND METRO PROJECT

TIPPING FEE COMPARISON



PORTLAND METRO PROJECT - PAGE ONE
COMBUSTION ENGINEERING, INC.
350,000 TPY REFUSE DERIVED FUEL FACILITY PROPOSAL-BASE-RDF

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

ASSUMPTIONS:	OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	FACILITY OPERATING ANALYSIS																
350,000 Tons	Accept. Waste Received (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
0.00 Percent	Bypass Waste (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Accept. Waste Processed (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
27 Percent	Residue to Landfill (Tons)	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855	92,855
550 kWh/Ton	Electricity Produced (kWh/Year)	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500	192,500
0 Pounds	Steam Produced (Pounds/Year)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Percent	Materials Recovered (Tons)	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
0 Percent	RDF Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Compost Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.04 esc. rate	REVENUES																
	Electricity Value ($/mWh)	21.00	28.99	29.87	30.74	32.58	34.40	35.23	38.95	41.67	42.45	45.12	46.82	48.50	52.97	55.53	57.14
	Total Electricity Revenue	4,043	5,581	5,750	5,917	6,272	6,622	6,782	7,498	8,021	8,172	8,686	9,013	9,336	10,197	10,690	10,999
2.39 $/1,000#	Steam Value ($/1,000 Pounds)	2.91	3.02	3.15	3.27	3.40	3.54	3.68	3.83	3.98	4.14	4.30	4.48	4.66	4.84	5.04	5.24
	Total Steam Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00 $/Ton	Recovered Materials Value ($/Ton)	5.52	5.63	5.74	5.86	5.98	6.09	6.22	6.34	6.47	6.60	6.73	6.86	7.00	7.14	7.28	7.43
1.02 esc. rate	Total Materials Revenue	81	83	84	86	88	90	91	93	95	97	99	101	103	105	107	109
7.50 $/Ton	RDF Value ($/Ton)	9.12	9.49	9.87	10.26	10.67	11.10	11.55	12.01	12.49	12.99	13.51	14.05	14.61	15.19	15.80	16.43
	Total RDF Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 $/Ton	Compost Value ($/Ton)	3.65	3.80	3.95	4.11	4.27	4.44	4.62	4.80	5.00	5.20	5.40	5.62	5.84	6.08	6.32	6.57
	Total Compost Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Revenues	4,124	5,663	5,834	6,004	6,359	6,712	6,873	7,591	8,117	8,269	8,785	9,114	9,439	10,302	10,797	11,109
	REVENUE CREDITS TO METRO																
100 Percent	Percent Electricity Credit	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Dollar Electricity Credit	4,043	5,581	5,750	5,917	6,272	6,622	6,782	7,498	8,021	8,172	8,686	9,013	9,336	10,197	10,690	10,999
0 Percent	Percent Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90 Percent	Percent Rec. Materials Credit	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
	Dollar Rec. Materials Credit	73	74	76	78	79	81	82	84	86	87	89	91	93	94	96	98
0 Percent	Percent RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Percent Compost Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dollar Compost Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Revenue Credits To Metro	4,116	5,655	5,826	5,995	6,351	6,703	6,864	7,582	8,107	8,259	8,775	9,104	9,429	10,291	10,786	11,098
	TOTAL CREDITS/NET REVENUE TO METRO																
	Subtotal - Revenue Credits	4,116	5,655	5,826	5,995	6,351	6,703	6,864	7,582	8,107	8,259	8,775	9,104	9,429	10,291	10,786	11,098
933,902 $/Year	Interest Income on Funds (1)	934	934	934	934	934	934	934	934	934	934	934	934	934	934	934	934
	Total Credits/Net Revenues	5,049	6,589	6,760	6,929	7,285	7,637	7,798	8,516	9,041	9,193	9,709	10,038	10,363	11,225	11,720	12,032
	Dollars Per Ton ($)	14.43	18.83	19.31	19.80	20.81	21.82	22.28	24.33	25.83	26.27	27.74	28.68	29.61	32.07	33.49	34.38

1. Based on a Debt Service Reserve Fund of $11.112 million, plus a $2 million Reserve and Contingency Fund, both at a 7 percent interest rate, compounded semi-annually.

PORTLAND METRO PROJECT - PAGE TWO
COMBUSTION ENGINEERING, INC.
350,000 TPY REFUSE DERIVED FUEL FACILITY PROPOSAL-BASE-RDF

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

			OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
			COSTS																
			Debt Service On Bonds	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647	11,647
		1.04 Inflation	OPERATING & MAINTENANCE COST																
		2,618,850 1986$	Personnel	3,155	3,281	3,413	3,549	3,691	3,839	3,992	4,152	4,318	4,491	4,670	4,857	5,051	5,254	5,464	5,682
		269,540 1986$	Utilities (Natural Gas/Other)	319	331	345	359	373	388	403	419	436	454	472	491	510	531	552	574
		725,500 1986$	Facility Maintenance	872	907	943	980	1,020	1,061	1,103	1,147	1,193	1,241	1,290	1,342	1,396	1,451	1,509	1,570
		1,365,900 1986$	Processing Equipt. Maintenance	1,646	1,711	1,780	1,851	1,925	2,002	2,082	2,166	2,252	2,342	2,436	2,533	2,635	2,740	2,850	2,964
		0 1986$	Building Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		823,350 1986$	Contract Services	992	1,032	1,073	1,116	1,160	1,207	1,255	1,305	1,358	1,412	1,468	1,527	1,588	1,652	1,718	1,786
		0 1986$	Equipment Rental	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1,198,000 1986$	Equipment Replacement Fund	1,443	1,501	1,561	1,624	1,688	1,756	1,826	1,899	1,975	2,054	2,136	2,222	2,311	2,403	2,499	2,599
			Total O & M Costs	8,426	8,763	9,114	9,479	9,858	10,252	10,662	11,089	11,532	11,993	12,473	12,972	13,491	14,031	14,592	15,175
			PASS THROUGH COSTS TO METRO																
		1,547,715 1986$	Property Tax	0	392	815	1,271	1,762	2,291	2,383	2,478	2,577	2,680	2,787	2,899	3,015	3,135	3,261	3,391
		371,550 1986$	Raw Materials	448	466	484	504	524	545	566	589	613	637	663	689	717	745	775	806
		350,000 1986$	Insurance Premium	422	439	456	474	493	513	534	555	577	600	624	649	675	702	730	759
		33,000 1986$	Site Lease	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		475,760 1986$	Electricity/Water/Sewer	573	596	620	645	671	697	725	754	784	816	848	882	918	954	993	1,032
		0 1986$	District Assessment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Trustees Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Metro Administration Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Office Supplies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Residue/RDF/Compost Costs																
10	10	0.60 $/Ton	Residue Hauling (10 miles)	678	705	733	762	793	825	858	892	928	965	1,003	1,043	1,085	1,129	1,174	1,221
Miles	Miles	20.00 $/Ton	Residue Disposal	2,259	2,350	2,444	2,542	2,643	2,749	2,859	2,973	3,092	3,216	3,345	3,478	3,617	3,762	3,913	4,069
		4.00 $/Ton	RDF Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3.75 $/Ton	Compost Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Pass Through Costs	4,413	4,980	5,585	6,231	6,919	7,653	7,957	8,274	8,604	8,947	9,303	9,674	10,060	10,461	10,878	11,312
			INDIRECT OPERATING COSTS																
		0 1986$	Management Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Return On Equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 Percent	Revenue Sharing To Contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Indirect Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			TOTAL COSTS																
			Facility Operating Costs (F.O.C.)	12,839	13,743	14,699	15,709	16,777	17,905	18,620	19,363	20,136	20,940	21,777	22,646	23,551	24,492	25,470	26,487
			Dollars Per Ton Accepted	36.68	39.27	42.00	44.88	47.93	51.16	53.20	55.32	57.53	59.83	62.22	64.70	67.29	69.98	72.77	75.68
			Debt Service And F.D.C. Costs	24,486	25,390	26,346	27,356	28,424	29,552	30,267	31,010	31,783	32,587	33,424	34,293	35,198	36,139	37,117	38,134
			Dollars Per Ton Accepted	69.96	72.54	75.27	78.16	81.21	84.43	86.48	88.60	90.81	93.11	95.50	97.98	100.57	103.25	106.05	108.96
			SERVICE FEE TO METRO																
			Gross Service Fee Dollars	19,437	18,901	19,586	20,427	21,139	21,915	22,469	22,494	22,742	23,395	23,715	24,256	24,835	24,914	25,397	26,103
350,000	350,000	419 kWh/Ton	Plus Metro Shortfall Payments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Net Service Fee Dollars	19,437	18,901	19,586	20,427	21,139	21,915	22,469	22,494	22,742	23,395	23,715	24,256	24,835	24,914	25,397	26,103
			Net Dollars Per Ton ($)	55.53	53.72	55.96	58.36	60.40	62.61	64.20	64.27	64.98	66.84	67.76	69.30	70.96	71.18	72.56	74.58
		1.04 Disc. Rate	Deflated Value/Ton (1987$)	47.47	44.15	44.23	44.35	44.13	43.99	43.37	41.75	40.59	40.14	39.13	38.48	37.86	36.54	35.82	35.40
			Ave. Deflated Value (1987$)	39.58															

SOURCE: GERSHMAN, BRICKNER & BRATTON, INC. # Portland Metro Project: CB622-B # Programmer: JVLH 03-Sep-87

PORTLAND METRO PROJECT - PAGE ONE
COMBUSTION ENGINEERING, INC.
350,000 TPY REFUSE DERIVED FUEL FACILITY PROPOSAL-BASE-MASS BURN

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

ASSUMPTIONS:	OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	FACILITY OPERATING ANALYSIS																
350,000 Tons	Accept. Waste Received (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
0.00 Percent	Bypass Waste (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Accept. Waste Processed (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
23 Percent	Residue to Landfill (Tons)	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755	79,755
510 kWh/Ton	Electricity Produced (kWh/Year)	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500	178,500
0 Pounds	Steam Produced (Pounds/Year)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Percent	Materials Recovered (Tons)	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
0 Percent	RDF Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Compost Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.04 esc. rate	REVENUES																
	Electricity Value ($/mWh)	21.00	20.99	29.67	30.74	32.58	34.40	35.23	38.95	41.67	42.45	45.12	46.82	48.50	52.97	55.53	57.14
	Total Electricity Revenue	3,749	5,175	5,332	5,487	5,816	6,140	6,289	6,953	7,438	7,577	8,056	8,357	8,657	9,455	9,912	10,199
2.39 $/1,000	Steam Value ($/1,000 Pounds)	2.91	3.02	3.15	3.27	3.40	3.54	3.68	3.83	3.98	4.14	4.30	4.48	4.66	4.84	5.04	5.24
	Total Steam Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5.00 $/Ton	Recovered Materials Value ($/Ton)	5.52	5.63	5.74	5.86	5.98	6.09	6.22	6.34	6.47	6.60	6.73	6.86	7.00	7.14	7.28	7.43
1.02 esc. rate	Total Materials Revenue	81	83	84	86	88	90	91	93	95	97	99	101	103	105	107	109
7.50 $/Ton	RDF Value ($/Ton)	9.12	9.49	9.87	10.26	10.67	11.10	11.55	12.01	12.49	12.99	13.51	14.05	14.61	15.19	15.80	16.43
	Total RDF Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 $/Ton	Compost Value ($/Ton)	3.65	3.80	3.95	4.11	4.27	4.44	4.62	4.80	5.00	5.20	5.40	5.62	5.84	6.08	6.32	6.57
	Total Compost Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Revenues	3,830	5,257	5,416	5,573	5,903	6,230	6,380	7,046	7,533	7,674	8,153	8,458	8,760	9,560	10,019	10,309
	REVENUE CREDITS TO METRO																
100 Percent	Percent Electricity Credit	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Dollar Electricity Credit	3,749	5,175	5,332	5,487	5,816	6,140	6,289	6,953	7,438	7,577	8,056	8,357	8,657	9,455	9,912	10,199
0 Percent	Percent Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
90 Percent	Percent Rec. Materials Credit	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00	90.00
	Dollar Rec. Materials Credit	73	74	76	78	79	81	82	84	86	87	89	91	93	94	96	98
0 Percent	Percent RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Percent Compost Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dollar Compost Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Revenue Credits To Metro	3,822	5,249	5,408	5,565	5,895	6,221	6,371	7,036	7,524	7,665	8,143	8,448	8,750	9,550	10,008	10,298
	TOTAL CREDITS/NET REVENUE TO METRO																
	Subtotal - Revenue Credits	3,822	5,249	5,408	5,565	5,895	6,221	6,371	7,036	7,524	7,665	8,143	8,448	8,750	9,550	10,008	10,298
954,878 $/Year	Interest Income on Funds (1)	955	955	955	955	955	955	955	955	955	955	955	955	955	955	955	955
	Total Credits/Net Revenues	4,776	6,204	6,363	6,519	6,849	7,176	7,326	7,991	8,479	8,619	9,098	9,403	9,705	10,505	10,963	11,253
	Dollars Per Ton ($)	13.65	17.73	18.18	18.63	19.57	20.50	20.93	22.83	24.22	24.63	25.99	26.87	27.73	30.01	31.32	32.15

1. Based on a Debt Service Reserve Fund of $11.406 million, plus a $2 million Reserve and Contingency Fund, both at a 7 percent interest rate, compounded semi-annually.

PORTLAND METRO PROJECT - PAGE TWO

COMBUSTION ENGINEERING, INC. — PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST

350,000 TPY REFUSE DERIVED FUEL FACILITY PROPOSAL-BASE-MASS BURN — ($000, Except Where Otherwise Specified)

			OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
			COSTS																
			Debt Service On Bonds	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020	12,020
		1.04 Inflation	OPERATING & MAINTENANCE COST																
		2,770,000 1986$	Personnel	3,337	3,471	3,610	3,754	3,904	4,060	4,223	4,392	4,567	4,750	4,940	5,138	5,343	5,557	5,779	6,010
		250,500 1986$	Utilities (Natural Gas/Other)	302	314	326	339	353	367	382	397	413	430	447	465	483	503	523	544
		934,000 1986$	Facility Maintenance	1,149	1,195	1,243	1,293	1,345	1,398	1,454	1,512	1,573	1,636	1,701	1,769	1,840	1,914	1,990	2,070
		507,000 1986$	Processing Equipt. Maintenance	611	635	661	687	715	743	773	804	836	869	904	940	978	1,017	1,058	1,100
		0 1986$	Building Maintenance	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		811,000 1986$	Contract Services	977	1,016	1,057	1,099	1,143	1,189	1,236	1,286	1,337	1,391	1,446	1,504	1,564	1,627	1,692	1,760
		0 1986$	Equipment Rental	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		999,000 1986$	Equipment Replacement Fund	1,204	1,252	1,302	1,354	1,408	1,464	1,523	1,584	1,647	1,713	1,782	1,853	1,927	2,004	2,084	2,168
			Total O & M Costs	7,560	7,883	8,198	8,526	8,867	9,222	9,591	9,975	10,374	10,789	11,220	11,669	12,136	12,621	13,126	13,651
			PASS THROUGH COSTS TO METRO																
		1,682,985 1986$	Property Tax	0	426	886	1,362	1,916	2,491	2,591	2,695	2,802	2,914	3,031	3,152	3,278	3,409	3,546	3,688
		597,000 1986$	Raw Materials	719	748	778	809	841	875	910	946	984	1,024	1,065	1,107	1,152	1,198	1,246	1,295
		350,000 1986$	Insurance Premium	422	439	456	474	493	513	534	555	577	600	624	649	675	702	730	759
		33,000 1986$	Site Lease	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		450,500 1986$	Electricity/Water/Sewer	543	564	587	611	635	660	687	714	743	773	803	836	869	904	940	977
		0 1986$	District Assessment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Trustees Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Metro Administration Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Office Supplies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Residue/RDF/Compost Costs																
10	10	0.60 $/Ton	Residue Hauling (10 miles)	582	605	630	655	681	708	737	766	797	829	862	896	932	969	1,008	1,049
Miles	Miles	23.00 $/Ton	Residue Disposal	1,941	2,018	2,099	2,183	2,270	2,361	2,456	2,554	2,656	2,762	2,873	2,988	3,107	3,231	3,361	3,495
		4.00 $/Ton	RDF Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3.75 $/Ton	Compost Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Pass Through Costs	4,240	4,634	5,469	6,147	6,870	7,642	7,947	8,263	8,592	8,935	9,291	9,661	10,046	10,447	10,863	11,296
			INDIRECT OPERATING COSTS																
		0 1986$	Management Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Return On Equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 Percent	Revenue Sharing To Contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Indirect Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			TOTAL COSTS																
			Facility Operating Costs (F.O.C.)	11,819	12,717	13,667	14,673	15,738	16,864	17,537	18,238	18,936	19,723	20,511	21,330	22,182	23,068	23,989	24,947
			Dollars Per Ton Accepted	33.77	36.33	39.05	41.92	44.97	48.18	50.11	52.11	54.19	56.35	58.60	60.94	63.38	65.91	68.54	71.28
			Debt Service And F.O.C. Costs	23,839	24,737	25,687	26,693	27,758	28,884	29,557	30,258	30,936	31,743	32,531	33,350	34,202	35,088	36,009	36,967
			Dollars Per Ton Accepted	68.11	70.68	73.39	76.27	79.31	82.53	84.45	86.45	88.53	90.69	92.95	95.29	97.72	100.25	102.88	105.62
			SERVICE FEE TO METRO																
			Gross Service Fee Dollars	19,063	18,533	19,324	20,174	20,908	21,708	22,232	22,266	22,507	23,124	23,433	23,947	24,497	24,583	25,046	25,715
350,000	350,000	410 kWH/Ton	Plus Metro Shortfall Payments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Net Service Fee Dollars	19,063	18,533	19,324	20,174	20,908	21,708	22,232	22,266	22,507	23,124	23,433	23,947	24,497	24,583	25,046	25,715
			Net Dollars Per Ton ($)	54.47	52.95	55.21	57.64	59.74	62.02	63.52	63.62	64.31	66.07	66.95	68.42	69.99	70.24	71.56	73.47
		1.04 Disc. Rate	Deflated Value/Ton (1987$)	46.56	43.52	43.64	43.80	43.65	43.58	42.91	41.33	40.17	39.68	38.66	37.99	37.37	36.66	35.32	34.87
			Ave.Deflated Value/Ton(1987$)	39.66															

SOURCE: GERSHMAN, BRICKNER & BRATTON, INC. & Portland Metro Project: CB522-B & Programmer: JVLK 803-Sep-87

PORTLAND METRO PROJECT - PAGE ONE
FLUOR/SOUTHERN ELECTRIC INTERNATIONAL/RILEY/TAKUMA
350,000 TPY MASS BURN FACILITY PROPOSAL-BASE

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

ASSUMPTIONS:	OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	FACILITY OPERATING ANALYSIS																
350,000 Tons	Accept. Waste Received (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
0.00 Percent	Bypass Waste (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Accept. Waste Processed (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
23 Percent	Residue to Landfill (Tons)	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050	79,050
450 kWh/Ton	Electricity Produced (mWh/Year)	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500	157,500
0.00 Pounds/Lb	Steam Produced (Mlbs/Year)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Percent	Materials Recovered (Tons)	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000	14,000
0 Percent	RDF Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Compost Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.04 esc. rate	REVENUES																
	Electricity Value ($/mWh)	21.00	28.99	29.87	30.74	32.58	34.40	35.23	38.95	41.67	42.45	45.12	46.82	48.50	52.97	55.53	57.14
	Total Electricity Revenue	3,308	4,566	4,705	4,842	5,131	5,418	5,549	6,135	6,563	6,686	7,106	7,374	7,639	8,343	8,746	9,000
2.39 $/1,000$	Steam Value ($/1,000 Pounds)	2.91	3.02	3.14	3.27	3.40	3.54	3.68	3.82	3.98	4.14	4.30	4.47	4.65	4.84	5.03	5.23
	Total Steam Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.00 $/Ton	Recovered Materials Value ($/Ton)	3.31	3.38	3.45	3.51	3.59	3.66	3.73	3.80	3.88	3.96	4.04	4.12	4.20	4.28	4.37	4.46
1.02 esc. rate	Total Materials Revenue	46	47	48	49	50	51	52	53	54	55	57	58	59	60	61	62
7.50 $/Ton	RDF Value ($/Ton)	9.12	9.49	9.87	10.26	10.67	11.10	11.55	12.01	12.49	12.99	13.51	14.05	14.61	15.19	15.80	16.43
	Total RDF Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 $/Ton	Compost Value ($/Ton)	3.65	3.80	3.95	4.11	4.27	4.44	4.62	4.80	5.00	5.20	5.40	5.62	5.84	6.08	6.32	6.57
	Total Compost Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Revenues	3,354	4,613	4,753	4,891	5,182	5,469	5,601	6,188	6,617	6,741	7,163	7,432	7,698	8,403	8,807	9,062
	REVENUE CREDITS TO METRO																
100 Percent	Percent Electricity Credit	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
	Dollar Electricity Credit	3,308	4,566	4,705	4,842	5,131	5,418	5,549	6,135	6,563	6,686	7,106	7,374	7,639	8,343	8,746	9,000
0 Percent	Percent Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
100 Percent	Percent Rec. Materials Credit	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
	Dollar Rec. Materials Credit	46	47	48	49	50	51	52	53	54	55	57	58	59	60	61	62
0 Percent	Percent RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Percent Compost Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dollar Compost Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Revenue Credits To Metro	3,354	4,613	4,753	4,891	5,182	5,469	5,601	6,188	6,617	6,741	7,163	7,432	7,698	8,403	8,807	9,062
	TOTAL CREDITS/NET REVENUE TO METRO																
	Subtotal - Revenue Credits	3,354	4,613	4,753	4,891	5,182	5,469	5,601	6,188	6,617	6,741	7,163	7,432	7,698	8,403	8,807	9,062
1,019,443 $/Year	Interest Income on Funds (1)	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019	1,019
	Total Credits/Net Revenues	4,373	5,633	5,772	5,910	6,201	6,489	6,620	7,207	7,637	7,761	8,182	8,451	8,717	9,422	9,827	10,081
	Dollars Per Ton ($)	12.50	16.09	16.49	16.89	17.72	18.54	18.92	20.59	21.82	22.17	23.38	24.15	24.91	26.92	28.08	28.80

1. Based on a $12.313 million Debt Service Reserve Fund, and a $2 million Reserve and Contingency Fund, both at a 7 percent interest rate, compounded semi-annually.

PORTLAND METRO PROJECT - PAGE TWO
FLUOR/SOUTHERN ELECTRIC INTERNATIONAL/RILEY/TAKUMA
350,000 TPY MASS BURN FACILITY PROPOSAL-BASE

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

			OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
		1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
			COSTS																
			Debt Service On Bonds	14,197	14,198	14,197	14,198	14,199	14,198	14,198	14,194	14,200	14,196	14,199	14,199	14,193	14,201	14,196	14,199
		1.04 Inflation	OPERATING & MAINTENANCE COST																
		1,660,000 1986$	Personnel	2,020	2,100	2,184	2,272	2,363	2,457	2,555	2,658	2,764	2,875	2,990	3,109	3,234	3,363	3,497	3,637
		240,000 1986$	Utilities	292	304	316	328	342	355	369	384	400	416	432	450	467	486	506	526
		896,000 1986$	Facility Maintenance	1,090	1,134	1,179	1,226	1,275	1,326	1,379	1,435	1,492	1,552	1,614	1,678	1,745	1,815	1,888	1,963
		298,000 1986$	Processing Equipt. Maintenance	363	377	392	408	424	441	459	477	496	516	537	558	580	604	628	653
		25,000 1986$	Building Maintenance	30	32	33	34	36	37	38	40	42	43	45	47	49	51	53	55
		368,000 1986$	Raw Materials	448	466	484	504	524	545	567	589	613	637	663	689	717	746	775	806
		300,000 1986$	Contract Services	365	380	395	411	427	444	462	480	500	520	540	562	584	608	632	657
		85,000 1986$	Equipment Rental	103	108	112	116	121	126	131	136	142	147	153	159	166	172	179	186
		1,085,000 1986$	Equipment Replacement Fund	1,320	1,373	1,428	1,485	1,544	1,606	1,670	1,737	1,807	1,879	1,954	2,032	2,113	2,198	2,286	2,377
		0 1986$	Other	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total O & M Costs	6,031	6,272	6,523	6,784	7,055	7,338	7,631	7,936	8,254	8,584	8,927	9,284	9,656	10,042	10,444	10,861
			PASS THROUGH COSTS TO METRO																
		1,772,220 1986$	Property Tax	0	448	933	1,455	2,018	2,623	2,728	2,837	2,951	3,069	3,192	3,319	3,452	3,590	3,734	3,883
		33,000 1986$	Site Lease	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
		239,000 1986$	Water/Sewer	291	302	315	327	340	354	368	383	398	414	430	448	466	484	504	524
		400000 1986$	Insurance Premium	487	506	526	547	569	592	616	640	666	693	720	749	779	810	843	876
		0 1986$	Trustees Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Metro Administration Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 1986$	Office Supplies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Residue/RDF/Compost Costs																
0	0	0.60 $/Ton	Residue Hauling (10 miles)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Miles	Miles	20.00 $/Ton	Residue Disposal	1,924	2,000	2,080	2,164	2,250	2,340	2,434	2,531	2,632	2,738	2,847	2,961	3,080	3,203	3,331	3,464
		4.00 $/Ton	RDF Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0.00 $/Ton	MSW Transport. To Facility	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Pass Through Costs	2,734	3,290	3,887	4,526	5,211	5,942	6,179	6,425	6,680	6,946	7,223	7,510	7,809	8,121	8,444	8,780
			INDIRECT OPERATING COSTS																
		200,000 Dollars	Management Fee	243	253	263	274	285	296	308	320	333	346	360	375	390	405	421	438
		1,100,000 Dollars	Return On Equity	1,338	1,392	1,448	1,505	1,566	1,628	1,693	1,761	1,832	1,905	1,981	2,060	2,143	2,228	2,318	2,410
		0 Dollars	Revenue Sharing To Contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Indirect Operating Costs	1,582	1,645	1,711	1,779	1,850	1,924	2,001	2,081	2,165	2,251	2,341	2,435	2,532	2,634	2,739	2,848
			TOTAL COSTS																
			Facility Operating Costs (F.O.C.)	10,347	11,208	12,121	13,090	14,116	15,204	15,811	16,442	17,099	17,781	18,491	19,230	19,997	20,796	21,627	22,490
			Dollars Per Ton Accepted	29.56	32.02	34.63	37.40	40.33	43.44	45.17	46.98	48.85	50.80	52.83	54.94	57.14	59.42	61.79	64.26
			Debt Service And F.O.C. Costs	24,544	25,406	26,318	27,287	28,316	29,403	30,009	30,636	31,298	31,977	32,690	33,429	34,191	34,997	35,823	36,689
			Dollars Per Ton Accepted	70.12	72.59	75.20	77.96	80.90	84.01	85.74	87.53	89.42	91.36	93.40	95.51	97.69	99.99	102.35	104.83
			SERVICE FEE TO METRO																
			Gross Service Fee Dollars	20,170	19,773	20,546	21,377	22,115	22,914	23,388	23,429	23,662	24,216	24,508	24,978	25,474	25,575	25,996	26,608
350,000	350,000	410 kWh/Ton	Plus Metro Shortfall Payments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Net Service Fee Dollars	20,170	19,773	20,546	21,377	22,115	22,914	23,388	23,429	23,662	24,216	24,508	24,978	25,474	25,575	25,996	26,608
			Net Dollars Per Ton ($)	57.63	56.49	58.70	61.08	63.18	65.47	66.82	66.94	67.60	69.19	70.02	71.37	72.78	73.07	74.27	76.02
		1.04 Disc. Rate	Deflated Value/Ton (1987$)	49.26	46.43	46.39	46.41	46.17	46.00	45.14	43.48	42.23	41.55	40.44	39.63	38.86	37.51	36.66	36.08
			Ave Deflated Value/Ton (1987$)	40.92															

SOURCE: GERSHMAN, BRICKNER & BRATTON, INC. # Portland Metro Project: C8622-B # Programmer: JVLK 026-Aug-87

PORTLAND METRO PROJECT - PAGE ONE
SCHNITZER STEEL PRODUCTS COMPANY/OGDEN MARTIN SYSTEMS, INC.
350,000 TPY MASS BURN FACILITY PROPOSAL-BASE

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

ASSUMPTIONS:	OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1986 Dollars	YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
	FACILITY OPERATING ANALYSIS																
350,000 Tons	Accept. Waste Received (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
0.00 Percent	Bypass Waste (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Accept. Waste Processed (Tons)	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000	350,000
21 Percent	Residue to Landfill (Tons)	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500	73,500
470 kWh/Ton	Electricity Produced (kWh/Year)	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500	164,500
0 Pounds	Steam Produced (Pounds/Year)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Percent	Materials Recovered (Tons)	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700	14,700
0 Percent	RDF Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Compost Produced (Tons)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1.04 esc. rate	REVENUES																
	Electricity Value ($/mWh)	21.00	28.99	29.87	30.74	32.58	34.40	35.23	38.95	41.67	42.45	45.12	46.82	48.50	52.97	55.53	57.14
	Total Electricity Revenue	3,455	4,769	4,914	5,057	5,359	5,659	5,795	6,407	6,855	6,983	7,422	7,702	7,978	8,714	9,135	9,400
2.39 $/1,000#	Steam Value ($/1,000 Pounds)	2.91	3.02	3.15	3.27	3.40	3.54	3.68	3.83	3.98	4.14	4.30	4.48	4.66	4.84	5.04	5.24
	Total Steam Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3.00 $/Ton	Recovered Materials Value ($/Ton)	3.31	3.38	3.45	3.51	3.59	3.66	3.73	3.80	3.88	3.96	4.04	4.12	4.20	4.28	4.37	4.46
1.02 esc. rate	Total Materials Revenue	49	50	51	52	53	54	55	56	57	58	59	61	62	63	64	66
7.50 $/Ton	RDF Value ($/Ton)	9.12	9.49	9.87	10.26	10.67	11.10	11.55	12.01	12.49	12.99	13.51	14.05	14.61	15.19	15.80	16.43
	Total RDF Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3 $/Ton	Compost Value ($/Ton)	3.65	3.80	3.95	4.11	4.27	4.44	4.62	4.80	5.00	5.20	5.40	5.62	5.84	6.08	6.32	6.57
	Total Compost Revenue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Total Revenues	3,503	4,819	4,964	5,108	5,412	5,713	5,850	6,463	6,912	7,041	7,482	7,762	8,040	8,777	9,199	9,465
	REVENUE CREDITS TO METRO																
90 Percent	Percent Electricity Credit	90	88	86	84	82	80	80	80	80	80	80	80	80	80	80	80
In 1991	Dollar Electricity Credit	3,109	4,197	4,226	4,248	4,395	4,527	4,636	5,126	5,484	5,586	5,938	6,162	6,383	6,971	7,308	7,520
0 Percent	Percent Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar Steam Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Percent Rec. Materials Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dollar Rec. Materials Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Percent RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Dollar RDF Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0 Percent	Percent Compost Credit	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Dollar Compost Credit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Revenue Credits To Metro	3,109	4,197	4,226	4,248	4,395	4,527	4,636	5,126	5,484	5,586	5,938	6,162	6,383	6,971	7,308	7,520
	TOTAL CREDITS/NET REVENUE TO METRO																
	Subtotal - Revenue Credits	3,109	4,197	4,226	4,248	4,395	4,527	4,636	5,126	5,484	5,586	5,938	6,162	6,383	6,971	7,308	7,520
1,024,643 $/Year	Interest Income on Funds (1)	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025	1,025
	Total Credits/Net Revenues	4,134	5,221	5,250	5,272	5,419	5,552	5,661	6,150	6,508	6,611	6,962	7,186	7,407	7,995	8,332	8,544
	Dollars Per Ton ($)	11.81	14.92	15.00	15.06	15.48	15.86	16.17	17.57	18.60	18.89	19.89	20.53	21.16	22.84	23.81	24.41

1. Based on a $12.386 million Debt Service Reserve Fund, and a $2 million Reserve and Contingency Fund, both at a 7 percent interest rate, compounded semi-annually.

PORTLAND METRO PROJECT - PAGE TWO
SCHNITZER STEEL PRODUCTS COMPANY/OGDEN MARTIN SYSTEMS, INC.
350,000 TPY MASS BURN FACILITY PROPOSAL-BASE

PORTLAND METRO RESOURCE RECOVERY PROJECT - BASE CASE REVENUE AND EXPENSE FORECAST
($000, Except Where Otherwise Specified)

1987	1987 ASSUMPTIONS:		OPERATING PERIOD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	1986 Dollars		YEAR	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
			COSTS																
			Debt Service On Bonds	14,057	14,054	14,056	14,055	14,055	14,052	14,055	14,056	14,055	14,056	14,054	14,055	14,055	14,059	14,051	14,057
		1.04 Inflation	OPERATING & MAINTENANCE COST																
	1,635,000	1986$	Personnel	1,989	2,069	2,152	2,238	2,327	2,420	2,517	2,618	2,722	2,831	2,945	3,062	3,185	3,312	3,445	3,582
	660,000	1986$	Utilities	803	835	869	903	939	977	1,016	1,057	1,099	1,143	1,189	1,236	1,286	1,337	1,391	1,446
	1,548,000	1986$	Facility Maintenance	1,883	1,959	2,037	2,119	2,203	2,291	2,383	2,478	2,578	2,681	2,788	2,899	3,015	3,136	3,261	3,392
	439,000	1986$	Processing Equipt. Maintenance	534	555	578	601	625	650	676	703	731	760	791	822	855	889	925	962
	91,000	1986$	Building Maintenance	111	115	120	125	130	135	140	146	152	158	164	170	177	184	192	199
	947,000	1986$	Raw Materials	1,152	1,198	1,246	1,296	1,348	1,402	1,458	1,516	1,577	1,640	1,705	1,774	1,845	1,918	1,995	2,075
	409,000	1986$	Contract Services	498	518	538	560	582	605	630	655	681	708	737	766	797	829	862	896
	19,000	1986$	Equipment Rental	23	24	25	26	27	28	29	30	32	33	34	36	37	38	40	42
	625,000	1986$	Equipment Replacement Fund	760	791	822	855	890	925	962	1,001	1,041	1,082	1,126	1,171	1,217	1,266	1,317	1,369
	385,000	1986$	Insurance Premium	468	487	507	527	548	570	593	616	641	667	693	721	750	780	811	844
			Total O & M Costs	8,222	8,551	8,893	9,249	9,619	10,003	10,404	10,820	11,253	11,703	12,171	12,658	13,164	13,690	14,238	14,808
			PASS THROUGH COSTS TO METRO																
	1,712,382	1986$	Property Tax	0	433	901	1,406	1,950	2,535	2,636	2,742	2,851	2,965	3,084	3,207	3,336	3,469	3,608	3,752
	33,000	1986$	Site Lease	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33	33
	0	1986$	District Assessment	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1986$	Trustees Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1986$	Metro Administration Fees	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1986$	Office Supplies	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1986$	Residue/RDF/Compost Costs																
10	10	0.60 $/Ton	Residue Hauling (10 miles)	537	558	580	604	628	653	679	706	734	764	794	826	859	893	929	966
Miles	Miles	20.00 $/Ton	Residue Disposal	1,720	1,788	1,860	1,934	2,012	2,092	2,176	2,263	2,354	2,448	2,546	2,647	2,753	2,863	2,978	3,097
		4.00 $/Ton	RDF Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		3.75 $/Ton	Compost Transportation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Pass Through Costs	2,289	2,813	3,375	3,977	4,622	5,313	5,524	5,744	5,972	6,210	6,457	6,714	6,981	7,259	7,548	7,848
			INDIRECT OPERATING COSTS																
		0 Dollars	Management Fee	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 Dollars	Return On Equity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		0 Percent	Revenue Sharing To Contractor	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Total Indirect Operating Costs	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			TOTAL COSTS																
			Facility Operating Costs (F.O.C.)	10,511	11,364	12,268	13,226	14,241	15,316	15,928	16,563	17,225	17,912	18,627	19,371	20,145	20,949	21,786	22,656
			Dollars Per Ton Accepted	30.03	32.47	35.05	37.79	40.69	43.76	45.51	47.32	49.21	51.18	53.22	55.35	57.56	59.85	62.25	64.73
			Debt Service And F.O.C. Costs	24,568	25,418	26,324	27,281	28,296	29,369	29,983	30,619	31,280	31,968	32,681	33,426	34,200	35,008	35,837	36,713
			Dollars Per Ton Accepted	70.19	72.62	75.21	77.95	80.85	83.91	85.67	87.48	89.37	91.34	93.37	95.50	97.71	100.02	102.39	104.89
			SERVICE FEE TO METRO																
			Gross Service Fee Dollars	20,434	20,197	21,074	22,009	22,877	23,817	24,322	24,469	24,771	25,357	25,719	26,240	26,793	27,013	27,505	28,169
350,000	350,000	410 kWh/Ton	Plus Metro Shortfall Payments	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
			Net Service Fee Dollars	20,434	20,197	21,074	22,009	22,877	23,817	24,322	24,469	24,771	25,357	25,719	26,240	26,793	27,013	27,505	28,169
			Net Dollars Per Ton ($)	58.38	57.71	60.21	62.88	65.36	68.05	69.49	69.91	70.78	72.45	73.48	74.97	76.55	77.18	78.59	80.48
		1.04 Disc. Rate	Deflated Value/Ton (1987$)	49.91	47.43	47.59	47.79	47.76	47.81	46.95	45.41	44.21	43.51	42.43	41.63	40.87	39.62	38.79	38.20
			Ave. Deflated Value/Ton (1987$)	42.74															

SOURCE: GERSHMAN, BRICKNER & BRATTON, INC. & Portland Metro Project: C8622-B & Programmer: JVLK 26-Aug-87

Sierra Club - Judy Dehen

Item 7
9/22/87

AN INTENSIVE TRASH SEPARATION AND RECYCLING SYSTEM FOR THE TOWN OF EAST HAMPTON

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PREFACE

Like every community on Long Island, East Hampton must very soon decide what to do with its trash, which is now simply consigned to a landfill. However, under the mandate of the New York State Long Island Landfill Law, by 1990 Long Island landfills will no longer be permitted to receive the total stream of trash, but only residues from new trash disposal systems. Along with all the other Long Island communities, East Hampton must now decide on an alternative means of trash disposal.

