UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	X	
	X	
HOUSTON LIGHTING & POWER COMPANY	X	Docket No. 50-466
	X	
(Allens Creek Nuclear Generating Station, Unit 1)	X	
	X	

TEX PIRG RESPONSE TO H. L&P'S FIRST SET OF INTERROGATORIES

Tex PIRG submits the following answers to the questions. These responses were prepared by John Doherty.

POOR ORIGINAL

Tex PIRG Contention 1

1. Yes. You have them.
2. n/a.
3. I do not yet know each person to be called as a witness. Efforts are now underway to locate such people. An effort will be made to have you and the NRC to pay for at least one expert for each contention to testify for Tex PIRG.
4.(a) It would be obviously superior from both an environmental and safety impact.(b)Yes.Environmental Report (ER).(c) You have it.
5.(a) I don't know. (b)Almost 11,000 acres of prime and unique farm land would be lost for no good reason. Such loss would be very significant. (c) ER and Final Supplement to Final Environmental Statement(FES Supp) and FES.
6.(a) I don't know, but the FES Supp says that it would be significant. (b)n/a (c)You have.
7.(a)Statute creating subsidence district for Houston area.(b) Many will have to in future (c)The Texas Water Plan (d)You already have it.
8. (a)The FES Supp says 1,041 acres less.(b)Over 1,000 acres of prime and unique farm land would be lost that is located near a large city that will need the land to feed several million people without wasting fuel for transportation from the California farms that are being destroyed by salt deposits.(c) FES Supp.
9. (a)Those stated in the Final ES's for S. Texas and Allens Creek. (b)Over 4 million fewer people would be within the 50 mile radius of the plant that could emit more radiation than a thousand atomic bombs and is planned to emit more radioactive materials than any other plant

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The environmental damages will have a much worse effect at the Allens Creek location because it is closer to the people that would be using the environment that was destroyed. (c)I don't know what p 81 and 82 say. (d)You have them.

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Contention 2

1.Yes. The ER, FES, and FES Supp.

2. n/a

3. I don't know who yet.

4. (a) The shore line of the original lake located north and northeast of the present lake. None of it will be available because it is without either water nor park area.(b)(i)No (ii)Yes,the fish restocked would soon die and /or be contaminated.(e) you have the ER and FES and FES Supp.

5.(a) mg/l and ppm;free available chlorine,total residual chlorine (b) As explained in FES Supp. (c) You have.

6. (a) No.(b)Because the total nutrient loading to the lake is expected to be high as is the thermal loading which will greatly increase the algae growth.(c)(i)No(ii)yes (iii)partially, because the lake is smaller and hotter.(e) You have.

7. (a)All present in the Brazos, Allens Creek, sewer discharges and nuclear plant discharges.These include mercury,cadmim, and lead as well as cobalt, copper, iorn, manganese, nickle, strontium and zinc. (b)Most fish will be unable to live in the lake even if there would not be excessive heavy metal concentrations. Those most likely to not live are the fish that feed off of the bottom of the lake where the heavy metals concentrate such as carp. (c) I know of no safe level for heavy metal concentrations in fish, just as there is no "threshold" for radiation that is safe.(d) The differences would be at least double that of the Brazos, but in addition it would be much higher because in addition the levels in the Allens Creek discharge, Wallis, Sealey, and plant discharges would be added and their concentrations are higher than that of the Brazos where sampled.(e)You have.

8.(a) It varies depending on type of fish, rate of change, and prior temperatures as well as other paramaters in the fish environment.I expect only rough fish could live anyway. Some would be killed by the thermal shock of going from cold to hot, but most would be killed during the winter (when the base load is less needed and the plant will be regularly closed for refueling) when the shock is from hot to cold. (b)Yes I disagree because each year the plant will close in the winter months, and most of the lakes fish will be near the dischage. (c)You have.

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Contention 4

1. (a) Yes. The ER, ER Supplement, and FES Supplement all support such a relocation. In fact, request 16 in the ER Supplement supports such a move.
2. N/A
3. We don't know who will be called yet.
4. There are several, but the map with request 17 in the ER Supplement is one.
5. A large amount. It would save Brazos River water, and allow a better spawning area, and a better shoreline for a public recreation area.
6. You have.

Contention 5

1. The final supplement to the final environmental statement has a brief section on page S.9-5 on combustion of refuse which shows that inadequate attention was given to this alternative source of electrical energy. While the report does cite two prototype plants that were operational at the time of the report it fails to even mention the work that was going on in Houston in 1975 to plan for a large scale refuse combustion facility under the direction of Paul Davies of the Gulf Coast Waste Disposal Authority. It is my understanding from Mr. Davies that Houston Power and Light was well aware of this proposed facility and in fact HL&P made it clear to Mr. Davies that electrical power generated from even a modest refuse combustion facility would not be allowed into the electrical system under HL&P's control. I believe as a result of this lact of cooperation at even the study phase of a refuse combustion system for the Houston area that the project that is being carried forward is much more modest than would have been the case with HL&P cooperation. (This information was obtained from a telephone conversation with Mr. Davies in the fall of 1978 with Gregory Skie.)