One highly publicized alternative is the mass-burn incinerator, which burns the total mass of unseparated trash, producing steam or electricity for sale (hence the common name, "resource recovery plant"). Such an incinerator produces a residue of ash comprising about 30% of the weight of the original trash, which must be consigned to a landfill. Serious questions have been raised about the environmental acceptability of such incinerators, chiefly because of the hazardous materials -- especially dioxins, furans and heavy metals -- that occur in the incinerator's emissions and ash residue.

Another alternative is based on the strategy of recovering and reusing materials separated from the trash rather than recovering energy. This avoids burning and the hazardous emissions and ash associated with it. Given the heterogeneous composition of trash, such a separation/recycling system is necessarily more elaborate than a system based on incineration. The latter consists of only a single piece of equipment, the incinerator itself. What goes into the incinerator is only trash

and the water that is converted into steam. Only a few things come out of it: steam, "bottom ash" (the unburnable residue), "fly ash" (very small ash particles trapped in the control device), water used to cool the ash, and the emissions released from the incinerator stack. In contrast, a separation system may involve several specialized collection containers, mechanical separation equipment, a compost plant, and multiple marketing arrangements to recycle the system's products. It is important to note as well that both types of system still require landfilling -- in the case of incinerators, to receive bottom and fly ash (which may contain sufficient dioxins and furans and toxic metals to require disposal in a special hazardous waste landfill), and in the case of a separation system, to receive materials which are not currently recyclable, such as plastics.

The initial decision faced by the Town of East Hampton is whether to simply contribute its trash to one of the large incinerators that several Long Island communities plan to build, or -- perhaps together with one or two similar towns -- to establish an effective separation/recycling system. The Town has decided, thus far, to at least consider the latter course and has asked CBNS to investigate its feasibility. In particular, the Town has been interested in the possibility of basing its trash-handling system on the construction of a specific composting plant, the Eweson Digester.

In keeping with this interest, CBNS began its study with an evaluation of the Eweson compost process. As shown in detail in

the Appendix, we determined that this process has the following basic characteristics:

1. The process receives unseparated trash (with large objects such as discarded tires or furniture removed), adds sewage sludge to it, and over a three-day period of treatment in a rotating cylindrical device, followed by screening and two weeks of aging, yields a compost product.

2. With certain additional features which are specified in the Appendix, the equipment could be operated in compliance with relevant federal and state environmental requirements.

3. Compost is an inherently useful material which, in the absence of certain detrimental components, can support plant growth, and can therefore be disposed of by spreading it on agricultural or other land. If several constituents of the starting material -- toxic chemicals and metals, fragments of glass, metal and plastic -- remain in the compost, they seriously reduce its usefulness and render it difficult to dispose of.

4. If operated as recommended by the company (i.e., that it receive essentially unseparated trash), the Eweson Digester produces compost which will contain toxic chemicals and metals that are present in the trash as well as fragments of plastic and glass derived from trash constituents. For this reason, the compost would be difficult to dispose of, for example as a soil supplement on agricultural acreage. Operating in the East Hampton region, the system can avoid one source of toxic materials by using exclusively sludge from domestic cesspools, which contains smaller amounts of toxic materials than the sludge available from urban sewage treatment systems. But there is no way to avoid

contaminating the compost with toxic materials, plastic and other extraneous materials that occur in trash if unseparated trash is a starting material.

It follows from these considerations that since compost should be free of such extraneous materials, the starting material should be restricted to: food garbage, brush and yard waste, uninked paper (ink may be toxic), and cesspool sludge. This means that composting equipment can be used successfully only if it is part of an overall separation system, which is capable of segregating the extraneous material from the compostable trash components.

Having reached this conclusion, we then investigated the feasibility of establishing a separation system in which the Eweson Digester or comparable equipment could be used to produce compost, with additional separation and recycling processes employed to deal with the other trash components. In the following sections we discuss the basic requirements for establishing such a separation/recycling system, the available facilities and processes that are capable of meeting these requirements, and their practical applicability to the Town of East Hampton. Finally, on this basis we have developed a conceptual design of a separation/recycling system which can effectively deal with the Town's trash with minimum adverse effects on the environment, and we discuss the further steps needed to realize this system.

I. THE REQUIREMENTS OF AN INTENSIVE SEPARATION/RECYCLING SYSTEM

A. General Considerations:

The practical decision which East Hampton must make is whether to consign its trash to an incinerator or to an alternative system, based on separation, which is equally capable of dealing with the trash but less hazardous to the environment and human health. It follows, then, that a proposed separation/recycling system should, like the incinerator, be designed to deal with the Town's total trash output.

This is a crucial consideration. A major advantage of an incinerator system is that it receives all the trash, disposing of up to 70% of it by combustion and returning the remaining 30% to a landfill. To our knowledge, no U.S. community has attempted to establish a separation system which, like the incinerator, achieves this high level of disposal. Rather, existing separation systems have been designed to deal with only a part of the total trash stream, in the form of readily recycled components such as newspapers or aluminum cans. A survey of current separation systems (Pettit, 1986) found that they deal with only an average of 7% of the total trash stream, reducing the community's trash problem to that extent but not solving it. The town which reports the most effective recycling program in the country, Woodbury, NJ, recycles 45% of its waste (by weight) (Sanderson, 1986). Separation systems that deal with only part of the trash cannot be regarded as an alternative to an incinerator.

In contrast, we are proposing a system which works on the total trash stream, recovering as much as possible in the form of

recycled materials and consigning the remainder to landfill in an environmentally acceptable form. Specifically, the goal of such a system is to consign to the landfill no more of the original trash than an incinerator does -- about 30% by weight.

The feasibility of such an intensive separation/recycling system depends on how much of the total trash is inherently capable of being separated into recyclable components. Thus, newspaper, cans and bottles, and food garbage are recyclables because they can yield marketable products which are disposed of in that way. On the other hand, discarded crockery and plastics are not presently convertable into marketable products and can only be disposed of in a landfill. Such recyclable components comprise a total of about 88% of the trash by weight. (See Section III)

It is also useful to distinguish between two groups of trash components with respect to their regularity of occurrence in the trash stream. "Regular" components are those which a household must discard on a continuous, routine basis, for example: food garbage; newspapers, other paper and packaging; glass, metal and plastic containers of foods, beverages, liquid soap, and other routinely used items. "Irregular" components are those discarded infrequently or seasonally: furniture and household appliances; hazardous materials such as pesticides or mercury batteries; yard waste. Some of the irregular components can seriously hinder separation unless properly isolated from the total trash stream. For example, if toxic chemicals are mingled with food garbage, the compost produced from the latter may contain toxic material that

will reduce the usefulness of the compost for crop acreage and therefore hinder its disposal.

These considerations suggest an overall strategy for devising a separation/recycling system which is comparable to a mass-burn incinerator in its trash-handling capability -- i.e., that about 70% of the trash is disposed of by recycling with 30% or less going to landfill. Accomplishing this purpose calls for a separation strategy which at the household level: (a) effectively isolates non-recyclable trash components from the recyclable ones; (b) segregates recyclable components into groups that can be further separated by relatively simple mechanical means into marketable products; (c) combines (a) and (b) into a regularly scheduled collection program and provides a suitable collection system for "irregular" trash components. In what follows we discuss the basic conditions which govern the realization of this strategy and describe the components of a separation/recycling system which is capable of accomplishing the strategic aims.

B. Basic Conditions:

1. Continuous operation:

Trash has two fundamental properties which must govern the design of any process designed to deal with it: It is produced continuously, and its food garbage component putrefies in a relatively short time. This means that any system that deals with trash must operate continuously, with storage facilities suitably sized relative to the frequency of transport. The food garbage component or any material contaminated with it can be stored only briefly before being rendered non-putrescible, for example by being converted into compost.

2. Completeness of separation:

The ease with which material separated from the overall trash mixture can be disposed of depends considerably on the homogeneity of the separated constituents. For example, a separated component that consists of only clean paper can be readily sold in the paper market. However, if it is mixed with only a small amount of food garbage, which will putrefy in storage, the paper may be unsalable. It is therefore particularly important to segregate food garbage and other putrescible material such as discarded disposable diapers from the other trash components.

3. Minimization of residues:

Ideally all of the material in the trash should be disposed of by being shipped away from the community in some usable form. Any unusable residue remains as a burden to the community, which can only be disposed of in a landfill. Although this ideal is impossible to achieve, the separation system should be sufficiently complete to keep the unusable residue -- and therefore the required landfill capacity -- to an absolute minimum. Moreover, such a residue should be environmentally benign, which in practice means that it should not contain toxic materials. As already noted, if a separation system is to be comparable to an incinerator in its overall trash-handling capability, it should aim at recycling 70% or more of the total trash stream.

4. Reasonable cost:

The actual cost of a trash-handling system must be estimated for each specific design and location, which is beyond the scope of the present analysis. However, it appears that a system

involving processes such as household separation and partial mechanical separation will be no more costly than incineration, and probably less so (EDF, 1985).

II. THE COMPONENTS OF AN INTENSIVE SEPARATION/RECYCLING SYSTEM

Conventionally, separation and recycling are regarded as capable of dealing with only a small fraction of the total trash. This conclusion is based on the assumed difficulty of achieving two necessary goals: nearly 100% participation of the community's households in the separation program; and separation of all or nearly all of the recyclables into components that can be successfully marketed. To our knowledge no U.S. community has organized a household separation program which is designed to meet both of these goals. Nevertheless, there is now enough experience with the processes and equipment used in less ambitious programs to indicate that these goals can in fact be achieved.

A. Household Separation: Level of Participation:

It is common experience that essentially 100% participation can be achieved in a conventional MSW collection system, in which householders are required only to bring to the curbside a single container of unseparated trash. It is often suggested that any further obligations will reduce a householder's participation in proportion to their complexity -- for example, the separation of MSW into different containers. Another factor which is likely to affect the level of participation is whether a separation program is voluntary or mandated by municipal regulations. Finally, participation will be affected by the degree of public education

about the program and the degree to which regulations are enforced.

Several surveys have been reported which attempt to evaluate the effects of such factors on levels of participation in household separation and collection programs:

- U.S. EPA, 1979a, "A National Survey of Separate Collection Programs"
- U.S. EPA, 1979b, "Multilateral Source Separation in Marblehead and Somerville, Massachusetts"
- C. Pettit, 1986, "Trends in Collecting Recyclables," Waste Age, July (results of a survey by the National Solid Waste Management Association, NSWMA)

While these surveys deal only with curbside collection programs, most of the resulting information deals with the householder's sorting behavior and therefore applies to East Hampton, despite the fact that most householders deliver trash to the landfill on their own initiative.

These surveys and several separate community reports lead to the following conclusions regarding the influence of various factors on the level of participation in source separation systems:

1. Mandatory vs. voluntary participation:

Experience has shown that separation systems based on statutes that require household participation yield considerably higher participation rates than voluntary programs. The NSWMA survey found that participation in mandatory programs averaged about 55%, as compared with 34% for voluntary programs. However, because of enforcement problems, a mandatory program does not automatically guarantee a high rate of participation. Nevertheless, it is evident that very high rates of participation

can be achieved in mandatory programs. For example, of 13 mandatory separation programs surveyed by NSWMA, five achieved participation rates of 80-98%. Woodbury, NJ has achieved 85-95% participation in a mandatory separation program. In contrast, voluntary programs never exceeded a 70% level of participation, and were generally lower. The EPA (1979a) survey reported that 59% of the mandatory programs had participation rates of 50% or more, compared with 19% of the voluntary programs.

2. The number of containers:

There is no clear evidence that the number of containers into which householders must separate MSW actually reduces the level of participation. To illustrate this point, the NSWMA survey report contrasts the 30% participation rate in Islip, NY, where residents place all their recyclables into one container, with the 70% participation rate achieved in Santa Rosa, CA, where residents are provided with special containers for each of three recyclable components (newspapers, metal, glass). According to the EPA report (1979b) on the Marblehead, MA, program, 74% participation was achieved in a mandatory system in which paper, cans and clear glass, and cans and colored glass went into three separate containers. In both Santa Rosa and Marblehead a fourth container received the rest of the trash, which included food garbage. Woodbury, NJ reports 85-95% participation in a system involving separation into seven containers (Sanderson, 1986).

3. Pick-up schedule:

There is evidence that participation is enhanced if all pick-ups (both recyclable and non-recyclable trash) occur on the same

day of the week. According to the NSWMA survey, the average rate of participation among 13 communities with mandatory participation is 76.5% with "same-day" pick-ups and 41% without. In contrast, the frequency of collection was found not to significantly affect participation rate in either the NSWMA or EPA surveys (although volumes of materials collected increased with more frequent collection).

4. Public education:

The available literature on source-separation programs consistently emphasizes the need for vigorous public education campaigns to elicit participation. Starting several weeks prior to implementation of a new program, recycling program coordinators should explain to residents the benefits of source separation and the steps they need to take to participate. Public education should continue throughout the duration of the recycling program in order to maintain high levels of participation. However, no consistent or uniform measures of the effectiveness of public education campaigns are available.

In interpreting the foregoing results, it should be recognized that participation rate is dependent on the joint effect of a number of factors, only some of which are considered above. An analysis by CBNS of the results of the NSWMA survey shows that statistically significant positive effects on participation rate are exerted by: mandatory requirement; "same day" collection; and the number of components collected. There is a significant, negative effect of population size, which in turn is likely to reflect a number of unevaluated social and economic factors. The EPA (1979a) survey made an attempt to evaluate such

factors (including average income and level of education) on participation rate, but the results are confused by disparate sources of data and in any case are characterized as "not a strong relationship."

Because such factors may be particularly reflected in the size of the community, in Table I we have collected the available data regarding towns in the size range of East Hampton (pop. 15,500). It is noteworthy that three of the seven towns have achieved 85-98% participation. All of these highly successful programs are mandatory rather than voluntary, and two of the three have a "same day" collection schedule. These observations suggest that household separation programs can involve up to four specified containers and still achieve a high level of participation. Considerable success has also been achieved in somewhat larger communities. In Groton, CT, (pop. 43,000) with 85% participation, newspapers, glass, cans and the remaining trash are separated into three different containers, which are collected weekly on a "same day" basis. Montclair, NJ (pop. 44,000) achieved 80% participation with four-container separation and "same day" collection; Marblehead, MA (pop. 25,000, with a summer increase) achieved 74% participation with four-container separation and no "same day" collection. It is significant that all of the above programs are mandatory.

In sum, it would appear to be possible to obtain nearly complete participation (of the order of 90% or better), certainly in towns of 10-20,000 population, with four-container separation, if the program is mandatory and (but not necessarily) if "same day" collection is used.

Table I

RECYCLING PROGRAMS IN CITIES WITH POPULATIONS BETWEEN 10,000 AND 20,000 (EAST HAMPTON = 15,500)

Town	Materials Collected*	"Same Day" Collection	Participation Voluntary	Participation Required
Hamburg, NY	NP,GL	yes		98%
Barrington, RI	NP,GL	yes		35%
Dover, NJ	NP	no		7%
No. Palm Beach, FL	NP	yes	20%	
Roxbury, NJ	NP,GL,AL	yes		85%
Springfield, PA	NP,GL,AL,TN	yes	65%	
Woodbury, NJ**	AP,GL,AL,TN,YW	no		85-95%

*NP=newsprint; AP=all paper; AL=aluminum cans; TN=tin cans; GL=glass bottles and jars; YW=yard waste.

Source:
Pettit, C.L., 1986

**Sanderson, City Councilman Donald, 1986.

B. Mechanical Processing of Source Separated Materials:

Separation of the total trash stream into four different containers is still insufficient to separate out all the individual recyclable products in readily marketable forms. Accordingly, further separation is essential if a high level of recycling is to be achieved. With respect to two groups of trash components -- a mixture of "tin" cans, aluminum cans and glass bottles and jars, and a mixture of newspaper, cardboard, and miscellaneous paper -- this can readily be achieved by mechanical means. Simple mechanical equipment can be used to separate a mixture of glass bottles and cans, yielding crushed glass, and ferrous and aluminum scrap metal for sale. Similar installations can be used to produce separated bales of newspaper, cardboard and miscellaneous paper (which includes magazines, mail and so forth) from mixtures of these components.

To our knowledge, there is no single survey of such mechanical installations in U.S. communities. However, the California Solid Waste Management Board has reviewed the operation of such systems in five California cities ranging in population from 43,000 to 313,000 (CSWMB, 1982a). Two of these systems are entirely operated by the city; two others are private enterprises; in one system the actual operation is private, with the city handling administration and public education. While most of the California facilities are largely based on hand-sorting, the DART program in Downey, CA is quite similar to the RRS facility (see below) and is the subject of a detailed report (CSWMB, 1981). The report describes a facility that sorts mixed recyclables at a rate

of about one ton per hour, using about 3.3 person-hours of labor per ton. The report indicates that the introduction of increased and/or improved mechanical processes would improve efficiency and lower operating costs.

Since, in this report, we have accepted as a criterion of acceptability that a given process should be available "off the shelf," we have investigated the availability, in the Long Island area, of commercial operators who are ready to build and operate such installations. Resource Recovery Systems Inc. (RRS) of Old Lyme, CT, is an example of such an enterprise, and on the basis of discussions with Mr. Peter Karter (President and Chief Executive Officer) and Mr. Matthew McCauley (Vice President, Operations), it can be characterized as follows.

RRS now operates separation/recycling installations at Groton, CT and Camden, NJ, and will soon operate a third facility in New York City. The Groton facility has been operating since April 1982. It receives two separate trash streams from the town's collection system: 40 tons per day of cans and glass bottles; and 12 tons per day of mixed paper (newspaper, cardboard, and miscellaneous paper). By means of several mechanical devices and hand-picking, these streams are separated into salable products: crushed glass, tin cans, aluminum cans, and several classes of paper and cardboard. The products are sold in the open market. The Camden facility, which can handle 80 tons per day of cans and bottles, has been operating since April 1986. RRS reports the following operational experience.

1. Under a five-year contract, RRS receives the indicated

trash stream from the town collection system, separates it and markets the products continuously.

2. A facility requires a 1-1.5 acre site. In addition to the separation facility, the site includes two buildings of about 7000 square feet each to store products until sufficient material has accumulated to warrant shipment to market.

3. A facility employs five to seven people, including a manager.

4. About 17% of the material received in the can and bottle stream is extraneous (e.g., discarded appliances, plastic, scrap metal) and is consigned to landfill. About 16% of the material received in the paper stream is extraneous and is discarded to landfill (McCauley, 1986a).

5. Equipment capable of handling 80 tons per day of cans and bottles can be constructed for about $360,000; equipment for 80 tons per day of paper can be constructed for about $400,000. Building and site construction costs are additional. To minimize costs to the Town, a facility should have a capacity of at least 25 tons per day of cans and bottles and 25 tons per day of paper.

6. The following should be excluded from the can and bottle waste stream: plastic items, including plastic bottles; discarded appliances; ceramic scrap; electric light bulbs; food garbage and other putrescible material. The paper waste stream should include only newspaper; corrugated cardboard; grey cardboard; discarded mail; books and magazines; miscellaneous paper.

In sum, such installations appear to be capable of facilitating the separation and recycling of two major waste streams: cans and bottles, and paper, on a continuous basis.

C. Composting:

Composting is a biological process, in which plant and animal remains (such as food garbage, brush and yard waste) are acted upon, usually together with sewage sludge, by a mixture of microorganisms under well-aerated conditions. Imitating the natural processes which occur in soil, the process converts the starting material into a humus-like product -- compost.

Composting can serve as a means of trash disposal if the compost product can be distributed as a useful soil additive. The agricultural value of compost is related in part to its positive contribution to the "tilth" of the soil -- i.e., its porosity which in turn influences soil drainage and aeration. The value of compost also depends on its contribution of nutrients (nitrogen, phosphorus, and potassium) to the soil. The positive contribution that compost can make to agriculture is particularly important on Long Island. For a number of years nitrate leaching from heavy applications of chemical fertilizer to Long Island crops has increased the nitrate level in the aquifers which supply drinking water, where it represents a potential health hazard. Nitrate leaching from heavily fertilized agricultural acreage may also contribute to the algal overgrowths which have recently occurred in Peconic Bay. Compost reduces leaching by enhancing soil aeration (which in turn facilitates nutrient uptake by the crop) and by providing nutrients which are only gradually released in a soluble form. Compost application to Long Island agricultural acreage could alleviate these important environmental hazards.

Thus, there should be a good local market for compost produced from trash, thereby contributing to trash disposal.

However, compost can be used as a soil additive only if it is not contaminated with toxic substances or other extraneous materials. Toxic materials may enter the compost in the sludge or the trash. Sludge from municipal sewage treatment plants is likely to be contaminated by toxic materials from industrial wastes, and for that reason sludge derived from domestic cesspools is significantly less contaminated (Naylor, 1986). Toxic materials occur in trash, not in the compostable components (for example, food garbage), but in other constituents, such as discarded mercury batteries or pesticides. Hence, to avoid contamination with toxic materials, compost should be prepared from cesspool sludge and from compostable components of trash which have been separated from toxic components.

Composting can be carried out by simply forming large piles of material, which are aerated periodically by turning them over. Alternatively, the initial stages of the process can be accelerated by treating the starting material in a large rotating cylinder. The Eweson Digester is one example of such equipment. Many European and Asian cities compost part of their municipal solid waste. Cities as diverse as Leicester (England), Heidelberg (West Germany), and Bangkok (Thailand) use some form of in-vessel aerobic composting -- i.e., a process similar to the Eweson Digester. Heidelberg requires separation of its trash at the household level into a food garbage-vegetation-paper segment which is composted, and a non-compostable segment. The Wanlip compost plant at Leicester, which has operated successfully for a number

of years, takes the trash as it comes but uses a separation process (largely hand-picking) to remove non-compostable material. Recyclable glass, metal, newspapers and other materials are sold, and the remainder of the trash is composted with sewage sludge.

Several American cities compost lawn and tree clippings, for example, Berkeley (Calif.) and Babylon (Long Island). Experience in Seattle illustrates some of the problems encountered by compost operations. An initial compost operation based on food garbage was closed down by the City Health Department because it was an uncontrolled windrow (i.e., open-air compost piles) operation. Then for several years a windrow compost operation based only on vegetation was carried out. In 1982 Seattle resumed food garbage composting (together with vegetation) in a vessel. Although the operation is too small to handle all the food and vegetation in the waste stream, it was reported to be working satisfactorily, and plans for expansion have been made.

The Dano plant which composts the Leicester MSW and sewage sludge at the Wanlip facility is probably the best known composting plant in the world because the plant manager regularly publishes reports on its physical and operational features. The facility has six Dano units, each 25.6 meters long and 3.5 meters in diameter, which rotate at one rpm during the workday and Ø.5 rpm at other times. As in the Eweson Digester, the cylinder rotation serves to grind down the garbage into small fragments. The material rotates in the drum for two to four days, is screened to 4 cm, and then goes to windrows for curing over a three-month

period. The windrows are turned every seven to ten days. After curing, the compost is screened to 1 cm, bagged and sold.

Successful compost operations in Europe have depended heavily on proper marketing and on public education and support. Understanding the seasonal changes in the different sectors of the market can help match the compost supply to the demand. Little touches such as having the name of the plant printed on the containers in which the compost is sold make a difference. Giving tours of the facility to school and civic groups also helps.

D. Disposal of Discarded Plastics, Textiles and Rubber:

This is a particularly difficult problem, especially if the material is heterogeneous. Although a number of efforts are being made to recycle these materials -- especially plastics -- it remains a difficult problem. Experience with recycling such materials may be summarized as follows:

1. Recycling of plastics:

Although plastic recycling shows some promise, at present there appears to be no steady market for recycled plastics. The inherent characteristics of plastics have created barriers to recycling. Since it is a lightweight material, it must be shredded and baled before it can be transported economically. In order to recycle it, plastic must be sorted into different types; this is difficult if the material is heterogeneous. Besides these technical problems which limit the cost-effectiveness of recycling, the economics of manufacturing plastics from secondary materials has acted as a barrier to recycling. Because of perceived or actual low quality, prices for secondary plastic resins need to be significantly lower than those for virgin resins

in order to make manufacturing plastics from recycled materials cost-effective. This price difference has been too narrow to generate sufficient recycling incentive and instead has supported the use of virgin materials. Some suggested legislation that would boost economic incentive for increased plastic recycling include: a tax on virgin materials (to widen the price gap between secondary and virgin resins); incentive payments to promote recycling; and a tax on non-recycled products (EPA, 1973).

Because plastic products must be separated according to their chemical composition (resin), those items which are composed of a single type of resin have the best recycling potential. The most recognizable such products are soft-drink bottles, which consist of polyethylene terephthalate resin (PET), and milk bottles, which are made from high density polyethylene (HDPE). Considerable effort has been made by the plastics industry to develop effective methods for recycling these two types of plastic. The Plastics Recycling Institute (PRI) at Rutgers University has already developed a facility which cleans and separates plastics from milk and soft-drink bottles into salable products (PRI, 1986). However, it is not yet clear whether the equipment could handle plastic contaminated with material routinely encountered in household trash, such as metal and glass, without frequent and costly breakdowns (McCauley, 1986b). Accordingly, this facility does not yet meet our criterion of an "off-the-shelf" technology for use in the proposed East Hampton recycling system.

Another problem encountered in the recycling of PET plastics is the lack of high-value end uses for recycled PET. The dominant

end use for recycled PET is fiberfill (used in pillows, ski jackets, etc.), which absorbed 85% of all PET reprocessed in 1984 (Doherty, 1985). Fiberfill's low selling value has effectively set a ceiling on the value of recycled PET material. Thus, there is a need for developing new, higher valued end-uses for recycled PET.

Hafner Industries, Inc. has recently designed a waste plastics separation and processing plant, which awaits funding for construction. When built, the plant is expected to take MSW rich in plastics (with some amount of contaminants allowable), and to process it, mostly by chemical separation methods, into several relatively pure and readily marketable plastic resins (Hafner, 1986). The plant will concentrate on recycling polyvinyl chloride (PVC), both because it constitutes a significant fraction of the plastics waste stream, and because the PVC is involved in dioxin emissions from trash-burning incinerators. If such a method for recycling plastics becomes available, the recycling system for East Hampton could be modified to accommodate plastic separation, perhaps through addition of a fifth container. However, until the processing and marketing of large quantities of plastic recovered from trash is demonstrated, plastics should be regarded as non-recyclables.

2. Disposal of textiles and rubber:

The bulk of these items are non-recyclable and will need to be disposed of in a landfill. Landfilling can be reduced, however, if residents are encouraged to donate reusable items such as old clothing to local Salvation Army or Goodwill stores. According to the Babylon recycling report, a Long Island firm may

be interested in acquiring discarded tires for reuse (GBB, 1985). Further discussion of the salvaging of reusable goods is presented in the following section.

E. Disposal of Furniture, Household Appliances ("White Goods"), and Wood:

In Berkeley, CA, a linear arrangement of the local refuse and recycling transfer station forces residents to encounter drop-off and buy-back operations for both recyclable and reusable materials before reaching the trash transfer facility. This arrangement, plus tipping fees of more than $8 per cubic yard for dumping non-recyclable refuse at the transfer facility, has successfully encouraged recycling. Besides accepting or purchasing reusable goods brought in, the salvage operation also reclaims materials from the floor of the trash transfer facility. The salvaged materials, which include old furniture, office equipment, books, records, clothing, and scrap metal, are sold at a flea market in the same location and generate profits of $2500 to $4000 per month (Knapp, 1986a).

Urban Ore Inc., which runs the Berkeley salvage operation, also operates a building materials buy-back facility that reports an annual gross income of over $200,000 (Knapp, 1986b). Eighty percent of the materials sold there are purchased from firms that renovate buildings, and 20 percent come from donations or drop-offs. Urban Ore also runs a composting operation which, in addition to selling compost, collects wood for sale as firewood. Although salvaging is often not given much consideration in traditional recycling schemes, Berkeley's experience demonstrates that such operations not only save landfill space, but also

generate considerable profits that can help finance the less cost-effective components of a recycling program.

F. Disposal of Hazardous Materials:

This is one of the most neglected areas of the trash problem, but there is increasing evidence that it must be resolved. Hazardous wastes generated by households include items such as solvents, cleaners and disinfectants, paints and preservatives, pesticides, automotive products (particularly waste oil), batteries, some medicines and cosmetics. Because household hazardous wastes are often improperly disposed of by pouring them down drains or by throwing them out with the regular trash, they generally end up in solid waste landfills or wastewater treatment systems, which are not designed to contain or degrade these materials (Doherty, 1985). Leachate from such improperly disposed of hazardous wastes contaminates surrounding surface water, ground water, air and soil. Explosions or fires in landfills can result from mixing hazardous with regular wastes, and solid waste handlers coming in contact with hazardous wastes can be seriously injured.

If no special means of dealing with household hazardous materials is established, they can seriously hinder the development of alternative systems for disposing of trash. For example, toxic metals such as the mercury or cadmium in batteries will occur in the emissions from trash-burning incinerators. If present in the food garbage or yard waste fraction of source-separated MSW, pesticides and other toxic chemicals will reduce the usefulness of compost produced from it; if present in the

residue or non-recyclables fraction, they will create problems when disposed of in a landfill. For a recycling system to be environmentally acceptable, the residue which is landfilled must contain as little hazardous material as possible. In a town such as East Hampton, which has little industry, this requires source separation of household hazardous waste.

Several communities have begun programs involving source separation of household hazardous wastes. Materials set aside in the household are disposed of through drop-off centers and periodic special collections. The State of Connecticut has developed a preliminary classification scheme for household hazardous wastes with suggestions for handling them. Some materials such as solvents, waste oil and batteries can be recycled. Others must be disposed of in a secure manner (see NYPIRG, 1986). The Town of Babylon has drop-off centers for waste oil located at service stations and at the landfill; the oil is cleaned and recycled (GBB, 1985). Baienfurt, West Germany, has separate collection for chemicals, paints and batteries (Franke, 1985).

East Hampton and several other Long Island towns have initiated an annual "Stop Throwing Out hazardous Pollutants (STOP) Day" during which household hazardous wastes are collected at the main town landfill. Brochures are sent to residents prior to the specified date, educating them on the problems resulting from improper disposal of household hazardous wastes, explaining how to identify and package such materials for transportation, and urging delivery of hazardous wastes to a special collection center.

While an annual collection day is an important start, there is clearly a need to deal with household hazardous wastes generated during the rest of the year. One solution would be to establish collection centers to accept small amounts of hazardous wastes on a regular basis. These facilities could store the wastes until enough accumulates to justify transport to a hazardous wastes disposal site. However, regulations require that sites which store hazardous wastes for more than 90 days go through a full permitting process; this tends to hamper the development of more permanent collection sites (Mattheis, 1986). Another formidable barrier is finding liability insurance to cover the site. Until these obstacles can be overcome, communities will have to address this problem through special drop-off and collection days, while relying on hazardous waste management firms to handle the collected wastes and transport them to hazardous waste disposal sites.

G. Recycling Collection Centers ("Drop-off" and "Buy-back"):

These are installations to which householders, on their own initiative, deliver separated trash components such as newspapers and bottles and cans. Recycling collection centers that receive materials without offering payment for them are referred to as "drop-off" centers; those which pay for delivered recyclables are called "buy-back" centers. The separated materials are then sold for recycling. By reducing or eliminating high collection costs, recycling collection centers are often viewed as inexpensive alternatives to curbside collection. Communities such as El Cerrito, CA, found that profits from operation of cost-effective recycling collection centers helped to finance curbside collection

(CSWMB, 1982b). However, collection centers, particularly drop-off centers, generally do not obtain the high participation and volumes of materials achievable through curbside collection. The chief difficulty is that they require the householder to not only separate but also transport the material. Buy-back centers, while operating at greater cost than drop-off centers, have been somewhat more successful; El Cerrito's buy-back program actually collected greater volumes of materials than did its curbside collection program. As discussed in section II.A above, the highest levels of participation and volumes of materials apparently can be achieved only in mandatory recycling programs which employ curbside collection (Pettit, 1986).

Although collection centers by themselves do not represent an alternative to systems which deal with the trash problem as a whole, they can serve as a useful and cost-saving component of an overall recycling system. Managers with long-term experience in the recycling business have emphasized the need for integrating several components, including collection centers, into an overall system, each targeting a different population or fraction of the waste stream (Knapp, 1986a). For example, recycling centers may be useful for collecting waste generated on an irregular basis, such as large scrap metal items or household hazardous wastes. Also, residents who miss collection days or who live outside collection routes can be conveniently serviced by recycling centers. In towns such as East Hampton which have no municipal collection system, many residents are already accustomed to bringing their trash to a landfill. Having to transport their

separated waste to a recycling center would therefore pose little additional inconvenience. As described in section E above, the city of Berkeley, CA is an example of a community which has successfully integrated collection centers (both drop-off and buy-back) with curbside collection, composting and salvage operations.

H. Total Trash-Separating Plants:

There are relatively large plants which receive entirely unseparated trash and use a series of mechanical devices to separate out various trash components: usually ferrous metal, non-ferrous metal, glass, food garbage, paper and (less frequently) plastic. The separated components are then sold for recycling or, where that is impossible (for example, in the case of some plastic material) consigned to a landfill. In the United States such plants generally yield a mixture of paper, plastic, and other organic matter which is sold for use as a "refuse derived fuel." Burning such fuel creates most of the environmental problems encountered when unseparated trash is incinerated.

While many technologies exist for the mechanical separation of trash, the Sorain-Cecchini technology in Rome probably represents the most complete recycling plant with the "greatest number of operating hours and tons processed in the world" (Abert, 1985). A distinctive attribute of this system is its ability to separate paper from plastic. Recovered plastic is shredded, washed, dried, melted and extruded to form granules. These are then melted to make either plastic bags or plastic piping. The latest plant of this type has been built in Oslo, Norway. Here, the paper recovery process includes treatment with hydrogen peroxide, which increases the salability of the pulp, so that it

can be used for food packaging, newsprint and tissue. Such upgrading of recovered material is an important step, for it increases the market value of recycled materials.

Such total trash-separating plants have a role in the disposal of municipal solid waste, possibly as a method for dealing with situations in which household separation is incomplete. However, our analysis suggests that where source separation can successfully minimize the amount of trash which must be burned or landfilled, it can probably achieve this goal at lower cost and with much less elaborate technology than a total trash-separating plant.

III. DESIGN OF AN INTENSIVE SEPARATION/RECYCLING SYSTEM

A. Household Separation:

The fundamental strategy for designing the system is suggested by the basic conditions discussed in section I and by the available off-the-shelf processes that are described in section II. This information leads to the following considerations:

1. The chief obstacle to continuous operation of a separation system is the relative instability of the markets for recycled material. Typically, such materials -- for example, scrap metal or newspapers -- are at the "bottom of the market"; that is, they receive the lowest price for metal or paper. This is particularly true if the recycled material is contaminated with other trash components. Critics of recycling sometimes claim that if the overall demand for metal or paper drops, as it will in a slack economy, there may be no market for the scrap material and

it will simply pile up. The EPA (1979a) survey provides actual data on this question, for it determined the effect of the economic recession of 1974-76 on the price and marketability of recycled material. In that period the price received by communities for recycled newsprint dropped from about $35 per ton to about $5 per ton. Nevertheless, only 19% of the communities surveyed reported that they were unable to market their recycled materials. Moreover, those communities that had long-term contracts with buyers were able to maintain the price at about $20 per ton. It would appear, therefore, that a sharp decline in demand will increase the net cost of recycling but not necessarily bring it to a halt.

These considerations establish an initial requirement for the system: that it must be based on separation processes and equipment which operate continuously under firm contracts for disposing of the recycled products.

2. Three facilities are available off-the-shelf which -- if provided with suitable inputs -- are capable of recycling and disposing of separated trash components on a continuous basis:

i) a compost facility, which receives food garbage, yard waste and brush, and sewage sludge, and yields a product which can be disposed of as a soil additive on agricultural or other land;

ii) a can and bottle processing facility, which separates this mixed input by mechanical means and hand-picking to yield products -- crushed glass, tin cans and aluminum cans -- which can be sold continuously into commercial markets;

iii) a paper processing facility, which receives mixed paper and uses mechanical means and handpicking to produce baled newsprint, cardboard and mixed paper, which can be sold into commercial markets on a continuous basis.

Consideration should also be given to a salvaging operation and recycling center such as described above.

It follows, therefore, that the separation/recycling system should be designed to include the three major facilities and to provide them with suitable inputs -- that is, material sufficiently homogeneous to yield products that are salable and hence readily disposed of.

3. The foregoing requirement can be met only if the separated products are relatively homogeneous and free of contaminating material which would lead to their rejection as salable commodities. Based on what is known about the operation of the three facilities, the following requirements can be specified:

i) The compost product must be sufficiently free of toxic substances (e.g., toxic metals such as lead or mercury) and of extraneous matter (such as scraps of glass and plastic) to be usable as a soil additive on crop land.

ii) The products yielded by the can and bottle and paper facilities must be free of significant contamination from plastic material, scrap metal and food garbage, which if present may seriously hinder the separation process and the salability of the products.

These considerations lead to a third strategic conclusion: that the input to the compost facility -- garbage and other

putrescible materials -- should be isolated from all the other trash components; and that the inputs to the can and bottle facility and the paper facility should be kept free of not only food garbage but also non-recyclable trash components such as plastic.

4. The foregoing requirements can be met if households are required to deposit trash into four separate containers for regular curbside collection, as follows:

Container I: Food garbage and other putrescible material such as disposable diapers, together with discarded tissue, food-soiled paper.

Container II: Newspaper and other forms of clean paper and cardboard, including food cartons free of contamination.

Container III: Metal cans and glass bottles and jars, rinsed by the householder before disposal.

Container IV: All the rest of the regular trash, including discarded plastic, metal and ceramic kitchenware, textile, small rubber items.

Based on the considerations discussed in section II.A, participation in the separation/recycling system should be mandatory, requiring households to separate their trash into the above four categories, with the containers collected on a regular "same day" basis.

5. The material collected in Container IV -- plastic packaging and other plastic discards (including plastic bottles), discarded textile items, rubber, discarded ceramic and metal kitchenware -- represents the most intractable problem in a

separation system. As indicated in section II.D, with some difficulty it may be possible to separate certain plastic items from this group and recycle them, but this cannot be relied on at present. It follows, therefore, that this non-recyclable material must be consigned to a landfill. As indicated in Table II, it represents about 12% of the total trash.

6. Trash items that are not generated on a regular daily basis include yard waste and brush, and wood; discarded furniture and clothing; "white goods" (i.e., refrigerators and other heavy appliances). As indicated in section II.E, these require separate collection systems. Yard waste can be collected with food garbage, in Container I, if the amount is not too large. In the summer months, larger amounts can be collected separately, delivered to the compost operation and incorporated in the starting material. Discarded furniture and large household appliances could be collected periodically (perhaps quarterly) or brought to collection stations.

7. A final conclusion follows from these considerations: that separate collection systems must be established to ensure that toxic materials do not enter the regular collection system.

B. Disposal:

1. Regular trash components:

The material in the four containers should be collected and disposed of as follows, on a suitable, regular schedule:

Container I (Food garbage and other putrescible material, yard waste):

Delivered to the compost plant, where together with

Table II

COMPOSITION OF TRASH AND DISTRIBUTION INTO SEPARATE HOUSEHOLD CONTAINERS

Component	Trash Composition (% of Total Trash)			Content of Household Containers (% of Total Trash)			
	Total Trash	Recyclable	Non-Recyclable	(I) Food Garbage & Yard Waste	(II) Paper	(III) Bottles & Cans	(IV) "All the Rest"
PAPER							
Newsprint	15.4	15.4		0	15.4	0	0
Magazines	2.6	2.6		0	2.6	0	0
Corrugated	1.5	1.5		0	1.5	0	0
Brown paper	8.3	8.3		0	8.3	0	0
Mail	4.1	4.1		0	4.1	0	0
Food cartons	3.1	3.1		0	3.1	0	0
Tissue	3.0	3.0		3.0	0	0	0
Wax cartons	0.4		0.4	0	0	0	0.4
Plastic-coated	1.1		1.1	0	0	0	1.1
	39.5						
METALS							
Ferrous bev. cont.	1.2	1.2		0	0	1.2	0
Other ferrous	6.4	6.4		0	0	6.4	0
Non-ferrous bev.	0.4	0.4		0	0	0.4	0
Other non-ferrous	0.7	0.7		0	0	0.7	0
	8.7						
GLASS							
Beverage cont.	5.0	5.0		0	0	5.0	0
Other glass	4.7	4.7		0	0	4.7	0
	9.7						
PLASTIC	4.7		4.7	0	0	0	4.7
RUBBER & LEATHER	2.0		2.0	0	0	0	2.0
TEXTILES	2.0		2.0	0	0	0	2.0
FOOD GARBAGE	11.4	11.4		11.4	0	0	0
WOOD	4.0	4.0		4.0	0	0	0
YARD WASTE	16.0	16.0		16.0	0	0	0
MISCELLANEOUS	2.0		2.0	0	0	0	2.0
TOTALS	100.0	87.8	12.2	34.4	35.0	18.4	12.2

Sources:

1. For percent total trash: Holzmacher, McLendon & Murrell, P.C., 1986.
2. For percent waste of subcomponents except brown paper, mail, cartons, tissue, wax cartons, and plastic-coated paper: US EPA, 1979b.
3. For percent waste of brown paper, mail, cartons, tissue, wax cartons, plastic-coated paper: EG&G, 1982.

brush and additional yard waste from special collections, and cesspool sludge it is processed to yield compost.

Container II (Clean mixed paper):

Delivered to a contractor's paper-sorting operation for separation into suitable salable products which are shipped to market.

Container III (Cans and bottles):

Delivered to a contractor's sorting and glass-crushing operation for separation into suitable salable products which are shipped to market.

Container IV ("Everything else," i.e., plastic, textile, rubber, small metal items):

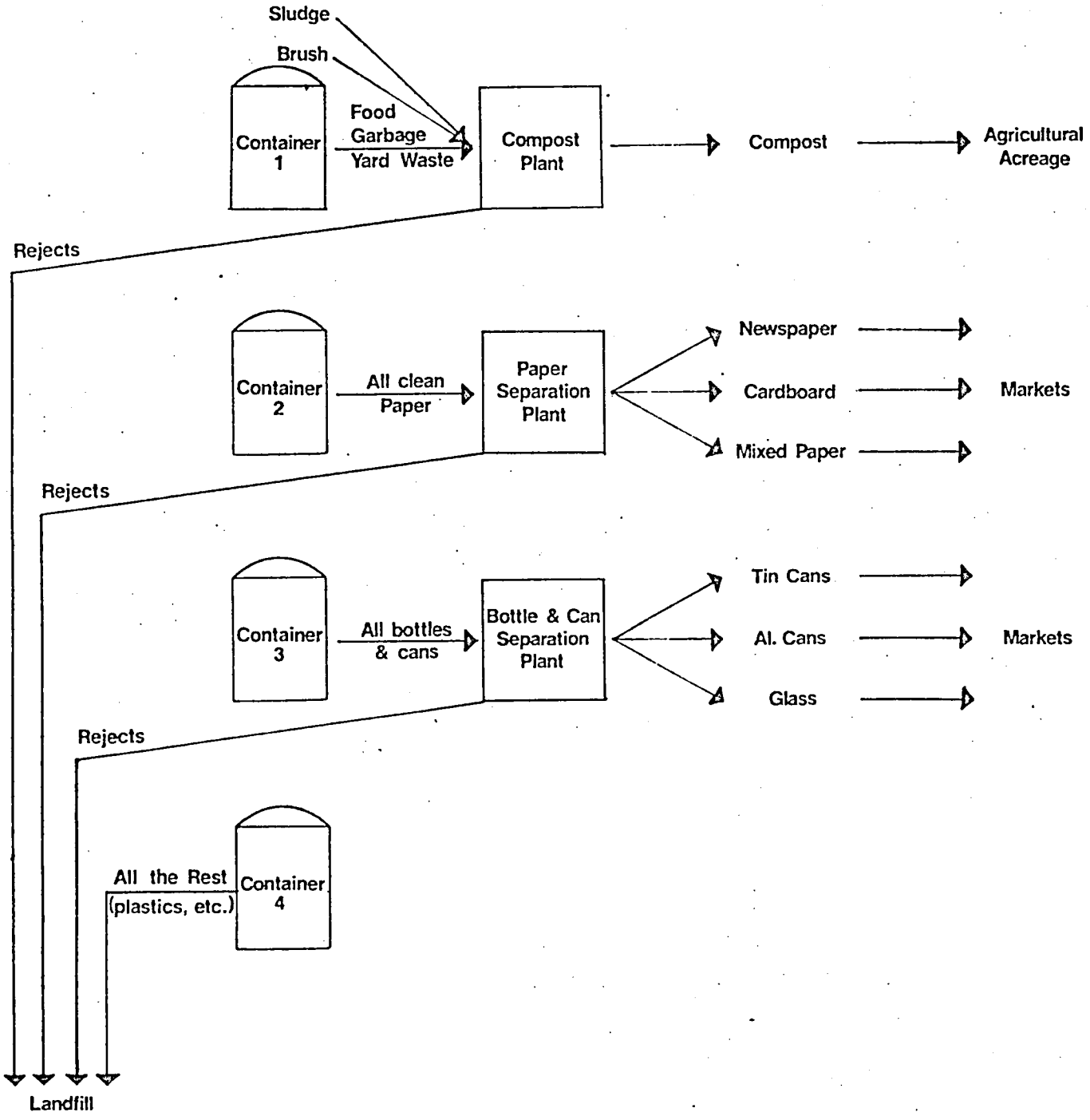
Delivered to the landfill site for possible sorting and separation of recyclable items. Nearly all of this trash stream is likely to be unrecyclable material which is consigned to the landfill.

Thus, all of the four separate trash streams defined above would be removed continuously: compost to agricultural acreage, parks and waste land; separated paper components, as guaranteed by the contractor, into the scrap paper market; separated cans and bottles, as guaranteed by the contractor, into scrap steel, glass recycling markets; "everything else," less recycled items, to the landfill. The overall structure of the system defined above is shown in Figure 1.

2. Irregular trash components and hazardous materials:

Bulky items, collected by occasional or special pickups, would be delivered to a sorting and resale operation (operated by

FIGURE 1
BASIC SEPARATION SCHEME



a community group or perhaps privately), with residual material periodically consigned to the landfill.

Hazardous materials would be collected and disposed of by a separately established system.

C. Quantitative Considerations:

There are certain quantitative requirements for the separation/recycling system outlined above:

- It should at least approximate the trash-handling capability of an incinerator system -- i.e., about 70% of the trash disposed of and about 30% consigned to landfill.
- The trash collected should supply input sufficient for cost-effective bottle and can, and paper processing -- i.e., about 10-25 tons per day of each of these mixed components.
- Sufficient sewage sludge should be available to provide a proper input to the compost process, when combined with the food garbage, brush and yard waste provided by the trash system.
- The foregoing considerations will in turn determine the size of the trash stream which can be effectively handled, and hence, the size of the population which it must serve.

In what follows we estimate the quantitative features of the scheme shown in Fig. 1, as they apply to the East Hampton trash stream.

1. The trash stream:

To consider these issues, it is necessary to begin with the expected composition of the town's trash stream. Although data for East Hampton itself are not available, they can be approximated from studies of trash in other Long Island

communities, supplemented with further details from additional studies. A trash composition table, constructed from these sources, which is probably sufficiently like the actual East Hampton trash stream to at least support the necessary computation is shown in Table II. The total East Hampton trash stream is about 68 tons per day, averaged over the year.

2. The distribution of trash components:

If the total household trash is divided among the four containers, in keeping with the scheme described above, four separate waste streams are created. As shown in Table II, the stream represented by Container I (food garbage and other organic matter) comprises 34.4% of the total (by weight); that represented by Container II (paper), 35%; that represented by Container III (cans and bottles), 18.4%; that represented by Container IV ("all the rest"), 12.2%.

3. The efficiency of recycling:

Containers I, II and III include all the recyclable components of the trash stream, amounting to 88% of the total. However, in practice it is impossible to achieve 100% efficiency -- that is, converting each trash stream entirely into the final marketable products. Two sources of inefficiency must be considered. First, in practice each of the three containers is likely to contain some extraneous material which will need to be rejected at the composting and separation plants, and consigned to the landfill. Second, the overall recycling efficiency will be reduced by the amount of household non-participation, assuming that non-participating households would set out unseparated trash

that would be unacceptable at the plants and need to be landfilled. The first of these factors -- i.e., the rejection rate at the plants -- can be estimated from operational experience. According to RRS, about 16% of the material received at their paper separation plants and about 17% of the material received at their can and bottle separation plants are rejected (McCauley, 1986a). Although mass-balance data on compost operations are not available, we assume a rejection rate of 5%. Finally, based on the considerations discussed in section II.A, we assume a rate of household participation of 90%.

The overall efficiency of recycling is computed in Table III, which shows that rejection at the compost and separation plants reduces the percent of the total trash stream which can be recycled from 88% to 77%. At a participation rate of 90%, this last figure is reduced to the net result: 70% of the total trash stream is recycled and 30% is consigned to landfill. This confirms that the system can approximate the overall reduction in landfill requirement achieved by mass-burn incinerators, which is also about 70%. Thus, the proposed scheme appears to be capable of achieving this strategic goal.

From the expected rate of East Hampton trash production -- about 68 tons per day -- the foregoing data can be converted to the actual tonnage of recycled material produced by the three processing facilities. This is shown in Table IV. Per day, the bottle and can processing facilities would produce about 3.9 tons of tin cans, about 0.6 tons of aluminum cans, and about 4.9 tons of glass. Per day the paper processing facility would produce about 7.9 tons of newspaper, 0.8 tons of corrugated cardboard, and

Table III

EFFICIENCY OF RECYCLING

	Recyclable Material (% of Total Trash)	Plant Rejection Rate (% of Recyclable Material)	Recycled Material (% of Total Trash)
Paper	35.Ø	16	29.4
Bottles & cans	18.4	17	15.3
Compost	34.4	5	32.6
Total	87.8		77.3

Household Participation Rate 90%

TOTAL RECYCLED (77.3% x 90%): 7Ø% of total trash
TOTAL LANDFILLED 3Ø% of total trash

Table IV

OUTPUT OF RECYCLED PRODUCTS

Recycled Product	% of Total Trash Recycled*	Tons per Day Recycled**
Newspaper	11.6	7.9
Corrugated paper	1.1	Ø.8
Mixed paper	13.7	9.3
Ferrous metal	5.7	3.9
Non-ferrous metal	Ø.8	Ø.6
Glass	7.2	4.9
Wood	3.4	2.3
Compostable trash components	26.Ø	17.6
Total Recycled	69.6%	47.2 tons

*Taking into account non-participation and rejects (see Table III)

**Based on an average total trash stream of 68 tons/day.

9.3 tons of mixed paper. The compost facility will consume about 17.6 tons per day (excluding rejects) of compostable material from trash. About 2.3 tons per day of wood could be reclaimed for resale as firewood, reuse as building material, or composting.

4. The compost process:

The compost process combines material from brush (food garbage, yard waste and some paper) with sewage sludge, which is needed to provide nitrogen sufficient to balance the carbon-rich waste from the trash stream. The amount of sewage sludge needed for this purpose is computed in Table V, based on the carbon to nitrogen ratios of the inputs relative to the ratio desired in the compost. Sludge represents, in dry weight, about 17% of the total starting material used in the compost process.

The foregoing data can now be related to the practical requirements of an effective separation/recycling system, designed to serve the needs of East Hampton. From the foregoing considerations the required capacities (including rejects) are:

Can & bottle processing facility: 24 tpd of input
Paper processing facility: 13 tpd of input
Compost facility: 20 tpd of input from trash stream plus 2.3 tpd of sewage sludge (dry weight)

Can/bottle and paper plants of this capacity can readily be installed, although they may be somewhat less cost-effective than plants with a somewhat larger capacity (about 25 tpd). Cesspool sludge available from East Hampton residences is probably of the order of 0.5 tpd (dry weight) (based on calculations from Loesch, 1985). Hence, a wider source of sludge will be needed to supplement that available from East Hampton. Alternatively, the available sludge could be supplemented with a chemical source of

Table V

INPUTS TO COMPOSTING PROCESS

Compost Input	Wet Wt. (tpd)	Moisture (%)	Dry Wt. (tpd)	% of Input	C/N Ratio
Paper	1.7	18.6	1.4	10.9	127.0
Food garbage	6.6	62.8	2.5	19.3	37.4
Yard waste	9.3	28.0	6.7	52.3	14.1
Sewage sludge	--	--	2.2	17.4	8.7
Total			12.8	100.0	30.0

Notes:
Composition takes into account non-participation and rejects.
Paper in compost consists of tissue or food-contaminated paper.

Sources:
The carbon-nitrogen ratio (C/N) and moisture contents of MSW components are from an analysis of Greenpoint household refuse in City of New York.
The starting material for composting should have a C/N ratio of about 20 to 30. Diaz et al., 1982.
C/N ratio of sewage sludge is from Hirai, et al., 1983. Cesspool sludge may have a lower C/N ratio.

nitrogen to provide the proper carbon/nitrogen ratio in the input material.

D. Uncertainties:

It should be recognized that the foregoing quantitative estimates involve a number of uncertainties. To begin with, trash composition is estimated from analyses done elsewhere rather than on actual data from East Hampton. However, any inaccuracies in composition are not expected to be large enough to affect the feasibility of the proposed separation/recycling scheme.

The assumed rate of household participation -- 90% -- is a goal that should be readily attainable in East Hampton. Indeed, with a well-thought-out educational campaign, it might well be exceeded. As noted earlier, the assumed rates of rejection at the paper and bottle/can separation plants -- 16% and 17% respectively -- are based on experience in Groton, where there is a three-container collection system. We believe that these rates might be reduced in an East Hampton facility given that separation will be based on four containers and therefore inherently more complete. In addition, if the three plants are located on the same site, rejects from one plant might be added to the input for another, rather than landfilled. (Thus, cans and bottles inadvertently added to Container I and discarded by the compost plant could be transferred to the can and bottle separation plant.)

The landfilled residue, which we estimate at about 30% by weight, involves uncertainties regarding the effect on landfill capacity. Landfill requirements are determined by the volume rather than the weight of the residue. If the material consigned to landfill has the same density as trash as a whole (about 0.7

ton per cubic yard), the 30% residue from one ton of trash will require about 0.43 cubic yards of landfill space per ton of unseparated MSW. In comparison, the 30% residue represented by incinerator ash has a density of one ton per cubic yard and will therefore occupy 0.3 cubic yards of landfill space per ton of original trash burned (EDF, 1985). Thus, unless the projected efficiency of the proposed separation system can be improved, it will use somewhat more landfill space per ton of original trash than an incinerator system would. Depending on the composition of the residue from the separation/recycling system which is landfilled, it may be possible to reduce this effect to some degree. For example, the density of a prominent component of the residue -- plastics -- is rather low, but a good deal of it may be readily compacted. Compaction of the residue preceding landfilling may therefore be a useful way of reducing the required landfill space. The practical realization of plastic recycling methods now under development could have a similar effect.

Some of these uncertainties may be reduced by the further studies which we recommend below. In most cases, more refined information can be obtained only from the actual operation of the system. However, taking the existing uncertainties into account, our analysis shows that the proposed separation/recycling system is the most effective way to deal with the Town's trash.

IV. CONCLUSIONS AND RECOMMENDATIONS

A. Conclusions:

The foregoing considerations support the following conclusions regarding the feasibility of operating a separation/recycling system for the Town of East Hampton:

1. The feasibility of a separation/recycling system capable of disposing of the order of 70% of the trash depends on household separation of trash into four different containers. Nearly all the households (of the order of 90%) must participate in this separation program.

2. The required level of participation can be achieved if (a) the household separation program is mandatory, (b) all containers are collected on the same day of the week (but not necessarily at the same frequency), (c) there is an effective educational campaign.

3. By properly specifying the content of the four household containers, three will contain material that is readily recycled; the fourth container will contain non-recyclable material that must be consigned to landfill.

4. One of the three recyclable trash streams is comprised of food garbage and other putrescible material (e.g., disposable diapers), food-soiled paper and cardboard, and yard waste. This material, together with a sufficient quantity of sewage sludge and shredded brush, is delivered to a compost plant for conversion to compost which is suitable for disposal as a soil additive on agricultural acreage.

5. The second of the recyclable trash streams, comprising unsoiled paper and cardboard (newspaper, magazines,

mail, corrugated and grey cardboard) is delivered to a paper separation plant, which produces several baled products for shipment to the recycled paper market.

6. The third of the recyclable trash streams, comprising cans and glass (but not plastic) bottles is delivered to a bottle/can separation plant which produces crushed glass, tin cans and aluminum cans for shipment to the appropriate markets.

7. There are successful operating examples of all three types of plants described in 4, 5 and 6 above; existing firms are prepared to build and operate them on the basis of long-term contracts.

8. With a 90% rate of household participation and the expected rate of rejection of extraneous material at the three processing plants, about 70% (by weight) of the total trash stream would be recycled and 30% consigned to landfill.

9. The material consigned to landfill by the separation/recycling system comprises chiefly plastic, ceramic, textile and rubber and leather discards. It represents about 30% of the total trash stream by weight and about 43% by volume (which could be reduced by compacting).

10. The overall environmental impact of the separation/recycling system will be well within regulatory limits and low relative to the impact of the alternative: an incinerator that burns unseparated trash. With suitable control on air emissions, the compost plant can operate within regulatory limits; the toxic metal content of the compost product is expected to be within New

York State regulatory requirements for soil additives to acreage growing crops for human consumption.

11. The system requires that toxic chemicals and materials (dry cell batteries, pesticides, solvents, paints) must be segregated from the recycled waste streams. Special collection and disposal systems will be needed to deal with these materials.

12. A separate collection system is needed to bring bulky discards (furniture, household appliances, tires) to the landfill, or preferably, to a resale center.

B. Recommendations:

We recommend that the Town of East Hampton develop a plan for implementing an intensive separation/recycling system patterned on the scheme presented above. The plan should be sufficiently specific to support the preparation of requests for proposals regarding the construction and operation of the three processing plants, and to support proposals for the requisite financing. To accomplish this purpose, the development plan should include the following new information beyond that presented in this study:

1. Specification of the overall size of the system:

While an effective separation/recycling system could be established to serve the needs of East Hampton alone, a larger system, designed to serve one or more additional nearby towns may significantly reduce net disposal costs. In order to determine the most cost-effective system size, it will be necessary to consider: economies of scale in the construction and operation of the three processing plants, especially with respect to the need for redundant equipment sufficient to cope with down-time; collection and transportation costs; the balance between available

trash and sewage sludge inputs to the compost plant; the relation between system size and financing requirements; administrative advantages and disadvantages.

2. Specification of the construction and operation of the processing plants:

These specifications should be sufficiently detailed to support the preparation of requests for proposals for each of the three plants. For this purpose it will be necessary to develop the following information about the plants:

a. Compost plant:

A detailed comparison of the cost and environmental impact of in-vessel and windrow composting, based on a review of current operational experience of U.S. plants; preparation of construction and operational specifications regarding reliability of operation, maximum environmental emissions, quality of compost, and availability of a suitable market.

b. Paper separation plant:

Specification of reliability of operation, redundancy requirements, efficiency of separation, quality of products and availability of suitable markets.

c. Bottle and can separation plant:

Specification of reliability of operation, redundancy requirements, efficiency of separation, quality of products, and availability of suitable markets.

3. Specification of collection requirements:

These specifications should be designed to delineate the most cost-effective system of collection from household containers including: number and types of trucks needed; estimated route

length; frequencies of collection of separate containers; recommended types of containers; relation between collection of "regular" or "irregular" trash; recommended procedures for collection of toxic and hazardous household waste.

4. Development of methods for reducing the amount of non-recyclables:

As indicated in this study, the proposed system's overall capability of reducing landfill requirements is critically affected by the proportion of non-recyclable material in the trash stream. Accordingly, the overall efficiency of the system could be enhanced by developing means of reducing the amount of non-recyclable material that must be consigned to landfill. For example, consideration should be given to voluntary means of reducing the use of plastic packaging, such as shopping bags and plastic wrapping. Consideration should also be given to the development of a resale system for discarded furniture, appliances and building materials.

5. Development of household separation instructions and statutes:

As indicated above, the separation system should be mandatory. Accordingly, it will be necessary to develop an understandable set of instructions to specify how household trash is to be distributed among the four containers. These instructions should be based on the development of a list of common household discard items (e.g., glass jars, plastic containers, food-soiled paper, aluminum foil, electric light bulbs) that are to be consigned to each of the four household

containers. Based on these specifications, a draft statute requiring household participation should be prepared.

6. Development of a public education program:

Public education should precede the actual operation of the separation/recycling system and continue thereafter. Suitable educational materials and activities should be prepared, e.g.: brochures, videotapes, news media presentations, town meetings, school programs.

7. Estimation of system costs:

Based on the above specifications of system components, the relevant capital, maintenance and operational costs should be estimated. From these data an estimate should be made of the net cost of trash disposal, for comparison with existing (i.e., landfill disposal) costs and the cost of alternatives, such as mass-burn incineration.

8. Review of possible financing arrangements:

Based on the estimated costs of the system components, alternative financing arrangements should be defined relative to: private vs. public construction and/or operation of processing plants; availability of bonds and tax abatements; availability of state and federal grants. It should be noted that the proposed separation/recycling system would be the first of its kind and would probably merit a state or federal grant as a demonstration project.

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Item 7
9/22/87

OSSI
OREGON SANITARY SERVICE INSTITUTE

Reply to: 2202 SE Lake Road
Milwaukie, OR 97222

654-9533

MEMBER
NSWMA
National Solid Wastes Management Association

September 22, 1987

TESTIMONY BEFORE METRO COUNCIL, September 22, 1987

Re: Negotiations with Resource Recovery Vendors, Agenda Item 7.

(This testimony is given on behalf of the Tri-County Council, comprised of representatives from Clackamas County Refuse Disposal Association, Multnomah County Refuse Disposal Association, Oregon Sanitary Service Institute, Portland Association of Sanitary Service Operators, Teamsters Local 281, and Washington County Refuse Disposal Association)

Disposal currently represents approximately 17-20% of the cost to solid waste collection companies. Any of the current resource recovery proposals would dramatically impact those costs.

The solid waste industry has made no recommendation in the past for a specific vendor nor for a specified technology. Our position has been that we would support the system where the dollars fall, the system that has the most economic viability. This remains our position.

Respectfully submitted,

Estle Harlan

ESTLE HARLAN

EH:e

C: TRI-COUNTY COUNCIL
OSSI

Item 7, 9/22/87

INSTRUCTIONS

FOR CIRCULATORS

- A petition circulator must be an elector of the state.
- Only electors may sign a petition.
- Do not use ditto marks.
- It is advisable to use a pen or indelible pencil for signing petitions.
- Only one circulator may collect signatures on any one sheet of a petition.
- All signers on any one sheet of a petition must be electors of the same county-city.
- The signature sheet affidavit must be completed for each sheet by the circulator of that sheet.
- It is unlawful for a person circulating a petition to knowingly make any false statement to any person who signs it or requests information about it.
- It is unlawful to circulate or file a petition knowing it to contain a false signature.

FOR SIGNERS

- Only electors may sign a petition.
- Do not use ditto marks.
- Sign your full name, as you did when you registered, and fill in the date on which you signed the petition, your residence address and your precinct in the spaces provided.
- If your signature is difficult to read, print your name clearly in the space provided.
- It is unlawful to sign any person's name other than your own. Do not sign another person's name under any circumstances.
- A woman should sign her own name, not her husband's or her husband's initials; for example, "Mary A. Jones", not "Mrs. John A. Jones."
- It is unlawful to sign a petition more than once.
- It is unlawful for a person to knowingly sign a petition when not qualified to sign it.

INITIATIVE PETITION

CHIEF PETITIONERS:	Steve Gibbons 100 South 1st Street St. Helens, Or 97051	Fred Roediger 125 Clark Street St. Helens, Or 97051	Kathy Locke 90 Columbia Blv St. Helens, Or

BALLOT TITLE

"CITY CHARTER AMENDMENT TO BAN ALL GARBAGE BURNING PLANTS"

RECEIVED
SEP 10 1987
CITY OF
ST. HELENS, OREGON

QUESTION: "Shall All Garbage Burning Plants Be Banned In St. Helens?"

EXPLANATION: Amends St. Helens' City Charter. Prohibits construction or operation of garbage burning plants. Ban covers all sites in the City. Ban includes plants combining prior recycling with an incinerator.

AN ACT

The Charter of the City of St. Helens shall include the following provision:

It is prohibited in the City of St. Helens to construct or operate an incinera that burns garbage within three miles of a public school, hospital or retireme home.

IN THE BOARD OF COUNTY COMMISSIONERS

FOR COLUMBIA COUNTY

An Ordinance Regulating)
sposal of Solid Waste)
n Columbia County)

ORDINANCE NO. 81-3

WHEREAS, there exists a shortage of solid waste disposal sites sufficient to serve the current and future needs of County residents; and

WHEREAS, solid waste generated in other counties is being transported to and deposited in Columbia County facilities; and

WHEREAS, such disposal accelerates and exacerbates potential seepage problems and thus constitutes a danger to the public health; and

WHEREAS, such disposal is detrimental to the needs of County residents in that it diminishes a limited landfill resource, and

WHEREAS, the Board of County Commissioners is authorized by ORS 459.085, to establish service areas and regulate solid waste management,

NOW, THEREFORE, IT IS HEREBY ORDAINED that disposal of solid waste in Columbia County by haulers or collectors of other counties is prohibited, and

IT IS FURTHER ORDAINED that Columbia County collection franchisees are prohibited from receiving for disposal at that site solid wastes brought in by haulers or collectors from other counties.

EXCEPTIONS. This ordinance does not apply to wastes required to be accepted by federal or state constitutional or statutory requirements; provided however, that the hauler shall not be excepted if the hauler mixes other wastes with those required to be accepted. A conditional exemption from this ordinance may be granted by the Board of County Commissioners upon a written showing by the petitioner that a proposed use of local landfill resources will not individually, or cumulatively with local users, endanger the current and future needs of Columbia County residents. The Board of County Commissioners may impose conditions to its

thorization relating to quantity dumped, hours of operation, access routes, and similar limitations on manner of operations.

PENALTIES. The civil penalties for violation of this ordinance are as follows:

1. First Offense. Upon conviction in District Court of a first offense in violation of this ordinance, the penalty shall be $500.00.

2. Second and Subsequent Offense. Upon conviction in District Court of a second offense, and for each offense committed thereafter, the penalty shall be $1,000.00.

These penalties are in addition to any other remedies available at law.

ENFORCEMENT. Enforcement shall be against the operator of the vehicle making the disposal, if known. If the identity of the operator is not known, enforcement shall be against the owner or subcontractor of the vehicle. Citation and enforcement procedure shall be according to the provisions of County Ordinance 203, Sections 1 through 8. Enforcement against disposal franchisees shall be as provided in this ordinance by the citation and enforcement procedure under County Ordinance 203, Sections 1 through 8.

EMERGENCY. This ordinance being immediately necessary to maintain the public welfare, health and safety, an emergency is declared to exist and this ordinance takes effect immediately upon its adoption.

DATED this 5th day of May, 1981.

BOARD OF COUNTY COMMISSIONERS
FOR COLUMBIA COUNTY, OREGON

Chairman

Commissioner

Commissioner

Item 7
9/22/87

STATEMENT BY HARVEY GERSHMAN, PRESIDENT
GERSHMAN, BRICKNER AND BRATTON, INC.
IN REGARD TO
WASTE-TO-ENERGY PROPOSER EVALUATION
ON BEHALF OF THE METRO EVALUATION TEAM

PRESENTED AT
METRO COUNCIL MEETING
SEPTEMBER 22, 1987

Thank you Mr. Presiding Officer, members of the Council, and Executive Officer.

The decision before you is on whether to authorize negotiations for a Memorandum of Understanding to commence with the top ranked proposer in the evaluation process.

During my years in solid waste management, I have participated in close to 20 different procurements. I haven't met a second or third ranked firm yet that was happy with the results. It is certainly understandable that proposers feel strongly about the selection process since they invest a considerable amount of time and money into submitting waste-to-energy proposals, and the rewards of succeeding in the selection decision are even higher. They certainly have a right to express their views, as they have done here.

It is your advisors' job to review the facts and present an objective analysis. In fact, it is GBB's policy not to represent vendors or equipment suppliers so that we can maintain our objectivity for evaluations such as the one in which we are engaged for you. It is not an easy job to sort out the technical, environmental, economic, financial, and contractual issues in such a project. We are fortunate in having an experienced and well-balanced team to meet this challenge.

Among the other advisors assisting Metro staff are

- Salomon Brothers as Senior Managing Underwriter
- Shearson Lehman Brothers and Alex Brown & Sons as Co-Managers
- Government Finance Associates as Financial Advisor
- McEwen, Gisvold, Rankin & Stewart as Transaction Counsel
- Stoel Rives Boley Jones & Grey as Bond Counsel

It is worth reminding everyone that this evaluation process has been a protracted and extensive one. Some seem to have neglected the fact that the recent September 10 report was in effect an update that builds on the Final Evaluation Report and other documents previously submitted to the Council. Greater attention to this fact might have prevented comments along the lines that this or that statement gave little attention to or brushed aside points that appear crucial to a competing proposer.

I will now address the points that have been raised by the competing proposers.

EVALUATION OF CREDIT RATINGS

Schnitzer/Ogden correctly stated that a given project's credit rating can only be determined once the total project structure is established. This is also true for many other aspects of financial analysis. Yet Metro requires at this stage some best estimate of the project cost. This can only be provided if assumptions are made. At this point we must assume that the financing structure will be the same for all proposers; however, the financial strength of the proposers is different. It is reasonable to use current credit rating information on similar projects; where there are none, then the company's own credit rating has to suffice.

Schnitzer/Ogden cited Kent County, Michigan to illustrate that it could obtain a "AAA" rating without credit support, bond insurance, backup letter of credit, or credit enhancement of any kind. What Schnitzer/Ogden neglected to mention was that Kent County was a resource recovery project <u>whose underlying security was the Limited Tax General Obligation of the County</u> (that is, the power to levy property taxes to pay the bonds without a vote of the people). This project was thus rated "A1" by Moody's and "AAA" by Standard and Poors. Metro's financial advisors discussed this project with the rating analysts who were responsible for the ratings. Both agencies confirmed that the rating was based upon the limited tax general obligation backing of the County, and therefore carried the same rating as all other Kent County Limited Tax General Obligation bonds. Metro has clearly stated in the past that the General Obligation of Metro was <u>NOT</u> to be considered as an optional security for this project--legally, it cannot be unless first approved by the voters as was done with the Convention Center bonds. The project structure represented by Metro is a project financing backed by Metro's service fee and revenues from the sale of recovered materials and energy. In addition to this revenue pledge, the

security will also be the contractor's own guarantees. Therefore, the contractor's financial position is potentially the "weak link" upon which the rating will be based.

Schnitzer/Ogden more correctly should refer to its resource recovery project in Babylon, New York, which will be rated "BBB+" when converted to a long term rate or their project in Bristol, Connecticut, rated "BBB." These actual ratings on similar projects lacking a general obligation pledge were used for the consultant's analysis.

Salomon Brothers and Government Finance Associates are not persuaded that credit enhancement is unavailable for RDF facilities. Several major banks have discussed their interest in providing Letters of Credit for Metro's project and have not indicated any unwillingness to consider an RDF project. There may be some, with whom Schnitzer/Ogden has spoken, that show an unwillingness at this time, but there are other major financing institutions that indicate interest. Other RDF projects which have involved credit enhancement include:

- Hartford, Connecticut — Municipal Bond Insurance
- SEMASS — Letter of Credit
- Saco/Biddeford, Maine — Letter of Credit

The Hartford project is a CE project.

Fluor/SEI protests its assigned rating, by stating that it would obtain a letter of credit. The other proposers could also obtain a letter of credit and be rated "AAA" assuming that all would be able to obtain letters with no proof that such credit enhancements are truly available. It is also likely that a letter of credit for a company rated "BB," such as Fluor/SEI, would cost more than a letter of credit for a company rated "A,"

such as CE. Note that Metro had been requested to consider a surety provided by Fluor/SEI as backup to their performance obligations. Fluor/SEI has yet to show evidence that the Securities and Exchange Commission (SEC) will approve Southern Company's full guarantee either in the form of a surety or a direct parent company guarantee. We allowed for the partial guarantee by Southern and that Fluor/SEI/Southern would pay up to 25 basis points if they could not obtain an "A" rating in that we did not use the "BB" rating, but rather, provided a "BBB" rating on the Fluor/SEI financing projections.

EQUITY INFUSION BY THE VENDOR

Schnitzer/Ogden claims that the following sentence in the September 10 report is erroneous; "CE's lump sum contribution is superior and lowers the tip fee by approximately $2.91."

The Schnitzer/Ogden "simple present value analysis" is correct: a very simple calculation would show $20,223,209 for CE and $20,606,954 for Schnitzer/Ogden. However, the timing of the infusion is not the basis for the judgment of superiority. The superiority results from:

- Because of the way leveraged leases are structured, the available savings will depend in large part on the interest rate borne by the bonds. The savings are not guaranteed, since the interest rate is unknown at this time. Yet potential savings are available to Metro in the CE proposal and are not available in the Schnitzer/Ogden offer. Using a 9.25 percent bond interest rate, a savings in the tip fee of $2.91 per ton will accrue to Metro's benefit from the CE proposal. We are more comfortable proceeding with the CE transaction than with the other proposers' offers.

- The equity amount is guaranteed. CE expressed a willingness to share any "windfall" resulting from the sale of federal tax benefits, yet did not require Metro to accept a lesser equity if the sale of tax benefits

produced less. Schnitzer/Ogden and Fluor/SEI were not willing to share any windfall unless Metro accepted less equity should the sale produce less.

Because CE is willing to share any significant benefits of the deferred equity, without forcing a share of the downside risk, CE's offer may be beneficial to Metro rate payers.

CE's obligation to commit equity will vary with the consequences of uncontrollable circumstances. This is a risk item that is not fully defined and therefore is subject to negotiation during the MOU proceedings; if a satisfactory arrangement cannot be reached, then CE's offer will be rejected. If Metro required that proposals be completely consistent with its risk position for acceptance, no proposer would have been accepted.

FEDERAL AND STATE TAX CREDITS

Federal

CE is the only proposer that offered to share federal tax benefits without requiring Metro to accept less equity. The equity contribution by CE will be made regardless of whether a leveraged lease transaction is accomplished. If it can be accomplished, and CE believes that it can be, CE is willing to share the additional benefits with Metro. The other proposers are willing to share the benefits only if Metro shares the downside risk. Obviously, if a leveraged lease transaction cannot be accomplished because of constitutional, tax or any other considerations, or, if accomplished, would result in more risk or less equity to Metro, Metro will not allow the leveraged lease transaction to go forward.

State

Metro is fully aware of the significant changes in the State pollution control tax credit statutes, including the fact that only an Oregon taxpayer can use the Oregon tax credits. There is nothing to prevent CE from obtaining an Oregon partner to enhance the use of Oregon tax credits. In determining Project economics, we did not include any revenues from Oregon tax credits. Because of the shorter construction period guarantee, the Refuse Derived Fuel (RDF) nature of the facility, and CE's 100 percent sharing proposal, we continue to believe that if benefits are obtained from Oregon tax credits, Metro will obtain more benefits from CE.

RECOVERED MATERIAL

Schnitzer/Ogden states that they have agreed to remove 80 percent of the ferrous metals and have guaranteed a market for their sale, whereas CE has guaranteed 90 percent removal of ferrous and 30 percent of aluminum, but has not guaranteed a market for these products. Furthermore, they state that GBB apparently used 0.5 percent aluminum content, whereas the Metro waste studies show 0.1 to 0.2 percent.

Actually, the Metro waste characterization study reports an average of 0.23 percent food container aluminum, plus 0.76 percent other aluminum, both of which are recyclable at somewhat different prices.

If 30 percent of this total of 0.98 percent were recovered, the recovery would be 0.294 percent. The current price of aluminum can stock is about $1,000 per ton,and for casting stock about $800 per ton. Using the lower figure of $800 per ton, the

revenue would be over $800,000 per year for both types of aluminum. The calculation is:

0.294% x 350,000 (tons/year) x 800 ($/ton) = $823,200/year

Based upon CE's proposal on aluminum, this results in a revenue credit to Metro of $0.77 per ton. It should not be forgotten that mass burn plants generally do not recover aluminum, and that the quality of ferrous scrap removed from ash residues is inferior to ferrous recovered from RDF processing. A higher quality product will generally yield a better price and greater market acceptance.