   The final supplement to the final environmental statement also fails to mention the project under the control of Browning Ferris Industries in Houston to develop a refuse derived fuel. The project has been active for the last several years and is in short an attempt to extract a paper rich fraction from refuse for use as a primary or supplemental boiler fuel.

   Failure to mention these local projects in particular indicates that no conscientious research was done into the possibility of generating electrical power from the combustion of municipal refuse in the Houston area. As the potential for electrical power production from refuse is large and may in fact obviate the need for the Allens Creek Nuclear facility a complete study of this alternative source of energy should be undertaken.

2. The response given above will also apply to question number two.

3. A list of person's will be supplied as soon as available. Inquiries have been made with and I expect to have confirmations shortly. I do expect Dr. Jack Matson from the Department of Environmental Engineering at the University of Houston, a representative from the National Center for Re-

source Recovery, and possibly a person who has worked in the recovery of materials and energy from solid waste for the past 10 years who now has his own company in this area. These witnesses will testify as to the feasibility and potential for materials and energy recovery from solid waste in the Houston and Harris County area.

4. The attachments showing existing plants published by the National Center for Resource Recovery list the operational plants by location, type, and owner. The one page attachment published by the Environmental Protection Agency in their Fourth Report to Congress lists the plants that were in the operational, design, and planning stage about the time, or shortly after the time, the first environmental statement on the Allen's Creek Plant was written. Many more cities and utilities were actively looking into the potential for refuse combustion by the time of the supplement to the final environmental report written in August of 1978. Europe has had a large number of successful waste heat recovery refuse incinerators in operation for many years. The best current source of information on these plants is the Handbook of Solid Waste Disposal: Materials and Energy Recovery. Van Nostrand Reinhold Environmental Engineering Series, 1975. A list by name, owner, and location of the plants in Europe is in this book. I will be happy to send a photocopy of the relevant table as soon as the book gets back into my hands.

5. This information was obtained from the enclosed handout published by the EPA in their Fourth Report to Congress: Resource Recovery and Waste Reduction 1977 page 51. A listing of the communities with facilities 1) in operation 2) under construction 3) in the advanced planning stage 4) or being studied is listed on page 47 of the EPA's Fourth Report to Congress on Resource Recovery and Waste Reduction 1977. I have included it as a three page attachment.

6. Such an estimate will be forthcoming. Such an estimate will include amortization of plant construction costs, operation of the plant, as well revenues from the sale of electricity, recovered materials, and income from the City of Houston for disposal of the cities solid waste.

7. The following is a more accurate assessment of the potential for electrical power production from refuse in the Houston area.

6,000 tons/day x 80% of the refuse is combustible = 4,800 tons/day
4,800 tons/day x 2,000 lb./ton x 10,000 BTU/lb of pretreated refuse = 9.6×10^{10} BTU/day

9.6×10^{10} BTU/day x 40% heat to electrical conversion efficiency = 3.84×10^{10} BTU/day
3.84×10^{10} BTU/day x 0.293 watt-hours/BTU x 1 day/24 hours = 469 Mega Watts

The earlier estimate was based on the thermal energy of a smaller amount of refuse. Although this amount of electrical energy falls short of the peak power estimate of the Allen's Creek plant, I believe it is important to remember that a refuse combustion plant will have far less down time than a nuclear plant. On an annual basis the total electrical power output of these two facilities would then be brought much closer to one another. More details on power production will be provided later.

Contention 5 (continued)

8. This statement means that in an area that produces 6,000 tons of refuse per day, it is reasonable to assume that half of this amount could be diverted from land fills to a waste processing facility for materials and energy recovery.

9. Several sources list the heat content of mixed solid waste (5,000 BTU/lb.), separated solid waste (10,000 BTU/lb.) and coal (11,000- 14,000 BTU/lb.). The best of these sources is, the Handbook of Solid Waste Disposal: Materials and Energy Recovery. Van Nostrand Reinhold Environmental Engineering Series, 1975. Another is, Energy Conservation Through Improved Solid Waste Management by Robert Lowe, EPA 1974.

   The two landfills in Houston accept approximately 6,000 tons of refuse according to Browning Ferris Industries (the operators of the landfills). A published source for this figure will be provided as soon as possible.

Contention 6

1. Yes. ER.
2. n/a
3. We don't have one yet.

3/23/79 p.17 CHRONICLE

4.(a) FAA (b) 30%/3 yr X 40/3 equals 400% in 40 years.(c) Houston (d) Everyone in Houston knows it.(e) NRC staff and book in U. of Houston.
5. None of this is known for sure yet, BY ANYONE.