NEGOTIATING POSTURE

In the September 10 Report, the Resource Recovery Negotiating Team indicated that CE had the most positive negotiating posture. Schnitzer/Ogden took exception to this by asserting its "intention to negotiate fairly and professionally, if selected." We believe all three proposers would negotiate fairly and professionally. Metro's advisors have represented other communities in negotiations with these proposers and can attest that each is a reputable company.

Our point focuses more on important issues that Metro has explored in the recent preliminary negotiations. On the basis of these specific experiences, we stand by our September 10th statement that "...we believe CE is, by a significant margin, the proposer most willing to negotiate reasonable solutions (from Metro's standpoint) to the issues that have yet to be resolved." If we do not achieve reasonable solutions, we will recommend termination of MOU negotiations with CE.

TECHNOLOGICAL RELIABILITY

CE offers one line because this is the economical size for a 1,200 tons per day RDF facility. CE has presented a statistical analysis of availability of the processing plant, boiler, and turbine plant. The processing plant can store both MSW and RDF, allowing time for repairs to be made.

The statistics CE used for evaluating availability of the boiler and turbine were obtained from utility industry data. This assumes competent management, which would make certain that spare parts would be available when needed. With an anticipated 85 percent availability, there will be about 55 days of downtime per year. Roughly half of the downtime is scheduled for major inspections and maintenance. All proposers must have provision for disposal of Municipal Solid Waste (MSW) during the annual boiler and first year turbine inspections.

It must be understood and accepted that all proposers are allowed periods of time when the boiler(s) and steam turbine are down. The single boiler does impose a different pattern of power generation, obviously, because instead of operating the turbine at half capacity when one boiler is down, it will be entirely shut down with the only boiler out of service. Normally a boiler can be shut down, repaired and put back on line over a weekend or during a two-day period. This applies to either a mass burn or RDF boiler. RDF boilers, usually having no refractory, can in principle be turned around in a shorter time than a mass burn boiler having a large amount of refractory.

CE used a mean time of 44 hours to repair a boiler, and 1,780 hours between failures, in making their analysis. This translates to 74 days between failures (2½ months) and 2 days for repair.

Schnitzer/Ogden cites the RDF boiler in Lawrence, Massachusetts as an indication of the reliability of a single boiler installation. Schnitzer/Ogden is operating this plant at present, after taking the project over from its thinly capitalized developer, who was not a contractor like those being considered here.

During its first year of operation and acceptance test, this plant demonstrated 85 percent availability, but lack of the anticipated steam market limited its operation, so that on-line time and availability become hard to distinguish. Further, we understand that this plant was not managed well, and the boiler was frequently pushed too hard to make steam during the periods when there was demand.

CE's guarantee--that if the single-line significantly underperforms, they will build part or all of a second line, at their cost--is considered a very significant commitment. We believe this represents a comfort to Metro in accepting CE's technical approach and comes as close as possible to a two line system without initially providing it.

TRACK RECORD

Although the Schnitzer/Ogden response downplays the advanced development of many CE projects in the U.S., and its extensive world-wide boiler experience, they do have a basis for touting their own track record. Schnitzer/Ogden has five plants currently operating and another six that are under construction in the United States. However, this <u>by itself</u> is not sufficient basis to recommend that all communities consider contracting <u>only</u> with Schnitzer/Ogden.

ENVIRONMENTAL CONSIDERATIONS

Questions have been raised concerning the comparative environmental impact of waste-to-energy facilities using refuse derived fuel versus mass burning technology.

It is GBB's opinion that an RDF burning facility using the latest information on producing the fuel, controlling the combustion and cleaning the flue gas will be able to meet comparable standards to those achieved by the best mass burning facilities. Furthermore, the health risks from the controlled emissions from either a mass burn or an RDF facility will not be significant compared with other risks.

The Marion County waste-to-energy facility represents the most advanced technology in operation in the United States at this time. It is our understanding that the dioxin emissions from Marion County with its scrubber/baghouse controls are presently the lowest reported from an operating facility in the country. These emissions are close to or below the extremely stringent goal set by the Swedish Environmental Protection Board and below those currently required by the Oregon Department of Environmental Quality.

A question we have to address is whether an RDF-burning facility can also be expected to have sufficiently low dioxin emissions. Another key question is whether the proposer is willing to guarantee such low emissions.

At this time there are no data available that can confirm with certainty that an RDF facility can match the performance of the Marion facility. However, there is one operating plant, and several under construction or ready to start soon, that promise emissions control performance similar to Marion County.

The Maine Energy Recovery Company (MERC) facility in Biddeford, Maine has been in operation since April, 1987. It is the first RDF plant in this country with a scrubber/baghouse of the type that would be used by Combustion Engineering for the Metro project. This plant will be tested in the next few months. The CE plant in Hartford, Connecticut is now in start-up, and will be tested within the next few months. CE's Hartford facility has a scrubber/baghouse as well.

Schnitzer/Ogden has supplied us with data showing that in recent tests of the Lawrence-Haverhill RDF plant, now operated by Schnitzer/Ogden Martin, reported PCDD+PCDF levels of 5,300 nanograms per cubic meter. Floyd Hasselriis, P.E. of our firm, is familiar with the Lawrence boiler. The boiler was underdesigned and has been retrofitted in an effort to compensate. Without further information, it is not appropriate to make comparisons with the proposed CE facility.

At this point we must rely on limited data from tests of RDF and mass burn plants of older vintages. These data tell an interesting story, which I would like to present to you in order to obtain a fair perspective.

Table I lists a number of RDF and mass burn plants that have been tested for dioxin emissions, and that also reported carbon monoxide emissions. They are listed in the order of date of start-up and/or testing. Also noted is the type of emission control: the older plants have electrostatic precipitators (ESP), and the newer ones have scrubber/baghouses. This is the same data GBB submitted to Metro previously in April and July, 1987.

TABLE I

TEST DATA FOR PCDD AND PCDF AND CARBON MONOXIDE
(ASSEMBLED FROM EPA DATABASE)

FACILITY	SIZE TPD	FUEL	CONTROL EQUIPMENT [a]	CO (ppm) [b]	PCDD + PCDF	TEF (ng/dscm) [c]	APPROXIMATE DATE OF START-UP
Marion County, Oregon	500	MSW	SD/BH	18	2	0.015	1986
Quebec City, Canada	205 [d]	MSW	SD/BH	(200)	1	0.01	1969
Wurzburg, West Germany	660	MSW	SD/BH	35	50	0.4	1984
Tulsa, Oklahoma	n.a.	MSW	SD/BH	(32)	53	0.7	1986
Linkoping, Sweden	400	RDF	SD/BH	(100)	--	0.7	1984
Prince Edward Island, Canada	100	MSW	NONE	40	143	1.4	1984
Peekskill, New York	2250	MSW	ESP	22	74	1.4	1984
Chicago Northwest, Illinois	330	MSW	ESP	70	280 [e]	5.2	1969
Albany, New York	250	RDF	ESP	195	223	5.6	1980
Niagara County, New York	2400	RDF	ESP	n.a.	1546	19.5	1980
Philadelphia, Pennsylvania	750	MSW	ESP	205	3600	59	1960
Hampton, Virginia	100	MSW	ESP	(2300)	9844	106	1970
Hamilton, Canada	250	RDF	ESP	700	8820	112	1970
Quebec City, Canada	200	MSW	ESP	(200)	1500	NR [f]	1969

[a]: SD/BH = Spray Dryer Scrubber/Baghouse; ESP = Electrostatic Precipitator

[b]: Values in parentheses are maximum values for the test period. All other values shown are averages for the test period.

[c]: TEF are 2,3,7,8 toxic equivalents by the EPA method.

[d]: The tests at Quebec City were performed on a small part of the flue gas in a pilot scale dry scrubber.

[e]: Penta dioxins and furans were not measured. Approximate values were used.

[f]: Not reported.

In examining this table, we see the following:

- The emissions of older mass burn and RDF plants are similar
- The emissions of intermediate mass burn and RDF plants with ESPs are also similar
- The emissions from newer plants with ESPs are lower
- The emissions from newer plants with scrubber/baghouses are still lower
- The differences that are likely to exist between the emissions of a modern RDF plant and a modern mass burn plant are also insignificant

What we see is a chronological improvement in the performance of both types of plants, because of improved combustion and improved emission controls.

From about 1969 to the present, we have seen the results of extensive investigation, research, and demonstration. Emissions which were once about 10,000 nanograms per cubic meter from the first mass burn and RDF plants have been reduced to about 1,000 in the first stage of improvement, to about 100 to 300 in the next stage, and finally to about 50 in plants with electrostatic precipitators.

With improved emissions controls, specifically with scrubber/baghouses, practically all of the dioxins and furans are removed and collected on the particulate matter.

In recent tests of the 1969 Quebec facility, stack gases having a dioxin plus furan level of 1,500 were passed through a pilot scrubber and came out at less than 2 nanograms per cubic meter.

Recent tests of the 1986 Marion County facility showed that the gases leaving the scrubber/baghouse contained between two and five nanograms per cubic meter of dioxins plus furans, compared with 53 nanograms at the Tulsa facility with the same Martin incinerator using electrostatic precipitators.

This means that even if the combustion is relatively poor, the dioxins will not be emitted. They will be attached to the collected fly ash. Relying solely on air pollution control equipment to capture dioxins could lead to high concentrations in the ash, which is why proper combustion design and operations are necessary and are included by all proposers. The amount of dioxins collected in the fly ash will vary with the efficiency of combustion, but with efficient combustion would not approach the levels EPA calls a matter of concern in soil. In any case, we recommend that total state-of-the-art environmental management of ash residues be required. This would include disposal in an ash monofill, with approved liners, leachate collection and treatment, and groundwater monitoring.

Figure 1 shows the performance of a plant with poor combustion, as indicated by CO levels around 160 parts per million, equipped with a modern scrubber/baghouse:

The graph shows data points from tests of the Quebec incinerator, before it was retrofitted, with emissions of 1,500 nanograms, and corresponding emissions that are dependent on the stack temperature. As the stack temperatures are reduced to 140°C (284°F) or to 100°C (212°F), PCDD plus PCDF were reduced to about 2 nanograms. The whole 1,500 nanograms were absorbed by the fly ash.

Figures 2 and 3 present data from more modern plants with good combustion, as indicated by lower CO emissions:

The Tulsa and the Marion County facilities, both having Schnitzer/Ogden technology, can be compared. Tulsa has an ESP, and Marion has a scrubber/baghouse. The

QUEBEC MASS BURN FACILITY
Effect of Temperature on Dioxin + Furan Emissions

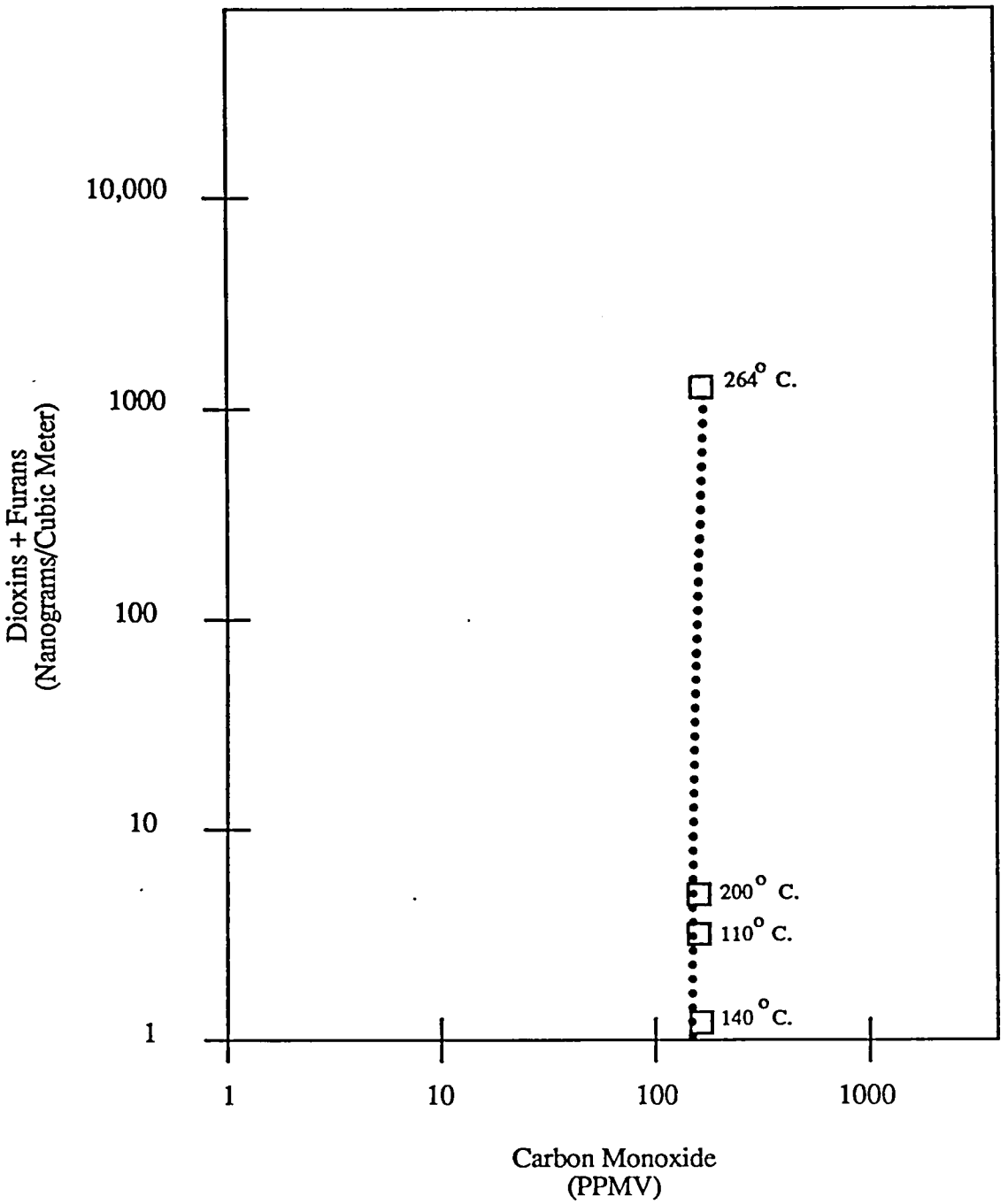

Figure 1

MASS BURN
Dioxins + Furans vs. Carbon Monoxide

Data from Tests of Various Plants

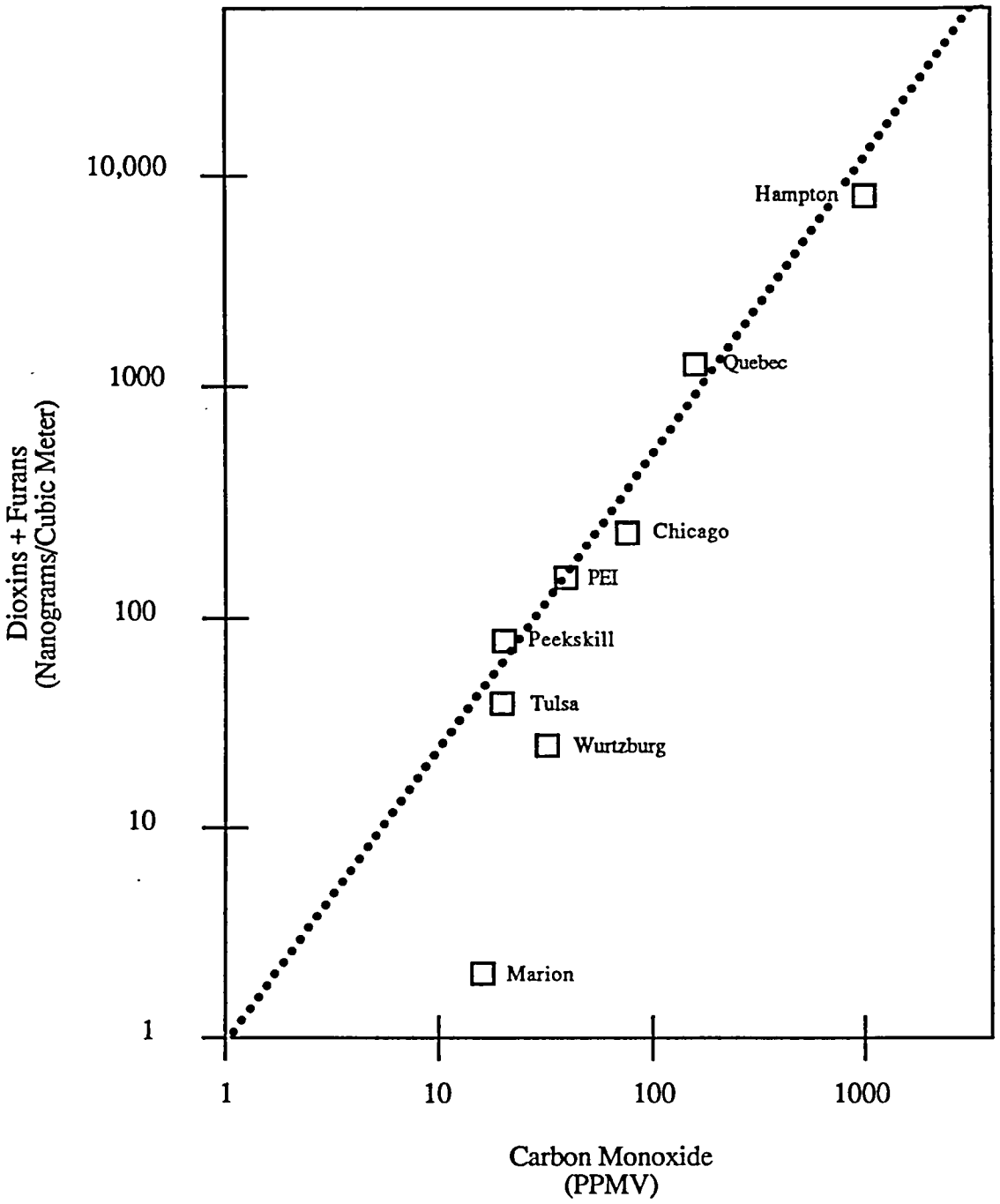

Figure 2

REFUSE DERIVED FUEL (RDF)
Dioxins + Furans vs. Carbon Monoxide

Data from Tests of Various Plants

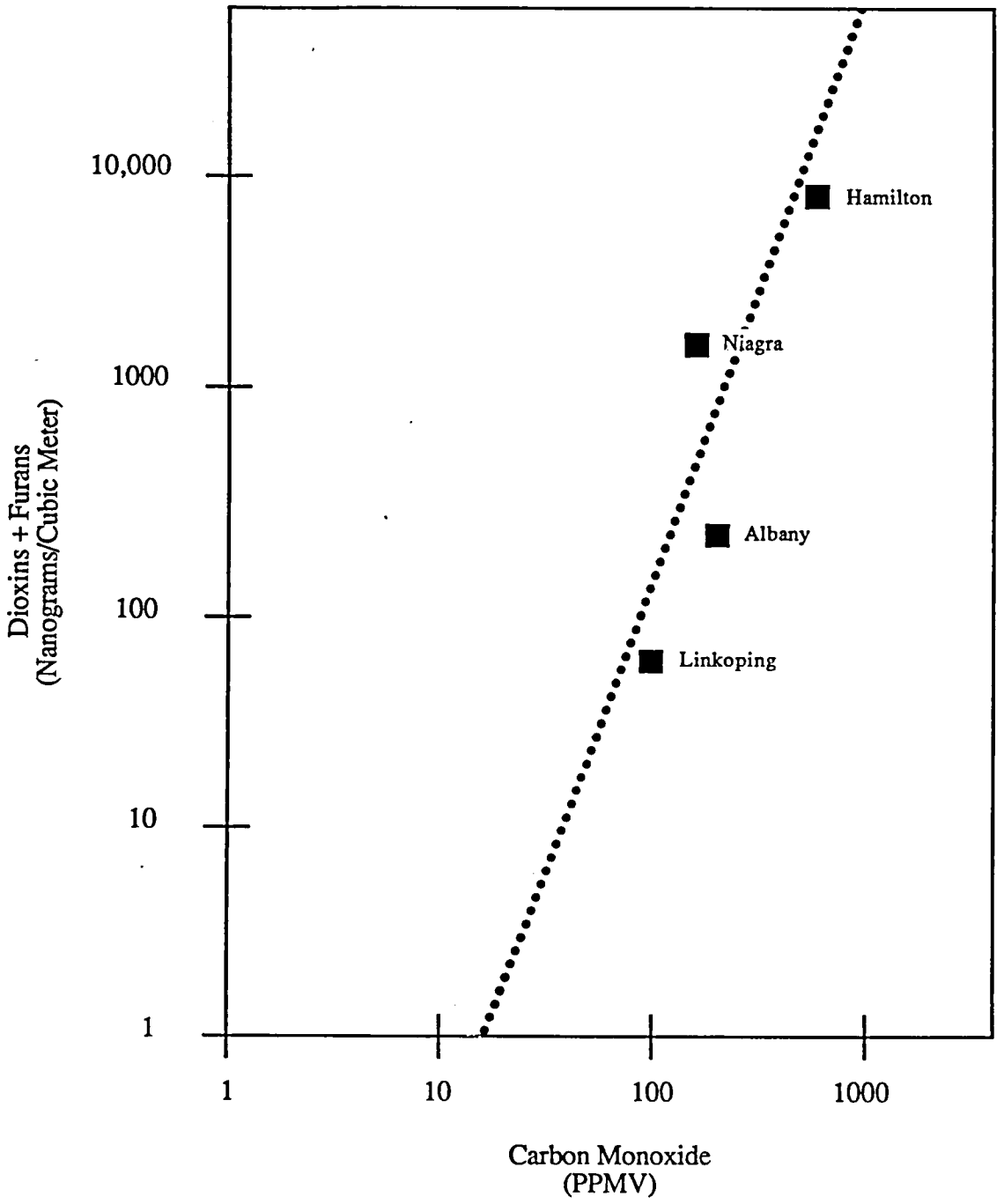

Figure 3

difference between emissions from these two plants may be assumed to be primarily the result of the emission controls, that were measured at 50 in Tulsa as compared to 2 nanograms per cubic meter in Marion County. The removed dioxins are on the fly ash and are 50 times less than those of the Quebec mass burn and Niagara RDF plants, and 4 times less than the Chicago and Albany plants.

Before we go further, we should also obtain a perspective on the health risk estimates that have been made in various environmental impact statements (EIS). The first major EIS was made for New York City, evaluating health risks for the facility planned for the Brooklyn Navy Yard. The emissions estimates for this EIS were based on tests of the Chicago facility, a Martin plant. The Toxic Equivalent of the calculated emissions from this plant is about five nanograms per cubic meter 2,3,7,8 TCDD equivalent. When referred to ground level concentrations, these emissions were calculated to represent a risk of one to five additional cancer cases per million people. This is the level below which such low effects could not possibly be detected, and is also generally considered as the level below which there is no significant health concern.

Now let us consider how much the risk is from modern plants. The levels which can be anticipated from all the proposers is less than five nanograms PCDD+PCDF, corresponding to less than one additional cancer case in ten million people. For comparison, a recent National Academy of Sciences report cited in the May 21, 1987 issue of the New York Times that a number of common foods have an estimated cancer risk of more than 5 additional cases per 10,000 people, or 500 per million. The cause of this risk is residual pesticides on or in these foods which include tomatoes, beef, and potatoes. GBB believes that emissions from modern properly designed, built and operated plants are acceptable from a health risk perspective especially when compared to other risks we face in our daily lives.

FACILITY SITE

Fluor/SEI claims that Metro changed the terms of the procurement process by allowing CE and Schnitzer/Ogden to supplement their proposals with information regarding the St. Helens site. Fluor/SEI's complaint misses the mark.

The RFP process, which is a form of procurement allowed by Oregon law, was adopted by the Metro Council, sitting as its own contract review board, after finding that the RFP process would not encourage favoritism and would encourage competitiveness. If we have seen anything during the limited negotiation process, we have seen an unbelievable amount of competitiveness. What has resulted from this competitiveness is the significant lowering of the tip fee.

Any procurement, including an RFP process, is done for one reason and that is to secure a service that is in the best interests of the community. The RFP document contains the following statements:

> "The proposer will be selected in the best interest of Metro." Section 7.1.
>
> "It must be expressly understood, however, that Metro reserves the right to select the Proposer, notwithstanding any evaluation criteria procedure, who in the best judgment of Metro is most likely to succeed in developing the Project desired by Metro." Section 1.5.1 (emphasis added).

Fluor/SEI was given significant credit during the evaluation process for the St. Helens site. The Metro Council, in its role of deciding what is best for the citizens of Portland, determined that siting the facility in St. Helens would be most appropriate,

regardless of which proposer built the facility. The Council also decided to conduct limited negotiations to encourage more competitiveness. Each proposer had the ability to sharpen its proposal to improve its ranking. Again, the RFP document stated that

> "Metro may <u>at any time</u> undertake simultaneous negotiations of an MOU for the final agreement with more than one Proposer." Section 1.5.3 (emphasis added).

EXPLOSIONS

Explosions experienced in RDF plants have forced designers and operators to modify plant and machinery design and to institute safety devices and operating procedures.

High-energy shredders are replaced by flail shredders to reduce likelihood of ignition and explosion; suppressants are used to stop a deflagration before it becomes an explosion; shredders are surrounded by concrete and steel walls; and sniffers are used to detect the solvents that are the usual cause of explosions. Most importantly, vents are provided to prevent pressure buildup, and to allow the force of any explosions that still occur to be dissipated harmlessly in the outside air.

The explosions are usually caused by cans of gasoline or similar solvents. They are minor and can easily be properly vented. The American Society for Testing and Materials (ASTM) has written a safety standard to promote industry-wide safety practices. It would be appropriate during negotiations for Metro to explore making these standards contractually binding on CE for this plant.

With present technology, no serious damage is done to machinery or the plant, and people are fully protected by restricted access to higher risk areas.

With the appropriate precautions, which have been outlined, the longest delay in returning to operation may be about one day to get suppressant bottles refilled.

HIERARCHY

In the hierarchical analysis, Fluor/SEI argues that the Shaneway system is superior to Combustion Engineering's proposal to remove preincinerated aluminum. However, the value of aluminum is close to $800 per ton or 40¢ per pound. Shaneway's letter of January 26, 1987 proposes a price of 1.5¢ per pound of recovered nonferrous metal from the post-incinerated ash. GBB believes that the implication of the price offered is indicative of very little recoverable and poor quality aluminum in the ash. In addition the Fluor/SEI proposal "guarantee" of the recovery of metals relies upon the guarantees of Shaneway, Inc., a private company whose financial resources cannot be ascertained. Fluor/SEI takes exception to assuming any liability with respect to the recovered materials user and therefore Metro would be relying on Shaneway, Inc. for this guarantee. For these reasons, Fluor/SEI was given minimal credit for aluminum recovery in this hierarchial analysis.

The cost of the steam line that Fluor/SEI has included in its capital costs to be prepared for sale of steam to Boise-Cascade is about 42¢ per ton and Fluor/SEI does have a point in that it is unfairly penalized. After this adjustment, the Fluor/SEI tip fee is $1.85/ton more than CE's (on average deflated costs in 1987 dollars basis). Nonetheless, this would not change the basic conclusion of the September 10, 1987 report from the Resource Recovery Evaluation Team to the Executive Officer.

TIP FEES

Fluor/SEI's proposition that there are several corrections required to reflect properly the proposals of all proposers is not correct except for the point mentioned earlier on the steam line. We have addressed Fluor/SEI's credit rating issue earlier and have found that it is without merit. We have addressed the Return on Equity issue for Combustion Engineering and that is covered in the discussion of the guaranteed lease rental factor. The adjustment that Fluor/SEI would impose on the Schnitzer/Ogden proposal is not correct in that the $3,500,000 to which Fluor/SEI refers is for Metro costs and is not a contractor cost. The Recovered Metals and Residue Haul and Disposal Cost adjustment to Fluor/SEI's tipping fees were addressed relative to the Shaneway system.

CONCLUSION

Our previous review of financial strength, equity, environmental factors, negotiating flexibility and low cost (after adjustment for the Fluor/SEI steam line cost) are correct. Our recommendation to proceed with CE in MOU negotiations still stands.

Our job as advisors is to analyze the pros and cons of various options and to recommend a sound course of action. The Metro Council is the policy-making body. This important decision is yours to make. My colleagues and I are also prepared to answer any questions you may have for us. We stand ready to assist you in pursuing the course of action that you determine to be most appropriate.

This concludes my remarks.

Item 7
9/22/87

COMBUSTION ENGINEERING

PRESENTATION
OF
COMBUSTION ENGINEERING
BEFORE METRO COUNCIL

September 22, 1987

During the September 15, 1987 meeting of your Council's Solid Waste Committee, I presented Combustion Engineering's response to the recommendation of your Executive Officer that Metro commence MOU negotiations with Combustion Engineering for a refuse derived fuel waste-to-energy facility.

We were, of course, very pleased with the recommendation, and I pointed out the numerous significant positive evaluation points the staff and consultants found regarding C-E's bid. These included the lowest tip fee, best corporate credit rating, most equity and best method of equity contribution, willingness to share windfall federal tax benefits, and best business/performance guarantees including a guaranteed aluminum recovery and highest kilowatt energy generation per ton of refuse. We were particularly pleased that Metro staff and consultants found C-E, "by a significant margin," the proposer most willing to negotiate unresolved issues.

During the course of the meeting, other aspects of the findings by Metro's staff and consultants were discussed, including the concurrence by your consultants in our detailed engineering/statistical analysis which demonstrated that our one-line system would produce an acceptable level of reliability, measured on a tons processed per year basis, and the fact that our proposal was the most consistent with Metro's solid waste disposal hierarchy. In addition, we have committed to build an additional line if any portion of the plant significantly misses its guarantees.

As you know, at the conclusion of the meeting last week, the Solid Waste Committee voted to accept the recommendation of the Executive Officer, with an additional recommendation that an independent advisory body composed of Oregon-based environmental experts be convened to advise the Council on environmental matters relating to the waste to energy proposal.

We urge a positive vote on the recommendations of the Executive Officer and Solid Waste Committee.

I would like, now, to address our response to certain statements made by one of our competitors on the 15th, because we believe they may be repeated tonight. Those statements dealt with dioxin emissions. An assertion was made that dioxin emissions were the most important consideration before your Council in considering the various proposals and that refuse derived fuel facilities inherently produce more dioxins than mass burn plants.

At the outset, we believe it needs restating that your consideration of the recommendations of your Executive Officer and Solid Waste Committee are governed by procurement documents already in place, as well as the rules, regulations and common practices in such a procurement. All relevant factors, involving the economic, environmental and technical aspects of a waste-to-energy facility, have to be considered. There is no one factor that becomes primary over all others.

Obviously, any health risk posed by such a facility must be given serious consideration. At the same time, data about this concern should be presented fully and fairly so as to inform the public, not confuse. The public trust requires careful discussion of this sensitive issue, not inflammatory charges that under review prove to be based on an attempt to seek a competitive advantage rather than on a full presentation of the facts and complete understanding of available information.

We have made an analysis of the current practice and theory on dioxin control worldwide. We have compared "apples to apples," showing the expected results when emission control from <u>current</u> RDF and mass burn technologies are set side by side. This comparison demonstrates dioxin measurements will be very similar. As a provider of both technologies, we are prepared to meet all environmental requirements in each case. Let me share some of the detail of our analysis.

Both the EPA and Environment Canada have reported this year that trace metals/organic compound emissions from waste to energy facilities can effectively be controlled by highly efficient particulate control devices (precipitators or baghouses), plus a combination of alkaline scrubbing (dry scrubbers) and use of good engineering combustion practices.

The use of a spray dryer scrubbing system upstream of the particulate control device serves to promote condensation and subsequent absorption of trace metals and organic (dioxin) compounds onto fine particulate matter. Available industry stack emissions test data have demonstrated up to 99% control for most trace metals when a scrubber is used upstream of the particulate control device.

Test data also have shown that scrubbing results in removal of over 99% of dioxins from incinerator emissions (EPA, Waste to Energy Report, March, 1987 and EPA Assessment of MWC, July, 1987). These findings indicate that good combustion systems design and associated operating conditions along with efficient post-combustion pollution controls, play a significant role in minimizing organic (dioxin) and trace metal emissions. It has also been identified that RDF facilities inherently combust refuse more cleanly than do mass burn facilities. It is important to note that in the Gallatin, Tennessee tests, provided to the Metro staff, emissions in unabated flue gas were reduced from 30% to 75% on the ten pollutants identified when noncombustibles were removed from the waste.

Regardless, however, of the type of combustion method (i.e., mass burn or RDF) the level of dioxins emissions is primarily a function of the combustion practices and control technology utilized. In the case of combustion practices, most regulations of dioxins in the past have focused on specifying an 1800 degree boiler temperature with at least one second residence time. This time and temperature has been found to be extremely effective at destroying dioxins.

In the information presented by one of the other bidders in our September 15th session with the Solid Waste Committee, they compared dioxin emissions data from one of their facilities utilizing both a scrubber and fabric filter with the Albany, New York RDF facility. The Albany facility was equipped with only an ESP (electrostatic precipitator). The analysis attached to my remarks prepared with the assistance of Dr. Alvin J. Greenburg, President, Risk Science Associates, demonstrates that if the Albany RDF facility had been equipped with a baghouse and scrubber of comparable efficiency (i.e., 96.2%), the dioxin toxic equivalence emitted from both facilities would be similar. Similarly, the Haverhill, Mass. RDF plant built by Babcock & Wilcox, which was also cited by the other bidder last week, did not have the baghouse and scrubber equipment proposed for the Portland region.

The attached technical data supports this analysis. Let me further summarize the data:

Because there are many kinds of dioxins and furans, and because they are not equally toxic, all regulatory agencies have developed the concept of toxic equivalents. So, it's not the totallity of dioxin emissions that is the final number of concern, it is, "...what are the toxic equivalents of the dioxin emissions?" As Dr. Greenberg's analysis shows, by using the same toxic equivalents and by assuming the same air pollution control equipment efficiencies, the dioxin toxic equivalents emitted by the Albany, New York RDF facility are about the same as the Marion County facility.

In the end, the simple fact is that any successful vendor has to comply with the environmental permitting requirements imposed by the State of Oregon and the federal Environmental Protection Agency with regard to all pollutants emitted by a waste to energy plant. At the hearing on the 15th, a representative from the Oregon DEQ testified that the determination of Best Available Control Technology was a constantly evolving process -- that as each plant was permitted and operating practices refined, the permitting requirements changed accordingly. Your Council can thus rest assured that by requiring the successful vendor to obtain all required permits, you are providing to the citizens of this region, the best available control technology for all pollutants, not just one that a competitor asserts is the most important.

Let me put the matter of the health risks of resource recovery in perspective. In a document released June 30th of this year, the federal EPA found, that with appropriate emission controls on all plants, including good combustion practices, the total, nationwide potential for annual additional cancers was 0.3 to 1.0 -- and this contemplates emissions from 210 plants! Clearly, waste-to-energy does not present any significant health risks, and it's time to put this issue in its proper perspective and get on with the MOU negotiations.

I want you to know that we have pledged to the people in Columbia County that we will work with them -- and you -- to put together a first class community education program, to bring the facts about waste-to-energy to all of the citizens of St. Helens and Columbia County. We also pledge to work with the outside consulting group to provide it with whatever information it needs in order to furnish Metro the guidance it seeks. We have significant experience in putting together community education programs, and we intend to bring all of our expertise to Columbia County.

In conclusion, we urge you to proceed by approving the recommendations of the Executive Officer and the Solid Waste Committee, and get on with the negotiations with the Company that has brought you the lowest tip fee, the highest credit rating, the best guarantees, and the greatest willingness to negotiate a deal.

Thank you very much.

Michael E. Bray, Vice President
Business Development

Technical Analysis:

Not all dioxins and dibenzofurans are created equal. Some isomers are thousands to millions of times less toxic than others. That is why the U.S. EPA, Sweden, New York State and California all developed toxic equivalency factors for the different isomers. These toxic equivalent factors represent the public health risks of the various isomers of dioxins and furans all computed at an equivalent toxicity level. This places the various isomers on an equal health risk basis. Therefore, because waste-to-energy facilities emit varying amounts of each different isomer, a comparison of only the raw dioxins and furans data from different facilities — as was presented by the other bidder last week — is misleading.

The more appropriate comparison should be made using the number of toxic equivalents emitted. According to a report by Jeffrey Hahn of Ogden Projects in Emeryville, California (Dec. 19, 1986), the Marion County, OR mass burn facility emitted 1.55 ng (nano-grams) (1 ng = .000000001 grams) of total dioxins and furans per normalized cubic meter of flue gas at 12% CO_2 and this was equal to 0.11 ng toxic equivalents/Nm^3 at 12% CO_2. This facility is equipped with a dry scrubber and baghouse fabric filter.

According to the New York State Department of Environmental Conservation (Jan. 28, 1985), the Albany, NY RDF facility (testing conducted by Jeffrey Hahn) emitted 395 ng total dioxins and furans/Nm^3 at 12% CO_2. However, this raw data figure, 395 ng of total dioxins and furans converts to only approximately 4.0 ng toxic equivalents/Nm^3 when various isomers are placed on an equal health risk basis.

Furthermore, the Albany facility is equipped with only an ESP, with no dry scrubber or baghouse. According to a June, 1987 report by Jeffrey Hahn, the dioxin and furan removal efficiency of the scrubber/fabric filter system at the Marion County facility is 96.2%. Thus, it would be expected that if the Albany RDF facility were equipped with a scrubber and baghouse, a 96.2% reduction in dioxins and furans would occur. The toxic equivalents that would then be expected to be emitted would be 0.15 ng/Nm^3, only .04 ng/Nm^3 (4 parts per 100 billion) different from that emitted from the Marion County facility.

In conclusion, it should also be pointed out that the Albany facility is an old boiler not incorporating the current state-of-the-art combustion practices regarding retention time and temperature in the boiler. It could be expected that when this newest technology is employed on C-E's RDF facility and with a higher efficiency control device (i.e., 99%), dioxin emissions would be further reduced.

Item 7
9/22/87

FOR RELEASE: WEDNESDAY, JULY 1, 1987

Robin Woods (202) 382-4377

EPA TO REGULATE EMISSIONS FROM MUNICIPAL WASTE INCINERATORS

The U.S. Environmental Protection Agency today announced that it is requiring controls on air emissions from municipal waste incinerators in light of findings which show that available technologies can substantially reduce risks associated with such emissions.