Contention 7

1. Yes, ER and FES, ~~Long Island Lighting~~ (Shoreham) ALAB-156, 10/26/73 RAI 73-0, 831-57.
2. n/a
3. ~~Andrew~~ Sansome, Texas Energy Extension Service, Univ. of Houston, Houston 77004, 749-1756
4.(a)Their management could autherize it, and the company could charge for their services and expenses. (b) All people in the service area would be allowed the services.(c)I don't understand the question because it is so vague.(d) Only cost-benefit should be considered so long as all costs and benefits are used and properly measured. (e)First come first served.(f)It was not claimed in the contention that the retrofits would replace all the need for power, since the use of solid waste would help also.
5. If half of the cost of ACNGS were spent on conservation then the use of solid waste would eliminate the need for any nuclear plant.
6. The question does not make any sense since 4(e) has no dates .
7. There are many companies and each are owned by thousands of stockholders so it is too much of a burden to answer fully , but Dow Chemical is one of them, and Amaco is another.
8. I think that Shell, Exxon, Browning-Ferris, and Monsanto are building or planning to build their own energy sources such as oil or coal fired plants.
9.The users wish a cheaper,more reliable source of power.
10. It is likely to be enough such that with the other reductions in energy use and alternative sources of energy that there will be no need for a nuclear plant in the Houston area.
11. The rate must go up with increased usage, and the rate should

be higher for peak us*age times so that there will be less need for peak units.

12. It is not certain that Dr. Wells will testify, and he has not prepared his statement so far as I know.

13. I don't know for certain.

14.aBuilding and landscape design. (b) I don't know exactly.
(c) I don't know. (d)The cost varies with the system and the size of home.(e) I dont know yet. (f)No.

15. The applicant, Houston L&P,admitted that their projections of demand had decreased by 22 %.

16. ER Supp, Table S1.1-2(modified), and table S.8.6 on page S.8-6 of FLS Supp. You have both.

G. Other

1. Acting Research Director -- John Doherty; 4438 1/2 Leeland , Houston, Texas 77023

Richard Bost, TEXPIRG, Rice Memorial Building, Rice Univ. Houston 77005
Elizabeth Heitman, " " "

Service to all parties via U. S. Postal Service, this 27 th of March, 1979.

R. Gordon Gooch (App.)
J. Gregory Copeland (App.)

Sheldon J. Wolfe (NRC)
Dr. E. Leonard Cheatum (NRC)
Gustave A. Linenberger (NRC)
Steve Sohinki (NRC)
Docketing & Service Sec. (NRC)

Carro Hinderstein
Brenda McCorkle

Respectfully submitted,

John Doherty

John Doherty
Executive Director of Tex PIRG
U. Of Houston
Houston, Texas
749-3130

TABLE 18

SUMMARY OF RESOURCE RECOVERY MIXED-WASTE FACILITIES IMPLEMENTATION, SUMMER 1976*

Location†	Type‡	Capacity (tons per day)	Products/markets	Startup date
Operational facilities (21):				
Altoona, Pa.	Compost	200	Humus	1963
Ames, Iowa	RDF	400	RDF, Fe, Al	9/75
Blytheville, Ark.	MCU	50	Steam/process	11/75
Braintree, Mass.	WWC	240	Steam/process	1971
Chicago, Ill. (Southwest)	RWI	1,200	Steam	1963
Chicago, Ill. (Northwest)	WWC	1,600	Steam (no market)	1970
N-E. Bridgewater, Mass.	RDF	160	RDF/utility	1974
D-Franklin, Ohio	Materials recovery	150	Fiber, Fe, glass, Al	1971
Groveton, N. H.	MCU	30	Steam/process	1975
Harrisburg, Pa.	WWC	720	Steam (no market)	1972
Merrick, N. Y.	RWI	600	Electricity	1952
Miami, Fl.	RWI	900	Steam	1956
Nashville, Tenn.	WWC	720	Steam/heating & cooling	7/74
Norfolk, Va.	WWC	360	Steam/Navy base	1967
Oceanside, N. Y.	RWI/WWC	750	Steam	1965/74
Palos Verdes, Calif.	Methane recovery		Gas/utility & Fe	6/75
D-St. Louis, Mo.§	RDF	300	RDF/coal-fired utility	1972
Saugus, Mass.	WWC	1,200	Steam/process	4/76
Siloam Springs, Ark.	MCU	20	Steam	9/75
N-South Charleston, W. Va.	Pyrolysis	200	Gas, Fe	1974
N-Washington, D.C.	RDF	80	RDF, Fe, Al, glass	1974
Facilities under construction (10):				
D-Baltimore, Md.	Pyrolysis	1,000	Steam/heating & cooling Fe, glass	6/75
G-Baltimore County, Md.	RDF	550	RDF, Fe, Al, glass	4/76
Chicago, Ill. (Crawford)	RDF	1,000	RDF/utility	3/77
Hempstead, N. Y.	WRDF/WWC	2,000	Electricity, Fe, Al, glass	NA
Milwaukee, Wis.	RDF	1,000	RDF, corrugated, Fe	1977
D-Mountain View, Calif.	Methane recovery		Gas/utility	6/77
N-New Orleans, La.	RDF¶	650	Nonferrous, Fe, glass, paper	11/76
Portsmouth, Va. (Shipyard)	WWC	160	Steam loop	12/76
D-San Diego County, Calif.	Pyrolysis	200	Liquid fuel/utility	4/77
St. Louis, Mo.	RDF	6,000	RDF/utility, Fe, glass, Al	NA
Communities in advanced planning (33): (RFP issued, design study underway, or construction funding made available)				
Akron, Ohio	WWC	1,000	Steam/heat, cool process	7/78
Albany, N. Y.	RDF	1,200	RDF, Fe	NA
Bridgeport, Conn.	RDF	1,800	RDF, Fe, Al, glass	NA
Central Contra Costa County Sanitation District, Calif.	RDF	1,000	RDF/sludge incinerators	1979
Chemung County, N. Y.	RDF	300	RDF, Fe	NA
Dade County, Fla.	WWC/wet-pulp	3,000	Electricity/utility, Fe	NA
G-Detroit, Mich.	RDF/WWC	3,000	RDF/steam	NA
Hackensack, N. J.	RDF	2,500	Steam/utility	NA
Haverhill, Mass.	WWC	3,000	RDF/utility, Fe	NA

(Continued)

A Nationwide Survey of Resource Recovery Facilities (ref. 6), updated.

†D = EPA demonstration grant; G = EPA implementation grant; N = non-EPA pilot or demonstration facility; E = ERDA grant.

‡RDF = refuse-derived fuel; WRDF = wet-pulped refuse-derived fuel; WWC = waterwall combustion; RWI = refractory wall incinerator with waste-heat boiler; MCU = modular combustion unit.

§Plant closed down in 1976.

¶Uses RDF technology, but current plan is to landfill the light fraction because of lack of market.

TABLE 18

SUMMARY OF RESOURCE RECOVERY MIXED-WASTE FACILITIES IMPLEMENTATION, SUMMER 1976 (continued)

Location†	Type‡	Capacity (tons per day)	Products/markets	Startup date
Communities in advanced planning (33): (continued)				
Honolulu, Hawaii	NA	2,000	Utility	NA
Jacksonville, Fla. (Navy base)	MCU	50	Steam, Fe	NA
Key West, Fla. (Navy base)	Compost	50	Humus, Fe	NA
G-Lane County, Oreg.	RDF	750	RDF	NA
G-Lexington-Fayette Urban Cty. Gov't., Ky.	WWC	1,050	Steam, Fe	NA
Mayport, Fla. (Navy base)	RWI	40	Steam	NA
Memphis, Tenn.	WWC/RDF	2,000	NA	NA
Minneapolis-St. Paul, Minn.	WWC	1,200	Steam/papermill	1980
Monroe County, N. Y.	RDF	2,000	RDF, Fe, Al, glass	NA
G-Montgomery County, Ohio	RDF	1,600	RDF	NA
New Haven, Conn.	WWC	1,800	Steam, Fe	NA
North Little Rock, Ark.	MCU	100	Steam	1977
Onondaga County, N. Y.	WWC	1,000	Steam/heat & cool, Fe	NA
Palmer Township, Penn.	RDF	150	Fuel/cement kiln, Fe	NA
E-Pompano Beach, Fla.	Methane recovery	50	Methane	NA
Portland, Oreg.	RDF	200	RDF, Fe	NA
Riverside, Calif.	Pyrolysis	50	Electricity	NA
Salem, Lynn & Beverly, Mass.	NA	750	NA	NA
Seattle, Wash.	Pyrolysis	1,500	Ammonia	NA
Smithtown, N. Y.	Hand sort	1,000	Newspaper, corrugated, Fe	11/77
Sun Valley, Calif.	Methane recovery		Gas/utility	1978
Takoma, Wash.	RDF	NA	Steam	NA
Westchester County, N. Y.	NA	1,300	NA	NA
D-Wilmington, Del.	RDF/sludge	300	RDF, Fe, Al, glass, humus	NA
Communities which have commissioned feasibility studies (54):				
Anchorage, Alaska		500		
Auburn, Maine		200		
Allegheny County, Pa.		2,000		
Babylon, Huntington & Islip, N. Y.		3,000		
Brevard County, Fla.		200		
G-Charlottesville, Va.		NA		
Cowlitz County, Wash.		100		
Columbus, Ohio		NA		
Cuyahoga County, Ohio		1,200		
DeKalb County, Ga.		1,000		
Dubuque, Iowa		500		
District of Columbia (Metro Area COG)		750		
G-Denver, Colo.		1,200		
Dutchess County, N. Y.		700		
Erie County, N. Y.		2,000		
Fairmont, Minn.		150		
Hamilton County, Ohio		1,500		
Lawrence, N. Y.		500		
Lincoln, Neb.		NA		
Lincoln County, Oreg.		NA		
Madison, Wisc.		200		
Marquette, Mich.		NA		
Miami County, Ohio		NA		
G-Middlesex County, N. J.		NA		
Minneapolis (Twin Resco)		NA		
Montgomery County, Md.		1,200		
Morristown, N. J.		NA		
Mt. Vernon, N. Y.		400		