The agency reported that existing facilities can emit dioxins and other organic chemicals, metals and acid gases, which, if left unregulated, could pose health and environmental risks, based on lifetime exposures. New, state-of-the-art facilities which follow certain performance procedures, such as providing optimal high-temperature combustion and using various kinds of pollution-control equipment, can substantially reduce these emissions.

J. Winston Porter, Assistant Administrator for Solid Waste and Emergency Response, said, "Municipal incinerators represent an important option for solving America's waste problems. EPA is now requiring controls that will assure the safe operation of this technology."

Don Clay, Deputy Assistant Administrator for Air and Radiation, said "EPA's conservative risk assessment shows that the potential health risks to the public are generally small, but of enough concern to justify regulation. The controls we are calling for today will substantially reduce the potential risks associated with such emissions."

The findings came in a report to Congress on municipal waste combustion and in an advance notice of proposed rulemaking for new facilities under the federal Clean Air Act. Last week, EPA issued guidance to its regional offices and to states to ensure that the best

control technologies are required in the permitting of new incinerators to control emissions. This guidance will have the immediate effect of ensuring that these technologies are used on new facilities even before the development of the upcoming regulations. All facilities must receive permits under the Clean Air Act.

Concurrent with proposal of regulations for new sources, the agency will propose guidelines to states for use in developing performance standards for all existing facilities, calling for the use of best available technologies. The state implementation of these guidelines is subject to EPA approval, and the agency can issue regulations for existing facilities in the event states fail to do so. In 1974 and 1986, EPA regulated dust (called particulate matter) from these facilities.

As a result of its findings that facility design and operation are major factors in the control of emissions, EPA has developed a set of "good combustion practices," which lead to complete combustion through high temperatures and good air distribution to minimize harmful emissions.

There are currently 111 municipal waste incinerators in the United States, with a capacity to incinerate 49,000 tons of solid (non-hazardous) waste per day. An estimated 210 facilities are known to be planned or under construction, which would add approximately 190,000-tons-per-day capacity by the year 2000. Incineration of municipal waste is an increasingly attractive waste-management option to local governments in the face of shrinking landfill availability, because it reduces the volume of the waste by 70 to 90 percent. Some incinerators also offer the ability to recover energy from the combustion process that can be used to offset the energy requirements of the facility or sold to local industries or utilities. These are often referred to as resource-recovery or waste-to-energy plants.

There are three types of municipal waste incinerators: 1) mass-burn, which burns unprocessed waste and is the most prevalent (68 percent of existing facilities); 2) modular, which also burns unprocessed waste but is generally smaller than the mass-burn facility; and 3) refuse-derived-fuel, which burns processed wastes, in some cases in conjunction with coal.

EPA is currently studying the characteristics of municipal-waste-incinerator ash produced in the combustion process. The results are expected to be available in the early fall.

EPA evaluated six organic chemical constituents in the emissions of municipal waste incinerators: dioxins, chlorobenzenes, chloriphenols, formaldehyde, polycyclic aromatic hydrocarbons, polychlorinated biphenyls (PCBs); and six metals: arsenic, beryllium, cadmium, chromium, lead and mercury. EPA also evaluated particulate (dust) emissions, sulfur dioxide, hydrogen chloride, carbon monoxide and nitrogen oxides.

Control technologies can remove a wide range of pollutants from the combustion gases. A combination of proper combustion conditions, an acid gas scrubber and a particulate-matter-collection device can reduce: dioxins and furans by greater than 99 percent; other organics by greater than 95 percent; hydrogen chloride by 90 percent; and metals by 97 to 99 percent.

In its health-risk analysis, the agency found that lifetime exposure to unregulated stack emissions could contribute potential long-term health effects. EPA believes that its estimated risk is higher than actual risk and that actual risk may be considerably lower. Using mathmatical models to project possible exposure to local populations, the agency found that most of the estimated long-term cancer risk is attributable to dioxins. Under reasonable worst-case assumptions, unregulated dioxins from existing facilities could potentially produce, on a national level, from three to 38 cancer cases a year through inhalation.

EPA believes additional controls could significantly reduce the risks from all pollutants, including dioxins, to 0.2 to 3.0 cancer cases a year for all existing facilities, and 0.3 to 1.0 cases for all new facilities.

Several carcinogenic (cancer-causing) metals, arsenic, beryllium, cadmium and chromium, are emitted in trace quantities. Under worst-case assumptions, without additional controls the overall national cancer risk associated with inhalation of these unregulated emissions is estimated to range up to 0.5 cases per year for existing sources and 0.4 cases for new facilities.

Other carcinogenic organic compounds, chlorobenzenes, chlorophenols, formaldehyde, polycyclic aromatic hydrocarbons and PCBs, are estimated to pose similar risks without additional controls, ranging from 0.05 to 0.7 cases a year for existing facilities and from 0.2 to 0.3 cases for new facilities.

Of the two non-carcinogenic substances studied, lead and mercury, neither is produced in levels that would exceed current ambient-air standards or guidelines.

EPA also is studying exposure through indirect sources such as absorption through the skin and from deposits on soil, water and food. Preliminary results indicate that exposures through indirect mechanisms may be comparable to exposures through direct inhalation for dioxins, PCBs, chlorobenzenes and mercury. Mercury may be further absorbed through food; lead through soil. Indirect exposure does not appear to be of concern for chromium, beryllium and formaldehyde.

At about one-half of the facilities, hydrogen chloride is produced in quantities which may lead to corrosion of ferrous metals.

The advance notice of proposed rulemaking will be published in the Federal Register within the next two weeks. The notice allows a 60-day public-comment period. The Federal Register can be found at most libraries. Copies of the "Report to Congress on Municipal Waste Combustion" and supporting documents will be available for purchase within the next week from the National Technical Information Service, Springfield, Va. 22161; (703) 487-4600. The Federal Register notice will provide additional required ordering information.

EXHIBIT A

STATEMENT OF SCHNITZER/OGDEN

Schnitzer and Ogden Martin would like to thank the Metro Council for this opportunity to comment on the latest recommendations that have been put before you. We'd like to make it clear to you that our comments are not the words of just another out-of-town bidder, but the concerns of a major Portland corporate citizen as well as the experience of the leading vendor in the resource recovery industry. We would not normally interject ourselves this way, but there are so many factual inaccuracies and omissions in this document that we believe we have a moral obligation to inform Metro and the citizens of the Portland metropolitan region and Columbia County as to the environmental and financial risks they would be taking on if they or you accept this recommendation.

First, let's consider the environmental issues. This recommendation would have you believe that CE and its RDF technology must be environmentally better for you. Nothing could be further from the truth. The real issue that has been completely skirted is dioxins--remember, those emissions that may cause cancer. This magic document, which gives all of three lines to the whole subject of the environment, doesn't even mention the word dioxin. We found out this morning that there is another report from GBB (which apparently forms the basis for the consultants' report) which purports to explain the

importance of NOx, and in that report, the word dioxin is mentioned just once. It talks about sulfur dioxide and hydrogen chloride and particulates and it compares RDF and mass burn plants with respect to NOx. While most of the statements in the GBB report are inexcusable pseudo-scientific hogwash, you ought to ask yourselves why there is no comparison between RDF and mass burn with respect to dioxin. I'll tell you why--because the comparison is frightening!

There are people here who would like you to believe that there is something truly unique about CE's RDF process; that an RDF plant designed by a competent engineering firm will do things that no other RDF plant will. Well let's talk real facts, not hypotheses and calculations.

In January of this year, we began construction of a mass burn plant in Haverhill, Massachusetts, to replace a 1300 TPD single boiler line RDF facility that is only two years old, was never able to achieve even 60 percent availability and was shut down by the state for excessive dioxin emissions. Was this a plant designed by some second rate engineers? Not at all! I'd like to hear Bob Zier say that Babcock & Wilcox is a second class power engineering firm and that Boeing is not a large engineering oriented company. The truth, ladies and gentlemen, as we, and the EPA and the state of Massachusetts and Marion County have discovered, is that RDF-fired boilers inherently, by their design, produce dioxins throughout the whole system. The Haverhill plant is comparable in almost

every respect to what CE has proposed, and it has clearly demonstrated that good combustion and high furnace temperatures in an RDF boiler have nothing to do with dioxin emissions. The Haverhill furnace while consistently giving excellent burnout and with good furnace control also consistently produced hundreds of times more dioxin than our Marion and Tulsa plants. This data is public information. Why hasn't it been mentioned here by GBB? Ask Bob Zier tonight why GBB focussed on the red herring of NOx and carefully ignored dioxins. The citizens of this region have a right to know, as do we.

The fact is that there is not an operating RDF facility in the U.S. that has ever tested within two orders of magnitude of Marion County for dioxins. That is more than 100 times the amount of dioxins. And don't be misled that scrubbers and baghouses reduce dioxin emissions. This is simply not true, they just put it in the ash instead of the air. The way to control dioxin is not to produce it. Will CE put a full corporate guarantee behind a 2-nanogram per cubic meter dioxin level? Ogden will!

The environmental report prepared by GBB is replete with half truths. Ten minutes isn't enough time to mention them all, but we'll sit down with you at your convenience to go through the other environmental issues that ought to be of concern to you.

The report before you makes the point that there is little to compare between the respective companies as to their

technologies and track records. We'd like to be able to give you hard data and facts from a CE plant, but no operating facility exists. GBB has come up with yet another report as to why a single waste processing line and a single boiler ought to be perfectly acceptable to you. Mind you, this report is based on hypothesis and speculation. There is not one iota of actual operating results in it. If your consultants believe that a single line system is superior to a dual train system, then why in the world did they specify a plant with <u>at least</u> two units in the RFP?

Again, let me remind you about Haverhill, a plant that was hailed by all just 24 months ago as an outstanding engineering achievement. While Haverhill has a single boiler, it has two waste processing lines. It does a very effective job of separating out the non-combustibles from the RDF. The residue is about 35 percent of the incoming waste--sound familiar? (By the way, we'd like to have GBB identify the device that screens out high nitrogen components from the RDF.)

Well, here's the kicker. Even with two processing lines, which you have to conclude would give you overall greater availability than a single line, the Haverhill plant has never achieved more than 60 percent annual availability, no matter how you measure it.

On to money issues: The recommendation says, CE's lump sum contribution of equity on completion of the plant rather than periodically during construction is "superior and

lowers the tip fee by approximately $2.91/ton." Now, stop and think about this for a minute. Let's assume that CE's approximately $25 million in equity goes in at the end of 30 months while the S/O equity of slightly more than $23 million goes in equally over a period of 32 months. A simple net present value analysis using an 8 1/2 percent discount rate (which is the going rate for tax-exempt money) demonstrates unequivocably that our equity is worth more to Metro than CE's. The statement in this report is a neat fabrication. The question that isn't asked and that you ought to be interested in having an answer to is "what happens if there's a major uncontrollable circumstance during construction?" The report does admit that CE's obligations on its equity are less than clear in the face of an uncontrollable. Why should you have to accept any risk with a supposedly superior equity offer?

As for state tax credits, you are asked to believe that an RDF facility will be eligible for more Oregon tax credits than a mass burn plant. We do not believe that to be true. You ought to know that state tax benefits are only usable by an Oregon taxpayer and that such a taxpayer must own the facility. We didn't see anything in the report mentioning that S/O is the only proposer that is an Oregon taxpayer and thus can use those benefits thereby having something to share with you. We have discussed the possibilities of a sale/leaseback candidly and openly with your consultants. If any of them believe that such a transaction can be structured

with an Oregon taxpayer so as to capture any Oregon state tax credits, let them stand up right now and say so. We would welcome an opportunity to respond. We've been down that road, unlike GBB. CE is being given credit for its willingness to give 100 percent of something that the consultants know, or should know, amounts to nothing.

The points we've raised tonight are only some of the issues that are fundamental to your making an informed decision. There are more in our written statement which will be provided to you tomorrow. We ask you to look carefully at what you're being told. Look carefully at the way the numbers have been presented. But even if you believe all the economic and financial projections, you can't escape the absolute bottom line. What you are being asked to do is to take a tip fee that's purportedly 10 percent lower, as a trade-off for getting half the equipment you asked for and a 100 fold increase in dioxin emissions.

Thank you.

EXHIBIT A

FLUOR DANIEL

FACSIMILE LEAD SHEET

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TODAYS DATE	NO. OF PAGES (including Lead Sheet)
9/15/87	PAGE 1 OF 13

FROM ORIGINATORS NAME	EXT.	MAIL CODE	ORG.	CONTRACT — W.O. #
Jack J. Cinque	2135	D6-1	722	605020

TRANSMIT TO

COMPANY	CITY — STATE — COUNTRY
Metro	Portland, OR
ADDRESS: 2000 SW First Ave.	FACSIMILE NUMBER: 503-241-7417
ATTENTION: JIM GARDNER	CONFIRMING TELEPHONE NUMBER

OPTIONAL

SPECIAL HANDLING INSTRUCTIONS

SUBJECT: Resource Recovery Project

TEXT

Attached is the Flour/SEI submission for the Solid Waste Committee meeting today.

APPROVED BY:
- ☐ CLIENT
- ☐ PROJECT OR DEPARTMENT MANAGER

PREPARED BY: Diana H.
EXT. 2396

TO BE COMPLETED BY OPERATOR

DATE	TIME IN	TIME SENT	OPR. INITIALS	☐ QUALITY NON-CONFORMANCE (Explanation Attached) ☐ ZERO DEFECTS

HOU 8698 REV. 12-86

FLUOR DANIEL

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September 15, 1987

Metropolitan Service District
2000 SW First Ave.
Portland, OR 97201-5398

Attention: Mr. Jim Gardner, Chairman
Solid Waste Committee

Dear Mr. Gardner:

Portland Resource Recovery Project

In evaluating the recommendations presented to Metro Council on September 10, 1987, Fluor/SEI earnestly request the Solid Waste Committee give full consideration to the following issues which are vital to the eventual success of your project.

FACILITY SITE

The RFP explicitly states each Proposer is solely responsible for finding and securing the Facility Site on which to build the Facility. Clearly Metro wished no involvement or responsibility for siting the Facility which is understandable in light of their previous experience at Oregon City. The Facility Site is as unique to each proposal as any other technical or commercial aspect of the proposals submitted competitively in response to the RFP.

By permitting other competitors to submit new bids for a facility located at the site proposed by Fluor/SEI Metro changed the terms of their procurement process. Did Council intend to do this, and if so is it proper?

Metro staff and their advisors cite the last sentence of section 2.4 on page 2-32 of the RFP as their authority for the action taken. We respectfully disagree. Section 2.4 must be read as a whole and in context of the entire RFP especially section 4.12.2 on page 4-33. These sections state the Proposer has the sole responsibility to identify and secure an ownership interest in the Facility Site and said interest is to be assigned/conveyed to Metro in connection with the issuance of the Bonds. There is no indication that Metro reserved any options with respect to the Facility Site.

Please refer to the attached copy of our August 25, 1987 letter to Metro for a more complete discussion of our position on this vital issue.

Finally, based on the available public record through August 21, 1987, no other bidder has fully complied with Section 2.4 for a Facility Site at St. Helens. Only Fluor/SEI have secured an ownership interest in the Facility Site which is an absolute requirement of the RFP.

RDF PROCESSING

After five months of intensive careful evaluation, Metro staff and their advisors, as well as the Citizens Review Committee, recommended elimination of the single processing line, single boiler, RDF plant proposed by Combustion Engineering as being technologically less reliable, and unresponsive to the terms of the RFP as well as Metro's needs. It is difficult to understand how, in a few short weeks, Metro staff and advisors can completely reverse their evaluation.

Last week Council heard a report that Metro staff had recently visited three RDF facilities, one of which was the Hartford, CT plant still under construction by C-E. We believe the Solid Waste Committee and Council should also consider the following information:

- According to the Resource Recovery Yearbook, of the 22 RDF plants constructed in the U.S. since 1967, 50% have been shut down due to explosions, fires, equipment problems and unfavorable economics (see attached table). Nine plants (41%) were closed permanently.

- Explosions in primary shredders are a well documented hazard recognized by C-E. Following are excerpts from a paper entitled "Economical and Reliable Disposal of Solid Waste by Combustion Engineering".

  - "The crushed waste is fed...into an isolated concrete room housing the primary shredder". "The room is designed with blow off panels to vent concussions from explosions and has sprinklers..."

  - "The flail type primary shredder has the best record of all designs available for minimizing impact of explosions".

  The article then describes effects of explosions and fires at the Madison, WI plant and the SWETS transfer station at San Francisco - both of which form the basis for the design offered by C-E to Metro.

- An extensive evaluation of RDF vs. mass-burn processing was conducted by the independent consulting firm Camp, Dresser, & McKee Inc. Copies of this report, which strongly support the selection of mass burn as the preferred technology by the Lancaster Area Refuse Authority, were transmitted to Metro and should be available to the Solid Waste Committee.

- Another independent consultant specifically studied the operating history of high speed shredders in 19 U.S. plants. His conclusions are:

  - Every facility investigated has had explosions.

  - With even the most skilled and careful operator, no operator can guarantee to eliminate explosions/fires, all they can do is give the owner an assurance that such incidents "will be taken care of".

  - Explosions in flair mills are not noticeably less frequent than in hammermills. The damage, however, seems to be less.

There appears to be no compelling argument for accepting a technology which introduces a potential hazard and then seeks credit for mitigating it. It is difficult to justify taking any risk when clear alternatives appear to exist.

Hierarchy/Materials Recovery

Great importance has been attached to recovery of aluminum. At Metro's request, C-E proposes to increase the Capital Cost (from $95,000,000) by $1,272,000 and to share any revenues 50/50 after recovery of the additional operating cost which was estimated - not guaranteed - to be $225,000/year. This would achieve a 30% recovery of aluminum which was evaluated to be equivalent to about 70¢/ton in Tip fee.

Fluor/SEI, using the Shaneway systen, has guaranteed 80% (not 70%) recovery of ferrous, aluminum, and all other metals, and this is included in our base proposal. Fluor/SEI have proposed that Metro receive 100% of all revenue from sale of recovered materials. Please note Fluor/SEI guaranteed recovery is 80% (estimated at 95%) compared to C-E's guarantee of 90% for ferrous and 30% for aluminum.

With respect to Metro's hierarchy, sale of recovered energy as steam is preferred over electricity production. Fluor/SEI's base proposal included all facilities and equipment necessary to extract, meter and transport 100,000 lb/hr of steam for sale to the adjacent Boise Cascade plant at St. Helens. (Note, gross steam production is 277,000 lb/hr at rated plant capacity.) The S/O proposal is, and remains, to produce electricity only. The original C-E proposal also produced electricity only. There is no indication the revised C-E proposal for either the RDF plant or mass burn plant at St. Helens of any provision for steam sales. (Net steam output is shown as "N/A" on C-E's revised Form P).

In our extensive negotiations last year to develop Boise-Cascade as a credible purchaser of steam, reliability of supply was the single most important consideration. Can a single train RDF plant requiring at least an annual shutdown with complete interruption of steam supply be acceptable to Boise-Cascade?

In summary, we do not believe the statement that, with respect to Metro's hierarchy, C-E, F/S and S/O are equivalent as to steam and electric production correctly represents the proposals received by Metro.

TIP FEE

Several corrections are required to properly reflect the proposals of all vendors. The major inaccuracies are outlined below.

- Financial guarantees/ratings: The recommendation treats C-E as "A", S/O as "BBB+", and F/S as "BBB". On June 10, 1987 F/S guaranteed in a written memo to Ms. D. G. Allmeyer that we would provide credit enhancement to enhance the bond ratings to "A" or would pay the difference in interest cost (up to 25 basis points). This was apparently not considered when calculating the debt service.

- Sharing federal tax benefits: C-E has indicated a willingness to negotiate a sharing of any "windfall" resulting from the sales of federal tax benefits. However, note that C-E's proposal explicitly states "...it is inappropriate as well as impossible to define windfall at this time." Obviously, a promise to negotiate something that cannot be defined is without value.

o Price - The report states that S/O reduced its Capital Cost from $105,401,000 to $102,901,000 ($3,500,000). It is our understanding that S/O eliminated $3,500,000 from development costs and that their Capital Cost remains at $105,401,000. A comparison of the Capital Costs including escalation should be as follows:

	C-E	S/O	F/S
Original Capital Cost	$95,000,000	$105,401,000	$98,392,000
Development Costs	-	3,500,000	-
PRICE CHANGES	-	(3,500,000)	-
SUBTOTAL	$95,000,000	$105,401,000	$98,392,000
Escalation to Jan. '88 (@ 6%)	1,425,000	3,162,000	-
	$96,425,000	$108,563,000	$98,392,000
Aluminum Recovery (incl. escal)	1,291,000	-	incl.
TOTAL	$97,716,000	108,563,000	$98,392,000
Original O&M Costs (Annual - 1986)			
Fixed Costs	7,979,300	5,012,000	$ 4,736,000
Pass Thru Costs	3,522,900	3,817,000	2,552,000
Maint. Fee & ROE	893,000	165,000	1,300,000
SUBTOTAL	12,395,200	8,994,000	8,588,000
PRICE CHANGES	(850,000)	-	-
SUBTOTAL	11,545,200	8,994,000	$ 8,588,000
Aluminum Operations (optional)	225,000*	-	incl.
TOTAL	$11,770,200	$8,994,000	$8,588,000
*Estimated (not fixed lump sum)			
Revenues to Metro (1991)			
Electricity	$ 3,749,000	$3,109,000	$3,308,000
Steam	-	-	incl. in elec.
Recovered Metals	73,000	-	199,000
	$ 3,822,000	3,109,000	3,507,000
NET ANNUAL COST (Cost less Revenues)	$7,948,200	$5,885,000	$5,081,000

It can be concluded from the above that C-E's single line RDF plant has about a $700,000 lower Capital Cost, and about a $2,900,000 greater yearly operations and maintenance cost when compared to Fluor/SEI.

o Recovered Materials/Revenue Sharing - The recommendation states F/S (Shaneway) guarantees incorrectly. We guaranteed recovery of 80% (not 70%) of all metals (not ferrous only). Note that we are guaranteeing all metals (ferrous, aluminum, and all others).

The financial comparisons made in the report (based on tip fee calculations) should be corrected as follows:

	TIP FEE $/TON		
	C-E	S/O	F/S
FROM SEPT. 10 MEMORANDUM			
Original Evaluation (w/o haul cost)	$47.76	$45.53	$43.62
After Negotiations	$39.58	$42.74	$42.92
Aluminum Recovery*	(.77)	-	incl.
TOTAL	$38.81	$42.74	$40.92
REQUIRED CORRECTIONS			
Credit Ratings	-	-	($0.90)
Price Adjustment**	-	$ 1.12	
Recovered Metals***	incl.	incl.	(0.40)
Residue Haul & Disposal***	-	-	(0.31)
ROE****	$ 2.55	-	-
TOTAL	$41.36	$44.33	$39.31
TOTAL COST (20 year tip fee in 1987 dollars)	$289,520,000	$307,020,000	$275,170,000

*Assumed that ($0.77) includes all capital and O&M costs as well as credits for revenues.

**See Capital Price Comparison above

***Difference is due to 80% guaranteed recovery of all metals (non ferrous and ferrous). Residue haul and disposal should be 19.7% to reflect 80% recovery of all metals.

****Apparently inadvertently left out of C.E. proforma. Note, this is not a fixed value and may increase to a value of 25% greater than stated.

FLUOR DANIEL

Mr. Jim Gardner
Metro

September 15, 1987
7

Fluor/SEI share with METRO the desire to provide the most cost effective resource recovery system to the community. We believe that when all the data is evaluated, the results will prove that the Fluor/SEI proposal is technically sound, cost effective, and provides the lowest tip fee.

Very truly yours,

Jack J. Cinque

Jack J. Cinque

JJC:dh
RR4/7

U.S. RDF PLANT HISTORY*

LOCATION	TYPE FACILITY	DESIGN CAPACITY (TPD)	STATUS (STARTUP) (SHUTDOWN)	REMARKS
Los Gatos, CA	RDF, Pelletized	400	Permanent Shutdown (1967) - (1970)	Unfavorable Economics
Pueblo, CO	RDF, Shred., Air Class.	300	Permanent Shutdown (1976) - (1976)	Unfavorable Economics, Equipment and Environmental Problems
Bridgeport, CT	RDF, Powdered	2400	Permanent Shutdown (9/79) - (9/80)	Equipment and Environmental Problems
Newcastle, DE	RDF, Shred., Air Class.	1000	Operational (3/84) -	---
Dade County, FL	RDF, Shred., Air Class.	1000	Permanent Shutdown (8/82) - (5/84)	Unfavorable Economics
Lakeland, FL	RDF, Shred., Co-fired w/coal	300	Operational (1983) -	Experienced Equipment Problems
Chicago, IL	RDF, Shred., Air Class.	1000	Temporary Shutdown (5/76) - (12/79)	Down for 48 months due to Equipment Problems and Unfavorable Economics
Ames, IA	RDF, Co-fired w/coal	200	Operational (9/75)	Experienced Shutdown for 7 months due to fire. Most recent explosion Aug. 1987. Plant currently down.
Cockeysville, MD	RDF, Co-fired w/coal	1200	Operational (3/76) -	Experienced Shutdown due to Explosion
East Bridgewater, MA	RDF, Powdered	600	Permanent Shutdown (10/73) - (1977)	Explosion, Fire, Unfavorable Economics
Haverhill and Lawrence, MA	RDF, Shred., Air Class.	1300	Operational (3/85) -	Experienced Equipment Problems

LOCATION	TYPE FACILITY	DESIGN CAPACITY (TPD)	STATUS (STARTUP) (SHUTDOWN)	REMARKS
Duluth, MI	RDF, Co-disposal w/sludge	400	Operational (3/81) -	Down for 36 months due to Explosion and Installation of New Equipment. Also, Unfavorable Economics
Albany, NY	RDF, Shred.	750	Operational (2/81) -	---
Niagara Falls, NY	RDF, Shred., Co-fired w/coal	2000	Operational (12/80) -	---
Rochester, NY	RDF, Shred., Air Class.	2000	Permanent Shutdown (9/79) - (7/94)	Unfavorable Economics
Westbury, NY	RDF, Wet Pulp	2000	Permanent Shutdown (8/78) - (3/80)	Equipment, Environmental and Political Problems
Columbus, OH	RDF, Shred., Co-fired w/coal	2000	Operational (6/83) -	Most recent shredder explosion Aug. 1987
Gahenna, OH	RDF, Compost	1000	Permanent Shutdown (11/81) - (7/84)	Equipment Problems Unfavorable Economics
Lane County, OR	RDF, Shred., Air Class.	500	Permanent Shutdown (4/87) - (12/81)	Explosion and Unfavorable Economics
Madison, WI	RDF, Shred., Co-fired w/coal	400	Operational (1/79) -	Experienced an Explosion
Milwaukee, WI	RDF, Shred., Air Class.	1600	Temporary Shutdown (5/77) - (6/82)	Down for 52 months due to Unfavorable Economics
Tacoma, WA	RDF, Shred., Air Class.	700	Operational (7/79) -	Unfavorable Economics

*Source of data from the 1986-1987 Resource Recovery Yearbook

SEP 1 1987

J.J.C.

FILE:

FLUOR DANIEL

ONE FLUOR DRIVE
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TELEPHONE: (713) 263-1000

August 25, 1987

Ms. Debbie Gorham Allmeyer
Project Manager
Metropolitan Service District
2000 S.W. First Avenue
Portland, Oregon 97201-5398

Metro Letter of 8/17/87

Dear Ms. Allmeyer:

We want to thank you for your letter of August 17 and would like to take this opportunity to discuss and clarify the major concern we have with respect to the procurement process. We have not taken issue with respect to Metro undertaking simultaneous negotiations with proposers based on their response to the RFP. (Section 1.5.3, page 1-8 of the RFP which you reference in your letter.) What does concern us deals with Metro inviting and allowing Fluor/SEI's competitors to modify or resubmit their proposals based on a St. Helens location.

We believe the basis for Metro's decision on vendor selection should be the full service proposals submitted competitively and clarified in response to Metro's original RFP dated October 8, 1986. Fluor/SEI would willingly enter into simultaneous MOU negotiations on that basis.

While Metro chose to retain certain options in the RFP, e.g. to proceed on public ownership basis (page 1-2), Metro did not retain the right to direct proposers to revise their proposals on a specific location or site, much less a location which was developed by one of the other proposers. Nowhere in the entire RFP or its amendments has Metro stated that it could request new proposals for other sites or locations. On the contrary, it is clearly the letter and spirit of the procurement documents that site development was a proposer responsibility. We believe proposals must be evaluated on the basis of the sites listed in each proposer's respective Form P. We feel deviation from this approach prior to vendor selection is not within the contemplation or process initiated by the RFP documents.

Our position in this regard is arrived at from a reading of the RFP document in general, as well as specific applicable provisions in the RFP such as:

Section 6.3.1.3 on pages 6-8 and 6-9 of the RFP, entitled: "FACILITY SITE PLAN" provides as follows:

> "The Facility will be located on a Facility Site secured by the Contractor. The Proposer has the sole responsibility to identify the prospective Facility Site in the Proposal; provide a detailed description of the specific parcel and surrounding area; describe the Facility Site geology and the results of any subsurface investigations; relevant soil profiles; hydrological data; foundation considerations; and any other pertinent data which the Proposer wishes to include..."

Section 7, page 7-1, entitled: "EVALUATION OF PROPOSALS" provides "The objective of this RFP process is to select a Proposer to negotiate final full service arrangements with Metro. Proposal will be judged using the evaluation criteria outlined in this section". One of these criteria listed is "g. Obtain public acceptability of technology used, cost, and location".

"Facility Site" on page 8 of the RFP "Definitions" is specified to be "the real property located in item C of Form P in Section 6.6 of this RFP upon which the Facility is to be constructed". Form P entitled: "FACILITY CONSTRUCTION AND PERFORMANCE INFORMATION" requires as Item "C" the identification of the Facility Site location.

There are numerous other RFP references which could be cited including:

Section 1.1 on page 1-1 and 1-2
Section 2.4 on page 2-24
Section 2.4 on page 2-32
Section 4.6.2 on page 4-14
Section 4.12.2 on page 4-33

"Facility" is defined on pages 7 and 8 to mean the resource recovery facility "to be designed and constructed on the Facility Site..." Every time the word "Facility" is used in the RFP, whether for evaluation or selection criteria or otherwise, Metro has defined it as being on the site listed in the respective vendors Form P. Fluor/SEI have consistently appreciated the importance of site selection in this procurement. Fluor/SEI proceeded in this procurement with the knowledge that substantial proposal costs would be incurred on the basis of the site proposed by Fluor/SEI.

We feel the established procurement process should not be compromised by changing to the point where proposers are re-proposing on a location identified and developed by a competing proposer. The fact that an alternate proposal was submitted involving a technology for which the proposer was not even "qualified" by Metro to bid, is indicative to the extent to which parties may be deviating from the intent of the original procurement process.

FLUOR DANIEL

August 25, 1987
3

Ms. Debbie Allmeyer
Metropolitan Service District
Portland, Oregon

Fluor/SEI respectfully request Metro proceed with its selection using the decision model initially developed and approved by Metro Council, with criteria, weighting and scoring being in accordance with the individual proposals as clarified, but not materially changed. The credits Fluor/SEI should receive for site permitability, lower property taxes, shorter permitting, no requirement to identify and purchase environmental offsets, substantial steam sales (hierarchy), host community support and so forth, must not be effectively taken away by giving all proposers the benefits of the same location.

We remain committed to Metro's project and are hopeful of being selected for negotiations to be a part of, and contribute to, a successful project.

Very truly yours,

SOUTHERN ELECTRIC INTERNATIONAL, INC.

by Therrell Murphy, Jr.

FLUOR DANIEL

by Jack J. Cinque

082/w1

EXHIBIT A

COLUMBIA COUNTY FARM BUREAU

the voice of organized agriculture

August 21, 1987

Commissioners Sykes, Dillard, & Petersen
Columbia County Courthouse
St. Helens, Oregon 97051

Dear Commissioners:

I am writing you this letter on behalf of the Columbia County Farm Bureau Board of Directors representing a membership in our county of over 200 members. It is our wish to stress to you our concern over the proposed Garbage burning plant in St. Helens.

First of all our main concern is that we feel our County should be responsible for our own garbage and not have to be dependent on the area of Metro to keep the plant running.

Second, the increased traffic congestion that will result because of influx of garbage to our area is another concern. Whether this be by barge or trucks it will cause extra road repair and also more traffic problems.

Third, the emissions of dioxide that will be in the air because of the plant, is a health and could cause animal and soil damage to our county for the generations now and in the future. We have to be concerned that we try to keep our natural resources intact for future generations. The plastics that will be in the burned garbage will definetly contribute to these hazards.

Fourth, when the garbage is burned the ash that is a by-product still has to be disposed of and where do you intend to send this to or are we going to have a special landfill for this? Is Metro going to be responsible for their share? Will the ash be more than Columbia Counties garbage alone?

Fifth, There are alternatives, let's pursue a recycling program and not continue to deplete our Natural Resources.

We would like a response from you as to how some of these problems will be handled. Thank you for your time.

Sincerely,

Dorothy Laica
Secretary-Treasurer

age in 1984 and 1985 and 52 who remained on the payroll. Nearly all worked at operating telephone companies although a few worked for AT&T. The two groups were among a larger group of employees whom the researchers had been tracking at regular intervals since the mid-1950s.

PERSONAL VALUES AND INTERESTS

The early retirees were a fun-loving group. These managers, Ms. Howard notes, rated higher on a scale known as [illegible] meaning they were more [illegible]

workers interviewed spoke positively about their careers and employer, separating the rancor they felt in their last few months at work. The lesson, she adds, is that "even managers stepping into a comfortable retirement need to feel appreciated."

As Trash Burning Spreads, Communities Face Fight Over Potential Health Effects

By Bill Paul
Staff Reporter of The Wall Street Journal

"I'm frightened," says Debbie Heywood of Bridgewater, N.J. "It's horrible."

"It" is a proposed trash incinerator that would stand just a few hundred feet from the Heywoods' home in Bridgewater, a prosperous suburb of New York City.

"We'll get the dioxins and the pollution," says Mrs. Heywood, whose seven-year-old son, Richard, attends elementary school near the proposed site. "Why don't they put (the incinerator) in a forest? Maybe the deer will die, but sooner Bambi than my son."

Having heard environmentalists' reports that garbage incinerators could endanger the health of those nearby, Mrs. Heywood has joined a citizens' group protesting the incinerator, even though local officials insist it is perfectly safe.

Countless communities across the country are similarly embroiled, as garbage problems escalate and harried municipal officials embrace trash burning as their best hope. Some 110 municipal incinerators are already operating, with another 210 under construction or planned for the next several years. Experts say that in another decade, most American cities will have built or planned for an incinerator.

Contradictory Claims

Contradictory claims by environmentalists and incinerator builders make it hard to know what to believe. Most of these experts "have an ax to grind," complains Sue Kelly of Bedford, N.Y., who recently organized a forum on garbage burning for her local garden club.

Still, both the environmentalists and incinerator builders agree on several points. Trash burning, they say, is a technology with real health risks. Still, it is preferable to other methods of trash disposal, and the health risks can be considerably lessened if proper procedures are followed.

Burning is less harmful, for example, than burying, says Frank McManus, publisher of the trade newsletter Resource Recovery Report. And yet 90% of the 400,000 tons of trash disposed of in the U.S. daily is buried. Even recycling, which some see as a panacea, has some health risks.

Less dangerous it may be, but federal officials are increasingly aware that burning must be done under strictly controlled conditions. Last month, the Environmental Protection Agency estimated that the existing incinerators together cause between three and 38 cancer cases a year through inhalation of highly toxic dioxin emissions. The EPA also found that other chemicals, metals and acid gases emitted by incinerators "pose health and environmental risks, based on lifetime exposures."

The EPA's proposed regulations, which focus on air-pollution controls, should significantly reduce those risks. But they aren't scheduled to take effect until 1991, by which time dozens of incinerators may have been built without the extra emission-control equipment, which can add 10% or more to the cost of a facility.

Moreover, retrofitting existing facilities will be at the discretion of the states. That's ironic, given that EPA acted only after three states (New York, Connecticut and Rhode Island) petitioned the agency to establish federal emission standards because they were worried about other states' lax standards.

> **SOME OF** those in the pro-incinerator camp say the problem isn't incinerators themselves, but people who run them.

"There are a few clunkers (incinerators) out there," says Anthony Licata, vice president, technology, for Dravo Corp.'s Dravo Energy Resources unit, which builds incinerators.

Some of those in the pro-incinerator camp say the problem isn't incinerators themselves, but the people who run them. Steven Jaasund, president of Jaasund Air-Tech Inc., a Mesa, Ariz.-based seller of air pollution-control equipment, says: "The (pollution-control) devices are getting very good. Unfortunately, (incinerator) operators don't maintain them properly."

Training is the weak link, says Mr. Jaasund. Operators "need a background in chemical engineering" to solve the typical problems that arise, he says.

In other countries, the training is often extensive. German incinerator operators devote six months' classroom study to combustion efficiency and dioxin formation and reduction, says Allen Hershkowitz. As solid-waste research director for the New York nonprofit group INFORM, Mr. Hershkowitz has studied garbage disposal in Europe and Japan. The German program, he says, which also includes two years of on-site training, is run by the German Boiler Manufacturers Association. By contrast, Mr. Hershkowitz says, the U.S. has no training institute, although the American Society of Mechanical Engineers is working to establish one.

Even if operators are trained and the latest pollution-control devices are used, an incinerator can still become a health risk if the garbage is burned improperly. The key is a fire that burns evenly at a high temperature; anything less creates excess dioxins, metal residues and other pollutants. Mr. Jaasund, the maker of pollution-control equipment, says operators must first homogenize and pulverize the garbage so that the waste can be fed into the boiler evenly. Unfortunately, he adds, at many incinerators, operators "just throw it all in."

When garbage is burnt, the ash residue roughly equals about 10% of the original volume. That ash must be buried in a landfill—a process that poses perhaps the most serious health risk related to incinerators.

"You don't want to mix ash and ordinary garbage," says Dravo's Mr. Licata, because toxic metals including lead can leach into the ground and air. Yet, says Mr. Licata, most incinerator ash is currently mixed with ordinary garbage, due to a scarcity of new landfills dedicated to ash.