(Continued)

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See previous page for footnotes.

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TABLE 18

SUMMARY OF RESOURCE RECOVERY MIXED-WASTE FACILITIES IMPLEMENTATION, SUMMER 1976 (concluded)

Location	Capacity (tons per day)
Communities which have commissioned feasibility studies (54): (continued)	
Niagara County, N. Y.	760
G-New York, N. Y. (Arthur Kill)	1,500
Oakland County, Mich.	NA
Orange County, Calif.	1,000
Phoenix, Ariz.	NA
Pasadena, Calif.	200
Peninsula Planning District, Va.	NA
Philadelphia, Pa.	1,600
G-Richmond, Va.	NA
Riverview, Mich.	NA
Rochester, Minn.	NA
St. Cloud, Minn.	NA
Salt Lake County, Utah	750
Scranton, Pa.	NA
S. E. Virginia Planning District	1,500
G-Springfield, Ill.	NA
Springfield, Mo.	1,000
Tallahassee, Fla.	NA
Tampa/St. Petersburg, Fla.	NA
Toledo, Ohio	1,200
Tulsa, Okla.	NA
Tennessee Valley Authority	2,000
Western Berks County, Pa.	250
Western Lake Superior Sanitary District	400
Winnebago County, Ill.	NA
Wyandotte, Mich.	1,000

G = aided by EPA implementation grant.

TREND IN MIXED-WASTE RESOURCE RECOVERY FACILITY IMPLEMENTATIONS*

Facility Status	July 1974	January 1975	July 1975	January 1976	July 1976
Operational	15	15	19	19	21
Under construction	7	8	8	10	10
Advanced planning	23	30	30	29	44
Feasibility studies‡	25	32	37	52	65
Total	70	85	94	110	118

*EPA interview and file data.

‡Prior to 1976, this category included all communities known to EPA which had "expressed interest" whether or not resources had been committed for feasibility studies.

Source: Fourth Report to Congress: Resource Recovery and Waste Reduction. U.S. Environmental Protection Agency SW-600, 1977, p. 51.

IATIONAL CENTER FOR RESOURCE RECOVERY, INC.
1211 CONNECTICUT AVE., N.W., WASHINGTON, D.C. 20036 (202/223-6154)

RESOURCE Briefs RECOVERY

RESOURCE RECOVERY ACTIVITIES . . . A STATUS REPORT

—September 1978—

Periodically, Resource Recovery Briefs summarizes the status of some of the resource recovery activities in the United States. In addition to the systems listed here, a number of communities are magnetically separating ferrous metals, conducting source separation programs for old newspapers, etc. While this report cannot be considered complete, future issues will present other systems as they are reported.

Location	Key Participants	Process	Output	Reported Capacity	Reported Capital Costs (millions of $)	Status
Akron, Ohio	City of Akron; Glaus, Pyle, Schomer, Burns & De Haven; Ruhlin Construction Co.; Babcock & Wilcox Co. (boiler supplier); Teledyne National (operator)	Shredding; air classification; magnetic separation; burning of refuse-derived fuel (RDF) product in semi-suspension stoker grate boiler	Steam for urban heating and cooling and industrial use; magnetic metals	1000 tons per day (TPD)	46[a]	Under construction; one-half complete; in shakedown by July 1979; fully operational by Jan. 1980
Albany, N.Y.	City of Albany and 10 surrounding communities; Smith and Mahoney (designers and project managers)	Shredding; magnetic separation; combustion in semi-suspension stoker grate boiler; recovery of nonferrous from boiler ash	RDF; magnetic metals; steam for urban heating and cooling; nonferrous metals	750 TPD	22	Groundbreaking held in Oct. 1977; construction 20% complete; in operation by Spring 1980
Ames, Iowa	City of Ames; Gibbs, Hill, Durham & Richardson, Inc. (designer)	Baling (waste paper); shredding; magnetic separation; air classification; screening; other mechanical separation	Refuse-derived fuel for use by utility; baled paper; magnetic metals; aluminum, other non-magnetic metals	200 TPD (50 tons per hour [TPH])	6.19[b]	Operational since 1975
Baltimore, Md.*	City of Baltimore; EPA	Landgard® process: shredding, pyrolysis, water quenching, magnetic separation	Steam; magnetic metals; glassy aggregate	1000 TPD	EPA-7 State of Maryland - 4 City of Baltimore - 11 Monsanto - 4 Additional funds: Dept. of Commerce, F.E.D.A. - 3.1 City of Baltimore - 1	Monsanto Enviro-Chem Systems, Inc., has withdrawn from the project; plant temporarily closed for installation of air pollution control equipment and other modifications; startup scheduled by Winter 1978
Baltimore County, Md.	Maryland Environmental Service; Baltimore County; Teledyne National (designer and operator)	Shredding; air classification; magnetic separation	RDF; magnetic metals; glass for secondary products; aluminum	600-1500 TPD	8.4	Shredding, air classification, magnetic separation and landfilling operational for testing; first transfer station operating
Bridgeport, Conn.	Connecticut Resources Recovery Authority; Occidental Petroleum Corp. and Combustion Equipment Assoc. (designers and operators)	Shredding; magnetic separation; air classification; froth flotation	Eco-Fuel II® (powdered fuel) for use in utility boiler; magnetic metals; non-magnetic metals; glass	1800 TPD	53[c]	Under construction; to be operational by early 1979
Chicago, Ill. (Southwest Supplementary Fuel Processing	City of Chicago; Ralph M. Parsons Co. (designer); Consoer, Townsend & Assoc.	Shredding; air classification; magnetic separation	RDF for use by utility; magnetic metals	1000 TPD	19[d]	In shakedown; began test-firing RDF; gradual production to reach full capacity by Fall 1978

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Location	Key Participants	Process	Output	Reported Capacity	Reported Capital Costs (millions of $)	Status
icago, Ill. orthwest inerator)	City of Chicago; Metcalf & Eddy, Inc. (designer)	Waterwall combustion	Steam for Brach Candy Co.; post-incineration metals recovery	1600 TPD	23	Operational since 1971; steam delivery line under construction and expected to be on line in 1979
de unty, ι.	Dade County; Black Clawson/Parsons & Whittemore, Inc. (designers)	Hydrasposal™ (wet pulping); magnetic and other mechanical separation	Steam for utility to produce electricity; glass; aluminum; magnetic metals	3000 TPD	82	Contracts signed between County and P&W and Florida Power & Light; all state permits approved; state has issued and sold pollution control bonds; construction (site preparation) has begun; shakedown expected in 1980
troit, ch.	City of Detroit	Shredding; air classification; magnetic separation	Steam and/or electricity for use by utility; magnetic metals	3000 TPD	100	Preliminary negotiations underway with joint venture, Combustion Engineering, Inc./Waste Resources Corp., prior to contract signing; agreement for steam purchase by Detroit Edison has been finalized; preparation of environmental impact statement initiated
luth, nn.	Western Lake Superior Sanitary District (operators); Consoer, Townsend & Assoc. (engineers)	Shredding; magnetic separation; air classification; secondary shredding; fluidized bed incineration of RDF and sludge	RDF; ferrous metals; steam for heating and cooling of plant and to run process equipment	400 TPD municipal solid waste; 340 TPD of 30% solids sewage sludge	19[e]	Under construction; projected startup by Apr. 1979
st idgewater, ass.	City of Brockton and nearby towns; Combustion Equipment Assoc.; East Bridgewater Assoc.	Shredding; air classification; magnetic separation; other mechanical separation	Eco-Fuel II® for industrial boiler; magnetic metals	1200 TPD	10-12	Fuel is being made and delivered to user; presently testing
anklin, hio	City of Franklin; Black Clawson Co.	Hydrasposal™/Fibreclaim™ proprietary processes using wet pulping and magnetic separation; heavy media; jigging; electrostatic precipitation; optical sorting	Paper fibers; magnetic metals; aluminum; color-sorted glass	150 TPD (50 TPD being processed)	3.2	Production plant operating since 1971
ampton, a.	City of Hampton, NASA Langley Research Center, U.S. Air Force at Langley Field	Mass burning	Steam for use by NASA Langley Research Center	200 TPD	9.4	Design and construction contract awarded to J.M. Kenith Co., Jan. 1978; Proceeding with plans and procurement of equipment
rrisburg, .	City of Harrisburg; Gannett, Fleming, Corddry and Carpenter, Inc. (designers)	Waterwall combustion; bulky waste shredding (steam driven); magnetic separation; sewage sludge burning	Steam for utility-owned district heating system and for city-owned sludge drying system; magnetic metals	720 TPD	8.3	Operational since Oct. 1972; steam main completion by Oct. 1978; sludge drying facilities completion by mid-1979
mpstead, Y.	Town of Hempstead; Hempstead Resource Recovery Corp. (Div. of Black Clawson/Parsons & Whittemore, Inc.) (owner/operator)	Hydrasposal™ (wet pulping); magnetic and mechanical separation; burning of RDF product in air-swept spout spreader stoker boilers	Electricity from utility-owned turbine generators; color-sorted glass; aluminum; magnetic metals	2000 TPD (150 TPH)	73	Under construction; startup and testing in Aug. 1978
ne unty, e.	Lane County; Allis-Chalmers Corp.; Western Waste Corp.	Shredding; air classification; magnetic separation	RDF; magnetic metals	500 TPD	2.1[f]	In shakedown; to be fully operational by Nov. 1978