'Magic Powder Dust'

Mr. Licata says Dravo has a large research project under way to find what he calls a "magic powder dust." The dust, which he describes as similar to concrete hardeners, would be mixed with the ash to immobilize the metals in it and prevent them from leaching. The Japanese frequently mix their ash with cement, says Mr. Licata, but Dravo hopes to have something less bulky out, perhaps before the end of this year.

Still, whatever the risk of garbage burning, "the alternative—landfill—is worse," says Mr. McManus, the publisher of Resource Recovery Report. Indeed, many older landfills weren't properly constructed to contain the toxic substances now leaching from decaying trash. In many states, water and air quality is threatened. New York City's Fresh Kills landfill on Staten Island, for one, dumps four million gallons of toxic liquid into nearby freshwater streams every day.

EXHIBIT A

ALTERNATIVES TO BURNING COMMITTEE

NEWSLETTER

SEPTEMBER 8, 1987

REPORT FROM GILLIAM COUNTY...Ted Stanwood, Co-chairman of ABC visited the 2000 acre landfill site proposed by Waste Management of Oregon. Located 7 miles south of Arlington, this landfill sits on top of 150 feet of natural clay liner, and is popular with the local residents. In two days of talking to the local residents, not one person spoke out against the proposal, and in fact it was considered a desperately needed economic boost to the community.

REPORT FROM SKAMANIA COUNTY,WA...Mike Sykes and Sandy Dillard, Columbia County Commissioners, together with members of ABC visited this recycling facility on August 17, 1987. This type of recycling plant is intended for smaller communities like Columbia County, and have the potential to reduce the volume of garbage going to a landfill by over 50%. Sykes stated that this type of facility "has merit, and is a step in the right direction". Maybe there's hope for them yet!

DIOXIN IN OUR FISH?...Recent EPA tests have discovered 2,3,7,8, TCDD, the most toxic form of DIOXIN in fish taken downstream from the paper mill at Wauna. The Boise Cascade mill at St Helens is also scheduled for testing. The Kraft Chemical bleach process is the suspected cause. The levels discovered are very minute, but there is no safe level for DIOXIN. Guess what? GARBAGE BURNERS are allowed to emit Dioxin by the EPA.

A GARBAGE BURNER for Columbia County? We say NO! They are allowed by law to pollute the air, they will cause massive rate increases in our garbage collection costs, and better methods DO exist. YOU CAN HELP! Call your County Commission, 397-4322, and tell them what you think! Get on our mailing list! We will try to keep you informed. Send your Name, Address, and Phone number along with a small donation (if you can afford it) to: David Fix, Treasurer, Alternatives to Burning Committee, 35266 Hazel Street, St Helens Or. 97051 Contact numbers are 397-6281, 397-3722, 397-4736,397-1001,397-5870

EXHIBIT A

ALTERNATIVES TO BURNING COMMITTEE

NEWSLETTER

The Metropolitan Service District in Portland proposes to build a garbage burner in St Helens that will burn 1130 tons per day of Metro's garbage. We think that is a very bad idea for us. Here's why!

The garbage burner currently in operation in Marion county, Oregon is allowed to polute the air. The EPA permit #24-5398 allows:

Nitrogen Oxides.....492 TONS PER YEAR
Sulfur Dioxide.....220 TONS PER YEAR
Carbon Monoxide.....170 TONS PER YEAR
Particles..... 61 TONS PER YEAR
Lead..... 1.6 TONS PER YEAR
Hydrogen Cloride..... 34 TONS PER YEAR

PLUS an additional tonnage of Mercury, Flourides, Organics, Beryllium, TCDD (DIOXIN) ....17+ TONS PER YEAR

WE SAY NO!!! THE GARBAGE BURNER BUILT HERE WILL BE TWICE AS BIG!!!

Our County Commission has committed us to this project. Did you get the right to vote?

The Metropolitan service district is currently negotiating the contracts for building this plant. Have you been informed?

We have been told that no other solution exists for Columbia County's garbage problem. Columbia County DOES NOT have a garbage problem. Ezra Cook, the OWNER of the Yamhill County landfill where we currently dispose of the largest portion of our garbage says space exists for the next 30 years, and there is no problem with renewing our contracts there.

The ash residue from these plants must be disposed of, and it may well be classified as hazardous waste. The state tax on hazardous waste is more than our current tipping fees, and no site exists for this material. Yet they plan on building the plant first and worrying about it later.

YOU CAN HELP!!! Call your County Commissioners, 397-4322 and let them know what you think. Get on our mailing list!!!

Send your name, address, and phone # along with a small donation, (If you can afford it) to David Fix, Treasurer, Alternatives to Burning Committee, 35266 Hazel Street, St Helens, Or 97051

Contact numbers are 397-6281, 397-3722, 397-4736, 397-1001, 397-5870, 397-2879

This background is necessary in order to discuss the difference in NOx emissions from RDF burning and mass burning.

Recent tests of the Marion County mass-burn facility have found NOx readings close to 300 ppmv, substantially in excess of the permit. These high readings may be because of high furnace temperatures or from the large amount of grass in the waste.

Tests of the Tulsa mass-burn plant, also a Martin design, also showed high levels of NOx emissions. It was noted that during the two days of testing, substantially higher NOx emissions were recorded on the day when a large amount of yard waste was burned.

The USEPA has published a data base on emissions from MWC facilities, which can be used to compare the emissions from various types of plants. The following table was abstracted from this source:

Facility Name	Nitrogen Oxide Emissions ppmv at 12% CO2	lb/ton Feed	
<u>Massburn Waterwall</u>			
Braintree	153	1.62	
Gallatin	140	2.20	
Kure	159	1.25	
Tulsa (Unit 1)	358	5.71	
Tulsa (Unit 2)	376	6.15	
Marion County	294	5.26	
Wurzburg	630	7.10	Avg. 6.06
<u>RDF-Fired</u>			
Hamilton	128	2.39	
Albany	263	4.91	
Niagara	210	3.91	Avg. 4.41

The first three older mass-burn waterwall plants showed much lower NOx emissions than the last four, which represent current technology and operation. There is a striking difference in their emissions. The average emissions of the recent mass-burn plants were 6.06 pounds per ton of feed.

The emissions from the RDF-fired plants were substantially lower. The Albany and Niagara plants, tested recently, are the most representative of current technology for which data

EXHIBIT A

NITROGEN OXIDES EMISSIONS

FROM RDF AND MASS BURN FACILITIES

by

Floyd Hasselriis, P.E.
Gershman, Brickner & Bratton, Inc.
Falls Church, Virginia, 22043

September 4, 1987

Nitrogen oxide (NOx) emissions are of concern in many areas where the atmosphere can remain static for days, allowing reactions to take place between ozone, hydrocarbons, and NOx, creating smog. Because of this problem, NOx emissions have been regulated to 150 parts per million by volume (ppmv) in many areas of California where mountains block air flow.

Waste-to-energy plants have in the past been able to meet this limit, but modern plants have been found to have higher NOx emissions, in some cases approaching 300 ppmv. Tests of all types of fuels have shown that as furnace temperatures are increased, NOx emissions increase. Modern plants are operated at higher furnace temperatures, hence higher NOx can be expected.

Actually, there are two causes of NOx emissions: nitrogen in the fuel and thermal NOx created by heating the nitrogen in the combustion air to high temperatures in excess of 2,000'F.

Fuel NOx are present in organic matter such as grass, and can be reduced by recycling of yard waste, and screening out high-nitrogen components of MSW while producing RDF.

The temperatures now required for combustion of MSW are high enough to significantly increase NOx emissions. NOx emissions can be reduced by not using excessive furnace temperatures, by staging combustion air, and by flue gas recirculation. There are also other methods, such as injecting ammonia into the furnace, and using catalysts after the boiler. The latter methods are expensive to use and have not been demonstrated in MSW combustion. The only plant now operating using ammonia treatment is the Commerce plant in the Los Angeles area, burning mainly commercial trash. This facility is reported to have met the California standard of 150 parts per million.

On this basis the comparison would be as follows:

Mass-burn	6.0 lb/ton	1.050 tons/year
New RDF	5.15 lb/ton	902 tons/year

In conclusion, it can be stated that the RDF facility can be anticipated to have 15 to 25% less NOx emissions that a mass-burn plant processing the same amount of MSW.

What about other emissions?

Considering that emissions of particulate matter, sulfur dioxide and hydrogen chloride are regulated by law, and the operators presumably would not guarantee to do any better, the emission concentrations from either a mass-burn or an RDF plant would be controlled to the same level.

Since the RDF plant would burn only 90% as much combustible matter as the mass-burn plant, the total emissions of all kinds would also be only 90% as great.

Since the sulfur and chlorine would be less, less lime would be needed to achieve the same outlet concentrations required by law, and lower emissions would be possible using the same amount of lime.

An RDF plant which refines the RDF by removing metals before combustion can be expected to emit less of these metals. The extent to which this is true has not yet been conclusively determined by test. Although tests of pre-separation of MSW at Galatin, TN showed reductions in emissions of about 20 to 30% for metals, these results are not generally accepted as conclusive. Since the particulate control device would remove most of the metals with the particulate matter in either case, the effect of pre-separation would only be significant to the extent that the concentration of metals on the particulate was reduced.

In conclusion, since the benefits of removing metals has not been documented conclusively, it would be conservative to say that the reduction in emissions of plants burning refined fluff-RDF should be at least 10%, and probably more, as compared with direct combustion of MSW.

were available. The average emissions of these plants were 4.41 pounds per ton of feed. Both of these plants produce coarse RDF, with only magnetic separation of ferrous metals. Hence there was no loss of combustible matter. For this reason they are comparable with the mass-burn plants burning unprocessed MSW.

The emissions of these two types of plants processing 350,000 tons per year can be compared as follows:

Mass-burn Waterwall:	6.06 lb/ton	1,060 tons/year
RDF-burning:	4.41 lb/ton	771 tons/year

The above comparison is based on actual, published test data. However, since the RDF plants had higher emissions of dioxins, indicating less than ideal furnace temperatures, it must be assumed that a modern state-of-the-art RDF furnace would operate at higher temperatures and thus create higher NOx emissions. For this reason the comparison may not be fair. It should also be noted that the RDF plants burned coarse RDF and do not represent the refined processing offered to Portland.

The RDF-burning facility proposed for Portland would process the MSW into a higher quality fluff. This plant would produce about 35% residue which would be disposed of in a landfill (if not composted). It is reasonable to assume that about 10% of the fuel value of the MSW is lost by refining the RDF in this way. Based on this assumption, the actual emissions of NOx from the proposed plant would be at least 10% less than a corresponding mass-burn plant.

In tests of the Albany plant (supervised by Floyd Hasselriis) it was found that processing RDF into a higher-quality fluff showed that removing these residues reduced the sulfur, chlorine and nitrogen by 20 to 30%. Other tests of pre-sorting of MSW have shown similar reductions (tests of Gallatin).

If processing reduced nitrogen in the RDF by 25%, then the total emissions due to fuel nitrogen would also be reduced by this amount. It is likely that fuel NOx represent about 100 ppmv, thermal NOx the remainder. Hence a 25% reduction in fuel NOx would represent a 25 ppm reduction in NOx emissions, or about 0.25 pounds per ton of MSW.

Assuming that a modern RDF furnace would produce 300 ppmv of NOx, corresponding to 6 lb/ton, the 10% reduction would result in 0.6 lb/ton of MSW. Adding the reduction in fuel NOx, the total reduction would be about 0.85 lb/ton compared with a mass-burn facility.

The processing plant equipment can be run for a longer period in order to compensate for a shutdown. The CE design assumes 12-hour operation, allowing at least another 4 hours of extended operation, hence 4-hour down time for minor repairs, and the rest of the night for major repairs. Storage of Municipal Solid Waste (MSW) on the tipping floor allows time for major repairs.

Considering the large amount of leeway in the RDF system, no loss of availability is anticipated by CE. Operating RDF plants provide the best basis for determining availability. Among the single-line systems operating today are Ames, Iowa; Madison, Wisconsin; and Cockeysville, Maryland. These plants operate on a one-shift basis because their processing capacity is sufficient.

RDF processing lines can handle from 30 to 100 tons per hour. Hence 12-hour operation can process 300 to 1,000 tons per day with a single line. For capacities exceeding 1,000 TPD it is necessary to have two lines. Examples are Akron, Niagara Falls and Haverhill.

The cost of two 50 percent boilers is much more than the cost of a single 100 percent boiler. This cost includes boiler drum heads and all control devices. The furnaces must be sized for volume. Because the stokers have to be the same length to burn out the waste, the boilers are made wider for larger units. Two 50 percent capacity boilers need 50 percent more waterwall surface plus casing in order to provide the same volume as a 100 percent unit.

Doubling the number of control components doubles the number of failures, because a probability for each item is the same. Availability is defined as operating time between

EXHIBIT A

COMMENTS ON AVAILABILITY OF ONE OR TWO TRAIN SYSTEMS

by

Floyd Hasselriis, P.E.
Gershman, Brickner & Bratton, Inc.
2735 Hartland Road
Falls Church, Virginia 22043

Combustion Engineering has proposed a single-train system for METRO and has stated that the availability of the proposed single-train system would be identical to that of a two-train system. As evidence, CE presents the results of a computer study that analyzed the mean time between failure (MTBF) and the mean time to repair of the alternate systems.

The calculations were made by a CE division, Statistical Engineering Services, which specializes in this type of analysis and offers these services to clients in addition to internal use. These analyses are routinely used in the utility industry and by industrial customers to study the benefits of redundancy as compared with cost.

The main benefit of a single-line system is cost. Two 50 percent capacity systems cost considerably more than a single 100 percent system, because many components are repeated.

Providing two 50 percent processing lines instead of one line costs almost twice what one line costs because most of the components, such as conveyors, shredders, and trommels must be made large enough for the largest components in the waste stream. Reducing the capacity of a shredder 50 percent changes the motor size but not the shredder size. The feed conveyors need to be the same size to accommodate the waste.

All considered, a single-line system has many advantages. It does, however, require a different approach to design, operation, and maintenance to compensate for the lack of spare units.

When two lines are used in RDF processing, and one is shut down, it is often not possible or desirable to do maintenance on the down line while the other one operates. Unless the lines are well isolated from each other, safety procedures may preclude maintenance of the down unit until the operating one is shut down.

failures (equivalent to MTBF) divided by total time, which is MTBF plus time to repair (MTTR).

CE's analysis shows that processing equipment only requires three hours to repair, but failures occur every 98 hours, or roughly four days total time or eight days at 12 hours. Obviously one down period per week can be tolerated.

The analysis states that boiler downtime produces an average 44-hour repair turn-around, almost two days. However failures are expected every 1,780 hours, or roughly once every two months.

During unscheduled down time, some scheduled maintenance can be done. Normally, scheduled down time of RDF boilers is every two months; unscheduled downtime can be reduced or may become scheduled downtime.

In summary, CE's contention that there is no difference in availability between two 50 percent and one 100 percent line is supported by sound theory and is plausible.

When a single-line system is in operation, the operators make an effort to have all necessary spare parts on hand, or know where they can get them on short notice. They also train themselves to execute quick repairs and turnarounds. With the whole plant down, the entire staff is available to carry out repairs.

By comparison, with two lines the same types of failure can occur in either unit, and because there are twice as many units, twice as many failures can occur. This means that either the normal crew has to carry out more repairs and may take more time, or more maintenance staff is needed.

EXHIBIT A

A Look at Trends in Resource Recovery

An up-to-date look at resource recovery trends includes information on plants that are operational, shut down, under construction or in the throes of conception.

While resource recovery has been around a while, it's difficult to get a sharp picture of a "typical" plant, going by statistics in the fact-packed 1984 Resource Recovery Yearbook.

Consider, for instance, materials recovery: half of the 128 plants in existence (87) or under construction (41) will recover some materials before burning, half will not. The same is true of the 124 plants now on drawing boards across the country: roughly one-half will not engage in materials recovery activities.

For another example, let's look at the type of process used by the plants:

- Mass-burn: 37% of the existing plants will use some form of this technology as will 61% of those in advanced planning stages and 54% of those on the drawing boards.
- Modular equipment: 34% of existing plants use this technology as will 17% of those under construction and 32% of those in the conceptual phase.
- RDF: 25% of the plants who began operation before 1985 were involved in RDF production. Of those currently being built, 23% will produce RDF; of those currently under discussion, 14% are conceived as being RDF-producers.

To help WASTE AGE readers get a better picture of the overall resource recovery scene, we present the following details and data—drawn from the Yearbook's executive summary section.

Operations

While operating efficiency of resource recovery plants seems to be on the increase, shutdowns are a plague on this industry.

Average operating efficiency of existing resource recovery plants is reported as 82%; this is measured by the ratio of actual daily throughput to plant design capacity.

Highest efficiency was found among modular mass-burning facilities (93%). Lowest was found among RDF plants (73%). For mass-burning waterwall incinerators, the figure was 76%.

Writers for Governmental Advisory Associates, the Yearbook's authors, note in their "conclusions" section that because of this reliability problem, governments must "incorporate back-up or contingency plans in any examination of resource recovery as a solid waste disposal option."

However, the authors also note that operating efficiency "appears to be increasing," with a reported jump from 70% in the 1983 Yearbook to 80% for this year's edition.

Unplanned plant shutdowns—those for reasons other than routine maintenance—have been reported by 52% of existing facilities. Highest incidence of these occurrences is in RDF plants (64%), with 47% of the mass-burning units and only 39% of modular units reporting unplanned outages.

Reasons for the shutdowns included: equipment problems (22%), equipment retrofitting (14%), explosions (14%), environmental problems (10%), unfavorable economics (9%), fires (8%) and legal problems (5%).

Ownership

Private sector firms are playing a significant role in resource recovery operations and ownership, and will play a bigger role in the future, according to Yearbook data.

Private firms own 42% and operate 64% of the 128 plants already in existence or currently under construction. Of the plants on the drawing boards for which an owner or operator has been designated, one-third (34%) will have a private concern as owner and 53% will have a private firm as operator.

Note that private firms will own 68% of the 41 plants currently under construction and operate 87% of these. The Yearbook's authors explain this trend as follows: "the planned facilities tend to be larger than existing plants and local governments are therefore turning to private sector capital and expertise."

Of those plants in existence or under construction, more than one-half used more than one source of capital funds. These sources included:

- private equity (about 25%);
- industrial development revenue bonds (17%),
- general obligation bonds (13%);

- special revenue bonds (11%) and
- federal and state grants (9%).

The Yearbook's authors report a trend away from government and government-backed funding in favor of private funding and industrial revenue bonds

Waste stream guarantees

One trend uncovered in this year's survey is that, of those resource recovery plants completed in the future, 46.3% will receive wastes from a geographical area of "several cities or towns," compared to only 29.9% of existing plants which receive waste on that semi-regional basis.

Guaranteeing waste flows—including flow control legislation—is becoming more prevalent. Because the authors did not discriminate in their survey between flow control, local ordinances or contractural agreements, the numbers here only indicate the growth in the waste guarantee trend.

Existing plants are more likely to produce steam while plants under construction are more likely to lean in the direction of electricity alone or steam and electricity.

Nearly all of the facilities currently under construction (92.5%) report having such guarantees in place, compared with only 57.5% of the existing plants. In addition, there is a direct correlation between size and flow measures; the larger a plant is, the more likely it is that it will have flow control (see Table One).

Costs

Table Two presents the adjusted capital costs by type of process for resource recovery plants currently in the conceptual stages.

Note that the 30% of mass-burning plants that will cost more than $101 million each will together average a capacity of 1,708 tons of

TABLE ONE

MSW Guarantees by Facility Size

Design capacity (tons per day)	No. of plants in size group	Percent with waste guarantee
0 to 200	52	53.8%
201-500	27	66.7%
501-1,000	17	82.4%
1,001 +	31	87.1%

TABLE TWO

Adjusted Capital Costs By Type of Process

(for plants in planning stages)

Adj. Cap. Cost 1983 Dollars	Type of Process: Mass-burn (except modular)	Mass-burn (modular)	RDF	Percent of Total
Below $10 million	10%	36.4%	—	16.9%
$12 to $50	47.5	63.6	44.4%	52.1
$51 to $100	12.5	—	—	7.0
$101 million plus	30.0	—	55.6	23.9
Total Facilities	(40)	(22)	(9)	(71)

TABLE THREE

Mean Tipping Fees by Region & Process Type

Process	Northeast	South	Northcentral	West	Avg.
Mass-burning except modular	$19.98 (13)	$18.40 (9)	$17.05 (5)	$11.30 (5)	$17.72 (32)
Modular mass-burning	$11.66 (8)	$8.53 (9)	$13.58 (3)	$12.50 (2)	$10.72 (22)
RDF (all)	$12.41 (8)	$13.32 (7)	$9.45 (4)	$11.80 (5)	$12.05 (24)
Total	$15.60	$13.42	$13.65	$11.71	$14.00

Note: *Numbers in parentheses indicate number of plants in each subgroup.*

Table Four

Plant Status	No. of Plants	Steam only	Electr. only	Steam & Electr.	Other
Existing	87	54%	12%	8%	26%
Under construction	41	24%	54%	22%	—
Conceptual	124	28.1%	34.8%	31.5%	5.6%

Note: *"Other" category includes RDF, gas, oil, etc.*

refuse per day.

The majority of planned RDF facilities will cost over $101 million and process an average of 1,960 tons per day.

Tipping fees

Average tipping fee charged in the entire sample of plants is $14.00 per ton, but certain plants were likely to exceed or be under that figure.

1. Tipping fees ranged from 50 cents per ton to $40.

2. Many modular facilities do not charge any tipping fee, mainly because they are often dedicated to a specific waste stream from an owner or user. As a result, tipping fees were reported by only 63.3% of the plants responding; 21.1% said they did not charge a fee, and another 15.6% did not respond.

3. Larger mass burning facilities charge a higher tipping fee, on average—$17.67 to $17.74 per ton—than other plants. RDF plants that charge tipping fees had an average of $12.05 per ton; modular mass-burning plants had an average fee of $10.72.

See Table Three for details on "mean" tipping fees in the survey, broken down by type of waste process used and region of the nation.

Fuels produced

Trends in resource recovery plant fuel production seem to be in the direction of electricity.

Existing plants are more likely to produce steam; plants under construction are more likely to be tilted toward production of electricity alone or steam and electricity.

Private firms own 42% and operate 64% of the 128 plants already in existence or currently under construction.

See Table Four for a look at fuel production by status of facility.

Pollution control

More than three-quarters (77.3%) of the existing or in-construction resource recovery plants use or will use some type of air pollution control equipment.

Note that 19, or 14.8%, reported that they do not use such equipment.

Of those plants using the air pollution control equipment, more than two-thirds are small-scale mass-burning modular plants with a mean design capacity of 51.46 tons per day.

Electrostatic precipitators were the choice of 57.6% of the plants sampled. Baghouse filters (14.1%), dry scrubbers (4.0%) and wet scrubbers (3.0%) were among the other alternatives most often used.

While only 50% of the existing plants use electrostatic precipitators, more than two-thirds (71.4%) of the in-construction plants will use this option.

The 1984 Resource Recovery Yearbook, edited by Robert N. Gould and Dr. Eileen Berenyi of Government Advisory Associates, includes information on methane gas recovery from landfills. The book is now available. For purchasing information, contact the management consulting firm at 177 E. 87th St., New York, N.Y. 10028

• special revenue bonds (11%) and
• federal and state grants (9%).

The Yearbook's authors report a trend away from government and government-backed funding in favor of private funding and industrial revenue bonds

Waste stream guarantees

One trend uncovered in this year's survey is that, of those resource recovery plants completed in the future, 46.3% will receive wastes from a geographical area of "several cities or towns," compared to only 29.9% of existing plants which receive waste on that semi-regional basis.

Guaranteeing waste flows—including flow control legislation—is becoming more prevalent. Because the authors did not discriminate in their survey between flow control, local ordinances or contractural agreements, the numbers here only indicate the growth in the waste guarantee trend.

Existing plants are more likely to produce steam while plants under construction are more likely to lean in the direction of electricity alone or steam and electricity.

Nearly all of the facilities currently under construction (92.5%) report having such guarantees in place, compared with only 57.5% of the existing plants. In addition, there is a direct correlation between size and flow measures; the larger a plant is, the more likely it is that it will have flow control (see Table One).

Costs

Table Two presents the adjusted capital costs by type of process for resource recovery plants currently in the conceptual stages.

Note that the 30% of mass-burning plants that will cost more than $101 million each will together average a capacity of 1,708 tons of

TABLE ONE

MSW Guarantees by Facility Size

Design capacity (tons per day)	No. of plants in size group	Percent with waste guarantee
0 to 200	52	53.8%
201-500	27	66.7%
501-1,000	17	82.4%
1,001 +	31	87.1%

TABLE TWO

Adjusted Capital Costs By Type of Process

(for plants in planning stages)

Adj. Cap. Cost 1983 Dollars	Type of Process: Mass-burn (except modular)	Mass-burn (modular)	RDF	Percent of Total
Below $10 million	10%	36.4%	—	16.9%
$12 to $50	47.5	63.6	44.4%	52.1
$51 to $100	12.5	—	—	7.0
$101 million plus	30.0	—	55.6	23.9
Total Facilities	(40)	(22)	(9)	(71)

TABLE THREE

Mean Tipping Fees by Region & Process Type

Process	Northeast	South	Northcentral	West	Avg.
Mass-burning except modular	$19.98 (13)	$18.40 (9)	$17.05 (5)	$11.30 (5)	$17.72 (32)
Modular mass-burning	$11.66 (8)	$8.53 (9)	$13.58 (3)	$12.50 (2)	$10.72 (22)
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Note: *"Other" category includes RDF, gas, oil, etc.*

EXHIBIT A

A Look at Trends in Resource Recovery

An up-to-date look at resource recovery trends includes information on plants that are operational, shut down, under construction or in the throes of conception.

While resource recovery has been around a while, it's difficult to get a sharp picture of a "typical" plant, going by statistics in the fact-packed 1984 Resource Recovery Yearbook.

Consider, for instance, materials recovery: half of the 128 plants in existence (87) or under construction (41) will recover some materials before burning, half will not. The same is true of the 124 plants now on drawing boards across the country: roughly one-half will not engage in materials recovery activities.

For another example, let's look at the type of process used by the plants:

- Mass-burn: 37% of the existing plants will use some form of this technology as will 61% of those in advanced planning stages and 54% of those on the drawing boards.
- Modular equipment: 34% of existing plants use this technology as will 17% of those under construction and 32% of those in the conceptual phase.
- RDF: 25% of the plants who began operation before 1985 were involved in RDF production. Of those currently being built, 23% will produce RDF; of those currently under discussion, 14% are conceived as being RDF-producers.

To help WASTE AGE readers get a better picture of the overall resource recovery scene, we present the following details and data—drawn from the Yearbook's executive summary section.

Operations

While operating efficiency of resource recovery plants seems to be on the increase, shutdowns are a plague on this industry.

Average operating efficiency of existing resource recovery plants is reported as 82%; this is measured by the ratio of actual daily throughput to plant design capacity.

Highest efficiency was found among modular mass-burning facilities (93%). Lowest was found among RDF plants (73%). For mass-burning waterwall incinerators, the figure was 76%.

Writers for Governmental Advisory Associates, the Yearbook's authors, note in their "conclusions" section that because of this reliability problem, governments must "incorporate back-up or contingency plans in any examination of resource recovery as a solid waste disposal option."

However, the authors also note that operating efficiency "appears to be increasing," with a reported jump from 70% in the 1983 Yearbook to 80% for this year's edition.

Unplanned plant shutdowns—those for reasons other than routine maintenance—have been reported by 52% of existing facilities. Highest incidence of these occurrences is in RDF plants (64%), with 47% of the mass-burning units and only 39% of modular units reporting unplanned outages.

Reasons for the shutdowns included: equipment problems (22%), equipment retrofitting (14%), explosions (14%), environmental problems (10%), unfavorable economics (9%), fires (8%) and legal problems (5%).

Ownership

Private sector firms are playing a significant role in resource recovery operations and ownership, and will play a bigger role in the future, according to Yearbook data.

Private firms own 42% and operate 64% of the 128 plants already in existence or currently under construction. Of the plants on the drawing boards for which an owner or operator has been designated, one-third (34%) will have a private concern as owner and 53% will have a private firm as operator.

Note that private firms will own 68% of the 41 plants currently under construction and operate 87% of these. The Yearbook's authors explain this trend as follows: "the planned facilities tend to be larger than existing plants and local governments are therefore turning to private sector capital and expertise."

Of those plants in existence or under construction, more than one-half used more than one source of capital funds. These sources included:

- private equity (about 25%);
- industrial development revenue bonds (17%);
- general obligation bonds (13%);

refuse per day.

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This means the net cost was $1,384,205—or $76.94 per ton of refuse diverted from the landfill. This is a big variation from the $20.70 per ton cost reported for the Madison facility (exclusive of debt service) to the authors the *Resource Recovery Yearbook—1984*.

Other details

Further examination of the cost figures reveal some other interesting facts.

The sale of the RDF yielded $350,790 in revenue. But the cost of operating the receiving stations at MG&E and Oscar Mayer—actually *back charges* from the fuel customers to the city—totaled $349,392.

So the *cost of selling* the RDF was just a few dollars less than the sales dollar total realized!

Indeed, MG&E was under instructions from the city to burn RDF

I: Costs/Revenue—1984

COSTS	
Labor	
Operation	$152,571.55
Maintenance	147,602.61
Hauling	67,926.13
Other	64,577.45
Total Labor	**$432,677.74**
Processing Plant	
Amortization	$196,237.00
Electric Power	232,025.95
Other Utilities	17,419.91
Hauling Equipment	159,395.51
Other Equipment	[illegible]
Parts & Supplies	[illegible]
MSWF Company	189,922.06
Disposal Fees	142,244.93
Miscellaneous	80,165.98
Total Processing Plant	[illegible]
MG&E Receiving Station Costs	[illegible]
Oscar Mayer Receiving Station Costs	[illegible]
[illegible]	[illegible]
[illegible]	[illegible]
Total [illegible]	[illegible]
Net Cost	**$1,384,205.84**

II: Madison, Wisconsin Solid Waste Generation & Disposition (tons)—1984

Total Refuse Received	69,709.69
Non Processable Wastes	2,813.65
Processable Wastes	[illegible]
RDF Produced	[illegible]
RDF to MG&E	[illegible]
RDF to Oscar Mayer	[illegible]
RDF to Other	583.39
Total RDF Sold	**17,040.54**
RDF to Landfill	1,196.01
Residue to Landfill	13,930.35
Ferrous Salvage	951.41
Primary Shred to Landfill	[illegible]
[illegible] *to Landfill*	[illegible]
Miscellaneous [illegible]	[illegible]
Total	[illegible]

EXHIBIT A

Economics in Madison

By DR. CHARLES JOHNSON

The Madison, Wis., waste-processing plant is one of the few remaining examples of a facility producing a refuse-derived fuel (RFD) for sale to an independent user as a substitute for another solid fuel.

This technology was heavily promoted in the 1970s, the early years of waste-to-energy development in the U.S. Most of these projects have long since shut down (see list), but the Madison facility continues to operate.

Often cited as a successful example of production and sale of RDF, the Madison unit sells its output to Madison Gas and Electric (MG&E) and Oscar Mayer, Inc.

Reports that officials in Madison, Wis., are considering shutting down that city's resource recovery facility could be the prelude to the end of an era.

Track records

A look at the track records of the major waste-to-energy technologies reveals the Madison plant is a member of the most troublesome group.

Every one of the large **mass-burn** facilities built in the U.S. since 1970 continues to operate as of this writing, according to the *Resource Recovery Yearbook—1984*. These facilities burn solid waste without significant pre-processing (except possibly for size reduction of oversized and bulky materials).

Some early **modular mass-burn units**, which consist of factory-fabricated combustion units shipped to the site almost completely preassembled, experienced difficulty. Some of the problems were attributable to poor operation. But all save a few of the early units continue in operation.

"Shred-and-burn" plants are facilities wherein the waste is processed into a fuel and burned by the same entity that did the processing, generally at the same site. Some early shred-and-burn facilities experienced difficulty; but several are apparently operating successfully.

The key, apparently, is that the same entity is responsible for fuel preparation and fuel burning, avoiding divided responsibility problems.

A poor history

The only waste-to-energy technology that has a really poor track record is that in which solid waste is converted into a fuel for sale to others, whose furnaces can use the fuel.

This idea was attractive in the 1970s, when energy shortages made headlines. The prospect of waste as an energy source seemed to be more important than waste disposal.

Presumably, production of solid fuel from municipal wastes would enable owners of furnaces with the capability of burning other solid fuels—coal, peat, wood chips, etc.—to use RDF as an alternate fuel.

This would enable waste-to-energy to come into use without the large capital cost entailed in building new special-purpose furnaces.

As well-intentioned as these early proposals were, they failed to take into account the technological difficulties in both preparing RDF from solid waste and also burning the RDF in furnaces designed for another fuel.

Of the several facilities built during that period where RDF was to be sold to an arms-length customer, only the Madison facility continued to operate in 1985.

The success of the Madison facility, said some observers, was the exception that proved the rule.

Is Madison a success?

But was that success a fact or a myth?

A 1984 report on operations at the Madison facility by the city of Madison's Department of Public Works contains some revealing facts. These facts, which cast doubt on the "success" of the Madison facility, are summarized in Tables One and Two.

Table One is an account of the tonnage of waste received and disposed of by the Madison waste processing facility. In 1984, 59,709 tons of municipal solid wastes were received at the facility; 18,236 tons of RDF were derived from this waste, of which 17,040 tons were actually sold to fuel users. The rest, 1,196 tons, was sent to the landfill after processing.

In addition to the RDF sold, 951 tons of ferrous metals were salvaged from the waste.

Thus, the total reduction in solid waste delivered to the landfill as a result of the Madison facility's operation was 17,991 tons. Cost figures (Table Two) indicate the facility incurred total operating costs for 1984 of $1,812,532, revenue totaled $428,326.

Dr. Charles Johnson is NSWMA's technical director.

whenever their incremental costs for burning the fuel were no greater than the price of the RDF itself, according to Kent Barlow of MG&E.

In effect, the city, in 1984 at least, *gave away* the fuel from the Madison project to its two customers.

Another detail: the city received only $543 from the sale of 951 tons of ferrous material. This was actually only a royalty received from Madison Magnetic Operations Co. (MMO), which actually processed and sold the ferrous metal.

But even this low revenue will not be received this year, at least, not from MMO—which has had to discontinue operations because of market conditions.

Recycling Program Loses $6,800 in Six Months

At first glance, the city of Madison's newspaper recycling program looks like a winner.

The city has a guaranteed market for the more than five tons a day of bundled newspapers municipal crews collect in the environmental-minded community of 175,000.

The market? A five-year contract with a local newspaper broker which guarantees Madison $5 per ton more than the Chicago Board of Trade's current market price, but no less than $25 a ton.

The Wisconsin Chapter of NSWMA, however, took a closer look at the program. It found that the city's newspaper recycling program may be losing more than $1,000 a month—despite the guaranteed market and $10 per ton in saved landfill tipping fees.

Since 1968, residents of the 44,083 stops serviced by municipal collectors have been able to leave bundled newspapers curbside, where crews picking up refuse load the papers into special bins.

As the newspaper bins fill, the refuse trucks leave their routes, empty the bins into centrally parked holding trucks, and then return to their routes.

At day's end, the holding trucks are unloaded into semi-trailers at Madison's public works facilities. The semis are eventually hauled to a newsprint plant in Alsip, Ill.

The Wisconsin Chapter of NSWMA interviewed city officials and gathered data on costs that could be directly attributed to the newspaper program—including labor time and extra truck travel.

Using that city-derived data, the chapter estimates that Madison spends $28.14 a ton in labor costs and $21.46 a ton in truck costs.

From January through June of this year, the city collected 712 tons of newspaper. The material was sold for an average of $30 per ton; crediting the $10 per ton in saved landfill tipping fees yields net revenue of $40 per ton.

With collection costs of $49.60 per ton, however, the city lost more than $6,800 on newspaper recycling in the first half of this year.

— *W.A. Staff*

This means the net cost was $1,384,205—or $76.94 per ton of refuse diverted from the landfill. This is a big variation from the $20.70 per ton cost reported for the Madison facility (exclusive of debt service) to the authors the *Resource Recovery Yearbook—1984*.

Other details

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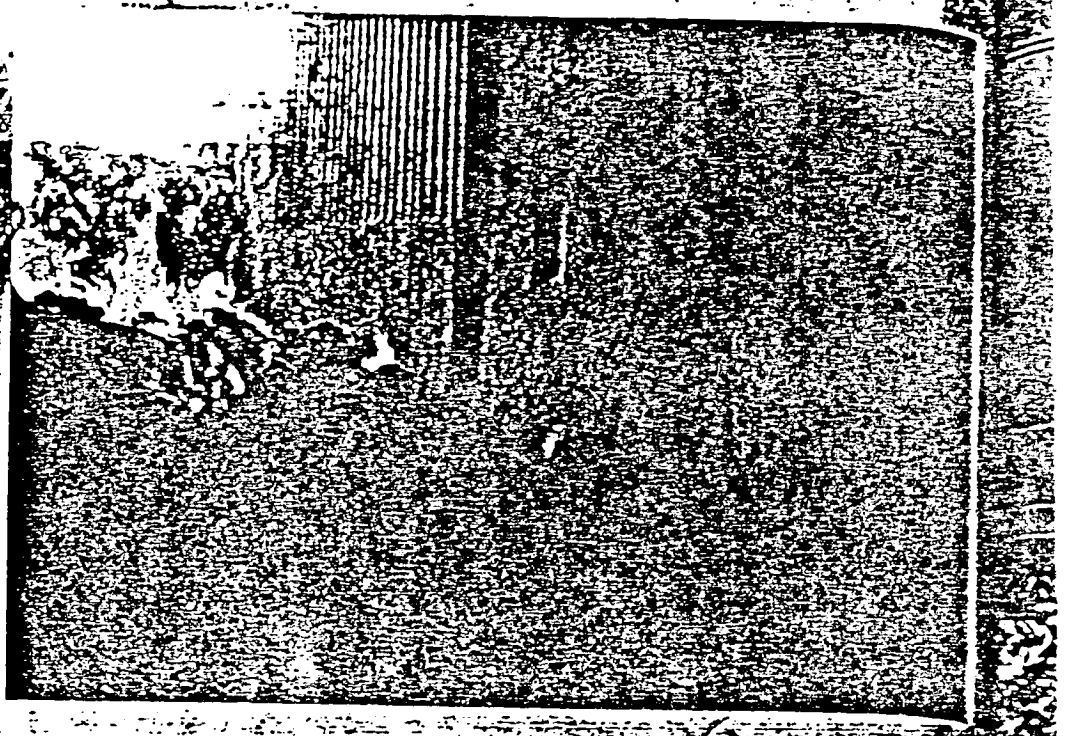
Amortization	$196,237.00
Electric Power	232,025.95
Other Utilities	17,419.91
Hauling Equipment	159,395.51
Other Equipment	7,633.82
Parts & Supplies	5,416.99
MSWF Company	189,922.06
Disposal Fees	142,244.93
Miscellaneous	80,165.98
Total Processing Plant	**1,030,462.15**
MG&E Receiving Station Costs	**262,358.27**
Oscar Mayer Receiving Station Costs	**87,034.26**
Total Operating Costs	**$1,812,532.42**
REVENUE	
Sale of RDF	350,790.78
Ferrous Metal	543.68
MSWF Back Charges	7,162.02
MMO Back Charges	8,828.70
Tipping Fees	59,764.72
Other	6,236.68
Total Revenue	**428,326.58**
Net Cost	**$1,384,205.84**

II: Madison, Wisconsin Solid Waste Generation & Disposition (tons)—1984

Total Refuse Received	59,709.69
Non Processable Wastes	2,813.65
Processable Wastes	**56,896.04**
RDF Produced	**18,236.55**
RDF to MG&E	13,812.75
RDF to Oscar Mayer	2,844.40
RDF to Other	383.39
Total RDF Sold	**17,040.54**
RDF to Landfill	1,196.01
Residue to Landfill	13,930.35
Ferrous Salvage	951.41
Primary Shred to Landfill	4,629.88
Bypass to Landfill	18,720.45
Miscellaneous Losses	427.40
Total	**39,855.50**

REFERENCE:
Solid Waste Management Annual Report, 1984, City of Madison (WI), Department of Public Works

Of the approximately 190 waste-to-energy facilities under way in North America, more than 75 percent use mass-burning technology. The burning of waste actually involves three stages—drying, burning, and cooling. Note how hot the fire is in the background and how completely the refuse is burned in the foreground.



The tipping pit must be large enough to hold about three days of refuse, if necessary. In smaller facilities, or where the water table is high, refuse may be dumped onto a floor instead of a pit.

How Waste-to-Energy Works

Recycling, either at a central location or curbside, still has a place with waste-to-energy. Many communities are building slightly smaller facilities because they expect to achieve recycling levels of 10 to 25 percent. Diverting some materials can actually improve waste-to-energy operations. For instance, the less glass in a system, the better, since glass tends to melt and clog grates.

If your community is considering converting waste into energy, you will be making an important technological decision, as well as major financial, environmental, management, and political decisions.

There are three major approaches to converting waste into energy—large-scale mass burning; small-scale mass burning, often called modular incineration; and prepared fuel or refuse-derived fuel—each with its own advantages and disadvantages. There are also a number of emerging technologies.

The choice of a technology on which to base a waste-to-energy plant is important, even if the plant is to be provided under a full-service contract. The basic technology of the plant depends on the amount of waste to be converted and on environmental concerns, and it is closely linked to the other decisions involved in the waste-to-energy development process.

June 1986

From Waste-to-Energy Facilities - A Decision-Maker's Guide

pit and is blown under the grate. Air from the boiler room is sometimes blown into the furnace above the grate to cool the flue gases and further enhance combustion.

Heating the water in the boiler generates steam. Boiler water is heated three ways. First, the waterwall tubes tied into the boiler bring already-hot water to the system. Second, gases and hot air from combustion provide heat. And third, other hot gases are captured by a device called an economizer, which returns them to the boiler. Because very hot steam is needed to produce enough pressure to drive a turbine and thus generate electricity, the boiler system often includes equipment to superheat the steam.

Combustion gases are removed from the furnace through the boiler by a fan and then treated by an air pollution control device— either a baghouse or an electrostatic precipitator. These devices are discussed in detail in the environmental section.

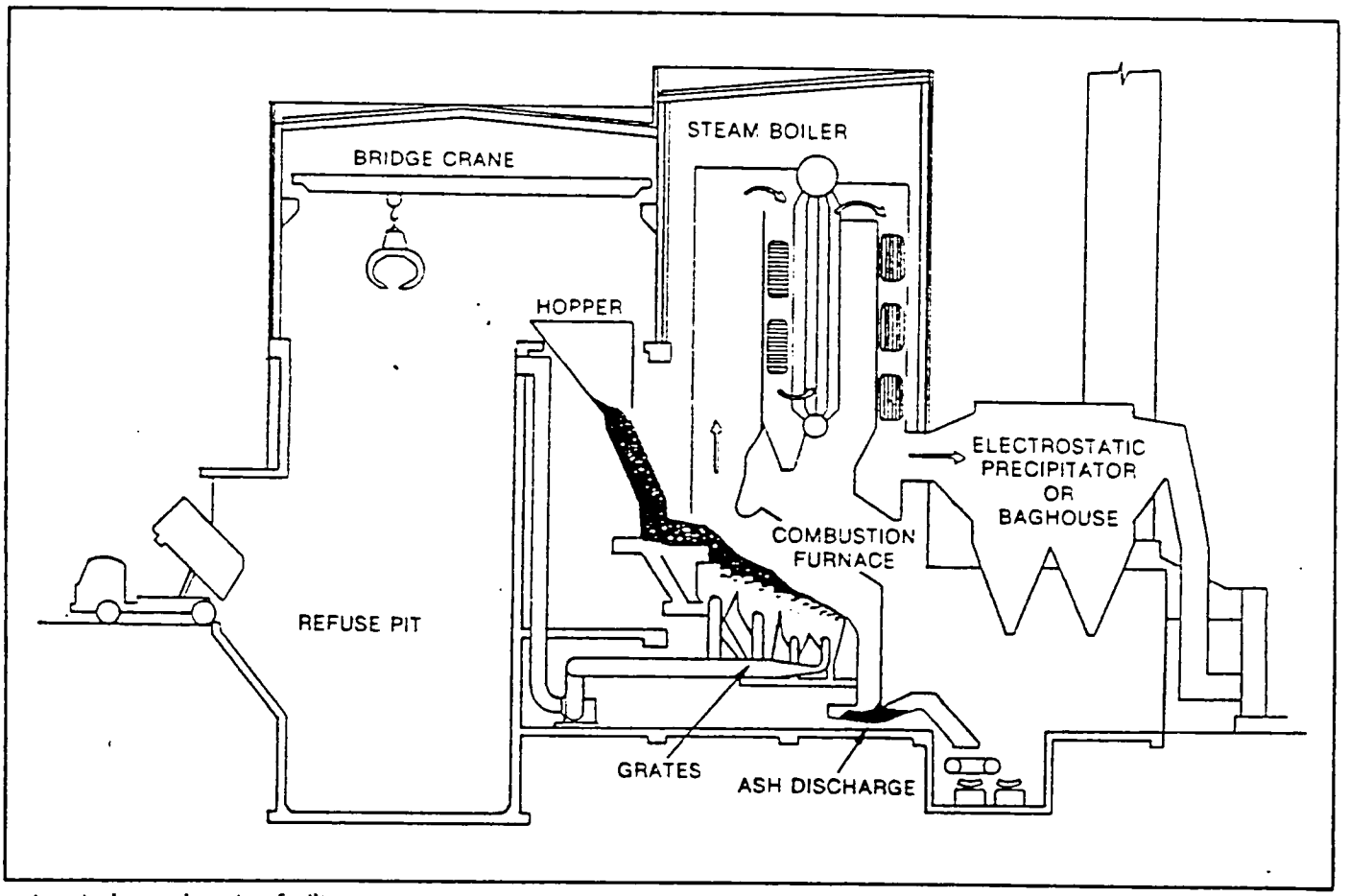
Most mass-burning systems reduce the volume of refuse by 90 percent, but some residues, usually ash, will remain. These residues are removed by an ash extractor at the rear of the furnace. In the ash extractor the noncombustible residues are cooled and removed through an air lock. The ash extractor collects and removes slags from the furnace as well as fine ashes that fall through the grate. Slag is drenched with water in the ash extractor to cool it. Metal residues can be removed by magnets.

Refractory-lined incinerators

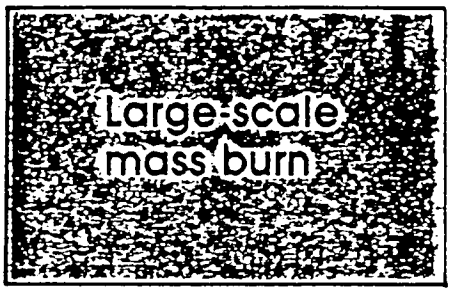
The inside of refractory-lined incinerators are lined with six- to eight-inch heat-resistant bricks that limit the transfer of heat to areas outside the incinerator and protect the outer metal shell from extreme and sudden changes in furnace temperatures.

The main difference between a refractory-lined unit and a waterwall unit is that the refractory-lined unit's boiler is separate from the combustion chamber.

To recover the energy from refractory-lined units, the hot gases from combustion are removed from the furnace by an induced draft fan and passed through the waste heat boiler. These flue gases leave the furnace at a temperature of 1800 degrees Fahrenheit, too hot to be cleaned. They must be cooled to 480 degrees Fahrenheit before the dust can be removed from them. This cooling takes place in a high efficiency steam boiler where the heat from the flue gases is recovered and used to produce steam. The steam produced by the boiler has a temperature of about 750 degrees Fahrenheit and a pressure of about 750 pounds per square inch. Higher temperatures are usually avoided in order to reduce corrosion.



A typical mass burning facility



Inside the furnace, the refuse falls on a grate, on which the waste is burned. The grate is the heart of any mass-burning incinerator.

Mass burning — the burning of untreated, unprocessed waste — is the predominant technology used to convert waste into energy. Of the approximately 190 waste-to-energy facilities under way in North America in 1986, 75 percent use mass-burning. Worldwide, more than 500 plants are based on mass burning.

Mass-burning waste-to-energy facilities burn refuse, capture the heat, and use it to generate steam or electricity, producing the energy equivalent of one and a half barrels of oil from a ton of waste. The waste needs very little handling and no sorting before it enters the plant. The burning process is carefully controlled, and advanced air pollution control equipment is used to protect the environment. The residue is solid, odorless, inert, and well-suited for landfill disposal. The process can be completely automated and managed from a central control room, reducing the number of people needed to operate the facility.

A typical plant includes two or more independent furnace and boiler units, each with its own feed hopper, loading chute, furnace, grate, boiler, combustion air system, exhaust fan, ash extractor and air pollution control devices.

At the heart of every mass-burning waste-to-energy facility is one of three types of incinerators — waterwall, refractory-lined, or modular.

In a waterwall incinerator, the boiler and the combustion chamber are one component, with the incinerator walls lined with water-filled tubes. In a refractory-lined, or brick-lined incinerator, the boiler and combustion chamber are separate.

Most facilities that burn more than 500 tons of waste per day are built around waterwall or refractory-lined incinerators, while modular incinerators are typically used in plants handling smaller amounts of waste. As technology advances, however, this distinction is blurring. Multiple units of modular incinerators are being used for larger facilities and at least one company has experimented with a modular waterwall incinerator.

First steps

Regardless of the type of incineration or the size of the facility, the first steps in the mass-burning process are essentially the same.

Trucks delivering refuse to the facility are weighed, and the private haulers, private users, or other communities using the facility are billed a tipping fee based on the weight of the refuse disposed at the facility. The trucks are then unloaded into a large refuse storage pit or onto a tipping floor. The unloading area is usually fully enclosed and ventilated by fans that pull air inward to keep dust and odors inside the plant. The air from the unloading area is fed to the furnace, where the dust and odors are burned. The refuse receiving pit is usually large enough to store about three days' worth of trash.

An overhead bridge crane mixes the trash in the pit to make sure that wet and dry materials are evenly distributed. Then the crane transfers the trash into hoppers or chutes that feed the furnace.

The waterwall incinerator

A waterwall incinerator is just what its name implies — an incinerator with walls containing water. The walls of a waterwall incinerator are lined with tubes through which water is circulated to absorb the heat generated by the burning refuse. This reduces the heat radiated outside the incinerator, and it helps heat the boiler that produces steam.

The refuse enters the incinerator through a hopper or chute, from which it is fed into the furnace by gravity or by a hydraulic ram. The chute is often water-cooled or lined with refractory brick to protect it from refuse that may be smoldering in the chute.

Inside the furnace, the refuse falls on a grate, on which the waste is burned. The grate is the heart of any mass-burning incinerator. The major difference among the mass-burning systems from various vendors, in fact, is the design of the grate. Most grate systems are designed as a series of steps, sections, or rollers. As the waste moves down the grate, it is tumbled and mixed to allow even burning. The grate also allows air to flow through the waste and keeps unburned wastes from falling to the hoppers under the grate.

The burning of the waste on the grate actually involves three stages — drying, burning, and cooling — that take place in three areas of the grate.

Forced air first dries the moist refuse as much as possible. Then the refuse is burned at temperatures reaching up to 2,000 degrees Fahrenheit. Finally, when the refuse is thoroughly burned, and there is no more fuel for the fire, it begins to cool.

The portions of the grate devoted to these three stages vary according to the waste being burned. Wet garbage needs a greater drying area, while dry but slow-burning waste needs a greater burning area.

Air is an important factor in controlling combustion within the incinerator, and where the air is introduced is as important as the amount of air. The air that supports the burning comes from the dumping

With both waterwall and refractory-lined incinerators, the steam is delivered to the customer or drives a turbine to generate electricity.

In mass-burning systems, two or more processing lines are generally installed to provide the facility's capacity. For instance, a 1,000 ton-per-day facility may contain two combustion chambers and boilers, each capable of processing 600 tons per day.

Problems

While mass burning of refuse has a long and successful history, it is not trouble-free.

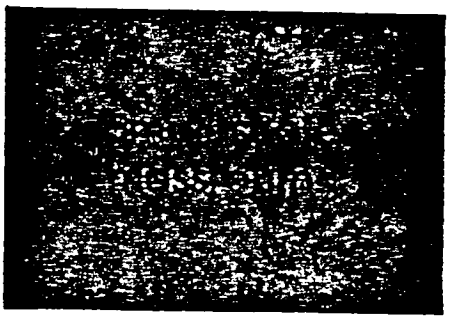
Refuse is not uniform. It contains many elements that should not be burned, as well as glass, sand, grit, and small pieces of metal that are very abrasive and can wear the grates, bricks, and other parts of the furnace floor.

Burning plastics increases the heat content of the refuse and increases steam production. But when they burn, plastics form corrosive compounds (hydrogen chloride, hydrogen fluoride, and chlorine) that damage the waterwall tubes. The flame of the burning refuse itself must be controlled so as not to damage the tubes.

Combustion generates large amounts of fly ash, which is corrosive and can damage or destroy the components of the waste-to-energy plant. Sometimes the ash discharged from the facility is not completely burned and is still smoldering. Hot ashes will damage the ash disposal system.

All of these problems, however, are well within the range of, and of the type that must be solved by, any industrial process. They can be reduced, if not avoided, by competent designers, and they can be managed by experienced operators.

Careful selection of alloys for furnace components that are less vulnerable to corrosion, for example, will give the units a longer life. In addition, regularly scheduled maintenance downtimes give the operator an opportunity to check the grates or stoker for wear, to replace tubes, and to make whatever other adjustments are necessary.



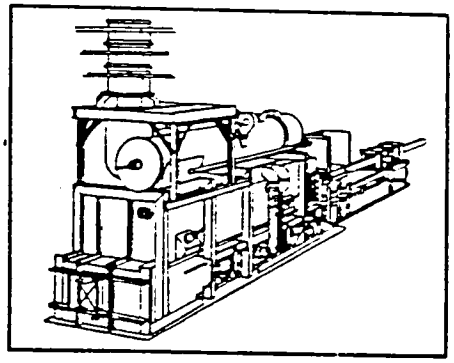
Modular Incineration

Modular incineration is direct combustion on a smaller scale. Originally designed for use in industrial plants, factories, or institutions, modular incinerators have been widely accepted by local governments, particularly those who have less than 500 tons per day of waste for disposal. Unlike larger mass-burning systems, which are constructed at the facility site, modular units are built in the factory and shipped to the location. Relatively little assembly is required at the site.

Two-chamber system

Most modular systems use a two-chamber burning process. In the first chamber, the refuse is burned under controlled air conditions. Some manufacturers use a starved-air system, in which little additional air enters the furnace. The minimal use of air made these units originally attractive for use in "peopled" environments, like hospitals and apartments, because the units produced less smoke and vented air. Other modular systems use a fan to blow additional air into the primary chamber.

The temperatures in the primary chamber of a modular system range from 1500 to 1800 degrees Fahrenheit. These temperatures are hot enough to burn the refuse, but they are not hot enough to destroy volatile gases. These gases are fed to the secondary burning chamber, often called an afterburner, where temperatures of 1800 to 2000 degrees Fahrenheit ensure their destruction.



Example of a modular incinerator

courtesy of Basic Environmental Engineering

A typical plant

In a typical municipal operation, a standard municipal packer truck is weighed in at the facility. The truck deposits waste onto a tipping floor, and small tractors push the waste directly into the incinerator's loading hopper.

Systems larger than 300 tons per day, or those requiring large amounts of storage capacity, are generally more economically served by a pit and crane. In smaller systems, the pressure of new waste entering the chamber is enough to move the waste through the unit. In larger systems, however, rams or grates move the waste materials through the system at a controlled pace. The ram or grate action, combined with the stepped floor of the chamber, mixes and exposes the trash for burning.

Gases from the first combustion chamber are fed to the secondary or pollution control chamber.

There, the gases are mixed with air to maintain a proper air-to-fuel ratio and temperature for entrance into the heat exchanger, or boiler, where steam is produced. A steam separator, or superheater, is often used to ensure high-quality steam.

The inert residue from the combustion process is ejected from the primary combustion chamber into a wet bath. A conveyor removes the ash to a closed container, which can then be hauled to the landfill for final disposal.

Air pollution control

In early modular incinerator installations, the afterburner was the only means of air pollution control. Today, however, most communities are willing to pay for the extra assurance that comes with adding a baghouse (filter system) or electrostatic

precipitator to the modular system. Many modular systems are looking more and more like their larger counterparts. Four new facilities — in Alameda, Calif.; Rutland, Vt.; Springfield, Mass.; and Portland, Me. — plan to generate steam as their output. Other plants are planning to cogenerate steam and electricity.

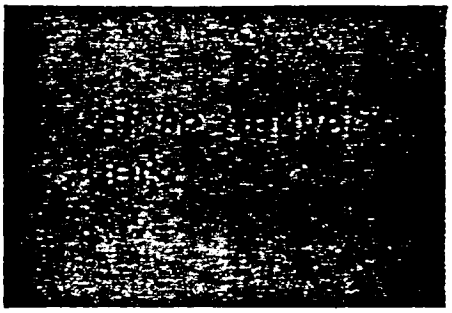
Advantages

Modular systems offer many advantages. A 200 ton-per-day facility probably can be constructed for less than $10 million, which puts waste-to-energy technology within the reach of many small communities.

The facilities also can be constructed quickly, generally within 12 to 24 months, as opposed to 24 to 36 months for site-built plants.

The favorable economics of modular systems also make it possible for a community to provide backup capability by installing a second unit to be used for peak periods or when the primary unit is being serviced. Multiple units can also be installed to handle larger quantities of wastes.

Because a modular facility can be erected on less than 10,000 square feet of land, a community can consider more potential sites. The facility can also be located near businesses that can use the energy produced.



Refuse derived fuel

A growing number of facilities are converting waste to fuel, instead of converting it directly to energy through some form of incineration. The fuels produced this way are known generically as refuse-derived fuels (RDF), and they sometimes carry brand names coined by the processors.

The objective of an RDF system is to separate combustible and noncombustible wastes and reduce the combustible wastes to a uniform material that can be burned.

RDF processing

There are two types of RDF, "fluff" and "densified."

Fluff RDF ranges in size from chunks of about four inches to particles roughly three-fourths of an inch in size. Densified RDF is made by compressing the smallest fluff RDF into pellets or briquets.

How RDF is made

The dry process begins when refuse is pushed onto a horizontal conveyor that carries it in a one-foot-deep stream into a shredding machine called a flail mill. The mill's swinging hammers, or flails, burst bags open, break glass, and loosen and expose the refuse.

Any ferrous metals in the waste are removed by large magnets. The separated metal is moved by a conveyor to another part of the plant, where it may be crushed or processed in other ways before being trucked to a scrap dealer for resale.

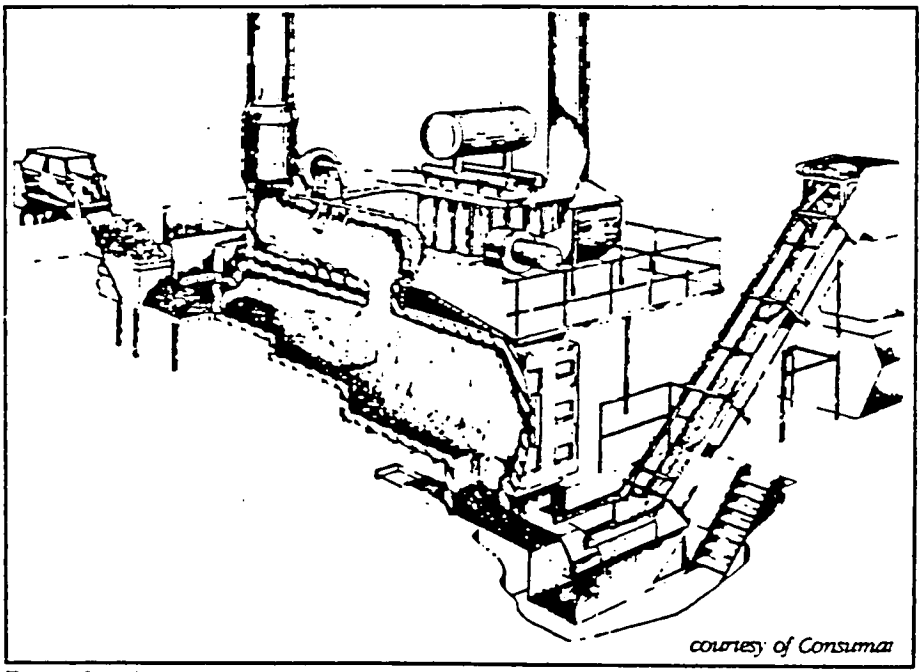
The remaining waste passes through cylindrical screens, called rotary or trommel screens, that sort the refuse to remove more noncombustible elements. Fine sand, dirt, and glass are separated for landfill disposal. Rock, large pieces of glass, and other heavy, dense objects are removed. The remaining material, approximately half of the original waste stream and mostly paper, continues to the fine shredding machine. This shredder also uses hammers to reduce the size of combustible material. This shredded waste goes through an air classifier, where a column of air further separates the lighter, more combustible materials from the rest of the waste. This very light material is fluff RDF, which can be compressed into pellets or briquets.

The RDF is transported to a nearby electric utility or industrial or institutional user. The existing boiler would have to be modified to include an RDF feed port and grates, if the boiler is not already served by a spreader stoker unit.

Co-firing with coal

A principal advantage of RDF or prepared fuels is that they can be burned together — cofired — with pulverized coal in existing boilers which need only slight modifications to accommodate RDF. This saves the expense of building a new energy system.

However, some RDF facilities have



Example of a modular incinerator

had problems cofiring refuse and coal. In 1985, for instance, R.W. Beck and Associates (Denver), consultants and engineers, recommended that the City of Columbus modify its RDF-and-coal plant to burn the refuse only. The combination of 90 percent RDF and 10 percent coal resulted in high furnace temperatures which melted metals. The metals then solidified on the grates, damaging them.

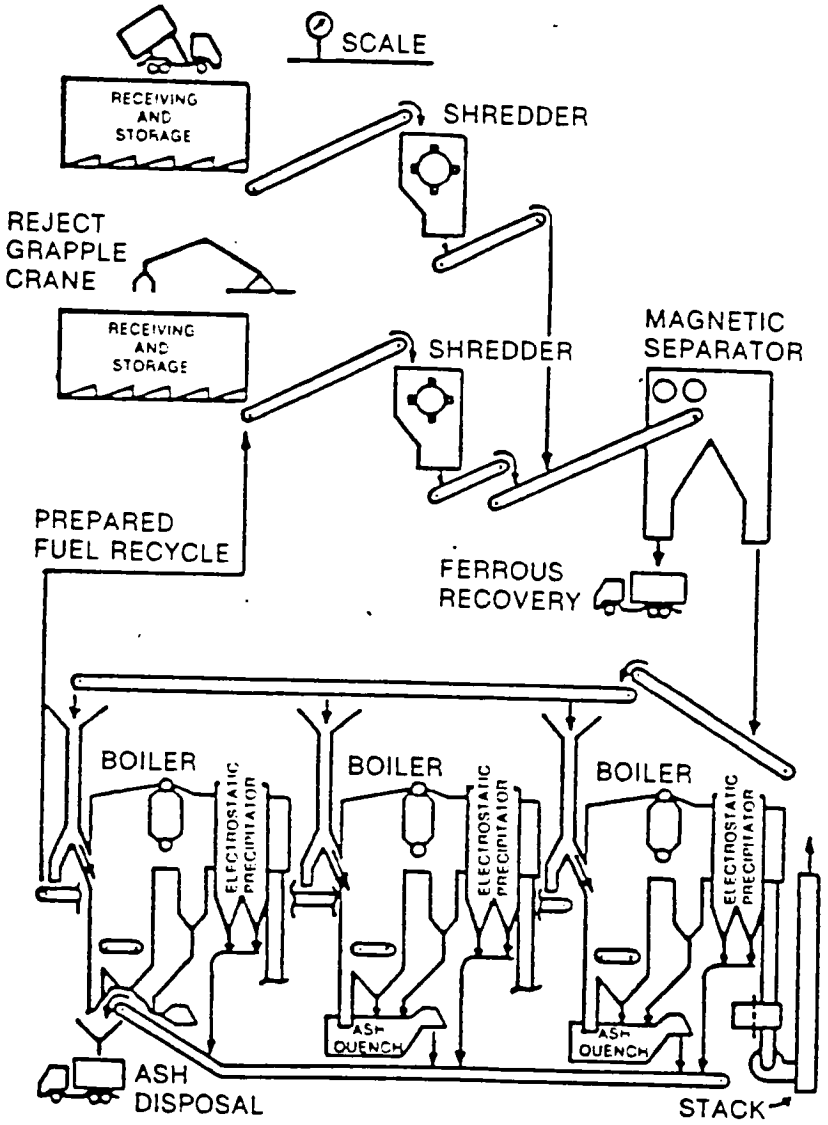
Dedicated boilers

Refuse-derived fuel can also be burned in a boiler designed specifically for burning prepared fuels. The RDF is fed into the boiler above the stoker or grate, and light particles burn almost instantly in suspension, before they even reach the grate. Heavier particles fall to the grate, remaining there until they are burned.

Once the refuse is on the grate, hot air starts the combustion. Grates or stokers move the fuel closer to the front of the boiler as it slowly burns. The sandy dry ash that accumulates is discharged into an ash pit. As with a mass-burning system, the air in the boiler must be carefully controlled.

A fan carries the hot combustion gases to the boiler tubes and boiler water, through the economizer, to the air pollution control equipment. Steam is piped to either a turbine generator or directly to the steam users.

Some of the earliest waste-to-energy efforts in the United States involved refuse-derived fuels. Ames, Iowa, has been cofiring RDF with coal since 1975. Madison, Wis., has been shredding refuse since 1966 and producing RDF for cofiring with coal since 1979.



SIMPLIFIED FLOW DIAGRAM

RDF INCINERATOR BOILER

Problems being managed

Early RDF efforts had their share of problems, one of the most serious of which has been explosions. Explosions at refuse processing facilities usually occur when the shredder hits flammable liquid containers or compressed gas tanks. Some industry experts believe another cause of explosions at RDF facilities is ignition of flammable vapors released by the refuse.

The risk of explosions can be reduced by careful design and operating practices. Low-speed shredders can be used to break open flammable containers before they enter high speed shredders. Shredder relief vents and explosion suppression systems can reduce the impact of explosions.

The best way to reduce the chances of an explosion, however, is to carefully scrutinize the incoming refuse.

Like mass-burning units, RDF facilities have operational problems that require attention. Noncombustible materials, such as glass and silt, sometimes become imbedded in the fuel and wear away the grates. Glass melts and sticks to the furnace walls. Aluminum, light enough to travel with the combustibles, melts on the grates, causing wear and alignment problems. RDF can't be stored for much longer than 24 hours since it tends to clump at the bottom of the pile.

RDF systems also produce more bottom ash and less energy per pound of refuse than mass-burning systems. These problems, however, are being managed by the companies operating RDF plants. Several large facilities — whose success will determine the future of this technology — are currently under construction. □

NOTE: The Franchise Application and related attachments have been distributed to Councilors. Other parties can arrange to pick up a copy of this material by calling Marie Nelson, Metro Council Clerk, 221-1646, extension 206.

Agenda Item No. 10.3

Meeting Date Nov. 12, 1987

SUPPLEMENTAL MATERIALS

K. B. RECYCLING, INC.

FRANCHISE PERMIT NO. 7 AND ATTACHMENTS

Franchise No. 7
Date Issued November 12, 1987
Expiration Date November 12, 1992

SOLID WASTE FRANCHISE
issued by the
METROPOLITAN SERVICE DISTRICT
2000 S. W. First Avenue
Portland, Oregon 97201-5398
(503) 221-1646

ISSUED TO: K. B. Recycling, Inc.

NAME OF FACILITY: K. B. Recycling

ADDRESS: 8277 S. E. Deer Creek Lane, Milwaukie, Oregon 97222

LEGAL DESCRIPTION: Lots 1700 and 1790, Section 5DA Township T25 Range R2E Willamette Meridian

CITY, STATE, ZIP: Milwaukie, Oregon 97222

NAME OF OPERATOR: K. B. Recycling, Inc.

PERSON IN CHARGE: Fred Kahut, President

ADDRESS: P. O. Box 550

CITY, STATE, ZIP: Canby, Oregon 97013

TELEPHONE NUMBER: (503) 659-7004

This Franchise will automatically terminate on the expiration date shown above, or upon modification or revocation, whichever occurs first. Until this Franchise terminates, K. B. Recycling, Inc. is authorized to operate and maintain a solid waste processing facility located at 8277 S. E. Deer Creek Lane, Milwaukie, Oregon 97222, for the purpose of accepting and processing solid waste in accordance with the Metro Code and the attached Schedules A, B, C, D and E, and in accordance with the provisions specified in the Solid Waste Disposal Site Permit to be issued by the State of Oregon, Department of Environmental Quality. This Franchise may be revoked at any time for any violation of the conditions of this Franchise or the Metro Code. This Franchise does not relieve the Franchise Holder from responsibility for compliance with ORS Chapter 459 or other applicable federal, state or local laws, rules, regulations or standards.

Fred A. Kahut, President
K. B. Recycling, Inc.

Rena Cusma, Executive Officer
Metropolitan Service District

SR/gl
7914C/513/10/26/87

FRANCHISE CONDITIONS

Franchise Number: 7 Expiration Date: November 12, 1992

SCHEDULE A

AUTHORIZED AND PROHIBITED ACTIVITIES

SA-1 The Franchise Holder is authorized to accept loads of mixed solid waste containing at least 30 percent recyclable material by weight, for processing in order to recover recyclable materials. No other wastes shall be accepted unless specifically authorized in writing by Metro supplementary to this Franchise.

SA-2 The following types of materials are specifically prohibited from being accepted at the processing facility:

a. Bulky combustible materials, car bodies, dead animals, sewage sludges, septic tank pumpings and hospital wastes.

b. All chemicals, liquids, explosives, infectious materials and other materials which may be hazardous or difficult to manage, unless specifically authorized by Metro.

SA-3 Disposal of mixed wastes by commercial solid waste haulers is allowed. No commercial hauler will be excluded from this site except when the load contains a small percentage of recyclables. Public dumping of mixed waste is not allowed.

SA-4 Salvaging and hand or mechanical sorting of mixed waste on a tipping floor to recover materials is authorized. Piles of mixed waste on the tipping floor shall be maintained to a reasonable size and shall be controlled so as to not create unsightly conditions or vector harborage. No wastes shall be allowed to remain on the tipping floor for longer than a 24-hour period.

SA-5 Non-recoverable material shall be removed from the processing tip floor and shall be transported to a franchised or authorized disposal site on a weekly basis or more often if necessary. Storage and transportation shall be carried out to avoid vector production and bird attraction.

SA-6 Materials separated and recovered for recycling (such as newsprint, waste paper, cardboard, glass, metals, yard debris, tires, appliances, and wood) shall be neatly stored in containers or areas provided for this purpose and shall be transported off-site to materials markets as often as necessary.

SA-7 The Franchise Holder shall perform litter patrols to keep the facility free of blowing paper and other material on at least a daily basis or more often if necessary.

SA-8 The Franchise Holder shall operate the processing facility in accordance with the Application and Operation Plan dated January 9, 1987.

SA-9 The Franchise Holder shall not, by act or omission, discriminate against, treat unequally or prefer any user of the processing facility in the fees or the operation of the facility.

SA-10 All solid waste transferring vehicles and devices using public roads shall be constructed, maintained, and operated so as to prevent leaking, sifting, spilling, or blowing of solid waste while in transit.

SA-11 The Franchise Holder may dispose of his residual wastes at the operator's transfer facility in Canby or the Riverbend Landfill provided that the Metro User Fee and Regional Transfer Charge are collected and forwarded to Metro.

SA-12 The Franchise Holder may accept no more than 10,000 tons of mixed waste per year nor more than 20 drop box loads of mixed waste per day without amendment to this Franchise Agreement.

FRANCHISE CONDITIONS

Franchise Number: 7 Expiration Date: November 12, 1992

SCHEDULE B

MINIMUM MONITORING AND REPORTING REQUIREMENTS

SB-1 The Franchise Holder or his/her Contractor shall effectively monitor the processing facility operation and maintain records of the following required data to be submitted to Metro:

a. Name and address of the Franchisee

b. Month and year of each report

Item or Parameter	Minimum Monitoring Frequency
c. Tons or cubic yards of solid waste delivered by commercial collection vehicles	Daily
d. Number of commercial collection vehicles	Daily
e. Unusual occurrences affecting processing facility operation	Each Occurrence
f. Tons or cubic yards of reject material disposed at an authorized disposal site	Monthly
g. Disposal rate charged for mixed solid waste	Daily
h. Tons or cubic yards of waste salvaged by type of material	Monthly
i. Signature and title of the Franchisee or its agent	

SB-2 Monitoring results shall be reported on approved forms. The reporting period is the calendar month. Reports must be submitted to Metro by the 20th day of the month following the end of each month.

SB-3 The Franchise Holder shall pay the annual franchise fee established in Metro Code Section 5.03.030 within 30 days of the effective date of the Franchise Agreement and each year thereafter.

SB-4 The Franchise Holder shall report to the District any changes in excess of five (5%) percent of ownership of the Franchisee's corporation or similar entity, or of the partners of a partnership within ten (10) days of such changes of ownership.

SB-5 The Franchisee may contract with another person to operate the disposal facility only upon ninety (90) days prior written notice to the District and the written approval of the Executive Officer. If approved, the Franchisee shall remain responsible for compliance with this Franchise Agreement.

SB-6 The Franchisee shall establish and follow procedures designed to give reasonable notice prior to refusing service to any person. Copies of notification and procedures for such action will be retained on file for three (3) years by each Franchisee for possible review by the District.

SB-7 The Franchisee shall maintain during the term of the franchise public liability insurance in the amounts set forth in SC-1 and shall give thirty (30) days written notice to the District of any lapse or proposed cancellation of insurance coverage or performance bond.

SB-8 The Franchisee shall file an Annual Operating Report detailing the operation as outlined in this Franchise on or before November 12 (anniversary date of Franchise) of each year for the preceeding year.

SB-9 The Franchise Holder shall submit a duplicate copy to the District of any information submitted to, or required by the Department of Environmental Quality pertaining to the solid waste permit for this facility.

SB-10 The Franchise Holder shall report to Metro the names of solid waste credit customers which are sixty (60) days or more past due in paying their disposal fees at the processing facility. Such report shall be submitted in writing each month on Metro approved forms. For the purposes of this section sixty (60) days past due means disposal charges due, but not paid on the first day of the second month following billing.

SB-11 In the event a breakdown of equipment, fire or other occurrence causes a violation of any conditions of this Franchise Agreement or of the Metro Code, the Franchise Holder shall:

a. Immediately take action to correct the unauthorized condition or operation.

b. Immediately notify Metro so that an investigation can be made to evaluate the impact and the corrective actions taken and determine additional action that must be taken.

SB-12 In the event that the processing facility is to be closed permanently or for an indefinite period of time during the effective period of this Franchise, the Franchise Holder shall provide Metro with written notice, at least ninety (90) days prior to closure, of the proposed time schedule and closure procedures.

SB-13 The Franchisee shall file a monthly report on forms approved by the District indicating the types (wood, paper, cardboard, metal, glass, etc.) and quantities (tonnage/cubic yards) of solid wastes accepted and recovered at the facility.

SB-14 Authorized representatives of Metro shall be permitted to inspect recyclable quantity information during normal working hours or at other reasonable times with notice.

FRANCHISE CONDITIONS

Franchise Number: 7 Expiration Date: November 12, 1992

SCHEDULE C

GENERAL CONDITIONS AND COMPLIANCE SCHEDULES

SC-1 The Franchise Holder shall furnish Metro with proof of public liability insurance, including automotive coverage, in the amounts of not less than $300,000 for any number of claims arising out of a single accident or occurrence, $50,000 to any claimant for any number of claims for damage to or destruction of property, and $100,000 to any claimant for all other claims arising out of a single accident or occurrence, or such other amounts as may be required by State law for public contracts. The District shall be named as an additional insured in this insurance policy.

SC-2 The term processing facility is used in this Franchise as defined in Section 5.01.010(n) of the Metro Code.

SC-3 The conditions of this Franchise shall be binding upon, and the Franchise Holder shall be responsible for all acts and omissions of, all contractors and agents of the Franchise Holder.

SC-4 The processing facility operation shall be in strict compliance with the Metro Code regarding storage, collection, transportation, recycling and disposal of solid waste.