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Location	Key Participants	Process	Output	Reported Capacity	Capital Costs (millions of $)	Status
Madison, Wis.	City of Madison and M.L. Smith Environmental (designers); Madison Gas & Electric Co.	Shredding; magnetic separation; separation of combustibles and non-combustibles; secondary shredding air swept	RDF for use by utility; magnetic metals	400 TPD (max.) (200 TPD being processed)	2.59	Under construction; startup scheduled for Jan. 1979
Milwaukee, Wis.	City of Milwaukee; to expand to surrounding Milwaukee County areas; Americology Div. of American Can Co. (owner/operator); Bechtel, Inc. (designer)	Shredding; air classification; magnetic and other mechanical separation	RDF for use by utility; bundled paper and corrugated; magnetic metals; aluminum; glass concentrate	1600 TPD	18	In shakedown, partially operational; test-firing RDF
Monroe County, N.Y.	Monroe County (owner); Raytheon Service Co. (designer)	Shredding; air classification; magnetic and other mechanical separation; froth flotation	RDF for use by utility; magnetic metals; non-magnetic metals; mixed glass	2000 TPD	50.4[h]	Under construction; 80% complete; startup scheduled for early 1979
Nashville, Tenn.	Nashville Thermal Transfer Corp.; I.C. Thomasson & Assoc., Inc. (designer)	Thermal combustion	Steam for urban heating and cooling	400 TPD	24.5	Operational since 1974
Newark, N.J.	City of Newark; Combustion Equipment Associates and Occidental Petroleum Corp. (designers and operators)	Shredding; air classification; magnetic separation	Eco-Fuel II® for use by utility; magnetic metals	3000 TPD (in 1000 TPD modules; to serve Newark's 700 TPD and surrounding community)	70 (for 3000 TPD) (initially 1000 TPD with a cost of $25 million including fuel user conversion)	Final contract signed in 1977; groundbreaking expected by mid-Fall 1978, to be operational by early 1980
New Orleans, La.	City of New Orleans; Waste Management, Inc. (owner/operator); National Center for Resource Recovery, Inc. (designer/implementer)	Shredding; air classification; magnetic and other mechanical separation	Magnetic metals; aluminum and other non-magnetic metals; glass	700 TPD	7.75[i]	Shredding/landfilling operational; recovering ferrous; aluminum, other nonferrous metals and glass in shakedown
Niagara Falls, N.Y.	Hooker Energy Corp. (Hooker Chemicals and Plastics Corp.) (owner/operator)	Shredding; magnetic separation; burning of shredded refuse	Electricity for use by company complex; magnetic metals	2200 TPD	Approximately 65	Under construction; to be operational by early 198[illegible]; $12 million worth of equipment on order
Pinellas County, Fla.	Pinellas County; Florida Power Corp.	Mass burning	Electricity; secondary materials recovered after burning include ferrous metals, aluminum and other non-magnetic metals	2000 TPD	70	Negotiations are underw[illegible] for a full-service contra[illegible] with UOP, Inc.; projecte[illegible] to begin operation by 1[illegible]
Pompano Beach, Fla.	Waste Management, Inc.; Energy Research & Development Administration; Jacobs Engineering Co. (designer)	Shredding; air classification; magnetic and other mechanical separation; anaerobic digestion of air classified light fraction with sewage sludge	Methane	50-100 TPD	3.1	Dedicated May 2, 1978 in shakedown
San Diego County, Calif.*	San Diego County; Occidental Petroleum Corp. (designer/operator)	Shredding; air classification; magnetic and other mechanical separation; froth flotation; pyrolysis	Pyrolytic oil; magnetic and non-magnetic metals; glass	200 TPD	EPA - 4.8 San Diego County - 2 Occidental Petroleum - 8.7	Demonstration plant; sh[illegible] down pending resolutio[illegible] for funding of modifications
Saugus, Mass.	Ten communities including Saugus and part of northern Boston; RESCO (joint venture of De Matteo Construction Co. and Wheelabrator-Frye, Inc.)	Water-wall combustion; magnetic separation	Steam for electrical generation and industrial use; magnetic metals	1200 TPD (two boilers with 600-TPD capacity each)	50	Operational since 1975
South Charleston, W. Va.	Linde Div., Union Carbide Corp.	Purox™ oxygen converter (pyrolysis); shredding	Fuel gas	200 TPD	Unknown	Operational demonstration plant since 1974

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Location	Key Participants	Process	Output	Reported Capacity	Reported Capital Costs (millions of $)	Status
Tacoma, Wash.	City of Tacoma (owner/operator); Boeing Engineering (designer)	Shredding; air classification; magnetic separation	RDF; magnetic metals; steam	500 TPD	2.5[j]	In shakedown; full operation by late Fall 1978
Wilmington, Del.*	Delaware Solid Waste Authority; EPA; Raytheon Service Co.	Shredding; air classification; magnetic and other mechanical separation; froth flotation; aerobic digestion	Ferrous metals; nonferrous metals; glass; RDF; humus	1000 TPD municipal solid waste coprocessed with 350 TPD of 20% solids digested sewage sludge	51[k] 9 from EPA, OSW; 16 from EPA, Water Prog.; 6 from State matching grants; remainder from the Authority through sale of revenue bonds	Contract signed August 10, 1978 with Raytheon Service Co.; groundbreaking expected by Sept. 1979

The following localities are either operating or constructing small modular combustion units to produce steam from mass combustion of municipal solid waste:

Operating:
- Blytheville, Ark. (50 TPD)
- Groveton, N.H. (30 TPD)
- Siloam Springs, Ark. (19 TPD)
- North Little Rock, Ark. (100 TPD)

In shakedown:
- Crossville, Tenn. (60 TPD)
- Salem, Va. (100 TPD)

Under construction:
- Lewisburg, Tenn. (50 TPD)

In addition to the systems listed above, projects are underway to recover methane-containing gas mixtures from sanitary landfills which can be purified to pipe line quality. They are:

POOR ORIGINAL

Azusa, Calif. – Azusa Land Reclamation Co., a wholly-owned subsidiary of the Southwestern Portland Cement Co. – Began operations in April 1978

Mountain View, Calif.* – City of Mountain View; EPA; Pacific Gas & Electric Co. – In shakedown

Palos Verdes, Calif. – Los Angeles County Sanitation District; Reserve Fuels, Inc. (joint venture of Reserve Oil & Gas Co. and NRG, Inc.) – Operational

Staten Island, N.Y. – (Fresh Kills Landfill) – New York City Resource Recovery Task Force; Brooklyn Union Gas Co., Inc.; Leonard S. Wegman, Inc.; New York State Energy Research and Development Authority – Plan to enter demonstration phase of project; preliminary testing of gas has been completed

The following state and local governments are in the "Request for Proposal" (RFP) stage, *i.e.*, RFP's have been issued – or are reportedly imminent – but contracts have not been signed:

- Auburn, Maine
- Central South Central Conn.
- Jefferson County, Ky.
- Knoxville, Tenn.
- Montgomery County, Ohio
- St. Paul, Minn.
- Seattle, Wash.
- Tulsa, Okla.

Cost information as reported:

[a]Construction (including $5 million for extensions to existing steam distribution system) $31 million; engineering and construction supervision $1.5 million; interest during construction $5.5 million; contingency, start-up and land costs $1.5 million; fees, underwriting and issuance costs $2.0 million; debt service reserve fund requirement $4.5 million.

[b]Construction and engineering $5.6 million; land $98,000; miscellaneous equipment $165,000; plant start-up in Fall 1975 $322,000.

[c]Total revenues (including bond, proceeds and investment income) $54,386,040. Total expenditures: $53,386,040, consisting of the following: project development $3,026,458; bond issue expenses $1,391,413; construction $39,549,771; special capital reserve $5,022,588; debt service $5,395,810 (including main facility and six transfer stations).

[d]Includes design and construction. Funding through G.O. bonds.

[e]Including incineration.

[f]Cost of Phase II of the project including construction of the resource recovery facility alone and in-plant equipment. Built in conjunction with Phase I which includes central receiving, transfer station and transfer equipment which cost approximately $2.2 million.

[g]For the processing plant

[h]Total funding authorized by county legislature: $50.4 million, including an $18.5 million grant-in-aid from New York State, D.E.C. funding under the Environmental Quality Bond Act. Includes $28.4 million for construction of the resource recovery facility. Construction of Russell Station RDF handling facility is estimated at $8 million. Balance of funds will be spent for engineering, startup, mobile equipment, etc.

[i]Includes Reduction Module (including landfill) $4,908,000 and Recovery Module $2,848,300.

[j]Not including shredder which was already on-site.

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[k]Total project costs – $51 million, including $20 million for sludge module.

*Partially funded by the U.S. Environmental Protection Agency (EPA)