SC-5 The Franchise Holder shall provide an adequate operating staff which is duly qualified to carry out the reporting functions required to ensure compliance with the conditions of this Franchise Agreement.

SC-6 Metro may reasonably regulate the hours of site operation as it finds necessary to ensure compliance with this Franchise Agreement.

SC-7 At least one sign shall be erected at the entrance to the processing facility. This sign shall be easily visible, legible, and shall contain at least the following:

a. Name of facility;

b. Emergency phone number;

c. Operational hours during which material will be received;

d. Disposal rates;

e. Metro information phone number; and

f. Acceptable materials.

SC-8 If the Executive Officer finds that there is a serious danger to the public health or safety as a result of the actions or inactions of a Franchisee, he/she may take whatever steps are necessary to abate the danger without notice to the Franchisee.

SC-9 Authorized representatives of Metro shall be permitted access to the premises of the processing facility owned or operated by the Franchise Holder at all reasonable times for the purpose of making inspections and carrying out other necessary functions related to this Franchise. Access to inspect is authorized:

a. during all working hours;

b. at other reasonable times with notice;

c. at any time without notice where, at the discretion of the Metro Solid Waste Division Director, such notice would defeat the purpose of the entry.

SC-10 This Franchise Agreement is subject to suspension, modification, revocation or nonrenewal upon finding that:

a. The Franchisee has violated the Disposal Franchise Ordinance, the Franchise Agreement, the Metro Code, ORS Chapter 459 or the rules promulgated thereunder or any other applicable law or regulation; or

b. The Franchisee has misrepresented material facts or information in the Franchise Application, Annual Operating Report, or other information required to be submitted to the District;

c. The Franchisee has refused to provide adequate service at the franchised site, facility or station, after written notification and reasonable opportunity to do so.

d. There has been a significant change in the quantity or character of solid waste received or the method of solid waste processing.

SC-11 This Franchise Agreement, or a photocopy thereof, shall be displayed where it can be readily referred to by operating personnel.

SC-12 The granting of a Franchise shall not vest any right or privilege in the Franchisee to receive specific types or quantities of solid waste during the term of the Franchise.

a. To ensure a sufficient flow of solid waste to the District's resource recovery facilities, the Executive Officer may, at any time during the term of the Franchise, without hearing, direct solid wastes away from the

Franchisee. In such case, the District shall make every reasonable effort to provide notice of such direction to affected haulers of solid waste.

b. To carry out any other purpose of the Metro Disposal Franchise Ordinance, the Executive Officer may, upon sixty (60) days prior written notice, direct solid wastes away from the Franchisee or limit the type of solid wastes which the Franchisee may receive.

Any Franchisee receiving said notice shall have the right to a contested case hearing pursuant to Code Chapter 2.05. A request for a hearing shall not stay action by the Executive Officer. Prior notice shall not be required if the Executive Officer finds that there is an immediate and serious danger to the public or that a health hazard or public nuisance would be created by a delay.

SC-13 The Franchisee shall pay the District the Metro User Fee and Regional Transfer Charge for all residual waste disposed outside the Metro region. Such fees shall be submitted with the monthly disposal reports specified in requirement SB-2.

SC-14 All notices required to be given to the Franchisee under this Franchise Agreement shall be given to Fred Kahut, K. B. Recycling, Inc., P. O. Box 550, Canby, OR 97013. All notices and correspondence required to be given to Metro under this Agreement shall be given to the Solid Waste Director, Solid Waste Department, Metropolitan Service District, 2000 S. W. First Avenue, Portland, OR 97201-5398.

FRANCHISE CONDITIONS

Franchise Number: 7 Expiration Date: November 12, 1992

SCHEDULE D

WASTE REDUCTION PLAN

SD-1 To fulfill the requirements for a Waste Reduction Plan as stated in Section 5.01.120(k) of the Metro Code, the Franchisee shall provide the services described in Attachment I and other operational functions described in the Franchise Application dated January 9, 1987. The Franchisee shall participate in an annual review with Metro of the facility's performance in accomplishing waste reduction goals and shall complete annual objectives for waste reduction which may be mutually identified through the process.

FRANCHISE CONDITIONS

Franchise Number: 7 Expiration Date: November 12, 1992

SCHEDULE E

DISPOSAL RATES

SE-1 In accordance with the variance granted by the Metro Council, the rates charged at this facility will be exempt from Metro rate-setting, Metro User Fee payments and Metro Regional Transfer Charge payments, except Metro reserves the right to exercise its authority to regulate rates pursuant to Metro Code Section 5.01.180.

SE-2 Until Metro establishes rates which are to be charged at the facility, the Franchisee shall adhere to the following conditions in the disposal rates which are charged at K. B. Recycling, Inc.:

a. Between the effective date of this franchise and January 1, 1988, the rates will be as follows:

For loads over 90 percent OCC	$2.00 per ton
For loads less than 90 percent OCC	$12.00 per ton

b. The Franchisee may modify rates to be charged and rate schedules on a quarterly basis. Rates may be adjusted on January 1, April 1, July 1 and October 1. Rates will not change more frequently than on these dates. Metro shall be notified ten (10) days prior to any proposed rate changes.

c. In no case may the franchisee charge any specific class of disposer more than what is charged at the CTRC for that class unless approval to do so is granted by the Metro Council.

d. Rates to be charged at the facility shall be posted on a sign near where fees are collected. All customers within a given disposal class shall receive equal, consistent and non-discriminatory treatment in the collection of fees.

e. The Franchisee shall maintain complete records of all costs, revenues, rates, waste flows and other information on the franchised operation which would be helpful to the Metro staff and Rate Review Committee for reviews of the operation's financial performance and for possible future rate-setting. These records shall be made available on request and summary reports shall be provided to Metro on a quarterly basis (4th quarter reports are due February 1, 1st quarter reports are due May 1, and so on).

K. B. Recycling Inc.

1184 S.W. Berg Parkway
P.O. Box 550
Canby, Oregon 97013
266-7903

Mr. Rich McConaghy
Metro
2000 S.W. 1st Ave.
Portland, Oregon 97201

Dear Rich:

K.B. Recycling is requesting that they be exempt from the following provisions of the Disposal Franchise Ordinance.

A.	501.180	Rates
B.	501.070	(E-2) Corporate Surety Bond
C.	501.070	(G) Direction of Solid Waste
D.	501.120	(B) Discontinue Service
E.	501.190	(E) Renewal
F.	501.200	Right to Condem or Purchase

I have enclosed some facts on why we need to be exempt from rate regulation and a letter from our insurance agent regarding the bond. If you need any additional information, please feel free to contact me.

Sincerely,

Fred Kahut

Fred Kahut

5. SITE DESCRIPTION - Tax Lot(s) 1700 & 1790

Section 5DA Township T25 Range R2E W.M.

6. ZONING - Present Land Use Zone _____

Restrictions _____

7. IS A CONDITIONAL USE PERMIT NECESSARY FOR THE PROPOSED FACILITY?

Yes _____ No XX

8. PUBLIC HEARING - Date(s) and nature of Public Hearing(s) held or to be held, if any None Required

9. PERMITS ISSUED OR APPLIED FOR - List name and number of all permits, (i.e., DEQ Solid Waste Disposal Permit, Conditional Use Permit, Air Permit, etc.) plus name, address and contact person at federal, state or local agency responsible for issuing permit(s).

Permits Applied for DEQ Solid Waste Disposal Permit

Permits Received Clackamas County

10. LICENSE OR FRANCHISE - Is the solid waste facility licensed or franchised by a city or county? Yes ___ No X.

Identify _____

11. POPULATION DATA - Estimated population to be served by site

300,000

12. ESTIMATED QUANTITY OF SOLID WASTE TO BE ACCEPTED

Annually: _____ Cubic Yards Daily: _____ Cubic Yards

Annually: 3900 Tons Daily: 15 Tons

DATE RECEIVED BY METRO

RECEIVED FEB 2 4 1987

MAIL THIS APPLICATION TO:

METROPOLITAN SERVICE DISTRICT
Attn: Solid Waste Department
~~527 S.W. Hall Street~~ 2000 S.W. First
Portland, Oregon 97201
221-1646

SOLID WASTE FRANCHISE APPLICATION

Check one or more:
- ☐ TRANSFER STATION
- ☒ PROCESSING CENTER
- ☐ RESOURCE RECOVERY FACILITY

DATE OF APPLICATION 1-9-87

1. NAME OF FACILITY K.B. Recycling, Inc.
   Facility Address 8277 S. . Deer Creek Lane
   Milwaukie, Or 97222

2. PROSPECTIVE FRANCHISEE - Public Agency ____ Private xx
   Name K.B. Recycling, Inc.
   Address 8277 S. . Deer Creek Lane
   Milwaukie, Or 97222
   Phone 659-7004

3. OWNER(S) OF PROPERTY

Name Fred Kahut	Name Jerald Kahut
Address 9911 S. Kraxberger Rd.	Address 7011 S. . Norbert Dr.
Canby, Or 97013	Milwaukie, Or 97222
Phone 266-4878	Phone

4. SUBCONTRACTORS - Name, address and function of franchisee's site operation subcontractors, if any None

16. PUBLIC/COMMERCIAL OPERATIONS, TRAFFIC VOLUME, OPERATING HOURS
Will the facility to be open to the public? Yes _____ No X ;
Commercial solid waste collectors? Yes X No _____

	Public	Commercial
Operating Hours		
Hours per Day	N/A	11
Days per Week	N/A	5½
Estimated Vehicles per Week	N/A	25

17. Does the owner or operator of this facility own, operate, maintain, have a proprietary interest in, or is the owner financially associated with or subcontracting the operation of the site to any individual, partnership, or corporation involved in the business of collecting residential, commercial, industrial or demolition refuse within the District?
Yes _____ No XX

18. Will the facility be open to any solid waste collection companies not wholely owned by the franchisee which collect refuse within the District? Yes X No ___

19. Will the facility be open to solid waste collection companies who collect outside the Service District other than the franchisee? Yes X No ___

Mixed loads will not be accepted from the general public. The facility will still be opened to the general Public for source separated recyclables only.

13. TYPES OF SOLID WASTE TO BE ACCEPTED, (i.e., food waste or containers, construction/demolition waste, land clearing debris, stumps, sludges, inert rock, etc.)

a. Paper Fiber 80 % of Total
b. Const 5 % of Total
c. Food 1 % of Total
d. Plastic 5 % of Total
e. Misc. 9% of Total

14. ESTIMATED ANNUAL QUANTITY OF MATERIAL TO BE RECYCLED FROM SOLID WASTE RECEIVED

Glass _____ tons _____% of total
Newspaper _____ tons _____% of total
Corrugated/Kraft 1365 tons 35 % of total
Aluminum _____ tons _____% of total
Other Metals _____ tons _____% of total
Ledger _____ tons _____% of total
Motor Oil _____ gallons _____% of total
Other Mixed Office Paper _____% of total
~~10~~

15. MARK ITEMS WHICH ARE TO BE EXCLUDED

None	____	All putrescible wastes (i.e., food or food contaminated materials)	____
Bulky combustible material (stump, etc.)	X	Dead Animals	X
Waste oil	____	Sewage or Industrial Sludges	X
Junk Automobiles	X	Large appliances	____
Demolition wastes	____	Tires	X
Hazardous materials	X		

Other items to be excluded: _____

ATTACHMENT A

PROJECT DESCRIPTION
AND
STATEMENT OF NEED

franchise is granted.

The impacts of K.B.'s proposal are all positive. First, the hauler will be able to dump at a lesser cost than at other disposal facilities and they will be able to dump on a hard surface within an enclosed building. Second, at least 1365 tons annually of corrugated cardboard and office paper which has been landfilled will be recovered and recycled, and finally, at least 2 new jobs will be created.

Depending upon one's point of view, the only possible negative impact of K.B.'s proposal is that approximately 1365 tons annually will be removed form the area's landfills. While an argument may be made that the removal of this tonnage from the landfill could cause dump fees to increase, K.B. believes an increase, if any, would be very slight and should be viewed as saving valuable landfill capacity in addition to retrieving a resource.

Metro's franchise ordinances prohibits discriminatory practices by the franchisee. This prohibition was necessary because of problems experienced by haulers at disposal facilities in the past. K.B. will be open to all haulers, but will be restrictive by requiring at least 50% by weight, of paper fiber in each load received. This discrimination will be against the type of material received and not against the hauler and will be similar to restrictions contained in previous permits and franchises granted by DEQ and Metro. For example, Killingsworth Fast Disposal and the old LaVelle landfills were prohibited from receiving food waste. The Grabhorn Landfill in Washington County can only receive demolition material while Metro's Clackamas Transfer and Recycling Center does not receive liquids and sludges.

K.B.'s proposal meets the Findings and Purpose stated in Section 3 of Metro's Disposal Franchise Ordinance 81-111. In addition, the proposal will assist Metro to achieve both its short and long term goals as stated in the adopted Waste Reduction Plan and is consistant with elements 2, 3, 4, 6 and 7 of the adopted Waste Reduction Policy Statement.[1] Further, the proposal is also in keeping with the provisions an and intent of SB 405, The Recycling Opportunity Act of 1983.

1 Metro's Waste Reduction Plan, January 1981, page 4.

ATTACHMENT A

20. K.B. Recycling, Inc. is proposing a full line recycling center which will be unique in the Clackamas area. The facility is located in the Clackamas area off of S.E. 82nd Ave. and Interstate I-205, and two blocks off Hwy 224 (Milwaukie Expressway). The property is currently zoned I-3 Industrial with a Department of Transportation and Development approval, which allows an outright use of these activities. The property includes 2.3 usable acres. All are in use as a recycling facility.

In addition to the existing operation of receiving source separated non ferrous metal, cardboard, newsprint, office paper and glass, K.B. Recycling will receive select mixed solid waste containing a high percentage of recyclable material. Mixed solid waste will be received from only commercial and industrial customers, including the refuse industry. These loads will be collected from commercial accounts such as department stores and office buildings. The intent is to keep the yield of fiber to an average of 40% on a weight basis. The materials not salvaged will consist of wood, plastics, grit, wax coated cardboard and possibly some food waste.

The mixed material will be received in commercial vehicles with self-dumping capability and unloaded on our tipping floor. The material will then be charged onto sort line conveyors after which corrugated cardboard and office paper will be sorted and placed onto our high density baling conveyor. The bales will then be shipped to a market. The remaining waste will continue on the conveyor to a garbage container and taken to an approved landfill.

21. One of Metro's highest priorities is to maximize the recovery of material from solid waste and reduce the dependency on landfills. K.B. Recycling is assisting Metro by purchasing source separated metal, corrugated cardboard, newsprint, computer and ledger paper and glass. However, a large amount of recyclable material is currently lost by landfilling because it is mixed with other types of materials. This mixing occurs because the generator of the waste, for various reasons, elects not to separate at the source or the hauler is not equipped to separate at the time of collection. According to Metro's regulations, once the material is mixed, it must be taken to an authorized facility.

K.B. Recycling's proposal is to increase the recycling of corrugated cardboard and office paper by accepting select loads of mixed waste which are currently landfilled, extracting the cardboard and office paper and disposing of the remaining materials at an approved landfill. Depending upon markets and the availability, other material such as plastic, ferrous and non-ferrous metals will also be recycled. It is anticipated that approximately 1365 tons per year will be recovered once the

ATTACHMENT B

PUBLIC LIABILITY INSURANCE

acord CERTIFICATE OF INSURANCE

ISSUE DATE (MM/DD/YY): 7/31/87

PRODUCER

KBI INSURANCE, INC.
P. O. BOX 888
TUALATIN, OR 97062
(503) 692-1520

FILE CODE: METRO SOLID WASTE DEPT

SEP 25 1987

RECEIVED

INSURED

K.B. RECYCLING, INC.
CANBY DISPOSAL COMPANY ET AL
P. O. BOX 550
CANBY, OR 97013

THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.

COMPANIES AFFORDING COVERAGE

COMPANY LETTER A	Security Insurance Co. of Hartford
COMPANY LETTER B	
COMPANY LETTER C	
COMPANY LETTER D	
COMPANY LETTER E	

COVERAGES

THIS IS TO CERTIFY THAT POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS, AND CONDITIONS OF SUCH POLICIES

CO. LTR.	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YY)	POLICY EXPIRATION DATE (MM/DD/YY)	ALL LIMITS IN THOUSANDS	
A	GENERAL LIABILITY [X] COMMERCIAL GENERAL LIABILITY [ ] CLAIMS MADE [X] OCCURRENCE [ ] OWNER'S & CONTRACTOR'S PROTECTIVE	MLP88-72-59	5-15-87	5-15-88	GENERAL AGGREGATE PRODUCTS COMP/OPS AGGREGATE PERSONAL & ADVERTISING INJURY EACH OCCURRENCE FIRE DAMAGE (ANY ONE FIRE MEDICAL EXPENSE (ANY ONE PERSON)	$ 1,000, $ 1,000, $ 500, $ 500, $ 50, $ 5,
A	AUTOMOBILE LIABILITY [X] ANY AUTO [ ] ALL OWNED AUTOS [ ] SCHEDULED AUTOS [ ] HIRED AUTOS [ ] NON-OWNED AUTOS [ ] GARAGE LIABILITY	MLP 88-72-59	5-15-87	5-15-88	CSL BODILY INJURY (PER PERSON) BODILY INJURY (PER ACCIDENT) PROPERTY DAMAGE	$ 500, $ $ $
	EXCESS LIABILITY [ ] OTHER THAN UMBRELLA FORM				EACH OCCURRENCE AGGREGATE	$ $
	WORKERS' COMPENSATION AND EMPLOYERS' LIABILITY				STATUTORY (EACH ACCIDENT) (DISEASE-POLICY LIMIT) (DISEASE-EACH EMPLOYEE)	 $ $ $
	OTHER					

DESCRIPTION OF OPERATIONS/LOCATIONS/VEHICLES/RESTRICTIONS/SPECIAL ITEMS

CERTIFICATE HOLDER

Metropolitan Service District
2000 S.W. First
Portland, Oregon 97201
Attn: Steve Rapp

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING COMPANY WILL ENDEAVOR TO MAIL 10 DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO MAIL SUCH NOTICE SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE COMPANY, ITS AGENTS OR REPRESENTATIVES.

AUTHORIZED REPRESENTATIVE

C H Kilhefner C. H. Kilhefner

ATTACHMENT C

ATTACHMENT C

There are two stockholders in K.B. Recycling, Inc. They are Fred A. Kahut, President, with 50% of the stock and Jerald A. Kahut, Vice President & Secretary/ Treasurer with 50% of the stock.

ATTACHMENT D

PROPOSED RATES

ATTACHMENT D

RATE REQUEST

In order to maximize the recovery of recyclables from the waste stream, the K.B. operation must be able to offer a rate that is lower than conventional disposal, meets operational costs, is flexible enough to reward those haulers for loads with fewer contaminants and recognizes higher than anticipated recovery rates.

Based on experience of the current recycling operation and our financial analysis, K.B. is requesting that a maximum fee of $17.38 per ton be approved for mixed loads received at the facility. The $17.38 per ton rate is based on a disposal fee at the CTRC of $17.38 per ton. Since the majority of the K.B. rate pays for disposal of non-recyclable material, it will "float" with any adjust ment to the CRTC rate.

In addition, we are requesting that K.B. be allowed to raise or lower this rate of $17.38 per ton if certain conditions exist. The rate reduction will be based on material flow, markets and the percent of recovered material. The rate increase would not be more than that charged at CRTC.

ATTACHMENT D

VARIANCE RATE SETTING REQUEST

In order to maximize the recovery of recyclables from the waste stream, the K.B. operation must be able to offer a rate that is lower than conventional disposal, meets operational costs, is flexible enough to reward those haulers for loads with fewer contaminants and recognizes higher than anticipated recovery rates.

Based on experience of the current recycling operation and our financial analysis, K.B. is requesting that there be no set fee at their facility. In order to attract selected material, we must provide a rate low enough that would be an adequate incentive. Estimated rates based on current markets would be: Loads over 90% OCC $2.00 per ton. Loads 50 - 90% OCC $12.00 per ton. See facts below:

1. FACT: K.B. Recycling is an experimental facility which is still evaluating the costs and revenues of handling various materials.

2. FACT: The price of recyclables can vary greatly and change quickly as the market for a particular material responds to supply and demand.

3. FACT: Precise prediction of recyclable commodities is not possible.

4. FACT: If tipping fees cannot be changed rapidly to respond to large changes in prices for recycled materials, the facility will exper ience financial losses.

5. FACT: Metro is instituting many ways to encourage and require recycling. With greater recycl ing, operational costs may be less, allowing a reasonable profit with lower tipping fees.

6. FACT: Requests for other processing center franchises have received variances from rate setting.

7. FACT: The majority of the business revenue is derived from the sale of secondary materials and not from disposal fees.

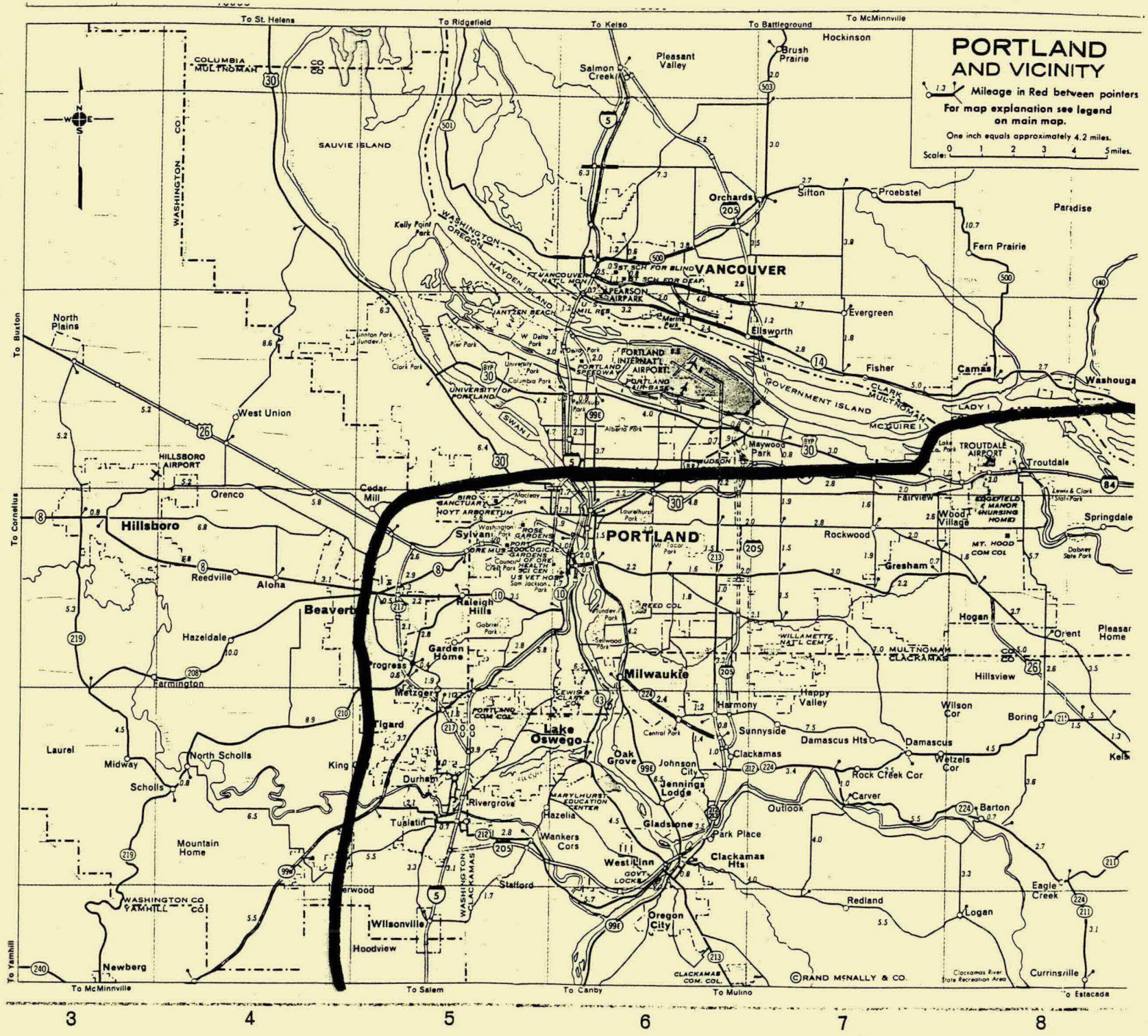
8. FACT: K.B. Recycling's proficiency at generating greater revenues lies in its ability to negotiate the best purchasing contracts with the buyers of the recovered material.

9. FACT: Public discloseure of these contracts will damage K.B. Recycling's ability to maintain the proprietary value of such agreements. Further, buyers have prohibited such disclosures.

10. FACT: K. B. Recyling is not requesting a monopoly or an exclusive franchise. Competition exists to moderate prices.

ATTACHMENT E

GEOGRAPHICAL SERVICE AREA


PORTLAND
AND VICINITY
Mileage in Red between pointers
For map explanation see legend on main map.
One inch equals approximately 4.2 miles.
Scale: 0 1 2 3 4 5 miles.
To St. Helens
To Ridgefield
To Kelso
To Battleground
To McMinnville
Hockinson
Brush Prairie
Pleasant Valley
Salmon Creek
COLUMBIA CO
MULTNOMAH CO
WASHINGTON CO
SAUVIE ISLAND
Kelly Point Park
WASHINGTON
OREGON
HAYDEN ISLAND
VANCOUVER
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ST SCH FOR DEAF
PEARSON AIRPARK
U S MIL RES
JANTZEN BEACH
Orchards
Sifton
Proebstel
Paradise
Fern Prairie
Evergreen
Ellsworth
Fisher
Camas
Washougal
LADY I
GOVERNMENT ISLAND
CLARK
MULTNOMAH
MCGUIRE I
PORTLAND INTERNAT'L AIRPORT
PORTLAND AIR BASE
PORTLAND SPEEDWAY
W Delta Park
Oaks Park
Pier Park
Clark Park
University Park
Columbia Park
UNIVERSITY OF PORTLAND
SWAN I
Albina Park
Peninsula Park
Maywood Park
HUDSON I
TROUTDALE AIRPORT
Troutdale
Lewis & Clark State Park
Dabney State Park
Springdale
Fairview
Wood Village
EDGEFIELD MANOR NURSING HOME
MT. HOOD COM COL
Rockwood
Gresham
Hogan
Orient
Pleasant Home
Hillsview
Boring
Kelso
Wilson Cor
Damascus
Damascus Hts
Wetzels Cor
Rock Creek Cor
Carver
Barton
Eagle Creek
Logan
Redland
Currinsville
Clackamas River State Recreation Area
Outlook
Park Place
Clackamas Hts
Gladstone
Jennings Lodge
Johnson City
Oak Grove
Clackamas
Sunnyside
Happy Valley
Harmony
Milwaukie
WILLAMETTE NAT'L CEM
MULTNOMAH CLACKAMAS CO
Lake Oswego
Tigard
Metzger
Progress
Garden Home
Raleigh Hills
Beaverton
SEED COL
Sylvan
PORTLAND
ROSE GARDENS
PORTLAND ZOOLOGICAL GARDENS
Council of Ore Chapters
HEALTH SCI CEN
US VET HOSP
Sam Jackson Park
Washington Park
Macleay Park
BIRD SANCTUARY
HOYT ARBORETUM
Laurelhurst Park
Mt Tabor Park
Sellwood Park
Gabriel Park
Hundley Park
Lewis & Clark Col
PORTLAND COM COL
Central Park
Cedar Mill
Orenco
West Union
North Plains
HILLSBORO AIRPORT
Hillsboro
Reedville
Aloha
Hazeldale
Farmington
Laurel
Midway
North Scholls
Scholls
King
Durham
Tualatin
Rivergrove
Hazelia
Wankers Cors
West Linn
GOVT LOCKS
Stafford
Mountain Home
WASHINGTON CO
YAMHILL CO
Sherwood
Wilsonville
Hoodview
Newberg
Oregon City
CLACKAMAS COM. COL.
MARYLHURST EDUCATION CENTER
To Buston
To Cornelius
To Yamhill
To McMinnville
To Salem
To Canby
To Mulino
To Estacada
©RAND McNALLY & CO.
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ATTACHMENT F

MAJOR EQUIPMENT

ATTACHMENT F

Major equipment currently in use include the following:

Equipment	Age	Replacement Schedule	Value
Baler, NSB 350	4	1995	$200,000
Powell Scale	4	1995	20,000
Bobcat Loader	6	1988	6,000
Forklift	15	1988	6,500
Forklift	1	1990	22,000
Forklift	12	1988	5,500
Conveyor	4	1990	18,000

Major new equipment includes conveyor, pit & compactor. All new equipment is on a five year replacement schedule and has an estimated value of $75,000.

ATTACHMENT G

FACILITY LAYOUT PLAN

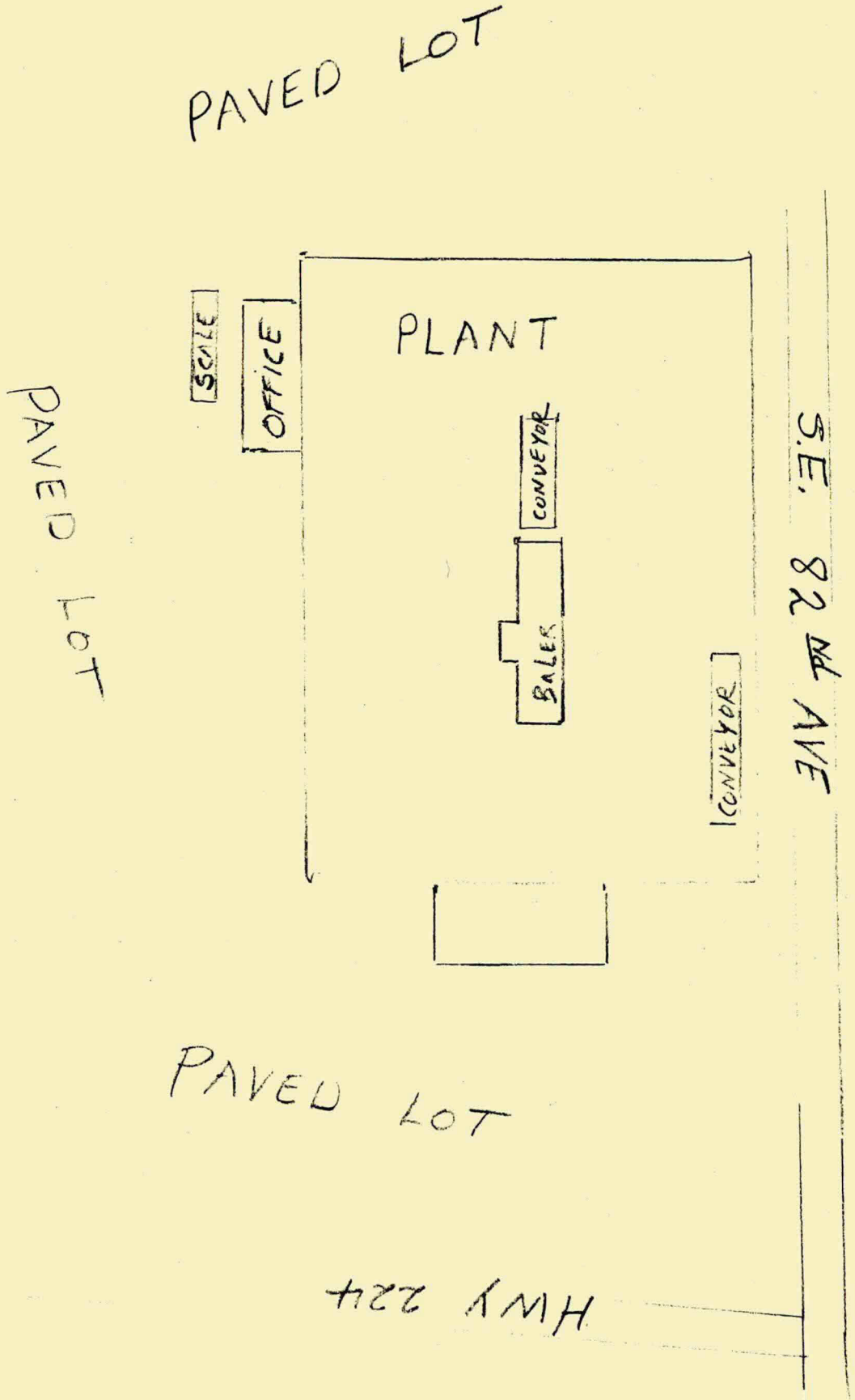
AND

SITE BOUNDARIES

K.B. Recycling, Inc.
8277 S.E. Deer Creek Lane
Milwaukie, Or 97222

NOT TO SCALE

Total Acres = 2.3
Usable Acres = 2.3



ATTACHMENT H

DEPARTMENT OF ENVIRONMENTAL QUALITY
PERMIT

NEIL GOLDSCHMIDT
GOVERNOR

Rob

RECEIVED AUG 2 4 1987

Department of Environmental Quality

811 S.W. SIXTH AVENUE, PORTLAND, OREGON 97204 PHONE: (503) 229-5696

August 21, 1987

Mr. Fred Kahut
K-B Recycling Center
P.O. Box 550
Canby, OR 97013

Re: K-B Recycling Center
Clackamas County
SW Permit No. 389

Dear Mr. Kahut:

On July 31, 1987, the Department issued Solid Waste Permit No. 389 for operation of the K-B Recycling Processing Center.

The permit was issued to defer any delay in your operation once a Metro franchise was granted. Since you are within Metro boundaries and will be receiving waste from the Metro area, you must have permission from Metro before you begin operation.

If you have questions regarding the above, please contact me at 229-6237.

Sincerely,

COPY

Robert L. Brown
Environmental Analyst
Hazardous and Solid Waste Division

RLB:f
cc: Metro

ATTACHMENT I

WASTE REDUCTION GUIDELINES

FRANCHISE APPLICANT

I hereby certify that the information contained in this application is true and correct to the best of my knowledge. I agree to notify Metro within 10 days of any change in the information submitted as a part of this application. I am enclosing the required $200.00 non-refundable franchise application fee. (Make check payable to Metro.)

Signature and title of person completing form:

SIGNATURE Fred A. Kahut TITLE President

DATE 2-19-87 PHONE 659-7004

TA/srb
7258B/322
01/17/83

ATTACHMENT I

WASTE REDUCTION PLAN
ACCEPTANCE OF SOURCE SEPARATED RECYCLABLES

Metro adopted the Waste Reduction Guidelines to insure that all regulated disposal facilities, i.e. landfills and transfer stations, provided an opportunity for recycling of source separated materials. Unlike other Metro franchised facilities, K.B. Recycling's primary purpose is recycling and waste reduction and not disposal. Currently K.B. operates a full line recycling "buy back" center, accepting cardboard, newsprint, office paper, glass and non-ferrouse metals, tin cans and aluminum cans. K.B.'s proposal will further enhance Metro's waste reduction program by removing more material from the waste stream. The following is a narrative describing the acceptance of source separated material and compliance with Metro's Waste Reduction Guidelines.

Access to the site is from Hwy 224. Upon entering the property, the customer approaches the scale house where materials are weighed. The existing area used for recycling is paved.

A sign has been erected at the corner of Deer Creek Lane and Johnson Rd. stating the Company's name and major materials accepted. Signs at the scale house indicate hours of operation, types and prices for all material recycled site rules and commodity specifications.

Current operating hours are 8:00AM to 4:30 PM Monday thru Friday and 8:00AM to 3:00 PM on Saturday. The facility is closed Sunday.

Upon entering the property, the vehicle is weighed on a 34 foot, 60,000 pound capacity scale. Depending on the type of material, the customer is then directed to the proper deposit area and informed of the rules regarding contaminants.

PROPERTY OWNER AGREEMENT

I have read Section 20(5)(a) and (b) of the Disposal Franchise Ordinance and agree to be bound by the requirements of the Section if the applicant's franchise is revoked or renewal is denied. I consent to the prospective franchisee's proposed use of the property. The nature and terms of the property interest held between myself and the prospective franchisee is (example, lease, lease option, land contract, etc.) LEASE CONTRACT

The duration of the property interest is _____

Fred A. Kahut
Signature of property owner

Date 2-19-87

Signature of property owner

Date _____

CLACKAMAS COUNTY

Department of Transportation & Development

WINSTON KURTH
EXECUTIVE DIRECTOR

RICHARD DOPP
DIRECTOR
OPERATIONS & ADMINISTRATION

TOM VANDERZANDEN
DIRECTOR
PLANNING & DEVELOPMENT

December 9, 1986

Metro
200 S.W. First
Portland, OR 97201

SUBJ: K.B. Recycling's High Grade Sorting

The new K.B. Recycling operation at 8277 S.E. Deer Creek Lane is located in an I-3 zone and is subject to the Clackamas County Zoning and Development Ordinance. The Ordinance allows the operation of a facility that would recover paper from select commercial loads of a mixed waste.

Section 603.03 of the Zoning Ordinance permits outright "primary uses, recycling collection depots and transfer stations and processing or treatment of paper, glass, metal or rags". So, the proposed use is permitted.

There are some constraints, however. The site and its building is not very large, so a tight control over the number of trucks using the site is a must. At least during the initial phase, the operation should be limited to Clackamas County haulers until the County, Metro and K.B. Recycling can see how it will work and smooth out any glitch in the system before the operation is expanded to include out of County waste.

The County is looking forward to having the facility operational to be able to begin producing high grade loads to further reduce our waste stream.

David G. Phillips

DAVID G. PHILLIPS - Administrator
Community Environment Section

/mb

RECEIVED SEP 0 9 1987

CLACKAMAS COUNTY

Department of Transportation & Development

WINSTON KURTH
EXECUTIVE DIRECTOR

RICHARD DOPP
DIRECTOR
OPERATIONS & ADMINISTRATION

TOM VANDERZANDEN
DIRECTOR
PLANNING & DEVELOPMENT

September 8, 1987

Metro
2000 S.W. First
Portland, OR 97201

Att: Steve Rapp

SUBJ: KB Recycling Franchise Application

Clackamas County when granting its approval for past collection sorting operation of K. B. Recycling expressed a desire to confine the flow to that originating in Clackamas County. The reason for this was that the County has concerns that the capacity of the building is not sufficient to have an open ended volume arriving there.

The County will withdraw that stipulation as long as a maximum volume limit is placed on the volume and the amount of that maximum should be worked out with Fred Kahut.

DAVID G. PHILLIPS - Administrator
Community Environment Section

/mb